

RESOLUTION OF THE  
RESOURCES AND DEVELOPMENT COMMITTEE  
Of the 23rd Navajo Nation Council---Second Year 2016

AN ACTION

RELATING TO RESOURCES AND DEVELOPMENT; APPROVING THE ISSUANCE OF A SAND AND GRAVEL LEASE TO BLUE GAP SAND AND GRAVEL FOR 20.24 ACRES, MORE OR LESS, AND AN ACCESS ROAD OF 2 ACRES, MORE OR LESS, TO EXTRACT, OPERATE AND MAINTAIN THE BLUE GAP GRAVEL QUARRY PIT IN THE TACHEE CHAPTER VICINITY FOR ROAD IMPROVEMENT PROJECTS, TACHEE CHAPTER VICINITY, NAVAJO NATION (APACHE COUNTY, ARIZONA)

**Section One. Findings**

A. Pursuant to 2 N.N.C. §501(b)(2), the Resources and Development Committee of the Navajo Nation Council has authority to give final approval of non-mineral leases and surface easements on Navajo Nation land and unrestricted (fee land).

B. The Blue Gap Sand and Gravel, Inc., P.O. Box 1678, Window Rock, Arizona 86515, has requested a sand and gravel lease to use 20.24 acres, more or less, of Navajo Nation Trust Lands for sand and gravel lease area and 2 acres, more or less, for access road for road improvements;

C. The proposed gravel lease site and the access road are within Sections 1, 11, 12, 14 and 15, Township 33 North, Range 22 East, G&SM, Apache County, Arizona. The location of the site is more particularly described on the map marked Exhibit "B."

D. The Project Review Section with the Navajo Land Department has obtained the consent from the affected land users (i.e., grazing permittees). The consent document is attached hereto as Exhibit "C."

E. The environmental and archeological studies have been completed and are attached hereto and incorporated herein by this reference. The biological Resources Compliance Form Exhibit "D," a memorandum from the Navajo Nation Environmental Protection Agency, Office of Environmental Review Exhibit "E," the Cultural Resources Compliance Form, Exhibit "F," and the Environmental Assessment Exhibit "G" are attached.

F. The Plan Survey Report for Tachee Enterprises, Inc., Proposed Blue Gap Gravel Quarry and Access Road is attached as Exhibit "H."

G. The Revegetation Plan for the Blue Gap Gravel Quarry is attached as Exhibit "I."

H. The Tachee Enterprises, Inc., Blue Gap Gravel Quarry Mining, Production, and Reclamation Plan is attached as Exhibit "J."

## **Section Two. Approval**

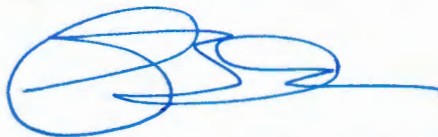
A. Resources and Development Committee of the Navajo Nation Council hereby approves a Sand and Gravel Lease for Blue Gap Sand and Gravel, Inc., for 20.24 acres, more or less, and 2 acres, more or less, for access road of Navajo Nation Trust Lands in the Tachee Chapter vicinity, Navajo Nation (Apache County, Arizona). The location is more particularly described on the survey map attached hereto as Exhibit "B".

B. The Resources and Development Committee of the Navajo Nation Council hereby approves the Blue Gap Sand and Gravel subject to, but not limited to the terms and conditions in the Lease attached hereto as Exhibit "A" and made a part hereof.

C. The Resources and Development Committee of the Navajo Nation Council hereby authorizes the President of the Navajo Nation to execute any and all documents necessary to affect the intent and purpose of this resolution.

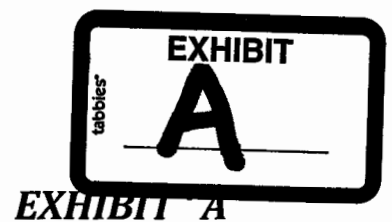
### **CERTIFICATION**

I, hereby, certify that the foregoing resolution was duly considered by the Resources and Development Committee of the 23<sup>rd</sup> Navajo Nation Council at a duly called meeting at Leupp Chapter, Leupp, (Navajo Nation) Arizona, at which quorum was present and that same was passed by a vote of 4 in favor, 0 opposed, 1 abstained this 5th day of January, 2016.



**Alton Joe Shepherd, Chairperson  
Resources and Development Committee  
Of the 23<sup>rd</sup> Navajo Nation Council**

**Motion: Honorable Leonard Pete  
Second: Honorable Benjamin Bennett**



**NAVAJO NATION SAND AND GRAVEL LEASE/PERMIT**

**THIS AGREEMENT** for a Sand and Gravel Lease (Lease) is made and entered by and between the Navajo Nation and whose address is at P.O. Box 7440 Window Rock Arizona 86515, and Blue Gap Sand and Gravel herein called the Lessee and whose address is at P.O. Box 1678, Window Rock Arizona 86515.

*Definitions:*

*Sand & Gravel means: Borrow (Earth,) Sand and Natural or Processed Gravel*

*Department means the Navajo Nation Minerals Department.*

*Navajo Nation (Navajo Nation) means the Navajo Tribe of Indians.*

*Secretary means the Secretary of the U.S. Department of Interior or his/her designated representative.*

*Performance bond means a surety bond, collateral bond or self-bond or a combination Navajo Nation thereof, by which a lessee assures faithful performance of all the requirements this lease and mining and reclamation plan.*

*Reclamation means those actions taken to restore mined land as required to a post-mining land use approved by the Department.*

*Resources and Development Committee means the Resources and Development Committee of the Navajo Nation Council.*

*Slope means average inclination of a surface, measured from the horizontal, normally expressed as a unit of horizontal distance to vertical distance.*

*Stabilize means to control movement of soil, or areas of disturbed earth by modifying the geometry of the mass, or by otherwise modifying physical or chemical properties, such as by providing a protective surface coating.*

*Ton means 2,000 pounds.*

*Water table means the upper surface of a zone of saturation.*

*Lessee, Permittee & Operator means the lessee of the Sand and gravel lease/permit.*

The Navajo Nation hereby grants Lessee a Lease right to extract sand and gravel from Sections 14 and 15 , Township 33N, Range 22E , Apache County, State of AZ. The

Lease occupy an area of 20.24 acres, more or less. The access road right-of-way consist of 6.13 acres, more or less in Sections 1, 11 , 12 ,14 and 15, T33N, R22E, Gila and Salt River Meridian, Apache County, Arizona. The location and legal description are shown in Exhibits B. The Lessee shall use existing public road to access the lease area.

1. The Lease shall be valid for a period of Five (5) years effective the date it is approved by the Secretary. This date shall be known as the Effective Date of the Lease.

2. Payments to the Navajo Nation by the Lessee:

(i) The Lessee shall pay an annual advance royalty for each lease year. The first payment in the amount of Four Thousand Two Hundred and Sixty Dollars (\$4,260.00) is due within ten (10) days of the Effective Date. Subsequent annual advance royalty payments are due on or before each anniversary of the Effective Date. The annual advance royalty payment shall be credited against production royalties only during the year for which the advance royalty has been paid.

(ii) A royalty at the rate of \$1.42 per ton for each ton of sand and gravel material removed and sold from the Lease premises. The royalty payment shall be made on a monthly basis within fifteen (15) days following the month for which the royalty is due.

(iii) Annual consideration of \$4,444.25 for the access road right-of-way. The first payment is due (unless it is paid in lump sum for the entire term of the lease) within ten (10) days of the Effective Date and all subsequent payments shall be made on or before each anniversary of the Effective Date.

(iv) The subsequent annual advance payments and the royalty rate shall be subject to annual adjustments on each anniversary of the Effective Date. The adjustments shall be based upon the increase in the Consumer Price Index (CPI), U.S. City Average for All Urban Consumers. The CPI for September 2015 shall be used as the base for all adjustments.

3. Mining and Reclamation Plan: The Lessee abide by the Mining and Reclamation plan attached in Exhibit "B-1". The trial & reclaimed slope grade shall exceed 1 (vertical) : 3(horizontal) .

4. Bond: The Lessee shall furnish a performance and reclamation bond for One Hundred and Fifty Thousand (\$150,000.00). The Lessee shall maintain this bond at all times even if the Lease has expired or is terminated. The bond shall only be released with the written consent of the Navajo Nation. The bond may also be increased by the Navajo Nation and/or the DOI. The Lessee shall request a bond release to DOI only after the expiration or termination of the Lease and Lessee has fulfilled all its obligations, including payments to the Navajo Nation and reclamation of site includes access road, under the terms and conditions of this Lease. No operation shall start unless the bond has been submitted to the DOI and a copy provided to the Navajo Nation Minerals Department.

5. Records and Reports: The Lessee shall maintain accurate records of all sand and gravel material extracted, stockpiled, sold and removed from the Lease and the royalty due and paid to the Navajo Nation. A copy of the records shall be provided to the DOI and the Navajo Nation Minerals Department (P.O. Box 1910, Window Rock, AZ: 86515) on a monthly basis within fifteen (15) days following the sale month. Monthly production reports must be filed even if there was no sale of material.

6. Method of Payments: All required payments under Section 2 of this Lease shall be made to the Department, in lawful money of the United States. A copy of the payments shall be provided to the DOI.

7. Disposition of Minerals and Surface: The Navajo Nation expressly reserves the right to use, lease or otherwise dispose of the minerals not covered by this Lease and the surface of the lands embraced within this Lease under existing laws and laws hereinafter enacted. Lesser further reserves the right to grant additional leases for the extraction and removal of sand and gravel or for any other purposes from the lands described herein. Such disposition and use shall be subject to the prior rights of the Lessee herein to use of so much of the said surface as is necessary in the extraction and removal of sand and gravel described in accordance with this Lease.

8. Diligence: The Lessee shall exercise diligence in the conduct of its mining operation and the land described herein shall not be held for speculative purposes, but in good faith for the extraction of sand and gravel and shall begin operation within one (1) month of the Effective Date.

9. No work shall commence until the mandatory mine health and safety training has been provided to the workers pursuant to 30 CFR, Part 46. The lessee must develop its own course instruction. The Lessee shall maintain the required training plan pursuant to the provisions of 30 CFR, Part 46. The Department shall be listed in the training plan if the Lessee wants the Department to conduct the training. The Lessee may contact the Department to arrange for the training.

10. The Lessee may develop, use and occupy the area under the Lease for the purpose of removing sand and gravel material. The Lessee may not develop, use or occupy the area under the Lease for any other purpose without the prior written approval of the Navajo Nation and the Secretary. Such approval of the Navajo Nation may be granted upon conditions or withheld at the sole discretion of the Navajo Nation. The Lessee may not develop, use or occupy the area under the permit for any unlawful purpose. Any unlawful use of the land within the Lease shall render the Lease void at the option of the Navajo Nation and/or the Secretary.

11. Sand and gravel material shall not be used for projects outside the Navajo Nation unless it is expressly authorized by the Resources and Development Committee of the Navajo Nation Council.

12. In all activities conducted by the Lessee within the Navajo Nation, the Lessee shall abide by all laws and regulations of the Navajo Nation and of the United States, now in force and effect or as hereafter may come into force and effect, including but not limited to the following:

- a. Title 25, Code of Federal Regulations, Parts 162 and 169;
- b. Title 30, Code of Federal Regulations, Parts 46 and 56;
- c. The Navajo Nation Mine Safety Code 18 N.N.C. § 401;
- d. All applicable federal and Navajo Nation antiquities laws and regulations, with the following additional condition: In the event of a discovery, all operations in the immediate vicinity of the discovery must cease and the Navajo Nation Historic Preservation Department must be notified immediately. As used herein, "discovery" means any previously unidentified or incorrectly identified cultural resources, including but not limited to archaeological deposits, human remains, or location reportedly associated with Native American religious/traditional beliefs or practice;
- e. The Navajo Preference in Employment Act, 15 N.N.C. §§ 601 et seq., the Navajo Nation Business Opportunity Act, 5 N.N.C. §§ 201 et seq.; and
- f. The Navajo Nation Water Code, 22 N.N.C. § et seq., Lessee shall apply for and submit all applicable permits and information to the Navajo Nation Water Resources Department, or its successor.

13. The Lessee shall ensure that the air quality of the Navajo Nation is not unduly degraded during operations by violating federal and Navajo Nation's applicable laws and regulations.

14. The Lessee shall clear and keep clear the lands within the Lease area to the extent compatible with the purpose of the Lease, and shall dispose of all vegetation and other materials cut, uprooted, or otherwise accumulated during any surface disturbance activities.

15. The Lessee shall at all times during the term of the Lease and at the Lessee's sole cost and expense, maintain the land subject to the Lease and all improvements located thereon and make all necessary reasonable repairs.

16. The Lessee shall obtain prior written permission to cross an existing permit or lease areas, if any, from the appropriate parties.

17. The Lessee shall be responsible for and promptly pay all damages when they are sustained, from actions the Lessee causes.

18. The Lessee shall indemnify and hold harmless the Navajo Nation and the Secretary and their respective authorized agents, employees, land users and occupants against any liability for loss of life, personal injury and property damages arising from the development, use or occupancy or use of area under the Lease by the Lessee.

19. The Lessee shall not assign, convey, transfer or sublet in any manner whatsoever, the lease or any interest therein, or in or to any of the improvements on the land subject to the lease, without the prior written consent of the Navajo Nation and the Secretary. Any such attempted assignment, conveyance or transfer without such prior written consent shall be void and of no effect. The consent of the Navajo Nation may be granted, granted upon conditions or withheld at the sole discretion of the Navajo Nation.

20. The Navajo Nation may recommend termination of the Lease by DOI for violation of any of the terms and conditions stated herein.

21. At the termination of the Lease, the Lessee shall peaceably and without legal process deliver up the possession of the premises, in good condition, usual wear and tear excepted. Upon the written request from the Navajo Nation, the Lessee shall provide the Navajo, at the Lessee's sole cost and expense, with an environmental audit assessment of the premises at least thirty (30) days after completion and notification to the Navajo Nation that all required reclamation has been performed.

22. Holding over by the Lessee after the termination of the Lease shall not constitute a renewal or extension thereof or give the Lessee any rights hereunder or in to the land subject to the Lease or to any improvements located thereon.

23. The Navajo Nation and the Secretary shall have the right, at any reasonable time during the term of the permit, to enter upon the premises, or any part thereof, to inspect the same and any improvements located therein. The Navajo Nation and Secretary have further right to audit all payments due to the Navajo Nation.

24. By acceptance of the grant of Lease, the Lessee consents to the full territorial legislative, executive and judicial jurisdiction of the Navajo Nation, including but not limited to the jurisdiction to levy fines and to enter judgments for compensatory and punitive damages and injunctive relief, in connection with all activities conducted by the Lessee within the Navajo Nation or which have a proximate (legal) effect on persons or property within the Navajo Nation.

25. By acceptance of the grant of the Lease, the Lessee covenants and agrees never to contest or challenge the legislative, executive or judicial jurisdiction of the Navajo Nation on the basis that such jurisdiction is inconsistent with the status of the Navajo Nation as an Indian Navajo Nation, or that the Navajo Nation government is not a government of general jurisdiction, or that the Navajo Nation government does not possess full police power (i.e., the power to legislate and regulate for the general health and welfare) over all lands, persons and activities within its territorial boundaries, or on any other basis not generally applicable to a similar challenge to the jurisdiction of a state government. Nothing

contained in this provision shall be construed to negate or impair federal responsibilities with respect to the land subject to the Lease or to the Navajo Nation.

26. Any action or proceeding brought by the Lessee against the Navajo Nation in connection with or arising out of the terms and conditions of the Lease shall be brought only in the Courts of the Navajo Nation, and no such action or proceeding shall be brought by the Lessee against the Navajo Nation in any court of any state.

27. Nothing contained herein shall be interpreted as constituting a waiver, express or implied, of the sovereign immunity of the Navajo Nation.

28. Except as prohibited by applicable federal law, the law of the Navajo Nation shall govern the performance and enforcement of the terms and conditions contained herein.

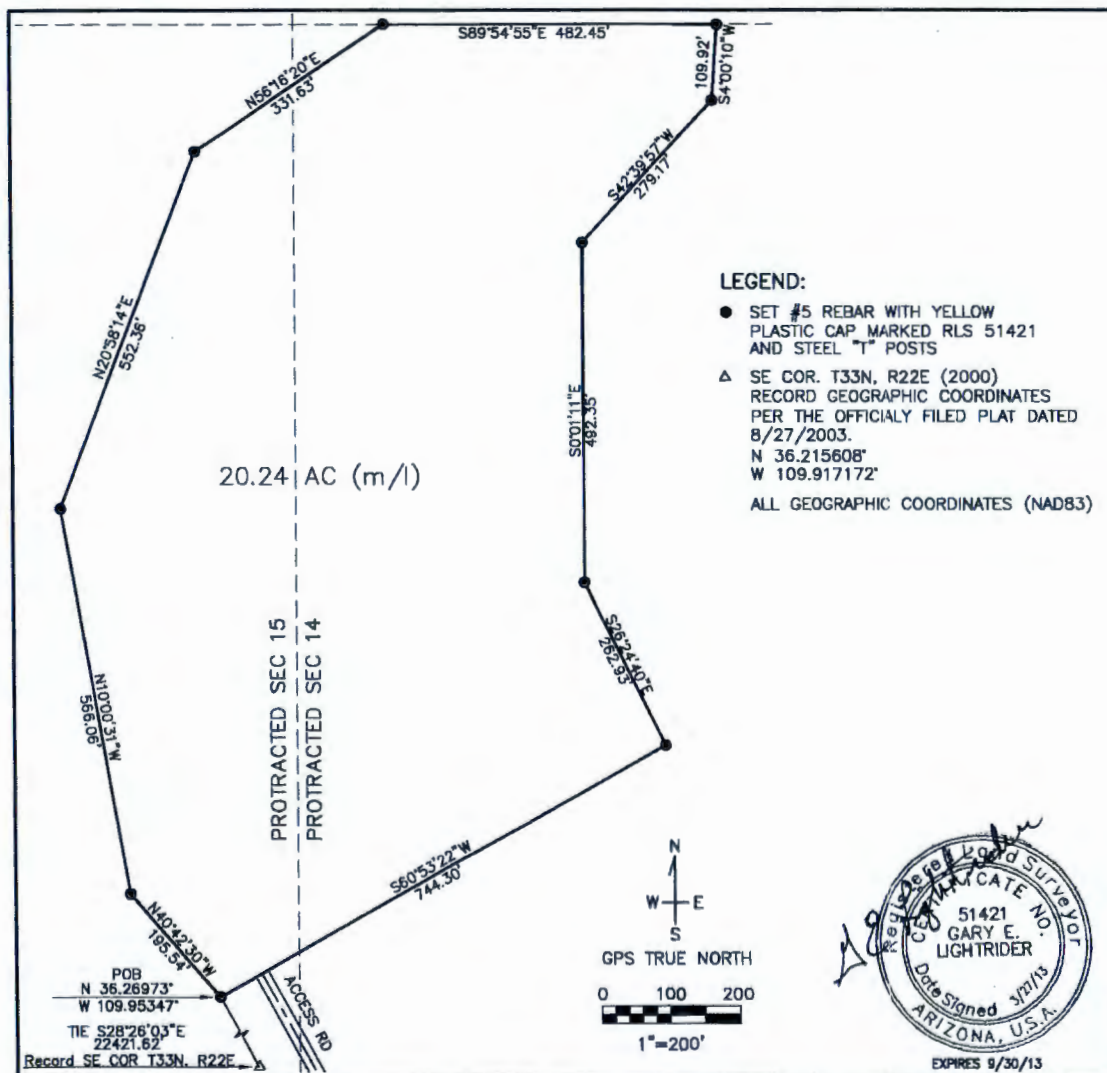
29. The terms and conditions contained herein shall extend to and be binding upon the successors, heirs, assigns, executors, administrators, employees and agents, including all contractors and subcontractors, of the Lessee, and the term "Lessee" whenever used herein, shall be deemed to include all such successors, heirs, assigns, executors, administrators, employees and agents.

30. There is expressly reserved to the Navajo Nation full territorial legislative, executive and judicial jurisdiction over the area under the Lease and all lands burdened by the Lease, including without limitation over all persons, including the public, and all activities conducted or otherwise occurring within the area under the Lease and all lands burdened by the Lease shall be and forever remain Navajo Indian Country for purposes of Navajo Nation jurisdiction.

31. The Lessee is required to maintain and submit a certificate issued by an insurance company authorized to do business in the United States, including the Navajo Nation, certifying that the applicant has a public liability insurance policy enforce for the mining and reclamation operations pursuant to this Lease. Such policy shall provide for personal injury and property damage protection in an amount adequate to compensate any person injured or property damaged as a result of the mining and reclamation operations, including the use of explosives. Minimum insurance coverage for bodily injury and property damage shall be \$500,000 for each occurrence and \$1,000,000 aggregate.

(a) The policy shall be maintained in full force during the term of the Lease and the liability period necessary to complete all reclamation requirements under the Plan.

(b) The policy shall include a rider requiring that the insurer notify the Department and DOI whenever substantive changes are made in the policy including any termination or failure to renew.

**LEGAL DESCRIPTION:**

A parcel of land situated in protracted Sections 14 and 15, Township 33 North, Range 22 East, Gila and Salt River Meridian, Black Mesa Chapter, Apache County, Arizona, with all bearings relative to GPS True North and more particularly described by metes and bounds as follows.

Commencing at the Point of Beginning (POB) from whence the Southeast corner of said Township 33 North, Range 22 East bears, by record, South 28°26'03" a distance of 22421.62 feet:

thence North 40°42'30" West, a distance of 195.54 feet;  
thence North 10°00'31" West, a distance of 566.06 feet;  
thence North 20°58'14" East, a distance of 552.36 feet;  
thence North 56°16'20" East, a distance of 331.63 feet;  
thence South 89°54'55" East, a distance of 482.45 feet;  
thence South 04°00'10" West, a distance of 109.92 feet;  
thence South 42°39'57" West, a distance of 279.17 feet;  
thence South 00°01'11" East, a distance of 492.35 feet;  
thence South 26°24'40" East, a distance of 262.93 feet;  
thence South 60°53'22" West, a distance of 744.30 feet to the Point of Beginning with said parcel containing 20.24 Acres, more or less.

**SURVEYOR'S STATEMENT:**

I, Gary E. Lighttrider, a Registered Professional Land Surveyor in the State of Arizona, hereby state that this survey and plat were completed under my direct supervision and that all monuments found and set are correct as shown.

Sheet 1 of 3

Surveyed by:	3/19/13	<b>LIGHTNING RIDGE SURVEYING, LLC</b>
Drawn by:	gel	1423 E. MAIN, CORTEZ, COLORADO 81321
Checked by:		970-739-1810
Job No.:	20130319	Results of Survey
REV.		BLUE GAP GRAVEL QUARRY BOUNDARY
		For Tachee Enterprises, Inc.
		Located in:
		Protracted Sections 14 & 15, T33N., R22E., G&SRM
		Black Mesa Chapter, Apache County, Arizona

Figure 4. Boundary plat of proposed Blue Gap Gravel Quarry.

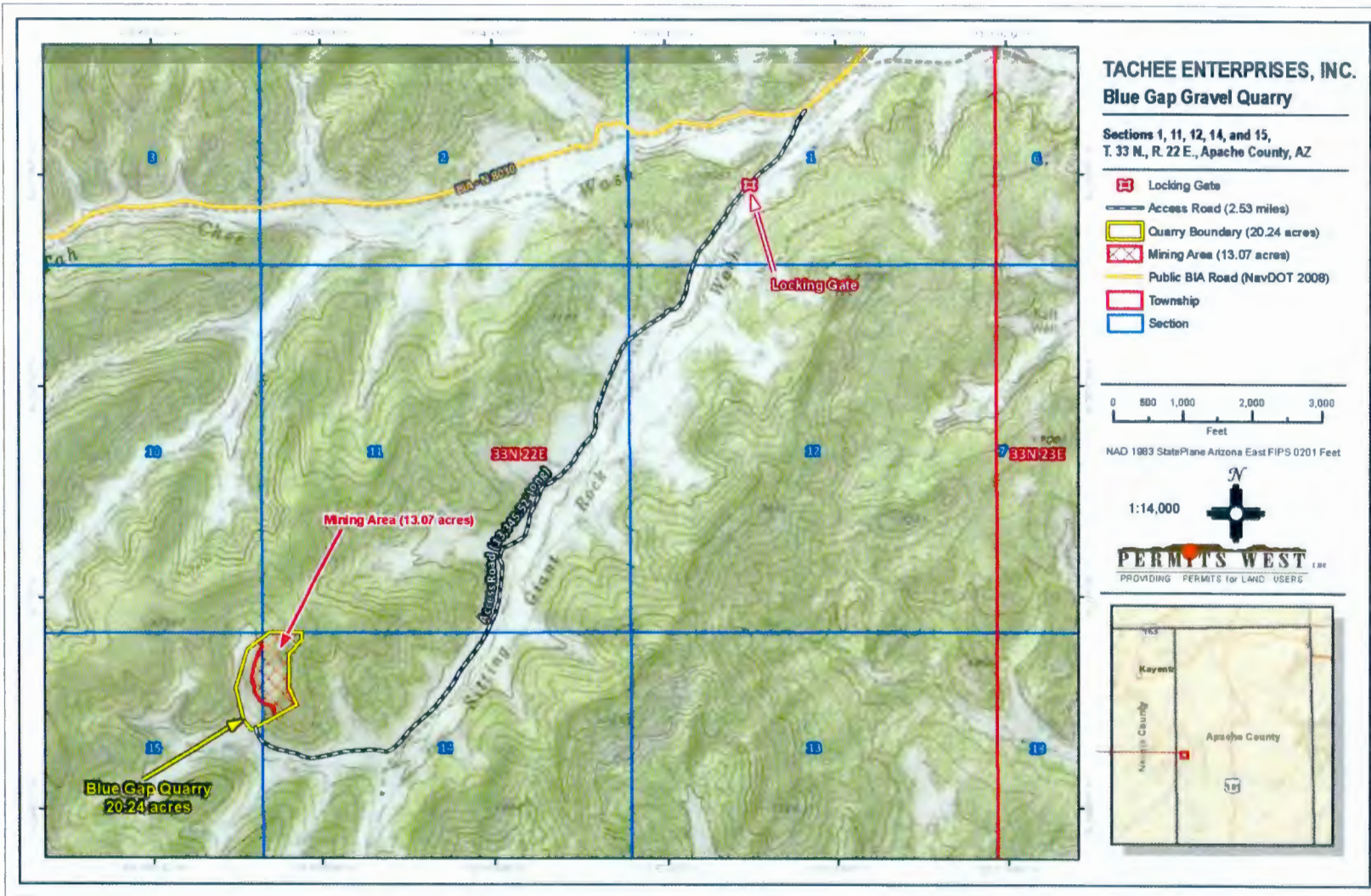
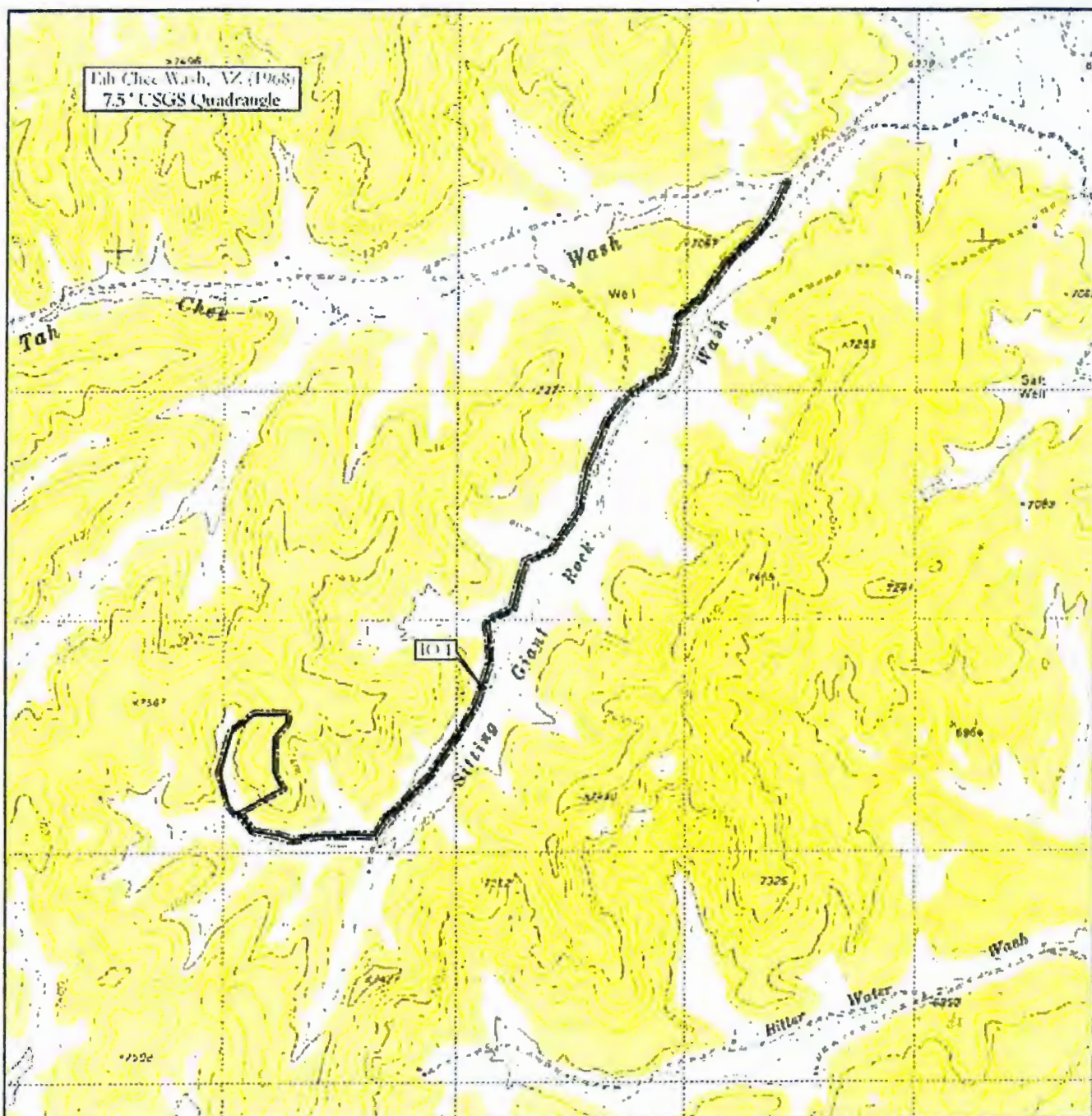
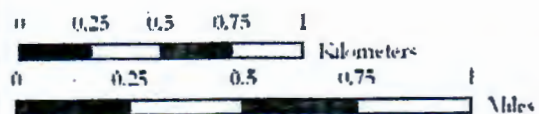


Figure 3. Map of project vicinity for the proposed Blue Gap Gravel Quarry.



### Legend

- Access Road
- Isolated Occurrence
- Project Area
- Cultural Buffer



### Land Ownership

- Tribal Land

T33N, R22E,  
Sections 1, 11, 12,  
14, and 15  
Apache County, AZ



### Blue Gap Gravel Pit and Access Road Cultural Resources Survey

#### Project Area

Lone Mountain Archaeological Services, Inc.

Drawn by: T. G. G. G.  
L. M. A. S. I. N. C.

Client:  
Tacho Enterprises, Inc.

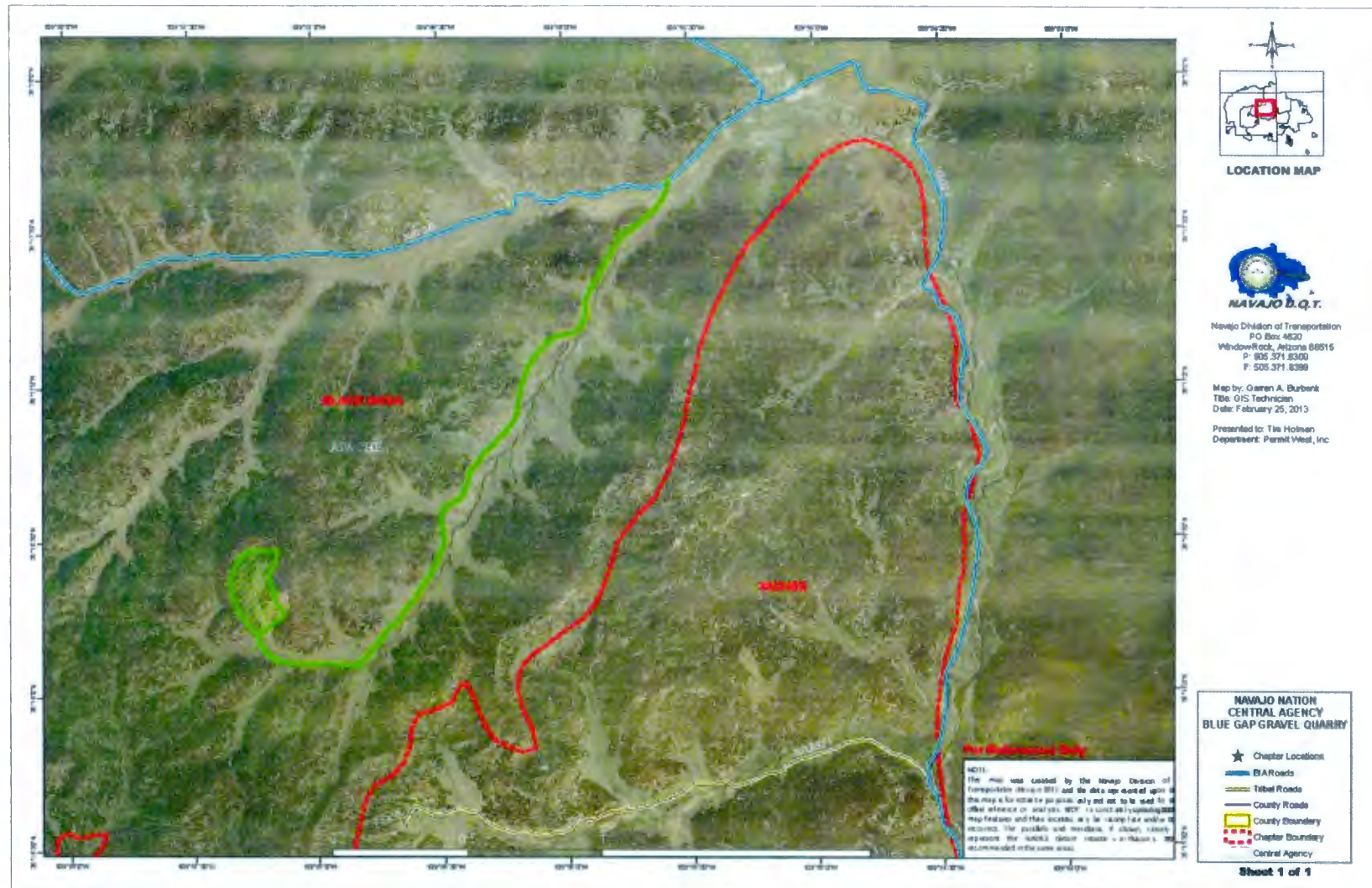


Figure 2. Map provided by the Navajo Department of Transportation (NDOT) showing designated public roads near the project area.

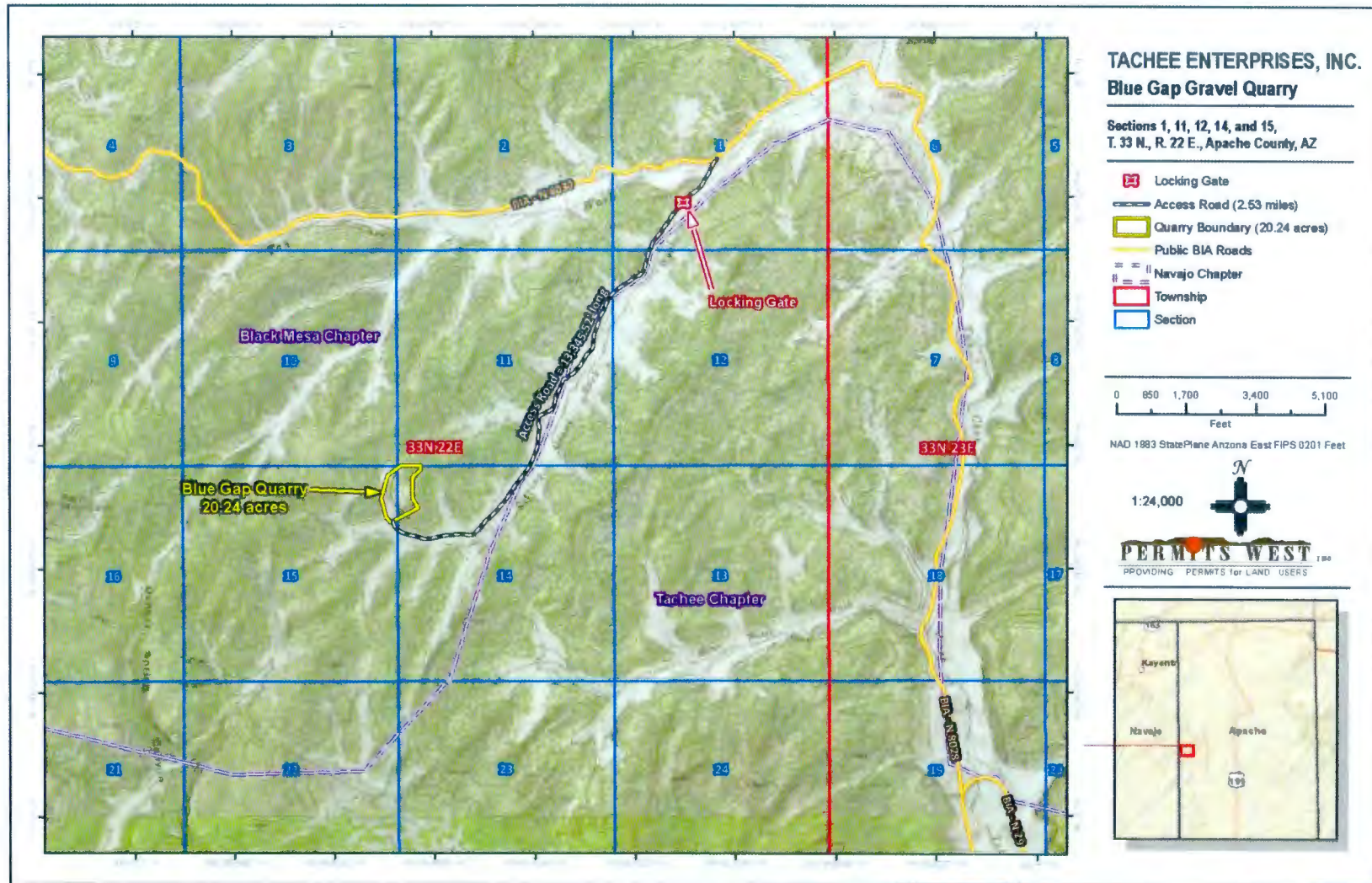


Figure 1. Overview of Project Area.

**TACHEE ENTERPRISES, INC.**  
**Blue Gap Gravel Quarry**

Sections 1, 11, 12, 14, and 15,  
 T. 33 N., R. 22 E., Apache County, AZ

- Locking Gate
- Access Road (2.53 miles)
- Quarry Boundary (20.24 acres)
- Mining Area (13.07 acres)
- Public BIA Road (NavDOT 2008)
- Township
- Section

0 500 1,000 2,000 3,000  
 Feet

NAD 1983 StatePlane Arizona East FIPS 0201 Feet  
 1:14,000

PROVIDING PERMITS for LAND USERS  
**PERMITS WEST**

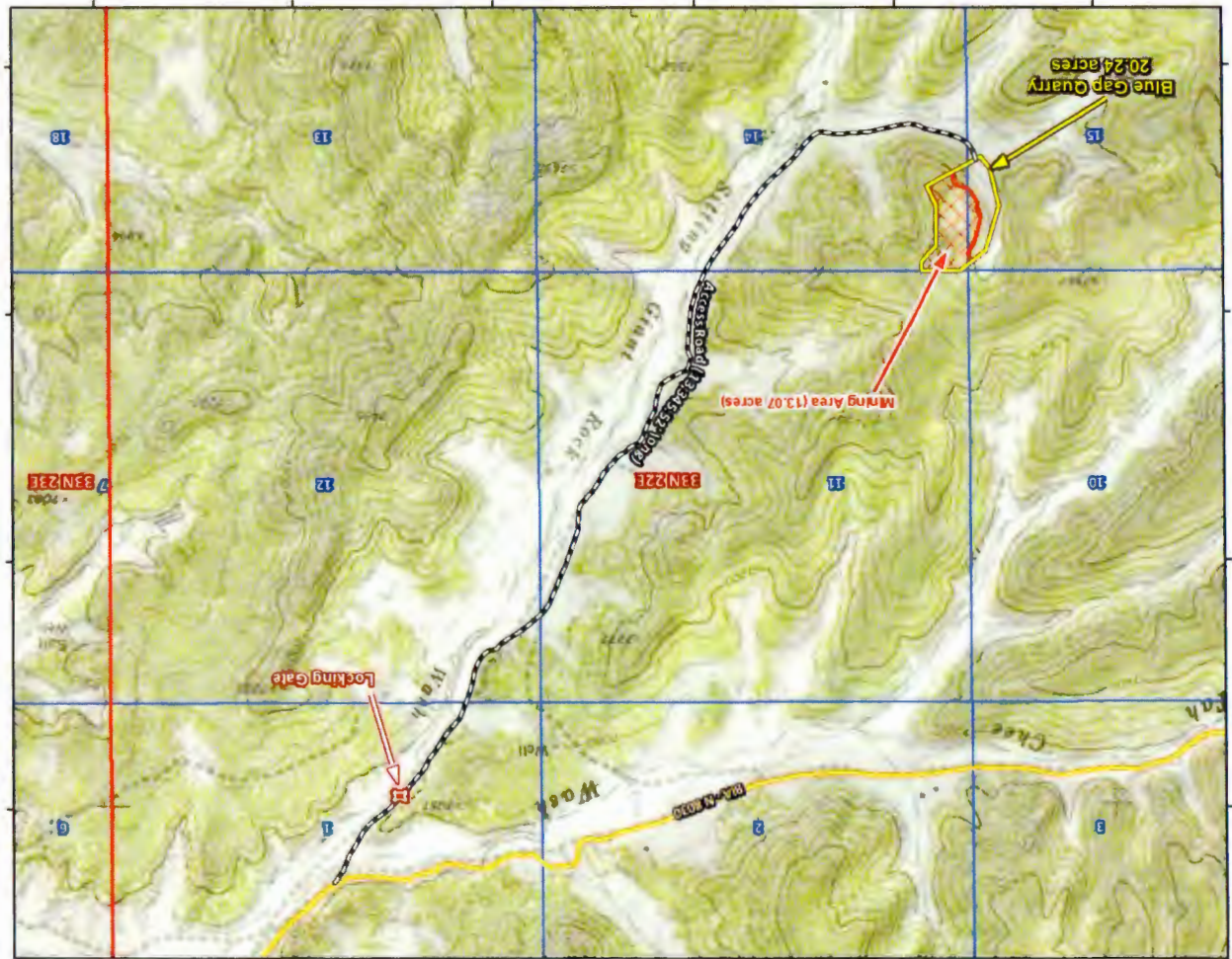


Figure 3. Map of project vicinity for the proposed Blue Gap Gravel Quarry.

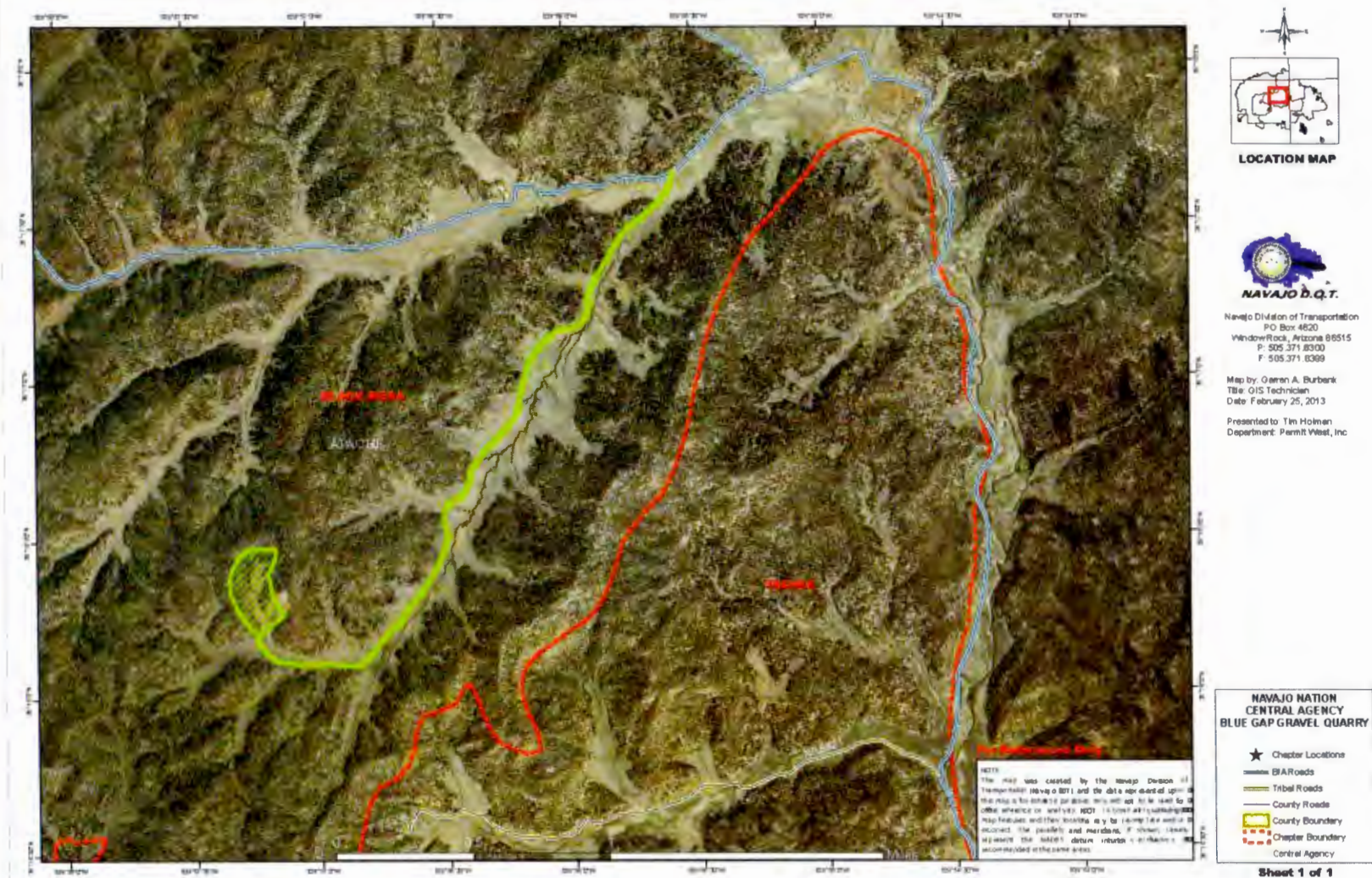


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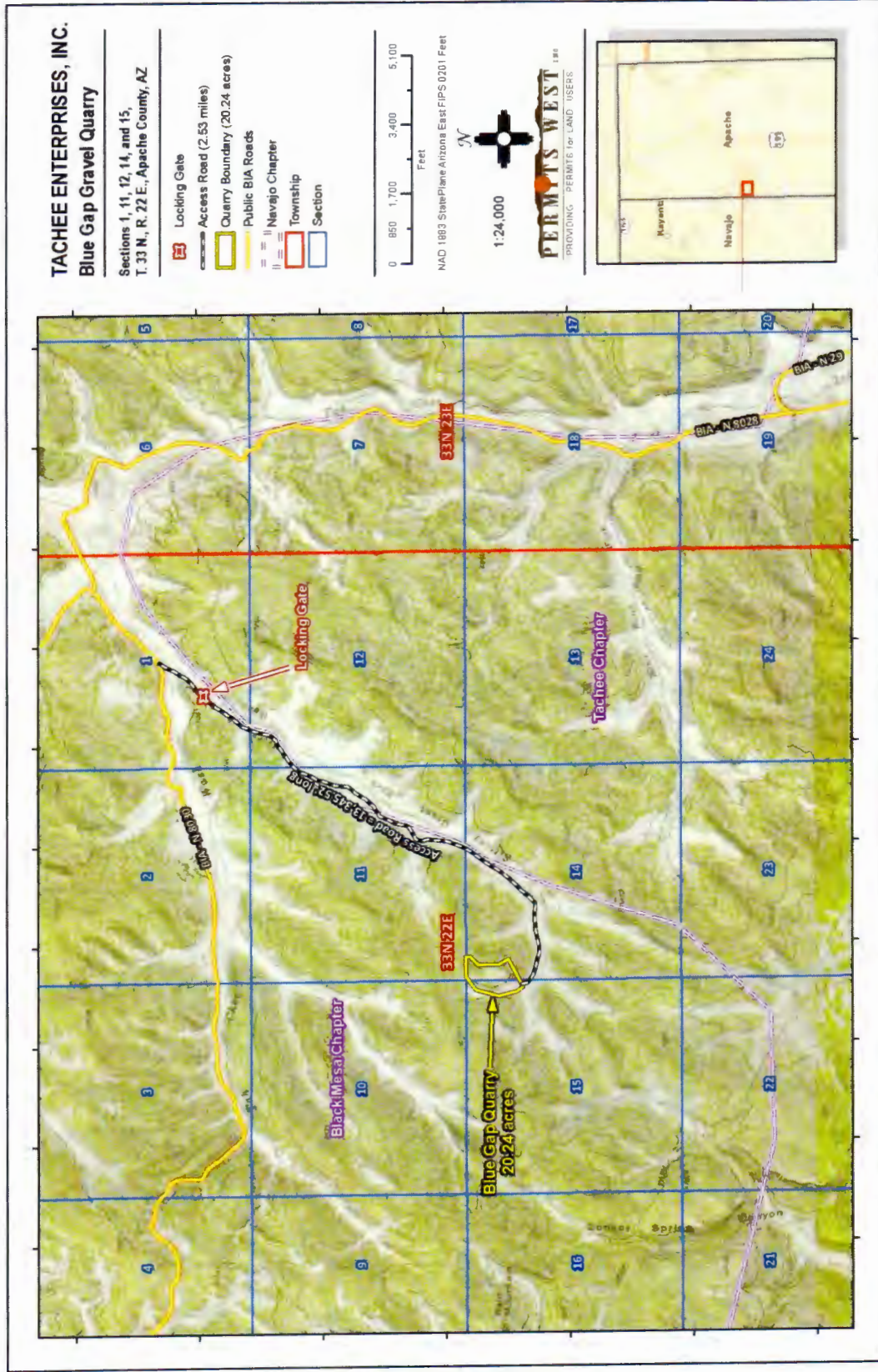


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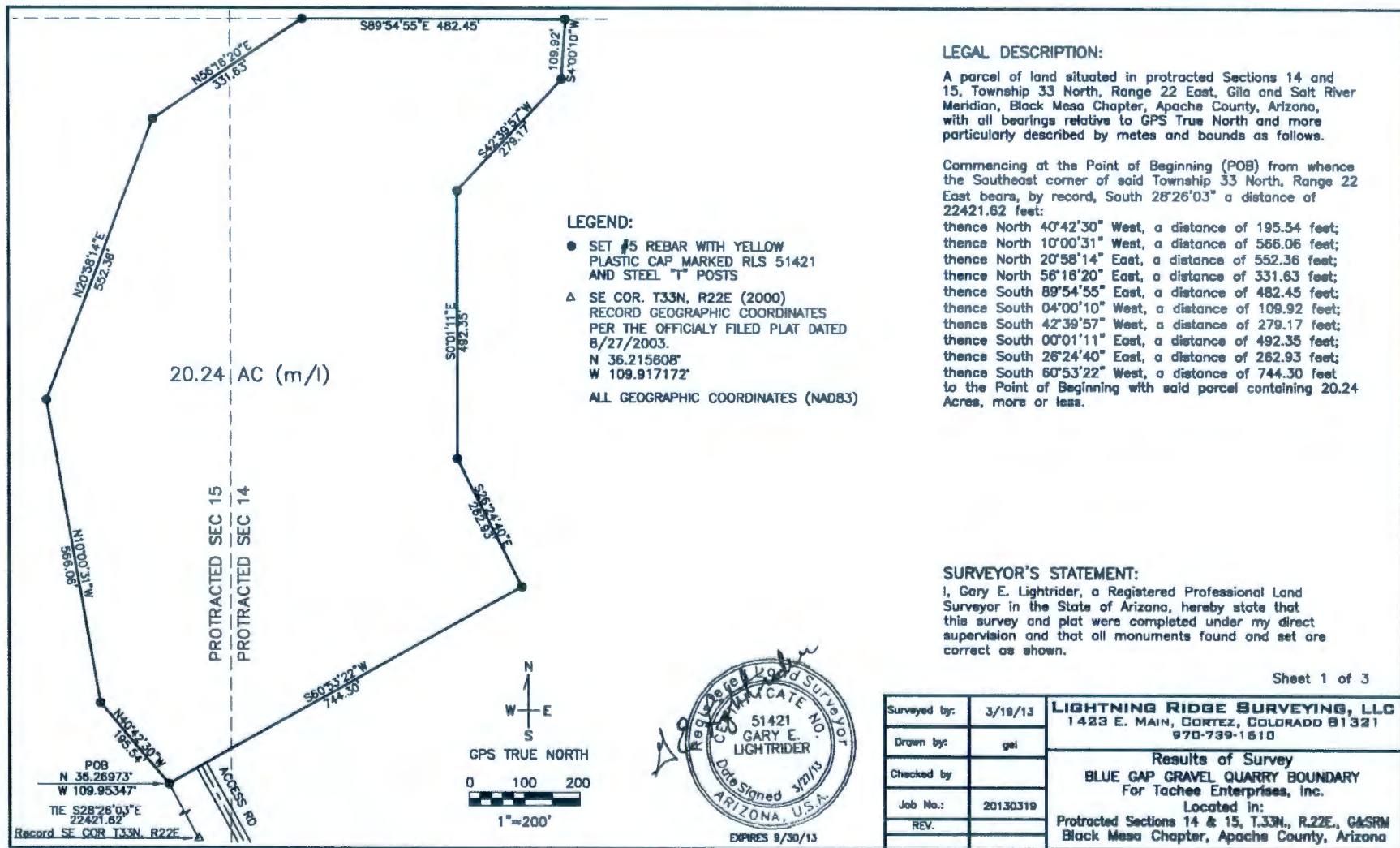


Figure 4. Boundary plat of proposed Blue Gap Gravel Quarry.

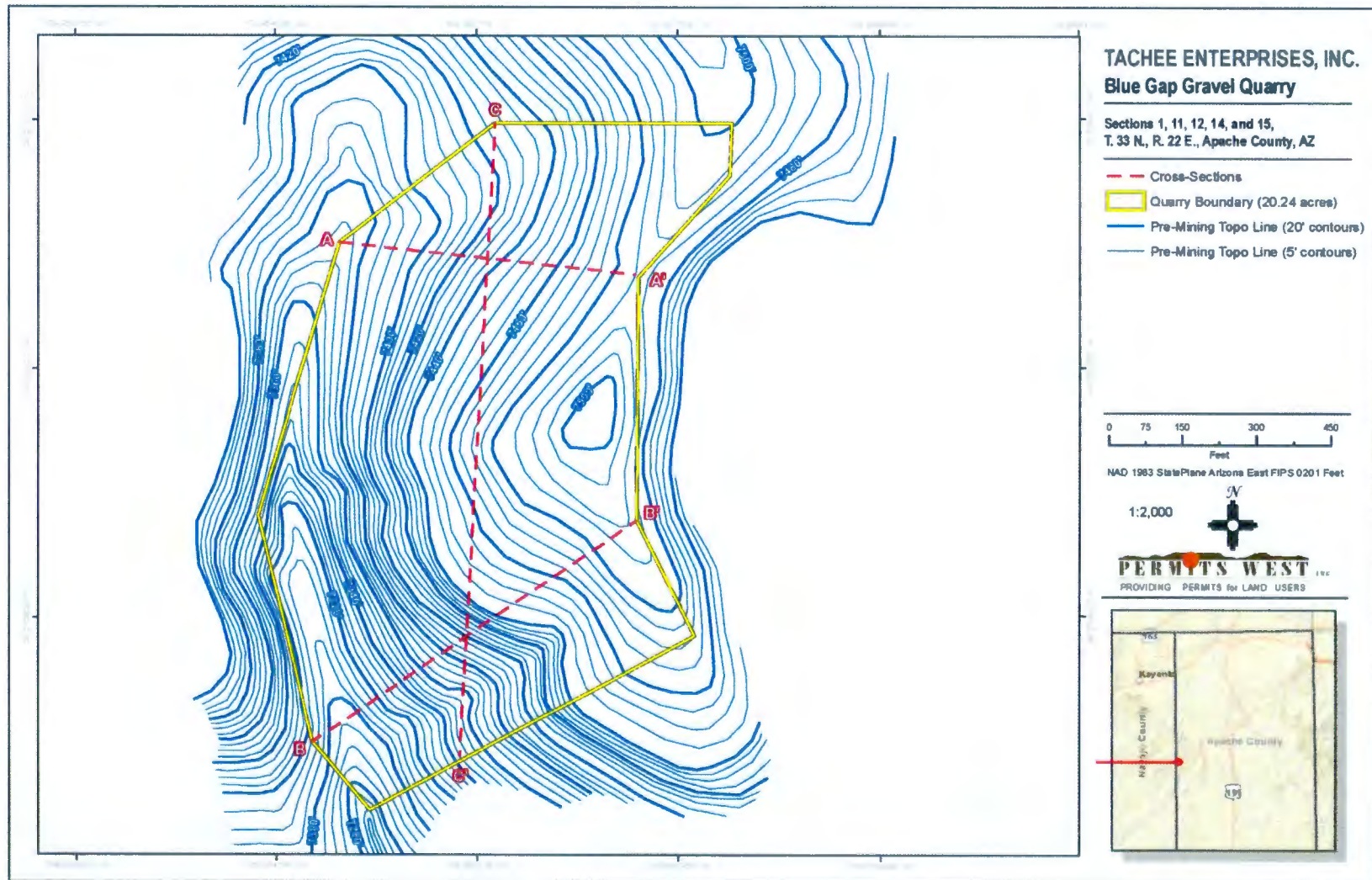


Figure 5. Map of original grade (pre-mining) at the proposed mine site.

## ACCESS RIGHT-OF-WAY LEGAL DESCRIPTION:

A 20 foot wide Right-of-Way situated in protracted Sections 1, 11, 12, 14 and 15, Township 33 North, Range 22 East, Gila and Salt River Meridian, Black Mesa Chapter, Apache County, Arizona, with all bearings relative to GPS True North and said Right-of-Way lying 10 feet each side of the following described centerline.

Commencing at the Point of Commencement (POC) on the southerly boundary line of the Blue Gap Gravel Quarry, marked by a 5/8" rebar with a yellow plastic cap marked "Arizona RLS 51421" from whence the Southeast corner of said Township 33 North, Range 22 East bears, by record, South 28°26'03" East a distance of 22,421.62 feet; thence, along said boundary line North 60°53'22" East, a distance of 69.27 feet to the True Point of Beginning (TPOB):

thence South 29°06'38" East, a distance of 114.15 feet;  
 thence South 29°06'38" East, a distance of 125.83 feet;  
 thence South 86°28'19" East, a distance of 267.53 feet;  
 thence South 76°12'44" East, a distance of 437.37 feet;  
 thence North 80°10'52" East, a distance of 455.84 feet;  
 thence North 86°15'29" East, a distance of 360.17 feet;  
 thence South 82°40'59" East, a distance of 298.08 feet;  
 thence North 44°03'56" East, a distance of 639.60 feet;  
 thence North 46°48'42" East, a distance of 341.14 feet;  
 thence North 39°50'31" East, a distance of 347.32 feet;  
 thence North 15°40'57" East, a distance of 167.68 feet;  
 thence North 32°23'48" East, a distance of 71.98 feet;  
 thence North 52°33'42" East, a distance of 100.06 feet;  
 thence North 38°39'08" East, a distance of 360.23 feet;  
 thence North 31°13'12" East, a distance of 237.94 feet;  
 thence North 23°19'33" East, a distance of 325.61 feet;  
 thence North 15°17'24" East, a distance of 172.39 feet;  
 thence North 02°45'31" East, a distance of 245.63 feet;  
 thence North 23°01'28" East, a distance of 80.38 feet;  
 thence North 04°32'24" East, a distance of 173.14 feet;  
 thence North 28°42'36" West, a distance of 87.37 feet;  
 thence North 04°26'27" West, a distance of 77.73 feet;  
 thence North 08°54'45" East, a distance of 101.23 feet;  
 thence North 74°41'53" East, a distance of 89.39 feet;  
 thence North 62°45'38" East, a distance of 246.82 feet;  
 thence North 39°03'02" East, a distance of 97.53 feet;  
 thence North 14°31'25" East, a distance of 290.03 feet;  
 thence North 25°05'14" East, a distance of 431.02 feet;

thence North 66°00'14" East, a distance of 88.27 feet;  
 thence North 50°38'38" East, a distance of 299.78 feet;  
 thence North 45°01'17" East, a distance of 145.28 feet;  
 thence North 30°25'59" East, a distance of 244.10 feet;  
 thence North 39°59'42" East, a distance of 286.02 feet;  
 thence North 19°21'47" East, a distance of 83.65 feet;  
 thence North 02°52'12" East, a distance of 215.36 feet;  
 thence North 18°53'48" East, a distance of 487.95 feet;  
 thence North 25°14'34" East, a distance of 566.67 feet;  
 thence North 44°10'22" East, a distance of 49.17 feet;  
 thence North 44°10'22" East, a distance of 37.68 feet;  
 thence North 53°57'38" East, a distance of 508.51 feet;  
 thence North 47°21'37" East, a distance of 177.93 feet;  
 thence North 69°32'28" East, a distance of 155.27 feet;  
 thence North 41°04'08" East, a distance of 119.27 feet;  
 thence North 24°45'28" East, a distance of 119.62 feet;  
 thence North 16°41'17" East, a distance of 440.77 feet;  
 thence North 26°38'34" East, a distance of 291.91 feet;  
 thence North 40°58'38" East, a distance of 227.50 feet;  
 thence North 34°47'58" East, a distance of 597.65 feet;  
 thence North 40°55'26" East, a distance of 270.67 feet;  
 thence North 50°36'18" East, a distance of 318.27 feet;  
 thence North 36°09'10" East, a distance of 250.33 feet;  
 thence North 28°25'51" East, a distance of 620.75 feet  
 to the Right-of-Way of BIA #8028 from which point said Southeast corner of Township 33 North, Range 22 East bears South 05°39'45" East, a distance of 28,616.46 feet. Right-of-Way side lines are lengthened or shortened to terminate on the lines being closed upon. This Right-of-Way as described is 13,345.52 feet in length, with a total of 6.127 acres, more or less. The acreage by section is:  
 Section 15 = 0.052 acres,  
 Section 14 = 1.933 acres,  
 Section 11 = 2.243 acres,  
 Section 12 = 0.716 acres,  
 Section 1 = 1.183 acres.

## SURVEYOR'S STATEMENT:

I, Gary E. Lightrider, a Registered Professional Land Surveyor in the State of Arizona, hereby state that this survey and plat were completed under my direct supervision and that all monuments found and set are correct as shown.



Sheet 1 of 7

Surveyed by:	3/19/13	<b>LIGHTNING RIDGE SURVEYING, LLC</b> 1423 E. MAIN, CORTEZ, COLORADO 81321 970-739-1610
Drawn by:	gal	
Checked by:		<b>Results of Survey</b> <b>BLUE GAP GRAVEL QUARRY ACCESS RIGHT-OF-WAY</b> For Tachee Enterprises, Inc. Located in: Protracted Sections 1, 11, 12, 14 & 15, T.33N., R.22E., G.83RM Black Mesa Chapter, Apache County, Arizona
Job No.:	20130319	
REV.		

Figure 6. Proposed access road ROW legal description.

# ACCESS RIGHT-OF-WAY LEGAL DESCRIPTION:

A 20 foot wide Right-of-Way situated in protracted Sections 1, 11, 12, 14 and 15, Township 33 North, Range 22 East, Gila and Salt River Meridian, Black Mesa Chapter, Apache County, Arizona, with all bearings relative to GPS True North and said Right-of-Way lying 10 feet each side of the following described centerline.

Commencing at the Point of Commencement (POC) on the southerly boundary line of the Blue Gap Gravel Quarry, marked by a 3/8" rebar with a yellow plastic cap marked "Arizona RLS 51421" from whence the Southeast corner of said Township 33 North, Range 22 East bears, by record, South 28°26'03" East a distance of 22,421.62 feet; thence, along said boundary line North 60°53'22" East, a distance of 69.27 feet to the True Point of Beginning (TPOB):

thence South 29°06'38" East, a distance of 114.15 feet;  
 thence South 29°06'38" East, a distance of 125.83 feet;  
 thence South 66°28'19" East, a distance of 267.53 feet;  
 thence South 76°12'44" East, a distance of 437.37 feet;  
 thence North 80°10'52" East, a distance of 455.84 feet;  
 thence North 86°15'29" East, a distance of 360.17 feet;  
 thence South 82°40'59" East, a distance of 298.08 feet;  
 thence North 44°03'56" East, a distance of 639.60 feet;  
 thence North 46°48'42" East, a distance of 341.14 feet;  
 thence North 39°50'31" East, a distance of 347.32 feet;  
 thence North 15°40'57" East, a distance of 167.68 feet;  
 thence North 32°23'48" East, a distance of 71.98 feet;  
 thence North 52°33'42" East, a distance of 100.06 feet;  
 thence North 38°39'08" East, a distance of 360.23 feet;  
 thence North 31°13'12" East, a distance of 237.94 feet;  
 thence North 23°19'33" East, a distance of 325.61 feet;  
 thence North 15°17'24" East, a distance of 172.39 feet;  
 thence North 02°45'31" East, a distance of 245.63 feet;  
 thence North 23°01'28" East, a distance of 80.38 feet;  
 thence North 04°32'24" East, a distance of 173.14 feet;  
 thence North 28°42'36" West, a distance of 87.37 feet;  
 thence North 04°26'27" West, a distance of 77.73 feet;  
 thence North 08°54'45" East, a distance of 101.23 feet;  
 thence North 74°41'53" East, a distance of 89.39 feet;  
 thence North 62°45'38" East, a distance of 246.82 feet;  
 thence North 39°03'02" East, a distance of 97.53 feet;  
 thence North 14°31'25" East, a distance of 290.03 feet;  
 thence North 25°05'14" East, a distance of 431.02 feet;

thence North 66°00'14" East, a distance of 88.27 feet;  
 thence North 50°38'38" East, a distance of 299.78 feet;  
 thence North 45°01'17" East, a distance of 145.28 feet;  
 thence North 30°25'59" East, a distance of 244.10 feet;  
 thence North 39°59'42" East, a distance of 286.02 feet;  
 thence North 19°21'47" East, a distance of 83.65 feet;  
 thence North 02°52'12" East, a distance of 215.36 feet;  
 thence North 18°53'48" East, a distance of 487.95 feet;  
 thence North 25°14'34" East, a distance of 566.67 feet;  
 thence North 44°10'22" East, a distance of 49.17 feet;  
 thence North 44°10'22" East, a distance of 37.68 feet;  
 thence North 53°57'38" East, a distance of 508.51 feet;  
 thence North 47°21'37" East, a distance of 177.93 feet;  
 thence North 69°32'28" East, a distance of 155.27 feet;  
 thence North 41°04'08" East, a distance of 119.27 feet;  
 thence North 24°45'28" East, a distance of 119.62 feet;  
 thence North 16°41'17" East, a distance of 440.77 feet;  
 thence North 26°38'34" East, a distance of 291.91 feet;  
 thence North 40°58'38" East, a distance of 227.50 feet;  
 thence North 34°47'58" East, a distance of 597.65 feet;  
 thence North 40°55'26" East, a distance of 270.67 feet;  
 thence North 50°36'18" East, a distance of 318.27 feet;  
 thence North 36°09'10" East, a distance of 250.33 feet;  
 thence North 28°25'51" East, a distance of 620.75 feet to the Right-of-Way of BIA #8028 from which point said Southeast corner of Township 33 North, Range 22 East bears South 05°39'45" East, a distance of 28,616.46 feet. Right-of-Way side lines are lengthened or shortened to terminate on the lines being closed upon. This Right-of-Way as described is 13,345.52 feet in length, with a total of 6.127 acres, more or less. The acreage by section is:  
 Section 15 = 0.052 acres,  
 Section 14 = 1.933 acres,  
 Section 11 = 2.243 acres,  
 Section 12 = 0.716 acres,  
 Section 1 = 1.183 acres.

## SURVEYOR'S STATEMENT:

I, Gary E. Lightrider, a Registered Professional Land Surveyor in the State of Arizona, hereby state that this survey and plat were completed under my direct supervision and that all monuments found and set are correct as shown.



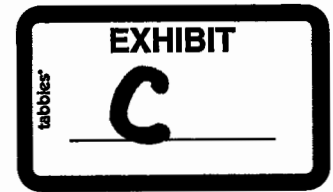
Sheet 1 of 7

Surveyed by:	3/19/13	<b>LIGHTNING RIDGE SURVEYING, LLC</b> 1423 E. MAIN, CORTEZ, COLORADO 81321 970-739-1610
Drawn by:	gel	
Checked by:		<b>Results of Survey</b> <b>BLUE GAP GRAVEL QUARRY ACCESS RIGHT-OF-WAY</b> <b>For Tachee Enterprises, Inc.</b> Located in: Protracted Sections 1, 11, 12, 14 & 15, T.33N., R.22E., G&SRM Black Mesa Chapter, Apache County, Arizona
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REV.		



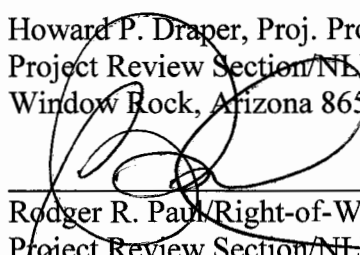
# THE NAVAJO NATION

RUSSELL BEGAYE PRESIDENT  
JONATHAN NEZ VICE PRESIDENT



## MEMORANDUM

**TO:** Howard P. Draper, Proj. Program Specialist  
Project Review Section/NLD  
Window Rock, Arizona 86515

**FROM:**   
Rodger R. Paul/Right-of-Way Agent  
Project Review Section/NLD  
Chinle, Arizona 86503

**DATE:** August 27, 2015

**SUBJECT:** **FIELD CLEARANCE ON GRAVEL PIT**  
**Blue Gap, Apache County, Arizona**

Recon, Post Office Box # 1678, Window Rock, Arizona 86515 has submitted an application requesting to with draw 20.24 acres, more or less of Navajo Tribal Trust Land (NTTL) to establish a gravel quarry pit (**Blue Gap Gravel Quarry Pit**), materials will be used for various road projects on, over and across the Navajo Nation and will set up crusher to crush gravel materials and will utilize 6.13 acres for access road for ingress and egress. The proposed site is located within Section 14 & 15, Township 33 North, Range 22 East, G&SRM, Blue Gap, Apache County, Arizona.

Project Review Section/Chinle Navajo Land Department (CNLD) has conducted and completed the field investigation, met with Benjamin Manycow Grazing Committee Member from Blue Gap chapter to identify the land user affected by the proposed project. Upon review of the attached map (legal description) according to Mr. Manycow records and knowledge there is only one (01) land user affected by the proposed project. Project Review Section has contacted the affected land user (Sadie Bill) and obtained her written consent. Ms. Bill was already aware of the project, no objection gave her written consent and requested for surface damage compensation at one hundred fifty dollars per acre. (\$150.00 x 20.24 = \$3,036.00). Attached hereto is the Field Clearance Checklist, Land User Consent Form #2 signed by Ms. Bill for your information and use. If you have any question(s) please contact me at (928) 674 2315/(928) 797-1835.

**cc:** **Office File**  
**Recon**

**CONSENT FORM # 2**  
**(Compensation for damages)**

**CONSENT TO USE**  
**NAVAJO TRIBAL LANDS**

**TO WHOM IT MAY CONCERN**

I Sadie Bill hereby grant consent to the Navajo Nation and the Bureau of Indian Affairs to permit Recon of Post Office Box # Window Rock, Arizona 86515 to use a portion of my land use area for the following purpose(s): to withdraw 20.24 acres, more or less of Navajo Tribal Trust Land (NTTL) to establish a gravel quarry pit (Blue Gap Gravel Quarry Pit), materials will be used for various road projects on, over and across the Navajo Nation and will set crusher to crush materials, 6.13 acres, more or less will be used for existing access road. The proposed site is located within the vicinity of Blue Gap, Apache County, Arizona as shown on the map showing the location of the proposed project on the back of this consent form.

My consent is given subject to the receipt of compensation three thousand thirty six dollars (\$3,036.00) which I acknowledge as good and adequate compensation for the diminishment in value of my land use rights as a result of the above referenced project as proposed.

**REMARKS:** \_\_\_\_\_

8/27/15 X Sadie Bill ----- G/P# 4-5539  
Date: Land User Signature (thumb print) Census No. Permit No.  
P.O. Box 1 Blue Gap, Arizona 86520  
Address: (P.O. Box, City, State, Zip) Social Security No. \_\_\_\_\_

**WITNESS:**

8/27/15 Bryan Morgan 04  
Date: Grazing Committee or Land Board Member District No.

**Acknowledgement of Field Agent**

I acknowledge that the contents of this consent form was read ☒ or fully explained ☒ to the land user in Navajo ☒ or English ☒ (check where applicable).

[Signature]  
Field Agent Signature

## FIELD CLEARANCE CHECKLIST

This form covers only damages and compensation to individual land users. It doesn't cover consideration or other fee to the Navajo Nation. (use back if necessary to complete this form).

1. Project Identification:  
Application: Recon  
Type of Project: Land Withdrawal  
Purpose: Construct, Operate Maintain a Gravel Quarry Pit  
Location: Blue Gap, Apache County, Arizona  
Identification number(s): \_\_\_\_\_
2. Amount of land affected; 20.24 acres
3. Land Status: Trust: XX Fee: \_\_\_\_\_ Other: \_\_\_\_\_
4. List names of all individuals whose land use rights will be affected by the proposed project.

	Name	Census Number	Type of Land Use Right
1.	<u>Sadie Bill</u>	<u>05499</u>	<u>G/P# 4-5539</u>
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____
9.	_____	_____	_____

5. Are all the land users with claims to the affected lands as shown in Branch Land Operation records included in the list in item 4? Yes
6. Have the Grazing Committee or Land Board Member (which ever appropriate) for the affected area confirm land user list in item 4 by signing acknowledgement below. Yes

### ACKNOWLEDGEMENT

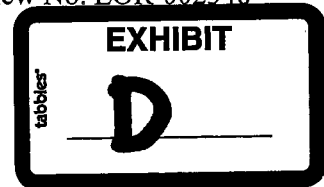
I acknowledge that due notice was given to the affected community of the proposed project, and according to my records and to the best of my knowledge, the list of the individual in item 4 includes all land users who have land use rights in the affected lands.

8/27/15  
Date:

Beyon Mayh  
Grazing Committee/Land Board Member

04  
Dist. No.

BIOLOGICAL RESOURCES COMPLIANCE FORM  
NAVAJO NATION DEPARTMENT OF FISH AND WILDLIFE  
P.O. BOX 1480, WINDOW ROCK, ARIZONA 86515-1480



It is the Department's opinion the project described below, with applicable conditions, is in compliance with Tribal and Federal laws protecting biological resources including the Navajo Endangered Species and Environmental Policy Codes, U.S. Endangered Species, Migratory Bird Treaty, Eagle Protection and National Environmental Policy Acts. This form does not preclude or replace consultation with the U.S. Fish and Wildlife Service if a Federally-listed species is affected.

PROJECT NAME & NO.: Blue Gap Gravel Quarry

DESCRIPTION: TEI proposes to obtain a mine lease consisting of 20.24 acres for mineral extraction and processing at the existing quarry site. An existing 13,345.52-ft. access road would require a 20-ft. wide ROW and would be used for ingress/egress to the site. The access road would be upgraded and bladed as necessary. A locking gate would be installed to deter public access. The total area of impact would be approximately 26.367 acres.

LOCATION: Sections 1, 11, 12, 14 & 15, T33N, R22E, G&SRM, Black Mesa<sup>1</sup> Chapter, Apache County, Arizona

REPRESENTATIVE: Hubert Dayzie, Tachee Enterprises, Inc. (TEI)

ACTION AGENCY: Navajo Nation and Bureau of Indian Affairs

B.R. REPORT TITLE / DATE / PREPARER: EA-Tachee Enterprises, Inc. Blue Gap Gravel Quarry, Appendices B, C, & D/28 APR 2014/Permits West, Inc.

SIGNIFICANT BIOLOGICAL RESOURCES FOUND: Area 1. Suitable nesting habitat is present within and adjacent to the proposed quarry site and access road. Data Response #13PERM-04 was not attached to the EA in the EOR package.

POTENTIAL IMPACTS

NESL SPECIES POTENTIALLY IMPACTED: NA

FEDERALLY-LISTED SPECIES AFFECTED: NA

OTHER SIGNIFICANT IMPACTS TO BIOLOGICAL RESOURCES: NA

AVOIDANCE / MITIGATION MEASURES: NA

CONDITIONS OF COMPLIANCE\*: Pursuant to the Migratory Bird Treaty Act (U.S. Code Title 16, Chapter 7, 703-712), migratory birds not listed under the NESL or ESA are prohibited from take by federal law. Vegetation removal, land clearing and grading at the quarry site and access road shall avoid the Migratory Bird breeding season of 15 MAR - 15 AUG or surveys will precede all ground-disturbing activities. If the breeding season cannot be avoided, surveys for active nests will be required. The survey must include a 50 m (165 ft.) buffer outside the edge of disturbance. Removal or disturbance of nesting habitat (i.e. trees & shrubs) will not be allowed within 50 meters of an active nest during incubation to fledging.

FORM PREPARED BY / DATE: Pamela A. Kyselka/07 OCT 2015

COPIES TO: (add categories as necessary)



BIA



2 NTC § 164 Recommendation:

Signature

Date

☐ Approval

☒ Conditional Approval (with memo)

☐ Disapproval (with memo)

☐ Categorical Exclusion (with request letter)

☐ None (with memo)

*Gloria M. Tom*  
Gloria M. Tom, Director, Navajo Nation Department of Fish and Wildlife

10/8/15

\*I understand and accept the conditions of compliance, and acknowledge that lack of signature may be grounds for the Department not recommending the above described project for approval to the Tribal Decision-maker.

Representative's signature

Date



**PRESIDENT  
RUSSELL BEGAYE  
VICE PRESIDENT  
JONATHAN NEZ**

NAVAJO FISH AND WILDLIFE P.O. BOX 1480 WINDOW ROCK, AZ 86515

07 October 2015

EOR002348

Howard Draper, Project Review Supervisor  
Navajo Land Department  
Post Office Box 2249  
Window Rock, Arizona 86515

Dear Howard,

The Navajo Nation Department of Fish and Wildlife (NNDFW) reviewed the Environmental Assessment for the **Blue Gap 20.24-Acre Gravel Quarry and Access Road** located in Black Mesa<sup>1</sup> Chapter, Arizona. The purpose of this letter is to inform you that we are granting the proposed project a Conditional Approval. Pursuant to the Migratory Bird Treaty Act (U.S. Code Title 16, Chapter 7, 703-712), migratory birds not listed under the NESL or ESA are prohibited from take by federal law. Vegetation removal, land clearing and grading at the quarry site and access road shall avoid the Migratory Bird breeding season of 15 MAR - 15 AUG or surveys will precede all ground-disturbing activities. If the breeding season cannot be avoided, surveys for active nests will be required. The survey must include a 50 m (165 ft.) buffer outside the edge of disturbance. Removal or disturbance of nesting habitat (i.e. trees & shrubs) will not be allowed within 50 meters of an active nest during incubation to fledging.

Please contact me at 928-871-7065 with any questions that you have concerning the review of this project.

Sincerely,

Pamela A. Kyselka, Wildlife Biologist  
Navajo Natural Heritage Program

CONCURRENCE

Gloria Tom, Director  
Department of Fish and Wildlife

10/8/15  
Date

<sup>1</sup>Chapter\_2014\_0430.shp (NLD GIS Section)



THE NAVAJO NATION

RUSSELL BEGAYE President  
JONATHAN NEZ Vice President



**ENVIRONMENTAL PROTECTION AGENCY**

OFFICE OF EXECUTIVE DIRECTOR/ADMINISTRATION

OFFICE OF ENVIRONMENTAL REVIEW

PO BOX 339 WINDOW ROCK ARIZONA 86515 Office: 928/871-7188 Fax: 928/871-7996

Website: www.navajonationepa.org

**M E M O R A N D U M**

**TO:** Howard Draper, Program & Project Specialist  
Project Review Office  
Navajo Land Department  
Division of Natural Resources

**FROM:**

Rita Whitehorse-Larsen, Senior Environmental Specialist  
Office of Executive Director/Administration  
Office of Environmental Review  
NNEPA

**DATE:** November 5, 2015

**SUBJECT:** 164 EOR 002348 Sand & Gravel Lease for Tachee Enterprise

The Blue Gap Sand and Gravel Inc., PO Box 1678, Window Rock, Arizona, 86515, submitted a sand & gravel lease to use 20.24 acres, more or less, of Navajo Nation Trust Lands for sand and gravel lease area and 6.127 acres, more or less, for [existing] access road for road improvements. Tachee Enterprises Inc., is proposing to obtain the lease to mine Navajo Tribal minerals (gravel) from the partially disturbed Blue Gap Quarry. The existing Blue Gap Quarry is 20.24 acres in size and has baked shale outcrop suitable for industrial gravel applications. All mineral extraction and processing would occur within the boundaries of the existing Blue Gap site. No new roads are needed for access. The existing 13,345.52 long and using 6.127 acres road will require a right-of-way hence it is not designated as a public roadway. The access road is being used for ingress/egress to the site. The road will be maintained when necessary and a locking gate will be installed to limit unwanted access.

Navajo Nation Environmental Protection Agency (NNEPA) reviewed<sup>1</sup> and recommends ***conditional approval*** for the proposed sand and gravel lease.

<sup>1</sup> Permits West, Inc. Environmental Assessment for Tachee Enterprises Inc., Blue Gap Gravel Quarry. April 2014.

The proposed action is required to meet the following and attain each required permit before commencing any operation activities.

**1. Navajo Nation Clean Water Act:**

- a. **Section §401 and §404:** Excavation and/or filling of waters of the US requires coverage under a US Army Corps of Engineers Nationwide (No. 44 for Mining Activities) or Individual Permit that requires CWA §401 Water Quality Certification from Navajo Nation EPA. Waters of the US jurisdictional waters are defined by Ordinary High-Water Mark characteristics. As determined in the EA, NNEPA Water Quality determined *"There appears to be no jurisdictional waters within the proposed project area. There are no filling or excavating of a jurisdictional water. Best Management Practices (BMPs) is highly recommended to be in place to prevent sediment runoff."* If you need more information, contact Patrick Antonio, Principal Hydrologist, NNEPA Water Quality.
- b. **Section §402 Multi-Sector General Permit (USEPA):** The proposed action is greater than 1 acre. Tachee Enterprises Inc., including sub-contractors are subject to complete the requirements under the Clean Water Act Section §402. *Sand and gravel operations are covered by the federal general permit for storm water discharges associated with industrial activities known as the Multi Sector General Permit (MSGP) under Sector J for Mineral Mining and Dressing specifically under J1 for Construction Sand and Gravel. USEPA recently reissued the MSGP that became effective June 4, 2015. Under the MSGP, the discharge authorization date is 30 days after USEPA notifies you that after receiving the Notice of Intent (NOI) and the Storm Water Pollution Prevention Plan (SWPPP) must be prepared before submission of the NOI. The NOI should be submitted to USEPA. USEPA does not approve SWPPP but it receives and processes the NOIs. The NOI should be submitted to USEPA and the MSGP discharge coverage occurs 30 days after notification from USEPA of a complete NOI. Coverage under the MSGP should be for the storm water discharges associated with active mining activities and for the earth-disturbing activities conducted prior to active mining activities.*

**2. Navajo Nation Air Pollution Prevention and Control Act:**

- a. The proposed action is not located in an attainment area.
- b. Visibility is good to excellent.
- c. Dust suppression must be implemented in the Best Management Practice.
- d. The Air Quality Control Program: Activity Application must be completed and submitted to NNEPA Operating Permit Program for the quarry processing, transporting and the road maintenance activities.

**3. Navajo Nation Safe Drinking Water Act:**

- a. No proposed drinking water system is expected to be at the proposed sand and gravel site.
- b. No proposed domestic waste water system is expected to be at the proposed sand and gravel site.
- c. Portable toilet rentals should be provided for onsite workers at the expense of Tachee Enterprises Inc. The portable toilet rentals shall be maintained and protected from vandalism during off working hours and holidays by Tachee Enterprises Inc.

**4. Navajo Nation Solid Waste Act:**

- a. Do not allow public to take onsite waste, cumulatively NNEPA receives complaints and reports on illegal trash dumpings on rural areas and in the waters of the US and Navajo Nation.
- b. The Tachee Enterprises Inc., is subject to control the solid waste littering and shall provide solid waste bins for onsite workers. The bins shall be maintained and protected from vandalism during off working hours and holidays by Tachee

Enterprises Inc.

5. ***Navajo Nation Comprehensive, Environmental Response, Compensation and Liability Act (CERLA):***

- a. No hazardous material will be stored, transported, generated and distributed from the proposed sand and gravel site.
- b. According the Navajo CERCLA, petroleum is considered hazardous material and any spills  $\geq$  25 gallons should be reported to NNEPA Office of Executive Director/Administration at 928/871-7692.

6. ***Navajo Nation Storage Tank Act (NNSTA) (formerly Underground Storage Tank (UST) Act; amended February 2012):***

- a. No storage tanks are proposed on the sand and gravel site.
- b. If there are plans to install underground and/or aboveground storage tanks greater than 100 gallons, the plans must meet the design specifications as outlined by NNEPA Storage Tank Program. The specifications must be approved by the Storage Tank Program. Contact the Storage Tank Program at 928/871-7993 for further technical assistance.
- c. NNEPA Storage Tank Program staff will need to be onsite before installing any above and underground storage tanks.

7. ***Federal Insecticide Fungicide and Rodenticide Act (FIFRA)/NN Pesticide Act:***

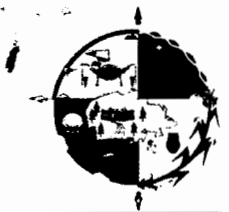
- a. The Tachee Enterprises Inc., is subject to control and prevent the spread of invasive and noxious weeds.
- b. Contact the NNEPA Pesticide Program at 928/871-7815/7810 before applying any pesticides and herbicides to control noxious and invasive plant species to ensure the product is in compliance and appropriately applied by a certified and licensed applicator.
- c. Pesticide staff will also may need to be onsite to monitor during pesticide/herbicide application.

8. ***Others To Contact Within Navajo Nation:***

- a. Existing public roads will be used for access during the operation activities.
- b. Submit all required documents for water permit including imported water to the Division of Natural Resources, Department of Water Resources – Water Code Program.

If there are any questions, you may contact Rita Whitehorse-Larsen at 928/871-7188. Thank you.

Cc: Blue Gap Chapter, PO Box 4427, Blue Gap, Arizona, 86520  
NNEPA Water Quality; Operating Permit Program; Administration chrono file  
Contact Person: Hubert Dayzie or Bruce Nicholson, PO Box 1678, Window Rock, AZ 86515; (214) 394-7561  
or (505) 488-3314



THE NAVAJO NATION  
HISTORIC PRESERVATION DEPARTMENT

PO Box 4950, Window Rock, Arizona 86515  
TEL: (928) 871-7198 / 7147 FAX: (928) 871-7886

CULTURAL RESOURCE COMPLIANCE FORM

EXHIBIT

F

ROUTE COPIES TO:

☒ LMAS

NNHPD NO.: HPD-14-014

OTHER PROJECT NO.: LMAS 1566

PROJECT TITLE: Cultural Resources Survey for the Blue Gap Gravel Quarry, Apache County, Arizona

LEAD AGENCY: BIA/NR

SPONSOR: Rincon Oil Co. LLC, P.O. Box 1678, Gallup, New Mexico 87301

PROJECT DESCRIPTION: The undertaking consists of the construction of the Blue Gap Gravel Pit and access road. Expected impacts will be from vehicle traffic along the access road and excavation and use of the gravel pit. The proposed gravel pit will comprise 25.2 acre block survey surrounded by a 50-ft cultural buffer zone and a 2.56 miles long linear access road. Ground disturbance will be intensive & extensive with the use of heavy equipment.

LAND STATUS: Navajo Tribal Trust

CHAPTER: Tachee

LOCATION: T.33N, R.22E - Sec.: 1, 11, 12, 14, & 15; Tah Chee Wash Quadrangle, Apache Arizona G&SRPM

PROJECT ARCHAEOLOGIST: Beth McCormack & Douglass Boggess

NAVAJO ANTIQUITIES PERMIT NO.: B13059

DATE INSPECTED: 10/31/13

DATE OF REPORT: 12/20/13

TOTAL ACREAGE INSPECTED: 56.05- ac

METHOD OF INVESTIGATION: Class III pedestrian inventory with transects spaced 15 m apart.

LIST OF CULTURAL RESOURCES FOUND:

(1) Isolated Occurrences (IO)

LIST OF ELIGIBLE PROPERTIES:

None

LIST OF NON-ELIGIBLE PROPERTIES:

(1) IO

LIST OF ARCHAEOLOGICAL RESOURCES:

None)

EFFECT/CONDITIONS OF COMPLIANCE: No historic properties will be affected

In the event of a discovery ["discovery" means any previously unidentified or incorrectly identified cultural resources including but not limited to archaeological deposits, human remains, or locations reportedly associated with Native American religious/traditional beliefs or practices], all operations in the immediate vicinity of the discovery must cease, and the Navajo Nation Historic Preservation Department must be notified at (928) 871-7147.

FORM PREPARED BY: Tamara Billie

FINALIZED: April 24, 2014

Notification to Proceed  
Recommended  
Conditions:

☒ Yes ☐ No

☐ Yes ☒ No

*[Signature]* 5-24-14  
The Navajo Nation  
Historic Preservation Office Date

Navajo Region Approval

☒ Yes ☐ No

*[Signature]* 5/21/14  
Acting BIA - Navajo Regional Office Date

TM 5-21-14



# THE NAVAJO NATION

RUSSELL BEGAYE PRESIDENT  
JONATHAN NEZ VICE PRESIDENT

October 20, 2015

## MEMORANDUM

TO: Howard Draper, Project Program Specialist  
Navajo Land Department- Project Review Section

FROM:   
Ora Marek-Martinez, HPD Department Manager

RE: 164B Document # 002348: Sand & Gravel Lease to Blue Gap Sand & Gravel

---

This memorandum is in regards to the Executive Official Review by the Historic Preservation Department of the Sand and Gravel Lease to Blue Gap Sand & Gravel.

After reviewing the document, it was found that the Cultural Resource Compliance Form was missing from the file. Attached to this memorandum, please find the applicable Compliance form for HPD-14-014 to complete your packet.

NNHPD further requests that the project sponsor be reminded to abide by the stipulations included on the Compliance document and if, during the course of any ground disturbing work, any cultural resources or human remains are encountered, NNHPD be contacted immediately, and that all work cease within a 50ft. boundary.

If you have any questions or concerns, please do not hesitate to contact me at tribal extension 7198 or via email at [oramm@navajo-nsn.gov](mailto:oramm@navajo-nsn.gov).

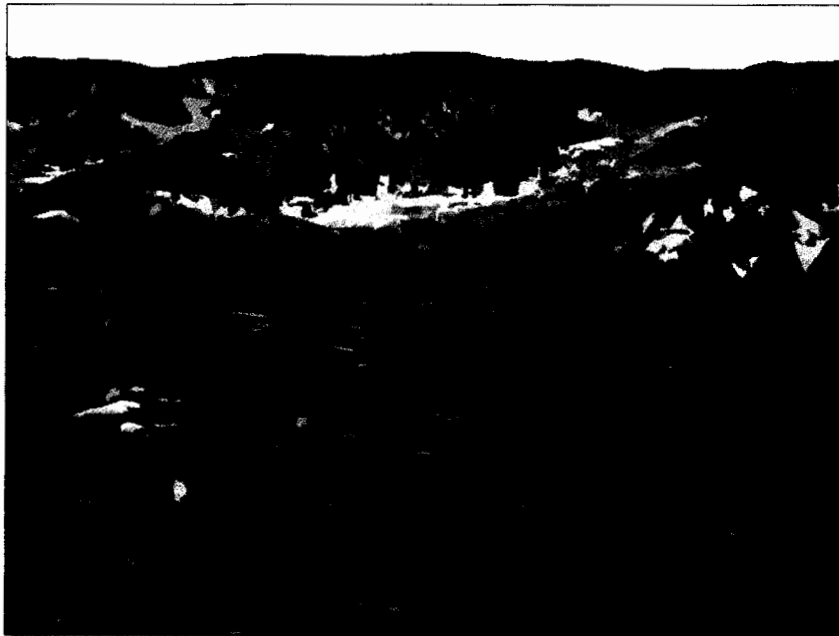
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# ENVIRONMENTAL ASSESSMENT

FOR

**TACHEE ENTERPRISES, INC.  
BLUE GAP GRAVEL QUARRY**

SECTIONS 1, 11, 12, 14, AND 15, T. 33 N., R. 22 E., APACHE COUNTY, AZ



**APRIL 28, 2014**

PREPARED BY:

**PERMITS WEST, INC.**  
PROVIDING PERMITS for LAND USERS  
37 Verano Loop, Santa Fe, New Mexico 87508 (505) 466-8120

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## **1.0 PURPOSE AND NEED**

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### **1.1 INTRODUCTION**

Tachee Enterprises, Inc. (TEI) is proposing to obtain a lease to mine Navajo Tribal minerals (gravel) from the partially previously disturbed Blue Gap Quarry located approximately 22 miles west of Chinle, AZ in Sections 1, 11, 12, 14, and 15, T. 33 N., R. 22 E., Apache County, AZ (Proposed Action). The proposed project is in the Bureau of Indian Affairs (BIA) Chinle Agency, Tachee Chapter. The existing Blue Gap Quarry is 20.24 acres in size and has a baked shale outcrop suitable for some industrial gravel applications. All mineral extraction and processing would occur within the boundaries of the existing Blue Gap site (Figure 1). No new roads are needed for access; however, an existing 13,345.52-foot long road would require a 20-foot wide right-of-way (ROW) because it is not designated as a public roadway. This access road ROW would be used for ingress/egress to the site. The existing access road would be upgraded and bladed as necessary to provide a safe travel surface, and a locking gate would be installed to limit unwanted access as shown in Figure 1.

This project Environmental Assessment (EA) addresses site-specific resources and impacts on Navajo-managed lands as required by the National Environmental Policy Act of 1969, as amended (NEPA; Pub. L. 91-90, 42 U.S.C. 4321 et seq.).

### **1.2 PURPOSE AND NEED**

The purpose of this EA is to evaluate whether BIA would provide reasonable access to Navajo Trust land, upgrade to an existing unimproved dirt access road on Tribal Trust, and provide authorization to excavate and process Navajo minerals at the proposed Blue Gap Gravel Quarry. The BIA needs to consider this action in accordance with its responsibilities under NEPA found in the Departmental Manual (DM) at 516 DM 10 and in the Indian Affairs Manual (IAM) at 59 IAM 3-H (Appendices 15 and 16), and regulations for environmental guidance for surface mining in 25 CFR Part 216 (Surface Exploration, Mining, and Reclamation of Lands).

### **1.3 CONFORMANCE WITH APPLICABLE LAND USE**

This environmental assessment addresses the resources and impacts on a site specific basis as required by the National Environmental Policy Act (NEPA) of 1969, as amended (Public Law 91-90, 42 USC 4321 et seq.). This assessment will be submitted to the Bureau of Indian Affairs (BIA) for review and approval. To date, the Proposed Action would not be in conflict with any local, county, or state plans. The Tachee (Blue Gap) Chapter endorsed the proposed quarry on March 20, 2013 under Chapter Resolution BGCH 13-03-001 (Appendix 1). Field Clearance will be requested and obtained prior to commencing the project.

### **1.4 FEDERAL, TRIBAL, STATE, AND LOCAL PERMITS, LICENSES, OR REQUIREMENTS**

Both the surface and minerals in the project area are owned by the Navajo Nation. Mining of the site would be accomplished according to applicable federal and tribal regulations. Specific details regarding mining, production, and reclamation can be referenced in the Mine Plan attached as Appendix 2.

A Navajo Nation Sand and Gravel Lease will be obtained by TEI for the right to extract gravel from near surface deposits at the site. TEI will be responsible for obtaining the required permits from Navajo Environmental Protection Agency (Navajo EPA) and/or U.S. Environmental Protection Agency (U.S. EPA), Navajo Minerals Department, and the Air Quality Control Program.

A Field clearance request for the 20.24-acre mine and the 6.127-acre access road ROW will be submitted to the Navajo Nation Project Review Office, and a response and resolution will be obtained prior to commencing the project.

The Navajo Nation Department of Fish and Wildlife – Natural Heritage Program (NNDFW) was consulted regarding Threatened, Endangered, and Special Status Species with potential to occur in the project area (Appendix 6). Both a wildlife survey and plant survey were performed of the project area by a qualified wildlife biologist and botanist. The Wildlife Survey Report and Plant Survey Report are attached as Appendices 3 and 4, respectively.

The Proposed Action would excavate an area larger than 1 acre; therefore, TEI would be subject to National Pollution Discharge Elimination System (NPDES) permit requirements. TEI will develop and file a Storm Water Pollution Prevention Plan (SWPPP) for the site and obtain a permit from the U.S. EPA NPDES Program prior to commencing operations.

TEI would be required to comply with Section 106 of the National Historic Preservation Act (NHPA). Cultural resources field inventories were collected and have undergone NHPA review and consultation with the Navajo Nation Historic Preservation Department (NNHPD). The Cultural Resources Compliance Form (CRCF) has not yet been prepared by NNHPD; however, it will be attached as Appendix 5 once received.

## **2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION**

### **2.1 ALTERNATIVE A – NO ACTION**

The BLM NEPA Handbook (H-1790-1) states that for EAs on externally initiated proposed actions, the No Action Alternative generally means that the proposed activity will not take place. This option is provided for in 43 CFR 3162.3-2 (h) (2). This alternative would deny the approval of the proposal for the gravel quarry and no activity would take place.

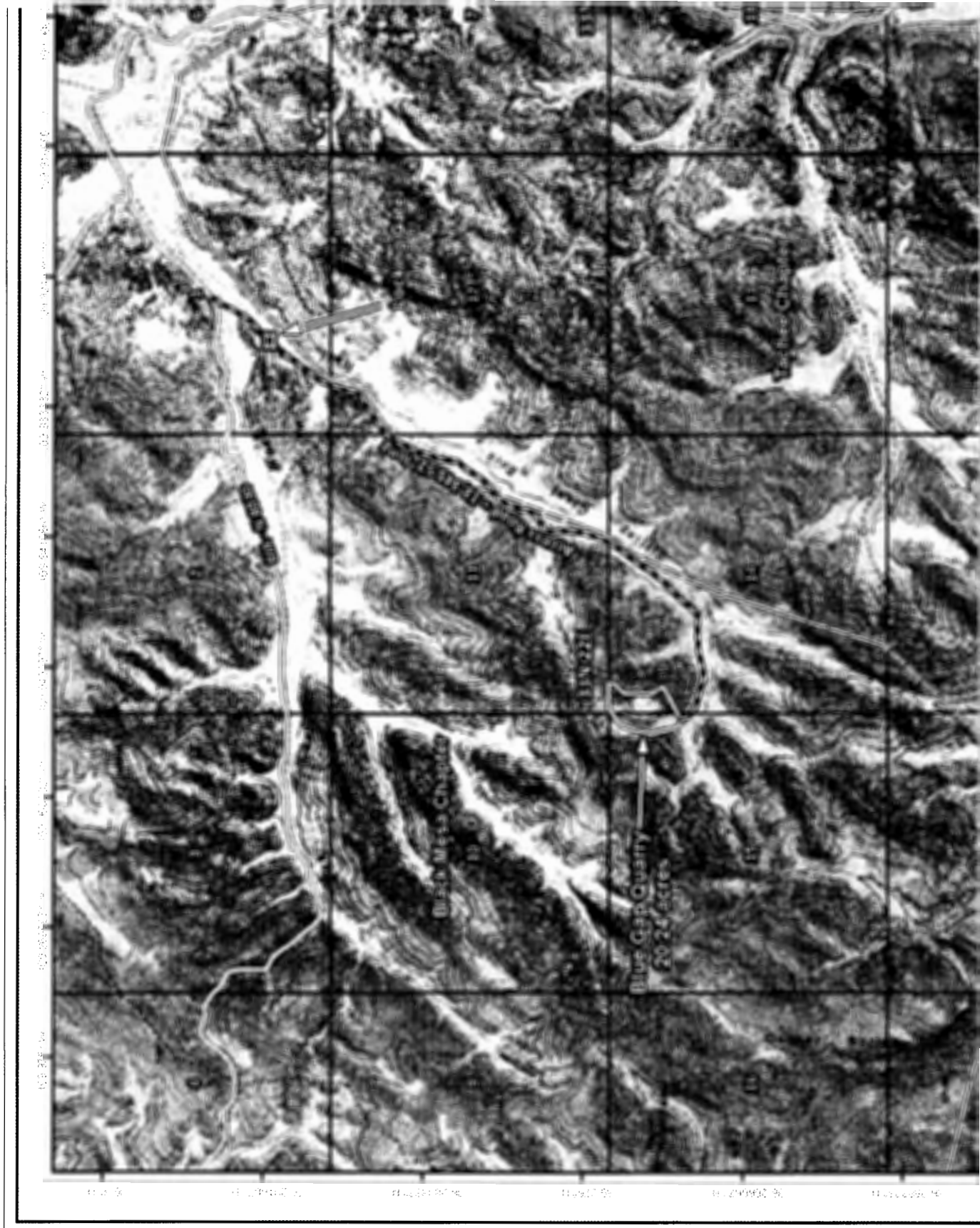
### **2.2 ALTERNATIVE B – PROPOSED ACTION**

The Proposed Action is located in Sections 1, 11, 12, 14, and 15, T. 33 N., R. 22 E., in Apache County, Arizona, approximately 6.75 miles north of the Blue Gap Chapter House (Figure 1). The project area is within the Bureau of Indian Affairs (BIA) Chinle Agency, Tachee Chapter. The total disturbance land area for the Proposed Action is 26.367 acres (20.24 acres for quarry, and 6.127 acres for the access road). The access road would be 13,345.52 feet long by 20' wide (Table 2.1). Specific details regarding mining, production, and reclamation can be referenced in the Mine Plan attached as Appendix 2.

#### **2.2.1 MATERIAL EXTRACTION, PROCESSING, AND ACCESS**

The Proposed Action involves entering and mining the proposed Blue Gap Quarry for baked shale material formed as part of coal seam fires on southern Black Mesa. TEI would be the mining operator at the site. No drilling and blasting would take place at the mine. A training program consistent with and pursuant to Mining Safety and Health Administration's (MSHA) regulation 30 CFR Part 46 would be provided to all employees of the mine at intervals consistent with the regulation. Material will be progressively loosened from the mining area (Figure 2) with a bulldozer, and pushed to the ore slope and allowed to fall under gravity to the bottom of the ore slope between the mining area and processing area on the mine floor. TEI will comply with the ground control plan stipulated in 30 CFR, Subpart B, § 56.3000 through § 56.3430. TEI will also maintain an inspection report of ground conditions required under 30 CFR, § 56.3401 and keep copies in the mine office for review. At the bottom of the ore slope, a front-end loader will scoop up material and

BLUE GAP GRAVEL QUARRY EA



BLUE GAP GRAVEL QUARRY EA



either load the material directly into trucks to be hauled off, or loaded into a power screen for initial sorting. Following sorting with the power screen, oversize material will be scooped with a loader and placed into a crusher/sorter for further processing and size reduction. The processed material will then be loaded into trucks for transport, or stockpiled in the Processing Area (Figure 2) for future sale.

During excavation and operations, it is possible that buried or previously unidentified cultural material may be encountered. In the event of a discovery, all operations in the immediate vicinity would cease and the NNHPD would be contacted for guidance and approval to proceed.

Operational equipment at the mine would include a bulldozer, front-end loader, power screen, crusher/sorter, conveyer belt(s), service trucks, water truck, and company/employee personal vehicles. Site facilities would include a portable office trailer, truck scale, dumpster or trash cage, and portable toilet. No fuels for equipment will be stored at the site. It is anticipated that the quarry would be mined for four (4) years and an estimated 254,584 cubic yards of material could be excavated during that period (Appendix 2).

**Table 2.1. Project Location, ownership, and map quadrangle.**

Project Name	Disturbance Area (Acres)	T.	R.	Sec.	Surface Ownership	County, State	Quad Map
Blue Gap Quarry	Quarry – 20.24 Road – 6.127 (13,345.52' long x 20' wide) Total – 26.367	33N	22E	1, 11, 12, 14, and 15	Navajo Tribal Trust	Apache, Arizona	Tah Chee Wash, Arizona 7.5-minute

An existing road would provide ingress/egress to the site; however, the existing road is not designated by as a public roadway. Therefore, TEI would use a 13,345.52 long by 20' wide right-of-way road (26.367 acres) for access to the site. The access road would be improved and widened to 20 feet as required to accommodate increased traffic and haul trucks prior to and/or concurrent with mining operations. A locking gate would be installed on the road to prevent unauthorized entry to the site (Figure 1).

Dust will be controlled using a water truck as conditions require. The only water use planned at the project site is for the office trailer. Water for the office trailer would be hauled from TEI's Gallup, NM office. TEI does not plan to use surface water or pump groundwater for mining in the project area. If water is required to control fugitive dust in the project area and road right-of-way, it will also be obtained from TEI's Gallup office. If this is not possible, water would be purchased from an approved source. If long-term water is required for mining, then a water use permit may be requested by TEI from the Navajo Nation Department of Water Resources; however, future need would determine any future request.

The operating hours for the Blue Gap Quarry would be from 7:00 a.m. to 7:00 p.m., Monday through Friday, depending on demand. The number of employees at the site during working hours would be approximately four to six, with a total of approximately four support vehicles, three mining vehicles and two to three pieces of processing machinery.

## 2.2.2 EROSION AND SEDIMENT CONTROL

TEI will adhere to all Navajo Nation Environmental Protection Agency (Navajo EPA) and U. S. Environmental Protection Agency (EPA) regulations and requirements to control erosion and sedimentation at the project site, including a Storm Water Pollution Prevention Plan (SWPPP) and the use of Best Management Practices (BMPs). BMPs will be implemented to control sedimentation, wind and water erosion, and wind deposition. Prior to material extraction, the top

6" of available topsoil and brush would be removed and stockpiled separate from overburden for future reclamation use. Topsoil would be stockpiled at the eastern part of the mining blocks as shown in Figure 2. In the short-term, erosion of and sedimentation from topsoil piles would be controlled by seeding and mulching the topsoil piles. Stormwater runoff barriers (e.g. straw bales and/or geotextile fences), and a small 2' high diversion berm would be installed along the western mining area boundary to prevent stormwater from runoff from the mining area to the processing area (Figure 2). The east reclamation highwall in the mining area would be sloped westward at no greater than 1V:5H (1 vertical to 5 horizontal) to limit erosion. Water would be controlled to flow north out of the mining area, west into the existing drainage, then south to exit the processing area at the southwest corner of the mine floor to Giant Sitting Rock Wash. All stormwater management will be detailed in a SWPPP that will be filed, certified, and approved by the U.S. EPA and/or Navajo EPA prior to initiating mining. Final contours and grading during closure reclamation activities would leave the mined out area with positive drainage toward the southern corner of the site. Straw bales would be placed across the drainage as it exits the processing area to prevent off-site sedimentation (Figure 2).

All personnel working at the site will receive onsite basic fire awareness training and will be notified of the locations of fire extinguishers and their proper methods of use. Every six months, persons assigned firefighting responsibilities will undergo firefighting drills conducted by TEI in order to maintain familiarity of firefighting methods, equipment, and fire safety.

### 2.2.3 RECLAMATION AND REVEGETATION

Reclamation will be performed concurrently as part of the mining cycle. Because little overburden exists at the site, crusher fines, waste rock, overburden and other unmarketable material will be used as reclamation backfill to reduce slope angles and stabilize features as interim reclamation. Where topsoil exists, the top 6" will be removed and stockpiled as a seed bed source as shown in Figure 2. Successful revegetation will be achieved by stockpiling topsoil, seeding and mulching the topsoil pile for interim reclamation, installing straw bales or similar BMP structures at the drainage low point, ripping compacted areas at least 12 inches deep on the contour to allow easier root penetration, pitting or ripping on the contour to trap storm water runoff to enhance growth, spreading topsoil evenly as a seed bed, and seeding with a Navajo Nation Department of Fish and Wildlife (NNDFW) approved seed mix (Table 2.2). Seeded areas will be monitored for success and to ensure no noxious weeds become established. Noxious weed control is outlined in the Revegetation Plan attached as Appendix 7, and follows guidelines pursuant to Navajo Nation EPA Pesticides Program noxious weed control methods. Seeded areas would be fenced until mature plant growth is established.

**Table 2.2. NNDFW Suggested Seed Mix for Reclamation.**

Plant Type	Botanical Name	Common Name
Shrub	<i>Ericameria nauseosa</i>	Rabbitbrush
Shrub	<i>Rhus trilobata</i>	Three-leaf sumac
Shrub	<i>Ribes cereum</i>	Wax currant
Shrub	<i>Artemisia carruthii</i>	Carruth's wormwood
Sub-shrub	<i>Berbis repens</i>	Creeping Oregon Grape
Grass	<i>Bouteloua gracilis</i>	Blue grama
Grass	<i>Elymus smithii</i>	Western wheat grass
Grass	<i>Sporobolus cryptandrus</i>	Sand dropseed
Grass	<i>Elymus elymoides</i>	Bottlebrush squirreltail
Grass	<i>Aristida purpurea</i>	Purple threeawn

Plant Type	Botanical Name	Common Name
Forb	<i>Melilotus officinalis</i>	Yellow sweet clover
Forb	<i>Sphaeralcea fendleri</i>	Fendler's globemallow
Forb	<i>Ipomopsis aggregata</i>	Skyrocket
Forb	<i>Achillea millefolium</i>	Common yarrow

### **2.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL**

One other location for the Proposed Action was considered; however, the present location was chosen due to the existing disturbance at the site, material availability, and proximity to consumers. No significant issues were identified for the present location of the Proposed Action during the following activities:

1. Onsite inspections;
2. Cultural Resources Inventories
3. Threatened, Endangered, and Special Status Species surveys; and
4. Review of Navajo Nation Department of Fish and Wildlife species of concern known to occur or with potential to occur on the 7.5 minute Tah Chee Wash, AZ quadrangle.

No additional alternatives to the Proposed Action, other than the No Action Alternative will be analyzed in this Environmental Assessment (EA).

### **3.0 AFFECTED ENVIRONMENT**

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This section describes the environment that could be affected by implementation of an action alternative. Aspects of the affected environment described in this section focus on the relevant major resources or issues only.

#### **3.1 TOPOGRAPHY AND GEOLOGIC RESOURCES**

The Proposed Action would occur partially within a previously mined quarry located on top of a small ridge north of Giant Sitting Rock Wash, a minor ephemeral drainage that drains to Tah Chee Wash, a moderate sized drainage that drains part of the southern Black Mesa area. Ephemeral flows in the project area tend to be minor.

The Blue Gap project area has exposures of sandstone and shale, capped with a baked shale deposit which is the target material. The project area is located on both steep and gently-sloped terrain with the desired gravel deposit occurring as a layer of hard red baked shale resulting from burned coal deposits in the area. The target gravel material overlies coal beds, siltstone units, and cross-bedded yellowish-gray sandstone units of the Wepo Member of the Mesa Verde Formation (NMGS 1958). The ore deposit is approximately 15 to 20 feet thick in the project area, but generally has varied depths across the project area.

#### **3.2 SOILS RESOURCES**

Soils within the project area are of the Ararab-Vessilla-Lindrith complex, 1 to 45 percent slopes. This soil complex consists of eolian deposits derived from sandstone over residuum weathered from sandstone and shale. The soil textures vary from stratified sandy loam to sandy loam. This soil association is found at elevations ranging from 6,700 to 8,100 feet. The mean annual precipitation is 14 to 18 inches with a mean annual temperature of 46 to 50°F and a frost-free period of 120 to 150 days (NRCS 2014).

Other attributes of this soil complex are as follows:

- Drainage Class: somewhat excessively drained
- Depth to water table: more than 80 inches
- Frequency of flooding/ponding: none/none
- Maximum salinity: nonsaline (0.0 to 2.0 mmhos/cm)
- Available water capacity: very low to moderate (0.3 to 6.5 inches; NRCS 2014)

### **3.3 AIR QUALITY**

Air quality in the region is affected by nearby industry and natural terrain. Data from 2006-2008 EPA Air Quality Index Values (AQI) for Apache County Arizona are 94.6% “good”, meaning air quality is considered satisfactory and air pollution poses little or no risk; 1.8% is “moderate”, meaning air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people (e.g. those with ozone sensitivity); and 1.8% is “unhealthy for sensitive groups”; meaning that although general public health is not likely to be affected at this AQI range, people with lung disease, heart disease, older adults, and children are a greater risk from exposure to ozone and the presence of particles in the air. The AQI is an index for reporting daily air quality and the EPA calculates the API for five major pollutants that are regulated by the Clean Air Act: ground level ozone, particulate matter (particle) pollution, carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), and nitrogen dioxide (NO<sub>2</sub>) [Air Now 2014].

The closest industry centers, high traffic areas, and commercial development potentially affecting air quality in the region would be Chinle, Arizona, located approximately 22 miles southeast of the project area.

### **3.4 WATER RESOURCES: SURFACE AND GROUNDWATER**

The project area is located in a small upper tributary valley of the Sitting Giant Rock Wash watershed. The hydrology of the project area is dominated by ephemeral drainages that are relatively deeply incised with active headcutting. Directly south of the project area is a headcut extending to the southern boundary of the project area. Much of this headcut was accelerated by previous mining activity in the area. There are no perennial or intermittent sources of water in the project area; however, there are several dirt tanks that irregularly fill with stormwater to water livestock. There are no springs, riparian areas, or wetlands in or near the project area and there are no signs of shallow groundwater near the project area.

In the immediate vicinity of the project, stormwater drains generally to the west and south, ultimately flowing to Giant Sitting Rock Wash located about 700 feet southeast of the southern quarry boundary (Figure 1). Previous mining of the site left disturbance in the upper mining area and on the mine floor.

There are no wetlands, riparian areas, or wet meadows within the project area. There are no drainages with perennial flows near the project area. A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the project area indicates that the project is not located within a 100-year floodplain (FEMA 2014).

The following Table 3.1 lists hydrologic aspects of the environment that could potentially be impacted by the Proposed Action.

**Table 3.1. Wetlands, Riparian Areas, and Floodplains.**

Resource	Discussion	Mitigation
Wetland	The area is not mapped in the National Wetlands Inventory and there are no perennial streams or wetlands in or near the project area.	No wetlands in or near proposed project area. No mitigation needed.
Riparian	There are no perennial streams or rivers and/or riparian corridors supporting multi-storied vegetation [e.g. willow ( <i>Salix spp.</i> ) or cottonwood ( <i>Populus spp.</i> )]	Not found in project area. No mitigation needed.
Floodplain	FIRM maps (FEMA 2014) indicates that the site is not located in a floodplain.	Not found in project area. No mitigation needed.

### 3.5 GENERAL WILDLIFE

On March 1, 2013, a pedestrian wildlife survey was conducted by a qualified wildlife biologist. The entire project area was inspected (mine site and access road ROW), plus a 50-foot buffer around the project area, and a 25-foot buffer on both sides of the access road. Also, a 0.5-mile radius around the project area was inspected for raptor nests, along with a 1.0-mile line-of-sight survey from the project area. No federal or Navajo listed species were observed during the wildlife survey. The Wildlife Survey Report dated March 25, 2013 is provided as Appendix 3.

Wildlife in the project area is typical for the pinyon (*Pinus edulis*)-juniper (*Juniperus spp.*) ecosystem and associated ecotones of the Colorado Plateau. The area provides wildlife habitat in the form of basins, washes, mesas, pinyon-juniper woodlands, juniper savannahs, sagebrush, and desert grasslands. Wildlife occurring in the area is typical of the Arizona Upper Sonoran life zone (Appendix 3). Ungulates such as elk and mule deer utilize valleys and side slopes for forage and thermal cover, and numerous remote drainages and highlands with pockets of ponderosa support a wide variety of avian, reptilian, and mammalian species. The entire project area is grazed by horses, cows, and sheep, and supports elk (*Cervus canadensis*) and mule deer (*Odocoileus hemionus*) as well.

There are no perennial waters that could support fish populations in the vicinity of the project area.

### 3.6 VEGETATION AND FORESTRY

On March 1, 2013, the project area and access road were surveyed by a qualified botanist. The survey of the proposed gravel quarry was accomplished by walking parallel transects across the proposed project area, including a 200-foot buffer around the project area, at approximately 80-foot intervals. Areas of steep slopes on the east side of the proposed quarry were not fully transected but were visually inspected from above and below. The proposed access road was surveyed by walking zig-zag transects through the 20-foot corridor and 200-foot buffers on each side of the corridor.

The access begins in a broad grassy canyon bottom dominated by blue grama (*Bouteloua gracilis*) with areas of mat grama (*Bouteloua simplex*) and scattered pinyon (*Pinus edulis*) and viscid rabbitbrush (*Chrysothamnus viscidiflorus*). Sandstone ledges near the start are dominated by blue grama, viscid rabbitbrush, broom snakeweed (*Gutierrezia sarothrae*), and big sagebrush (*Artemisia tridentata*). The sides of the canyon are in a pinyon-juniper woodland, which the access soon enters. The woodland is dominated by pinyon and one-seed juniper (*Juniperus monosperma*) with an understory of big sagebrush, viscid rabbitbrush, and four-wing saltbush (*Atriplex canescens*).

The abandoned gravel quarry is small and open and is dominated by areas of curly gumweed (*Grindelia squarrosa*), four-wing saltbush, pale wolfberry (*Lycium pallidum*), and blue grama. The surrounding slopes are dominated by pinyon and cliffrose (*Purshia mexicana* var. *stansburyana*), with one-seed juniper joining these two species in the higher proposed expansion area to the east. On this mesa top

above the abandoned quarry are areas dominated by rock goldenrod (*Petradoria pumila*), Gambel's oak (*Quercus gambelii*), and broom snakeweed. A portion of this area along the east side of the abandoned quarry appears to have been previously cleared, but not quarried. This area is dominated by cliffrose and rubber rabbitbrush (*Chrysothamnus nauseosus* var. unknown) with scattered narrow-leaf yucca (*Yucca* sp.).

There are no plants listed by the NNHP as species of concern that are known to occur in or near the project area. No plant species of concern to the Navajo Natural Heritage Program or the United States Fish and Wildlife Service will be impacted by the proposed project. There are seventeen species listed on the BIA Navajo Noxious Weed List. None of these species is present in the project area (Appendix 4).

Additional detail regarding vegetation and noxious weeds can be referenced in the Plant Survey Report dated April 14, 2013 attached as Appendix 4.

### **3.7 THREATENED, ENDANGERED, AND SPECIAL STATUS SPECIES**

No federally or Navajo listed threatened, endangered, or special status species were observed during the March 1, 2013 wildlife survey. However, suitable habitat for the northern saw-whet owl (*Aegolius acadicus*) was present. The northern saw-whet owl is a NESL Group 4 species which is the Navajo Nation's lowest level of protection. Several attempts were made to contact the Navajo Nation for guidance regarding this species with no reply. Therefore, no additional action was taken regarding the northern saw-whet owl habitat at this site. A detailed inventory of wildlife species documented at the site, their potential to occur, existence of suitable habitat, and their listed status are provided in the Wildlife Survey Report attached as Appendix 3.

None of the target plant species were found during the March 1, 2013 botanical survey. The Navajo Natural Heritage Program maintains a Navajo Nation Sensitive Species List (NNHP 2008) in addition to the NESL. None of the plant species on the list were found during this survey. A detailed inventory of plant species documented at the site, their potential to occur, existence of suitable habitat, and their listed status are provided in the Plant Survey Report attached as Appendix 4.

Currently there are a total of six Navajo Nation special status and federally listed species that have the potential to occur in or near the project area. These species include those that have Navajo cultural or economic significance, those that are protected by Navajo Fish and Wildlife Natural Heritage Program (NNHP), and those that are protected by the Federal Endangered Species Act (ESA), the Eagle Protection Act EPA), and the Migratory Bird Treaty Act (MBTA). Most of the species designated for protection under these acts require specific habitat elements that are unique to the species.

### **3.8 CULTURAL RESOURCES**

Lone Mountain Archaeological Services (LMAS) surveyed the project area on October 31, 2013. No cultural resource sites and only one isolated occurrence were identified during the survey and initially, the Navajo Nation did not identify any Traditional Cultural Properties (TCPs). The isolated occurrence (grayware sherd) has been completely recorded in a manner consistent with current standards and does not require any additional work (LMAS 2013). However, after the Archaeological Report was submitted, the Navajo Nation Historic Preservation Division (NNHPD) identified a TCP in or near the project area. As such, LMAS worked with the NNHPD to determine the location, extent, and any avoidance or standoff distances that would apply to the TCP. After further investigation, the TCP was determined by NNHPD to be outside of the project area and would not be affected by mining activity. The original survey findings were published in a report titled "Lone Mountain Report No. 1566." A determination of "no historic properties affected" and no further work is recommended based on the lack of located

cultural resources (LMAS 2013). If buried cultural resources are located during construction, work will cease and the Navajo Nation would be contacted for guidance.

Compliance with Section 106 responsibilities of the National Historic Preservation act (NHPA) would be adhered to, as well as consultation with the Cultural Resources Compliance Section (CRCS) of the Navajo Nation Historic Preservation Department. No Cultural Resources Compliance Form (CRCF) has yet been issued by NNHPD; however, once received, it will be included as Appendix 5.

### **3.9 VISUAL RESOURCES**

Typically views are uninterrupted throughout the Navajo Nation with few structures visible except two track routes, barbed wire fencing, the occasional power line in the distance, and infrequent homesites. This leaves one with an impression of space and remoteness. However, along travel routes, intrusions are more numerous and apparent including: signs, highways, dirt roads, power lines, pipeline corridors, industrial buildings, and residences.

The project area has been previously developed for material extraction and thus represents a visually altered landscape. Views of the project area are defined by strong horizontal forms with numerous intersecting horizontal and diagonal lines broken by strong vertical forms that are rough and darkly colored. The mid-ground and background from the project area are defined by gently to sharply undulating surfaces with moderate contrast between depositional layers forming moderate valleys and uplands bounded by gold and yellow sandstone cliffs with dark and light gray and tan shale slopes. Within the project area, vegetation changes from very little on the gravel flats on the mine floor to yellow and/or pastel green grasses (seasonally dependent) with infrequent grey/green shrubs on the upper slopes and ridges. Above the quarry, vegetation transitions to dark green with coarser textures dominating from the larger conifer trees. Surrounding the site on the valleys and ridges are silhouetted dark green and blue conifers forming transitional and digitate edges between changing vegetation communities. Textures of vegetation are finer in the foreground and mid-ground (flats in the processing area) with uneven and random patches of shrubs and grass, mostly concentrated in erosional drainages west and south of the project area. Coarseness increases from the project area to the slopes and ridges as vegetation changes from grass and shrubs and conifers. This change sometimes appears abrupt due to vegetation forming a digitate pattern following the flow of drainages along ridges and canyons. Nearby ephemeral drainages are visible flowing into Giant Sitting Rock Wash from the uplands to the south and west. The landform soil appears in tan, beige with rusts, light and dark brown, and light orange and gold, yellow, and light and dark gray.

The closest homesite to the project area is located approximately 0.75 miles east of the mine area just north of the access road. The quarry site is not readily apparent to the casual observer and is not visible from any homesite or public roadway.

### **3.10 NOISE**

Currently noises heard from the project area are dominated by natural sources such as wind and animals. Noises generated from human activities in the vicinity of the project area are from traffic along the access road, livestock grazing, and other users in the area (closest home is about 0.75 miles east). The site is currently relatively quiet with little noise disturbances heard by the casual observer. Noises generated from within the project area would not likely travel far due to the topographic barriers to sound movement (ridges, trees, valleys).

### **3.11 SOCIOECONOMIC RESOURCES**

The total population of Chinle, AZ, which is located approximately 22 miles southeast of the project area, is about 4,518 people according to 2010 U.S. Census Bureau records (U.S. Census Bureau 2010). Most of the jobs generating the income in the region are general service industry jobs. Rural activities, such as farming and raising livestock, may supplement workers' wages. Native cultural arts and crafts are also a source of income for some Navajos living in the area.

#### **3.11.1 LAND USE**

The proposed project is located on Navajo Tribal Trust surface. Hunting, wood gathering, ceremonial use, residences, and raising livestock/farming are the primary land uses in the project area. Grazing allotments are located within and adjacent to the project area.

#### **3.11.2 TRANSPORTATION**

Access to the Blue Gap Quarry would be along an existing 2.53-mile long dirt roadway that was previously used to access the old quarry (Figure 1). BIA Routes N-8028 and N-8030 north of the Tachee (Blue Gap) Chapter House will provide the initial approach to the project's access road to the mine site. These travel routes are currently not in conflict with local transportation needs.

### **3.12 HAZARDOUS AND SOLID WASTE**

Some hazardous materials would be used on site (e.g. fuels, hydraulic oils, etc.); however, no hazardous wastes or toxic substances would be stored at the site. Mining activities would not create any hazardous wastes. A portable toilet would be located in the project area. Human wastes would be removed on a regular basis and would be disposed of at an approved facility. Trash generated during construction and operation of the mine would be stored in a dumpster or trash cage in the processing area. No wastes would be buried or burned at the site. Currently, there are no hazardous wastes or other environmental contaminants in the vicinity of the project area.

### **3.13 PUBLIC HEALTH AND SAFETY**

There is currently no mining activity occurring at the site, and there are no activities proposed that would result in a hazard to public health and safety. Shared public roads would ultimately be used to transport machinery, crews, and produced materials to and from the site. No activities are proposed that would endanger public health and safety.

## **4.0 ENVIRONMENTAL CONSEQUENCES**

Various resources described in Section 3.0 have issues identified that could result in impacts from the operation and subsequent reclamation and closure of the Blue Gap Quarry. The relevant and pertinent impacts to the local environment from the Proposed Action are described in the following sections.

### **4.1 TOPOGRAPHY AND GEOLOGIC RESOURCES**

#### **4.1.1 DIRECT AND INDIRECT EFFECTS OF THE NO ACTION ALTERNATIVE**

Under the No Action Alternative, the mine and access road would not be authorized or constructed and no impacts to topography and geologic resources would occur.

#### **4.1.2 DIRECT AND INDIRECT EFFECTS OF THE PROPOSED ACTION**

A direct impact to topography would occur from modification to the shape and drainage pattern in the project area. The resulting excavation would leave the topography permanently changed from its existing form. The elevation of the project area would be modified but would remain flat on the mine floor with slopes  $\leq 5H:1V$ . These topographic grades would be consistent with surrounding landforms and contours. The post-mining topography would leave the area altered, but would not be significantly different from the current topographic character or function of the site.

#### **4.1.3 MITIGATIONS FOR TOPOGRAPHY AND GEOLOGIC RESOURCES**

As long as appropriate protective and reclamation measures outlined as design features of the Proposed Action are followed, no mitigations to protect topography or geologic resources should be required.

### **4.2 SOILS RESOURCES**

#### **4.2.1 DIRECT AND INDIRECT EFFECTS OF THE NO ACTION ALTERNATIVE**

Under the No Action Alternative, the mine and access road would not be authorized or constructed and no impacts to soils resources would occur.

#### **4.2.2 DIRECT AND INDIRECT EFFECTS OF THE PROPOSED ACTION**

Soils would be directly affected in the project area and access road for the life of the project due to scraping, mixing, compacting, and burying. BMPs (straw bales) would be implemented at the mine exit (Figure 2) to filter stormwater leaving the project area limiting impacts from erosion and sedimentation. Where available, the top 6" of topsoil would be collected for stockpiling and later use as a seed bed during reclamation revegetation to ensure revegetation success and limiting bare soil exposures. Areas receiving considerable heavy machinery traffic would be heavily compacted; however, TEI would rip compacted areas at least 12" deep and distribute stockpiled topsoil as a seed bed, seed with a Navajo Nation approved seed mix to limit impacts to soils and help re-establish a viable post-mining soil in the project area.

#### **4.2.3 MITIGATIONS FOR SOILS RESOURCES**

As long as appropriate protective and reclamation measures outlined as design features of the Proposed Action are followed, no mitigations to protect soils resources should be required.

## **4.4 AIR QUALITY**

### **4.4.1 DIRECT AND INDIRECT EFFECTS OF THE NO ACTION ALTERNATIVE**

Under the No Action Alternative, the mine and access road would not be authorized or constructed and no impacts to air quality would occur.

### **4.4.2 DIRECT AND INDIRECT EFFECTS OF THE PROPOSED ACTION**

Proposed upgrades to the access road, prior to and during operation of the mine, would lead to a temporary (for the life of the mine) increase in emissions and fugitive dust during construction. These increased dust and exhaust emissions would be short-term and would occur prior to opening the quarry and intermittently during the life of the mine during maintenance activities.

For the life of the project (approx. 4 years), dust and emissions from heavy equipment operating at the mine, and dust and emissions from haul trucks operating on the access road and in the active quarry, would temporarily increase in the project area. Emissions would be greater on weekdays during daylight hours while operating. Fugitive dust emissions would also slightly increase along the public dirt access roads leading to the project area; however, this infrequent low speed truck traffic is not anticipated to cause significant air quality impacts to local receptors. The nearest air quality receptor is a home located about 0.75 miles east of the quarry along the access road ROW. Emissions from heavy equipment and traffic would include volatile organic compounds (VOC), oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), hydrocarbons (HC), and particulate matter. Slight local increases in all of these emissions are anticipated during the estimated four year operational life of the quarry. If dust is regularly controlled in the active mining area and access road, using water sprayed from a water truck, significant impacts to air quality are not anticipated.

### **4.4.3 MITIGATIONS FOR AIR QUALITY**

As long as water is sprayed to control dust and appropriate BMPs outlined as design features of the Proposed Action are followed, no mitigations to protect air quality should be required.

## **4.5 WATER RESOURCES: SURFACE AND GROUNDWATER**

### **4.5.1 DIRECT AND INDIRECT EFFECTS OF THE NO ACTION ALTERNATIVE**

Under the No Action Alternative, the mine and access road would not be authorized or constructed and no impacts to water resources would occur.

### **4.5.2 DIRECT AND INDIRECT EFFECTS OF THE PROPOSED ACTION**

No water would be generated during mining or operations at the Blue Gap Quarry site. Some water may be required for dust control on an as needed basis. Any water required at the site would be trucked in by TEI from either its Gallup, NM office, or purchased from an approved source.

Direct impacts to water resources could result from increases in sediment loading into adjacent surface drainages through runoff of disturbed soils and dust generation from mining operations. Spilled contaminants (e.g., fuel, hydraulic oil) could also be accidentally introduced into the environment that resulting in negative consequences. Also, potential changes to runoff patterns from ongoing earthwork at the site could result in sedimentation or ponding within the mine area during operations.

Under the Proposed Action, TEI will implement appropriate BMPs to protect resources. No fuels for equipment will be stored on site. Any spilled contaminants will be cleaned up as soon as possible by TEI to prevent run-off or infiltration of contaminants and immediately reported to the Navajo Nation

and EPA. During closure, positive drainage will be established at the site to control stormwater flows to drain out the southwest corner of the mine site through straw bales or other appropriate BMP structure to filter sediment from stormwater. The entire site will be prepped and seeded with a seed mix approved by the Navajo Nation. Based on these site controls and BMPs, no significant impacts to surface or groundwater resources are anticipated.

#### **4.5.3 MITIGATIONS FOR WATER RESOURCES**

As long as appropriate BMPs outlined as design features of the Proposed Action are followed, no mitigations to protect water resources should be required.

### **4.6 GENERAL WILDLIFE**

#### **4.6.1 DIRECT AND INDIRECT EFFECTS OF THE NO ACTION ALTERNATIVE**

Under the No Action Alternative, the mine and access road would not be authorized or constructed and no impacts to wildlife would occur.

#### **4.6.2 DIRECT AND INDIRECT EFFECTS OF THE PROPOSED ACTION**

Noise and activity associated with the project would likely result in behavioral changes in local wildlife. Hunting and foraging patterns, nesting, denning, and migration patterns may be altered to avoid the project area, especially during operating hours. Direct impacts to wildlife could result from displacement and traffic collisions with individual animals. Local wildlife would likely adjust to these patterns and may still use the vicinity of the project area during or after hours, which could alleviate impacts to movement patterns and behaviors. Environmental contaminants such as dust and emissions, or spilled contaminants such as fuels and oil, could directly affect local wildlife if exposure occurs. All contaminants would be sealed and contained properly and all spills would be cleaned up promptly and thoroughly to reduce potential exposure to wildlife and immediately reported to the proper authorities.

During operation, removal of vegetation would result in a temporary loss of forage and cover. Reclamation efforts described in the Revegetation Plan (Appendix 7) would restore vegetation and may ultimately improve the availability of forage and cover following closure. During closure, vegetation will be reestablished using a Navajo approved seed mix.

Although there would be direct disturbances from mining and a loss of vegetation for the life of the mine, no threatened, endangered, or special status wildlife species were observed, and significant impacts to listed wildlife are not anticipated.

#### **4.6.3 MITIGATIONS FOR WILDLIFE**

As long as appropriate BMPs and revegetation standards outlined as design features of the Proposed Action are followed, no mitigations to protect general wildlife should be required.

### **4.7 VEGETATION AND FORESTRY RESOURCES**

#### **4.7.1 DIRECT AND INDIRECT EFFECTS OF THE NO ACTION ALTERNATIVE**

Under the No Action Alternative, the mine and access road would not be authorized or constructed and no impacts to vegetation and forestry resources would occur.

#### **4.7.2 DIRECT AND INDIRECT EFFECTS OF THE PROPOSED ACTION**

Mining operations and improvement to the access road will remove existing vegetation from up to 26.367 acres of the project area. There are no noxious weeds present at the site (Appendix 4). It is

possible that noxious weed populations may become established at the site, introduced by unwashed equipment, vehicles travelling to and from the site, and other vectors. BMPs to protect resources will be implemented, and following mining, the site will be revegetated using a Navajo approved seed mix. The site will also be monitored at regular intervals for the presence of noxious weeds. Vegetation would be restored to cleared areas through seeding and reclamation efforts outlined in the Revegetation Plan attached as Appendix 7. The implementation of these design features should limit impacts to vegetation and forestry resources and prevent the establishment and/or spread of noxious weeds at the site. As a result, no significant impacts to vegetation and forestry resources are anticipated.

#### **4.7.3    *MITIGATIONS FOR VEGETATION AND FORESTRY RESOURCES***

As long as appropriate BMPs and revegetation standards outlined as design features of the Proposed Action are followed, no mitigations to protect vegetation or forestry resources should be required.

### **4.8    *THREATENED , ENDANGERED, AND SPECIAL STATUS SPECIES***

#### **4.8.1    *DIRECT AND INDIRECT EFFECTS OF THE NO ACTION ALTERNATIVE***

Under the No Action Alternative, the mine and access road would not be authorized or constructed and no impacts to threatened, endangered, and special status species would occur.

#### **4.8.2    *DIRECT AND INDIRECT EFFECTS OF THE PROPOSED ACTION***

None of the species indicated on the NNHP list were observed during the surveys; however habitat does exist at the site for one species and migratory birds including: northern saw-whet owl, and all migratory birds. Land surrounding the project area provide ample similar habitat to that found in the project area. Other impacts to these species would be the same as those discussed for vegetation and general wildlife. Therefore, the temporary loss of habitat for the one sensitive wildlife species should not have significant negative effects to this species as a whole.

#### **4.8.3    *MITIGATIONS FOR THREATENED, ENDANGERED, AND SPECIAL STATUS SPECIES***

As long as appropriate BMPs and revegetation standards outlined as design features of the Proposed Action are followed, no mitigations to protect threatened, endangered, and special status species should be required.

### **4.9    *CULTURAL RESOURCES***

#### **4.9.1    *DIRECT AND INDIRECT EFFECTS OF THE NO ACTION ALTERNATIVE***

Under the No Action Alternative, the mine and access road would not be authorized or constructed and no impacts to cultural resources or Traditional Cultural Properties would occur.

#### **4.9.2    *DIRECT AND INDIRECT EFFECTS OF THE PROPOSED ACTION***

Lone Mountain Archaeological Services (LMAS) surveyed the project area and found no cultural sites, one isolated occurrence (IO), and no TCPs. No resources are considered significant and eligible for nomination to the National Record of Historic Places (NRHP) or for protection under the Archaeological Resources Protection Act (ARPA; 16 USC 470). During excavation and operations, it is possible that buried or previously unidentified cultural material may be encountered. Any cultural resources (historic or prehistoric site or object) discovered by TEI or its contractors during the life of the Proposed Action, or any person working on their behalf, would be protected and immediately

reported to the NNHPD. All work in the area of a discovery would be immediately suspended until approval to proceed is issued by NNHPD.

#### **4.9.3     *MITIGATIONS FOR CULTURAL RESOURCES***

As long as appropriate BMPs outlined as design features of the Proposed Action are followed, no mitigations to protect cultural resources should be required.

### **4.10   *VISUAL RESOURCES***

#### **4.10.1     *DIRECT AND INDIRECT EFFECTS OF THE NO ACTION ALTERNATIVE***

Under the No Action Alternative, the mine and access road would not be authorized or constructed and no impacts to visual resources would occur.

#### **4.10.2     *DIRECT AND INDIRECT EFFECTS OF THE PROPOSED ACTION***

The project area is located at the end of an existing but undesignated dirt roadway. The location of the mine is not visible from any major road, highway, or homesite. One local resident living east of the site may be able to see dust from operations and traffic traveling the access road past the homesite. There are no travelers or other land users in the area that have access past the locking gate, or a clear view of any proposed mining or processing activity areas. The existing quarry already presents a scar on the landscape and proposed new mining activity is unlikely to significantly alter the already disturbed site. The proposed site is mostly disturbed and would not be greatly altered.

New mining will however slightly alter the character of the project area by removing existing vegetation and creating a high contrast feature (quarry with mine floor). However, due to the nature of the surrounding landscape (strong blocking ridgelines), the light soil colors (light tan to gold and light gray to orange), and lack of significant vegetative cover in the existing abandoned quarry site, alteration to the project area would not be obvious to the casual observer from a distance, and no public vantage points offer a clear view of any part of the mine. Also, the proposed contours and elevations to be created as part of mining and closure are similar to natural features and shapes surrounding the project area. Also, upon closure, the mine area would be reclaimed and seeded with a Navajo approved seed mix and fenced to exclude grazing. As a result, no significant impacts to visual resources are anticipated from implementation of the Proposed Action.

#### **4.10.3     *MITIGATIONS FOR VISUAL RESOURCES***

As long as appropriate BMPs and revegetation standards outlined as design features of the Proposed Action are followed, no mitigations to protect visual resources should be required.

### **4.11   *NOISE***

#### **4.11.1     *DIRECT AND INDIRECT EFFECTS OF THE NO ACTION ALTERNATIVE***

Under the No Action Alternative, the mine and access road would not be authorized or constructed and no impacts to noise resources would occur.

#### **4.11.2     *DIRECT AND INDIRECT EFFECTS OF THE PROPOSED ACTION***

During operating hours (7 a.m. to 7 p.m. Monday through Friday) the mine and access road will generate noise. Over the life of the mine, the ambient noise levels in the project area will increase due to the use of heavy equipment, powered processing equipment, vehicle traffic, and human activity. These operating noises are unavoidable but would be temporary for the life of the mine (approx. 4 years). This mining noise may impact wildlife and nearby residents when environmental

conditions allow (e.g., wind blowing noise toward receptor). Although noise will increase in the project area, there are no homes with 0.75 miles of the project area and no homes, businesses, or structures within a direct line-of-sound. Additionally, mining equipment would be located in the quarry and shielded by surrounding topographic and biological barriers (i.e., ridges and trees).

There are no receptors and no nearby homes (closest approx. 0.75 miles east) in the direct line-of-sound of the mine area. No blasting or drilling will occur at the site. Therefore, no significant impacts to noise resources are anticipated.

#### **4.11.3 MITIGATIONS FOR NOISE**

As long as appropriate BMPs outlined as design features of the Proposed Action are followed, no mitigations to protect noise resources should be required.

### **4.12 SOCIOECONOMIC RESOURCES**

#### **4.12.1 DIRECT AND INDIRECT EFFECTS OF THE NO ACTION ALTERNATIVE**

Under the No Action Alternative, the mine and access road would not be authorized or constructed and no impacts to socioeconomic resources would occur.

#### **4.12.2 DIRECT AND INDIRECT EFFECTS OF THE PROPOSED ACTION**

The Proposed Action will have a temporary beneficial impact on socioeconomic conditions in the area by improving employment, increasing the tax base, generating royalties for the Navajo Nation, and generating an industrial gravel source to support construction projects in the region. Up to six workers will be needed to operate the Blue Gap Gravel Quarry. The project would also have a beneficial impact from purchases at local supply stores, gas stations, restaurants/grocery stores, and other businesses by employees of the mine. This will all help to improve economic conditions in the region.

Upon closure of the mine, reclamation efforts would restore the vegetation at the site to resemble the surrounding vegetative community. These efforts would be monitored for success and to ensure that no noxious weeds become established at the site. Establishment of reclamation vegetation is expected to take several years. Once vegetation establishes, some land use activities could be resumed such as grazing and hunting to replace land uses lost by mining.

The land use within the project area would be temporarily altered to a saleable mineral mining use. This would be quite different from the current uses of livestock grazing, wood gathering, and hunting. Direct impacts would result from clearing approximately 20.24 acres of potential grazing and hunting land in the mine site for the life of the project. However, none of these activities will be heavily impacted due to the presence of large amounts of similar land available for the same or similar uses entirely surrounding the project area. Furthermore, the project area does not offer prime grazing or hunting opportunities.

There will also be an increase in local traffic along the access roads leading to the mine for the life of the project (approx. 4 years). Most traffic would be from haul trucks, employee vehicles, a water truck, and service trucks travelling to and from the site. This increased traffic may impact air quality by increasing emissions (dust and exhaust), ambient noise levels, and local traffic patterns during construction and operation; however, these impacts will be temporary and minor and would become less noticeable over time as people habituate to the increased level of activity. None of this is anticipated to have a significant negative impact on the socioeconomics of the area.

#### **4.12.4 MITIGATIONS FOR SOCIOECONOMIC RESOURCES**

Grazing permittees in the vicinity of the Proposed Action would be compensated for the clearing of approximately 20.24 acres for the mine site and 6.127 acres for the access road ROW of grazing land.

### **4.13 HAZARDOUS AND SOLID WASTE**

#### **4.13.1 DIRECT AND INDIRECT EFFECTS OF THE NO ACTION ALTERNATIVE**

Under the No Action Alternative, the mine and access road would not be authorized or constructed and no impacts from hazardous and/or solid wastes would occur.

#### **4.13.2 DIRECT AND INDIRECT EFFECTS OF THE PROPOSED ACTION**

Some hazardous materials will be used at the site (e.g. fuels and oils). These substances have the potential to negatively impact the environment if not properly contained and handled. There is also the potential for hazardous materials, such as fuels to be spilled in the project area. Infiltration of hazardous materials into the soils and ultimately into groundwater can have significant negative consequences on local residents and wildlife. As a result, machinery will be inspected daily for leaks and any leaks will be corrected prior to mining. All machinery will have on board spill kits to soak up any spills or leaks identified. All hazardous or contaminant materials brought on site will be properly contained and handled according to federal and Navajo Tribal Hazardous Waste guidelines. Major spills will be contained, immediately cleaned up by TEI, and reported to the Navajo Hazardous Waste Program. A portable toilet would be available on site and would be pumped as needed. Human waste would be disposed of at an approved disposal facility. All solid waste would be collected in a trash cage or dumpster and disposed of as needed at an approved disposal facility. Therefore, no significant impacts from hazardous or solid wastes are anticipated.

#### **4.13.3 MITIGATIONS FOR HAZARDOUS AND SOLID WASTE**

As long as appropriate BMPs and revegetation standards outlined as design features of the Proposed Action are followed, no mitigations to protect against hazardous and solid wastes should be required.

### **4.14 PUBLIC HEALTH AND SAFETY**

#### **4.14.1 DIRECT AND INDIRECT EFFECTS OF THE NO ACTION ALTERNATIVE**

Under the No Action Alternative, the mine and access road would not be authorized or constructed and no impacts to public health and safety would occur.

#### **4.14.2 DIRECT AND INDIRECT EFFECTS OF THE PROPOSED ACTION**

The Proposed Action could potentially impact the health and safety of local residents and the public. Potential impacts to health and safety could result from exposure to dust and emissions during mining operations, heavy equipment usage, exposure to hazardous materials, increased air pollution in the vicinity of the mine (closest resident is approximately 0.75 miles east); however, the general public would not be exposed to the majority of these impacts. Dust control measures (water truck) and limited idle time of trucks and equipment would help to alleviate impacts to air quality, local residents, and the general public that may be sensitive to emissions. The greatest hazards to the general public are from haul trucks traveling roads and unauthorized trespass into the mine site. The access road to the mine will have a locking gate installed to limit unauthorized entry to the site. Therefore, significant impacts to public health and safety are not anticipated.

#### 4.14.3 MITIGATIONS FOR PUBLIC HEALTH AND SAFETY

As long as appropriate BMPs and site controls outlined as design features of the Proposed Action are followed, no mitigations to protect public health and safety should be required.

#### 4.15 CUMULATIVE IMPACTS

Past impacts to the Area of Potential Effect (APE) have come from previous gravel mining activities, road building (access road), wood gathering, grazing of livestock, and hunting. The previous mining operation of the Blue Gap Quarry left a sizeable visual impact on the land. The Proposed Action would increase visual impacts slightly on up to 26.367 acres, but limit new disturbance by mostly mining within the boundaries of the previous operation. The Proposed Action would also add to the current rate of erosion and sedimentation that is occurring naturally and from man-made activities in the area. These visual and erosion impacts would be somewhat alleviated by successful earthwork reclamation and reseeding of the site and the placement of appropriate BMPs to protect resources. The Proposed Action would add to the cumulative impacts to air quality originating from industry and traffic in the Chinle/Many Farms region. Cumulative impacts to hunting and recreation in the area would increase by up to 26.367 acres due to the exclusion of hunters from the project area using a locking gate. However, installation of a locking gate and prevention of unauthorized entry into the site would limit any negative effects to human health and safety. Cumulative impacts to travel and air quality along local roads would be increased due to an increase in operational traffic for the mine.

### 5.0 CONSULTATION AND COORDINATION

This section includes individuals responsible for obtaining the information necessary for the preparation of this document.

Interdisciplinary Team			
Member	Title	Organization	Performed Onsite Inspection?
Tim Holman	Author, consultant	Permits West, Inc.	Yes
Celia Cook	Wildlife Biologist	Permits West, Inc.	Yes
Marian Rohman	Botanist	Permits West, Inc.	Yes
Mary Errickson	Archaeologist	CASA-Archaeology	Yes
Hubert Dayzie	President	Tachee Enterprises, Inc.	Yes
Bruce Nicholson	VP Operations	Tachee Enterprises, Inc.	Yes

#### 5.1 CONTACT INFORMATION

##### Author/Consultant:

Tim Holman  
Permits West, Inc.  
37 Verano Loop  
Santa Fe, NM 87508  
Office: 505-466-8120  
Fax: 505-466-9682


##### Applicant/Operator:

Hubert Dayzie  
Tachee Enterprises, Inc.  
P.O. Box 1678  
Window Rock, AZ 86515  
Phone # 1: (214) 394-7561  
Phone # 2: (505) 488-3314

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**JOHNNY NAIZE** COUNCIL DELEGATE

**ANITA DRAPER** COMMUNITY SERVICES COORDINATOR

**BGCH 13-03-001**  
**Special Meeting**

**RESOLUTION OF BLUE GAP/TACHEE CHAPTER**

**REQUESTING RECON OIL COMPANY TO OBTAIN ALL NECESSARY REQUIRED CLEARANCES FOR THE PROPOSED CHAPTER'S SITTING GIANT ROCK SAND AND GRAVEL PIT WITH THE ACCESS ROAD LOCATED 15 MILES NORTH OF BLUE GAP/TACHEE CHAPTER, MOBLIZE ALL NECESSARY EQUIPMENTS AND BEGIN CRUSHING AND TRANSPORT THE CRUSHED MATERIAL TO DESIGNATED ROAD LOCATIONS WITHIN THE CHAPTER COMMUNITY.**

**WHEREAS:**

Pursuant to 2 N.N.C and 26 N.N.C., the Blue Gap/Tachee Chapter is recognized and established as a government entity of the Navajo Nation Government to enhance and foster the needs and nest interest of the community membership; and

Pursuant to 26 N.N.C. sections 3(A) and 1(B)(2), the Navajo Nation Council delegated to chapter government authority with respect to local matters consistent with Navajo law, including custom and tradition and allows the Blue Gap/Tachee Chapter to make decisions and govern with responsibility and accountability to community membership; and

The Blue Gap/Tachee Chapter has an urgent priority to utilize local crushed gravel source to upgrade their community roads which are in dilapidated conditions creating hazardous transportation for all, i.e., school children, elderly, health care patients, utility company, law enforcement, communication companies; and

The gravel source, commonly referred to as "red dog gravel" is located approximately 15 miles north of the Blue Gap/Tachee Chapter and the land use permit holder has given the required consent to improve the access road to the site and mine the source, transport and utilize it on designated chapter roads and where ever it deems necessary; and

**NOW, THEREFORE, BE IT RESOLVED, THAT:**

The Blue Gap/Tachee Chapter hereby requests RECON OIL COMPANY to obtain all necessary required clearances for the proposed Chapter's Sitting Giant Rock Sand and Gravel Pit with the access road located 15 miles north of Blue Gap/Tachee Chapter, mobilize all necessary equipment and begin crushing and transport the crushed material to designated road locations with the community.

The Blue Gap/Tachee Chapter further declare restoration to all disturbed area and refrain from deliberate destruction of plantation and land outside the boundary of the withdrawn tract for the gravel pit; and

**JO P. Yazzie, President**

**Leo Sheppard, Vice President**

**Betty V. Askie, Sec./Treasurer**

**Benjamin Manyows, Grazing Representative**

**JOHNNY NAJEE** COUNCIL DELEGATE

**ANITA DRAPER** COMMUNITY SERVICES COORDINATOR

The Blue Gap/Tachee Chapter requested RECON OIL COMPANY to build a secure steel structure entrance at the existing gateway to the gravel pit.

The Blue Gap/Tachee Chapter has further discussed to include proper drainages and should be remediate with proper drainage structures on Bureau of Indian Affairs road N-8028 and the access road to the gravel site.

The Blue Gap/Tachee Chapter declared prohibition of wood cutting hauling and restrict all Unauthorized entries; and

The Gravel Pit will be under the control of the Chapter and will only be access through Chapter's authorization.

#### CERTIFICATION

We hereby certify that the foregoing resolution was duly considered by the Blue Gap/Tachee Chapter at a duly called meeting in Blue Gap, Navajo Nation, Arizona at which a quorum was present and the same was passed by a vote of 25 in favor, 0 opposed, 1 abstain, on this 20<sup>th</sup> day of March, 2013.

Motioned by: Helen Nez

Seconded by: Sadie Bill

Aeron P. Yazzie  
Aeron P. Yazzie, Chapter President

Leo Sheppard, Jr.  
Leo Sheppard, Chapter Vice-President

Betty V. Askie  
Betty V. Askie, Chapter Secretary/Treasurer

Benjamin Manyows  
Benjamin Manyows, Grazing Representatives

1 P. Yazzie, President

Leo Sheppard, Vice President

Betty V. Askie, Sec./Treasurer

Benjamin Manyows, Grazing Representative

**PLANT SURVEY REPORT**  
**FOR**  
**TACHEE ENTERPRISES, INC.'S PROPOSED**  
**BLUE GAP GRAVEL QUARRY AND ACCESS ROAD**

**SW/4 SECTION 1, NW/4 SECTION 12, E/2 SECTION 11, N/2 SECTION 14,**  
**AND NE/4 SECTION 15, T. 33 N., R. 22 E.**

**APACHE COUNTY, ARIZONA**

**By: Marian J. Rohman**  
**April 14, 2013**

## **1.0 INTRODUCTION**

This report discusses the potential for disturbance to plant species listed by the Navajo Natural Heritage Program (NNHP) and the United States Fish and Wildlife Service (USFWS) that could occur in the project area. There are no plants listed by the NNHP for the project area (Detsoi, 2013). Navajo sedge (*Carex specuicola*) and Zuni fleabane (*Erigeron rhizomatus*) are listed as Threatened by the United States Fish and Wildlife Service (USFWS) and as present in Apache County, Arizona (USFWS, 2013). A Threatened species is one that is likely to become endangered in the foreseeable future throughout all or a significant portion of its range (USFWS, 2004). In addition, the potential for Parish's alkali grass (*Puccinellia parishii*) will need to be evaluated if wetland conditions exist that contain white alkaline crusts (Detsoi, 2013). Parish's alkali grass is a Group 4 species, indicating that there is not currently sufficient information to support its being listed as endangered, but there is reason to consider it (NNHP, 2008).

Navajo sedge is a perennial grass-like plant with leaves that are 1-3 mm wide and dried persistent leaf bases. The flowers are inconspicuous with the female flowers located above the males in 2-4 short spikelets including both lenticular and trigonous achenes. They are clustered at the end of a long thin stalk. Flowering and fruit set occur from spring to summer, but most of the reproduction appears to be vegetative. The plants are typically found in seeps and hanging gardens on vertical Navajo Sandstone cliffs and alcoves from 4,400 to 7,000 feet (ARPC, 2001a; Roth, 2001a).

Zuni fleabane is an herbaceous perennial distinct from other *Erigerons* by its rhizomatous habit, nearly hairless achenes with 5-6 nerves, and very few hairs on the stems and leaves. In Arizona, it is typically found on fine textured clay hillsides derived from the Chinle Formation at 7,600 feet elevation in ponderosa pine communities. Flowering occurs from May through June (ARPC, 2001c; Roth, 2001b).

Parish's alkali grass is a short-lived winter or spring annual that is easily distinguished from other *Puccinellias* by its annual habit. It grows in alkaline springs, seeps, and seasonally wet areas at elevations of 2,950 to 6,070 feet and flowers and fruits from mid-April to early June (ARPC, 2001b; Roth, 2001c).

## 2.0 PROJECT DESCRIPTION

The proposed project consists of a 20.24-acre reopening and expansion of an abandoned gravel quarry and an access road that is 13,345.52 feet in length within a 20-foot right-of-way. The total land use for the proposed project will be 26.367 acres. The project is located on Navajo Tribal Land in Apache County, Arizona, approximately 22.08 miles west-northwest of the town of Chinle. It is in the SW/4 of Section 1, the NW/4 of Section 12, the E/2 of Section 11, the N/2 of Section 14, and the NE/4 of Section 15 in T. 33 N., R. 22 E. The proposed access road begins on the south side of dirt BIA Road 8028 in Section 1 and heads south then west, to end at the southwest corner of the proposed gravel quarry in Section 15. The proposed gravel quarry is in Sections 14 and 15. The proposed access follows an existing access along Sitting Giant Rock Wash for most of its length.

The access begins in a broad grassy canyon bottom dominated by blue grama (*Bouteloua gracilis*) with areas of mat grama (*Bouteloua simplex*) and scattered pinyon (*Pinus edulis*) and viscid rabbitbrush (*Chrysothamnus viscidiflorus*). Sandstone ledges near the start are dominated by blue grama, viscid rabbitbrush, broom snakeweed (*Gutierrezia sarothrae*), and big sagebrush (*Artemisia tridentata*). The sides of the canyon are in a pinyon-juniper woodland, which the access soon enters. The woodland is dominated by pinyon and one-seed juniper (*Juniperus monosperma*) with an understory of big sagebrush, viscid rabbitbrush, and four-wing saltbush (*Atriplex canescens*).

The abandoned gravel quarry is small and open and is dominated by areas of curly gumweed (*Grindelia squarrosa*), four-wing saltbush, pale wolfberry (*Lycium pallidum*), and blue grama. The surrounding slopes are dominated by pinyon and cliffrose (*Purshia mexicana* var. *stansburyana*), with one-seed juniper joining these two species in the higher proposed expansion area to the east. On this mesa top above the abandoned quarry are areas dominated by rock goldenrod (*Petradoria pumila*), Gambel's oak (*Quercus gambelii*), and broom snakeweed. A portion of this area along the east side of the abandoned quarry appears to have been previously cleared, but not quarried. This area is dominated by cliffrose and rubber rabbitbrush (*Chrysothamnus nauseosus* var. unknown) with scattered narrow-leaf yucca (*Yucca* sp.).

The project area is in the Arabrab-Vessilla-Lindrith complex, 1 to 45 percent slopes soil unit. It consists of aeolian deposits derived from sandstone over residuum weathered from sandstone and shale with soil textures of sandy loam and sandy clay loam (NRCS, 2013). The bedrock in the project area consists of sedimentary rocks of the Upper Cretaceous Mesa Verde Group (Richards, et al, 2000). The elevation of the project area ranges from approx. 6,960 feet at the start of the access to 7,495 feet on the mesa above the abandoned gravel quarry. Disturbances in the project area include dirt and two-track roads, the abandoned gravel quarry, and a fence line paralleling part of the access.

## 3.0 METHODOLOGY

The project area was surveyed on March 1, 2013, by botanist Marian Rohman. The survey of the proposed gravel quarry was accomplished by walking parallel transects across the proposed project area, including a 200-foot buffer around the project area, at approximately 80-foot intervals. Areas of steep slopes on the east side of the proposed quarry were not fully transected but were visually inspected from above and below. The proposed access road was surveyed by

walking zig-zag transects through the 20-foot corridor and 200-foot buffers on each side of the corridor. Snow cover over most of the project area was minimal and scattered, but did reach up to 60% on the mesa top. However, the snow did not interfere with habitat assessment. The emphasis of the survey was to inspect for the plants listed by the NNHP and USFWS as species of concern; however, all plants were identified in order to provide a more complete description of the environment. A list of the plants observed in the project area is included at the end of this report.

## 4.0 SURVEY RESULTS

### 4.1 LISTED SPECIES

There are no plants listed by the NNHP as species of concern that are known to occur in or near the project area (Detsoi, 2013). Navajo sedge and Zuni fleabane are listed by the USFWS and are present in Apache County, AZ (USFWS, 2013). The potential for Parish's alkali grass was also evaluated (Detsoi, 2013).

SPECIES STATUS*	HABITAT	POTENTIAL TO OCCUR IN THE PROJECT AREA**
<i>Carex specuicola</i> Navajo sedge  USFWS Threatened NNHP Group 3	Restricted to seeps and hanging gardens on vertical Navajo Sandstone cliffs and alcoves between 4400 and 7000 feet. Flowering/fruiting period is from spring to summer (ARPC, 2001a; Roth, 2001b).	<b>No appropriate habitat:</b> there are no seeps, or hanging gardens or Navajo Sandstone in the project area. (NP)
<i>Erigeron rhizomatus</i> Zuni fleabane  NNHP Group 2 USFWS Threatened	In ponderosa pine communities on fine textured clay hillsides derived from the Chinle Formation at an elevation of 7600 feet. Flowers from May through June (ARPC, 2001c; Roth, 2001b).	<b>No appropriate habitat:</b> there are no ponderosa pine communities or Chinle Formation in the project area. The project area is below the known elevation of the species. (NP)
<i>Puccinellia parishii</i> Parish's alkali grass  NNHP Group 4 not USFWS listed	Alkaline springs, seeps, and seasonally wet areas such as washes at 2950 to 6070 feet. Flowers and fruits from mid-April to early June (ARPC, 2001b; Roth, 2001c).	<b>No appropriate habitat:</b> there are no alkaline springs, seeps or seasonally wet areas in the project area. The project area is well above the known elevation range of the species. (NP)

#### Status\*

NNHP – Navajo Endangered Species List (NNHP, 2008)

Group 2 – a species or subspecies whose prospects of survival or recruitment are in jeopardy

Group 3 – a species or subspecies whose prospects of survival or recruitment are likely to be in jeopardy in the foreseeable future

Group 4 – a species or subspecies where there is not currently sufficient information to support its being listed as endangered, but there is reason to consider it

USFWS – U.S. Fish and Wildlife Service (USFWS, 2004)

Threatened – a species that is likely to become endangered in the foreseeable future throughout all or a significant portion of its range.

#### Potential to Occur\*\*

K – Known, documented observation within project area.

S – Habitat suitable and species suspected to occur within the project area.

NS – Habitat suitable but species is not suspected to occur within the project area.

NP – Habitat not present and species unlikely to occur within the project area

### 4.2 NOXIOUS WEEDS

There are seventeen species listed on the BIA Navajo Noxious Weed List (OSM, 1999). None of these species is present in the project area.

### **4.3 PLANTS OBSERVED DURING THE SURVEY**

Scientific and common names according to Welsh et al., 2003

Identifications based on Welsh et al., 2003, and Weber and Wittman, 2012

#### **TREES:**

<i>Elaeagnus angustifolia</i>	<i>Russian olive</i>
<i>Juniperus monosperma</i>	<i>One-seed juniper</i>
<i>Juniperus scopulorum</i>	<i>Rocky Mountain juniper</i>
<i>Pinus edulis</i>	<i>Pinyon</i>
<i>Pinus ponderosa</i>	<i>Ponderosa pine</i>

#### **SHRUBS AND SUBSHRUBS:**

<i>Amelanchier utahensis</i>	<i>Utah serviceberry</i>
<i>Artemisia prob. nova</i>	<i>Black sagebrush</i>
<i>Artemisia tridentata</i>	<i>Big sagebrush</i>
<i>Atriplex canescens</i>	<i>Four-wing saltbush</i>
<i>Chrysothamnus nauseosus</i> var. <i>unknown</i>	<i>Rubber rabbitbrush</i>
<i>Chrysothamnus nauseosus</i> poss. var. <i>bigelovii</i>	<i>Bigelow's rabbitbrush</i>
<i>Chrysothamnus nauseosus</i> poss. var. <i>graveolens</i>	<i>Glabrate rabbitbrush</i>
<i>Chrysothamnus viscidiflorus</i>	<i>Viscid rabbitbrush</i>
<i>Gutierrezia sarothrae</i>	<i>Broom snakeweed</i>
<i>Leptodactylon pungens</i>	<i>Sharp slenderlobe</i>
<i>Lycium pallidum</i>	<i>Pale wolfberry</i>
<i>Menodora scabra</i>	<i>Rough menodora</i>
<i>Purshia mexicana</i> var. <i>stansburyana</i>	<i>Cliffrose</i>
<i>Quercus gambelii</i>	<i>Gambel's oak</i>
<i>Yucca</i> sp.	<i>Narrow-leaf yucca</i>
<i>Yucca baccata</i>	<i>Datil yucca</i>

#### **CACTI:**

<i>Opuntia polyacantha</i>	<i>Central pricklypear</i>
<i>Opuntia whipplei</i>	<i>Whipple's cholla</i>
<i>Pediocactus simpsonii</i>	<i>Simpson's footcactus</i>

#### **GRASSES:**

<i>Bouteloua simplex</i>	<i>Mat grama</i>
<i>Bouteloua gracilis</i>	<i>Blue grama</i>
<i>Stipa hymenoides</i>	<i>Indian ricegrass</i>

#### **FORBS:**

<i>Arabis</i> sp.	<i>Rockcress</i>
<i>Bassia scoparia</i>	<i>Summer-cypress</i>
<i>Chrysopsis villosa</i>	<i>Hairy goldenaster</i>
<i>Cryptantha</i> sp.	<i>Perennial cryptanth</i>
<i>Cryptantha</i> sp.	<i>Annual cryptanth</i>
<i>Chenopodium graveolens</i>	<i>New Mexico goosefoot</i>

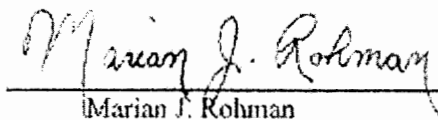
*Erodium cicutarium*  
*Grindelia squarrosa*  
*Haplopappus armerioides*  
*Hymenopappus filifolius*  
*Machaeranthera canescens*  
*Mentzelia prob. multiflora*  
*Penstemon prob. linarioides*  
*Petradoria pumila*  
*Salsola tragus*  
*Senecio douglasii*  
*Sphaeralcea sp.*

*Storksbill*  
*Curly gumweed*  
*Thrifty goldenweed*  
*Hyalineherb*  
*Hoary aster*  
*Desert stickleaf*  
*Toadflax penstemon*  
*Rock goldenrod*  
*Russian-thistle*  
*Douglas' groundsel*  
*Globemallow*

## 5.0 DISCUSSION

No plant species of concern to the Navajo Natural Heritage Program or the United States Fish and Wildlife Service will be impacted by the proposed project.

Signature of Author:

  
Marian J. Rohman

Date: April 14, 2013

## 6.0 REFERENCES

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**WILDLIFE SURVEY REPORT  
FOR  
TACHEE ENTERPRISES, INC.'S PROPOSED  
BLUE GAP GRAVEL QUARRY AND ACCESS ROAD**

**SW/4 SECTION 1, NW/4 SECTION 12, E/2 SECTION 11, N/2 SECTION 14,  
AND NE/4 SECTION 15, T. 33 N., R. 22 E.  
APACHE COUNTY, ARIZONA**

**By: Celia A. Cook  
March 25, 2013**

**1.0 INTRODUCTION**

Threatened, endangered and special status wildlife (T&E) surveys were conducted at the location for Tachee Enterprises, Inc.'s proposed Blue Gap Gravel Quarry and access road March 1, 2013. The project site is located in Sections 1, 11, 12, 14, and 15 of Township 33 North, Range 22 East in Apache County, Arizona. UTM coordinates at the center of the proposed quarry are 594128m E, 4014421m N (UTM NAD 27, Zone 12N).

The project is located approximately 6 miles north of the Blue Gap/Tachee Chapter House on Navajo Tribal Trust lands. The proposed quarry is 20.24 acres and includes within its boundaries approximately 10 acres of disturbed land left over from previous mining endeavors at the same location. The access road is an unimproved road that follows Sitting Giant Rock Wash from its junction with Tah Chee Wash for 2.56 miles before reaching the proposed project site.

**2.0 METHODS**

Navajo Nation Natural Heritage Program was contacted regarding the potential for T&E wildlife species to occur on or near the project area. In response to this request, a list of all T&E species that are known or have potential to occur within the 7.5 minute Tah Chee Wash, AZ quadrangle map was issued to Permits West, Inc. March 6, 2013. This list was reviewed during the preparation of this report.

Permits West, Inc. field biologist, Celia Cook conducted a pedestrian survey of the proposed quarry and access road March 1, 2013. The purpose of the survey was to inspect for the presence of T&E wildlife species and suitable habitat for T&E species. Weather during surveys was generally clear, with moderately strong breezes and temperatures in the low to high 50s. Areas of the proposed project, particularly the access road, were extremely muddy from snow melt, and north facing slopes still had approximately 6-10 inches of snow.

The surveyed area consisted of the 2.56 miles of proposed access road and the 20.18 acre proposed quarry, most of which is previously disturbed. General habitat and existing conditions were evaluated. A 0.5-mile radius around the project area was surveyed with binoculars, and in some areas on foot, for structures or land

formations that would support raptor nests and other unique habitat elements that would benefit T&E species and wildlife in general.

### **3.0 DESCRIPTION OF EXISTING HABITAT**

The project area is situated the southeastern edge of Black Mesa, a large landform forming the western boundary of Chinle Valley. Black Mesa is made up of rolling hills and vertical bluffs bisected by broad alluvial drainages with deeply incised channels. The proposed quarry lies within the upper reaches of Sitting Giant Rock Wash, a side drainage of the larger Tah Chee Wash. In the vicinity of the quarry, the hills and side slopes support dense pinyon-juniper woodlands with pockets of oak (*Quercus spp.*), service berry (*Amelanchier sp.*), and cliff rose (*Purshia sp.*) providing understory components. Occasional ponderosa pines (*Pinus ponderosa*) are also present in side drainages and along the bottom of the wash near the northeast segment of the access road. Valley vegetation is made up of shrubs such as sage (*Artemisia spp.*), fourwing saltbush (*Atriplex sp.*), and rabbitbrush (*Chrysothamnus spp.*). Grasses are sparse and include primarily grama (*Bouteloa spp.*) Side canyons and bluffs reveal bare sandstone outcroppings in some places. Elevation within the project area ranges from approximately 6900 to 7460 feet. The soils are derived from shales and sandstones. The drainage channel along the bottom of Sitting Giant Rock Wash is deeply incised with vertical banks up to 20 feet in height along much of its lower stretch. The entire project area is grazed by horses, cows, and sheep, and supports elk (*Cervus canadensis*) and mule deer (*Odocoileus hemionus*) as well. There is no permanent water within 0.5 miles of the project area; however, Tah Chee wash was flowing with ephemeral runoff at the time of the survey.

The quarry site itself is previously disturbed. Approximately 10 of the proposed 20.18 acres have been mined for gravel in the recent past. A few shrubs and small trees have grown into the disturbed area, but most of it is barren and rocky.

One occupied home and associated corrals and outbuildings is located within the project area along the existing access road, which undoubtedly serves as the home's access as well.

Wildlife occurring in the area is typical of the Arizona Upper Sonoran life zone (Holdridge, 1967). Ungulates such as elk and mule deer utilize valleys and side slopes for forage and thermal cover, and numerous remote drainages and highlands with pockets of ponderosa support a wide variety of avian, reptilian, and mammalian species. A complete list of species observed during the survey can be found in Section 6.0.

### **4.0 THREATENED, ENDANGERED, AND SPECIAL STATUS WILDLIFE SPECIES**

According to the March 6, 2013 correspondence from the Navajo Natural Heritage Program, the species indicated in Table 4.1 have the potential to occur in or near the project area.

**Table 4.1. T&E Species with Potential to occur in the Project Area.**

Species	Status*	Habitat	Presence**
Golden eagle ( <i>Aquila chrysaetos</i> )	NESL Group 3, MBTA, EPA	A wide variety of open habitats, typically nests in steep cliffs typically > 30 meters in height.	NS No nearby nest habitat; Potential foraging habitat only.
Peregrine falcon ( <i>Falco peregrinnus</i> )	NESL Group 4, MBTA	Nests in sheer cliff faces typically > 30 meters in height usually near water or mesic canyons. In migration, occurs in a variety of lowland, wetland habitats	NP Water bodies and sheer cliffs lacking. Potential to occur as transients.
Northern Saw-whet Owl ( <i>Aegolius acadicus</i> )	NESL Group 4, MBTA	In Arizona, pinyon-juniper and ponderosa pine woodlands.	S The forests surrounding the project area provide suitable habitat for this small owl.
Mexican spotted owl ( <i>Strix occidentalis lucida</i> )	NESL Group 3, T	In Arizona, mature woodlands and wooded canyons, with decadent multi-story canopy.	NP
Southwestern willow flycatcher ( <i>Empidonax trailii extimus</i> )	NESL Group 2, MBTA; E	Cottonwood-willow habitats within perennial riparian areas.	NP
Black-footed ferret ( <i>Mustela nigripes</i> )	NESL Group 2; E	Grassland or shrubby habitats where large, densely populated prairie dog towns are present	NP No large prairie dog towns present.

**Status\***

Federal Status: E = Endangered; T= Threatened; C= Candidate; EPA = Eagle Protection Act; MBTA= Migratory Bird Treaty Act

Tribal Status: NESL = Navajo Endangered Species List Group 1-4

**Presence\*\***

K= Known, documented observation within project area.

S =Habitat suitable and species suspected to occur within or near the project area.

NS= Habitat suitable but species is not suspected to occur within the project area.

NP= Habitat not present and species unlikely to occur within the project area.

## 5.0 RESULTS

No federally or Navajo listed threatened, endangered, or special status species were observed during the March 1, 2013 wildlife surveys. However, suitable habitat for the northern saw-whet owl (*Aegolius acadicus*) was present. These small woodland owls are a Navajo Fish and Wildlife Natural Heritage Program G4 species. Northern saw-whet owls are forest dwelling owls and their nesting habitat includes all types of forests in their range (Cartron, 2010). The mixed conifer forest around the project area provides suitable saw-whet owl habitat, including cavities that could be used for nesting. Though the saw-whet owl is not uncommon throughout its range, more information is needed about this species to determine its status on the Navajo Reservation.

No other threatened, endangered or special status species, or their habitats were observed during the survey of the project area.

**Migratory Birds:**

Migratory birds are protected under the Migratory Bird Treaty Act. Birds protected under the Act include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows and others, including their body parts (feathers, plumes etc.), nests, and eggs. The Act protects migratory birds from a "take". Take is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities". A "take" does not include habitat destruction or alteration, as long as there is not a direct taking of birds, nests, eggs, or parts thereof.

Seven migratory bird species were observed during the survey. All of these species have the potential to nest within or adjacent to the proposed quarry. Birds nesting within the boundaries of the proposed gravel pit will be directly impacted by development of the gravel pit either through removal of their nesting substrate (trees or shrubs) and/or noise and human activity.

**6.0 SPECIES OBSERVED DURING THE SURVEY**

**Avian species observed:**

- Common raven (*Corvus corax*)
- Northern flicker (*Colaptes auratus*)
- Western scrub-jay (*Aphelocoma californica*)
- Mountain chickadee (*Poecile gambeli*)
- Mountain bluebird (*Sialia currucoides*)
- Western bluebird (*Sialia mexicana*)
- Spotted towhee (*Pipilo maculatus*)

**Mammalian species observed:**

- Coyote (*Canis latrans*)
- Elk (*Cervus canadensis*)
- Mule deer (*Odocoileus hemionus*)
- Cottontail (*Sylvilagus sp.*)

No reptilian or amphibian species were observed.

**7.0 RECOMMENDATIONS**

It is recommended that presence/absence survey for the northern saw-whet owl (*Aegolius acadicus*) be completed at the Blue Gap project site prior to ground breaking due to the presence of suitable habitat for this species. The one time survey should be completed no later than June 30, 2013. No other threatened, endangered, or special status species or their habitats were found during the wildlife surveys of the project area.

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**Signature of Author:**



Celia A. Cook  
Wildlife Biologist  
Permits West, Inc.  
37 Verano Loop  
Santa Fe, NM 87508  
(505) 466-8120

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# REVEGETATION PLAN

FOR THE  
**BLUE GAP GRAVEL QUARRY**  
TACHEE ENTERPRISES, INC.

Sections 1, 11, 12, 14, and 15, T. 33 N., R. 22 E.  
Apache County, Arizona



**APRIL 14, 2014**

*PREPARED BY:*

**PERMITS WEST**, INC.  
PROVIDING PERMITS for LAND USERS

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## 1.0 SUMMARY

A reclamation and revegetation plan typically considers three phases:

1. Documentation of the plant species composition and quantitative estimation of the ground cover prior to mining activities.
2. Reclamation and revegetation methods.
3. Monitoring and measuring of the success of the revegetation effort.

This document primarily emphasizes phases 1 and 3; however, general issues for phase 2 are described.

Successful revegetation has been accomplished when the following criteria are met:

- Vegetation is predominantly composed of native species.
- Reclamation vegetation cover is at least 90 percent of the reference area cover and shrub frequency is at least 90 percent of shrub of the reference area in at least two years between years six and ten after the initial seeding. Note that grasses and forbs are measured as percent cover whereas shrubs and trees are measured by frequency. This is because shrubs and trees grow at much slower rates and it is unrealistic to expect either shrub or tree cover to approach pre-disturbance levels within ten years of seeding.
- Invasive non-native species are absent or are present at no higher cover levels than pre-disturbance levels.

## 2.0 INTRODUCTION

This report addresses the reclamation and revegetation of the proposed reopening and expansion of an abandoned gravel quarry and access road located approximately 22 miles west-northwest of Chinle, AZ. This project area is in Sections 1, 11, 12, 14, and 15, T. 33 N., R. 22 E., in Apache County, AZ. The project area is on Navajo Nation Tribal Trust Land.

The elevation of the project area ranges from approximately 6,960 feet at the start of the access road to 7,495 feet on the mesa above the quarry site. The soils at the site were identified using the USDA NRCS soils map (2013). Soils within the project area are entirely characterized as Arabrab-Vessilla-Lindrith complex, 1 to 45 percent slopes. This soil complex consists of Aeolian deposits derived from sandstone over residuum weathered from sandstone and shale with soil textures of sandy loam and sandy clay loam (NRCS 2013). The mean annual precipitation is 14 to 18 inches with a mean annual temperature of 46° to 50°F, and a frost-free period of 120 to 150 days (USDA NRCS 2014). Other attributes of this soil complex are as follows:

- Drainage class: somewhat excessively drained
- Depth to water table: more than 80 inches
- Frequency of flooding: none
- Frequency of ponding: none
- Maximum salinity: nonsaline (0.0 to 2.0 mmhos/cm)
- Available water capacity: very low to moderate (about 0.3 to 6.5 inches; USDA NRCS 2014)

Vegetation represented at the project site was varied. The access begins in a broad grassy canyon bottom dominated by blue grama (*Bouteloua gracilis*) with areas of mat grama (*Bouteloua simplex*), scattered pinyon (*Pinus edulis*), and viscid rabbitbrush (*Chrysothamnus viscidiflorus*). Sandstone ledges near the start are dominated by blue grama, viscid rabbitbrush, broom snakeweed (*Gutierrezia*

*sarothrae*), and big sagebrush (*Artemisia tridentata*). The sides or the canyon are in a pinyon-juniper woodland, which the access soon enters. The woodland is dominated by pinyon and one-seed juniper (*Juniperus monosperma*) with an understory of big sagebrush, viscid rabbitbrush, and four-wing saltbush (*Atriplex canescens*).

The abandoned gravel quarry is small and open and is dominated by areas of curly gumweed (*Grindelia squarrosa*), four-wing saltbush, pale wolfberry (*Lycium pallidum*), and blue grama. The surrounding slopes are dominated by pinyon and cliffrose (*Purshia mexicana* var. *stansburyana*), with one-seed juniper joining these two species in the higher proposed expansion area to the east. On the mesa top above the abandoned quarry are areas dominated by rock goldenrod (*Petradoria pumila*), Gambel's oak (*Quercus gambelii*), and broom snakeweed. A portion of this area along the east side of the abandoned quarry appears to have been previously cleared, but not quarried. This area is dominated by cliffrose and rubber rabbitbrush (*Chrysothamnus nauseosus* var. unknown) with scattered narrow-leaf yucca (*Yucca* sp.).

This reclamation and revegetation plan has three phases:

1. Documentation of the plant species composition and a quantitative estimate of the ground cover prior to the commencement of mining activities.
2. Methods for reclamation and revegetation.
3. Monitoring and measuring the success of the revegetation effort.

The plan largely emphasizes Phases 1 and 3, and describes general issues to be considered for Phase 2. Reclamation and re-seeding methods will be refined and described in detail by the contractor responsible for their implementation in a separate document.

## **2.1 GOALS**

The outcome goals of any endeavor must be clearly defined before commencing any restoration or revegetation program. The overall goal of this effort is to eventually restore the land to its pre-mining condition (or better) so that it can provide suitable wildlife habitat and forage.

The chronology of activities to meet these goals are:

- Pre-mining activities: on-site inventory to document plant species composition; measurements of ground cover values and shrub frequencies using transect line surveys.
- Reclamation and post-mining grading, stabilizing, and seeding activities.
- Post-seeding monitoring and quantitative assessment.

## **3.0 VEGETATION SURVEYS**

### **3.1 PRE-MINING**

On-site inventory to document plant species composition and estimates of cover values must be made prior to the commencement of mining.

The existing communities at the site were described and a Plant Survey Report was compiled on April 14, 2013 (Rohman 2013). This inventory provides information on which to base seed mixes for post disturbance revegetation efforts. Reseeding with plant species native to the vegetation communities of the development area is now recognized as being an important element for successful revegetation and reclamation and is now part of public policy. A second inventory survey must be made in a subsequent year to capture the extent of plant species diversity at the site.

In addition to inventory, quantitative estimates of vegetation cover must be made. The reasons for these measurements are two-fold. Primarily, cover measurements establish a baseline upon which to estimate the success of revegetation efforts. They also indicate the relative amount of each species that is appropriate in the post mining seeding mix. Late summer or early fall are appropriate times of year to make quantitative surveys.

The proposed gravel quarry is on flat to steeply sloping land, much of which has experienced variable levels of disturbance in the past. Therefore, quantitative measures of average ground cover values and their variability needs to be conducted only in undisturbed portions of the project area and in contiguous suitable surrounding habitat that has not been significantly altered.

If possible, the success of previous revegetation efforts should also be assessed so that the positive aspects can be included in the next reclamation effort and any shortcomings can be avoided (see Section 4.0, below).

### **3.2 METHODOLOGY FOR GROUND COVER MEASUREMENTS**

Quantitative estimates of ground cover must be made prior to mining activity so that revegetation success can be measured. This is most easily carried out by surveying the ground cover along 50-meter-long transect lines.

There are three methods that are typically used to measure ground cover: a point-intercept method, a line-intercept method, or a method utilizing quadrants (usually referred to as Daubenmire quads - after Daubenmire, 1959) along a transect line (Elzinga et al. 2001). It is recognized that each method has inherent strengths and weaknesses.

The point-intercept method is often recommended and will be used in this project since it is objective and relatively rapid. Floyd and Anderson (1987) found that the point intercept method achieved the same level of precision as the line-intercept method while taking one third of the time (Elzinga et al. 2001). In some cases, this method can tend to overestimate cover (Korb et al. 2003). However, this source of error will be minimized if the same method is used when measuring the success of revegetation. The objective nature of the data gathering makes it appropriate for use over several years with different operators involved.

A 50-m tape measure (transect line) will be laid across the ground and secured at each end. The cover that intercepts the line at 1-m intervals along the 50-m transect will be measured. Using this method, the cover types and the amount of bare ground can be calculated as the percentage of interceptions ("hits") relative to the total number of points sampled (e.g., see Forest and Range.org at <http://www.forestandrange.org/modules/vegmonitor/mod9/mod9-14.shtml>).

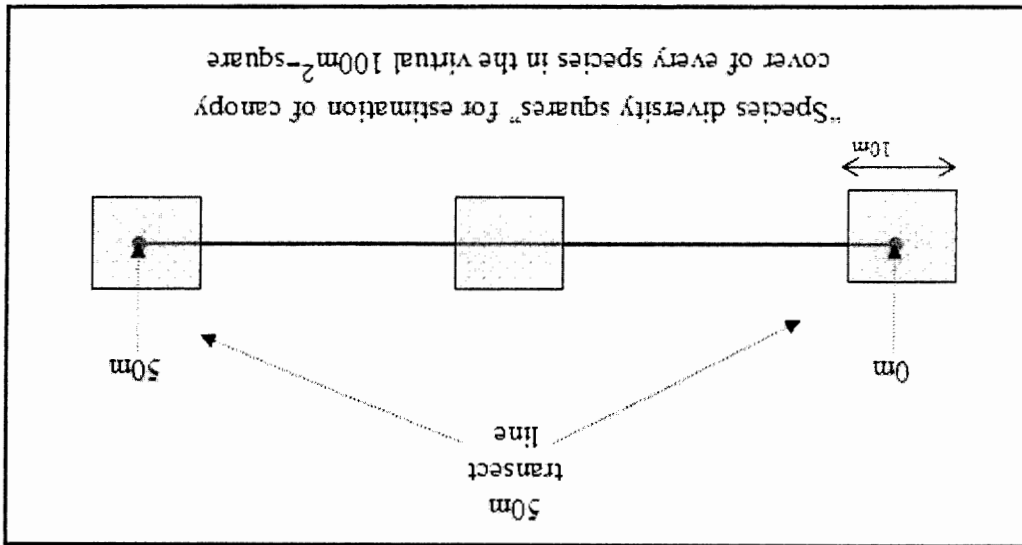
Vegetation cover types will be: total native trees, total native grasses, total native forbs, total native shrubs, total succulents, total graminoid species (sedges, etc.) total non-native grasses, total non-native forbs, and total non-native shrubs. Although Russian olive (*Elaeagnus angustifolia*) was observed at the project site (Rohman 2013), non-native, invasive trees are not expected outside of the areas that have been substantially disturbed. However, if non-natives are observed, they would be documented as well. The cover of individual plant species will also be measured by recording the plant species name whenever it is intercepted by a point.

Other cover classes include: bare ground defined as soil alone, coarse sand defined as particles less than 3 mm (0.12 inches) across, gravels defined as particles up to 7.6 cm (3 inches), and rocks defined as particles greater than 7.6 cm (3 inches). Microbiotic crust will be recorded as a separate cover class with the most prominent life form (moss, lichen, or cyanobacteria) in the crust noted. Litter is dead plant material directly covering the ground, dead perennial vegetative bases, or animal scat, including cow

A portion of the quarry has been significantly disturbed and does not represent undisturbed habitat. Therefore, in order to thoroughly document the natural ground cover and its variability, transect lines distributed in the quarry will be surveyed. This area is relatively large, so the survey may be extended into contiguous areas to achieve a representative quantitative estimate of the community. It is anticipated that 8 to 10 transect lines will need to be surveyed. This estimate of the number of lines required is made from an aerial photograph of the site. The number of transect lines that need to be surveyed in order to document the variability may be increased during ground-truthing. In addition, the

### 3.3 TRANSECT LINE PLACEMENT

Figure 1. Diagram Showing Arrangement of the Species Diversity Squares



An important disadvantage of the point-intercept method is that species with low cover values may not be effectively sampled because they are so rarely intercepted with the pointing device (Korb et al. 2003). This problem will be mitigated by estimating the canopy cover of each species within a ten-meter square at the beginning, in the mid-section, and at the end of each transect (see Figure 1). All species that are in this ten-meter-wide square will be recorded and their cover estimated, so that 1 m<sup>2</sup> (1 square meter) of vegetative cover equals 1 percent, 5 m<sup>2</sup> equals 5 percent, etc. Cover of individual plant species will be estimated to be within one of seven cover classes: T = trace, 1 = 1% to 5%, 2 = 5% to 25%, 3 = 25% to 50%, 4 = 50 to 75%, 5 = 75 to 85% and 6 = 95 to 100%. These squares are termed "species diversity squares" (Figure 1).

These transect lines will also be used to estimate shrub frequency. In addition to measuring cover along the transect line, the number of sub-shrubs and shrubs within a one-meter wide belt along the transect line (a "belt transect") will be counted and recorded by species name. In a similar way, the number of trees will be counted within a ten-meter-wide belt transect.

recorded when the sampling point falls on any part of the vegetation. When the canopy of multiple species overlaps, all of the cover-types will be recorded.

annual forb that is rooted and recognizable to species will be recorded as that species. Species will be considered as litter cover when unattached to the roots and can potentially be windblown. A dead then considered to be the ground covering, or lack of covering, below it. Dead annual forbs are dung. If a small stem or piece of litter is not considered large enough to intercept a raindrop, the "hit" is

variance among transect lines needs to be small enough to meet a statistical sample adequacy test (see Data Analysis section).

The geographic coordinates marking the location of each end of the transect line will be recorded using a GPS unit. The ends will not be permanently marked since it is anticipated that those locations will be excavated.

### **3.4 REFERENCE AREA**

The vegetation cover and shrub and tree frequency within the reference area provide a means by which to track changes that occur to the vegetation throughout the mining and revegetation phase. They indicate if significant changes occur to the vegetation due to environmental conditions. For example, lasting impacts of a drought or a storm on the vegetation within the project area during the mining or revegetation phases will be reflected in the condition of the vegetation within the exclosure. These changes may be reflected in percent cover, shrub frequency, or in the species composition, and will help in interpreting the results of the revegetation effort.

The reference area should be established in a location that will be unaffected by mining activities but where there are very similar cover conditions. If there is livestock grazing in the area, the reference area should be fenced in order to exclude the livestock. It is therefore termed an "exclosure." Such areas protected from livestock grazing provide a clear indication as to the potential and natural successional trajectory of the native vegetation at the site.

Since portions of the project site have been significantly disturbed by prior mining activity, the reference area will be selected on the basis of land in the western or northern portion of the project area that is contiguous with the project area.

Generally reference areas are selected to be as close as possible to the project site. However this region has cliffy and ridged topography and possible reference areas near the site appear to have substantially variable aspects and slopes. Slope and aspect needs to be considered when selecting the area since they will affect all facets of vegetation cover. Likely reference site locations will be established and recorded using Google Earth and will be planned with similar aspect, slope, vegetation, and elevation (within 300 feet) as the project site. However, other areas in the region may provide sites that are likely to be as appropriate.

The reference area needs to be approximately 5 acres in size. This area will encompass the community type representative of the project site and there will be approximately 10 transects established in independent locations within this reference area. The exact number will be determined by a statistical sample adequacy test. The UTM coordinates marking the location of each end of the transect lines will be recorded using a GPS unit. The reference area perimeter will also be recorded with UTM coordinates.

The mean and standard deviation of ground cover and tree and shrub frequencies within the reference site will be calculated within and between the reference site and the project area. Data analysis is discussed later in the document.

### **3.5 PHOTO-POINTS**

Photographs will be taken of each transect line and reference area. Additional photographs that show landscape views and close-up views of the vegetation that are representative of the project site will be taken to describe the area. The azimuth of the photograph shot and UTM coordinates of the location where all the photographs are taken will be recorded.

## 4.0 PROACTIVE MANAGEMENT

Starting at the beginning of mining activities, cursory inspections at three monthly intervals will be used as an adaptive management tool to correct problems as they arise. These visual inspections will include considering and remediating these elements:

1. Invasion of noxious weeds;
2. Damage to fences, etc. resulting from human or livestock trespass;
3. Presence of other conditions, such as severe erosion, that, if unchecked, will result in failure to meet revegetation success criteria

Actions taken to respond to observations might include mending or erecting additional fencing to exclude grazing animals from the exclosures, weed control, and installation of erosion control blankets.

No specific recommendations for noxious weed control have been made by either The Navajo Natural Heritage Program or the Navajo Nation Department of Fish and Wildlife. Emphasis is placed on immediate control, prevention of seed spread, and eradication. Awareness, identification, control, and monitoring are priorities (USDI OSM 1999). An example of proactive weed management may be that if a noxious weed is observed along the access road or within the project site, measures will be taken to eliminate it. No noxious weeds on the BIA Navajo Area Noxious Weed List were reported in the project area (Rohman 2013); however, one species considered by various agencies was present, Russian olive. A survey during the summer and fall months would be made to confirm this observation since many species are easily overlooked or are not detectable at certain times of the year.

After revegetation seeding has been completed, the condition of the seeded area needs to be evaluated. All disturbances to reclaimed areas need to be minimized. The seeded areas should be protected from all grazing for at least five years after seeding. Establishing vigorous stands of desirable native plants will limit the opportunity for invasion by noxious weeds.

Visual inspections of the seeded area will include checking and remediating these elements:

- Bare spots,
- Eroded areas,
- Areas of excessive settlement,
- Wash out areas, and
- Areas where initial attempts to establish vegetation were not successful.

If there is a drought, the possibility of temporary irrigation will be considered. Follow-up seeding or corrective erosion control measures may be required on areas that experience reclamation failure. Interseeding, secondary seeding, or staggered seeding may be required to accomplish revegetation objectives. If small areas experience being washed out or eroded, local applications of mulch followed by reseeding may be a good way to keep a successful revegetation effort on track. Re-seeding small areas in a timely manner is better than having to reseed large acreages after several years have passed.

After three years, vegetation cover and shrub frequency will be measured using transect lines and species diversity squares to monitor the seeding results in detail. This is distinct from the measurements that will determine success for bond release. Periodic checking in the course of proactive management may miss localized areas where seeding has obviously failed. During the three-year survey time seedling/small plants will be observed in detail by a botanist. Seeding is often considered a failure when an average of less than one seeded species per square meter is established (Wright et al. undated).

Understanding the reasons why seeding fails helps anticipate and prevent future failures. When evaluating why an initial seeding failed, either locally or more widely, the following questions can be asked (after Wright et al. Undated):

A simple but often overlooked question is: *Was the area missed by the seeder?*

Questions relating to seed source include:

- Was good seed used from a reputable vendor?
- Was the seed tested?
- Were the best adapted seed varieties, sources and species used?

Questions relating to environmental factors:

- Was the seed planted too late in the spring or too early in the fall?
- Was the year drier than normal?
- Was the spring drier than normal?
- Was the seed eaten by rodents or birds?
- Was the seed exposed to wind or water erosion?

In relatively small areas where there are no obvious reasons for poor germination and/or seedling development, soil testing will be done to determine if soil amendments are needed before re-seeding. Soil tests will also indicate if the soil is inhospitable to certain species in some way, e.g. having a particularly acidic or saline soil. In the case of acidic soils, if an amendment cannot change the pH, a seed mix of different native species may have to be used to achieve the revegetation objectives. In this case, spores need to be collected from plants in the vicinity of the site to ensure that locally adapted ecotypes are used and alien genes are not introduced into the gene pool.

## **5.0 POST MINING RECLAMATION AND REVEGETATION**

Reclamation and re-seeding methods will be refined and described by the operator in a separate document. Some issues that affect revegetation success are listed in the following section.

The goals of the reclamation effort are:

1. Stabilize disturbed sites by reducing the potential for soil erosion by wind and water runoff.
2. Re-establish healthy, vigorous ground cover to their original condition or better using native plant species.
3. Establish regenerating and self-supporting native vegetation

Documentation detailing the dates of revegetation activity, specific seed mixtures applied, and materials, equipment, and personnel involved in each activity, will be maintained so they can be referred to in the future.

Immediate site stabilization to limit wind and water erosion in the short-term will be carried out so that there is not undue substrate loss before the long-term reclamation effort commences.

When excavation of the site has been completed, the sides will be sloped, graded or scaled, and the general quarry area smoothed and stabilized. The original contours and drainage patterns will be replicated as much as possible. Slopes will be stabilized with erosion blankets, mulch, and/or applicable techniques to reduce the potential for soil erosion by wind and water.

Soil analysis will be undertaken before any fertilizer is applied. Unless the topsoil is particularly poor in nutrients, fertilizer is not planned since seed germination and seedling establishment is often enhanced to a far greater degree for weeds than for native species.

Mulch can be applied before or after seeding and is important for preventing water erosion, reducing wind erosion, reducing soil crusting, decreasing rainfall impact, insulating the soil surface, and decreasing evaporation (Munshower 1994). The mulch used will be free from mold, fungi, and noxious weed seeds. Certified noxious-weed free straw and hay will be ordered. Biodegradable material will be used and mulch options include native hay, small grain straw, wood fiber, cotton, or jute. Native hay and small grain straw tends to contain seeds of the vegetative material and they also tend to attract livestock and wildlife. Therefore, they may not be the first choice but both are viable options.

Disturbance to reclaimed areas will be minimized. The seeded areas will be protected from grazing for at least five years after seeding. This is essential in regions with low-precipitation. If re-seeding is necessary, the length of time the areas are protected from grazing will be extended.

It is generally recognized that adequate topsoil can be of great importance in reclamation success. Therefore, stockpiling topsoil is a common practice. The stockpiled topsoil is spread on the exposed surface and used as a seedbed for sowing the selected seeds. However, the quality (microbial components and structure) of topsoil and the germinability of native seeds in the seed bank declines in proportion to the length of time the soil is stored, whereas the population of seed bank-weed seeds capable of germinating increases proportionally. That is, the seeds of only a few species of native grasses will usually survive storage in a topsoil stockpile whereas weed seeds usually have efficient dormancy mechanisms and can survive quite adverse storage conditions. In some circumstances it is preferable to seed native grass species directly into the mined surface substrate as long as it has been well prepared (Service NSW 2005). However, this is a site specific situation and requires the advice and recommendations of a soil scientist familiar with native plant growth requirements. At the current time, stockpiling available topsoil appears to be the best course of action for this site. The quantitative estimates of weed infestation made by transect line survey will help determine if alternative approaches are more appropriate.

Topsoil piles need to be stabilized by seeding a sterile non-native species or a mix of native grass and forb species that is similar to the seed mix recommended for the site. Shrub species are not needed in this mix since they will take a long time to establish and reproduce so their value to a short-term stabilization effort is not cost effective. The topsoil pile should be checked for weed germination. If there is significant weed germination on the topsoil piles, the weeds should not be allowed to set seed.

Contemporaneous reclamation may be carried out if the mining activity is such that discrete areas can be excavated, stabilized, reclaimed and can be left undisturbed while the mine is operating. The major benefit of this option is that topsoil would not have to be stored for very long periods.

Soil preparation is important. Appropriate surface roughness improves retention of seed, water, and soil. Care will be taken not to compact the soil surface. The number of passes made by the tillage and seeding machinery will be minimized. In addition to tillage surface preparation, "habitat niches" that create an environment that promotes seed germination and seedling survival will be formed if possible. One problem with reseeding litter-free areas is that there is often insufficient moisture to sustain seedling development. One mechanical way of roughing the surface and providing a variation in microclimates is by pitting. Pitting is literally creating pits in the ground surface that will collect litter, seeds, fine dust and precipitation and act as a refugia from wind for seed germination and seedling establishment (Bainbridge 1997).

A native grass and forb mix is the primary component of the revegetation plan and will be used to provide initial cover and stabilization. However, shrubs are also important elements of the community, especially in the long term, at the project site. Shrub seed will be seeded with the grass and forb mix.

## **6.0 POST-SEEDING SURVEY - MONITORING AND MEASURING SUCCESS**

Frequent examination of the seeded areas will be made after the seed mix of native species is sown. The revegetated areas will be formally and quantitatively surveyed three years post-seeding (see Proactive Management section). Monitoring the results of the seeding effort allows proactive management and timely reactions to localized failures of the revegetation processes. Therefore, appropriate monitoring at frequent intervals between the initial reseeding event and the quantitative survey after 3 years will alert managers if possible proactive efforts or remedial activities are required to ensure the success of the effort.

Quantitative evaluation of the results of the revegetation effort is necessary to determine if the revegetation and reclamation effort has met its goals and objectives. Revegetation efforts should not be considered a failure for a minimum of two years after the original planting effort. For the project site, a quantitative measure of success will first be made 3 years after the original sowing time. Because of the long length of time shrubs take to mature, shrub revegetation success will be considered on a frequency basis since their immature size makes it unreasonable to use a cover measurement. Viewing shrub frequency early or late in the growing season helps identify them since seedlings and small young shrubs are easily obscured by other vegetation.

If the cover along the transect lines in the reference area and along the revegetation transects are similar but different to the original baseline cover, the cause of the difference is likely environmental. Vegetation cover will obviously be lower in years with low precipitation. Therefore, the success of the revegetation effort needs to be evaluated in the context of the cover of the native vegetation in the reference area (exclosure) in the year that the survey is made rather than only to that of the original values.

The revegetation effort has been successful when:

- Native species are predominant at the site;
- Non-native species are at the same levels or lower than the baseline levels before mining commenced;
- The mean native grass and forb cover and the mean native shrub frequency in the reclaimed areas are no less than 90 percent of those in the exclosure (reference) areas, with 90 percent statistical confidence, for any two consecutive years six to ten years after the initial seeding.

## **7.0 DATA ANALYSIS**

### **7.1 PRE-MINING PHASE**

Approximately 30% of the project area appears to have been significantly disturbed prior to this project. Therefore, only the northern portion of the project area will be surveyed for cover since this is likely the vegetation community at the site prior to disturbance. Since this area is limited in size, the survey may be extended into contiguous areas to achieve a representative quantitative estimate of the community.

Eight (8) to ten (10) transect lines in each of the project area and in the reference area will be surveyed prior to mining activities. The final number surveyed will depend upon meeting statistical sample adequacy tests for values measured.

"Percent cover" will be calculated using results from the point-intercept survey results. For data analysis purposes, transformations (e.g. arcsine transformation) may need to be performed on the percent cover values if they do not follow a normal distribution.

Frequency (number per acre) of shrubs and sub-shrubs will be calculated from counts made in the belt transects. Results from surveying the "species diversity squares" (see Methodology for Ground Cover Measurements section) will be reported as: the number of species diversity squares in which the species occurred, the arithmetic mean, the mode, and median of the species cover class. All of these values are useful in visualizing the frequency (commonness/rareness) with which the species occurs as well as how much canopy they contribute to cover. These observations also provide insight into the species diversity at the project site.

The ground cover and shrub frequency on the transect lines surveyed within the reference area will be compared by analysis of variance with the cover on the transect lines surveyed at the project site. Cover measurements are expected to be no different between the two groups at the 90 percent level of probability.

Percent cover of all species and shrub frequencies will be reviewed when deciding the final seed mix that will be sown during the revegetation phase. These survey results will also provide a basis upon which to measure revegetation success.

## **7.2 POST-SEEDING PHASE**

The transect lines within the reference area indicates the potential of the site and successional processes that occur due to environmental conditions. It is essential that there is no livestock grazing pressure to obscure changes that are a result of the environment.

Transect lines, belt transects, and species diversity squares will be surveyed on the revegetated area and within the reference area at appropriate times after seeding and planting. The results will be used to determine the success of the revegetation effort (see previous "Proactive management" and "Post-seeding survey - monitoring and measuring success" sections).

Some discussion is required about the statistical analyses of vegetation data. It is proposed that these guidelines using a "reverse null hypothesis" are followed when estimating the success of the revegetation effort.

For these types of measurements, the major issue is in determining how many transects are needed to make a valid statistical comparison between pre- and post-mining conditions and/or between reference and revegetated areas. Generally, measuring more transects is more costly, but provides quantitative metrics with lower variance. Some states do not use a sample-adequacy assessment but instead define the comparison result requirements in a way where higher measurement variability makes it harder to demonstrate reclamation success.

Neighboring New Mexico's approach of using a "reverse null hypothesis" starts with the statistical premise that the pre- and post-mining conditions are not the same until quantitatively shown to be otherwise (Ames 1993). Measurements from transects both before and after disturbance (and within the reference areas) gives values to be compared. Each of these values consists of a mean (average) and a range (variance). The variance can be high if only a small number of transects are measured and/or the transect lines are not located in areas with similar plant habitat. Instead of directly putting limits on the amount of variance, New Mexico requires that nearly all of the post-mining value range is higher than the pre-mining or reference area value range. This encourages the use of enough transect measurements to minimize the range and reduce the difficulty in meeting the comparison standard.

## 8.0 SEED MIXES

Final seed species selection and seed mixture specifications will need to be reviewed after the quantitative cover surveys are completed. All seed will be tested for purity by an AOSCA-certified seed laboratory.

The seed mix will contain at least three species of forbs, two species of shrubs, four species of grasses. Seedlings of at least one tree species may also be transplanted. A mix of life forms and species that grow at different times of year and that have contrasting root growth forms, for example fibrous-rooted grasses and tap-rooted forbs, more efficiently fill all the available niches and use resources most effectively (Weaver 1968). In this case, both resource use and productivity will be maximized. A diverse plant community is likely to be more weed-resistant because few resources are available to a potential invader. Seed mixtures of grasses with legumes (members of the *Fabaceae* such as *Astragalus*, *Trifolium*, and *Lupinus*) have been shown to improve the rate of microbial and soil structure recovery compared to that of grasses alone.

In practice, seed mix is likely to be influenced by seed availability. The most appropriate mix can be achieved if seed collection is contracted and coordinated with the seeding activity and preparations are made two years ahead of when they will be needed.

Locally adapted ecotypes and cultivars will be purchased when available. Other factors that will be taken into consideration for seed selection include ease of establishment, and seedling vigor. If any non-native species have to be added to the mix due to unavailability of natives, they will be annual and sterile.

As an enhancement to the native seed plantings or in the event that native seed is unavailable, a cover of sterile non-native species can provide immediate ground cover. At the end of the growing season the litter or stubble will serve to trap moisture and wind-blown seed from the surrounding communities and provide the microsites needed for successful native seed germination and seedling establishment. It is important that these non-natives do not produce viable seed so that there is no chance of permanent establishment. After sterile plants die, they do not leave a new generation of seeds behind to compete with native annuals or slower growing native perennial species. <sup>1</sup>Regreen™ is a wheat x wheatgrass (*Triticum aestivum* x *Elytrigia elongata*) hybrid that produces a sterile plant and is often used in revegetation projects (Glen 1992). There are also other varieties of spring wheat (*Triticum aestivum*), oats (*Avena sativa*), and barley (*Hordeum vulgare*) that do not produce viable seed and may be available commercially. Regreen™ can be planted in either the spring or fall in most climates although adequate soil moisture is necessary. Regreen™ has a dense, fibrous root system that can stabilize the soil surface but it also has a deep root system that confers drought tolerance, winter hardiness, and adaptability to varying soil and moisture conditions. When seeding in a mix of other grasses, a seeding rate of 10 pounds per acre for Regreen™ is recommended. At this rate, the plants contribute to stabilizing the soils while competition is minimized.

Sculptured seeding is the name given to the method of matching seed mixes of native grass species to varying site conditions and is widely and successfully used in revegetation efforts (Jacobsen et al. 1994). Often such methods are applied to local communities. There are several communities of native species within the project area that appear to be due to prior disturbances and are not sharply delineated. It is

<sup>1</sup> Regreen™ is a wheat x wheatgrass (*Triticum aestivum* x *Elytrigia elongata*) hybrid that produces a sterile plant. Regreen™ has a dense, fibrous root system that can stabilize the soil surface but it also has a deep root system that confers drought tolerance, winter hardiness, and adaptability to varying soil and moisture conditions.

likely that the communities described intergrade, and moreover, would not be applicable in post disturbance soils. Therefore it is recommended that one seed mix be used for reclamation.

The plant species selected will, if possible, include locally adapted species that are currently present in the area (Table 1). Appropriate grass species in the seed mix includes *Bouteloua gracilis*, *Elymus smithii*, *Stipa hymenoides*, and *Sporobolus cryptandrus*. Appropriate forbs include *Sphaeralcea coccinea* and *Chrysopsis villosa*. For small patches, an appropriate seeding rate for the forbs and grasses is 9.75 gm/m<sup>2</sup> taking care to dispense the species in the proportions appropriate for the area (Elseroad et al. 2003).

*Atriplex canescens* (four-wing saltbush) and *Ericameria nauseosa* (rubber rabbitbrush) both occur at the site (Rohman 2013). These may be particularly appropriate species for this reclamation effort because both species tolerate of a wide range of environmental conditions. Both naturally occur in full sunlight and in the understory and are found on a wide range of edaphic conditions. More information on seed handling and on their potential for mined land reclamation is available in Rosner et al (2001).

The suggestions for a species to be included in the seed mix are indicated in Table 1. Seeding rates depend upon the species, the number of seeds per lb., and the seed quality. Seed quality is usually expressed as PLS (Pure Live Seed). PLS is a combination of how pure the seed is (amount of seed vs. amount of chaff, other non-viable plant material, and weed seeds), and what the germination rate is of the seed. For example, seed with 90 percent purity and a 50 percent germination rate would have PLS calculated as shown:

$$\text{PLS} = \frac{(\text{percent purity}) * (\text{percent germination rate})}{100} = \frac{90 * 50}{100} = 45 \% \text{ PLS}$$

To get the desired amount of seed to germinate, seeds with a lower PLS will need to be applied at higher rates than seed with higher PLS values.

An example seeding rate for an appropriate mix is displayed in Table 2. *Bouteloua gracilis* (blue grama) is a perennial warm season C4 grass that complements the other C3 cool season grasses in the mix. The format of Table 2 is such that the reader can understand and work through how the figures were developed. The rates in Table 2 assume 100% purity and 80% germination rates. The rates suggested are appropriate for drill seeding. If broadcasting or hydroseeding needs to be used, the seeding rates should be at least doubled. The number of seeds per pound (lb.) depends on the variety. A median value is used in Table 2 but the variation can be significant.

**Table 1. Seed mix suggestions for the project site. The seed mix needs to be composed of at least two shrub species, four grass species and three forb species.**

Life form	Botanical name	Six-letter acronym	Common name
<b>Shrubs</b>			
Shrub	<i>Ericameria nauseosa</i>	Erinau	Rabbitbrush
Shrub	<i>Quercus gambelii</i>	Quegam	Gambel's oak
Shrub	<i>Atriplex canescens</i>	Atrcan	Four-wing saltbush
Shrub	<i>Purshia mexicana</i>	Purmex	Cliffrose
Shrub	<i>Artemisia prob. nova</i>	Artnov	Black sage
<b>Grasses</b>			
Grass	<i>Bouteloua gracilis</i>	Bougra	Blue grama
Grass	<i>Elymus smithii</i>	Elysmi	Western wheatgrass
Grass	<i>Sporobolus cryptandrus</i>	Spocry	Sand dropseed
Grass	<i>Elymus elymoides</i>	Elyely	Bottlebrush squirreltail
Grass	<i>Stipa hymenoides</i>	Stihym	Indian ricegrass

Forbs			
Forb	<i>Penstemon linarioides</i>	Penlin	Toadflax penstemon
Forb	<i>Sphaeralcea coccinea</i>	Sphcoc	Scarlet globemallow
Forb	<i>Senecio douglasii</i>	Sendou	Douglas' groundsel
Forb	<i>Chrysopsis villosa</i>	Chrvil	Hairy goldenaster
Forb	<i>Petradoria pumila</i>	Petpum	Rock goldenrod
End of Table			

**Table 2. Seed mix and seeding rate for the project site. Estimates are made with the goal of 60% germinating seeds per acre. Plant species are represented by the six-letter acronym.**

Species	Bougra	Spocry	Elyely	Stihym	Erinau	Atrean	Chrvil	Sphcoc	Penlin
% of mix	35	25	15	15	2	2	2	2	2
seed per ft <sup>2</sup>	21	15	9	9	1.2	1.2	1.2	1.2	1.2
PLS	80	80	80	80	80	80	80	80	80
# seeds/lb	710,000	5,600,000	190,000	260,000	400,000	49,000	336,500	500,000	1,000,000
seeds/acre	914,760	653,400	392,040	161,920	52,272	52,272	52,272	52,272	52,272
lbs/acre if 80% germination	1.55	0.14	2.48	0.75	0.16	1.28	0.19	0.13	0.06
Round up to nearest half or one-tenth of a lb	2.0	0.2	2.5	1.0	0.2	1.5	0.2	0.2	0.1
End of Table									

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**PLANT SURVEY REPORT**  
**FOR**  
**TACHEE ENTERPRISES, INC.'S PROPOSED**  
**BLUE GAP GRAVEL QUARRY AND ACCESS ROAD**

**SW/4 SECTION 1, NW/4 SECTION 12, E/2 SECTION 11, N/2 SECTION 14,**  
**AND NE/4 SECTION 15, T. 33 N., R. 22 E.**

**APACHE COUNTY, ARIZONA**

**By: Marian J. Rohman**

**April 14, 2013**

**1.0 INTRODUCTION**

This report discusses the potential for disturbance to plant species listed by the Navajo Natural Heritage Program (NNHP) and the United States Fish and Wildlife Service (USFWS) that could occur in the project area. There are no plants listed by the NNHP for the project area (Detsoi, 2013). Navajo sedge (*Carex specuicola*) and Zuni fleabane (*Erigeron rhizomatus*) are listed as Threatened by the United States Fish and Wildlife Service (USFWS) and as present in Apache County, Arizona (USFWS, 2013). A Threatened species is one that is likely to become endangered in the foreseeable future throughout all or a significant portion of its range (USFWS, 2004). In addition, the potential for Parish's alkali grass (*Puccinellia parishii*) will need to be evaluated if wetland conditions exist that contain white alkaline crusts (Detsoi, 2013). Parish's alkali grass is a Group 4 species, indicating that there is not currently sufficient information to support its being listed as endangered, but there is reason to consider it (NNHP, 2008).

Navajo sedge is a perennial grass-like plant with leaves that are 1-3 mm wide and dried persistent leaf bases. The flowers are inconspicuous with the female flowers located above the males in 2-4 short spikelets including both lenticular and trigonous achenes. They are clustered at the end of a long thin stalk. Flowering and fruit set occur from spring to summer, but most of the reproduction appears to be vegetative. The plants are typically found in seeps and hanging gardens on vertical Navajo Sandstone cliffs and alcoves from 4,400 to 7,000 feet (ARPC, 2001a; Roth, 2001a).

Zuni fleabane is an herbaceous perennial distinct from other *Erigerons* by its rhizomatous habit, nearly hairless achenes with 5-6 nerves, and very few hairs on the stems and leaves. In Arizona, it is typically found on fine textured clay hillsides derived from the Chinle Formation at 7,600 feet elevation in ponderosa pine communities. Flowering occurs from May through June (ARPC, 2001c; Roth, 2001b).

Parish's alkali grass is a short-lived winter or spring annual that is easily distinguished from other *Puccinellias* by its annual habit. It grows in alkaline springs, seeps, and seasonally wet areas at elevations of 2,950 to 6,070 feet and flowers and fruits from mid-April to early June (ARPC, 2001b; Roth, 2001c).

## 2.0 PROJECT DESCRIPTION

The proposed project consists of a 20.24-acre reopening and expansion of an abandoned gravel quarry and an access road that is 13,345.52 feet in length within a 20-foot right-of-way. The total land use for the proposed project will be 26.367 acres. The project is located on Navajo Tribal Land in Apache County, Arizona, approximately 22.08 miles west-northwest of the town of Chinle. It is in the SW/4 of Section 1, the NW/4 of Section 12, the E/2 of Section 11, the N/2 of Section 14, and the NE/4 of Section 15 in T. 33 N., R. 22 E. The proposed access road begins on the south side of dirt BIA Road 8028 in Section 1 and heads south then west, to end at the southwest corner of the proposed gravel quarry in Section 15. The proposed gravel quarry is in Sections 14 and 15. The proposed access follows an existing access along Sitting Giant Rock Wash for most of its length.

The access begins in a broad grassy canyon bottom dominated by blue grama (*Bouteloua gracilis*) with areas of mat grama (*Bouteloua simplex*) and scattered pinyon (*Pinus edulis*) and viscid rabbitbrush (*Chrysothamnus viscidiflorus*). Sandstone ledges near the start are dominated by blue grama, viscid rabbitbrush, broom snakeweed (*Gutierrezia sarothrae*), and big sagebrush (*Artemisia tridentata*). The sides of the canyon are in a pinyon-juniper woodland, which the access soon enters. The woodland is dominated by pinyon and one-seed juniper (*Juniperus monosperma*) with an understory of big sagebrush, viscid rabbitbrush, and four-wing saltbush (*Atriplex canescens*).

The abandoned gravel quarry is small and open and is dominated by areas of curly gumweed (*Grindelia squarrosa*), four-wing saltbush, pale wolfberry (*Lycium pallidum*), and blue grama. The surrounding slopes are dominated by pinyon and cliffrose (*Purshia mexicana* var. *stansburyana*), with one-seed juniper joining these two species in the higher proposed expansion area to the east. On this mesa top above the abandoned quarry are areas dominated by rock goldenrod (*Petradoria pumila*), Gambel's oak (*Quercus gambelii*), and broom snakeweed. A portion of this area along the east side of the abandoned quarry appears to have been previously cleared, but not quarried. This area is dominated by cliffrose and rubber rabbitbrush (*Chrysothamnus nauseosus* var. unknown) with scattered narrow-leaf yucca (*Yucca* sp.).

The project area is in the Ararab-Vessilla-Lindrieth complex, 1 to 45 percent slopes soil unit. It consists of aeolian deposits derived from sandstone over residuum weathered from sandstone and shale with soil textures of sandy loam and sandy clay loam (NRCS, 2013). The bedrock in the project area consists of sedimentary rocks of the Upper Cretaceous Mesa Verde Group (Richards, et al, 2000). The elevation of the project area ranges from approx. 6,960 feet at the start of the access to 7,495 feet on the mesa above the abandoned gravel quarry. Disturbances in the project area include dirt and two-track roads, the abandoned gravel quarry, and a fence line paralleling part of the access.

## 3.0 METHODOLOGY

The project area was surveyed on March 1, 2013, by botanist Marian Rohman. The survey of the proposed gravel quarry was accomplished by walking parallel transects across the proposed project area, including a 200-foot buffer around the project area, at approximately 80-foot intervals. Areas of steep slopes on the east side of the proposed quarry were not fully transected but were visually inspected from above and below. The proposed access road was surveyed by

walking zig-zag transects through the 20-foot corridor and 200-foot buffers on each side of the corridor. Snow cover over most of the project area was minimal and scattered, but did reach up to 60% on the mesa top. However, the snow did not interfere with habitat assessment. The emphasis of the survey was to inspect for the plants listed by the NNHP and USFWS as species of concern; however, all plants were identified in order to provide a more complete description of the environment. A list of the plants observed in the project area is included at the end of this report.

## 4.0 SURVEY RESULTS

### 4.1 LISTED SPECIES

There are no plants listed by the NNHP as species of concern that are known to occur in or near the project area (Detsoi, 2013). Navajo sedge and Zuni fleabane are listed by the USFWS and are present in Apache County, AZ (USFWS, 2013). The potential for Parish's alkali grass was also evaluated (Detsoi, 2013).

SPECIES	STATUS	POTENTIAL
<i>Carex specuicola</i> Navajo sedge  USFWS Threatened NNHP Group 3	Restricted to seeps and hanging gardens on vertical Navajo Sandstone cliffs and alcoves between 4400 and 7000 feet. Flowering/fruiting period is from spring to summer (ARPC, 2001a; Roth, 2001b).	<b>No appropriate habitat:</b> there are no seeps, or hanging gardens or Navajo Sandstone in the project area. (NP)
<i>Erigeron rhizomatus</i> Zuni fleabane  NNHP Group 2 USFWS Threatened	In ponderosa pine communities on fine textured clay hillsides derived from the Chinle Formation at an elevation of 7600 feet. Flowers from May through June (ARPC, 2001c; Roth, 2001b).	<b>No appropriate habitat:</b> there are no ponderosa pine communities or Chinle Formation in the project area. The project area is below the known elevation of the species. (NP)
<i>Puccinellia parishii</i> Parish's alkali grass  NNHP Group 4 not USFWS listed	Alkaline springs, seeps, and seasonally wet areas such as washes at 2950 to 6070 feet. Flowers and fruits from mid-April to early June (ARPC, 2001b; Roth, 2001c).	<b>No appropriate habitat:</b> there are no alkaline springs, seeps or seasonally wet areas in the project area. The project area is well above the known elevation range of the species. (NP)

#### Status\*

NNHP – Navajo Endangered Species List (NNHP, 2008)

Group 2 – a species or subspecies whose prospects of survival or recruitment are in jeopardy

Group 3 – a species or subspecies whose prospects of survival or recruitment are likely to be in jeopardy in the foreseeable future

Group 4 – a species or subspecies where there is not currently sufficient information to support its being listed as endangered, but there is reason to consider it

USFWS – U.S. Fish and Wildlife Service (USFWS, 2004)

Threatened – a species that is likely to become endangered in the foreseeable future throughout all or a significant portion of its range.

#### Potential to Occur\*\*

K – Known, documented observation within project area.

S – Habitat suitable and species suspected to occur within the project area.

NS – Habitat suitable but species is not suspected to occur within the project area.

NP – Habitat not present and species unlikely to occur within the project area

### 4.2 NOXIOUS WEEDS

There are seventeen species listed on the BIA Navajo Noxious Weed List (OSM, 1999). None of these species is present in the project area.

#### **4.3 PLANTS OBSERVED DURING THE SURVEY**

Scientific and common names according to Welsh et al., 2003  
Identifications based on Welsh et al., 2003, and Weber and Wittman, 2012

##### **TREES:**

<i>Elaeagnus angustifolia</i>	<i>Russian olive</i>
<i>Juniperus monosperma</i>	<i>One-seed juniper</i>
<i>Juniperus scopulorum</i>	<i>Rocky Mountain juniper</i>
<i>Pinus edulis</i>	<i>Pinyon</i>
<i>Pinus ponderosa</i>	<i>Ponderosa pine</i>

##### **SHRUBS AND SUBSHRUBS:**

<i>Amelanchier utahensis</i>	<i>Utah serviceberry</i>
<i>Artemisia prob. nova</i>	<i>Black sagebrush</i>
<i>Artemisia tridentata</i>	<i>Big sagebrush</i>
<i>Atriplex canescens</i>	<i>Four-wing saltbush</i>
<i>Chrysothamnus nauseosus</i> var. <i>unknown</i>	<i>Rubber rabbitbrush</i>
<i>Chrysothamnus nauseosus</i> poss. var. <i>bigelovii</i>	<i>Bigelow's rabbitbrush</i>
<i>Chrysothamnus nauseosus</i> poss. var. <i>graveolens</i>	<i>Glabrate rabbitbrush</i>
<i>Chrysothamnus viscidiflorus</i>	<i>Viscid rabbitbrush</i>
<i>Gutierrezia sarothrae</i>	<i>Broom snakeweed</i>
<i>Leptodactylon pungens</i>	<i>Sharp slenderlobe</i>
<i>Lycium pallidum</i>	<i>Pale wolfberry</i>
<i>Menodora scabra</i>	<i>Rough menodora</i>
<i>Purshia mexicana</i> var. <i>stansburyana</i>	<i>Cliffrose</i>
<i>Quercus gambelii</i>	<i>Gambel's oak</i>
<i>Yucca</i> sp.	<i>Narrow-leaf yucca</i>
<i>Yucca baccata</i>	<i>Datil yucca</i>

##### **CACTI:**

<i>Opuntia polyacantha</i>	<i>Central pricklypear</i>
<i>Opuntia whipplei</i>	<i>Whipple's cholla</i>
<i>Pediocactus simpsonii</i>	<i>Simpson's footcactus</i>

##### **GRASSES:**

<i>Bouteloua simplex</i>	<i>Mat grama</i>
<i>Bouteloua gracilis</i>	<i>Blue grama</i>
<i>Stipa hymenoides</i>	<i>Indian ricegrass</i>

##### **FORBS:**

<i>Arabis</i> sp.	<i>Rockcress</i>
<i>Bassia scoparia</i>	<i>Summer-cypress</i>
<i>Chrysopsis villosa</i>	<i>Hairy goldenaster</i>
<i>Cryptantha</i> sp.	<i>Perennial cryptanth</i>
<i>Cryptantha</i> sp.	<i>Annual cryptanth</i>
<i>Chenopodium graveolens</i>	<i>New Mexico goosefoot</i>

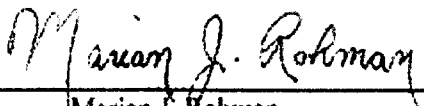
*Erodium cicutarium*  
*Grindelia squarrosa*  
*Haplopappus armerioides*  
*Hymenopappus filifolius*  
*Machaeranthera canescens*  
*Mentzelia prob. multiflora*  
*Penstemon prob. linarioides*  
*Petradoria pumila*  
*Salsola tragus*  
*Senecio douglasii*  
*Sphaeralcea sp.*

*Storksbill*  
*Curly gumweed*  
*Thrifty goldenweed*  
*Hyalineherb*  
*Hoary aster*  
*Desert stickleaf*  
*Toadflax penstemon*  
*Rock goldenrod*  
*Russian-thistle*  
*Douglas' groundsel*  
*Globemallow*

## 5.0 DISCUSSION

No plant species of concern to the Navajo Natural Heritage Program or the United States Fish and Wildlife Service will be impacted by the proposed project.

Signature of Author:

  
Marian J. Rohman

Date: April 14, 2013

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**WILDLIFE SURVEY REPORT  
FOR  
TACHEE ENTERPRISES, INC.'S PROPOSED  
BLUE GAP GRAVEL QUARRY AND ACCESS ROAD**

**SW/4 SECTION 1, NW/4 SECTION 12, E/2 SECTION 11, N/2 SECTION 14,  
AND NE/4 SECTION 15, T. 33 N., R. 22 E.  
APACHE COUNTY, ARIZONA**

**By: Celia A. Cook  
March 25, 2013**

**1.0 INTRODUCTION**

Threatened, endangered and special status wildlife (T&E) surveys were conducted at the location for Tachee Enterprises, Inc.'s proposed Blue Gap Gravel Quarry and access road March 1, 2013. The project site is located in Sections 1, 11, 12, 14, and 15 of Township 33 North, Range 22 East in Apache County, Arizona. UTM coordinates at the center of the proposed quarry are 594128m E, 4014421m N (UTM NAD 27, Zone 12N).

The project is located approximately 6 miles north of the Blue Gap/Tachee Chapter House on Navajo Tribal Trust lands. The proposed quarry is 20.24 acres and includes within its boundaries approximately 10 acres of disturbed land left over from previous mining endeavors at the same location. The access road is an unimproved road that follows Sitting Giant Rock Wash from its junction with Tah Chee Wash for 2.56 miles before reaching the proposed project site.

**2.0 METHODS**

Navajo Nation Natural Heritage Program was contacted regarding the potential for T&E wildlife species to occur on or near the project area. In response to this request, a list of all T&E species that are known or have potential to occur within the 7.5 minute Tah Chee Wash, AZ quadrangle map was issued to Permits West, Inc. March 6, 2013. This list was reviewed during the preparation of this report.

Permits West, Inc. field biologist, Celia Cook conducted a pedestrian survey of the proposed quarry and access road March 1, 2013. The purpose of the survey was to inspect for the presence of T&E wildlife species and suitable habitat for T&E species. Weather during surveys was generally clear, with moderately strong breezes and temperatures in the low to high 50s. Areas of the proposed project, particularly the access road, were extremely muddy from snow melt, and north facing slopes still had approximately 6-10 inches of snow.

The surveyed area consisted of the 2.56 miles of proposed access road and the 20.18 acre proposed quarry, most of which is previously disturbed. General habitat and existing conditions were evaluated. A 0.5-mile radius around the project area was surveyed with binoculars, and in some areas on foot, for structures or land

formations that would support raptor nests and other unique habitat elements that would benefit T&E species and wildlife in general.

### **3.0 DESCRIPTION OF EXISTING HABITAT**

The project area is situated the southeastern edge of Black Mesa, a large landform forming the western boundary of Chinle Valley. Black Mesa is made up of rolling hills and vertical bluffs bisected by broad alluvial drainages with deeply incised channels. The proposed quarry lies within the upper reaches of Sitting Giant Rock Wash, a side drainage of the larger Tah Chee Wash. In the vicinity of the quarry, the hills and side slopes support dense pinyon-juniper woodlands with pockets of oak (*Quercus spp.*), service berry (*Amelanchier sp.*), and cliff rose (*Purshia sp.*) providing understory components. Occasional ponderosa pines (*Pinus ponderosa*) are also present in side drainages and along the bottom of the wash near the northeast segment of the access road. Valley vegetation is made up of shrubs such as sage (*Artemisia spp.*), fourwing saltbush (*Atriplex sp.*), and rabbitbrush (*Chrysothamnus spp.*). Grasses are sparse and include primarily grama (*Bouteloa spp.*) Side canyons and bluffs reveal bare sandstone outcroppings in some places. Elevation within the project area ranges from approximately 6900 to 7460 feet. The soils are derived from shales and sandstones. The drainage channel along the bottom of Sitting Giant Rock Wash is deeply incised with vertical banks up to 20 feet in height along much of its lower stretch. The entire project area is grazed by horses, cows, and sheep, and supports elk (*Cervus canadensis*) and mule deer (*Odocoileus hemionus*) as well. There is no permanent water within 0.5 miles of the project area; however, Tah Chee wash was flowing with ephemeral runoff at the time of the survey.

The quarry site itself is previously disturbed. Approximately 10 of the proposed 20.18 acres have been mined for gravel in the recent past. A few shrubs and small trees have grown into the disturbed area, but most of it is barren and rocky.

One occupied home and associated corrals and outbuildings is located within the project area along the existing access road, which undoubtedly serves as the home's access as well.

Wildlife occurring in the area is typical of the Arizona Upper Sonoran life zone (Holdridge, 1967). Ungulates such as elk and mule deer utilize valleys and side slopes for forage and thermal cover, and numerous remote drainages and highlands with pockets of ponderosa support a wide variety of avian, reptilian, and mammalian species. A complete list of species observed during the survey can be found in Section 6.0.

### **4.0 THREATENED, ENDANGERED, AND SPECIAL STATUS WILDLIFE SPECIES**

According to the March 6, 2013 correspondence from the Navajo Natural Heritage Program, the species indicated in Table 4.1 have the potential to occur in or near the project area.

**Table 4.1. T&E Species with Potential to occur in the Project Area.**

Species	Status	Habitat	Presence
Golden eagle ( <i>Aquila chrysaetos</i> )	NESL Group 3, MBTA, EPA	A wide variety of open habitats, typically nests in steep cliffs typically > 30 meters in height.	NS No nearby nest habitat; Potential foraging habitat only.
Peregrine falcon ( <i>Falco peregrinnus</i> )	NESL Group 4, MBTA	Nests in sheer cliff faces typically > 30 meters in height usually near water or mesic canyons. In migration, occurs in a variety of lowland, wetland habitats	NP Water bodies and sheer cliffs lacking. Potential to occur as transients.
Northern Saw-whet Owl ( <i>Aegolius acadicus</i> )	NESL Group 4, MBTA	In Arizona, pinyon-juniper and ponderosa pine woodlands.	S The forests surrounding the project area provide suitable habitat for this small owl.
Mexican spotted owl ( <i>Strix occidentalis lucida</i> )	NESL Group 3, T	In Arizona, mature woodlands and wooded canyons, with decadent multi-story canopy.	NP
Southwestern willow flycatcher ( <i>Empidonax traillii extimus</i> )	NESL Group 2, MBTA; E	Cottonwood-willow habitats within perennial riparian areas.	NP
Black-footed ferret ( <i>Mustela nigripes</i> )	NESL Group 2; E	Grassland or shrubby habitats where large, densely populated prairie dog towns are present	NP No large prairie dog towns present.

**Status\***

Federal Status: E = Endangered; T= Threatened; C= Candidate; EPA = Eagle Protection Act; MBTA= Migratory Bird Treaty Act

Tribal Status: NESL = Navajo Endangered Species List Group 1-4

**Presence\*\***

K= Known, documented observation within project area.

S =Habitat suitable and species suspected to occur within or near the project area.

NS= Habitat suitable but species is not suspected to occur within the project area.

NP= Habitat not present and species unlikely to occur within the project area.

## 5.0 RESULTS

No federally or Navajo listed threatened, endangered, or special status species were observed during the March 1, 2013 wildlife surveys. However, suitable habitat for the northern saw-whet owl (*Aegolius acadicus*) was present. These small woodland owls are a Navajo Fish and Wildlife Natural Heritage Program G4 species. Northern saw-whet owls are forest dwelling owls and their nesting habitat includes all types of forests in their range (Cartron, 2010). The mixed conifer forest around the project area provides suitable saw-whet owl habitat, including cavities that could be used for nesting. Though the saw-whet owl is not uncommon throughout its range, more information is needed about this species to determine its status on the Navajo Reservation.

No other threatened, endangered or special status species, or their habitats were observed during the survey of the project area.

**Migratory Birds:**

Migratory birds are protected under the Migratory Bird Treaty Act. Birds protected under the Act include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows and others, including their body parts (feathers, plumes etc.), nests, and eggs. The Act protects migratory birds from a "take". Take is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities". A "take" does not include habitat destruction or alteration, as long as there is not a direct taking of birds, nests, eggs, or parts thereof.

Seven migratory bird species were observed during the survey. All of these species have the potential to nest within or adjacent to the proposed quarry. Birds nesting within the boundaries of the proposed gravel pit will be directly impacted by development of the gravel pit either through removal of their nesting substrate (trees or shrubs) and/or noise and human activity.

**6.0 SPECIES OBSERVED DURING THE SURVEY**

**Avian species observed:**

- Common raven (*Corvus corax*)
- Northern flicker (*Colaptes auratus*)
- Western scrub-jay (*Aphelocoma californica*)
- Mountain chickadee (*Poecile gambeli*)
- Mountain bluebird (*Sialia currucoides*)
- Western bluebird (*Sialia mexicana*)
- Spotted towhee (*Pipilo maculatus*)

**Mammalian species observed:**

- Coyote (*Canis latrans*)
- Elk (*Cervus canadensis*)
- Mule deer (*Odocoileus hemionus*)
- Cottontail (*Sylvilagus sp.*)

No reptilian or amphibian species were observed.

**7.0 RECOMMENDATIONS**

It is recommended that presence/absence survey for the northern saw-whet owl (*Aegolius acadicus*) be completed at the Blue Gap project site prior to ground breaking due to the presence of suitable habitat for this species. The one time survey should be completed no later than June 30, 2013. No other threatened, endangered, or special status species or their habitats were found during the wildlife surveys of the project area.

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**Signature of Author:**

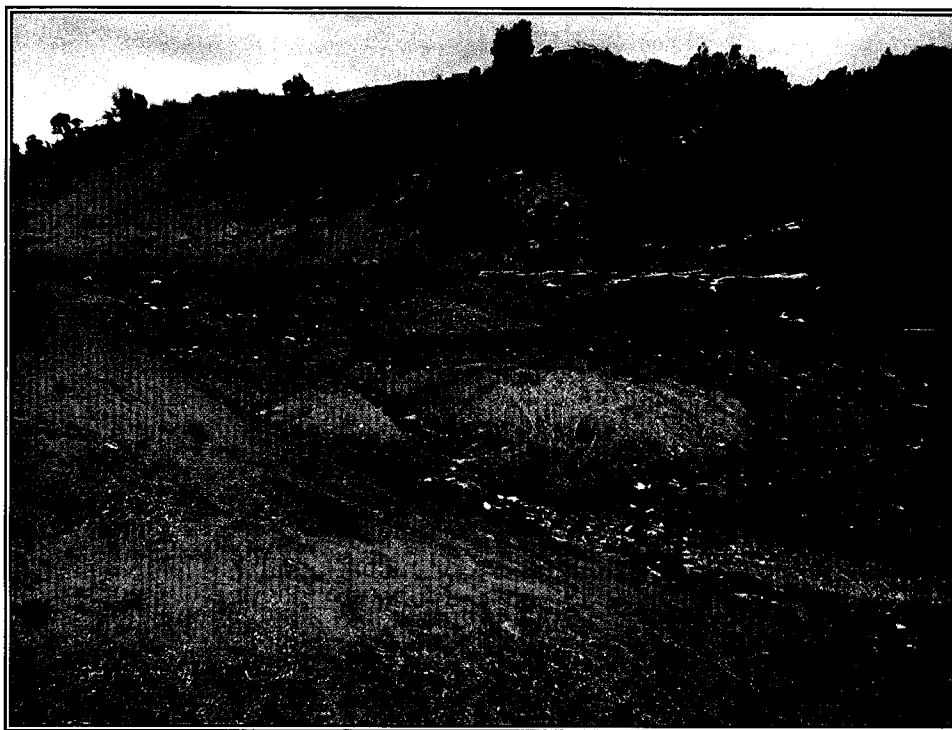


Celia A. Cook  
Wildlife Biologist  
Permits West, Inc.  
37 Verano Loop  
Santa Fe, NM 87508  
(505) 466-8120

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**REVEGETATION PLAN**  
**FOR THE**  
**BLUE GAP GRAVEL QUARRY**  
**TACHEE ENTERPRISES, INC.**

Sections 1, 11, 12, 14, and 15, T. 33 N., R. 22 E.  
Apache County, Arizona



**APRIL 14, 2014**

*PREPARED BY:*

**PERMITS WEST, INC.**  
PROVIDING PERMITS for LAND USERS

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## 1.0 SUMMARY

A reclamation and revegetation plan typically considers three phases:

1. Documentation of the plant species composition and quantitative estimation of the ground cover prior to mining activities.
2. Reclamation and revegetation methods.
3. Monitoring and measuring of the success of the revegetation effort.

This document primarily emphasizes phases 1 and 3; however, general issues for phase 2 are described.

Successful revegetation has been accomplished when the following criteria are met:

- Vegetation is predominantly composed of native species.
- Reclamation vegetation cover is at least 90 percent of the reference area cover and shrub frequency is at least 90 percent of shrub of the reference area in at least two years between years six and ten after the initial seeding. Note that grasses and forbs are measured as percent cover whereas shrubs and trees are measured by frequency. This is because shrubs and trees grow at much slower rates and it is unrealistic to expect either shrub or tree cover to approach pre-disturbance levels within ten years of seeding.
- Invasive non-native species are absent or are present at no higher cover levels than pre-disturbance levels.

## 2.0 INTRODUCTION

This report addresses the reclamation and revegetation of the proposed reopening and expansion of an abandoned gravel quarry and access road located approximately 22 miles west-northwest of Chinle, AZ. This project area is in Sections 1, 11, 12, 14, and 15, T. 33 N., R. 22 E., in Apache County, AZ. The project area is on Navajo Nation Tribal Trust Land.

The elevation of the project area ranges from approximately 6,960 feet at the start of the access road to 7,495 feet on the mesa above the quarry site. The soils at the site were identified using the USDA NRCS soils map (2013). Soils within the project area are entirely characterized as Arabrab-Vessilla-Lindrith complex, 1 to 45 percent slopes. This soil complex consists of Aeolian deposits derived from sandstone over residuum weathered from sandstone and shale with soil textures of sandy loam and sandy clay loam (NRCS 2013). The mean annual precipitation is 14 to 18 inches with a mean annual temperature of 46° to 50°F, and a frost-free period of 120 to 150 days (USDA NRCS 2014). Other attributes of this soil complex are as follows:

- Drainage class: somewhat excessively drained
- Depth to water table: more than 80 inches
- Frequency of flooding: none
- Frequency of ponding: none
- Maximum salinity: nonsaline (0.0 to 2.0 mmhos/cm)
- Available water capacity: very low to moderate (about 0.3 to 6.5 inches; USDA NRCS 2014)

Vegetation represented at the project site was varied. The access begins in a broad grassy canyon bottom dominated by blue grama (*Bouteloua gracilis*) with areas of mat grama (*Bouteloua simplex*), scattered pinyon (*Pinus edulis*), and viscid rabbitbrush (*Chrysothamnus viscidiflorus*). Sandstone ledges near the start are dominated by blue grama, viscid rabbitbrush, broom snakeweed (*Gutierrezia*

*sarothrae*), and big sagebrush (*Artemisia tridentata*). The sides of the canyon are in a pinyon-juniper woodland, which the access soon enters. The woodland is dominated by pinyon and one-seed juniper (*Juniperus monosperma*) with an understory of big sagebrush, viscid rabbitbrush, and four-wing saltbush (*Atriplex canescens*).

The abandoned gravel quarry is small and open and is dominated by areas of curly gumweed (*Grindelia squarrosa*), four-wing saltbush, pale wolfberry (*Lycium pallidum*), and blue grama. The surrounding slopes are dominated by pinyon and cliffrose (*Purshia mexicana* var. *stansburyana*), with one-seed juniper joining these two species in the higher proposed expansion area to the east. On the mesa top above the abandoned quarry are areas dominated by rock goldenrod (*Petradoria pumila*), Gambel's oak (*Quercus gambelii*), and broom snakeweed. A portion of this area along the east side of the abandoned quarry appears to have been previously cleared, but not quarried. This area is dominated by cliffrose and rubber rabbitbrush (*Chrysothamnus nauseosus* var. unknown) with scattered narrow-leaf yucca (*Yucca* sp.).

This reclamation and revegetation plan has three phases:

1. Documentation of the plant species composition and a quantitative estimate of the ground cover prior to the commencement of mining activities.
2. Methods for reclamation and revegetation.
3. Monitoring and measuring the success of the revegetation effort.

The plan largely emphasizes Phases 1 and 3, and describes general issues to be considered for Phase 2. Reclamation and re-seeding methods will be refined and described in detail by the contractor responsible for their implementation in a separate document.

## 2.1 GOALS

The outcome goals of any endeavor must be clearly defined before commencing any restoration or revegetation program. The overall goal of this effort is to eventually restore the land to its pre-mining condition (or better) so that it can provide suitable wildlife habitat and forage.

The chronology of activities to meet these goals are:

- Pre-mining activities: on-site inventory to document plant species composition; measurements of ground cover values and shrub frequencies using transect line surveys.
- Reclamation and post-mining grading, stabilizing, and seeding activities.
- Post-seeding monitoring and quantitative assessment.

## 3.0 VEGETATION SURVEYS

### 3.1 PRE-MINING

On-site inventory to document plant species composition and estimates of cover values must be made prior to the commencement of mining.

The existing communities at the site were described and a Plant Survey Report was compiled on April 14, 2013 (Rohman 2013). This inventory provides information on which to base seed mixes for post disturbance revegetation efforts. Reseeding with plant species native to the vegetation communities of the development area is now recognized as being an important element for successful revegetation and reclamation and is now part of public policy. A second inventory survey must be made in a subsequent year to capture the extent of plant species diversity at the site.

In addition to inventory, quantitative estimates of vegetation cover must be made. The reasons for these measurements are two-fold. Primarily, cover measurements establish a baseline upon which to estimate the success of revegetation efforts. They also indicate the relative amount of each species that is appropriate in the post mining seeding mix. Late summer or early fall are appropriate times of year to make quantitative surveys.

The proposed gravel quarry is on flat to steeply sloping land, much of which has experienced variable levels of disturbance in the past. Therefore, quantitative measures of average ground cover values and their variability needs to be conducted only in undisturbed portions of the project area and in contiguous suitable surrounding habitat that has not been significantly altered.

If possible, the success of previous revegetation efforts should also be assessed so that the positive aspects can be included in the next reclamation effort and any shortcomings can be avoided (see Section 4.0, below).

### **3.2 METHODOLOGY FOR GROUND COVER MEASUREMENTS**

Quantitative estimates of ground cover must be made prior to mining activity so that revegetation success can be measured. This is most easily carried out by surveying the ground cover along 50-meter-long transect lines.

There are three methods that are typically used to measure ground cover: a point-intercept method, a line-intercept method, or a method utilizing quadrants (usually referred to as Daubenmire quads - after Daubenmire, 1959) along a transect line (Elzinga et al. 2001). It is recognized that each method has inherent strengths and weaknesses.

The point-intercept method is often recommended and will be used in this project since it is objective and relatively rapid. Floyd and Anderson (1987) found that the point intercept method achieved the same level of precision as the line-intercept method while taking one third of the time (Elzinga et al. 2001). In some cases, this method can tend to overestimate cover (Korb et al. 2003). However, this source of error will be minimized if the same method is used when measuring the success of revegetation. The objective nature of the data gathering makes it appropriate for use over several years with different operators involved.

A 50-m tape measure (transect line) will be laid across the ground and secured at each end. The cover that intercepts the line at 1-m intervals along the 50-m transect will be measured. Using this method, the cover types and the amount of bare ground can be calculated as the percentage of interceptions ("hits") relative to the total number of points sampled (e.g., see Forest and Range.org at <http://www.forestandrange.org/modules/vegmonitor/mod9/mod9-14.shtml>).

Vegetation cover types will be: total native trees, total native grasses, total native forbs, total native shrubs, total succulents, total graminoid species (sedges, etc.) total non-native grasses, total non-native forbs, and total non-native shrubs. Although Russian olive (*Elaeagnus angustifolia*) was observed at the project site (Rohman 2013), non-native, invasive trees are not expected outside of the areas that have been substantially disturbed. However, if non-natives are observed, they would be documented as well. The cover of individual plant species will also be measured by recording the plant species name whenever it is intercepted by a point.

Other cover classes include: bare ground defined as soil alone, coarse sand defined as particles less than 3 mm (0.12 inches) across, gravels defined as particles up to 7.6 cm (3 inches), and rocks defined as particles greater than 7.6 cm (3 inches). Microbiotic crust will be recorded as a separate cover class with the most prominent life form (moss, lichen, or cyanobacteria) in the crust noted. Litter is dead plant material directly covering the ground, dead perennial vegetative bases, or animal scat, including cow

ding. If a small stem or piece of litter is not considered large enough to intercept a raindrop, the "hit" is then considered to be the ground covering, or lack of covering, below it. Dead annual forbs are considered as litter cover when unattached to the roots and can potentially be windblown. A dead annual forb that is rooted and recognizable to species will be recorded as that species. Species will be recorded when the sampling point falls on any part of the vegetation. When the canopy of multiple species overlaps, all of the cover-types will be recorded.

These transect lines will also be used to estimate shrub frequency. In addition to measuring cover along the transect line, the number of sub-shrubs and shrubs within a one-meter wide belt along the transect line (a "belt transect") will be counted and recorded by species name. In a similar way, the number of trees will be counted within a ten-meter-wide belt transect.

An important disadvantage of the point-intercept method is that species with low cover values may not be effectively sampled because they are so rarely intercepted with the pointing device (Korb et al. 2003). This problem will be mitigated by estimating the canopy cover of each species within a ten-meter square at the beginning, in the mid-section, and at the end of each transect (see Figure 1). All species that are in this ten-meter-wide square will be recorded and their cover estimated, so that 1 m<sup>2</sup> (1 square meter) of vegetative cover equals 1 percent, 5 m<sup>2</sup> equals 5 percent, etc. Cover of individual plant species will be estimated to be within one of seven cover classes: T = trace, 1 = 1% to 5%, 2 = 5% to 25%, 3 = 25% to 50%, 4 = 50 to 75%, 5 = 75 to 85% and 6 = 95 to 100%. These squares are termed "species diversity squares" (Figure 1).

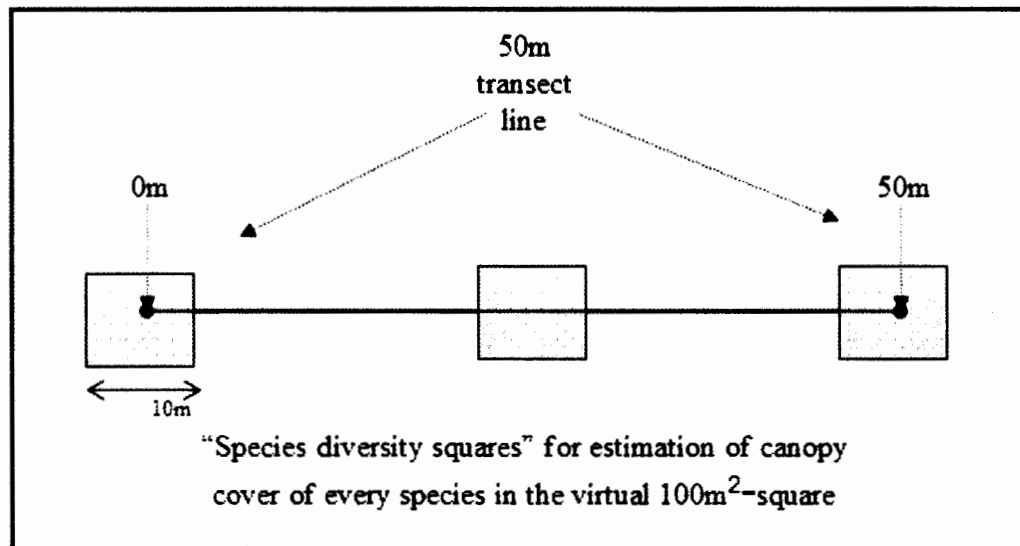


Figure 1. Diagram Showing Arrangement of the Species Diversity Squares

### 3.3 TRANSECT LINE PLACEMENT

A portion of the quarry has been significantly disturbed and does not represent undisturbed habitat. Therefore, in order to thoroughly document the natural ground cover and its variability, transect lines distributed in the quarry will be surveyed. This area is relatively large, so the survey may be extended into contiguous areas to achieve a representative quantitative estimate of the community. It is anticipated that 8 to 10 transect lines will need to be surveyed. This estimate of the number of lines required is made from an aerial photograph of the site. The number of transect lines that need to be surveyed in order to document the variability may be increased during ground-truthing. In addition, the

variance among transect lines needs to be small enough to meet a statistical sample adequacy test (see Data Analysis section).

The geographic coordinates marking the location of each end of the transect line will be recorded using a GPS unit. The ends will not be permanently marked since it is anticipated that those locations will be excavated.

### **3.4 REFERENCE AREA**

The vegetation cover and shrub and tree frequency within the reference area provide a means by which to track changes that occur to the vegetation throughout the mining and revegetation phase. They indicate if significant changes occur to the vegetation due to environmental conditions. For example, lasting impacts of a drought or a storm on the vegetation within the project area during the mining or revegetation phases will be reflected in the condition of the vegetation within the enclosure. These changes may be reflected in percent cover, shrub frequency, or in the species composition, and will help in interpreting the results of the revegetation effort.

The reference area should be established in a location that will be unaffected by mining activities but where there are very similar cover conditions. If there is livestock grazing in the area, the reference area should be fenced in order to exclude the livestock. It is therefore termed an "enclosure." Such areas protected from livestock grazing provide a clear indication as to the potential and natural successional trajectory of the native vegetation at the site.

Since portions of the project site have been significantly disturbed by prior mining activity, the reference area will be selected on the basis of land in the western or northern portion of the project area that is contiguous with the project area.

Generally reference areas are selected to be as close as possible to the project site. However this region has cliffy and ridged topography and possible reference areas near the site appear to have substantially variable aspects and slopes. Slope and aspect needs to be considered when selecting the area since they will affect all facets of vegetation cover. Likely reference site locations will be established and recorded using Google Earth and will be planned with similar aspect, slope, vegetation, and elevation (within 300 feet) as the project site. However, other areas in the region may provide sites that are likely to be as appropriate.

The reference area needs to be approximately 5 acres in size. This area will encompass the community type representative of the project site and there will be approximately 10 transects established in independent locations within this reference area. The exact number will be determined by a statistical sample adequacy test. The UTM coordinates marking the location of each end of the transect lines will be recorded using a GPS unit. The reference area perimeter will also be recorded with UTM coordinates.

The mean and standard deviation of ground cover and tree and shrub frequencies within the reference site will be calculated within and between the reference site and the project area. Data analysis is discussed later in the document.

### **3.5 PHOTO-POINTS**

Photographs will be taken of each transect line and reference area. Additional photographs that show landscape views and close-up views of the vegetation that are representative of the project site will be taken to describe the area. The azimuth of the photograph shot and UTM coordinates of the location where all the photographs are taken will be recorded.

## 4.0 PROACTIVE MANAGEMENT

Starting at the beginning of mining activities, cursory inspections at three monthly intervals will be used as an adaptive management tool to correct problems as they arise. These visual inspections will include considering and remediating these elements:

1. Invasion of noxious weeds;
2. Damage to fences, etc. resulting from human or livestock trespass;
3. Presence of other conditions, such as severe erosion, that, if unchecked, will result in failure to meet revegetation success criteria

Actions taken to respond to observations might include mending or erecting additional fencing to exclude grazing animals from the exclosures, weed control, and installation of erosion control blankets.

No specific recommendations for noxious weed control have been made by either The Navajo Natural Heritage Program or the Navajo Nation Department of Fish and Wildlife. Emphasis is placed on immediate control, prevention of seed spread, and eradication. Awareness, identification, control, and monitoring are priorities (USDI OSM 1999). An example of proactive weed management may be that if a noxious weed is observed along the access road or within the project site, measures will be taken to eliminate it. No noxious weeds on the BIA Navajo Area Noxious Weed List were reported in the project area (Rohman 2013); however, one species considered by various agencies was present, Russian olive. A survey during the summer and fall months would be made to confirm this observation since many species are easily overlooked or are not detectable at certain times of the year.

After revegetation seeding has been completed, the condition of the seeded area needs to be evaluated. All disturbances to reclaimed areas need to be minimized. The seeded areas should be protected from all grazing for at least five years after seeding. Establishing vigorous stands of desirable native plants will limit the opportunity for invasion by noxious weeds.

Visual inspections of the seeded area will include checking and remediating these elements:

- Bare spots,
- Eroded areas,
- Areas of excessive settlement,
- Wash out areas, and
- Areas where initial attempts to establish vegetation were not successful.

If there is a drought, the possibility of temporary irrigation will be considered. Follow-up seeding or corrective erosion control measures may be required on areas that experience reclamation failure. Interseeding, secondary seeding, or staggered seeding may be required to accomplish revegetation objectives. If small areas experience being washed out or eroded, local applications of mulch followed by reseeding may be a good way to keep a successful revegetation effort on track. Re-seeding small areas in a timely manner is better than having to reseed large acreages after several years have passed.

After three years, vegetation cover and shrub frequency will be measured using transect lines and species diversity squares to monitor the seeding results in detail. This is distinct from the measurements that will determine success for bond release. Periodic checking in the course of proactive management may miss localized areas where seeding has obviously failed. During the three-year survey time seedling/small plants will be observed in detail by a botanist. Seeding is often considered a failure when an average of less than one seeded species per square meter is established (Wright et al. undated).

Immediate site stabilization to limit wind and water erosion in the short-term will be carried out so that there is not undue substrate loss before the long-term reclamation effort commences. When excavation of the site has been completed, the sides will be sloped, graded or scaled, and the general quarry area smoothed and stabilized. The original contours and drainage patterns will be replicated as much as possible. Slopes will be stabilized with erosion blankets, mulch, and/or applicable techniques to reduce the potential for soil erosion by wind and water.

Documentation detailing the dates of revegetation activity, specific seed mixtures applied, and materials, equipment, and personnel involved in each activity, will be maintained so they can be referred to in the future.

3. Establish regenerating and self-supporting native vegetation
2. Re-establish healthy, vigorous ground cover to their original condition or better using native plant species.
1. Stabilize disturbed sites by reducing the potential for soil erosion by wind and water runoff.

The goals of the reclamation effort are:

Reclamation and re-seeding methods will be refined and described by the operator in a separate document. Some issues that affect revegetation success are listed in the following section.

## 5.0 POST MINING RECLAMATION AND REVEGETATION

In relatively small areas where there are no obvious reasons for poor germination and/or seedling development, soil testing will be done to determine if soil amendments are needed before re-seeding. Soil tests will also indicate if the soil is inhospitable to certain species in some way, e.g. having a particularly acidic or saline soil. In the case of acidic soils, if an amendment cannot change the pH, a seed mix of different native species may have to be used to achieve the revegetation objectives. In this case, spores need to be collected from plants in the vicinity of the site to ensure that locally adapted ecotypes are used and alien genes are not introduced into the gene pool.

- Was the seed planted too late in the spring or too early in the fall?
- Was the year drier than normal?
- Was the spring drier than normal?
- Was the seed eaten by rodents or birds?
- Was the seed exposed to wind or water erosion?

Questions relating to environmental factors:

- Were the best adapted seed varieties, sources and species used?
- Was the seed tested?
- Was good seed used from a reputable vendor?

Questions relating to seed source include:

A simple but often overlooked question is: *Was the area missed by the seeder?*

Understanding the reasons why seedling fails helps anticipate and prevent future failures. When evaluating why an initial seedling failed, either locally or more widely, the following questions can be asked (after Wright et al. Undated):

Soil analysis will be undertaken before any fertilizer is applied. Unless the topsoil is particularly poor in nutrients, fertilizer is not planned since seed germination and seedling establishment is often enhanced to a far greater degree for weeds than for native species.

Mulch can be applied before or after seeding and is important for preventing water erosion, reducing wind erosion, reducing soil crusting, decreasing rainfall impact, insulating the soil surface, and decreasing evaporation (Munshower 1994). The mulch used will be free from mold, fungi, and noxious weed seeds. Certified noxious-weed free straw and hay will be ordered. Biodegradable material will be used and mulch options include native hay, small grain straw, wood fiber, cotton, or jute. Native hay and small grain straw tends to contain seeds of the vegetative material and they also tend to attract livestock and wildlife. Therefore, they may not be the first choice but both are viable options.

Disturbance to reclaimed areas will be minimized. The seeded areas will be protected from grazing for at least five years after seeding. This is essential in regions with low-precipitation. If re-seeding is necessary, the length of time the areas are protected from grazing will be extended.

It is generally recognized that adequate topsoil can be of great importance in reclamation success. Therefore, stockpiling topsoil is a common practice. The stockpiled topsoil is spread on the exposed surface and used as a seedbed for sowing the selected seeds. However, the quality (microbial components and structure) of topsoil and the germinability of native seeds in the seed bank declines in proportion to the length of time the soil is stored, whereas the population of seed bank-weed seeds capable of germinating increases proportionally. That is, the seeds of only a few species of native grasses will usually survive storage in a topsoil stockpile whereas weed seeds usually have efficient dormancy mechanisms and can survive quite adverse storage conditions. In some circumstances it is preferable to seed native grass species directly into the mined surface substrate as long as it has been well prepared (Service NSW 2005). However, this is a site specific situation and requires the advice and recommendations of a soil scientist familiar with native plant growth requirements. At the current time, stockpiling available topsoil appears to be the best course of action for this site. The quantitative estimates of weed infestation made by transect line survey will help determine if alternative approaches are more appropriate.

Topsoil piles need to be stabilized by seeding a sterile non-native species or a mix of native grass and forb species that is similar to the seed mix recommended for the site. Shrub species are not needed in this mix since they will take a long time to establish and reproduce so their value to a short-term stabilization effort is not cost effective. The topsoil pile should be checked for weed germination. If there is significant weed germination on the topsoil piles, the weeds should not be allowed to set seed.

Contemporaneous reclamation may be carried out if the mining activity is such that discrete areas can be excavated, stabilized, reclaimed and can be left undisturbed while the mine is operating. The major benefit of this option is that topsoil would not have to be stored for very long periods.

Soil preparation is important. Appropriate surface roughness improves retention of seed, water, and soil. Care will be taken not to compact the soil surface. The number of passes made by the tillage and seeding machinery will be minimized. In addition to tillage surface preparation, "habitat niches" that create an environment that promotes seed germination and seedling survival will be formed if possible. One problem with reseeding litter-free areas is that there is often insufficient moisture to sustain seedling development. One mechanical way of roughing the surface and providing a variation in microclimates is by pitting. Pitting is literally creating pits in the ground surface that will collect litter, seeds, fine dust and precipitation and act as a refugia from wind for seed germination and seedling establishment (Bainbridge 1997).

A native grass and forb mix is the primary component of the revegetation plan and will be used to provide initial cover and stabilization. However, shrubs are also important elements of the community, especially in the long term, at the project site. Shrub seed will be seeded with the grass and forb mix.

## **6.0 POST-SEEDING SURVEY - MONITORING AND MEASURING SUCCESS**

Frequent examination of the seeded areas will be made after the seed mix of native species is sown. The revegetated areas will be formally and quantitatively surveyed three years post-seeding (see Proactive Management section). Monitoring the results of the seeding effort allows proactive management and timely reactions to localized failures of the revegetation processes. Therefore, appropriate monitoring at frequent intervals between the initial reseeding event and the quantitative survey after 3 years will alert managers if possible proactive efforts or remedial activities are required to ensure the success of the effort.

Quantitative evaluation of the results of the revegetation effort is necessary to determine if the revegetation and reclamation effort has met its goals and objectives. Revegetation efforts should not be considered a failure for a minimum of two years after the original planting effort. For the project site, a quantitative measure of success will first be made 3 years after the original sowing time. Because of the long length of time shrubs take to mature, shrub revegetation success will be considered on a frequency basis since their immature size makes it unreasonable to use a cover measurement. Viewing shrub frequency early or late in the growing season helps identify them since seedlings and small young shrubs are easily obscured by other vegetation.

If the cover along the transect lines in the reference area and along the revegetation transects are similar but different to the original baseline cover, the cause of the difference is likely environmental. Vegetation cover will obviously be lower in years with low precipitation. Therefore, the success of the revegetation effort needs to be evaluated in the context of the cover of the native vegetation in the reference area (exclosure) in the year that the survey is made rather than only to that of the original values.

The revegetation effort has been successful when:

- Native species are predominant at the site;
- Non-native species are at the same levels or lower than the baseline levels before mining commenced;
- The mean native grass and forb cover and the mean native shrub frequency in the reclaimed areas are no less than 90 percent of those in the exclosure (reference) areas, with 90 percent statistical confidence, for any two consecutive years six to ten years after the initial seeding.

## **7.0 DATA ANALYSIS**

### **7.1 PRE-MINING PHASE**

Approximately 30% of the project area appears to have been significantly disturbed prior to this project. Therefore, only the northern portion of the project area will be surveyed for cover since this is likely the vegetation community at the site prior to disturbance. Since this area is limited in size, the survey may be extended into contiguous areas to achieve a representative quantitative estimate of the community.

Eight (8) to ten (10) transect lines in each of the project area and in the reference area will be surveyed prior to mining activities. The final number surveyed will depend upon meeting statistical sample adequacy tests for values measured.

“Percent cover” will be calculated using results from the point-intercept survey results. For data analysis purposes, transformations (e.g. arcsine transformation) may need to be performed on the percent cover values if they do not follow a normal distribution.

Frequency (number per acre) of shrubs and sub-shrubs will be calculated from counts made in the belt transects. Results from surveying the “species diversity squares” (see Methodology for Ground Cover Measurements section) will be reported as: the number of species diversity squares in which the species occurred, the arithmetic mean, the mode, and median of the species cover class. All of these values are useful in visualizing the frequency (commonness/rareness) with which the species occurs as well as how much canopy they contribute to cover. These observations also provide insight into the species diversity at the project site.

The ground cover and shrub frequency on the transect lines surveyed within the reference area will be compared by analysis of variance with the cover on the transect lines surveyed at the project site. Cover measurements are expected to be no different between the two groups at the 90 percent level of probability.

Percent cover of all species and shrub frequencies will be reviewed when deciding the final seed mix that will be sown during the revegetation phase. These survey results will also provide a basis upon which to measure revegetation success.

## **7.2 POST-SEEDING PHASE**

The transect lines within the reference area indicates the potential of the site and successional processes that occur due to environmental conditions. It is essential that there is no livestock grazing pressure to obscure changes that are a result of the environment.

Transect lines, belt transects, and species diversity squares will be surveyed on the revegetated area and within the reference area at appropriate times after seeding and planting. The results will be used to determine the success of the revegetation effort (see previous “Proactive management” and “Post-seeding survey - monitoring and measuring success” sections).

Some discussion is required about the statistical analyses of vegetation data. It is proposed that these guidelines using a “reverse null hypothesis” are followed when estimating the success of the revegetation effort.

For these types of measurements, the major issue is in determining how many transects are needed to make a valid statistical comparison between pre- and post-mining conditions and/or between reference and revegetated areas. Generally, measuring more transects is more costly, but provides quantitative metrics with lower variance. Some states do not use a sample-adequacy assessment but instead define the comparison result requirements in a way where higher measurement variability makes it harder to demonstrate reclamation success.

Neighboring New Mexico’s approach of using a “reverse null hypothesis” starts with the statistical premise that the pre- and post-mining conditions are not the same until quantitatively shown to be otherwise (Ames 1993). Measurements from transects both before and after disturbance (and within the reference areas) gives values to be compared. Each of these values consists of a mean (average) and a range (variance). The variance can be high if only a small number of transects are measured and/or the transect lines are not located in areas with similar plant habitat. Instead of directly putting limits on the amount of variance, New Mexico requires that nearly all of the post-mining value range is higher than the pre-mining or reference area value range. This encourages the use of enough transect measurements to minimize the range and reduce the difficulty in meeting the comparison standard.

## 8.0 SEED MIXES

Final seed species selection and seed mixture specifications will need to be reviewed after the quantitative cover surveys are completed. All seed will be tested for purity by an AOSCA-certified seed laboratory.

The seed mix will contain at least three species of forbs, two species of shrubs, four species of grasses. Seedlings of at least one tree species may also be transplanted. A mix of life forms and species that grow at different times of year and that have contrasting root growth forms, for example fibrous-rooted grasses and tap-rooted forbs, more efficiently fill all the available niches and use resources most effectively (Weaver 1968). In this case, both resource use and productivity will be maximized. A diverse plant community is likely to be more weed-resistant because few resources are available to a potential invader. Seed mixtures of grasses with legumes (members of the *Fabaceae* such as *Astragalus*, *Trifolium*, and *Lupinus*) have been shown to improve the rate of microbial and soil structure recovery compared to that of grasses alone.

In practice, seed mix is likely to be influenced by seed availability. The most appropriate mix can be achieved if seed collection is contracted and coordinated with the seeding activity and preparations are made two years ahead of when they will be needed.

Locally adapted ecotypes and cultivars will be purchased when available. Other factors that will be taken into consideration for seed selection include ease of establishment, and seedling vigor. If any non-native species have to be added to the mix due to unavailability of natives, they will be annual and sterile.

As an enhancement to the native seed plantings or in the event that native seed is unavailable, a cover of sterile non-native species can provide immediate ground cover. At the end of the growing season the litter or stubble will serve to trap moisture and wind-blown seed from the surrounding communities and provide the microsites needed for successful native seed germination and seedling establishment. It is important that these non-natives do not produce viable seed so that there is no chance of permanent establishment. After sterile plants die, they do not leave a new generation of seeds behind to compete with native annuals or slower growing native perennial species. <sup>1</sup>Regreen™ is a wheat x wheatgrass (*Triticum aestivum* x *Elytrigia elongata*) hybrid that produces a sterile plant and is often used in revegetation projects (Glen 1992). There are also other varieties of spring wheat (*Triticum aestivum*), oats (*Avena sativa*), and barley (*Hordeum vulgare*) that do not produce viable seed and may be available commercially. Regreen™ can be planted in either the spring or fall in most climates although adequate soil moisture is necessary. Regreen™ has a dense, fibrous root system that can stabilize the soil surface but it also has a deep root system that confers drought tolerance, winter hardiness, and adaptability to varying soil and moisture conditions. When seeding in a mix of other grasses, a seeding rate of 10 pounds per acre for Regreen™ is recommended. At this rate, the plants contribute to stabilizing the soils while competition is minimized.

Sculptured seeding is the name given to the method of matching seed mixes of native grass species to varying site conditions and is widely and successfully used in revegetation efforts (Jacobsen et al. 1994). Often such methods are applied to local communities. There are several communities of native species within the project area that appear to be due to prior disturbances and are not sharply delineated. It is

<sup>1</sup> Regreen™ is a wheat x wheatgrass (*Triticum aestivum* x *Elytrigia elongata*) hybrid that produces a sterile plant. Regreen™ has a dense, fibrous root system that can stabilize the soil surface but it also has a deep root system that confers drought tolerance, winter hardiness, and adaptability to varying soil and moisture conditions.

likely that the communities described intergrade, and moreover, would not be applicable in post disturbance soils. Therefore it is recommended that one seed mix be used for reclamation.

The plant species selected will, if possible, include locally adapted species that are currently present in the area (Table 1). Appropriate grass species in the seed mix includes *Bouteloua gracilis*, *Elymus smithii*, *Stipa hymenoides*, and *Sporobolus cryptandrus*. Appropriate forbs include *Sphaeralcea coccinea* and *Chrysopsis villosa*. For small patches, an appropriate seeding rate for the forbs and grasses is 9.75 gm/m<sup>2</sup> taking care to dispense the species in the proportions appropriate for the area (Elseroad et al. 2003).

*Atriplex canescens* (four-wing saltbush) and *Ericameria nauseosa* (rubber rabbitbrush) both occur at the site (Rohman 2013). These may be particularly appropriate species for this reclamation effort because both species tolerate of a wide range of environmental conditions. Both naturally occur in full sunlight and in the understory and are found on a wide range of edaphic conditions. More information on seed handling and on their potential for mined land reclamation is available in Rosner et al (2001).

The suggestions for a species to be included in the seed mix are indicated in Table 1. Seeding rates depend upon the species, the number of seeds per lb., and the seed quality. Seed quality is usually expressed as PLS (Pure Live Seed). PLS is a combination of how pure the seed is (amount of seed vs. amount of chaff, other non-viable plant material, and weed seeds), and what the germination rate is of the seed. For example, seed with 90 percent purity and a 50 percent germination rate would have PLS calculated as shown:

$$\text{PLS} = \frac{(\text{percent purity}) * (\text{percent germination rate})}{100} = \frac{90 * 50}{100} = 45 \% \text{ PLS}$$

To get the desired amount of seed to germinate, seeds with a lower PLS will need to be applied at higher rates than seed with higher PLS values.

An example seeding rate for an appropriate mix is displayed in Table 2. *Bouteloua gracilis* (blue grama) is a perennial warm season C4 grass that complements the other C3 cool season grasses in the mix. The format of Table 2 is such that the reader can understand and work through how the figures were developed. The rates in Table 2 assume 100% purity and 80% germination rates. The rates suggested are appropriate for drill seeding. If broadcasting or hydroseeding needs to be used, the seeding rates should be at least doubled. The number of seeds per pound (lb.) depends on the variety. A median value is used in Table 2 but the variation can be significant.

**Table 1. Seed mix suggestions for the project site. The seed mix needs to be composed of at least two shrub species, four grass species and three forb species.**

Shrubs			
Shrub	<i>Ericameria nauseosa</i>	Erinau	Rabbitbrush
Shrub	<i>Quercus gambelii</i>	Quegam	Gambel's oak
Shrub	<i>Atriplex canescens</i>	Atrcan	Four-wing saltbush
Shrub	<i>Purshia mexicana</i>	Purmex	Cliffrose
Shrub	<i>Artemisia prob. nova</i>	Artnov	Black sage
Grasses			
Grass	<i>Bouteloua gracilis</i>	Bougra	Blue grama
Grass	<i>Elymus smithii</i>	Elysmi	Western wheatgrass
Grass	<i>Sporobolus cryptandrus</i>	Spocry	Sand dropseed
Grass	<i>Elymus elymoides</i>	Elyely	Bottlebrush squirreltail
Grass	<i>Stipa hymenoides</i>	Stihym	Indian ricegrass

Forbs			
Forb	<i>Penstemon linarioides</i>	Penlin	Toadflax penstemon
Forb	<i>Sphaeralcea coccinea</i>	Sphcoc	Scarlet globemallow
Forb	<i>Senecio douglasii</i>	Sendou	Douglas' groundsel
Forb	<i>Chrysopsis villosa</i>	Chrvil	Hairy goldenaster
Forb	<i>Petradoria pumila</i>	Petpum	Rock goldenrod
End of Table			

**Table 2. Seed mix and seeding rate for the project site. Estimates are made with the goal of 60% germinating seeds per acre. Plant species are represented by the six-letter acronym.**

	Bougra	Spocry	Elyely	Stihym	Erinau	Atrean	Chrvil	Sphcoc	Penlin
	35	25	15	15	2	2	2	2	2
	21	15	9	9	1.2	1.2	1.2	1.2	1.2
	80	80	80	80	80	80	80	80	80
	710,000	5,600,000	190,000	260,000	400,000	49,000	336,500	500,000	1,000,000
	914,760	653,400	392,040	161,920	52,272	52,272	52,272	52,272	52,272
	1.55	0.14	2.48	0.75	0.16	1.28	0.19	0.13	0.06
	2.0	0.2	2.5	1.0	0.2	1.5	0.2	0.2	0.1
End of Table									

## 9.0 REFERENCES

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EXHIBIT B-1

EXHIBIT

tabbles

J

# TACHEE ENTERPRISES, INC.

## BLUE GAP GRAVEL QUARRY

### MINING, PRODUCTION, AND RECLAMATION PLAN

April 9, 2014

Sections 1, 11, 12, 14, and 15, T. 33 N., R. 22 E., G&SRM



Apache County, Arizona

TAH CHEE WASH, AZ 7.5 MINUTE QUADRANGLE

Prepared by:

**PERMITS WEST, INC.**  
PROVIDING PERMITS for LAND USERS  
37 Verano Loop, Santa Fe, New Mexico 87508 (505) 466-8120

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APPENDIX B – PLANT SURVEY REPORT
APPENDIX C – WILDLIFE SURVEY REPORT
APPENDIX D - REVEGETATION PLAN

## 1.0 INTRODUCTION

Tachee Enterprises, Inc. (TEI) is interested in acquiring a lease from the Navajo Nation for the use of Tribal Trust surface to mine Tribal minerals (sand and gravel) approximately 6.75 miles north of the Tachee Chapter (Blue Gap) House, in Apache County, Arizona. The proposed Blue Gap permit area is approximately 20.24 acres in size located on the west slope of a buttressing ridgeline in the upper portion of the Giant Sitting Rock Wash watershed. The project area is located on both steep and gently-sloped terrain with the desired gravel deposit occurring as a layer of hard red baked shale resulting from burned coal in the area. The target gravel material overlies coal beds, siltstone units, and cross-bedded yellowish-gray sandstone units of the Wepo Member of the Mesa Verde Formation (NMGS 1958). These deposits of red baked shale are suitable for some industrial and engineered gravel applications. TEI will apply to the Navajo Nation for a lease of the land and minerals in question and for approval of the proposed mining action.

## 2.0 OVERVIEW OF PROPOSED ACTION

### 2.1 QUARRY LOCATION

The proposed Blue Gap gravel quarry *including the access road* would be located in Sections 1, 11, 12, 14, and 15, T. 33 N., R. 22 E., G&SRM, Apache County, AZ (Figure 1). The proposed quarry is located in the upper watershed of Sitting Giant Rock Wash to the east which ultimately drains to Tah Chee Wash to the northeast (Figure 1). Elevations at the proposed mine site range from 7,280 feet at the southern boundary, to 7,490 feet at the northeast corner of the mine site. The proposed project area is within the Bureau of Indian Affairs (BIA) Chinle Agency, in both the Black Mesa and Tachee (Blue Gap) Chapters. The total proposed mine area is 20.24 acres (Figures 3 and 4). Figure 5 shows the original topography in the Project Area.

### 2.2 ACCESS

Access to the proposed mine site would be from N-8030 located approximately 2.25 miles northeast of the mine site (Figure 1). The mine access road is currently dirt, is not classified as a BIA or Navajo public road, and would be 20 feet wide. The access road would require a right-of-way (ROW) for legal access (Figure 1, 2, 3, 6, and 7a-7f). The access road would be graded and maintained as necessary to allow safe travel to and from the Blue Gap mine site. No culverts would be installed and no other upgrades would be applied to the access road. The access road will be the only means of ingress and egress from the proposed mine site.

Figure 2 is a map provided by Garren Burbank of the Navajo Department of Transportation (NDOT) showing designated public roads near the project area incorporated into the 2008 Navajo Indian Reservation Roads (IRR) Inventory.

The access road will have a locking gate installed approximately 0.25 miles west of its junction with N-8030 to prevent unwanted access to the site (Figures 1 and 3).

### 2.3 LAND USE CONSENT

TEI will request permission from the Navajo Nation to lease the land and minerals in the project area. The Tachee Chapter endorsed the gravel quarry on March 20, 2013 (Resolution BGCH 13-03-001; Appendix A). The closest home to the site is located approximately 0.75 miles east of the mine area. The quarry would not be visible from any homes and would not be obvious to the casual observer.

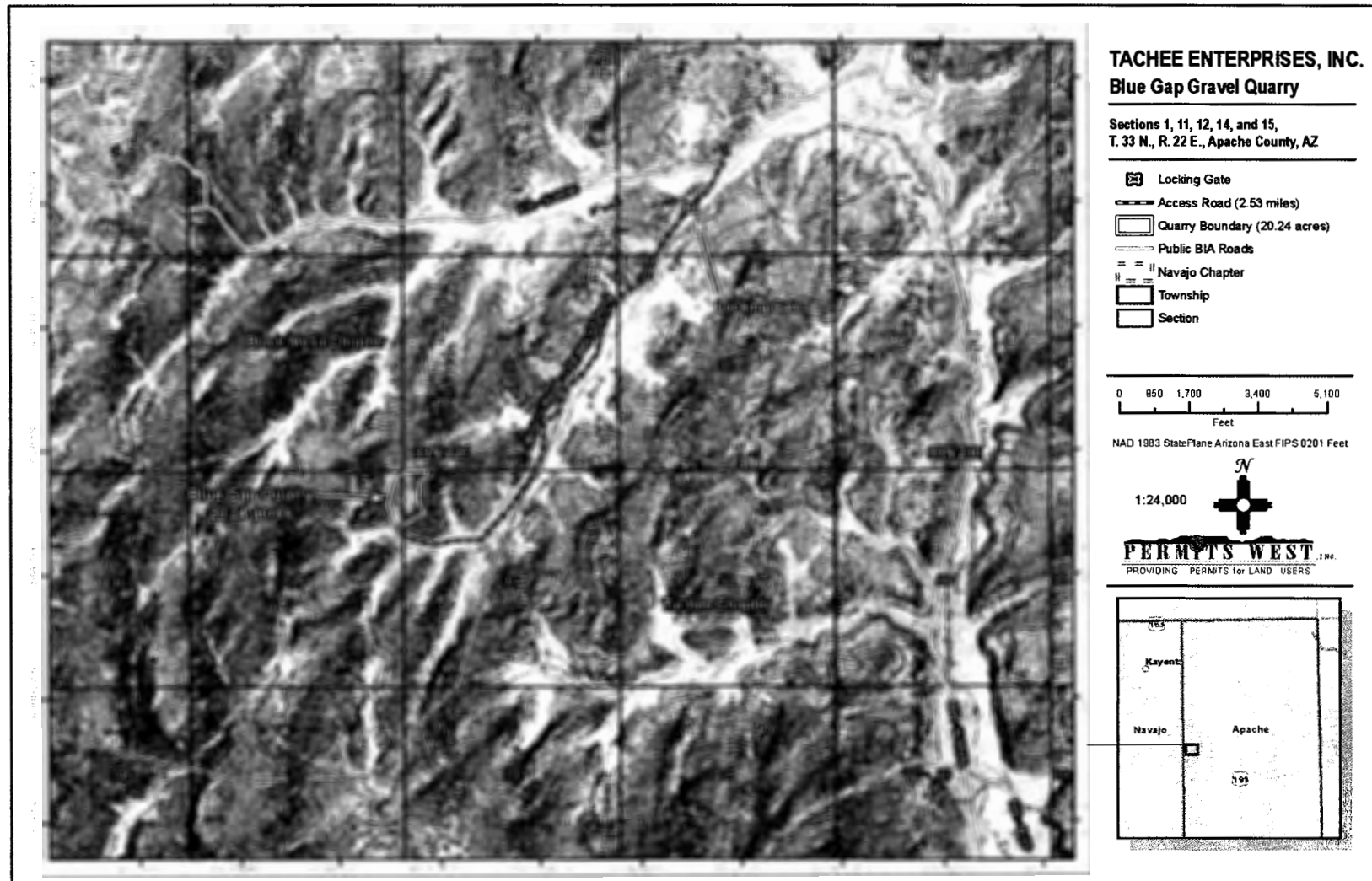


Figure 1. Overview of Project Area.

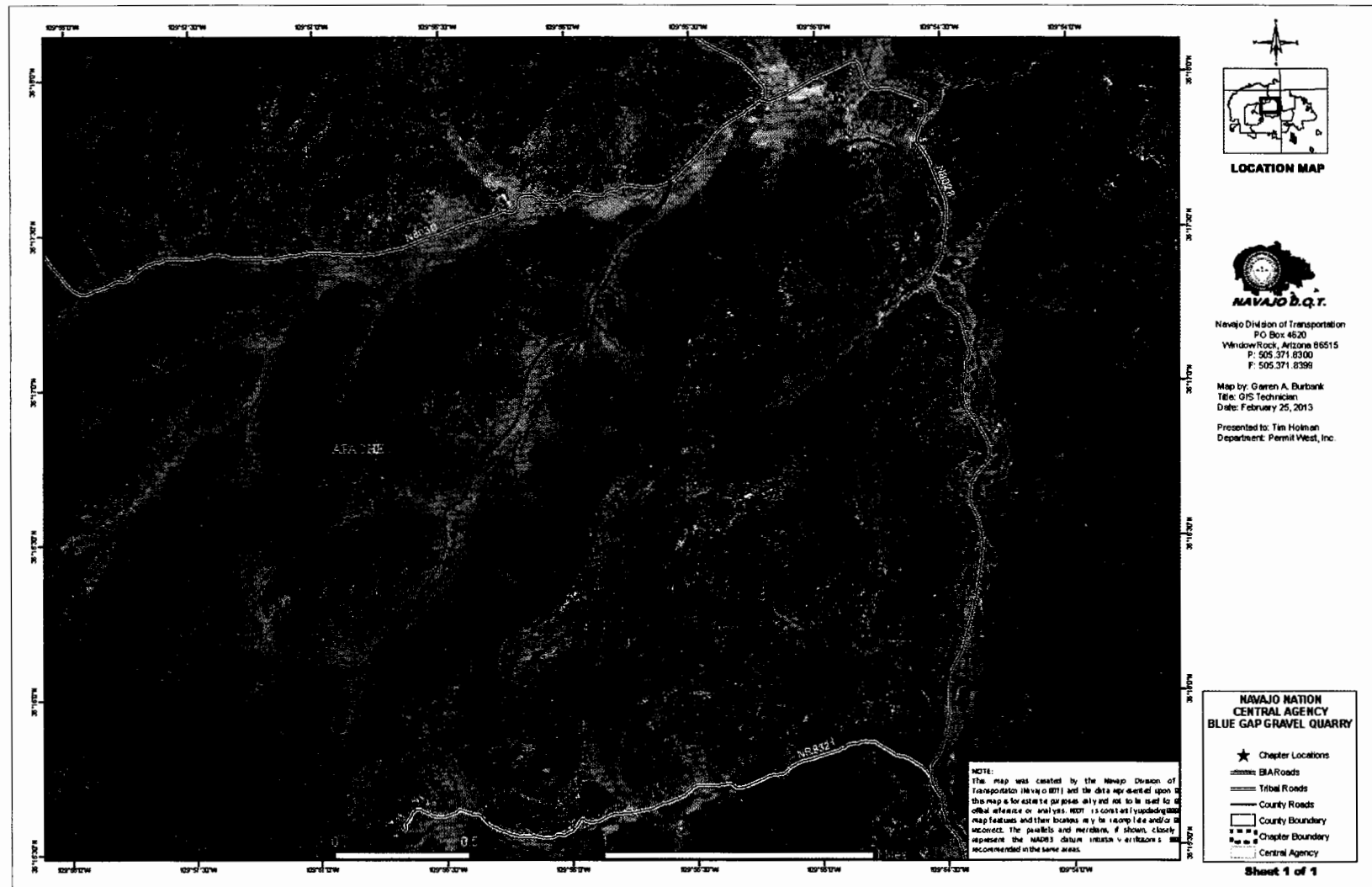


Figure 2. Map provided by the Navajo Department of Transportation (NDOT) showing designated public roads near the project area.

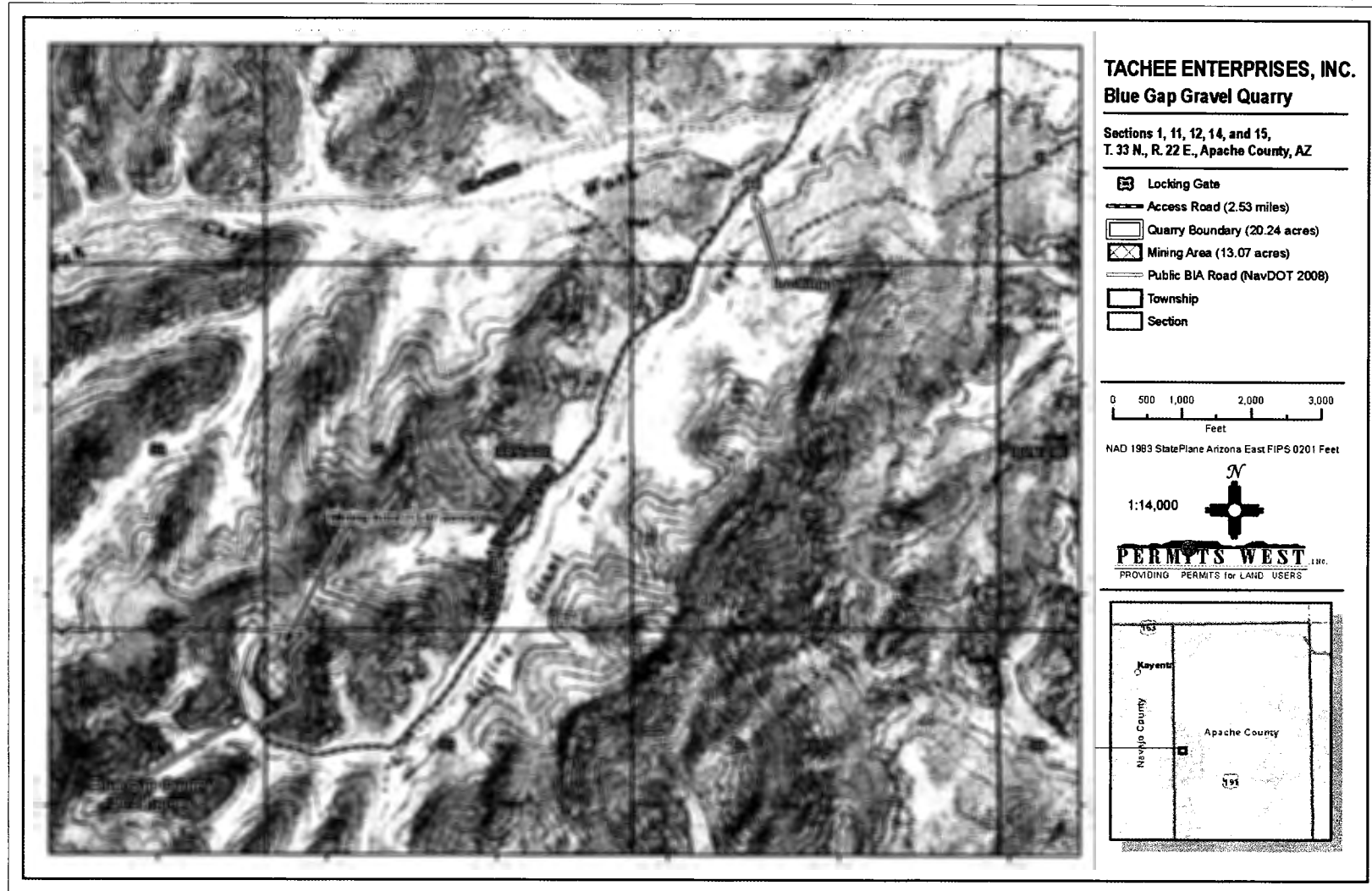


Figure 3. Map of project vicinity for the proposed Blue Gap Gravel Quarry.

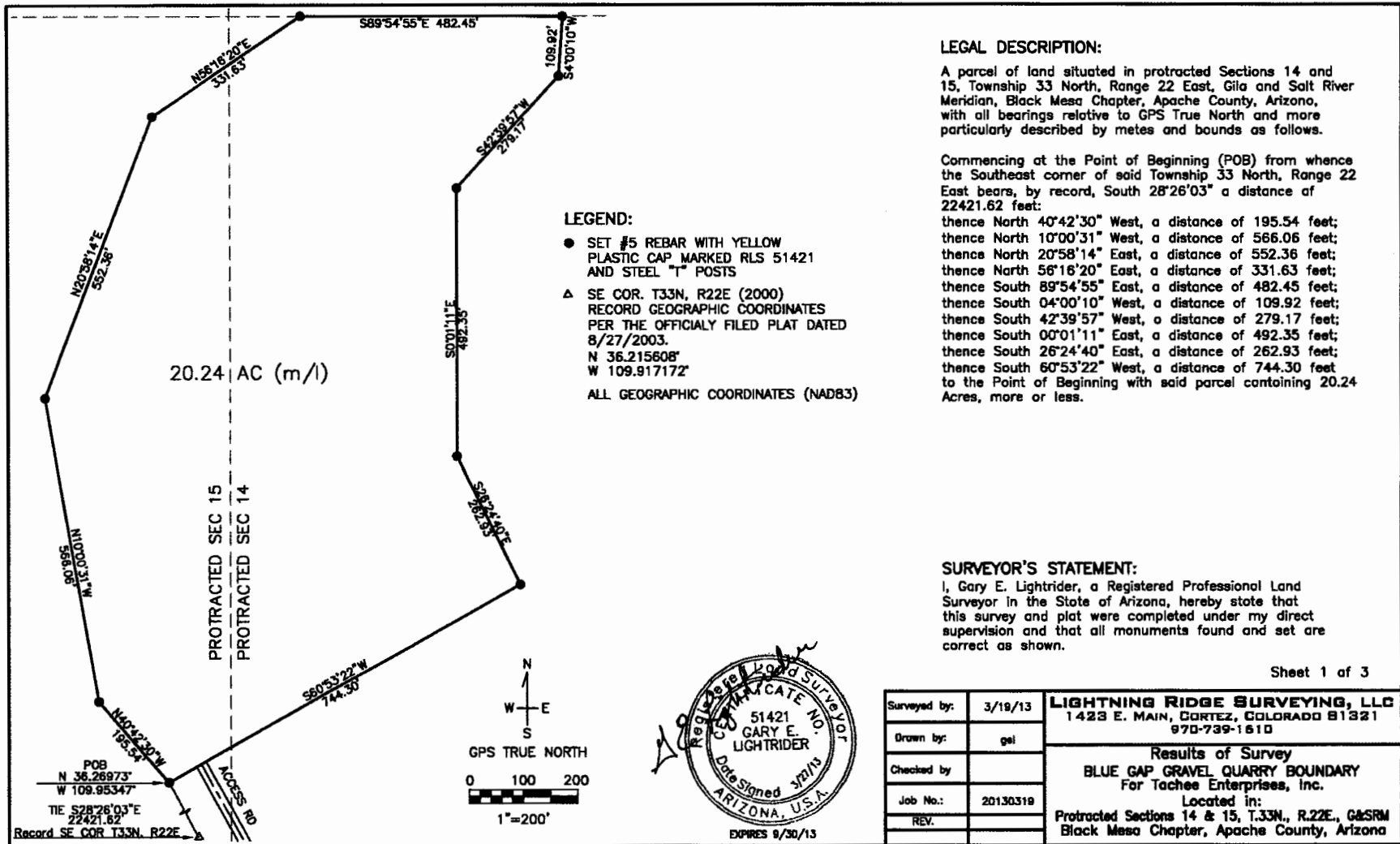


Figure 4. Boundary plat of proposed Blue Gap Gravel Quarry.

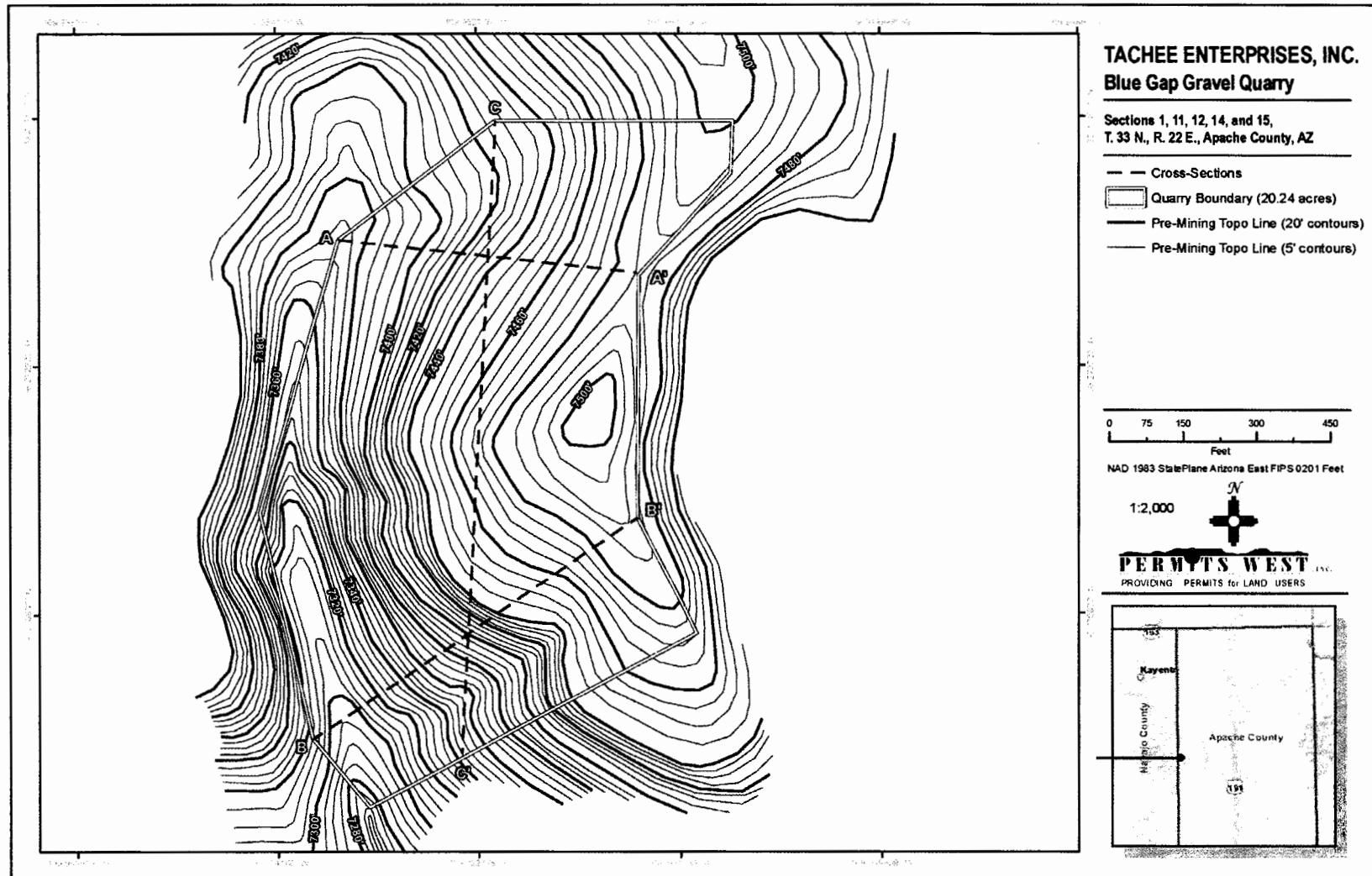


Figure 5. Map of original grade (pre-mining) at the proposed mine site.

**ACCESS RIGHT--OF--WAY LEGAL DESCRIPTION:**

A 20 foot wide Right-of-Way situated in protracted Sections 1, 11, 12, 14 and 15, Township 33 North, Range 22 East, Gila and Salt River Meridian, Black Mesa Chapter, Apache County, Arizona, with all bearings relative to GPS True North and said Right-of-Way lying 10 feet each side of the following described centerline.

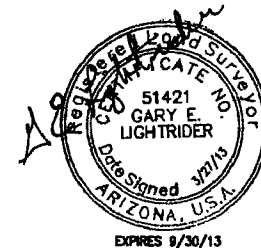
Commencing at the Point of Commencement (POC) on the southerly boundary line of the Blue Gap Gravel Quarry, marked by a ½" rebar with a yellow plastic cap marked "Arizona RLS 51421" from whence the Southeast corner of said Township 33 North, Range 22 East bears, by record, South 28°26'03" East a distance of 22,421.62 feet; thence, along said boundary line North 60°53'22" East, a distance of 69.27 feet to the True Point of Beginning (TPOB):

thence South 29°06'38" East, a distance of 114.15 feet;  
 thence South 29°06'38" East, a distance of 125.83 feet;  
 thence South 66°28'19" East, a distance of 267.53 feet;  
 thence South 76°12'44" East, a distance of 437.37 feet;  
 thence North 80°10'52" East, a distance of 455.84 feet;  
 thence North 86°15'29" East, a distance of 360.17 feet;  
 thence South 82°40'59" East, a distance of 298.08 feet;  
 thence North 44°03'56" East, a distance of 639.60 feet;  
 thence North 46°48'42" East, a distance of 341.14 feet;  
 thence North 39°50'31" East, a distance of 347.32 feet;  
 thence North 15°40'57" East, a distance of 167.68 feet;  
 thence North 32°23'48" East, a distance of 71.98 feet;  
 thence North 52°33'42" East, a distance of 100.06 feet;  
 thence North 38°39'08" East, a distance of 360.23 feet;  
 thence North 31°13'12" East, a distance of 237.94 feet;  
 thence North 23°19'33" East, a distance of 325.61 feet;  
 thence North 15°17'24" East, a distance of 172.39 feet;  
 thence North 02°45'31" East, a distance of 245.63 feet;  
 thence North 23°01'28" East, a distance of 80.38 feet;  
 thence North 04°32'24" East, a distance of 173.14 feet;  
 thence North 28°42'36" West, a distance of 87.37 feet;  
 thence North 04°26'27" West, a distance of 77.73 feet;  
 thence North 08°54'45" East, a distance of 101.23 feet;  
 thence North 74°41'53" East, a distance of 89.39 feet;  
 thence North 62°45'38" East, a distance of 246.82 feet;  
 thence North 39°03'02" East, a distance of 97.53 feet;  
 thence North 14°31'25" East, a distance of 290.03 feet;  
 thence North 25°05'14" East, a distance of 431.02 feet;

thence North 66°00'14" East, a distance of 88.27 feet;  
 thence North 50°38'38" East, a distance of 299.78 feet;  
 thence North 45°01'17" East, a distance of 145.28 feet;  
 thence North 30°25'59" East, a distance of 244.10 feet;  
 thence North 39°59'42" East, a distance of 286.02 feet;  
 thence North 19°21'47" East, a distance of 83.65 feet;  
 thence North 02°52'12" East, a distance of 215.36 feet;  
 thence North 18°53'48" East, a distance of 487.95 feet;  
 thence North 25°14'34" East, a distance of 568.67 feet;  
 thence North 44°10'22" East, a distance of 49.17 feet;  
 thence North 44°10'22" East, a distance of 37.68 feet;  
 thence North 53°57'38" East, a distance of 508.51 feet;  
 thence North 47°21'37" East, a distance of 177.93 feet;  
 thence North 69°32'28" East, a distance of 155.27 feet;  
 thence North 41°04'08" East, a distance of 119.27 feet;  
 thence North 24°45'28" East, a distance of 119.62 feet;  
 thence North 16°41'17" East, a distance of 440.77 feet;  
 thence North 26°38'34" East, a distance of 291.91 feet;  
 thence North 40°58'38" East, a distance of 227.50 feet;  
 thence North 34°47'58" East, a distance of 597.65 feet;  
 thence North 40°55'26" East, a distance of 270.67 feet;  
 thence North 50°36'18" East, a distance of 318.27 feet;  
 thence North 36°09'10" East, a distance of 250.33 feet;  
 thence North 28°25'51" East, a distance of 620.75 feet  
 to the Right-of-Way of BIA #8028 from which point said Southeast corner of Township 33 North, Range 22 East bears South 05°39'45" East, a distance of 28,616.46 feet. Right-of-Way side lines are lengthened or shortened to terminate on the lines being closed upon. This Right-of-Way as described is 13,345.52 feet in length, with a total of 6.127 acres, more or less. The acreage by section is:  
 Section 15 = 0.052 acres,  
 Section 14 = 1.933 acres,  
 Section 11 = 2.243 acres,  
 Section 12 = 0.716 acres,  
 Section 1 = 1.183 acres.

**SURVEYOR'S STATEMENT:**

I, Gary E. Lightrider, a Registered Professional Land Surveyor in the State of Arizona, hereby state that this survey and plot were completed under my direct supervision and that all monuments found and set are correct as shown.



Sheet 1 of 7

Surveyed by:	3/19/13	<b>LIGHTNING RIDGE SURVEYING, LLC</b> 1423 E. MAIN, CORTEZ, COLORADO 81321 970-739-1610
Drawn by:	gel	
Checked by:		<b>Results of Survey</b> <b>BLUE GAP GRAVEL QUARRY ACCESS RIGHT-OF-WAY</b> For Tachee Enterprises, Inc. Located in: Protracted Sections 1, 11, 12, 14 & 15, T.33N, R.22E, G&SRM Black Mesa Chapter, Apache County, Arizona
Job No.:	20130319	
REV.		

Figure 6. Proposed access road ROW legal description.

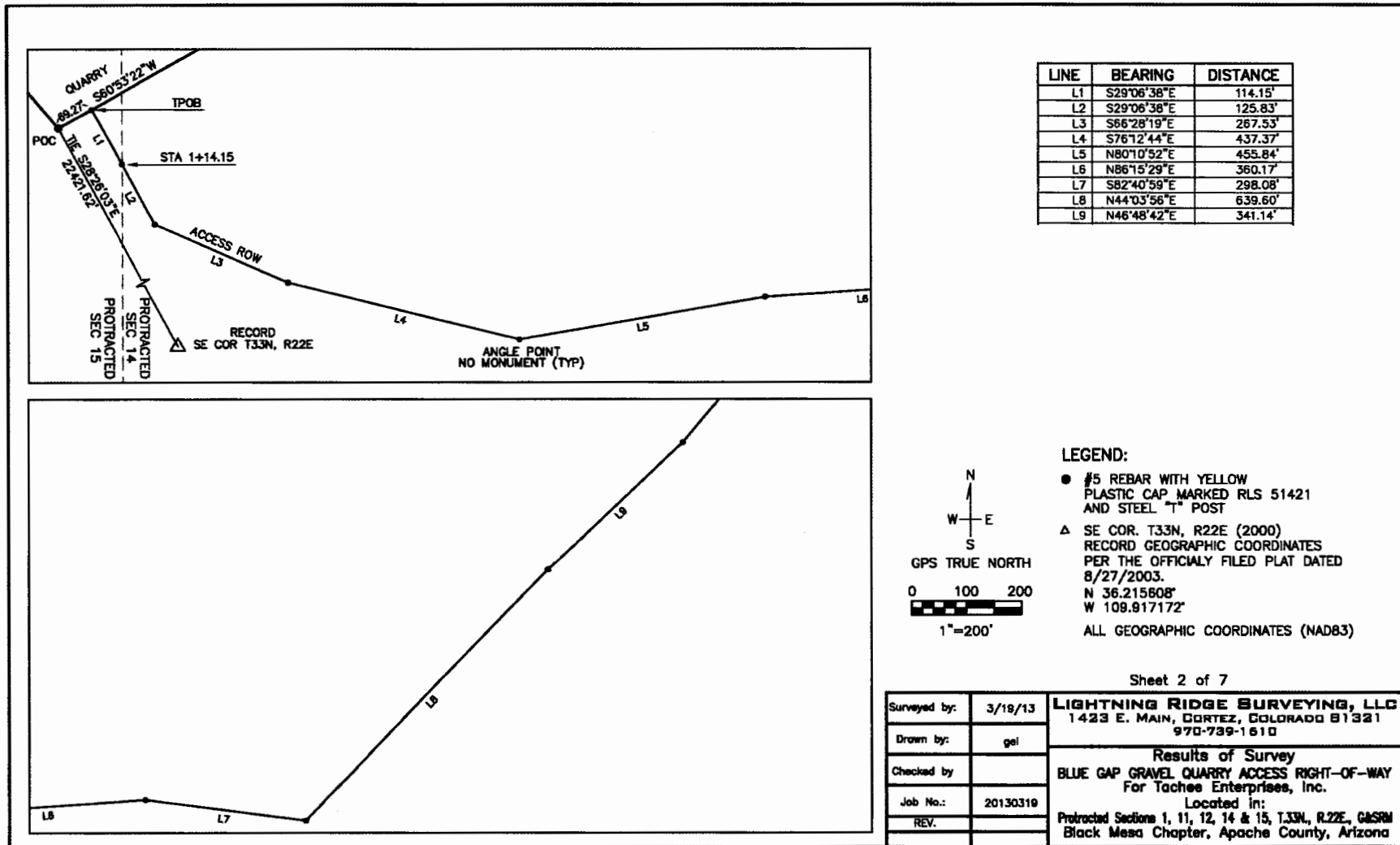


Figure 7a. Proposed Access Road ROW plat (Page 1 of 6).

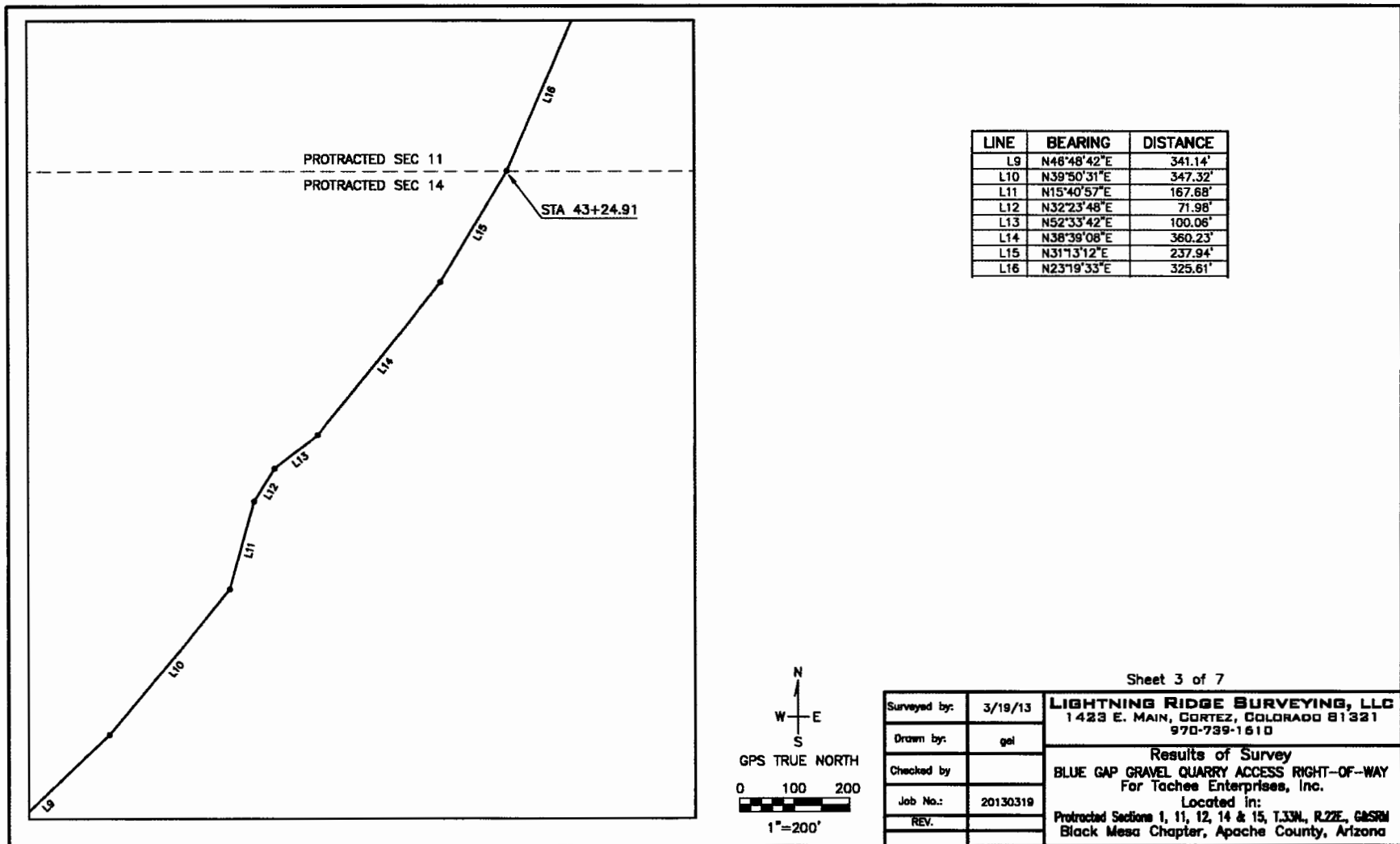


Figure 7b. Proposed Access Road ROW plat (Page 2 of 6).

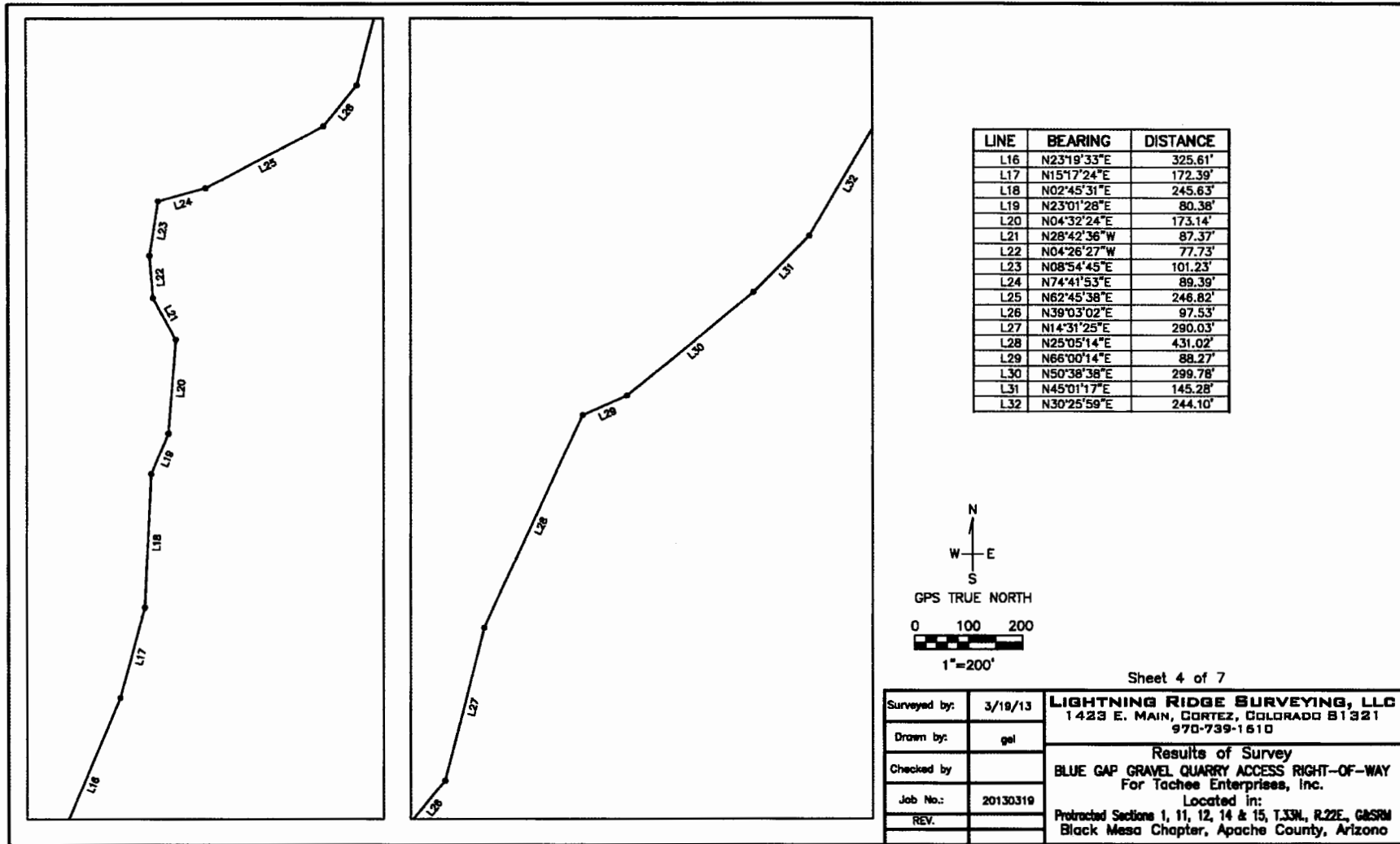


Figure 7c. Proposed Access Road ROW plat (Page 3 of 6).

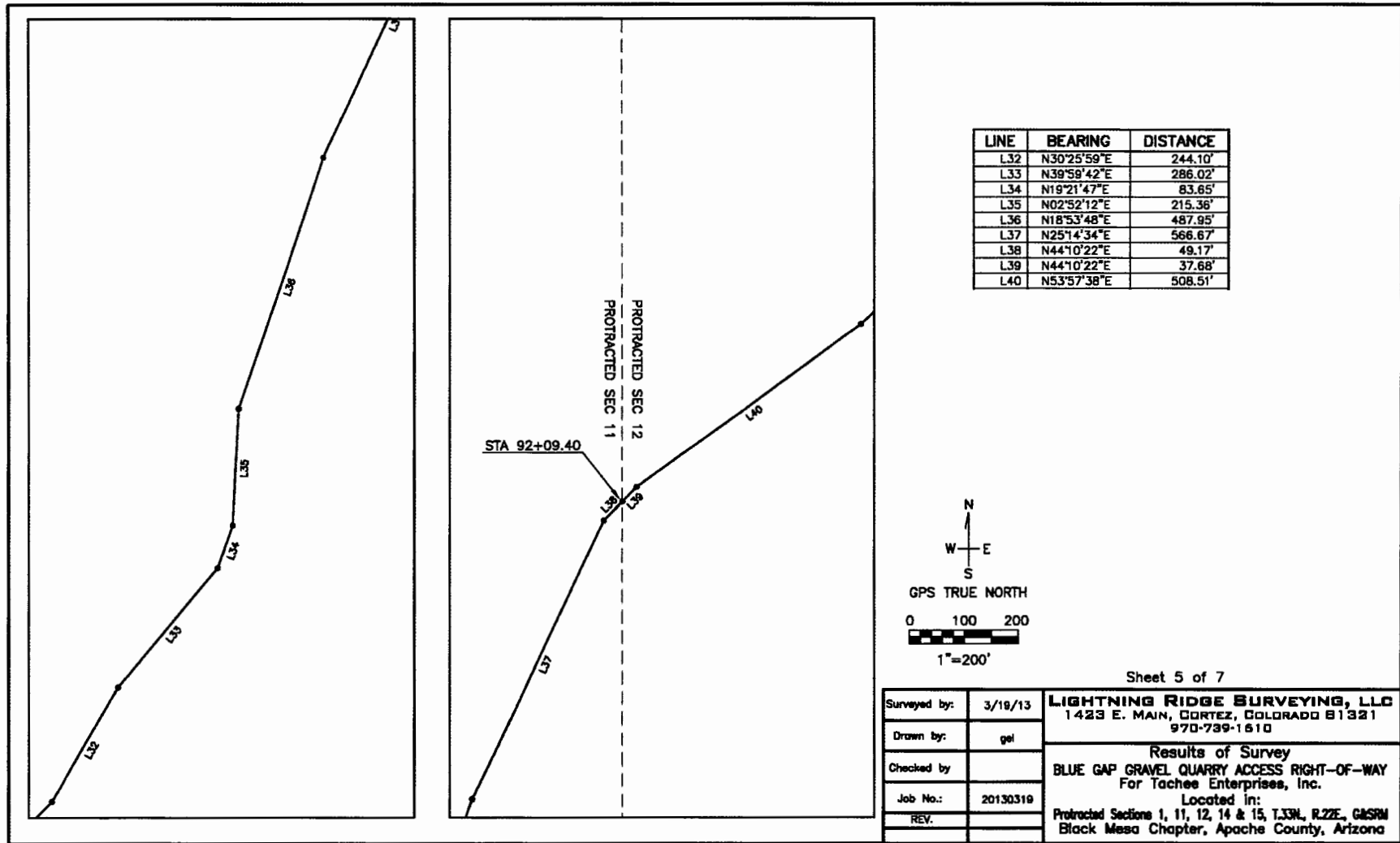


Figure 7d. Proposed Access Road ROW plat (Page 4 of 6).

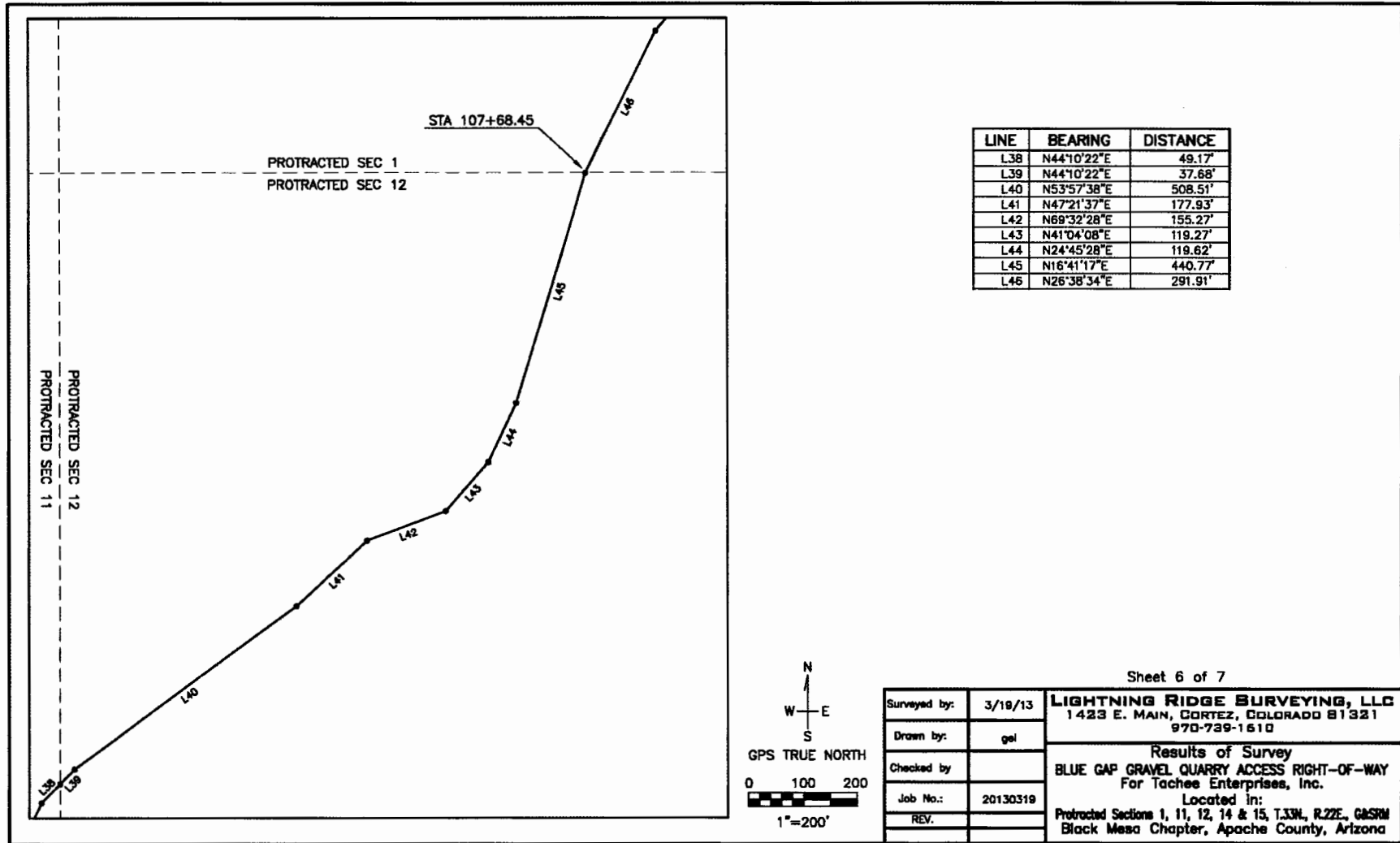


Figure 7e. Proposed Access Road ROW plat (Page 5 of 6).

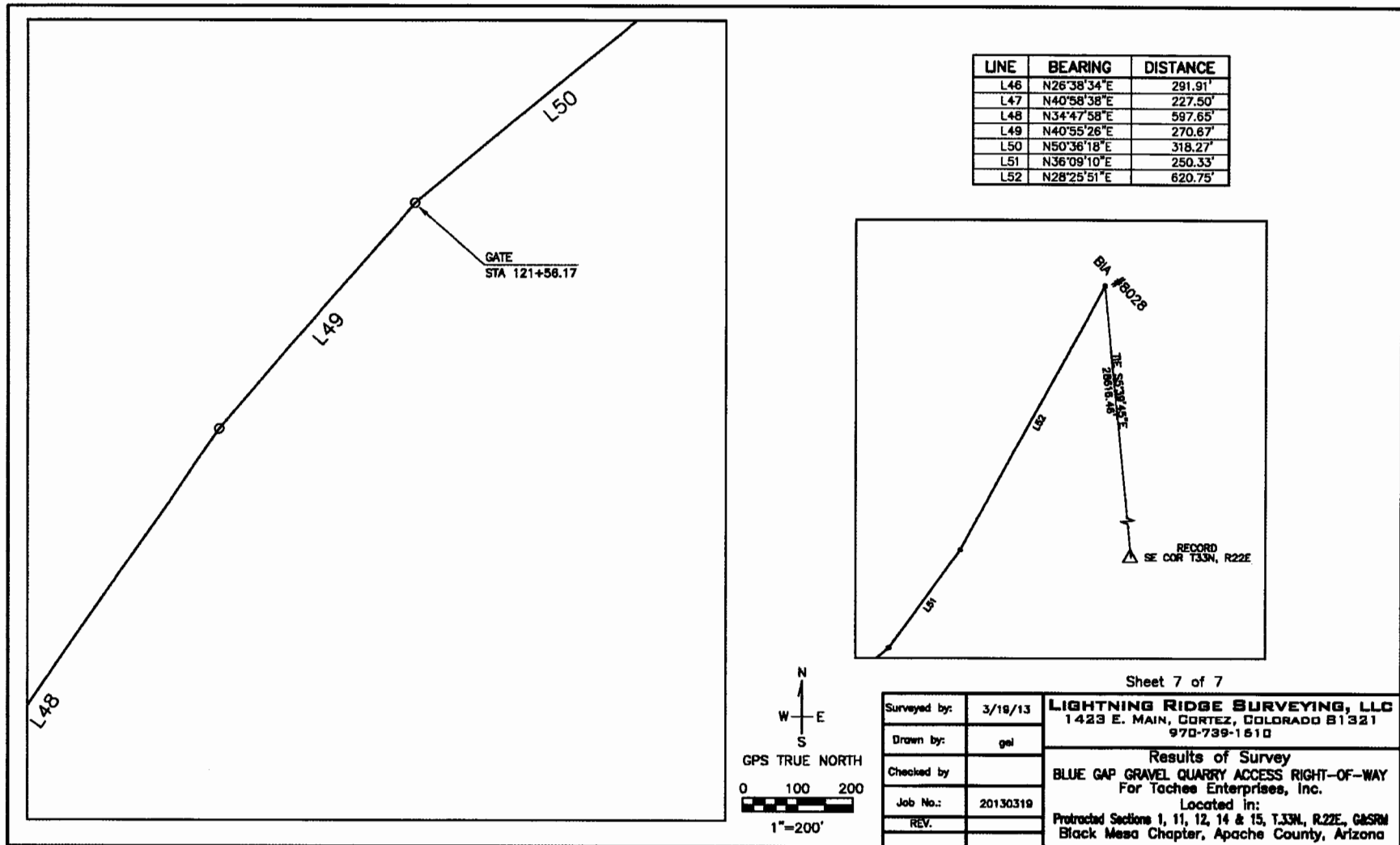


Figure 7f. Proposed Access Road ROW plat (Page 6 of 6).

## 2.4 CULTURAL INVENTORY AND REPORTING

Lone Mountain Archaeological Services (LMAS) surveyed the project area on October 31, 2013. No cultural resource sites and only one isolated occurrence were identified during the survey and initially, the Navajo Nation did not identify any Traditional Cultural Properties (TCPs). The isolated occurrence (grayware sherd) has been completely recorded in a manner consistent with current standards and does not require any additional work (LMAS 2031). However, since the report was submitted, the Navajo Nation Historic Preservation Division (NNHPD) has since identified a TCP in or near the project area. As such, LMAS is working with the NNHPD to determine the location, extent, and any avoidance or standoff distances that would apply to the TCP. The nature of the TCP is not known at this time. The survey findings have been published in a report titled "Lone Mountain Report No. 1566." A determination of "no historic properties affected" and no further work is recommended based on the lack of located cultural resources (LMAS 2013). If buried cultural resources are located during construction, work will cease and the Navajo Nation would be contacted for guidance.

## 2.5 BIOLOGICAL SURVEYS AND REPORTING

**Plants:** On March 1, 2013, a pedestrian botanical survey was conducted by a qualified botanist of the 20.24-acre mine site, the 13,345.52-foot long by 20-foot wide access road, along with a 200-foot buffer around the project area and access road corridor. No plant species of concern to the Navajo Natural Heritage Program or the U.S. Fish and Wildlife Service were observed. There were no species of noxious weeds observed during the plant survey. The Plant Survey Report dated April 14, 2013 is provided as Appendix B.

**Wildlife:** On March 1, 2013, a pedestrian wildlife survey was conducted by a qualified wildlife biologist. The entire project area was inspected (mine site and access road ROW), plus a 50-foot buffer around the project area. Also, a 0.5-mile radius around the project area was inspected for raptor nests, along with a 1.0-mile line-of-sight survey from the project area. No federal or Navajo listed species were observed during the wildlife survey. The Wildlife Survey Report dated March 25, 2013 is provided as Appendix C.

## 2.6 GEOLOGY, SOILS, AND HYDROLOGY

### 2.6.1 GEOLOGY

The project area is located on both steep and gently-sloped terrain with the desired gravel deposit occurring as a layer of hard red baked shale resulting from burned coal deposits in the area. The target gravel material overlies coal beds, siltstone units, and cross-bedded yellowish-gray sandstone units of the Wepo Member of the Mesa Verde Formation (NMGS 1958). These deposits of red baked shale are suitable for some industrial and engineered gravel applications. The ore deposit is approximately 15 to 20 feet thick in the project area, but generally has varied depths across the project area.

### 2.6.2 SOILS

Soils within the project area are of the Arabrab-Vessilla-Lindrith complex, 1 to 45 percent slopes. This soil complex consists of eolian deposits derived from sandstone over residuum weathered from sandstone and shale. The soil textures vary from stratified sandy loam to sandy loam. This soil association is found at elevations ranging from 6,700 to 8,100 feet. The mean annual precipitation is 14 to 18 inches with a mean annual temperature of 46 to 50°F and a frost-free period of 120 to 150 days (NRCS 2014).

Other attributes of this soil complex are as follows:

- Drainage Class: somewhat excessively drained
- Depth to water table: more than 80 inches

- Frequency of flooding/ponding: none/none
- Maximum salinity: nonsaline (0.0 to 2.0 mmhos/cm)
- Available water capacity: very low to moderate (0.3 to 6.5 inches; USDA NRCS 2014)

### 2.6.3 HYDROLOGY

The project area is located on an upper sub-valley of the Sitting Giant Rock Wash watershed. The hydrology of the project area is dominated by ephemeral drainages that are relatively deeply incised with a head cut. Directly south of and below the project area is a headcut extending to the southern corner of the project area. Much of this headcut was accelerated by previous mining activity in the area. There are no perennial or intermittent sources of water in the project area. There are no springs, riparian areas, or wetlands in or near the project area and there are no signs of shallow groundwater near the project area.

## 2.7 NEPA PROCESS

An Environmental Assessment (EA) would be developed and submitted to the BIA as part of the SAS package. The NEPA document will analyze specific effects or reason for “no effect” to various resources that may be impacted by the proposed operation. Resources likely to be affected are included in the following list. This list may not represent the complete list, as the NEPA process for the project would be ongoing and continue to evolve.

#### *Potentially affected resources analyzed in the EA:*

- Biological Resources (flora & fauna)
- Cultural Resources
- Visual Resources
- Soil Resources
- Geologic Resources
- Health and Human Safety
- Air Quality
- Traffic Resources
- Noise

## 3.0 MINING PROCESS

### 3.1 OPERATING HOURS

Operating hours would adhere to the Navajo Nation requirements. Typical operation hours would be Monday through Friday from 7:00 a.m. to 7:00 p.m.

### 3.2 MINING METHODS, EQUIPMENT, SEQUENCE, AND TIMING

Mining of the proposed quarry would be accomplished according to applicable federal and tribal regulations. The pace of development of the Blue Gap Quarry will entirely depend on demand. It is anticipated that products from the Blue Gap Quarry would be purchased for commercial and industrial improvements by the Tachee (Blue Gap) and Black Mesa Chapter as well as other businesses and private individuals. There is currently no mining occurring in the project area; however, as part of an emergency measure, small amounts of gravel material were removed for the Tachee Chapter's use. TEI would use land in the Processing Area to stage equipment and perform crushing and sorting operations for the life of the mine. There are a total of four mining blocks (Block 1 through Block 4) each representing approximately one year of reserves depending on demand (Figure 8). Estimated reserve volumes associated with each block are:

Estimated Reserves (based on 15' average depth with 80% saleable material)				
Block 1 – 4.30 ac.	Block 2 – 3.07 ac.	Block 3 – 3.37 ac.	Block 4 – 2.41 ac.	Total
83,248 cubic yards (cy)	59,435 cy	65,243 cy	46,658 cy	254,584 cy

Due to the geologic character of the site, in some area of the project area, little topsoil is available for stockpiling as suitable rock is exposed at the surface. However where available, the top 6 inches of topsoil and vegetation would be stripped and discreetly stockpiled at the northeast, east, and southeast edges of the mine boundary (Figure 8). Topsoil stockpiles would also have signs installed that would face the mining area to prevent mine personnel from mixing overburden with topsoil. TEI would then seed the topsoil stockpiles with a NNDFW approved seed mix and cover with mulch. Little overburden is anticipated. When encountered, overburden will either be immediately used for concurrent earthwork reclamation, or stockpiled immediately north of the Processing Area for later use during reclamation (Figure 8). Also, vegetation removal would avoid the core Migratory Bird nesting season of April 1 to August 15. If the breeding season cannot be avoided, presence/absence surveys and consultation with the NNDFW would precede project construction and vegetation removal.

Any berms as required by the Mine Safety and Health Administration (MSHA) will be constructed using overburden to serve as safety barriers. During reclamation, TEI will coordinate all revegetation efforts with the NNDFW staff as appropriate.

There will be no drilling or blasting. Material will be loosened with a ripper equipped bulldozer or front-end loader. A bulldozer or loader would then push loosened material to the Ore Slope illustrated in Figure 8, where ore would fall under gravity to the toe of the Ore Slope adjacent to the Processing Area (Figure 8). If the circuit distance from the active face to the Ore Slope becomes too great, TEI may decide to use haul trucks to transport material either to the top of the Ore Slope, or down the haul road to the Processing Area to increase efficiency. All berms placed to protect haul roads or edges would conform to MSHA standards. A front-end loader will then pick up and load unprocessed material either directly into the power screen and sorter/crusher or directly into haul trucks for transport off-site.

A power screen will be used to separate fine material from rock. Then, rock material exiting the screener will be conveyed by belt to a stockpile. From there, a loader would pick up sorted rock and load it into a 25' by 40' impact crusher/sorter. The crusher/sorter would process rock to a size of approximately 1" minus in diameter and crushed rock would then be conveyed by belt to an out-feed stockpile in the Processing Area as illustrated in Figure 8. The front-end loader would either load saleable material directly into haul trucks from the crusher's out-feed pile, or move the processed 1" minus base course material to a separate stockpile for future sale.

All truck weights will be measured with an 11' x 70' truck scale that will be inspected and certified annually by the Navajo Nation Department of Weights and Measures. The scale would be rated to ≈200,000 pounds. Each trucks tare weight would be measured and recorded in the morning, and again in the afternoon to determine accurate tare weights. Once a haul truck is weighed, it would be loaded and reweighed to determine the tonnage of material being removed prior to exiting the site. Weight records would be collected daily and reported monthly, or as required, to the U.S. Department of the Interior's Office of Natural Resources Revenue (ONRR) through the Minerals Management Service (MMS) online reporting system.

An office trailer will be located at the mine entrance for records and site management. The office trailer will have self-contained water and sewage tanks, or a portable toilet will be brought in. Sewage will be hauled off-site to a State approved disposal facility. A trash dumpster will be placed near the office trailer for collection of garbage (Figure 8). The dumpster will be hauled away to an approved transfer station or landfill as needed. No trash will be buried or burned at the site.

Crusher fines, waste rock, overburden, and other unmarketable material will be used as backfill to reduce slopes and stabilize the mine site during reclamation.

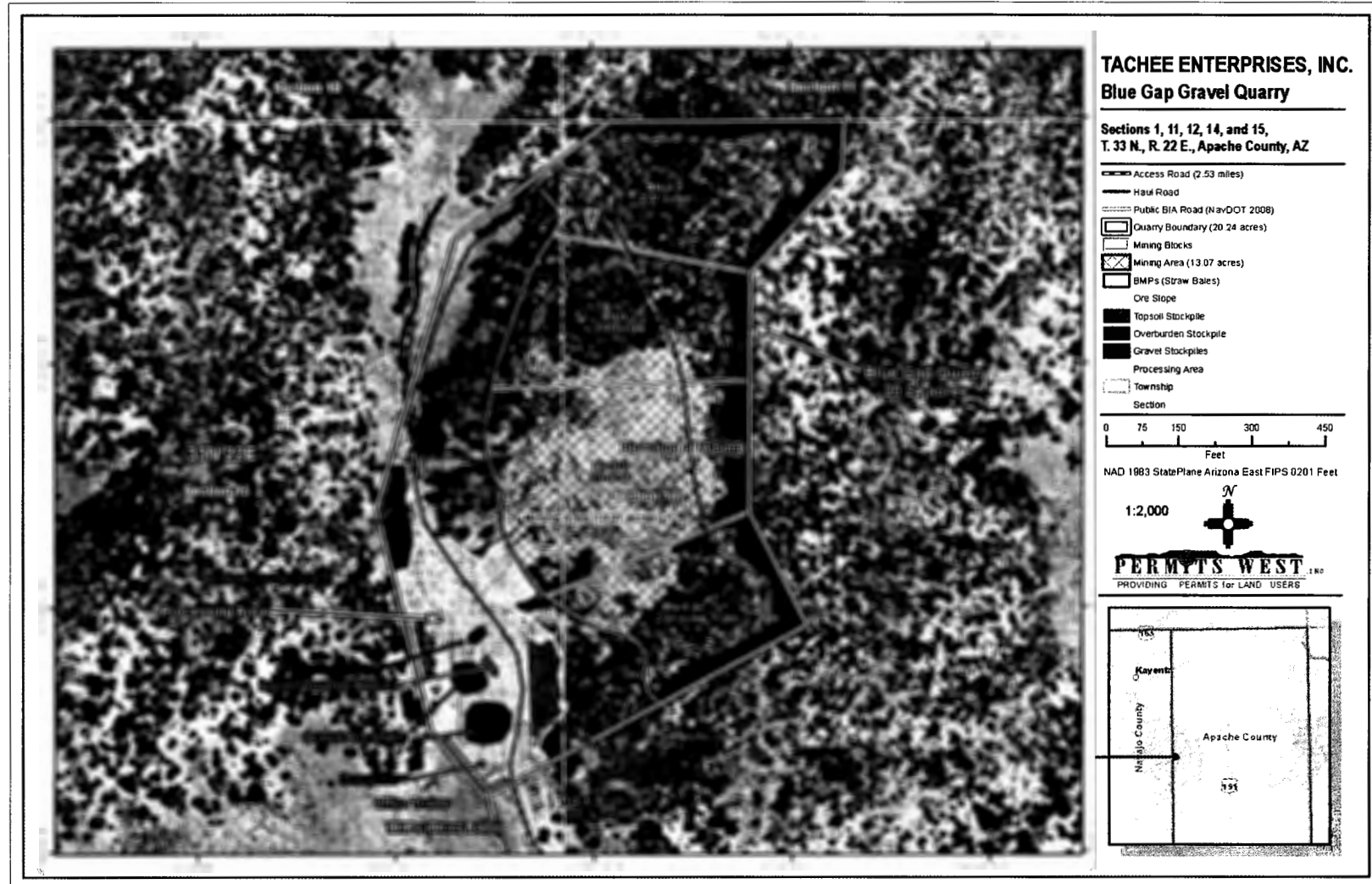


Figure 8. Mining blocks (approx. one year of production each) and general equipment layout at the Blue Gap Quarry.

Specific machinery, vehicles, and equipment that will be used at the site include the following:

Vehicles, Machinery, and Equipment to be Used		
Impact crusher/sorter (25' by 42')	Power screen	Service truck(s)
Front-end loader	Dump truck(s)	Utility truck (s)
Bulldozer	≈200,000 pound truck scale (11'x70')	Pickup trucks
Conveyor belt(s)	Seed drill	Office trailer
Dumpster or trash cage	Portable toilet	Water truck

**YEAR 1 (BLOCK 1 = 4.30 ACRES):** The first year would include the initial staging of equipment near the mine entrance in the Processing Area and would include: siting of the office trailer, dumpster, truck scale, power screen, crusher/sorter, gravel stockpiles, improvement of a haul road running through Blocks 1-4, and the equipment storage and parking area (Figure 8). For the life of mining, the power screen and crusher/sorter would be located in the Processing Area near the entrance to the mine site. The processing equipment would not move to follow the active mine face; rather, the ore would either be loaded on haul trucks and hauled down the haul road, or pushed down the Ore Slope to Processing Area below (Figure 8).

Where available, the top 6" of topsoil and vegetation would be removed and stockpiled at the north and/or east edge of each mining block. Topsoil would be used for later reclamation as a seed bed. Very little overburden is anticipated; however, where available, it would either be stockpiled north of the Processing Area for later use (Figure 8), or immediately used to reduce slopes. The mine will initially migrate from east to west at a pace determined by demand, but mining blocks are estimated to represent approximately one year of reserves. All material will be mined using heavy equipment described in Section 3.5 (bulldozer, front-end loader, etc.). A dozer with a ripping hook would loosen material and then push loose material to the Ore Slope (Figure 8), where it would fall under gravity to the edge of the Processing Area. A loader would then pick up the ore and dump it in a power screen for processing. Loaders may also load haul trucks for transport off-site. After initial sizing, material would be picked up from the power screen with a loader and dumped directly into the impact crusher/sorter for final sizing. A conveyor belt would then transport saleable gravel material to an outfeed stockpile (Figure 8). Loaders would either load material directly from the crusher/sorter outfeed into haul trucks, or move material to separate stockpiles for future sale.

**YEAR 2 (BLOCK 2 = 3.07 ACRES):** Progression of the mine face would advance north into Block 2 from Block 1 and generally mine from east to west (downhill) by ripping and pushing ore toward the Ore Slope (Figure 8). In general, material would be moved south into Block 1 and the Ore Slope. If haul trucks are used, they would transport material to either the top of the ore slope, or down the haul road to the Processing Area. Again, the top 6" of topsoil would be stockpiled along the east boundary of Block 2. Any overburden generated would be immediately used, or stockpiled for later reclamation of open portions of mined out areas. All material will be mined using heavy equipment described in this Section and hauled or pushed to the Ore Slope or Processing Area (Figure 8) or power screen for processing. All saleable material will then be stockpiled discreetly within the Processing Area or sold and hauled away (Figure 8). Gravel stockpiling may also occur within open portions of active mining blocks until sold.

**YEAR 3 (BLOCK 3 = 3.37 ACRES):** Following mine out of Block 2, the mine face would advance north into Block 3 along the eastern boundary, turn west then south, and transport material to either the Ore Slope or Processing Area. In general, material would be moved south through Block 2 and into Block 1 toward the Processing Area. The top 6" of topsoil would be stockpiled for later reclamation use as a seed bed along the eastern and northern boundary of Block 3. Any overburden generated would be immediately used or stockpiled for reclamation of open portions of mining blocks. All material will be

mined using heavy equipment described in this Section and transported to the power screen and crusher/sorter for processing. All saleable material will then be sold, or stockpiled within the Processing Area (Figure 8).

**YEAR 4 (BLOCK 4 = 2.41 ACRES):** Following mine out of Blocks 1 through 3, the mine face would advance south into Block 4 from Block 1 at the east boundary. In general, material would be pushed or transported to the top of the Ore Slope. Ore would then fall under gravity to the toe of the Ore Slope adjacent to the Processing Area (Figure 8). Where available, the top 6" of topsoil would be stockpiled for later reclamation use as a seed bed along the eastern and southern mine boundary. In general, material would be moved west and north toward the Ore Slope in Block 1. Any overburden generated would be immediately used or stockpiled for reclamation of open mining blocks. All material will be mined using heavy equipment described in this Section and transported to the power screen and crusher/sorter for processing. All saleable material will either be immediately sold and hauled away, or stockpiled within the Processing Area (Figure 8).

### 3.3 CONFIGURATION

During mining, the maximum elevation reduction in the mining area would be ≈30 feet. The maximum width (east-west) of the potential 20.24-acre quarry would be ≈829 feet. The maximum length of the project area (north-south) would be ≈1,421 feet. A 13,345.52-foot long by 20-foot wide access road would be used to access the site and would require a ROW (Figure 7a-7f). The total land use for the proposed mine site would be 20.24 acres. The total land use required for the access road would be 6.127 acres. The total land use acreage for both the mine site and access road would be 26.367 acres. The desired ore is present at the surface and would result in very little overburden being generated at the site. In areas where overburden is produced, it would be immediately used, or stockpiled north of the Processing Area.

### 3.4 SLOPE STABILITY

At some point in the past the Blue Gap site was mined. Briefly in 2013, the site was reopened for an emergency measure to supply the Tachee Chapter with gravel material to repair roads. In late 2013, all mining ceased and equipment was removed and no mining has occurred at the site in 2014. There are no highwalls present at the site; however, there is a relatively steep ore slope with a natural steep to shelved slope that separates the upper mining area from the lower Processing Area (Figure 8). The general shape of the reclaimed mining area would be a gentle west-facing slope with a 1V:5H slope from the eastern boundary on the ridgeline to the middle of the mining area (Figure 8). No major changes to topography would be made below an elevation of approximately 7,400 feet (approximate bottom of deposit). The project area would have positive drainage to the southern corner and an unnamed ephemeral drainage that flows into Giant Sitting Rock Wash. Where necessary, a 4-foot high MSHA berm would be constructed of overburden along the entire exposed western edge of the Mining Area at the top edge of the steep natural slope (Figure 8) to prevent machinery and vehicles from an accidently fall. The berm would not extend in front of the Ore Slope (Figure 8) allowing material to be pushed through the gap in the berm to the lower Processing Area below. The berm would also control stormwater drainage to flow north, then west down to the drainage north of the Processing Area, rather than west down the natural slope.

No steep highwalls would be created within the project area during active mining and following excavation. The steep natural slopes between the Mining Area and Processing Area would not be worked during or after mining. The highest reclamation slope in the project area would be in the upper Mining Area and would taper westerly at a 1V:5H slope. Any reclaimed slopes would have a maximum reclamation slope of 1V:5H. All natural slopes between the Mining and Processing Areas would be

maintained at their current aspect and slope during and following mining. Active quarry slopes will be no steeper than 1V:1H. All other mining faces will comply with all applicable MSHA and Tribal regulations. Caution will be exercised during any mine activities that occur beside or beneath steeply sloped areas.

Figures 10, 11, and 12 provide cross-sections of the existing topography in the project area. Figures 13, 14, and 15 provide cross-sections of the proposed post-mining topography in the project area (cross-section alignments are illustrated in Figures 5 and 9).

### **3.5 PILE STABILITY**

Stockpile slopes will be at the angle of repose for the material being piled. This applies to topsoil, overburden, unprocessed material, and all marketable products (e.g., pit run, gravel, sand), and all unmarketable material (e.g., crusher fines). The angle of repose for the material being mined is between 28-35° depending on the proportions of fine or coarse material and the moisture content.

### **3.6 HAZARDOUS MATERIALS**

Mining equipment would be routinely inspected for leaks and other deficiencies that could cause spillage of hazardous products. Fueling of equipment would only occur in the Processing Area. Any leaks would be promptly corrected. Any sizeable spills would be immediately reported to the Navajo Nation and any other relevant agencies as required. Spills and disposal of contaminated material would be managed in accordance with federal and tribal regulations, standards, and guidelines. No materials will be burned or buried at the site.

### **3.7 DRILLING & BLASTING**

There will be no drilling or blasting at the site.

### **3.8 EROSION & SEDIMENT CONTROL**

Erosion and sedimentation will be controlled in the short-term using Best Management Practices (BMPs). The quarry will be excavated to form a long, shallow slope with a western aspect and a 1V:5H slope. A berm would be constructed along the western boundary of the Mining Area (Figure 8) to prevent erosion of the natural slope between the mining and processing areas. Straw bales would also be installed at the southern boundary, immediately south of the Processing Area to filter sediment entering the unnamed arroyo directly south of the project area. Once the entire mine area is excavated, unsalable material would be used to profile the quarry slope to create a 1V:5H west-facing slope with very gentle positive drainage to the north, then west. The berm would control the flow of stormwater and prevent sedimentation, riling, and gullyng of the natural slope between the Mining and Processing Areas. Additional berms will be constructed as needed during active mining to direct water into or away from the erosion prone areas. A very small portion of the unnamed ephemeral drainage initiating above the mine site flows onto the mine site. Any water flowing through the site would be captured in the upper Processing Area, flow south, and be filtered through the straw bales (BMPs) prior to exiting the site. No direct rain or snowfall will accumulate in the project area as no impoundments are proposed during or following mining. Also, there is expected to be minimal precipitation accumulation potential since the evaporation rate exceeds the precipitation rate in the region, and the soils complex in the project area has no frequency of flooding or ponding (NRCS 2014).

Best Management Practices (BMPs) will be implemented to control sedimentation, wind and water erosion, and wind deposition as necessary. All off-site runoff would be detailed in a yet to be developed Storm Water Pollution Prevention Plan (SWPPP) and filed with the U.S. Environmental Protection Agency (EPA) and Navajo EPA.

**BGCH 13-03-001**  
**Special Meeting**

**RESOLUTION OF BLUE GAP/TACHEE CHAPTER**

**REQUESTING RECON OIL COMPANY TO OBTAIN ALL NECESSARY REQUIRED CLEARANCES FOR THE PROPOSED CHAPTER'S SITTING GIANT ROCK SAND AND GRAVEL PIT WITH THE ACCESS ROAD LOCATED 15 MILES NORTH OF BLUE GAP/TACHEE CHAPTER, MOBLIZE ALL NECESSARY EQUIPMENTS AND BEGIN CRUSHING AND TRANSPORT THE CRUSHED MATERIAL TO DESIGNATED ROAD LOCATIONS WITHIN THE CHAPTER COMMUNITY.**

**WHEREAS:**

Pursuant to 2 N.N.C and 26 N.N.C., the Blue Gap/Tachee Chapter is recognized and established as a government entity of the Navajo Nation Government to enhance and foster the needs and nest interest of the community membership; and

Pursuant to 26 N.N.C. sections 3(A) and 1(B)(2), the Navajo Nation Council delegated to chapter government authority with respect to local matters consistent with Navajo law, including custom and tradition and allows the Blue Gap/Tachee Chapter to make decisions and govern with responsibility and accountability to community membership; and

The Blue Gap/Tachee Chapter has an urgent priority to utilize local crushed gravel source to upgrade their community roads which are in dilapidated conditions creating hazardous transportation for all, i.e., school children, elderlies, health care patients, utility company, law enforcement, communication companies; and

The gravel source, commonly referred to as "red dog gravel" is located approximately 15 miles north of the Blue Gap/Tachee Chapter and the land use permit holder has given the required consent to improve the access road to the site and mine the source, transport and utilize it on designated chapter roads and where ever it deems necessary; and

**NOW, THEREFORE, BE IT RESOLVED, THAT:**

The Blue Gap/Tachee Chapter hereby requests RECON OIL COMPANY to obtain all necessary required clearances for the proposed Chapter's Sitting Giant Rock Sand and Gravel Pit with the access road located 15 miles north of Blue Gap/Tachee Chapter, mobilize all necessary equipment and begin crushing and transport the crushed material to designated road locations with the community.

The Blue Gap/Tachee Chapter further declare restoration to all disturbed area and refrain from deliberate destruction of plantation and land outside the boundary of the withdrawn tract for the gravel pit; and

JO P. Yazzie, President

Leo Sheppard, Vice President

Betty V. Askie, Sec./Treasurer

Benjamin Manyows, Grazing Representative



**NAVAJO NATION DEPARTMENT OF JUSTICE**  
**OFFICE OF THE ATTORNEY GENERAL**

HARRISON TSOSIE  
ATTORNEY GENERAL

DANA L. BOBROFF  
DEPUTY ATTORNEY GENERAL

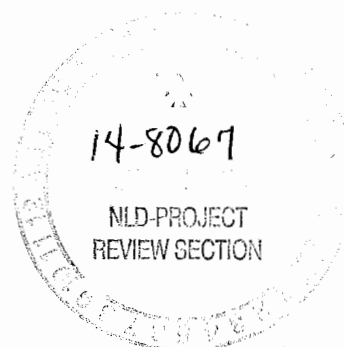
MEMORANDUM

TO: Ram Das, Principal Mining Engineer  
Navajo Minerals Department  
Division of Natural Resources

FROM: Kathy Grounds  
Katy Grounds, Attorney  
Natural Resources Unit, Department of Justice

DATE: May 9, 2014

SUBJECT: **Tachee Enterprises, Inc. – Blue Gap Gravel Quarry**



Please find attached three documents from Tachee Enterprises, Inc. for your review. They are (1) Environmental Assessment for Blue Gap Gravel Quarry dated April 28, 2014; (2) Mining, Production and Reclamation Plan for Blue Gap Gravel Quarry dated April 9, 2014; (3) Revegetation Plan for Blue Gap Gravel Quarry dated April 14, 2014.

These documents are being submitted to the Minerals Department pursuant to the BIA's February 2014 notice to cease and desist issued to Recon Oil Company, Inc. in an effort to assist the company with getting into compliance.

Attachments

KG/

PICK UP BY  
Bruce M  
7-8-14  
12:00



**EXECUTIVE OFFICIAL REVIEW**Title of Document: Sand & Gravel Lse. 4-Tachee Enterprise. Contact Name: DRAPER, HOWARDProgram/Division: DIVISION OF NATURAL RESOURCESEmail: howarddraper@frontiernet.net Phone Number: 928 871-6447☐ **Business Site Lease** Sufficient    Insufficient

- |   |             |   |   |  |
|---|-------------|---|---|--|
| 1. Division: _____  | Date: _____ | □ | □ |  |
| 2. Office of the Controller: _____  | Date: _____ | □ | □ |  |
| (only if Procurement Clearance is not issued within 30 days of the initiation of the E.O. review) |             |   |   |  |
| 3. Office of the Attorney General: _____  | Date: _____ | □ | □ |  |

☐ **Business and Industrial Development Financing, Veteran Loans, (i.e. Loan, Loan Guarantee and Investment) or Delegation of Approving and/or Management Authority of Leasing transactions**

- |  |             |   |   |  |
|--|-------------|---|---|--|
| 1. Division: _____                       | Date: _____ | □ | □ |  |
| 2. Office of the Attorney General: _____ | Date: _____ | □ | □ |  |

☐ **Fund Management Plan, Expenditure Plans, Carry Over Requests, Budget Modifications**

- |   |             |   |   |  |
|---|-------------|---|---|--|
| 1. Office of Management and Budget: _____ | Date: _____ | □ | □ |  |
| 2. Office of the Controller: _____        | Date: _____ | □ | □ |  |
| 3. Office of the Attorney General: _____  | Date: _____ | □ | □ |  |

☐ **Navajo Housing Authority Request for Release of Funds**

- |  |             |   |   |  |
|--|-------------|---|---|--|
| 1. NNEPA: _____                          | Date: _____ | □ | □ |  |
| 2. Office of the Attorney General: _____ | Date: _____ | □ | □ |  |

☐ **Lease Purchase Agreements**

- |  |             |   |   |  |
|--|-------------|---|---|--|
| 1. Office of the Controller: _____       | Date: _____ | □ | □ |  |
| (recommendation only)                    |             |   |   |  |
| 2. Office of the Attorney General: _____ | Date: _____ | □ | □ |  |

☐ **Grant Applications**

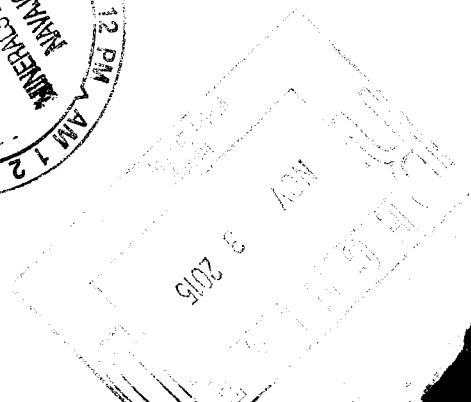
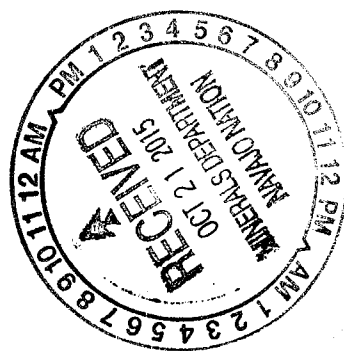
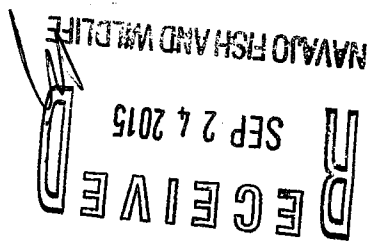
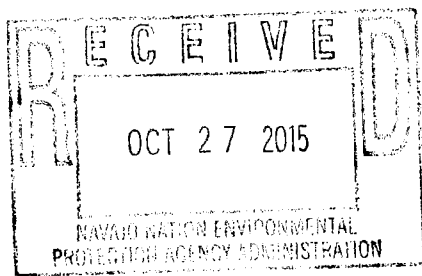
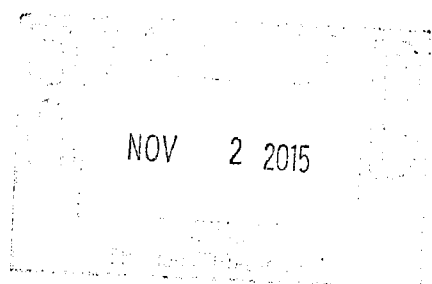
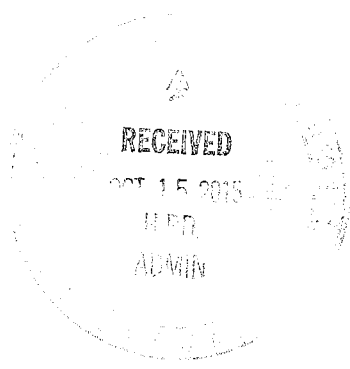
- |   |             |   |   |  |
|---|-------------|---|---|--|
| 1. Office of Management and Budget: _____ | Date: _____ | □ | □ |  |
| 2. Office of the Controller: _____        | Date: _____ | □ | □ |  |
| 3. Office of the Attorney General: _____  | Date: _____ | □ | □ |  |

☐ **Five Management Plan of the Local Governance Act, Delegation of an Approving Authority from a Standing Committee, Local Ordinances (Local Government Units), or Plans of Operation/Division Policies Requiring Committee Approval**

- |  |             |   |   |  |
|--|-------------|---|---|--|
| 1. Division: _____                       | Date: _____ | □ | □ |  |
| 2. Office of the Attorney General: _____ | Date: _____ | □ | □ |  |

☐ **Relinquishment of Navajo Membership**

- |  |             |   |   |  |
|--|-------------|---|---|--|
| 1. Land Department: _____                | Date: _____ | □ | □ |  |
| 2. Elections: _____                      | Date: _____ | □ | □ |  |
| 3. Office of the Attorney General: _____ | Date: _____ | □ | □ |  |



☐ **Land Withdrawal or Relinquishment for Commercial Purposes**

Sufficient    Insufficient

1. Division: \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
2. Office of the Attorney General: \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐

☐ **Land Withdrawals for Non-Commercial Purposes, General Land Leases and Resource Leases**

1. NLD \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
2. F&W \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
3. HPD \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
4. Minerals \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
5. NNEPA \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
6. DNR \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
7. DOJ \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐

☐ **Rights of Way**

1. NLD \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
2. F&W \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
3. HPD \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
4. Minerals \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
5. NNEPA \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
6. Office of the Attorney General: \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
7. OPVP \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐

☐ **Oil and Gas Prospecting Permits, Drilling and Exploration Permits, Mining Permit, Mining Lease**

1. Minerals \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
2. OPVP \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
3. NLD \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐

☐ **Assignment of Mineral Lease**

1. Minerals \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
2. DNR \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
3. DOJ \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐

☐ **ROW (where there has been no delegation of authority to the Navajo Land Department to grant the Nation's consent to a ROW)**

1. NLD \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
2. F&W \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
3. HPD \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
4. Minerals \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
5. NNEPA \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
6. DNR \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
7. DOJ \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐  
8. OPVP \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐

☒ **OTHER: Sand & Gravel Lease for Blue Gap Sand & Gravel, Inc. in Tachee vicinity, AZ.**

1. NLD ~~see~~ \_\_\_\_\_ Date: 23 Sept-15 ☒ ☐  
2. F&W see Ltr of 10/2/15 \_\_\_\_\_ Date: 10/8/15 ☒ ☐  
3. HPD see Ltr of 10/20/15 \_\_\_\_\_ Date: 10/20/15 ☒ ☐  
4. MIN Subject all recommended \_\_\_\_\_ Date: 10/27/15 ☒ ☐  
5. NEPA see terms and conditions \_\_\_\_\_ Date: 11-04-2015 ☒ ☐  
6. DOJ see \_\_\_\_\_ Date: 11-18-15 ☒ ☐  
7. P/VP \_\_\_\_\_ Date: \_\_\_\_\_ ☐ ☐

Changes in

Pursuant to 2 N.N.C. § 164 and Executive Order Number 07-2013

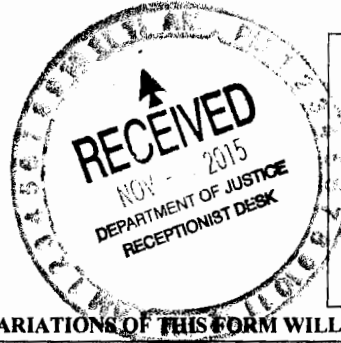
Date: 11-23-15 ☐ ☐



# NAVAJO NATION DEPARTMENT OF JUSTICE

## DOCUMENT REVIEW REQUEST FORM

☐ RESUBMITTAL



DOJ
11/05/15 @ 11:41a
DATE / TIME
<input type="checkbox"/> 7 Day Deadline
DOC #: 002341
SAS #:
UNIT: NRU

\*\*\* FOR NNDJ USE ONLY - DO NOT CHANGE OR REVISE FORM. VARIATIONS OF THIS FORM WILL NOT BE ACCEPTED. \*\*\*

### CLIENT TO COMPLETE

DATE OF REQUEST:	9/3/2015 11/5/15	DIVISION:	Natural Resources (DNR)
CONTACT NAME:	Howard P Draper, Kayla Bia, Vera Shurley	DEPARTMENT:	Navajo Land Dept (NLD)
PHONE NUMBER:	X-6447, 6490, 6401	E-MAIL:	howarddraper@frontiernet.net; klbia@frontier.com; verashurley@frontiernet.net
TITLE OF DOCUMENT: Approving Sand & Gravel Lease of 20.24 acres and 2 acres for road access to Blue Gap Sand & Gravel Pit, extract, operate and maintain the Blue Gap Gravel Quarry Pit, Tachee vicinity, Arizona			

### DOJ SECRETARY TO COMPLETE

DATE/TIME IN UNIT:	11/05/15 1:02pm	REVIEWING ATTORNEY/ADVOCATE:	Sage 11/17/15
DATE TIME OUT OF UNIT:	11/18/15 3:44pm		SB

### DOJ ATTORNEY / ADVOCATE COMMENTS

Document is legally sufficient

REVIEWED BY: (Print)	Date / Time	SURNAMED BY: (Print)	Date / Time
Sage Garland	11-17-15 / 4:30	Veronica Blackhat	11-18-15 3:07pm

DOJ Secretary Called: Howard Draper for Document Pick Up on 11/18/15 at 3:00pm By: SB

PICKED UP BY: (Print) DATE / TIME:

NNDJ/DRRF-July 2013



# THE NAVAJO NATION

## MINERALS DEPARTMENT

Post Office Box 1910

Window Rock, Arizona 86515

Phone: (928) 871-6587 • Fax: (928) 871-7095

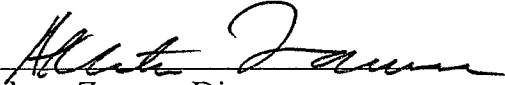
**Russell Begaye**  
President

**Jonathan Nez**  
Vice-President

October 16, 2015

### MEMORANDUM

TO : ALL CONCERNED


FROM :   
Akhtar Zaman, Director  
Minerals Department

SUBJECT : DELEGATION OF AUTHORITY

Ms. Rowena Cheromiah, Minerals Royalty/Audit Manager, is hereby delegated to act in the capacity of the Director of the Minerals Department beginning at 8:00 A.M. on Tuesday, October 20, 2015 and ending at 5:00 P.M. on Friday, October 30, 2015.

Your cooperation with Ms. Cheromiah will be appreciated.

### ACKNOWLEDGMENT

  
Rowena Cheromiah  
Minerals Audit Department

AZ/kjs  
Distribution