

**RESOLUTION OF THE
RESOURCES AND DEVELOPMENT COMMITTEE
23rd Navajo Nation Council --- Fourth Year, 2018**

AN ACTION

**RELATING TO RESOURCES AND DEVELOPMENT COMMITTEE; APPROVING A
SAND AND GRAVEL LEASE TO THE NAVAJO DIVISION OF TRANSPORTATION
TO OPERATE AND MAINTAIN A SAND AND GRAVEL PIT TO OCCUPY 50
ACRES, MORE OR LESS, AND AN ACCESS ROAD OF 9.0331 ACRES, MORE OR
LESS, OF NAVAJO NATION TRUST LANDS LOCATED WITHIN THE GREASEWOOD
SPRINGS CHAPTER VICINITY, NAVAJO NATION (NAVAJO COUNTY, ARIZONA)**

BE IT ENACTED:

Section One. Authority

- A. The Resources and Development Committee is a standing committee of the Navajo Nation Council. 2 N.N.C. § 500(A).
- B. The Resources and Development Committee of the Navajo Nation Council has authority to give final approval of all land withdrawals, non-mineral leases, permits, licenses, rights-of-way, surface easements and bonding requirements on Navajo Nation lands and unrestricted (fee) land. This authority shall include subleases, modifications, assignments, leasehold encumbrances, transfers, renewals, and terminations. 2 N.N.C. § 501 (B)(2).

Section Two. Findings

- A. The Navajo Nation Division of Transportation, P.O. Box 4620, Window Rock, Arizona 86515, has submitted a request for a sand and gravel lease to occupy 50 acres and an access road right-of-way of 9.0331 acres, more or less, of Navajo Nation Trust Lands. The proposed Sand and Gravel Lease is attached hereto as **Exhibit A**.
- B. The proposed Sand and Gravel Lease consists of 50 acres, more or less, of Navajo Nation Trust Lands located at Section 2, Township 23 North, Range 22 East, Navajo County, Arizona, Gila and Salt River Meridian. See **Exhibit A**. The location of the site and access road is more particularly described on the maps attached hereto as **Exhibits B and C**.

- C. The Project Review Section with the Navajo Land Department has obtained the consent from the affected land users (i.e., grazing permittees). The consent documents are attached hereto as **Exhibit D**.
- D. All environmental and archaeological studies and clearances have been completed and are attached hereto and incorporated herein by this reference. The Environmental Assessment is attached hereto as **Exhibit E** and includes, among other documents, the environmental assessment maps and the Biological Resources Compliance Form. The Cultural Resource Compliance Form and Cultural Resource Survey are attached hereto as **Exhibit F**. The Mining and Reclamation Plan is attached hereto as **Exhibit G**.
- E. The Greasewood Chapter supports the proposed sand and gravel pit and access road for the benefit of the community. See Resolution GSC07-17-0743, Resolution GSC04-17-0718, and Letter Dated August 5, 2016 from Greasewood Springs Chapter President are attached hereto as **Exhibit H**.
- F. The Navajo Nation Division of Transportation has submitted the Sand and Gravel Lease application to the General Land Development Department. See Letter dated June 1, 2017 from Garret Silversmith to Howard Draper attached hereto as **Exhibit I**.
- G. The Navajo Division of Transportation Lease for sand and gravel operations near Greasewood Springs has completed an Executive Official Review with various Departments and Programs providing approval and supplemental comments. Executive Official Review Document No. 009643 is attached hereto as **Exhibit J**.

Section Three. Approval

- A. The Resources and Development Committee of the Navajo Nation Council hereby approves a Sand and Gravel Lease for the Navajo Division of Transportation, for 50 acres, more or less, and an access road right-of-way of 9.0331 acres, more or less, of Navajo Nation Trust Lands in the Greasewood Springs vicinity, Greasewood Springs Chapter, Navajo Nation (Navajo County, Arizona) to operate and maintain a sand and gravel pit and access road. The location is more particularly described on the survey maps attached as **Exhibits B and C**.

- B. The Navajo Nation hereby approves the Sand and Gravel Lease 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 Navajo Nation hereby authorizes the President of the Navajo Nation to execute any and all documents necessary to implement the intent and purpose of this resolution.

CERTIFICATION

I, hereby, certify that the following resolution was duly considered by the Resources and Development Committee of the 23rd Navajo Nation Council at a duly called meeting at the Navajo Division of Transportation, Tse Bonito, Navajo Nation (New Mexico), at which a quorum was present and that same was passed by a vote of 3 in favor, 1 opposed, 1 abstained on this 28th day of March, 2018.



Jonathan Perry, Pro Tempore Chairperson
Resources and Development Committee
of the 23rd Navajo Nation Council

Motion: Honorable Jonathan Perry
Second: Honorable Leonard Pete



Navajo Nation Sand and Gravel Lease

NAVAJO NATION SAND AND GRAVEL LEASE

THIS AGREEMENT is for a Sand and Gravel Lease (Lease) made and entered into this _____ day of _____, 2018, by and between the Navajo Nation, whose address is Post Office Box 1910, Window Rock, Arizona 86515, and Navajo Division of Transportation, herein called the Lessee and whose address is at Post Office Box 4620, Window Rock, Arizona 86515.

Definitions:

Sand and Gravel means: Barrow (Earth), Sand and Natural or Processed Gravel,

Department means the Navajo Nation Minerals Department.

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

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

Performance bond means a surety bond, collateral bond or self-bond or a combination 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 Committee means the Resources 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 2000 pounds.

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

The Navajo Nation hereby grants Lessee a Lease right to extract sand and gravel from Greasewood, Section 2, Township 23 North, Range 22 East, Navajo County, State of Arizona, Gila and Salt River Meridian. The Lease occupies an area of fifty (50) acres, more or less, and the access road right-of-way consists of 9.0331 acres, more or less. The location maps and legal descriptions of the Lease and the access road are shown in attached Exhibits "D" and "E" respectively. The Lease shall be subject to the following terms and conditions.

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 Nation by the Lessee:
 - (i.) An annual advance royalty for each lease year. The first payment in the amount of Ten Thousand Five Hundred dollars (\$10,500.00) 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 rates of \$3.50 per ton for each ton of material removed and sold from the Lease premises. Since all material removed from this pit will be used for Navajo routes which are within the Navajo DOT inventory, a reduction factor of 50% will be used. The royalty rate will be \$1.75 per ton. 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 \$6,500.00 for the access road right-of-way. The first payment is due (unless it is paid in lump sum for the entire term for 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, the royalty rate and the right-of-way consideration (if not paid in lump sum) shall not 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 February 2018 shall be used as the base for all adjustments.
3. Mining and Reclamation Plan: The Lessee shall provide a mining and reclamation plan (Plan) to the Nation and to the U.S. Department of the Interior (DOI). The Lessee shall obtain the approval of the Nation and the DOI prior to making any changes in the approved Plan. The plan will include the area to mine with drainage control; annual tonnage estimates for the mining area; and the planned reclamation timing to coincide with the mining. As a general rule, slopes will not exceed 5:1 and majority of the revegetation species will be native to the area.
4. Bond: The Lessee shall furnish a performance and reclamation bond for Zero dollars (\$0.00). 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 Lease has been expired or

terminated and Lessee has fulfilled all its obligations, including payments to the Nation and reclamation, under the terms and conditions of this Lease.

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, Arizona 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. Lessor 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 and shall continue production thereafter at the rate specified in the plan.
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 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 occupy the area under the Lease for any other purpose without the prior written approval of the Nation and the Secretary. Such approval of the Nation may be granted upon conditions or withheld at the sole discretion of the 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 Nation and /or the Secretary.**

11. Sand and Gravel material shall not be used for projects outside the Nation unless it is expressly authorized by the Resources Committee of the Navajo Nation Council.
12. In all activities conduction by the Lessee within the Navajo Nation, the Lessee shall abide by all laws and regulation of the Nation and the United States, now in force and effector 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 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 Nation is not unduly degraded during operations by violating federal and 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 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 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 Nation may be granted, granted upon conditions or withheld at the sole discretion of the Nation.
20. The Nation may recommend termination of the Lease by DOI for violation of any of the terms and condition 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 form the 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 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 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 Nation and Secretary have further right to audit all payments due to the Nation.
24. By acceptance of the grant of Lease, the Lessee consents to the full territorial legislative, executive and judicial jurisdiction of the Nation, including but not limited to the jurisdiction to levy fines and to enter judgements 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 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 Nation on the basis that such jurisdiction is inconsistent with the status of the Nation as an Indian 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 general 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 Nation.

26. Any action or proceeding brought by the Lessee against the Nation in connection with or arising out of the terms and conditions of the Lease shall be brought only in the Courts or the Nation, and such action or proceeding shall be brought by the Lessee against the Nation, and no such action or proceeding shall be brought by the Lessee against the 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 Nation.
28. Except as prohibited by applicable federal law, the law of the 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 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, and on the Navajo Nation, certifying that the applicant has a public liability insurance policy in force 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 terms 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.
32. The Lessee shall maintain a minimum 200.00 feet buffer zone with the San Juan River.

33. All employees of the Lessee shall be thoroughly familiar with the Lessee's emergency response plan.
34. The Lessee shall obtain the permission of permittees of existing mineral, oil and gas lease holders, operators and rights-of-way permittees when crossing these leases and rights-of-way.
35. The Lessee shall not extract sand and gravel located in the vicinity of Oil and gas wells, including abandoned wells unless written authorization is obtained from the Navajo Nation and those federal agencies having jurisdiction.

THE NAVAJO NATION

3/2/18
Date

By Russell Begaye
Russell Begaye, President

NAVAJO DIVISION OF TRANSPORTATION

Date

By _____
Garret Silversmith, Director



SECTION 1

Map and Legal Description of the Proposed Pit

NOTES:

- [illegible]

COPIES PREPARED BY:

**WILSON
& COMPANY**
4900 LANG AVENUE, N.E.
ALBUQUERQUE, NEW MEXICO 8
PHONE: 505-348-4000
FAX: 505-348-4055

GREASEWOOD SPRINGS CHAPTER, SECTIONS 1 & 2, TOWNSHIP 23 NORTH, RANGE 22 EAST,
SECTIONS 12 & 13, TOWNSHIP 24 NORTH, RANGE 22 EAST, SECTIONS 7, 18 & 19,
TOWNSHIP 24 NORTH, RANGE 23 EAST. ARIZONA GILA AND SALT RIVER MERIDIAN

PARCEL A 40 ACRE GRAVEL PIT LEASE AREA:

Beginning at a set rebar with cap on the Northwest corner of parcel herein described; whence a Section 35, T.34N., R.22E., s. 3-12" survey data found in place, bear N 31°20'37" W, 465.39 feet; thence from said point of beginning, leaving said Northwest corner of tract;

511°31'06"E, a distance of 1296.88 feet to a set rebar with cap marking an angle point in this
 same line. The cap marking is as follows:

N48.2°44'04"W, a distance of 197.00 feet to a set rebar with cap marking an angle point in this corner. The corner is marked with a 1/2" rebar cap marked "three".

S10°39'02"W, a distance of 288.26 feet to a set rebar with cap marking an angle point and the southeast corner of this natural tunnel:

N75°42'40"W, a distance of 1157.66 feet to a set rebar with cap marking an angle point and the southeast corner of this parcel, thence:

N07°27'51"E, a distance of 1444.38 feet to the Point of Beginning of Parcel A containing

1/42x13 square feet 40,000 acres, more or less.

PARCEL B ACCESS ROAD LEASE AREA:

Beginning at a Set rebar with cap on the Northwest corner of parcel herein described; whence a Survey of Interior/Bureau of Indian Affairs Survey monument being the SW corner of Section 35, T.24N., R.22E., and the Point of Beginning, a 3-1/2" survey disk found in place, bears N 43°57'3" W, 2,204.83 feet thence from said point of beginning, leaving said Northwest corner of tract;

S88°37'27"E, a distance of 303.65 feet to a set rebar with cap, marking an angle point, thence;

548°14'06"E, a distance of 261.03 feet to a set rebar with cap marking an angle point, thence;

S88°23'52"E, a distance of 561.52 feet to a wet rebar with cap marking an angle point, thence;

S73°42'28"E, a distance of 340.12 feet to a set rebar with cap marking an angle point, thence;

S61°44'48"E, a distance of 194.07 feet to a set rebar with cap marking an angle point, thence;

S48°36'58"E, a distance of 359.02 feet to a set rebar with cap marking an angle point, thence;

Eastern point of the parcel herein described, thence;

S39°52'08"W, a distance of 100.10 feet to a wet rebar with cap marking an angle point, being the Southern point of the parcel herein described, thence;

N48°36'53"W, a distance of 351.11 feet to a set rebar with cap marking an angle point, thence

N61°44'49"W, a distance of 174.01 feet to a set rebar with cap marking an angle point, thence

N73° 42' 28" W, a distance of 363.11 feet to a net rebar with cap marking an angle point, thence

S89°07'34"W, a distance of 319.86 feet to a set rebar with cap marking an angle point, thence

N48°14'06"W, a distance of 284.10 feet to a set rebar with cap marking in angle point, thence

N463°35'40"W, a distance of 128.72 feet to a set rebar with cap marking an angle point, thence

N11°31'05"W, a distance of 107.59 feet to the Point of Beginning of Parcel B containing 393.41 most Western point of the parcel herein described, thence;

square feet 9.0331 acres, more or less.

PARCEL C 10 ACRE GRAVEL PIT STAGING SITE LEASE AREA:

Beginning at a Set rebar with cap on the Southern corner of parcel herein described; whence a Department of Interior/Bureau of Indian Affairs Survey monument being the SW corner of Section 35, T.24N., R.22E., a 3-1/2" survey disk found in place, bears M 04°16'45" E, 3095.12 feet; thence from said point of beginning, leaving said Southern corner of tract:

Western corner of paracel herein described, thence;

55°21'43.58" N, a distance of 600.85 km to a cat shelter with cat machines on each side and the Northern corner of parcel herein described, thence;

Eastern corner of parcel herein described, thence;

squares feet 10,000 acres, more or less.

Surveyor's Certificate:

THIS IS TO CERTIFY THAT THIS MAP AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE ARIZONA MINIMUM STANDARD OF PRACTICE FOR BOUNDARY SURVEYS.
THE FIELD WORK WAS COMPLETED IN MARCH 2017.

[Signature]

NATHAN L. GARDNER, R.L.S. NO. 36786
4900 LANG AVENUE, N.E.
ALBUQUERQUE, NEW MEXICO 87109



**WILSON
& COMPANY**

NAVAJO INDIAN RESERVAION
FORT DEFENCE AGENCY-Department of Realty
GRAVEL PIT, STAGING AREA, ACCESS
HAUL ROAD LEASE AREAS

STATE OF ARIZONA: APACHE COUNTY 1 OF 4



SECTION 2

Map and Legal Description of Access Roads

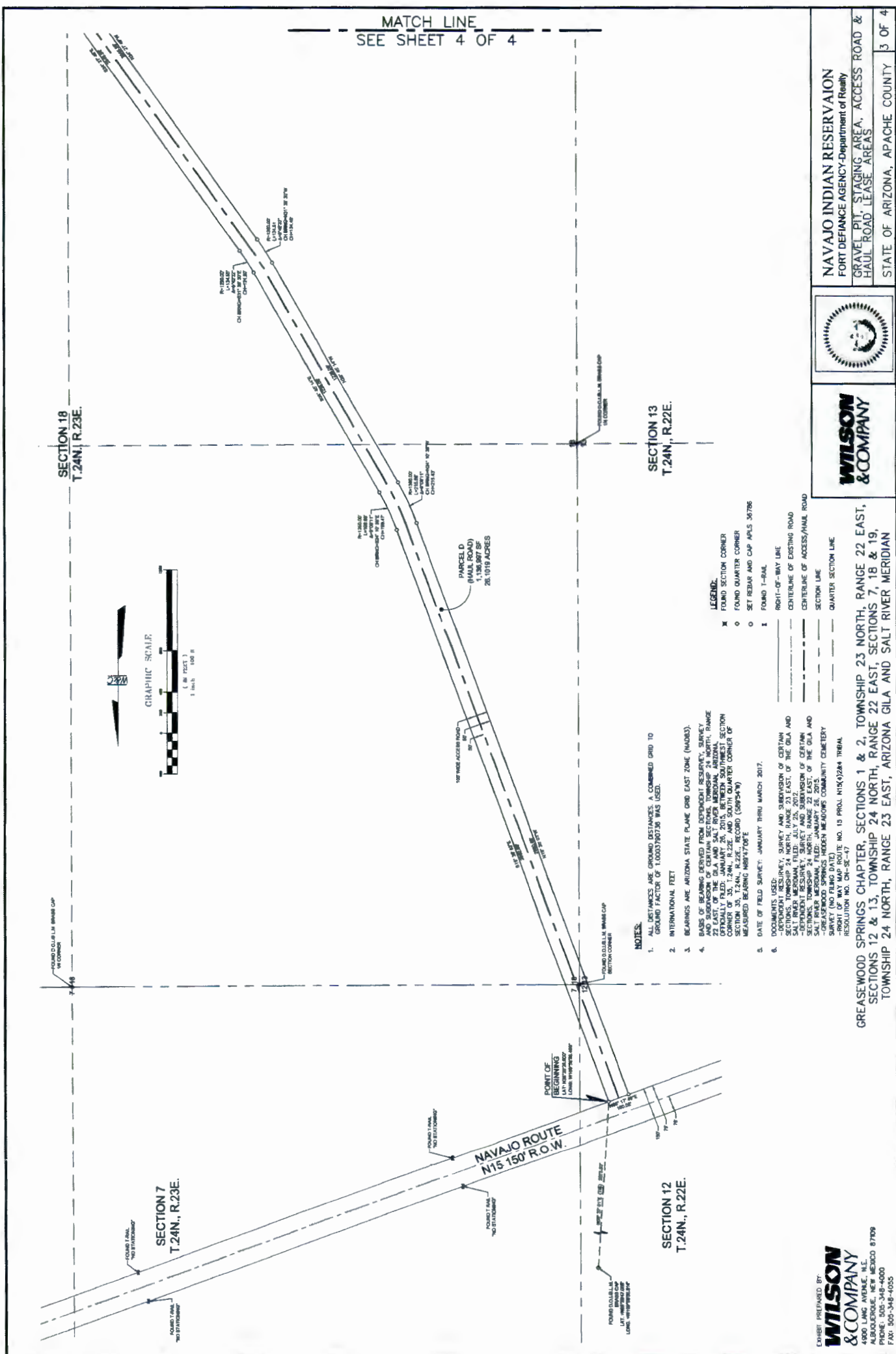


EXHIBIT PREPARED BY:

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**WILSON
& COMPANY**



NAVAJO INDIAN RESERVAION
FORT DEFENCE AGENCY-Department of Realty

GRAVEL PIT, STAGING AREA, ACCESS ROAD & HAUL ROAD LEASE AREAS

STATE OF ARIZONA, APACHE COUNTY 3 OF 4

SECTION 20
T.24N., R.23E.

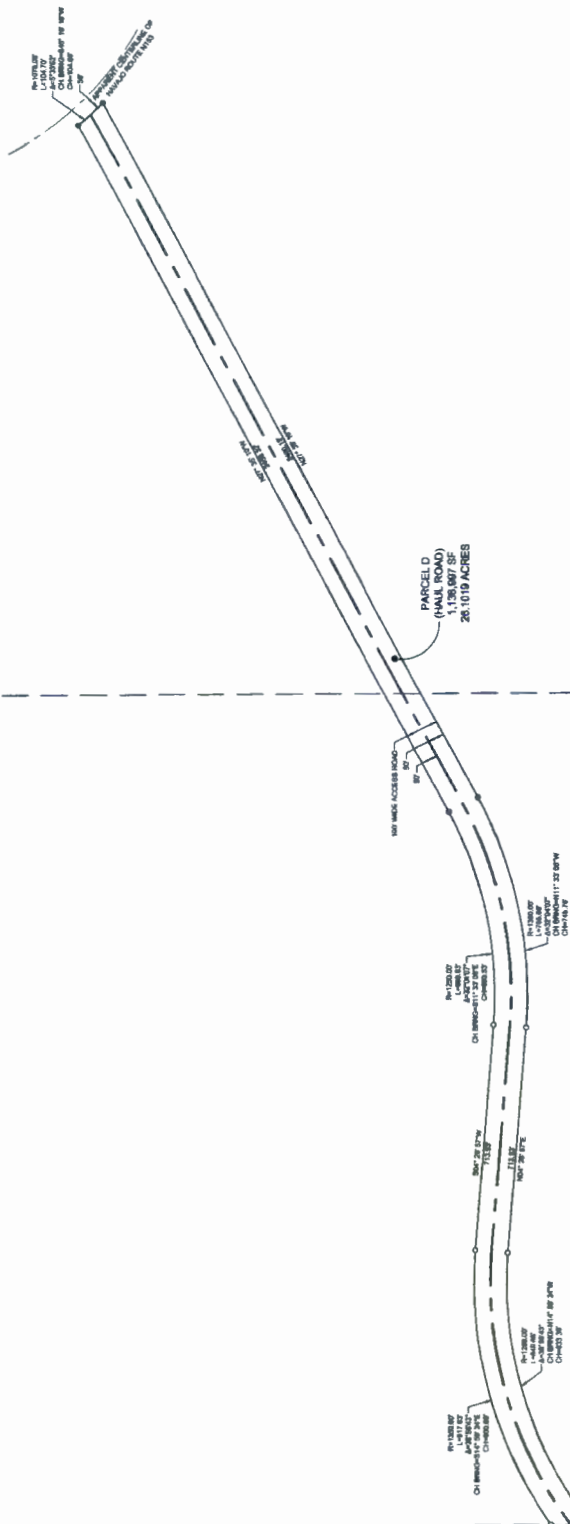
FOUNDED 0.0 L.M. MARK CAP
IN CORNER

FOUNDED 0.0 L.M. MARK CAP
IN CORNER



SECTION 18
T.24N., R.23E.

MATCH LINE
SEE SHEET 3 OF 4



SECTION 19
T.24N., R.23E.

NOTES:
1. ALL DISTANCES ARE GROUND DISTANCES. A COMBINED GRID TO GROUND FACTOR OF 1.0003790728 WAS USED.
2. INTERNATIONAL FEET
3. BEARINGS ARE ARIZONA STATE PLANE GRID EAST ZONE (NAD83).
4. BASIS OF BEARING DERIVED FROM DEPENDENT RESURVEY, SURVEY AND SUBDIVISION OF CERTAIN SECTIONS, TOWNSHIP 24 NORTH, RANGE 23 EAST, ARIZONA GILA AND SALT RIVER MERIDIAN, OFFICIALLY FILED: JANUARY 26, 2015, BETWEEN SOUTHWEST CORNER OF 35, T.24N., R.23E. AND SOUTHWEST CORNER OF SECTION 35, T.24N., R.23E., RECORD (589754W).
5. DATE OF FIELD SURVEY: JANUARY THRU MARCH, 2017.
6. DOCUMENTS USED:
-DEPENDENT RESURVEY, SURVEY AND SUBDIVISION OF CERTAIN SECTIONS, TOWNSHIP 24 NORTH, RANGE 23 EAST, ARIZONA GILA AND SALT RIVER MERIDIAN, FILED: JULY 25, 2012.
-DEPENDENT RESURVEY, SURVEY AND SUBDIVISION OF CERTAIN SECTIONS, TOWNSHIP 24 NORTH, RANGE 23 EAST, ARIZONA GILA AND SALT RIVER MERIDIAN, FILED: JANUARY 26, 2015.
-GREASWOOD SPRINGS HIDDEN MEADOWS COMMUNITY CEMETERY SURVEY (NO FILING DATE)
-GREASWOOD SPRINGS HIDDEN MEADOWS COMMUNITY CEMETERY SURVEY (NO FILING DATE)
-ARIZONA STATE PLANE GRID EAST ZONE (NAD83) TRIBAL RESOLUTION NO. 04-28-17

LEGEND:

- FOUNDED SECTION CORNER
- FOUNDED QUARTER CORNER
- SET REBAR AND CAP APX 30706
- FOUNDED T-HAIL
- RIGHT-OF-WAY LINE
- CENTERLINE OF EXISTING ROAD
- CENTERLINE OF ACCESS/HAUL ROAD
- SECTION LINE
- QUARTER SECTION LINE

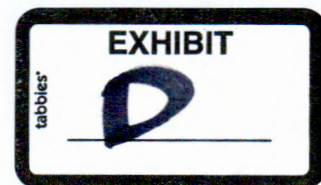
EXHIBIT PREPARED BY
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NAVAJO INDIAN RESERVATION
FORT DEFENSE AGENCY-Department of Realty

GRAVEL PIT, STAGING AREA, ACCESS ROAD &
HAUL ROAD LEASE AREAS
STATE OF ARIZONA, APACHE COUNTY

GREASWOOD SPRINGS CHAPTER, SECTIONS 1 & 2, TOWNSHIP 23 NORTH, RANGE 22 EAST, SECTIONS 12 & 13, TOWNSHIP 24 NORTH, RANGE 22 EAST, SECTIONS 7, 18 & 19, TOWNSHIP 24 NORTH, RANGE 23 EAST, ARIZONA GILA AND SALT RIVER MERIDIAN



SECTION 3

Land Use Consent



NAVAJO DIVISION OF TRANSPORTATION

POST OFFICE BOX 4620, WINDOW ROCK, AZ 86515

TEL: 505-371-8300/8301 FAX: 505-371-8399

April 10, 2017

Mr. Jim Bydone, Range Technician
Bureau of Indian Affairs
Natural Resources Fort Defiance Agency
P.O. Box 7H
Fort Defiance, AZ 86504

Dear Mr. Bydone,

Subject: Request for Names of Grazing Permittees

The Navajo Division of Transportation (Navajo DOT) submits this letter requesting names of the Grazing Permit Holders impacted by the proposed Sand and Gravel Pit in Greasewood Springs, AZ.

Navajo DOT is pursuing a sand and gravel lease for the site located in Greasewood Springs. See maps attached. Currently, Navajo DOT is working on the following to prepare the submission of the lease packet: chapter resolutions, consents of the grazing permittees, environmental and cultural studies, survey, surface testing, preparation of exploratory drilling, mining operation plan, and permits and leases.

For the past year, we have been in contact and working with the Greasewood Springs Chapter officials, staff, and community members. Their response has been favorable with the exception of a delayed response from Mr. Bill Spencer, Grazing Official, which is undesirably impacting the project. See letter attached.

Therefore, we are requesting your assistance to provide the names of the Permit Holders to the following:

- 1) Marlinda Littleman, Senior Programs & Projects Specialist, Navajo Division of Transportation, P.O. Box 4620, Window Rock, AZ. 86515, 505-371-8372.
- 2) Elerina Yazzie, Program Manager, Navajo Land Department General Land Development, P.O. Box 2249, Window Rock, AZ. 86515, 928-871-6401.
- 3) Bill Spencer, Grazing Official, Greasewood Springs Chapter, P.O. Box 1260, Ganado, AZ. 86505, 928-797-8844.

According to the Navajo Land Department and Navajo Minerals Department, Navajo DOT will need to get a chapter resolutions for the entire sand and gravel pit site project which includes the 40 acres site, 10 acres staging area, access route, hauling route, and drilling rig route. Navajo DOT already has an approved chapter resolution for the 40 acres site. The chapter resolution for the 10 acres staging area and routes is on the agenda for the next Greasewood Springs Chapter meeting on Sunday, April 23, 2017.

Page 2 of 2: Request for Names of Grazing Permittees

Further, according to the Navajo Land Department and Navajo Minerals Department, Navajo DOT must get consents from permittees who graze on or near the 40 acres site, 10 acres staging areas, access route, hauling routes, and drilling rig route. We have attached a map to identify each one.

Signatures were Obtained from Three Permit Holders

In collaboration with Bill Spencer, Grazing Official, Navajo DOT was provided a copy of signatures by three grazing permittees, which was specifically for the 40 acres site. See attachment. Unfortunately, the original documents are no longer on file with Navajo Land Department and Navajo DOT was advised to obtain the signatures again, using the correct forms. Whether Navajo DOT or Navajo Land Department contact the grazing permittees, both departments will need the names of the permittees to proceed with the consents.

The Sand and Gravel Pit project(s) are a priority of the Navajo Nation President/Vice-President and we need your help to expedite this project. Please provide us the names of the grazing permittees so that we may contact them and get signatures. Navajo DOT will do this in collaboration with the Navajo Land Department.

Your help and consideration is appreciated. If you have any questions, please talk directly with Marlinda Littleman, Senior Programs & Projects Specialist, or Arlando Teller, Deputy Division Director, at (505) 371-8372. Thank you.

Sincerely,

 1/12/2017

Garett Silversmith, Division Director
Navajo Division of Transportation

xc: File
MLittleman, SPPS
ATeller, Deputy Division Director
Greasewood Springs Chapter
Navajo Land Department
JBydone, BIA
Department of Agriculture
Navajo Division of Natural Resources

Attachments: Maps
Consents of Permit Holders for the 40 acres
Chapter Resolution for the 40 acres
Draft Chapter Resolution for the 10 acres and Routes
Letter to Bill Spencer

consents

FIELD CLEARANCE CHECKLIST

(This form covers only damages and compensation to individual land users. It does not cover consideration or other fees to the Navajo Tribe. Use back if necessary to complete this form.)

1.) Project Identification:

Applicant: Navajo Nation Division of Transportation
Type of Project: Sand & Gravel Pit
Purpose: Right of Ways, Clearances, Studies, Access/Hauling Route
Location: Navajo County, Greasewood, Arizona
Identification Number (s): 18-9131

2.) Amount of land affected: Total of 50.5 acres, 10.5 acres for "Staging Area" will be adjoining the 40 acres, and the gravel provided shall be utilized at no expense to Navajo, Apache County within the boundaries of the Navajo Nation.

3.) Land Status: Trust X Fee _____ Other _____

4.) List names of all individuals whose land use rights will be affected by project:

<u>Names</u>	<u>Census Number</u>	<u>Permit Number</u>
1. <u>Minnie Spencer</u>	<u> </u>	<u>17-01-97</u>
2. <u>Alice Spencer</u>	<u> </u>	<u>17-1444</u>
3. <u>Jeannie S. Gishey</u>	<u> </u>	<u>17-30-97</u>

5.) Are all "land users with claims to be affected lands as shown in Branch of Land Operations records included in the list in item 4? Yes

6.) Have the Grazing committee or Land Board Member (whichever is appropriate) for the affected areas confirmed the land user list in Item 4? Yes

ACKNOWLEDGEMENT

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

1-23-18
Date

Verna Arviso
Verna Arviso, Land Support Agent
General Land Development Department

CONSENT FORM 2
(Compensation for damages)

CONSENT TO USE
NAVAJO NATION LANDS

TO WHOM IT MAY CONCERN:

I, Minnie Spencer, hereby grant consent to the Navajo Nation and the Bureau of Indian Affairs to permit: Navajo Division of Transportation (NDOT) Designation of a Sand/Gravel Pit of 50.5 acres; and, to use a portion of my land use area for the following purpose:

1. Resolution GSC05-16-0630; and Right of Ways, Clearances, Studies, Access/Hauling Route (N153 leads to the Sand and Gravel Pit location), and;
2. Access Road #2 one time use for Rigs/Equipment (1.57 mile from N153 and head west then north to access pit), and;
3. Hauling Route Propose Gravel pit to existing N153 then north to Windmill, and;
4. Modified Resolution #GSC04-17-0718, 10.5 acres for "Staging Area" will be adjoining the 40 Acres, and;
5. The Gravel provided shall be utilized at no expense to Navajo, Apache County within the boundaries of the Navajo Nation.

As shown on the map showing the location of the proposed project on the attachments' as exhibits.

I am in compliance and abiding by all grazing laws set forth in The Navajo Reservation Grazing Handbook and Livestock Laws in Navajo Title Code 3.

My consent is given subject to the receipt of Road improvements from N157 west to N153 @ 4 miles for NDOT or its Contractors (attachment Road Map). The water storage tank was destroyed and needs to be replaced so our animals will have water.

Remarks: Take care of route between Route N157 and N153 by house #9004 and westward on N153 @ 4 miles. It gets very muddy and impassible during inclement weather conditions. Maintain the roads on a quarterly basis. Return the land back to the owner once the land has been rehabilitated.

1-23-18
Date

X Minnie Spencer
Land user Signature or Thumbprint

Census No. _____
Permit No. 17-01-97

Witness Melvin Spencer

1-23-18
Date

X Bill Spencer
Bill Spencer Grazing Official

#17-2
District No. 2

ACKNOWLEDGEMENT OF FIELD AGENT

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

Vina Amido
Field Agent Signature

CONSENT FORM 2
(Compensation for damages)

CONSENT TO USE
NAVAJO NATION LANDS

TO WHOM IT MAY CONCERN:

I, Alice Spencer, hereby grant consent to the Navajo Nation and the Bureau of Indian Affairs to permit: Navajo Division of Transportation (NDOT) Designation of a Sand/Gravel Pit of 50.5 acres; and, to use a portion of my land use area for the following purpose:

1. Resolution GSC05-16-0630; and Right of Ways, Clearances, Studies, Access/Hauling Route (N153 leads to the Sand and Gravel Pit location), and;
2. Access Road #2 one time use for Rigs/Equipment (1.57 mile from N153 and head west then north to access pit), and;
3. Hauling Route Propose Gravel pit to existing N153 then north to Windmill, and;
4. Modified Resolution #GSC04-17-0718, 10.5 acres for "Staging Area" will be adjoining the 40 Acres, and;
5. The Gravel provided shall be utilized at no expense to Navajo, Apache County within the boundaries of the Navajo Nation.

As shown on the map showing the location of the proposed project on the attachments' as exhibits.

I am in compliance and abiding by all grazing laws set forth in The Navajo Reservation Grazing Handbook and Livestock Laws in Navajo Title Code 3.

My consent is given subject to the receipt of Road improvements from N157 west to N153 @ 4 miles for NDOT or its Contractors (attachment Road Map). The water storage tank was destroyed and needs to be replaced so our animals will have water.

Remarks: Take care of route between Route N157 and N153 by house #9004 and westward on N153 @ 4 miles. It gets very muddy and impassible during inclement weather conditions. Maintain the roads on a quarterly basis. Return the land back to the owner once the land has been rehabilitated.

1-23-18
Date

X RT
Land user Signature or Thumbprint

Census No. _____
Permit No. 17-1444

Witness: Alice Spencer

1-23-18
Date

X Bill Spencer
Bill Spencer Grazing Official

#17-2
District No. 2

ACKNOWLEDGEMENT OF FIELD AGENT

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

Verna Cerrito
Field Agent Signature

CONSENT FORM 2
(Compensation for damages)

CONSENT TO USE
NAVAJO NATION LANDS

TO WHOM IT MAY CONCERN:

I, Jeannie S. Gishey, hereby grant consent to the Navajo Nation and the Bureau of Indian Affairs to permit: Navajo Division of Transportation (NDOT) Designation of a Sand/Gravel Pit of 50.5 acres; and, to use a portion of my land use area for the following purpose:

1. Resolution GSC05-16-0630; and Right of Ways, Clearances, Studies, Access/Hauling Route (N153 leads to the Sand and Gravel Pit location), and;
2. Access Road #2 one time use for Rigs/Equipment (1.57 mile from N153 and head west then north to access pit), and;
3. Hauling Route Propose Gravel pit to existing N153 then north to Windmill, and;
4. Modified Resolution #GSC04-17-0718, 10.5 acres for "Staging Area" will be adjoining the 40 Acres, and;
5. The Gravel provided shall be utilized at no expense to Navajo, Apache County within the boundaries of the Navajo Nation.

As shown on the map showing the location of the proposed project on the attachments' as exhibits.

I am in compliance and abiding by all grazing laws set forth in The Navajo Reservation Grazing Handbook and Livestock Laws in Navajo Title Code 3.

My consent is given subject to the receipt of Road improvements from N157 west to N153 @ 4 miles for NDOT or its Contractors (attachment Road Map). The water storage tank was destroyed and needs to be replaced so our animals will have water.

Remarks: Take care of route between Route N157 and N153 by house #9004 and westward on N153 @ 4 miles. It gets very muddy and impassible during inclement weather conditions. Maintain the roads on a quarterly basis. Return the land back to the owner once the land has been rehabilitated.

1-23-18
Date

X Jeannie S. Gishey
Land user Signature or Thumbprint

Census No. _____
Permit No. 17-30-97

Witness: Pauline S. Gishey

1-23-18
Date

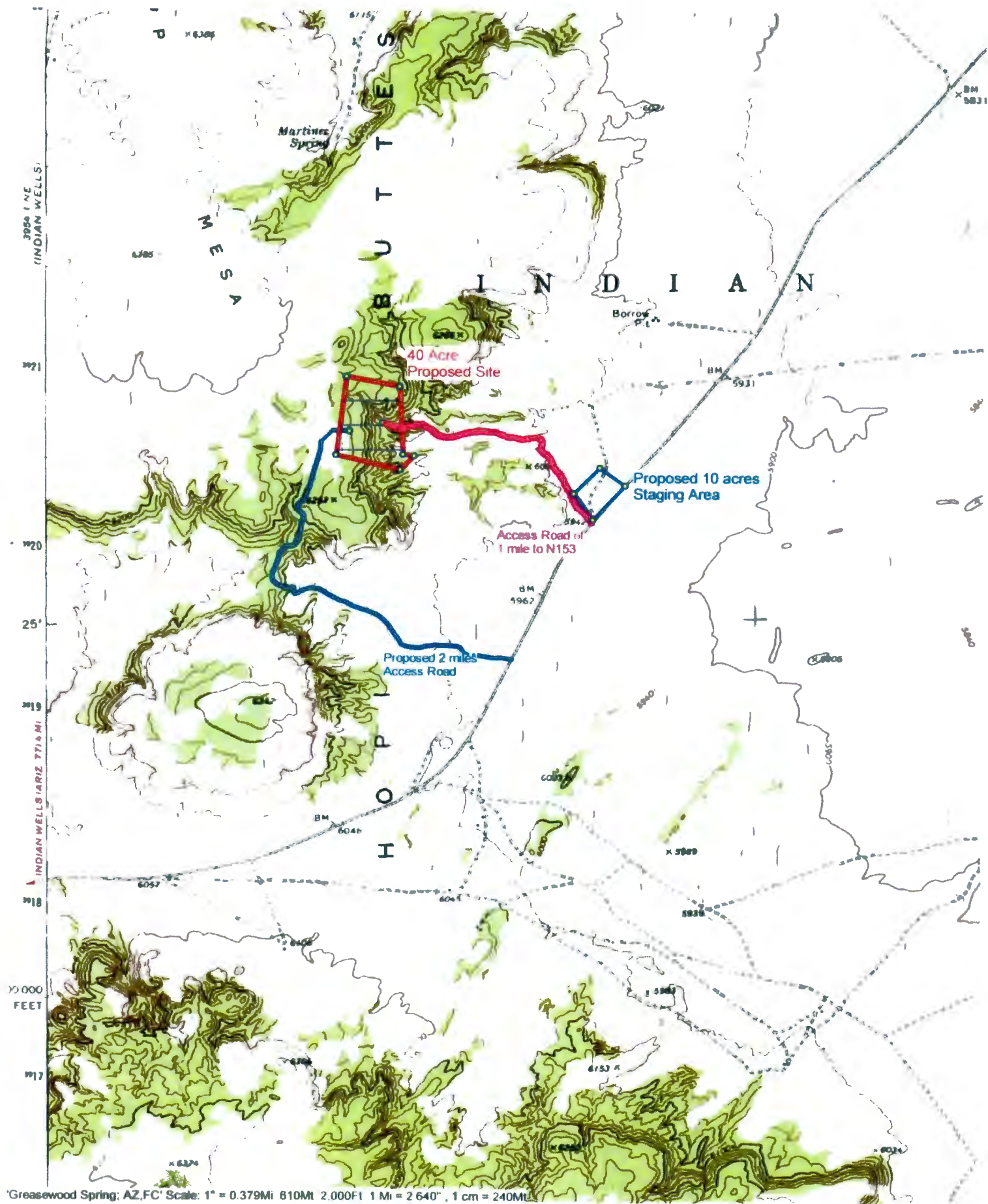
X Bill Spencer
Bill Spencer Grazing Official

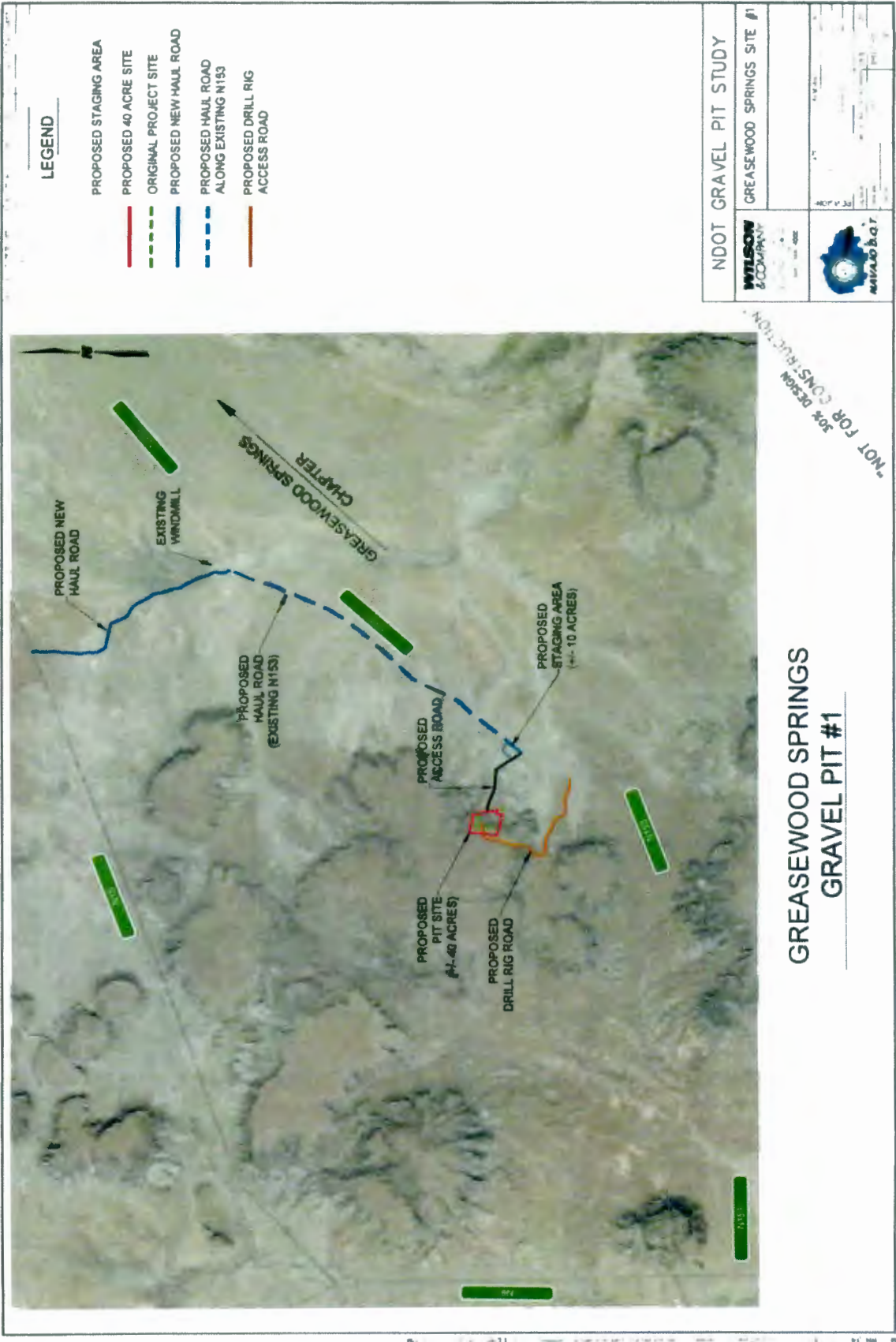
#17-2
District No. 2

ACKNOWLEDGEMENT OF FIELD AGENT

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

Vincent Amado
Field Agent Signature





LEGEND

- PROPOSED STAGING AREA
- PROPOSED 40 ACRE SITE
- ORIGINAL PROJECT SITE
- PROPOSED NEW HAUL ROAD
- PROPOSED HAUL ROAD ALONG EXISTING N153
- PROPOSED DRILL RIG ACCESS ROAD



NDOT GRAVEL PIT STUDY

	GREASEWOOD SPRINGS SITE #1

**GREASEWOOD SPRINGS
GRAVEL PIT #1**

NOT FOR CONSTRUCTION



GREASEWOOD SPRINGS GRAVEL PIT#1 ACCESS ROAD EXHIBIT

LEGEND

--- EXISTING ACCESS ROAD

— ACCESS ROAD BOUNDARY LIMITS

NDO GRAVEL PIT STUDY

WILSON & COMPANY

GREASEWOOD SPRINGS SITE #1



DATE APRIL 7 2017

Environmental Assessment

Greasewood Springs Gravel Pit #1 Project

Navajo County, Arizona



Prepared for
Navajo Division of Transportation

Greasewood Springs Gravel Pit #1
Navajo Nation lands near Greasewood Springs, Navajo County, Arizona

Applicant
Navajo Division of Transportation

Federal Agency
Bureau of Indian Affairs

Tribal Entity
Navajo Nation

Prepared by:

Marron and Associates, Inc.
7511 Fourth Street, NW
Albuquerque, New Mexico 87107
Project Number 17004.01

and

Wilson and Company, Inc.
4900 Land Ave. NE
Albuquerque, NM 87109

PROJECT SUMMARY

The Navajo Division of Transportation (NDOT) proposes to develop a gravel pit and associated access and infrastructure within the Greasewood Springs Chapter. The Greasewood Springs Chapter is located within the Navajo Nation's Fort Defiance Agency region in Navajo County, Arizona. The NDOT needs a materials source for roadway construction and maintenance projects on the Navajo Nation as identified in the Long Range Transportation Plan (LRTP). The project would provide roadway-surfacing materials for NDOT transportation projects including roadways and parking lots.

A gravel pit lease would be granted to NDOT from the Navajo Nation Division of Natural Resources (NNDNR) Minerals Department to remove gravel material from approximately 40 acres of Navajo trust lands. Associated actions would include the following:

- Construction of 2 new roadways for long-term use (approximately 5 years) and 1 new roadway for one-time drilling rig access
- Exploration (drilling/sampling) of the proposed gravel pit
- Use of a portion of an existing road (N153) as a haul route
- Construction of a staging area to crush, stockpile, and distribute materials from the gravel pit operation.

The total volume of material removed should be 250,000 cubic yards, or 330,000 tons, over approximately 2 years. The gravel could be used intermittently for road construction projects on the Navajo Nation for up to 5 years.

The Greasewood Springs Chapter President, Calvin F. Lee, has passed a resolution supporting the use of access and haul routes, drilling rig, staging area, and gravel pit site (Appendix A).

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Appendix A: Supporting Information

Appendix B: Project Plans

Appendix C: Tribal Agency Coordination Letters

Appendix D: Biological Resource Compliance Form

Appendix E: Cultural Resource Compliance Form

1.0 Purpose and Need for the Action

1.1 Summary of Proposed Action

This environmental assessment (EA) evaluates the potential environmental impacts associated with the NDOT Greasewood Springs Gravel Pit #1 Project. The NDOT, in coordination with the Bureau of Indian Affairs (BIA), other Navajo Nation departments, and the Greasewood Springs Chapter, proposes to conduct exploratory boring activities to determine the viability of operating a gravel pit on Navajo Nation lands near Greasewood, Navajo County, Arizona. The proposed project would provide gravel for maintaining and improving transportation infrastructure on the Navajo Nation.

This EA document has been prepared on behalf of the NDOT by Marron and Associates (Marron) in compliance with the National Environmental Policy Act (NEPA) of 1969, and other applicable laws, statutes, regulations, and land use plans. Important components of the NEPA process include the analysis of potential environmental impacts and the development and consideration of alternatives. This EA also documents the need to prepare an environmental impact statement (EIS) if significant environmental impacts are identified.

1.2 Purpose and Need for Action

The purpose of the Proposed Action is to grant a gravel pit lease to the NDOT from the NNDNR Minerals Department for the removal of gravel material from approximately 40 acres of trust lands. The Proposed Action would develop a gravel pit operation to provide aggregate materials to complete NDOT transportation infrastructure improvements and maintenance projects on the Navajo Nation. The Navajo Nation has more than 18,000 miles of roadway including many unpaved miles of roadway. The Proposed Action is needed to provide a local source of gravel for Navajo Nation road resurfacing and maintenance projects. The Proposed Action would also provide a less expensive option over a non-local source for the processing and transportation of materials to roadway construction sites.

1.3 Location

The proposed project area is located on the *Greasewood Springs, Arizona* US Geological Survey (USGS) 7.5 minute topographic map (Figure 1). The proposed gravel pit location is approximately 10 miles southwest of the Greasewood community and approximately 1 mile west of BIA N153 (Figure 1). The project area is within the Fort Defiance Agency boundaries on the Navajo Nation.

1.4 Project Area Maps
Figure 1.

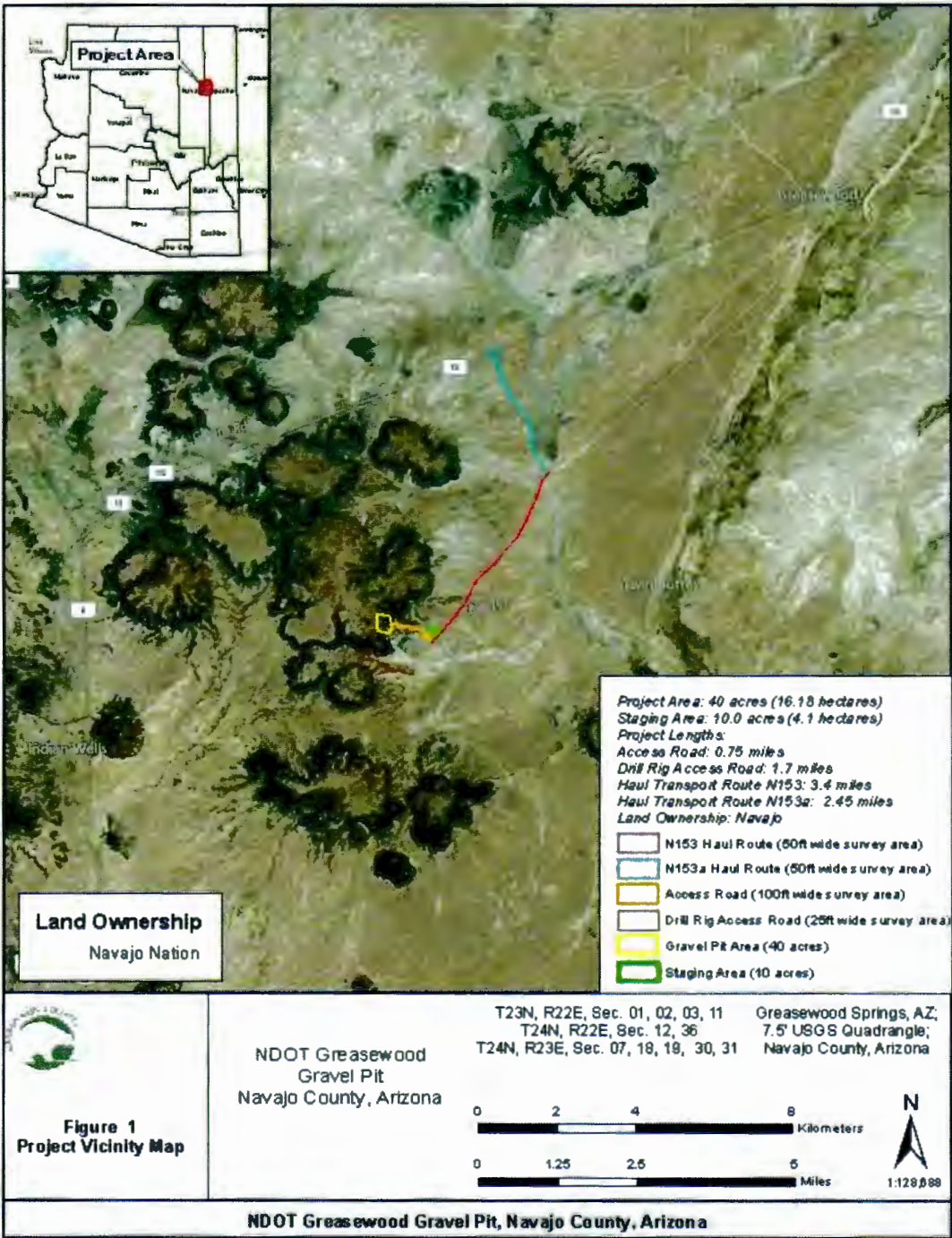
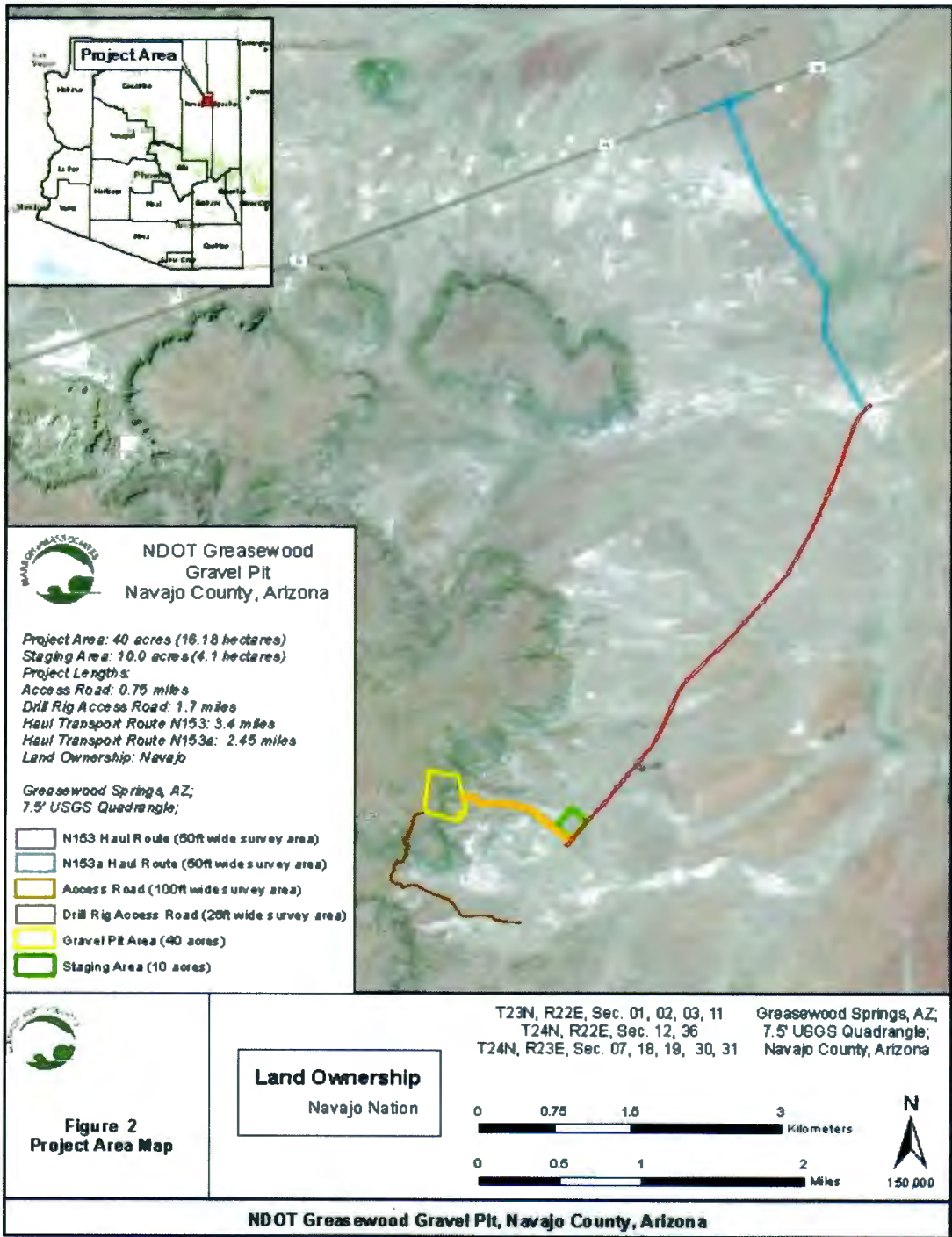


Figure 2.



2.0 Alternatives Including the Proposed Action

This chapter describes and compares the alternatives considered for the NDOT Greasewood Springs Gravel Pit #1 Project. It includes a description of each alternative considered. The No Action Alternative describes current conditions exclusive of the Proposed Action Alternative and provides a baseline with which to compare project-related actions.

2.1 No Action Alternative

Section 1502.14(d) of NEPA requires that the alternative analysis “include the alternative of no action.” Under the No Action Alternative, the gravel pit lease would not be authorized. NDOT would not be granted access to complete boring samples within the proposed 40-acre gravel pit area, no additional access roads nor staging area would be constructed, and the gravel pit would not be developed. The area would continue to be managed under current land use practices, and the area would not be affected by the proposed project activities.

2.2 Proposed Action Alternative

The NDOT proposes to develop a gravel pit and associated access and infrastructure within the Greasewood Springs Chapter located within the Navajo Nation’s Fort Defiance Agency region in Navajo County, Arizona. The project would provide roadway-surfacing materials for NDOT transportation projects. The NDOT needs a materials source for roadway construction and maintenance projects on the Navajo Nation as identified in their LRTP.

Under the Proposed Action, a gravel pit lease would be granted to NDOT from the NNDNR Minerals Department to remove gravel material from approximately 40 acres of trust lands. Associated actions would include the following:

- Construction of 2 new roadways for long-term use (5 years) and 1 new roadway for one-time access
- Exploration (drilling/sampling) of the proposed gravel pit; long-term use of a portion of N153 as a haul route
- Construction of a staging area to crush, stockpile, and distribute materials from the gravel pit.

These activities are described in further detail in the sections that follow. The total volume of material removed is estimated at 250,000 cubic yards, or 330,000 tons, over approximately 2 years. The gravel would be used intermittently for transportation projects including roadways and parking lots on the Navajo Nation.

Prior to the proposed gravel pit extraction activities, an approximately 1.7-mile long drilling rig access road would be constructed beginning at N153 approximately 0.64 miles south of the staging area (Figure 2). This access road would allow the drilling rig one-time use to complete boring samples and then to exit the gravel pit area once boring activities are completed. Exploration for basaltic material depths would include overland travel in a truck with a mounted rig. Exploration would include drilling up to approximately 120 feet deep and 6 inches in diameter at up to 15 borehole locations (Appendix B).

Once exploration activities have established the viability of gravel material for road construction projects, a 40-acre gravel pit would be constructed. Production drilling and blasting of the resource deposit would occur. A 50,000-pound excavator, front end loader, and water truck would be used at the pit, and dump trucks would transport material to a staging area for processing. Additionally, a water well would be installed at the project area to provide water for gravel pit operations.

A 10.5-acre staging area would be constructed with an associated access road approximately 0.75 miles east of the gravel pit (Figure 2). The staging area would serve to crush and stockpile mined materials because of the terrain and limited space at the gravel pit site. Material would be distributed to construction sites in haul trucks from this location. Operating equipment at the staging area would include a mobile jaw crusher and mobile cone crusher, a screening plant, belt conveyors, and a water truck. A water-spray dust-suppression system would be used to control dust emissions. Water would be available from a well drilled at the project area.

The project would include constructing a new haul transport route that extends from N15 approximately 2.45 miles south to N153 (Figure 2 – N153a). This proposed haul route is approximately 5.5 miles west of Greasewood and would divert the gravel trucks from the portion of N153 that passes through the community of Greasewood. Approximately 3.4 miles along N153 is proposed to be used as a haul route for gravel pit operations (Figure 2). The project would include up to approximately 108 acres of new ground disturbance across the project area.

2.3 Alternatives Eliminated from Detailed Analysis

The NDOT proposes to develop a gravel pit and associated infrastructure within the Greasewood Springs Chapter. Initially, an additional southern haul route was proposed along N153. Data received from the Navajo Natural Heritage Program (NNHP) indicated that the southern haul route option passed within 1 mile of a known golden eagle site. Additionally, the southern haul route option would cross into Indian Wells Chapter lands and could impact residents. Subsequently, the alternative was eliminated from further analyses.

3.0 Affected Environment

The No Action Alternative reflects the current situation within the project area and will serve as the baseline for comparing the environmental impacts of the Proposed Action. The affected environment, including the physical, biological, and human environment, are described for the project area on Navajo Nation lands in Navajo County, Arizona.

3.1 Land Resources

Topography

The landscape surrounding the proposed haul routes, drilling rig access road, and the staging area is flat to gently rolling lowlands with an elevation ranging from 5,850 to 6,250 feet above mean sea level (amsl). The proposed gravel pit would be located on top and along the southeastern edge of Wood Chop Mesa. The slopes of the mesa along the project area are steep and are eroded in many places. The top of the mesa is primarily open and flat terrain, and the elevation where the gravel pit is proposed ranges from 6,100 to 6,250 feet amsl. No cliffs are present within the project area, but many areas along Wood Chop Mesa are characterized by steep cliff faces.

The project area occurs within the southeastern edge of the Black Mesa Basin in the Hopi Buttes volcanic field south of Martinez Spring. The Hopi Buttes volcanic field consists of approximately 300 late Miocene volcanic centers within a 700 square mile area of northeastern Arizona (Zelawski, 2016). These volcanic eruption areas created large buttes and mesa features that dominate the landscape surrounding the project area. The proposed gravel pit would be located on the southeastern edge of Wood Chop Mesa, which is one of these features. Nearby are Twin Buttes and Smooth Butte to the south, and an unnamed low mesa northeast of the project area. The most pronounced and tallest features near the project area is Bidhochi Butte located approximately 3.5 west of the proposed gravel pit.

Soils

Information on soils was obtained from the Natural Resources Conservation Service (NRCS) (Appendix A; NRCS, 2017). Primary soil mapping units and their composition and features within the project area are listed in Table 1.

Table 1. NRCS Soil Mapping Units

Soil Unit	Percent in Project Area
Begay-Milok family Mathis family complex, 1 to 60 percent slopes	18.7
Flaco-Chinchin family complex, 1 to 8 percent slopes	3.8
Kinusta-Strych families-Rock outcrop complex, 30 to 65 percent slopes	11.0
Moenkopie-Monue complex, 3 to 15 percent slopes	4.4
Redlands-Monue complex, 1 to 8 percent slopes	10.9
Redlands-Somorent family complex, 2 to 6 percent slopes	10.0
Redlands-Whitecone complex, 1 to 4 percent slopes	31.2
Wepo-Ives-Jocity association, 0 to 2 percent slopes	10.1

Begay-Milok soils typically occur in fan terraces with a parent material of eolian deposits and fan alluvium derived from sandstone. Flaco-Chinchin complex soils typically occur in mesas and buttes with parent material of eolian deposits and slope alluvium derived from volcanic and sedimentary rock. Kinusta-Strych families-Rock outcrop complex typically occurs in escarpments on mesas and plateaus with parent material of colluvium and residuum derived from siltstone and/or weathered from limestone and sandstone. Moenkopie-Monue complex typically occurs on plateaus with parent material of slope alluvium, eolian material, and/or fan alluvium derived from sandstone. Redlands-Monue complex occurs in stream or fan terraces with parent material of eolian and fan alluvium derived from sandstone and/or stream and fan alluvium derived from sandstone and shale. Redlands-Somorent family complex and Redlands-Whitecone complex occur in fan terraces with a parent material of fan alluvium derived from sandstone or shale. Wepo-Ives-Jocity association occurs in stream terraces on valley floors with parent material of stream alluvium derived from shale.

These soils are well drained, usually non-saline to slightly saline, and have a low to moderate available water storage capacity. Wepo-Ives-Jocity association has a high water storage capacity. None of these soils types are classified as prime farmland (Appendix A; NRCS, 2017).

Geological Setting and Mineral Resources

The project area is located in the Navajo section of the Colorado Plateau, which is characterized by deep canyons, steep escarpments, and flat plateaus composed of gently dipping sedimentary rocks (Thornbury, 1965). The most distinctive features of the area are the large quantity of monoclines. The monoclines are divided throughout the province by structural basins and upwarps. The exposed rocks of the Colorado Plateau range from Precambrian to recent in age (Thornbury, 1965).

Wood Chop Mesa is one such monocline, which is capped with Quaternary basalt overlaying Quaternary sandy playa lake deposits. The top of the mesa has shallow basalt bedrock (often less than 2 feet below the surface). The edge and upper slopes of the mesa have exposed bedrock 30 to 60 feet thick, and the lower slopes are composed of a sandy soil covered with scattered basalt fragments. The lowland areas that surround Wood Chop Mesa are subtended by Quaternary sandstone, shale, and conglomerate layers (Wilson, et. al., 1960). It is estimated that between approximately 30 and 60 feet of basaltic lava material suitable for gravel road construction is likely present at the proposed gravel pit location (Durán Bokich Enterprises, LLC, 2016).

Information regarding past mining operations near or within the proposed project area has been requested from the Navajo Nation Environmental Protection Agency (NNEPA) (Appendix C).

3.2 Water Resources

Surface Water Resources

Clean Water Act Section 401, Water Quality Certification

Four (4) unnamed waterways appear to cross the project area on topographic mapping; however, 9 small unnamed waterways/washes were identified within the project area during field surveys. Most of these support no bed and bank features at the project crossing, and none appear to have recently conveyed

surface flows that connect to Steamboat Wash, which is a downstream receiving arroyo. Most waterways had only partially defined channels that would often spread into sheet flood areas.

Although several small ephemeral waterways cross the haul road, no wetlands are permanent water sources. Additionally, based on results of the field surveys, no wetlands were present in the project area. None of the waterways conveyed sufficient water to sustain wetland vegetation. A man-made tank structure occurs within 1 of these drainages and temporarily pools water after rain events, but did not support enough water for wetland development. Additionally, a spring has historically occurred along the eastern boundary of the proposed gravel pit. A detailed investigation of this area was completed during surveys and there were no indications of recent surface flows.

A determination regarding Clean Water Act (CWA) Section 404 has been requested from the NNEPA Surface and Ground Water Protection Department (Appendix C).

Clean Water Act Section 402, Storm Water Pollution Protection

A receiving arroyo, Steamboat Wash, is located downstream from the project area.

Clean Water Act Section 404, nationwide or individual permits

Nine (9) small, unnamed waterways/washes were identified within the project area during field surveys. Most of these support no bed and bank features at the project crossing, and none appear to have recently conveyed surface flows that connect to Steamboat Wash, which is a downstream receiving arroyo.

A determination regarding CWA Section 404 has been requested from the NNEPA Surface and Ground Water Protection Department (Appendix C).

Ground Water Resources

The proposed project area is located in the Little Colorado River Plateau on the Eastern Plateau (USGS, 2016). No state or USGS information is available regarding the average depth to groundwater for the project area on the Navajo Nation, but NRCS soil data indicates that ground water would occur at depths greater than 80 feet (Appendix A; NRCS, 2017a). The project area is not located in a US Environmental Protection Agency (USEPA) designated sole source aquifer area (USEPA, 2017d).

3.3 Air Quality

Quality

The Clean Air Act of 1970, as amended, established National Ambient Air Quality Standards (NAAQS) for criteria air pollutants. The NAAQS were established to protect the public from exposure to dangerous levels of these pollutants (USEPA, 2011). The USEPA has the primary responsibility for regulating air quality, including for criteria air pollutants. The criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), particulate matter (PM₁₀ and PM_{2.5}), sulfur dioxide (SO₂) and lead (Pb).

The NNEPA Air Quality Control Program (AQCP) oversees the air-quality monitoring network on the Navajo Nation to determine compliance with the NAAQS. The closest monitoring station to the project area is approximately 40 miles northeast at Nazlini, Apache County, Arizona (NNEPA AQCP, 2017). AQCP monitors 4 of the criteria pollutants including PM_{2.5}, O₃, SO₂, and NO₂ (NNEPA AQCP, 2017).

The project area is characterized by rural open space, abundant sunshine, low relative humidity, and low precipitation. The primary activities that contribute to levels of air pollutant and greenhouse gas (GHG) emissions in the vicinity are electricity generation stations, fossil fuel industries, and vehicle travel. Air quality in the vicinity of the project area is generally good unless forest fires, prescribed burns, or wind-blown dust conditions occur. Navajo County is in attainment of federal ambient air quality standards (NNEPA AQCP, 2017; USEPA, 2016). Air quality issues at the project area are likely to be primarily from mobile vehicle emissions and regional sources such as power plants and dust from windy conditions. Relatively few vehicles travel through the project area, and the open rural terrain allows for dispersal of air pollution sources. From the period of 2012 to 2016, Nazlini station data showed PM_{2.5} concentrations were below the NAAQS annual mean for the time span (NNEPA AQCP, 2017).

Air quality in a given region can be measured by its Air Quality Index (AQI) value. The AQI is reported according to a 500-point scale for each of the major criteria air pollutants, with the worst denominator determining the ranking. For example, if an area has a CO value of 132 on a given day and all other pollutants are below 50, the AQI for that day would be 132. The AQI scale breaks down into 6 categories: good (AQI<50), moderate (50-100), unhealthy for sensitive groups (100-150), unhealthy (>150), very unhealthy, and hazardous. The AQI is a national index, the air quality rating and the associated level of health concern is the same everywhere in the country. The AQI is an important indicator for populations sensitive to air quality changes.

Mean AQI values for Navajo County were generally in the good range (AQI<50) in 2013 with the majority of days in that range. Although the AQI in the region has reached the level considered unhealthy for sensitive groups on several days over the last decade, there are no patterns or trends to the occurrences (Table 2). Over the past decade, AQI values did not reach the level of “unhealthy” nor “very unhealthy.” In 2009, 2013, 2015, and 2016, there were no days that were “unhealthy for sensitive groups” or worse in air quality.

Table 2. Number of Days Classified as “Unhealthy for Sensitive Groups” (AQI 101-150)

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Days	2	5	0	2	1	7	0	2	0	0

Source: USEPA, 2013

Visibility

The vicinity of the project area is characterized by rural open space, abundant sunshine, low relative humidity, and low precipitation. Air quality and visibility in the project area is generally good unless forest fires, prescribed burns, or wind-blown dust conditions occur.

Climate/Meteorology

On-going scientific research has identified the potential impacts of GHG emissions such as carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), water vapor, and several trace gases on global climate. Through interactions on a global scale, GHG emissions cause a net warming effect of the atmosphere, primarily by

decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), human activity is believed to have caused an increase in GHG concentrations, with fossil fuel combustion for electricity generation and transportation to be considered the leading causes.

Air quality is determined by atmospheric pollutants and chemistry, dispersion meteorology and terrain, and includes applications of noise, smoke management, and visibility. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. The USEPA has proposed or completed actions recently to implement Clean Air Act requirements for GHG emissions. Climate has the potential to influence renewable and non-renewable resource management.

Evidence of global climate change continues to be documented and is a result of the cumulative and indirect impacts of many human activities. In the American Southwest, global climate change may result in more droughts (International Panel on Climate Change, 2007; Pew Center on Global Climate Change, 2011).

The project area is located in a semiarid climate regime typified by dry windy conditions and limited rainfall. Summer maximum temperatures are generally in the 80s or 90s (degrees Fahrenheit [°F]) and winter minimum temperatures are generally in the 20s. Temperatures occasionally reach above 100°F during summer months. Precipitation is divided between summer thunderstorms associated with monsoons and winter snowfall. Table 3 shows climate normals for the 43-year period from 1973 to 2016 for the Painted Desert National Park, which is a weather and climate pattern monitoring station and is located approximately 25 miles south of the project area (Western Regional Climate Center, 2016).

Table 3. Climate Normals for Painted Desert National Park near the Project Area, 1973-2016

Month	Average Maximum Temperature (°F)	Average Minimum Temperature (°F)	Average Precipitation (inches)	Average Snowfall (inches)
January	48.2	21.9	0.89	2.8
February	53.2	24.8	0.75	1.6
March	61.8	29.8	0.80	1.7
April	69.3	35.2	0.47	1.0
May	78.7	43.9	0.48	0.3
June	89.6	52.2	0.27	0.0
July	92.4	59.5	1.30	0.0
August	89.0	58.5	1.68	0.0
September	82.3	51.7	1.26	0.0
October	72.1	41.1	1.02	0.0
November	58.9	29.4	0.76	1.2
December	48.9	22.7	0.85	2.2
Annual Average	71.9	37.8	8.32	10.6

Source: Western Regional Climate Center, 2016

3.4 Biotic Resources

This section describes the biotic resources present at the project area. These include a description of the ecosystem and biological communities, wildlife, vegetation, and agriculture. The information provided is based on a field survey completed by Marron from March 21 to 23, 2017, coordination with NNHP, and a literature search. A separate Biological Evaluation was completed to supplement to the information provided below (Marron, 2017a; Appendix D).

Description of Ecosystems and Biological Communities

The proposed project area is located approximately 4 miles southwest of Greasewood, Arizona in the Hopi Buttes area. Specifically, the proposed gravel pit is located along the southeastern edge of Wood Chop Mesa. The top of the mesa is principally open grassland with scattered juniper and a narrow band of more densely spaced juniper occurring along the edge of the mesa. The proposed haul road to the gravel pit traverses flat to gently rolling lowlands primarily dominated by grassland.

Wildlife

Terrestrial

Twenty-two (22) vertebrate animal species or their sign were observed within the project area during the survey (Marron, 2017a). These included 10 bird species, 10 mammal species, and 2 reptiles. No amphibians were recorded during the field survey. The project area is characterized predominantly by grasslands, with sparse tree and tall shrub cover. As vegetative structure is a primary component in the diversity, distribution, and abundance of wildlife, the project area experiences low species diversity.

Active migratory bird nest sites are protected under the Migratory Bird Treaty Act (MBTA). Besides the proposed gravel pit location, the project area is predominantly grasslands with sparse tree and tall shrub cover, which leaves marginal habitat for nesting birds. No nests were found within the project area during the field survey. No raptors were observed within 1 mile of the project area.

The field survey found no indication of current or past bat use. The tracks, burrows/mounds, or droppings of prairie dog, coyote, fox, cottontail, jackrabbit, pocket gopher, mule deer, badger, squirrel, and kangaroo rat were noted during surveys (Marron, 2017a). No indication of present or past use of prairie dog colonies by burrowing owls was recorded (Marron, 2017a).

Riparian/Aquatic

No amphibians or unique habitats (marshes and springs) for amphibians were recorded during the field survey. Additionally, no suitable habitat for fish species was present.

Threatened, Endangered, and Otherwise Protected Species

A total of 15 listed or otherwise protected species were considered during field surveys for the proposed project (NNHP, 2017; US Fish and Wildlife Service [USFWS], 2017). The NNHP was contacted for species occurrence data relative to the project area and responded with a list of 7 species of concern within the vicinity of the project area (Table 4). The NNHP also determined that parts of the project area are currently within areas protected by the Golden and Bald Eagle Nest Protection Regulations. Wood Chop Mesa, which is the proposed gravel pit location, as well as portions of the haul access roads and drilling rig access

roads, are designated as Area 1 by the NNHP. Area 1 indicates the potential for nesting of golden eagles and it is recommended that no development, with few exceptions, occur (NNHP, 2017).

The field survey and data provided by NNHP determined that no golden eagles are present within 1 mile of the project area, but golden eagles are present within 3 miles of the project area. Additionally, the USFWS Information for Planning and Consultation (IPaC) list for the project area considered 5 species (Table 5). No USFWS designated or proposed critical habitats occur within or directly adjacent to the project area (Table 5). No NNHP species listed in Table 4, nor USFWS species listed in Table 5 were observed within the project area at the time of the field survey (Marron, 2017a).

Potential habitat for banner-tailed kangaroo rats occurs along the proposed haul access road corridor from the staging area to the gravel pit. Although inactive, collapsed kangaroo rat mounds/burrows were observed in the project area during field surveys, the species was not observed, and there was no evidence that they belonged specifically to banner-tailed kangaroo rats.

Table 4. NNHP Known and Potential Species in the Study Area

Species Name	NESL Status	Known to Occur within 1 Mile	Known to Occur within 3 Miles	Present in the Project Area
AQCH = <i>Aquila chrysaetos</i> / Golden Eagle NESL G3	G3	No	Yes	No
ATCU = <i>Athene cunicularia</i> / Burrowing Owl	G4	No	Yes	No
BURE = <i>Buteo regalis</i> / Ferruginous Hawk	G3	No	No	No
CHMO = <i>Charadrius montanus</i> / Mountain Plover	G4	No	No	Too Early to Determine
FAPE = <i>Falco peregrinus</i> / Peregrine Falcon	G4	No	No	No
MUNI = <i>Mustela nigripes</i> / Black-footed Ferret	G2	No	No	No
SAPAER = <i>Salvia pachyphylla</i> ssp <i>eremopictus</i> / Arizona Rose Sage	G4	No	No	No

Table 5. USFWS Species and Designated or Proposed Critical Habitat

Species Name	USFWS Status
California condor	Endangered
Yellow-billed cuckoo	Threatened
Gray wolf	Experimental
Roundtail chub	Proposed Threatened
Northern Mexican garter snake	Threatened

Vegetation

Terrestrial

The project area supports 3 major natural vegetation types: Plains/Mesa Grassland, Juniper Savanna, and Arroyo Riparian (Dick-Peddie, 1993). The most abundant of these communities was the Plains/Mesa

Grassland, which occurs along the proposed haul routes, the drilling rig access road, the staging area, and at the base of Wood Chop Mesa. Juniper Savanna dominates the top of the mesa at the proposed gravel pit location. Arroyo Riparian vegetation is described below. Shrubs were generally scarce throughout most of the project area. Although both scattered shrubs are locally abundant, no cohesive shrub communities are present in the project area.

The field survey identified 72 species of vascular plants within the project area. A full list of these species is presented in the Biological Evaluation (Marron, 2017a). None of the plant species observed were rare or unusual.

Riparian/Aquatic

Arroyo riparian vegetation is scarce and has formed in the bottom of a few ephemeral waterways crossing the haul road and drilling rig access road to the gravel pit. Rubber rabbitbrush is locally abundant and occurs along waterways and headwater swales. Nine (9) small ephemeral drainages occur within the project area, but most only had partially defined channels that would often spread into sheet flood areas. Swales within the grassland communities at the upper reaches of ephemeral drainages supported mostly four-wing-saltbush and occasionally western wheatgrass. The more defined waterways near Wood Chop Mesa were lined by rubber rabbitbrush, four-wing saltbush, and snakeweed intermixed by scattered clumps of grasses such as alkali sacaton and western wheatgrass. There were no large waterways in the project area, nor were any riparian trees present.

Threatened and Endangered Species

No USFWS threatened or endangered plant species, or NNHP listed species (including Arizona rose sage) were present in the project area during field surveys (Marron, 2017a).

Agriculture

Information on farmland ratings related to soil composition within the project area was obtained from the NRCS (2017). Soil types that occur in the project area are classified as “not prime farmland” (Appendix A). This classification is based on the soil composition best suited to farmland. No lands within or directly adjacent to the project area are currently used for growing crops. Past grazing has occurred within the project area. Current grazing activity is likely to occur, but no cattle, sheep, or horses were observed during the field surveys. The proposed project area occurs in the Greasewood Springs Chapter area, which is located within Grazing District 17 on Navajo Land Department mapping. The Chapter manages grazing and other agricultural activity.

3.5 Cultural Resources

This following describes the cultural resources present at the project area based on a field survey completed by Marron from March 14 to 16, 2017. A separate cultural resources report was completed (Marron, 2017b; Appendix E).

Traditional Cultural Properties, Historic, Religious Properties

Cultural resources are those aspects of the physical environment that relate to human culture and society, and those cultural institutions that hold communities together and link them to their surroundings. Cultural resources include expressions of human culture and history in the physical environment such as

prehistoric or historic archaeological sites, buildings, structures, objects, districts, or other places including natural features and biota, which are considered to be important to a culture, subculture, or community. No historic, sacred, or traditional cultural properties were identified within the project area.

Archaeological Resources

The cultural resource survey recorded 7 archaeological sites. Four (4) sites were located in the gravel pit area, 2 sites were located along the drilling rig access road, and 1 site was located in the staging area. The sites are described and evaluated in detail in the cultural resources report (Marron, 2017b). A brief discussion of eligibility to the National Register of Historic Places (NRHP) is discussed in Chapter 4.0 in this document.

3.6 Socioeconomic Conditions

Employment and Income

To analyze socioeconomic conditions for the project area in Census Tract 9400.14, 2010 census data and American Community Survey (ACS) (2011-2015 5-year estimates) were compared to the Greasewood community census designated place (CDP), Navajo County, and the State of Arizona (Appendix A; US Census Bureau, 2017). Table 6 provides employment and income data within Census Tract 9400.14, Greasewood CDP, Navajo County, and Arizona.

Table 6: Comparative Economic and Population Data

Population Characteristics	Arizona	Navajo County	Greasewood CDP	Census Tract 9400.14
Economic Characteristics: 2011-2015 5-Year Estimates				
Median household income	\$50,255	\$35,921	\$27,222	\$19,728
Per capita income	\$25,848	\$16,486	\$9,907	\$9,202
12-month income below poverty level for all families	13.3%	25.1%	34.9%	45.6%
12-month income below poverty level for all people	18.2%	30.6%	41.2%	53.4%

Source: US Census Bureau, 2017

ACS provides estimates that the median household incomes reported for census tract (\$19,728) are far below Greasewood (\$27,222), Navajo County (\$35,921), and the State of Arizona (\$50,255) median income levels. Per capita income within the census tract is notably lower at \$9,202 than in the County (\$16,486) and the State (\$25,848), but are similar to per capita income for Greasewood (\$9,907). Approximately 45.6 percent of residents within the census tract, and approximately 34.9 percent of residents within Greasewood live below the poverty level. These poverty levels are notably higher than for the County (25.1 percent), and the State (13.3 percent).

The rural character of the area does not offer substantial opportunity for employment within the vicinity of the project area. Employment for Greasewood Chapter residents includes Navajo Nation Government departments, BIA, health, and other public services and commercial enterprises.

Demographics and Trends

Census Tract 9400.14 is in a rural area located in Navajo County that includes the community of Greasewood and the Whitecone area as well as scattered residences throughout the southern and eastern portion of the County. ACS (2011-2015 5-year estimates) information was used to compare population characteristics within the census tract, Greasewood CDP, Navajo County, and the State of Arizona (Appendix A). Native Americans represent the principal minority group in the vicinity of the project area, including the census tract (98 percent) and Greasewood CDP (93.3 percent) (Table 7; US Census Bureau, 2017).

Table 7. Demographic and Population Data

Population Characteristics	Arizona	Navajo County	Greasewood CDP	Census Tract 9400.14
2011-2015 ACS 5-Year Population Estimates	6,641,928	107,656	519	2,858
2011-2015 ACS 5-Year Estimates: Racial Representation*				
- Native American	4.4%	43.9%	93.3%	98.0%
- Hispanic/Latino	30.3%	11.1%	5.8%	2.1%
- African American	4.2%	0.7%	0.0%	0.1%
- Asian	3.0%	0.6%	0.0%	0.0%
- Hawaiian / Pacific Islander	0.2%	0.1%	0.8%	0.1%
- White	78.4%	48.4%	2.1%	0.7%
- Some other race	6.5%	3.4%	0.0%	0.1%
- Two or more races	3.2%	3.0%	3.9%	0.9%

*Minority categories do not add up to 100% because Hispanic/Latino includes more than one race.

Source: US Census Bureau, 2017

Lifestyles, Cultural Values, Attitudes, Expectations

Communities within the Navajo Nation are typically comprised of predominantly Navajo residents. These residents largely continue to practice traditional Navajo lifestyles and hold Navajo cultural values, but some communities have integrated a contemporary American lifestyle. Navajo Nation communities typically support appropriate commercial development to provide basic services and create jobs for residents. Many residents in the area travel to nearby towns for products and services. The mix of traditional and contemporary lifestyles benefits community economies while preserving their culture and heritage.

Community Infrastructure

The vicinity of the project area is rural in character and the nearest residents live approximately 4 miles away. Infrastructure in the vicinity of the project area includes improved and un-improved roadways, which cater to local traffic. The proposed gravel pit and associated staging area and haul routes can be accessed by travelling southwest/northeast on N153 (Figure 1). No power, water, wastewater, or solid waste infrastructure is located at the project area, but some utilities including power are located nearby.

3.7 Environmental Justice

Executive Order 12898, dated February 11, 1994, established the requirement to address environmental justice concerns within the context of federal agency operations. As part of the NEPA process, agencies

are required to identify and address disproportionately high and adverse effects on minority and low income communities (Council on Environmental Quality [CEQ], 1997). In terms of minority status and income data (Tables 6 and 7), the population within the census tract and Greasewood CDP qualifies as a Community of Concern, which should be evaluated for environmental justice impacts. The impacts are addressed in Chapter 4.0 of this document.

Indian Trust Resources

Indian trust resources are resources set aside for Native American Tribes that are protected by United States' fiduciary obligation through Executive Orders, treaties, regulations, or statutes. Such resources include associated actions and natural resources regarding real estate. Valuation is typically placed on such resources as land, water, fish, wildlife, rangeland, minerals, timber, and fossils. Indian trust assets are administered through the BIA Office of Trust Services. The proposed project area is on Navajo Nation lands and associated resources and land uses are evaluated in this document.

3.8 Environmental Module

The study area is located in a rural region and land use includes rangeland, access roads, and recreational opportunities. Desktop research of federal and state environmental databases was completed for known hazardous materials sites near the project area; however, State and USEPA lists may be incomplete for tribal lands.

Resource Conservation and Recovery Act Subtitle C, hazardous waste/materials

No documented hazardous material sites are known to occur at or directly near the project area, but unidentified sites may be present (USEPA, 2017a and 2017b). State and USEPA lists may be incomplete for tribal lands.

Resource Conservation and Recovery Act Subtitle D, nonhazardous solid waste sites

No documented nonhazardous solid waste sites nor hazardous waste generators are known to be at or directly near the project area, but unidentified sites may be present. State and USEPA lists may be incomplete for tribal lands.

Resource Conservation and Recovery Act Subtitle I, underground storage tank/s sites

No documented underground storage tanks (USTs) are known to occur at or directly near the project area, but unidentified tanks may be present. State and USEPA lists may be incomplete for tribal lands.

Comprehensive Environmental Response, Compensation, and Liability Act Sites

No Comprehensive Environmental Response Compensation and Liability Act (CERCLA) sites are known to occur at or directly near the project area, but unidentified sites may be present (USEPA, 2017c). No service stations are known to have operated in the project area.

Toxic Substances Control Act Sites

No toxic substances are known to occur or be stored at or directly near the project area, and no industrial facilities are located in the project area (US Drug Enforcement Agency, 2017).

3.9 Resource/Land Use Patterns

Hunting, Fishing, Gathering

The proposed project area is located in the Navajo Nation Department of Fish and Wildlife (NNDFW) Hunting Unit 8. Residents in the vicinity may informally use the area for gathering activity, but no known formal fishing or gathering areas are located at or directly near the project area.

Timber Harvesting

No known timber harvesting occurs in or directly near the project area. No forested areas are located in the project area.

Agriculture

Based on a desktop review of available data, no prime or unique farmlands occur at or near the project area (Marron, 2017a; NRCS, 2017). Although field observations recorded no cattle, sheep, or horses during surveys, grazing activity is likely to occur. The proposed project area occurs in the Greasewood Springs Chapter area, which is located within Grazing District 17 on Navajo Land Department mapping. The Chapter manages grazing and other agricultural activity.

Mining

No known mining activity currently occurs at the project area.

Outdoor Recreation

No known government, private, or designated outdoor recreation areas are located at or directly near the project area. Informal recreational opportunities, including hiking and biking, may occur in the vicinity.

Transportation Use Network

The vicinity of the project area includes some improved roadways, including N15, and several un-improved and informal roadways (e.g. N9004 and N9811), which accommodate local traffic from nearby Greasewood, Indian Wells, and scattered residences. The proposed gravel pit and associated staging area and haul routes can be accessed by travelling southwest/northeast on N153, which is an unpaved roadway (Figures 1 and 2). The proposed project would provide roadway surfacing material for NDOT transportation projects on the Navajo Nation as identified in their LRTP.

Land Use Plans

The Greasewood Springs Chapter has passed a resolution supporting the use of access and haul routes, drilling rig, staging area, and gravel pit site (Appendix A).

. Coordination with the Greasewood Springs Chapter has been ongoing during planning for this project.

3.10 Other Values

Wilderness

The closest designated wilderness to the proposed project area is the Petrified Forest National Wilderness Area, managed by the National Park Service. It is located approximately 23 miles south of the project area (Figure 1).

Sound and Noise

The project area is rural in nature and sound and noise in the vicinity include occasional traffic along N153 and other local roads. No residences or communities are located within approximately 5 miles of the gravel pit project area.

Public Health and Safety

The Greasewood Springs Chapter is located within the Fort Defiance Agency region in the southern portion of the Navajo Nation in Arizona. Emergency and health services for the area are provided by the Sage Memorial Hospital in the community of Ganado, which is approximately 27 miles northwest of Greasewood. Law enforcement is provided in the area by the Navajo Nation Division of Public Safety and the BIA. Fire services are provided by the Ganado Fire District located approximately 21 miles from Greasewood.

Visual Setting

The proposed project area is rural in character and is in a scenic region of the Navajo Nation within the Hopi Buttes. The vicinity of the project area is characterized by high mesas and rolling grass and shrub lands. No scenic byways or other designated scenic areas occur in or directly near the project area.

4.0 Environmental Consequences of the Proposed Action

An environmental impact is an alteration of the existing condition of the environment as a result of a proposed action. Impacts can vary in degree from no change to complete modification within an environmental system. Environmental impacts for the Proposed Action Alternative and No Action Alternative are described and evaluated in the sections that follow.

The Proposed Action Alternative includes exploratory drilling for basaltic material depths and viability of use. Associated actions would include the construction of a one-time use drilling rig access road; the construction of a new gravel pit, associated access roads, and a staging area; and the use of a portion of an existing roadway (N153) as a haul access route.

Under the No Action Alternative, the NNDNR Mineral Department would not grant the gravel pit lease to NDOT to develop a gravel pit and associated infrastructure on trust lands. The area would continue to be managed under the Greasewood Springs Chapter in the Navajo Nation's Fort Defiance Agency region, and the proposed project area would not be affected by exploration or gravel pit operations. The No Action Alternative is the baseline for which impacts from the Proposed Action Alternative are measured.

4.1 Land Resources/Physical Impacts and Mitigation

Impacts

The Proposed Action Alternative would begin with exploratory drilling activities to determine the viability of soils and geologic materials to be used for road construction. Exploration would include drilling up to 15 boreholes to approximately 120 feet deep and 6 inches in diameter within the proposed gravel pit area. Exploratory activities would not be expected to alter the landscape permanently. However, if basaltic material is found to be viable for the mining operation, long-term impacts to topography and geologic resources would occur as a result of the proposed gravel pit. The terrain and geologic formation would be altered on approximately 40 acres of the southeastern edge of Wood Chop Mesa. The proposed new haul access roads, drilling rig access road, and staging area would not be expected to impact area topography, geology, or mineral resources significantly. Impacts to topography, geology, and mineral resources would not be expected from the use of N153, which is an existing roadway.

The Proposed Action Alternative would disturb up to approximately 108 acres of soil during facility construction and gravel pit operation including construction of new access roads and a staging area. Long-term impacts to soils would result from the gravel pit, staging area, and new access and haul roads during operations. Impacts to soils resulting from drilling rig access road construction and use would be temporary and minimal. The Proposed Action would not impact mineral resources other than basaltic materials at the gravel pit.

Under the No Action Alternative, the existing conditions and management of the project area would remain unchanged. No impacts to topography, soils, geology, nor mineral resources would occur as a result of the No Action Alternative.

Mitigation

A Mining and Reclamation Plan will be developed to include measures for mitigating long-term impacts of the project and detailing reclamation actions upon project completion. The Plan would include

generally accepted practices for operating a gravel pit. For the protection of soils and geology resources, mitigation and reclamation measures would include the following:

Mitigation during Gravel Pit Exploration and Operations

- Drilling rig travel will occur one-time to complete boring samples at the proposed gravel pit location, and one-time to exit the gravel pit area once boring has been completed.
- Project related vehicles will travel at speeds no greater than 15 miles per hour where speed limits are not posted to reduce dust.
- Minimal quantities of hazardous materials will be used for equipment maintenance and would be properly managed, maintained, and stored to prevent releases to the soils at the project area.
- Top soil at the proposed gravel pit location will be removed and stored for reclamation purposes.

Reclamation upon Completion of Exploration and/or Gravel Pit Operations

- All man-made structures and debris will be removed from the project area.
- All disturbed areas will be regraded to match the natural contour of the area.
- The disturbed area will be re-seeded with a native seed mix to reduce erosion.
- Boreholes will be backfilled and compacted to grade if exploratory drilling does not result in viable material for roadway construction.
- Vegetation removed during drilling operations will be spread across the disturbed area to reduce erosion if exploratory drilling does not result in viable material for roadway construction.

4.2 Water Resources Impacts and Mitigation

Impacts

The Proposed Action Alternative could result in impacts to the unnamed waterways/washes identified during field surveys and on topographic mapping, and to Steamboat Wash, which is a downstream receiving arroyo outside the project area. No wetlands or waterways with bed and bank features crossed the proposed project area; however, letters requesting determinations regarding CWA Sections 401 and 404 have been sent to the NNEPA Surface and Ground Water Protection Department.

The Proposed Action Alternative includes exploratory drilling and subsequent gravel pit excavation depths of up to 120 feet. Groundwater in the area likely occurs at depths greater than 80 feet. Installation of a groundwater well is proposed to provide water for gravel pit operations at the project area. Coordination between NDOT and the NNEPA Surface and Ground Water Protection Department will occur to determine necessary permitting and mitigation measures prior to project construction.

Under the No Action Alternative, the existing conditions and management of the project area would remain unchanged. No impacts to water resources, including surface water, ground water, or wetlands, would occur in the project area as a result of the No Action Alternative.

Mitigation

If the NNEPA Surface and Ground Water Protection Department determines that waterways crossing the project area are jurisdictional, Section 401 or Section 404 permitting will be required (Appendix C). Permitting will be obtained prior to project construction. Additionally, as required under CWA Section

402, a Storm Water Pollution Prevention Plan (SWPPP) may be required for projects impacting more than 1 acre. The required National Pollution Discharge Elimination Systems (NPDES) permit coverage would be obtained from the USEPA prior to project construction.

Minimal quantities of hazardous materials would be used for equipment maintenance at the project area. Potential materials include diesel and hydraulic fluids for heavy equipment fuel, grease/oil for lubrication, and ethylene glycol for equipment antifreeze/coolant. These materials would be managed in a manner to prevent releases to surface water or ground water at the project area.

4.3 Air Resources Impacts and Mitigation

The Proposed Action Alternative would result in minor and relatively short-term impacts to air quality both during construction and during operation of the gravel pit. Air quality would be impacted by pollution from exhaust emissions and dust (particulate matter) from vehicles and equipment used during construction and operation of the proposed project. Air pollution and dust dissemination from project-related construction and operation would discontinue at project completion, once the project area is vacated. The Proposed Action could result in a relatively minor increase in several criteria pollutants, including particulate matter. With the appropriate precautions, project activities would not be expected to result in exceeding the NAAQS for any criteria pollutants.

To minimize air pollution during project construction and operation, all project-related vehicles would travel at speeds no greater than 15 miles per hour where speed limits are not posted to reduce dust. All project equipment would be required to use approved emission control devices and limit unnecessary idling. At the staging area, a water-spray dust-suppression system will be included on the transfer points on the crushers to minimize the risk of air quality violations.

Under the No Action Alternative, local traffic would continue to emit exhaust and create dust conditions; however, no additional impacts to air quality, visibility, or climate/meteorology would occur as a result of the No Action Alternative.

4.4 Biological Impacts and Mitigation

Wildlife

The Proposed Action Alternative would have long- and short-term effects on wildlife. Impacts would include temporary habitat loss and disruption of habitat use from the noise and activities associated with project actions. Larger mammals and birds may leave the area and individual small mammals and reptiles may be displaced during gravel pit operations.

The Proposed Action Alternative would take place over approximately 5 years. During that time, wildlife may occupy the project area and become accustomed to project activities. Potential habitat is present for some NNHP protected species and for birds protected under MBTA in the project area. However, no listed or protected species, nor birds protected under MBTA were observed within the project area during field surveys. The survey indicated that potential habitat for gray vireo and banner-tailed kangaroo rat occur within the project area. Coordination between NDOT and NNHP will determine if further action and avoidance measures are required.

When possible, project activities that include clearing and grubbing of vegetation will occur outside the nesting season for area species (nesting season for NNHP species will be determined by NNHP). If project construction activities would include clearing vegetation or disruption of habitat use during future nesting seasons, preconstruction nest surveys will be conducted. Additionally, when gravel pit operations end, disturbed areas (where appropriate and deemed necessary through coordination with NNDFW) will be reseeded with a native seed mix approved by the NNDFW to re-establish wildlife habitat.

Portions of the project area are designated as Area 1, which are areas that are determined to be highly sensitive and are recommended that no development occur with few exceptions. These areas have the potential for nesting golden eagles. As blasting is the method for rock removal at the gravel pit location, coordination between NDOT and NNDFW will occur to meet the criteria for developing and operating a gravel pit in an Area 1 designation.

Potential habitat for banner-tailed kangaroo rats occurs along the proposed access road corridor from the staging area to the gravel pit. NNHP recommends that no activity that could result in the destruction of mounds/borrows or take of the species occur within approximately 50 feet of active mounds. The proposed haul access road from the gravel pit will avoid the inactive, collapsed mound observed during the field survey. Avoidance measures could include moving the road alignment 50 feet south of the mound or installing a short fence between the mound and the northern edge of roadway. Coordination between NDOT and NNHP will determine further avoidance measures that may be required.

Under the No Action Alternative, the existing conditions and management of the project area would remain unchanged. No impacts to wildlife, including migratory birds, nor listed or protected species, would occur in the project area as a result of the No Action Alternative.

Vegetation

The Proposed Action Alternative would have short- and long-term as well as permanent impacts on vegetation. The proposed 1.5-mile drilling rig access road would cross through alkali sacaton grassland principally and juniper savanna. The impacts from the drilling rig access road would be temporary and minimal. The proposed 40-acre gravel pit, 10.5-acre staging area, and new haul access routes would permanently remove most trees and shrubs. The proposed haul route along 3.4 miles of N153, which is an existing roadway, is not expected to impact adjacent vegetative communities. Although potential habitat for the NNHP Arizona sage rose occurs in the project area, the species does not occur in the project area and project activities would not impact it (Marron, 2017a).

Project-related vehicles will remain on newly constructed roadways and on N153 throughout the life of the project so as not to disturb established vegetative communities along the roadways. Upon completion of gravel pit operations, disturbed areas (where appropriate and deemed necessary through coordination with NNDFW) will be reseeded with a native seed mix approved by the NNDFW to re-establish wildlife habitat and prevent erosion.

Under the No Action Alternative, the existing conditions and management of the project area would remain unchanged. No impacts to vegetation, including listed or protected species, would occur in the project area as a result of the No Action Alternative.

4.5 Cultural Resources Impacts and Mitigation

The Proposed Action Alternative would not impact cultural, historic, or archaeological resources within the project area (Marron, 2017b). All 7 recorded sites date from a historic to recent time period and none are recommended eligible for nomination to the NRHP. The sites are likely not significant under the Archaeological Resources Protection Act (ARPA). Also the sites do not appear to be significant under American Indian Religious Freedom Act (AIRFA). The sites are described and evaluated in detail in the cultural resources report (Marron, 2017b). No further treatment is recommended for the 7 sites.

Under the No Action Alternative, the existing conditions and management of the project area would remain unchanged. No impacts to cultural resources would occur in the project area as a result of the No Action Alternative.

4.6 Socioeconomic Conditions and Environmental Justice Impacts and Mitigation

The Proposed Action Alternative would have minor impacts on socioeconomic conditions within the vicinity of the project area. The project area is approximately 4 miles from Greasewood and 5 miles from Indian Wells. The Proposed Action would employ 6 to 8 people and, if they are hired from the local area, the project would provide jobs that would otherwise not be available. If personnel were not hired from the local communities, workers would still purchase goods and services nearby, providing an indirect benefit to those in the community providing these items.

The Proposed Action Alternative would not result in disproportionate environmental or health impacts to the population within the project area. No known residences occur within at least 4 miles of the proposed project area. The Proposed Action would be expected to benefit the Navajo Nation and communities near the project area indirectly as roadway improvements are made. No changes in Navajo Nation ownership of the project area or associated natural resources would occur as a result of the project.

No project-specific mitigation measures for socioeconomic indicators are recommended. Impacts from the Proposed Action are expected to benefit the local communities.

Under the No Action Alternative, the existing conditions and management of the project area would remain unchanged. The roadway projects NDOT proposes to construct would not receive material from the proposed gravel pit, although other means could be sought. If the Proposed Action is not approved, the local communities could potentially be impacted as a result of delaying roadway improvements on the Navajo Nation. No direct impacts to socioeconomic conditions nor environmental justice issues would occur in the project area as a result of the No Action Alternative.

4.7 Environmental Module Impacts and Mitigation

Resource Conservation and Recovery Act Subtitle C, hazardous waste/materials

The Proposed Action Alternative would include the use of hazardous materials and substances for operation and maintenance of project-related equipment. These materials include diesel and hydraulic fluids for heavy equipment fuel, grease/oil for lubrication, and ethylene glycol for equipment antifreeze/coolant. No known hazardous waste or materials are present within 1.0 mile of the project area.

Gravel pit operators would ensure that no hazardous materials are released during project activities. Any hazardous materials would be properly monitored, maintained, and stored while present in the project area. If contaminated soil is encountered or created during the project, actions would be taken immediately to protect workers and the public from exposure. The NDOT and NNEPA would be contacted for guidance, and any contaminated materials would be properly handled and removed.

Under the No Action Alternative, the existing conditions and management of the project area would remain unchanged. The No Action Alternative would have no impact on Resource Conservation and Recovery Act (RCRA) Subtitle C hazardous waste or materials.

Resource Conservation and Recovery Act Subtitle D, nonhazardous solid waste sites

The Proposed Action Alternative would not be expected to generate any nonhazardous solid waste sites. No known nonhazardous solid waste sites or facilities are located within 1.0 mile of the project area.

Under the No Action Alternative, the existing conditions and management of the project area would remain unchanged. The No Action Alternative would have no impact on RCRA Subtitle D nonhazardous solid waste sites.

Resource Conservation and Recovery Act Subtitle I, underground storage tank/s sites

The Proposed Action Alternative would not include the installation of USTs. No known USTs or leaking petroleum storage tanks are located within 1.0 mile of the project area.

Under the No Action Alternative, the existing conditions and management of the project area would remain unchanged. The No Action Alternative would have no impact on RCRA Subtitle I USTs or sites.

Comprehensive Environmental Response, Compensation, and Liability Act Sites

The Proposed Action Alternative would not create or impact any hazardous materials sites. No known Superfund sites are located within 1.0 mile of the project area.

Under the No Action Alternative, the existing conditions and management of the project area would remain unchanged. The No Action Alternative would have no impact on CERCLA sites.

Toxic Substances Control Act Sites

The Proposed Action Alternative would not create Toxic Substance Control Act (TSCA) concerns. The Proposed Action Alternative would include storing diesel fuel to power a generator for project operations. Gravel pit operators would ensure that no hazardous materials are released during project activities. Any hazardous materials would be properly monitored, maintained, and stored while present in the project area. If contaminated soil is encountered or created during the project, actions would be taken immediately to protect workers and the public from exposure. The NDOT and NNEPA would be contacted for guidance, and any contaminated materials would be properly handled and removed.

4.8 Cumulative Impacts

Cumulative impacts from the Proposed Action would contribute up to approximately 108 acres of disturbance to undisturbed soils, terrain, geologic material, air quality and visibility, and wildlife and vegetation over the proposed project area. If basaltic material is found in viable amounts for gravel pit

mining, gravel pit operation would result in the removal and stockpiling of topsoil and geologic material. The topsoil would be replaced and revegetated during reclamation. Over time, cumulative impacts from the Proposed Action and future related actions including construction of additional gravel pits for roadway and parking lot improvement projects, vehicular traffic throughout the region, regional power plants, and grazing in the area would disturb environmental resources in the region. No other projects are known to occur within or directly near the project area at this time.

The Proposed Action Alternative would have the potential to result in cumulative impacts to wildlife including migratory birds in the region. If gravel materials are found in viable amounts for extraction, NDOT would conduct a resource extraction operation at the project area. This would result in avoidance of the area by wildlife and the removal of vegetation within the project area. Over time, cumulative impacts from all mining activities, including from future gravel pits and associated roadway construction on the Navajo Nation, would have the potential to remove portions of habitat in the region, resulting in cumulative impacts to wildlife species.

5.0 List of Preparers

Marron and Associates, Inc.

Marcel Browne, GIS Specialist

Julie Dickey, Environmental Specialist

Toni Goar, Principle Investigator

Eric Johnson, Senior Environmental Project Manager

Paul Knight, Natural Resource Manager/Lead Biologist

Alex Ochoa, GIS Specialist

Navajo Department of Transportation

Taft Blackhorse, Department Manager

Wilson and Company, Inc.

Scott Perkins, P.E., Vice President/Manager

6.0 Agencies, Organizations, and Persons to Whom the Document Was Sent

Navajo Department of Transportation, Taft Blackhorse

7.0 Agency/Entity Consultation and Coordination

Table 8. Agencies/Entities Consulted for Project Information

Agency	Contact	Title	Information Requested
Navajo Nation Department of Agriculture	Mr. Leo Watchman, Jr.	Department Manager III	Agricultural information
Navajo Nation Department of Agriculture	Ms. Roxie June	Principal Planner	Agricultural information
Bureau of Indian Affairs – Fort Defiance Agency	Mr. Calvin Castillo	Supervisor Highway Engineer	Project road construction standards and criteria
Bureau of Land Management	Mr. Lucas Lucero	Deputy State Director, Lands and Minerals	Mining and reclamation requirements and standards
Greasewood Springs Chapter	Mr. Ronald Gishey, Sr.	President	Land Use Plan
Navajo Nation Forestry Department	Mr. Alex Becenti	Senior Department Manager	Issues or concerns with forestry activities in project area
Navajo Nation Land Department	Ms. Elerina Yazzie	Program Manager, General Land Development	Land Use Plan
Navajo Nation Environmental Protection Agency	Ms. Eugenia Quintana	Air Quality Control	Air quality and dust control permitting
Navajo Nation Environmental Protection Agency	Waste Regulatory and Compliance Department		Hazardous materials sites
Navajo Nation Environmental Protection Agency – Surface and Ground Water Protection Department	Ms. Leana Martinez	Senior Environmental Protection Specialist	Evaluation and determination on waterways and permitting
Navajo Nation Division of Fish and Wildlife	Mr. Chad Smith	Zoologist	Navajo Natural Heritage Program species of concern
Navajo Nation Historic Preservation Department	Mr. Richard M. Begay	Department Manager III	Cultural resources
Bureau of Indian Affairs – Navajo Region	Ms. Harrilene J. Yazzie	Supervisory Environmental Protection Specialist	Environmental Assessment and agency coordination
Bureau of Indian Affairs – Navajo Region	Ms. Justine A. Vaivai	Environmental Protection Specialist	Environmental Assessment and agency coordination
Navajo Natural Heritage Program	Mr. Dexter D. Prall	GIS Supervisor	GIS data regarding species of concern
US Fish and Wildlife Service	Information for Planning and Consultation		Federally-listed and protected species

8.0 References

- CEQ. 1997. *Environmental Justice Guidance under the National Environmental Policy Act*. Council on Environmental Quality. Washington, DC. Website: https://www3.epa.gov/environmentaljustice/resources/policy/ej_guidance_nepa_ceq1297.pdf.
- Dick-Peddie, William A. 1993. *New Mexico Vegetation: Past, Present, and Future*. University of New Mexico Press. Albuquerque, New Mexico.
- Durán Bokich Enterprises, LLC. 2016. *Greasewood Springs Site #1 Conceptual Overview of Potential Road Gravel Extraction Operation, Project Review, Analyses and Operating Parameters*. Elephant Butte, New Mexico.
- Intergovernmental Panel on Climate Change. 2007. *Climate Change 2007: The Physical Basis* (Summary for Policymakers). Cambridge University Press. Cambridge, England, and New York, New York. Website: <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf>.
- Marron. 2017a. *Biological Evaluation*. May 2016. Marron & Associates, Inc. Albuquerque, New Mexico.
- Marron. 2017b. *Cultural Resources Survey*. Marron & Associates, Inc. Albuquerque, New Mexico.
- NNEPA AQCP. 2017. Air Quality Monitoring Station Data. Nazlini, Apache County, Arizona. Website: http://navajonationepa.org/main/index.php?option=com_content&view=article&id=3&catid=14.
- NNHP. 2017. Navajo Nation Heritage Program Species Accounts.
- NRCS. 2017. *Web Soil Survey*. Washington, D.C.: NRCS. Website: <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>.
- Pew Center on Global Climate Change. 2011. *Summary of COP 17 and CMP 7*. Arlington, VA. Pew Center on Global Climate Change.
- Thornbury, W.D. 1965. *Regional Geomorphology of the United States*. John Wiley and Sons, New York.
- US Census Bureau. 2017. American FactFinder. Suitland, MD: US Census Bureau. Website: <http://www.factfinder.census.gov>.
- US Drug Enforcement Administration. 2017. *National Clandestine Laboratory Register – Arizona*. Washington, DC: US Drug Enforcement Administration. Website: <http://www.usdoj.gov/dea/seizures/arizona.html>.
- USEPA. 2011. *National Ambient Air Quality Standards*. Washington, DC: USEPA, Office of Air Quality Planning and Standards. Website: <http://www.epa.gov/airs/criteria.html>.
- USEPA. 2013. *Air Quality Index Report*. Retrieved March 12, 2014, from U.S. Environmental Protection Agency. Website: http://www.epa.gov/airdata/ad_rep_aqi.html.
- USEPA. 2017a. *RCRA 2020 Cleanup Baseline*. Dallas, TX; USEPA Region 6. Website: <https://www.epa.gov/wastes/hazard/correctiveaction/facility/index.htm>.

- USEPA. 2017b. *Search for Superfund Sites Where You Live*. Washington, DC: USEPA. Website: <https://www2.epa.gov/superfund/search-superfund-sites-where-you-live#basic>.
- USEPA. 2017c. *CERCLIS Public Access Database*. Washington, DC: USEPA. Website: <http://cumulis.epa.gov/supercpad/cursites/>.
- USEPA. 2017d. *Sole Source Aquifers for Drinking Water*. US Environmental Protection Agency. Washington, DC. Website: <https://www.epa.gov/dwssa>.
- USFWS. 2017. *Official Species List of Federal Endangered, Threatened, Proposed, and Candidate Species. Information, Planning, and Conservation System (IPAC)*. Ecological Services Field Office. Albuquerque, New Mexico. Website: <http://ecos.fws.gov/ipac>.
- Western Regional Climate Center. 2016. *Painted Desert National Park, Arizona: Period of Record Monthly Climate Summary*. Website: <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nm8524>.
- Wilson, E.D., Moore, R.T., and O'Haire, R.T. 1960. *Geologic Map of Navajo and Apache Counties, Arizona*. Arizona Bureau of Mines. University of Arizona, Arizona County Map Series 03-07.
- Zelawski, Mallory. 2016. *The Hopi Buttes Volcanic Field, Navajo Nation, Arizona. School of Earth Science and Environmental Sustainability*. Northern Arizona University. Flagstaff, Arizona. Website: http://www.azgs.az.gov/arizona_geology/spring10/article_earthscience%20.html.

APPENDIX A

SUPPORTING INFORMATION



Greasewood Springs Chapter

Diwozhii Bii' To doo' Bi'Naha'ta'

Calvin F. Lee, President
Emery Lester, Vice-President
Omercita Begay, Secretary/Treasurer

Bill Spencer., Grazing Committee Member
Lee Jack, Sr., Council Delegate

GSC04-17-0718

RESOLUTION OF THE GREASEWOOD SPRINGS CHAPTER

Resolution to Approve the Use of Sand and Gravel Pit Access Road, Hauling Routes, and Route Identified to Haul the Drilling Rigs Equipment for Exploratory Drilling within the proposal Sand and Gravel Pit Project Site in Greasewood Springs, Arizona.

WHEREAS:

1. The Greasewood Springs Chapter exists as a local unit of government recognized as a political sub-division of the Navajo Nation, pursuant of the Navajo Nation Code No. 26, Section (a) and is authorized to review all matter effecting the community in order to address the needs of the local residents with the authority to act in the best interest of the general welfare of its community membership; and
2. Pursuant to Resolution No. CAP-34-98, the Navajo Nation council approved the Historic Local Governance Act, which authorized the local Navajo Communities to plan develop and implement a restructuring process to improve community decision making allowing communities to excel and flourish enabling Navajo leaders to lead toward a prosperous future and improve the strength of the Navajo Nation Sovereignty; and
3. The Greasewood Springs Chapter hereby supports the use of access, hauling routes, drill rig and staging area for the development of a sand and gravel pit by the Navajo Nation for the beneficial use of general public, chapter projects, and the Greasewood Springs Chapter community. The 40 Acre Pit Site has been approved under a prior Chapter Resolution. The 40 Acre Pit Site is comprised of six corners and the locations of these corners are as follows:

Coordinates for 40 Acre Pit Site

N: 1612133.10; E: 754978.13
N: 1611936.96; E: 755931.15
N: 1610666.20; E: 756190.11
N: 1610691.12; E: 755994.69
N: 1610407.82; E: 755941.41
N: 1610700.95; E: 754790.49

4. The Sand and Gravel Pit will have a 10 Acre staging area located adjacent to N153. This area will be utilized to crush and process large aggregate that is transported from the pit site and store the aggregate until it is transported for projects across the Navajo Nation. The four locations of the four corners comprising this staging area are as follows:

2. The Greasewood Springs Chapter hereby recognizes the access and hauling routes for community development to benefit the local community, improve local routes, and major thoroughfare within the Navajo Nation.

CERTIFICATION

We, hereby certify that the foregoing was duly considered by the Greasewood Springs Chapter at a duly called regular chapter meeting in Greasewood Springs (Navajo Nation) Arizona, at which a quorum of community membership was present and the same had passed with a vote of; 30 in favor, 4 in opposed and 3 in abstained on this 23th day of April, in the year 2017.

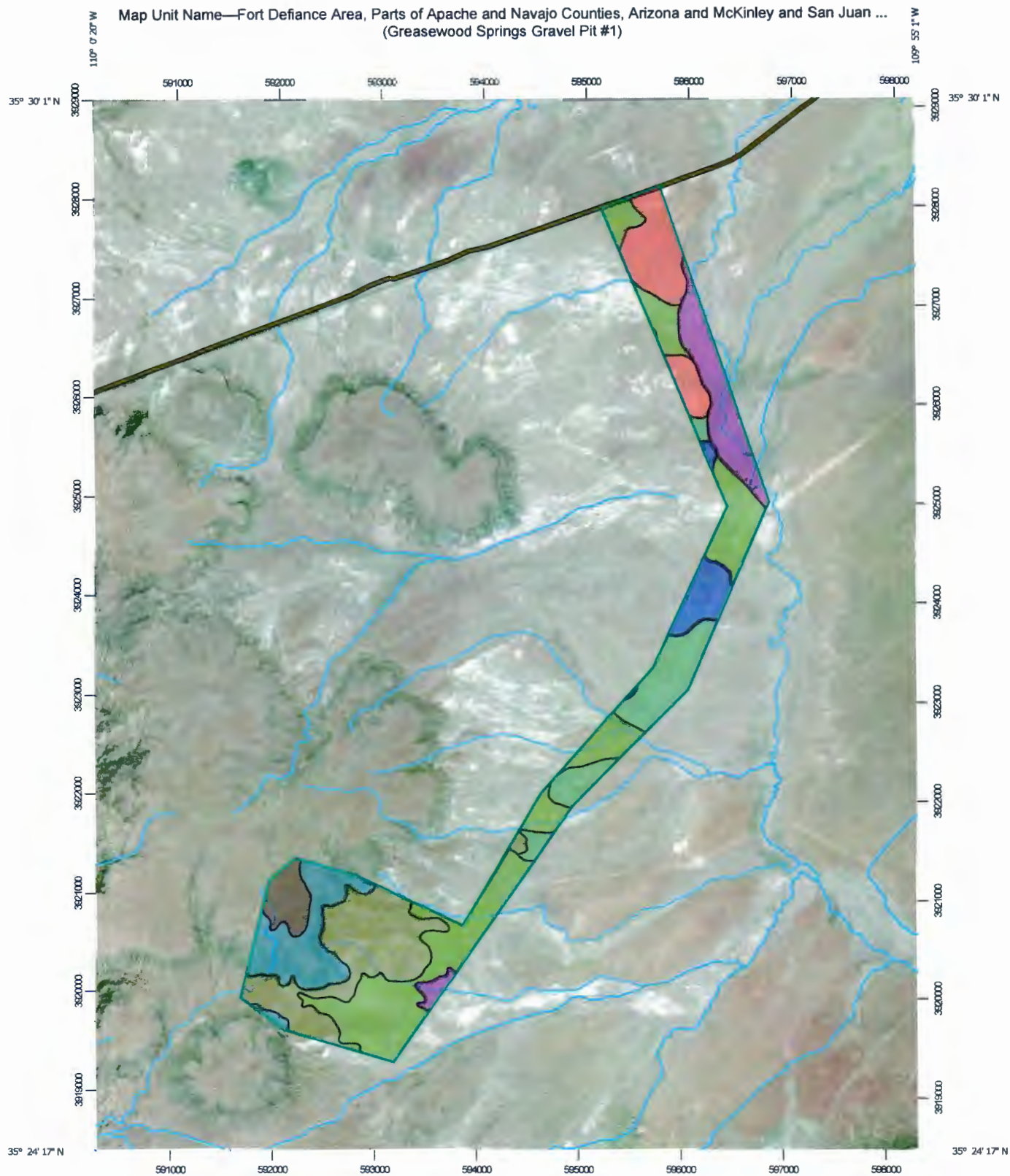
Motioned By: Joni Begay

Seconded By: Theresa McCraith



Calvin F. Lee, President

Map Unit Name—Fort Defiance Area, Parts of Apache and Navajo Counties, Arizona and McKinley and San Juan ...
(Greasewood Springs Gravel Pit #1)



Map Scale: 1:51,800 if printed on A portrait (8.5" x 11") sheet.

0 500 1000 2000 3000 Meters

0 2500 5000 10000 15000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

































Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

3/21/2017
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MAP LEGEND

	Area of Interest (AOI)		Not rated or not available		Begay-Milok family-Mathis family complex, 1 to 60 percent slopes		Rails
	Soils		Soil Rating Lines		Begay-Milok family-Mathis family complex, 1 to 60 percent slopes		Interstate Highways
	Soil Rating Polygons		Begay-Milok family-Mathis family complex, 1 to 60 percent slopes		Flaco-Chinchin family complex, 1 to 8 percent slopes		US Routes
	Begay-Milok family-Mathis family complex, 1 to 60 percent slopes		Flaco-Chinchin family complex, 1 to 8 percent slopes		Kinusta-Strych families-Rock outcrop complex, 30 to 65 percent slopes		Major Roads
	Flaco-Chinchin family complex, 1 to 8 percent slopes		Kinusta-Strych families-Rock outcrop complex, 30 to 65 percent slopes		Moenkopie-Monue complex, 3 to 15 percent slopes		Local Roads
	Kinusta-Strych families-Rock outcrop complex, 30 to 65 percent slopes		Moenkopie-Monue complex, 3 to 15 percent slopes		Redlands-Monue complex, 1 to 8 percent slopes		Background
	Moenkopie-Monue complex, 3 to 15 percent slopes		Redlands-Monue complex, 1 to 8 percent slopes		Redlands-Somorent family complex, 2 to 6 percent slopes		Aerial Photography
	Redlands-Monue complex, 1 to 8 percent slopes		Redlands-Somorent family complex, 2 to 6 percent slopes		Redlands-Whitecone complex, 1 to 4 percent slopes		
	Redlands-Somorent family complex, 2 to 6 percent slopes		Redlands-Whitecone complex, 1 to 4 percent slopes		Wepo-Ives-Jocity association, 0 to 2 percent slopes		
	Redlands-Whitecone complex, 1 to 4 percent slopes		Wepo-Ives-Jocity association, 0 to 2 percent slopes		Not rated or not available		
	Wepo-Ives-Jocity association, 0 to 2 percent slopes		Not rated or not available				
			Water Features				
			Streams and Canals				
			Transportation				
							

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Fort Defiance Area, Parts of Apache and Navajo Counties, Arizona and McKinley and San Juan Counties, New Mexico

Survey Area Data: Version 14, Sep 29, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Name

Map Unit Name— Summary by Map Unit — Fort Defiance Area, Parts of Apache and Navajo Counties, Arizona and McKinley and San Juan Counties, New Mexico (AZ715)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
11	Begay-Milok family-Mathis family complex, 1 to 60 percent slopes	Begay-Milok family-Mathis family complex, 1 to 60 percent slopes	300.1	18.7%
35	Flaco-Chinchin family complex, 1 to 8 percent slopes	Flaco-Chinchin family complex, 1 to 8 percent slopes	60.8	3.8%
49	Kinusta-Strych families-Rock outcrop complex, 30 to 65 percent slopes	Kinusta-Strych families-Rock outcrop complex, 30 to 65 percent slopes	176.9	11.0%
62	Moenkopie-Monue complex, 3 to 15 percent slopes.	Moenkopie-Monue complex, 3 to 15 percent slopes.	70.1	4.4%
92	Redlands-Monue complex, 1 to 8 percent slopes	Redlands-Monue complex, 1 to 8 percent slopes	175.2	10.9%
94	Redlands-Somorent family complex, 2 to 6 percent slopes	Redlands-Somorent family complex, 2 to 6 percent slopes	160.2	10.0%
96	Redlands-Whitecone complex, 1 to 4 percent slopes	Redlands-Whitecone complex, 1 to 4 percent slopes	499.9	31.2%
134	Wepo-Ives-Jocity association, 0 to 2 percent slopes	Wepo-Ives-Jocity association, 0 to 2 percent slopes	161.4	10.1%
Totals for Area of Interest			1,604.6	100.0%

Description

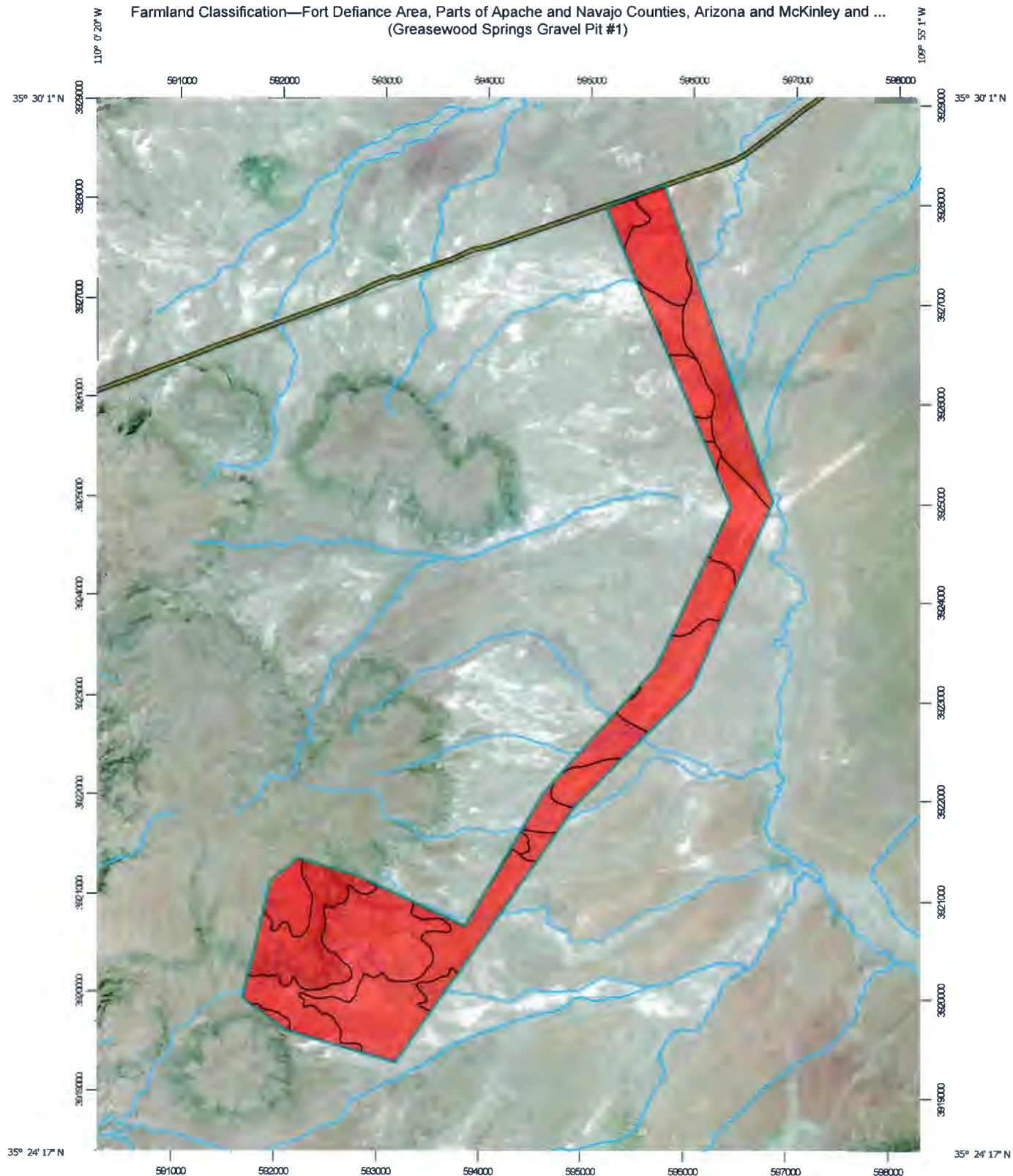
A soil map unit is a collection of soil areas or nonsoil areas (miscellaneous areas) delineated in a soil survey. Each map unit is given a name that uniquely identifies the unit in a particular soil survey area.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Farmland Classification—Fort Defiance Area, Parts of Apache and Navajo Counties, Arizona and McKinley and ...
(Greasewood Springs Gravel Pit #1)



Map Scale: 1:51,800 if printed on A portrait (8.5" x 11") sheet.

0 500 1000 2000 3000 Meters

0 2500 5000 10000 15000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

3/21/2017
Page 1 of 4

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

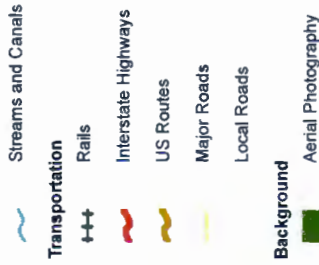
Water Features

- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

MAP INFORMATION



The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Fort Defiance Area, Parts of Apache and Navajo Counties, Arizona and McKinley and San Juan Counties, New Mexico

Survey Area Data: Version 14, Sep 29, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Fort Defiance Area, Parts of Apache and Navajo Counties, Arizona and McKinley and San Juan Counties, New Mexico (AZ715)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
11	Begay-Milok family- Mathis family complex, 1 to 60 percent slopes	Not prime farmland	300.1	18.7%
35	Flaco-Chinchin family complex, 1 to 8 percent slopes	Not prime farmland	60.8	3.8%
49	Kinusta-Strych families- Rock outcrop complex, 30 to 65 percent slopes	Not prime farmland	176.9	11.0%
62	Moenkopie-Monue complex, 3 to 15 percent slopes.	Not prime farmland	70.1	4.4%
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94	Redlands-Somorent family complex, 2 to 6 percent slopes	Not prime farmland	160.2	10.0%
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Totals for Area of Interest			1,604.6	100.0%

Description

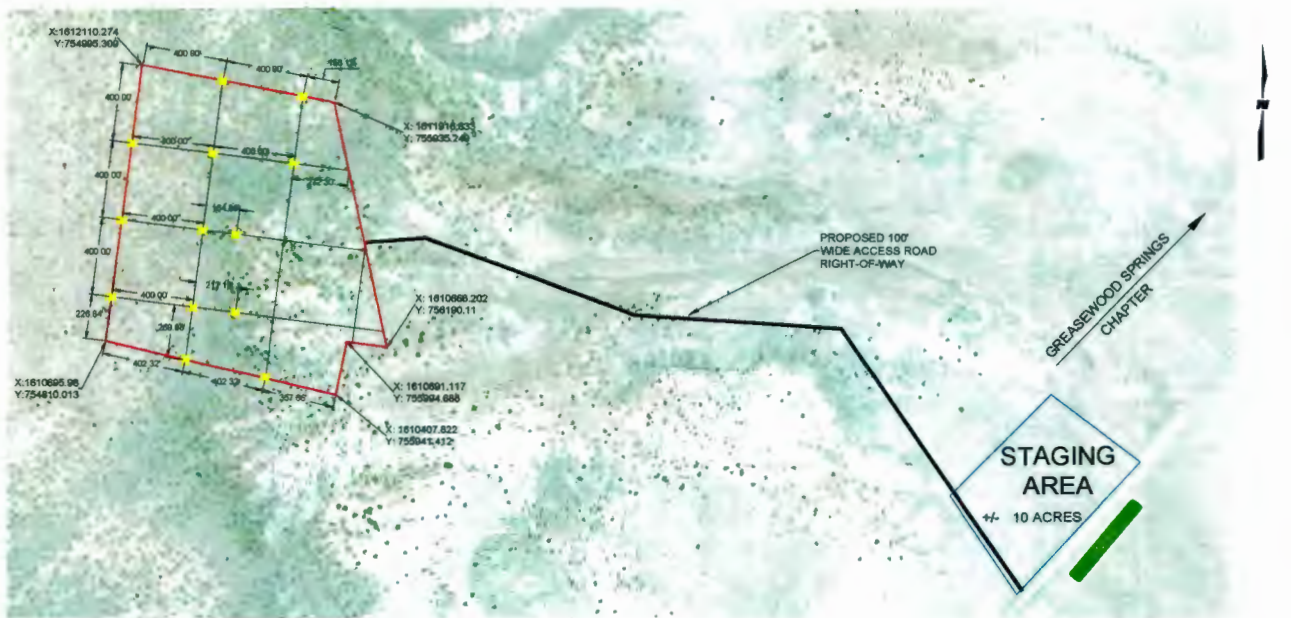
Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

M:\WORK\14-100-040-013_2003\PROJECTS\GREASEWOOD SPRINGS GRAVEL PIT\DWG\2007_1.31.Plot



LEGEND

- PROPOSED 40 ACRE PIT SITE
- APPROXIMATE BORING LOCATION

GREASEWOOD SPRINGS GRAVEL PIT#1 APPROXIMATE BORING LOCATIONS

SCALE 1"=200'

NDOT GRAVEL PIT STUDY

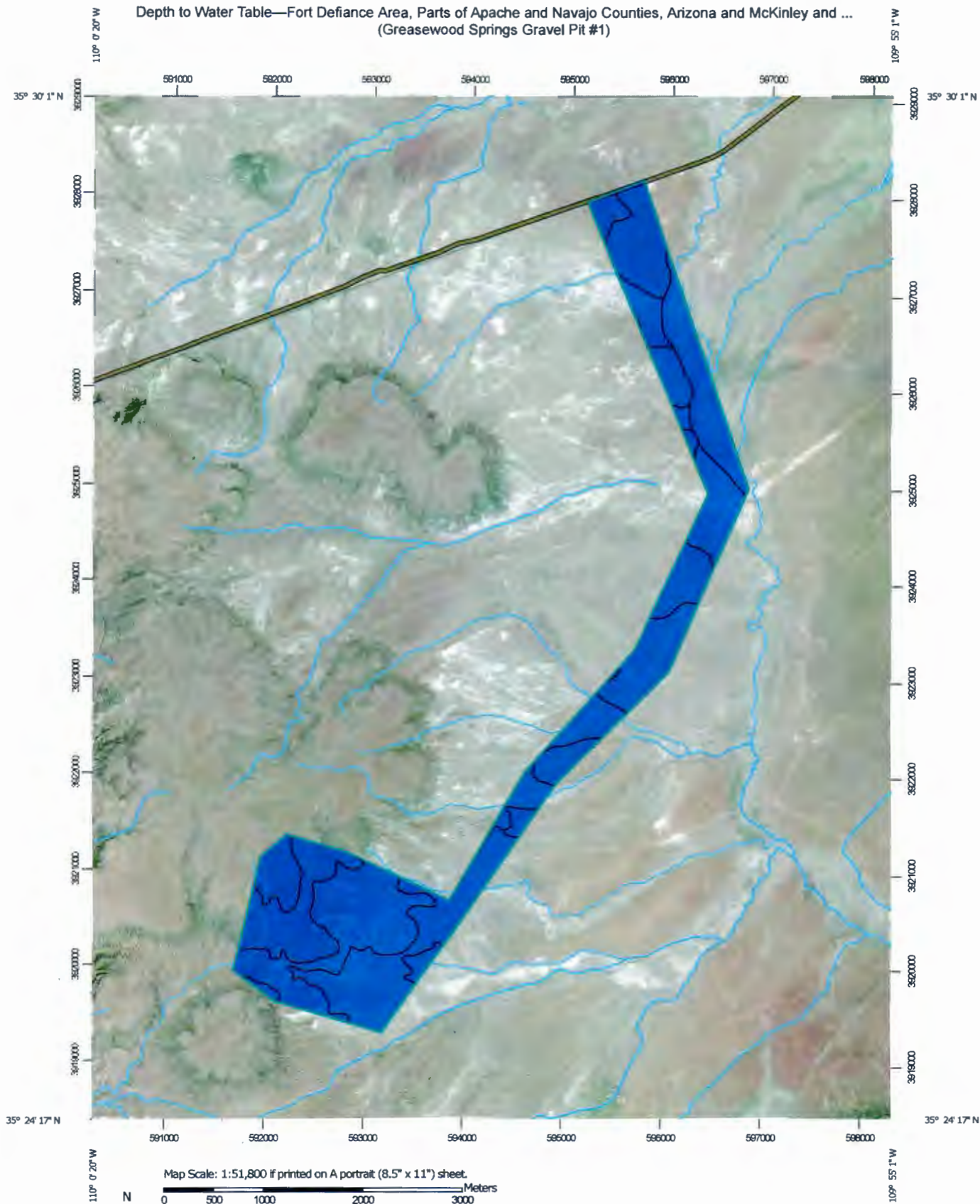
WILSON & COMPANY
1800 CAMP AVE. N.E.
ALBUQUERQUE, NEW MEXICO
87104
(505) 548-4000

GREASEWOOD SPRINGS SITE #1

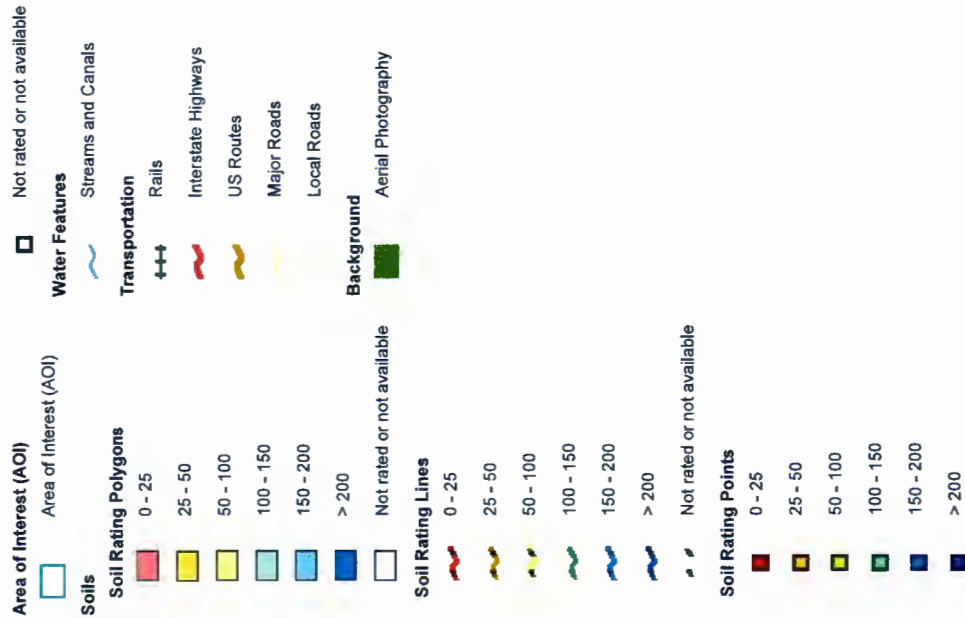


NO.	DATE	REMARKS	BY
DESIGN	SPR	NDOT NO. 1418904000E DATE	2017
DRAWN		PROJECT NO.	SHEET NO.
CHECK			OF

Depth to Water Table—Fort Defiance Area, Parts of Apache and Navajo Counties, Arizona and McKinley and ...
(Greasewood Springs Gravel Pit #1)



MAP LEGEND



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Fort Defiance Area, Parts of Apache and Navajo Counties, Arizona and McKinley and San Juan Counties, New Mexico
Survey Area Data: Version 14, Sep 29, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Depth to Water Table

Depth to Water Table— Summary by Map Unit — Fort Defiance Area, Parts of Apache and Navajo Counties, Arizona and McKinley and San Juan Counties, New Mexico (AZ715)				
Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
11	Begay-Milok family-Mathis family complex, 1 to 60 percent slopes	>200	300.1	18.7%
35	Flaco-Chinchin family complex, 1 to 8 percent slopes	>200	60.8	3.8%
49	Kinusta-Strych families-Rock outcrop complex, 30 to 65 percent slopes	>200	176.9	11.0%
62	Moenkopie-Monue complex, 3 to 15 percent slopes.	>200	70.1	4.4%
92	Redlands-Monue complex, 1 to 8 percent slopes	>200	175.2	10.9%
94	Redlands-Somorent family complex, 2 to 6 percent slopes	>200	160.2	10.0%
96	Redlands-Whitecone complex, 1 to 4 percent slopes	>200	499.9	31.2%
134	Wepo-Ives-Jocity association, 0 to 2 percent slopes	>200	161.4	10.1%
Totals for Area of Interest			1,604.6	100.0%

Description

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters



Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

Air Quality Index Report

Geographic Area: Navajo County, AZ
Summary: by County
Year: 2006

		Number of Days when Air Quality was...					AQI Statistics			Number of Days when AQI Pollutant was...					
County	# Days with AQI	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Maximum	90th Percentile	Median	CO	NO2	O3	SO2	PM2.5	PM10
Navajo County, AZ	328	230	92	6	.	.	150	74	45	.	306	.	15	7	7

Get detailed information about this report, including column descriptions, at http://www.epa.gov/airquality/airdata/ad_about_reports.html#aqi

AirData reports are produced from a direct query of the AQS Data Mart. The data represent the best and most recent information available to EPA from state agencies. However, some values may be absent due to incomplete reporting, and some values may change due to quality assurance activities. The AQS database is updated by state, local, and tribal organizations who own and submit the data.

Readers are cautioned not to rank order geographic areas based on AirData reports. Air pollution levels measured at a particular monitoring site are not necessarily representative of the air quality for an entire county or urban area.

Air Quality Index Report

Geographic Area: Navajo County, AZ
Summary: by County
Year: 2007

	Number of Days when Air Quality was...						AQI Statistics			Number of Days when AQI Pollutant was...					
	# Days with AQI	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Maximum	90th Percentile	Median	CO	NO2	O3	SO2	PM2.5	PM10
County															
Navajo County, AZ	311	198	111	2			112	77	46			286		16	9

Get detailed information about this report, including column descriptions, at http://www.epa.gov/airquality/airdata/ad_about_reports.html#aqi

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Air Quality Index Report

Geographic Area: Navajo County, AZ
Summary: by County
Year: 2008

		Number of Days when Air Quality was...					AQI Statistics			Number of Days when AQI Pollutant was...					
County	# Days with AQI	Unhealthy for Sensitive Groups		Unhealthy		Very Unhealthy	Maximum	90th Percentile	Median	CO	NO2	O3	SO2	PM2.5	PM10
		Good	Moderate												
Navajo County, AZ	345	219	121	5	.	.	115	77	47	.	334	.	11	.	.

Get detailed information about this report, including column descriptions, at http://www.epa.gov/airquality/airdata/ad_about_reports.html#aqi

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Air Quality Index Report

Geographic Area: Navajo County, AZ
Summary: by County
Year: 2009

County	# Days with AQI	Number of Days when Air Quality was...					AQI Statistics			Number of Days when AQI Pollutant was...					
		Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Maximum	90th Percentile	Median	CO	NO2	O3	SO2	PM2.5	PM10
Navajo County, AZ	365	279	86	.	.	.	97	61	44	.	.	354	.	5	6

Get detailed information about this report, including column descriptions, at http://www.epa.gov/airquality/airdata/ad_about_reports.html#aqi

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Air Quality Index Report

Geographic Area: Navajo County, AZ
Summary: by County
Year: 2010

County	Number of Days when Air Quality was...						AQI Statistics			Number of Days when AQI Pollutant was...					
	# Days with AQI	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Maximum	90th Percentile	Median	CO	NO2	O3	SO2	PM2.5	PM10
Navajo County, AZ	364	279	83	2	.	.	112	61	44	.	.	360	.	1	3

Get detailed information about this report, including column descriptions, at http://www.epa.gov/airquality/airdata/ad_about_reports.html#aqi

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Air Quality Index Report

Geographic Area: Navajo County, AZ
Summary: by County
Year: 2011

County	# Days with AQI	Number of Days when Air Quality was...					AQI Statistics			Number of Days when AQI Pollutant was...					
		Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Maximum	90th Percentile	Median	CO	NO2	O3	SO2	PM2.5	PM10
Navajo County, AZ	365	247	117	1	.	.	105	74	46	.	.	362	.	.	3

Get detailed information about this report, including column descriptions, at http://www.epa.gov/airquality/airdata/ad_about_reports.html#aqi

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Air Quality Index Report

Geographic Area: Navajo County, AZ
Summary: by County
Year: 2012

		Number of Days when Air Quality was...					AQI Statistics			Number of Days when AQI Pollutant was...					
County	# Days with AQI	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Maximum	90th Percentile	Median	CO	NO2	O3	SO2	PM2.5	PM10
Navajo County, AZ	366	245	114	7			126	80	45			351			15

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Air Quality Index Report

Geographic Area: Navajo County, AZ
Summary: by County
Year: 2013

County	# Days with AQI	Number of Days when Air Quality was...					AQI Statistics			Number of Days when AQI Pollutant was...					
		Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Maximum	90th Percentile	Median	CO	NO2	O3	SO2	PM2.5	PM10
Navajo County, AZ	365	246	119				100	74	46			351			14

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Air Quality Index Report

Geographic Area: Navajo County, AZ
 Summary: by County
 Year: 2014

County	# Days with AQI	Number of Days when Air Quality was...					AQI Statistics			Number of Days when AQI Pollutant was...					
		Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Maximum	90th Percentile	Median	CO	NO2	O3	SO2	PM2.5	PM10
Navajo County, AZ	365	272	91	2	.	.	101	64	44	.	.	358	.	1	6

Get detailed information about this report, including column descriptions, at http://www.epa.gov/airquality/airdata/ad_about_reports.html#aqi

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Air Quality Index Report

Geographic Area: Navajo County, AZ
Summary: by County
Year: 2015

County	# Days with AQI	Number of Days when Air Quality was...					AQI Statistics			Number of Days when AQI Pollutant was...					
		Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Maximum	90th Percentile	Median	CO	NO2	O3	SO2	PM2.5	PM10
Navajo County, AZ	365	317	48	.	.	.	100	54	39	.	.	320	.	10	35

Get detailed information about this report, including column descriptions, at http://www.epa.gov/airquality/airdata/ad_about_reports.html#aqi

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Air Quality Index Report

Geographic Area: Navajo County, AZ

Summary: by County

Year: 2016 (Annual statistics for 2016 are not final until May 1, 2017)

		Number of Days when Air Quality was...					AQI Statistics			Number of Days when AQI Pollutant was...					
County	# Days with AQI	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Maximum	90th Percentile	Median	CO	NO2	O3	SO2	PM2.5	PM10
Navajo County, AZ	366	301	65				90	54	42.5			352			14

Get detailed information about this report, including column descriptions, at http://www.epa.gov/airquality/airdata/ad_about_reports.html#aqi

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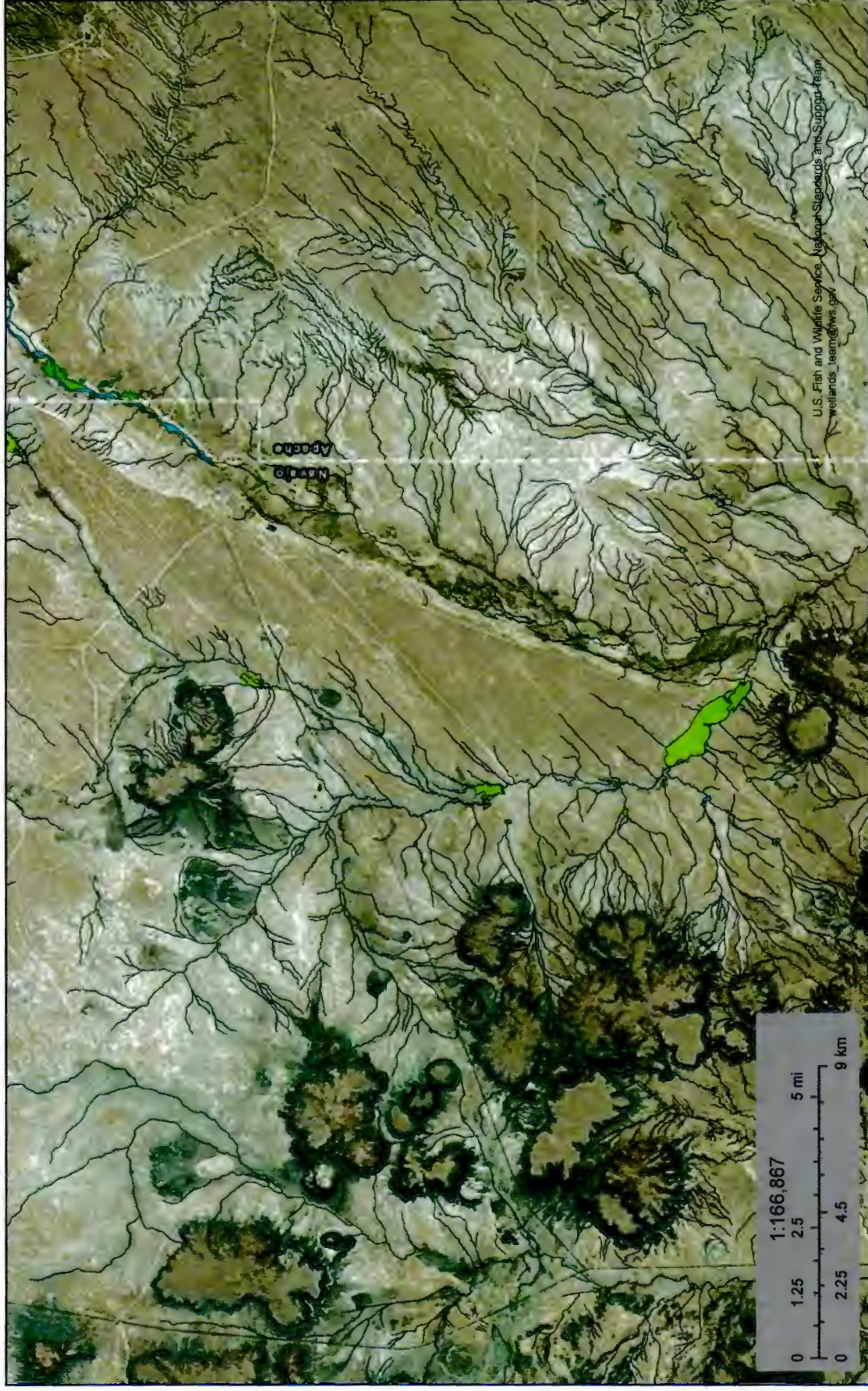
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U.S. Fish and Wildlife Service

National Wetlands Inventory

Greasewood Springs Gravel Pit #1 Wetland

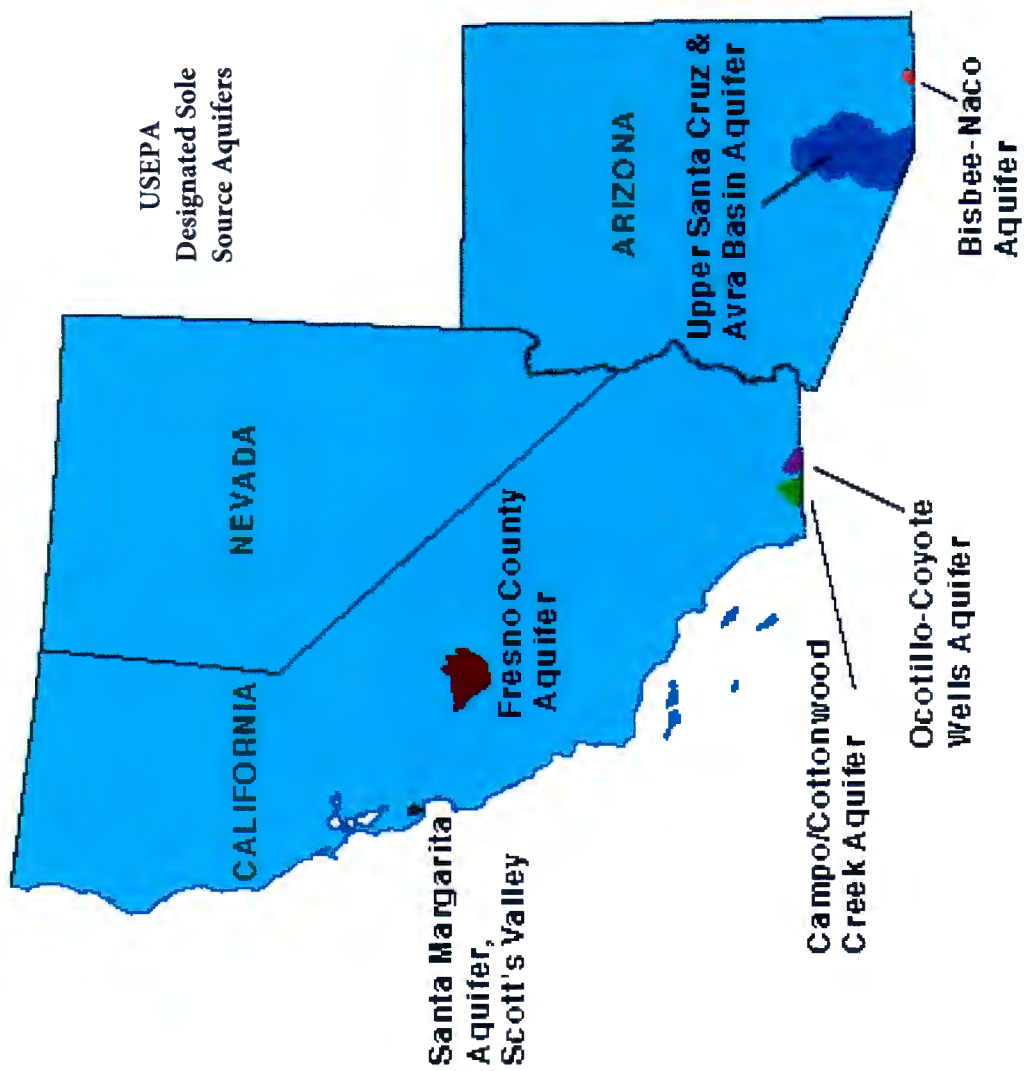


March 21, 2017

- | | | | | | |
|--|--------------------------------|--|-----------------------------------|--|----------|
| | Estuarine and Marine Deepwater | | Freshwater Forested/Shrub Wetland | | Other |
| | Estuarine and Marine Wetland | | Freshwater Pond | | Riverine |
| | Freshwater Emergent Wetland | | Lake | | |

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Subject	Navajo County, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
Mean travel time to work (minutes)	22.3	+/-1.1	(X)	(X)
OCCUPATION				
Civilian employed population 16 years and over	31,955	+/-928	31,955	(X)
Management, business, science, and arts occupations	9,109	+/-593	28.5%	+/-1.8
Service occupations	8,169	+/-627	25.6%	+/-1.7
Sales and office occupations	7,262	+/-591	22.7%	+/-1.6
Natural resources, construction, and maintenance occupations	3,693	+/-460	11.6%	+/-1.4
Production, transportation, and material moving occupations	3,722	+/-342	11.6%	+/-1.1
INDUSTRY				
Civilian employed population 16 years and over	31,955	+/-928	31,955	(X)
Agriculture, forestry, fishing and hunting, and mining	1,208	+/-228	3.8%	+/-0.7
Construction	2,613	+/-338	8.2%	+/-1.0
Manufacturing	1,265	+/-275	4.0%	+/-0.8
Wholesale trade	350	+/-130	1.1%	+/-0.4
Retail trade	4,205	+/-542	13.2%	+/-1.6
Transportation and warehousing, and utilities	2,306	+/-311	7.2%	+/-1.0
Information	455	+/-145	1.4%	+/-0.5
Finance and insurance, and real estate and rental and leasing	1,083	+/-213	3.4%	+/-0.7
Professional, scientific, and management, and administrative and waste management services	1,444	+/-236	4.5%	+/-0.7
Educational services, and health care and social assistance	8,983	+/-490	28.1%	+/-1.6
Arts, entertainment, and recreation, and accommodation and food services	4,018	+/-412	12.6%	+/-1.2
Other services, except public administration	1,189	+/-233	3.7%	+/-0.7
Public administration	2,836	+/-345	8.9%	+/-1.0
CLASS OF WORKER				
Civilian employed population 16 years and over	31,955	+/-928	31,955	(X)
Private wage and salary workers	19,516	+/-929	61.1%	+/-2.0
Government workers	10,003	+/-635	31.3%	+/-1.9
Self-employed in own not incorporated business workers	2,353	+/-349	7.4%	+/-1.1
Unpaid family workers	83	+/-66	0.3%	+/-0.2
INCOME AND BENEFITS (IN 2015 INFLATION-ADJUSTED DOLLARS)				
Total households	34,129	+/-626	34,129	(X)
Less than \$10,000	5,295	+/-445	15.5%	+/-1.3
\$10,000 to \$14,999	2,547	+/-274	7.5%	+/-0.8
\$15,000 to \$24,999	4,688	+/-426	13.7%	+/-1.2
\$25,000 to \$34,999	4,232	+/-398	12.4%	+/-1.1
\$35,000 to \$49,999	4,598	+/-400	13.5%	+/-1.1
\$50,000 to \$74,999	6,268	+/-492	18.4%	+/-1.4
\$75,000 to \$99,999	3,023	+/-295	8.9%	+/-0.9
\$100,000 to \$149,999	2,344	+/-313	6.9%	+/-0.9
\$150,000 to \$199,999	651	+/-163	1.9%	+/-0.5
\$200,000 or more	483	+/-148	1.4%	+/-0.4
Median household income (dollars)	35,921	+/-1,585	(X)	(X)
Mean household income (dollars)	48,549	+/-2,004	(X)	(X)
With earnings	22,570	+/-643	66.1%	+/-1.3
Mean earnings (dollars)	50,094	+/-2,885	(X)	(X)
With Social Security	12,818	+/-396	37.6%	+/-1.1
Mean Social Security income (dollars)	17,452	+/-473	(X)	(X)
With retirement income	7,495	+/-400	22.0%	+/-1.2
Mean retirement income (dollars)	20,637	+/-1,286	(X)	(X)





DP03

SELECTED ECONOMIC CHARACTERISTICS

2011-2015 American Community Survey 5-Year Estimates

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the Data and Documentation section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the Methodology section.

Tell us what you think. Provide feedback to help make American Community Survey data more useful for you.

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.

Subject	Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
EMPLOYMENT STATUS				
Population 16 years and over	5,207,123	+/-1,676	5,207,123	(X)
In labor force	3,106,324	+/-8,229	59.7%	+/-0.2
Civilian labor force	3,089,118	+/-8,256	59.3%	+/-0.2
Employed	2,813,406	+/-7,893	54.0%	+/-0.2
Unemployed	275,712	+/-3,860	5.3%	+/-0.1
Armed Forces	17,206	+/-938	0.3%	+/-0.1
Not in labor force	2,100,799	+/-8,647	40.3%	+/-0.2
Civilian labor force	3,089,118	+/-8,256	3,089,118	(X)
Unemployment Rate	(X)	(X)	8.9%	+/-0.1
Females 16 years and over	2,639,742	+/-1,399	2,639,742	(X)
In labor force	1,440,426	+/-5,728	54.6%	+/-0.2
Civilian labor force	1,438,097	+/-5,724	54.5%	+/-0.2
Employed	1,313,662	+/-5,025	49.8%	+/-0.2
Own children of the householder under 6 years	502,325	+/-2,638	502,325	(X)
All parents in family in labor force	302,591	+/-3,785	60.2%	+/-0.7
Own children of the householder 6 to 17 years	1,027,007	+/-3,075	1,027,007	(X)
All parents in family in labor force	682,943	+/-5,379	66.5%	+/-0.5
COMMUTING TO WORK				
Workers 16 years and over	2,777,754	+/-7,744	2,777,754	(X)
Car, truck, or van -- drove alone	2,125,151	+/-7,242	76.5%	+/-0.2
Car, truck, or van -- carpooled	307,132	+/-4,840	11.1%	+/-0.2
Public transportation (excluding taxicab)	58,024	+/-1,919	2.1%	+/-0.1
Walked	56,694	+/-1,945	2.0%	+/-0.1
Other means	76,649	+/-2,415	2.8%	+/-0.1
Worked at home	154,104	+/-3,367	5.5%	+/-0.1

Subject	Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
Mean travel time to work (minutes)	24.8	+/-0.1	(X)	(X)
OCCUPATION				
Civilian employed population 16 years and over	2,813,406	+/-7,893	2,813,406	(X)
Management, business, science, and arts occupations	986,331	+/-6,979	35.1%	+/-0.2
Service occupations	559,290	+/-6,490	19.9%	+/-0.2
Sales and office occupations	737,817	+/-5,362	26.2%	+/-0.2
Natural resources, construction, and maintenance occupations	258,469	+/-3,447	9.2%	+/-0.1
Production, transportation, and material moving occupations	271,499	+/-3,854	9.7%	+/-0.1
INDUSTRY				
Civilian employed population 16 years and over	2,813,406	+/-7,893	2,813,406	(X)
Agriculture, forestry, fishing and hunting, and mining	44,908	+/-1,784	1.6%	+/-0.1
Construction	185,028	+/-3,053	6.6%	+/-0.1
Manufacturing	204,240	+/-2,876	7.3%	+/-0.1
Wholesale trade	67,492	+/-2,177	2.4%	+/-0.1
Retail trade	344,151	+/-3,994	12.2%	+/-0.1
Transportation and warehousing, and utilities	138,155	+/-2,938	4.9%	+/-0.1
Information	50,115	+/-1,700	1.8%	+/-0.1
Finance and insurance, and real estate and rental and leasing	228,065	+/-3,526	8.1%	+/-0.1
Professional, scientific, and management, and administrative and waste management services	334,219	+/-5,251	11.9%	+/-0.2
Educational services, and health care and social assistance	622,383	+/-5,917	22.1%	+/-0.2
Arts, entertainment, and recreation, and accommodation and food services	304,606	+/-5,324	10.8%	+/-0.2
Other services, except public administration	136,066	+/-3,228	4.8%	+/-0.1
Public administration	153,978	+/-3,406	5.5%	+/-0.1
CLASS OF WORKER				
Civilian employed population 16 years and over	2,813,406	+/-7,893	2,813,406	(X)
Private wage and salary workers	2,230,268	+/-7,765	79.3%	+/-0.2
Government workers	411,874	+/-5,570	14.6%	+/-0.2
Self-employed in own not incorporated business workers	166,671	+/-2,854	5.9%	+/-0.1
Unpaid family workers	4,593	+/-558	0.2%	+/-0.1
INCOME AND BENEFITS (IN 2015 INFLATION-ADJUSTED DOLLARS)				
Total households	2,412,212	+/-7,194	2,412,212	(X)
Less than \$10,000	185,629	+/-3,119	7.7%	+/-0.1
\$10,000 to \$14,999	125,386	+/-2,588	5.2%	+/-0.1
\$15,000 to \$24,999	268,065	+/-3,509	11.1%	+/-0.1
\$25,000 to \$34,999	267,669	+/-3,966	11.1%	+/-0.2
\$35,000 to \$49,999	352,984	+/-3,785	14.6%	+/-0.2
\$50,000 to \$74,999	446,513	+/-4,859	18.5%	+/-0.2
\$75,000 to \$99,999	285,636	+/-3,727	11.8%	+/-0.1
\$100,000 to \$149,999	288,720	+/-3,853	12.0%	+/-0.2
\$150,000 to \$199,999	99,975	+/-2,354	4.1%	+/-0.1
\$200,000 or more	91,635	+/-1,912	3.8%	+/-0.1
Median household income (dollars)	50,255	+/-211	(X)	(X)
Mean household income (dollars)	68,297	+/-291	(X)	(X)
With earnings	1,804,676	+/-6,876	74.8%	+/-0.2
Mean earnings (dollars)	68,904	+/-312	(X)	(X)
With Social Security	771,485	+/-3,788	32.0%	+/-0.1
Mean Social Security income (dollars)	18,862	+/-75	(X)	(X)
With retirement income	480,074	+/-4,149	19.9%	+/-0.1
Mean retirement income (dollars)	24,807	+/-274	(X)	(X)

Subject	Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
With Supplemental Security Income	102,392	+/-2,271	4.2%	+/-0.1
Mean Supplemental Security Income (dollars)	9,698	+/-127	(X)	(X)
With cash public assistance income	56,036	+/-1,519	2.3%	+/-0.1
Mean cash public assistance income (dollars)	3,188	+/-129	(X)	(X)
With Food Stamp/SNAP benefits in the past 12 months	325,831	+/-3,646	13.5%	+/-0.2
Families	1,581,380	+/-7,010	1,581,380	(X)
Less than \$10,000	87,683	+/-2,123	5.5%	+/-0.1
\$10,000 to \$14,999	53,424	+/-1,767	3.4%	+/-0.1
\$15,000 to \$24,999	133,190	+/-2,449	8.4%	+/-0.2
\$25,000 to \$34,999	159,245	+/-2,767	10.1%	+/-0.2
\$35,000 to \$49,999	223,084	+/-3,413	14.1%	+/-0.2
\$50,000 to \$74,999	313,831	+/-4,211	19.8%	+/-0.2
\$75,000 to \$99,999	216,059	+/-3,418	13.7%	+/-0.2
\$100,000 to \$149,999	233,503	+/-3,611	14.8%	+/-0.2
\$150,000 to \$199,999	84,110	+/-2,107	5.3%	+/-0.1
\$200,000 or more	77,251	+/-1,726	4.9%	+/-0.1
Median family income (dollars)	59,480	+/-381	(X)	(X)
Mean family income (dollars)	78,365	+/-425	(X)	(X)
Per capita income (dollars)	25,848	+/-124	(X)	(X)
Nonfamily households	830,832	+/-4,718	830,832	(X)
Median nonfamily income (dollars)	32,283	+/-223	(X)	(X)
Mean nonfamily income (dollars)	45,752	+/-383	(X)	(X)
Median earnings for workers (dollars)	29,627	+/-222	(X)	(X)
Median earnings for male full-time, year-round workers (dollars)	45,090	+/-275	(X)	(X)
Median earnings for female full-time, year-round workers (dollars)	37,264	+/-203	(X)	(X)
HEALTH INSURANCE COVERAGE				
Civilian noninstitutionalized population	6,533,509	+/-929	6,533,509	(X)
With health insurance coverage	5,551,125	+/-10,256	85.0%	+/-0.2
With private health insurance	3,977,054	+/-18,531	60.9%	+/-0.3
With public coverage	2,324,123	+/-13,307	35.6%	+/-0.2
No health insurance coverage	982,384	+/-10,380	15.0%	+/-0.2
Civilian noninstitutionalized population under 18 years	1,615,216	+/-379	1,615,216	(X)
No health insurance coverage	178,507	+/-4,618	11.1%	+/-0.3
Civilian noninstitutionalized population 18 to 64 years	3,910,423	+/-1,165	3,910,423	(X)
In labor force:	2,906,399	+/-7,914	2,906,399	(X)
Employed:	2,652,462	+/-7,776	2,652,462	(X)
With health insurance coverage	2,173,947	+/-8,970	82.0%	+/-0.2
With private health insurance	1,965,236	+/-10,211	74.1%	+/-0.3
With public coverage	273,111	+/-4,156	10.3%	+/-0.2
No health insurance coverage	478,515	+/-6,344	18.0%	+/-0.2
Unemployed:	253,937	+/-3,803	253,937	(X)
With health insurance coverage	156,576	+/-3,198	61.7%	+/-0.8
With private health insurance	76,727	+/-2,411	30.2%	+/-0.8
With public coverage	86,485	+/-2,286	34.1%	+/-0.8
No health insurance coverage	97,361	+/-2,446	38.3%	+/-0.8
Not in labor force:	1,004,024	+/-7,941	1,004,024	(X)
With health insurance coverage	787,012	+/-6,758	78.4%	+/-0.4
With private health insurance	464,329	+/-5,829	46.2%	+/-0.5

Subject	Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
With public coverage	382,587	+/-4,982	38.1%	+/-0.4
No health insurance coverage	217,012	+/-4,452	21.6%	+/-0.4
PERCENTAGE OF FAMILIES AND PEOPLE WHOSE INCOME IN THE PAST 12 MONTHS IS BELOW THE POVERTY LEVEL				
All families	(X)	(X)	13.3%	+/-0.2
With related children of the householder under 18 years	(X)	(X)	21.2%	+/-0.4
With related children of the householder under 5 years only	(X)	(X)	20.2%	+/-0.9
Married couple families	(X)	(X)	7.6%	+/-0.2
With related children of the householder under 18 years	(X)	(X)	12.0%	+/-0.4
With related children of the householder under 5 years only	(X)	(X)	10.0%	+/-0.8
Families with female householder, no husband present	(X)	(X)	31.7%	+/-0.6
With related children of the householder under 18 years	(X)	(X)	40.3%	+/-0.8
With related children of the householder under 5 years only	(X)	(X)	42.2%	+/-2.2
All people	(X)	(X)	18.2%	+/-0.2
Under 18 years	(X)	(X)	26.0%	+/-0.4
Related children of the householder under 18 years	(X)	(X)	25.6%	+/-0.4
Related children of the householder under 5 years	(X)	(X)	28.7%	+/-0.7
Related children of the householder 5 to 17 years	(X)	(X)	24.5%	+/-0.4
18 years and over	(X)	(X)	15.7%	+/-0.2
18 to 64 years	(X)	(X)	17.5%	+/-0.2
65 years and over	(X)	(X)	8.8%	+/-0.2
People in families	(X)	(X)	16.0%	+/-0.3
Unrelated individuals 15 years and over	(X)	(X)	27.4%	+/-0.3

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Estimates of urban and rural population, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2010 data. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

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DP03

SELECTED ECONOMIC CHARACTERISTICS

2011-2015 American Community Survey 5-Year Estimates

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Tell us what you think. Provide feedback to help make American Community Survey data more useful for you.

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.

Subject	Census Tract 9400.14, Navajo County, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
EMPLOYMENT STATUS				
Population 16 years and over	2,112	+/-141	2,112	(X)
In labor force	827	+/-85	39.2%	+/-3.0
Civilian labor force	827	+/-85	39.2%	+/-3.0
Employed	512	+/-57	24.2%	+/-2.4
Unemployed	315	+/-55	14.9%	+/-2.3
Armed Forces	0	+/-12	0.0%	+/-1.6
Not in labor force	1,285	+/-107	60.8%	+/-3.0
Civilian labor force	827	+/-85	827	(X)
Unemployment Rate	(X)	(X)	38.1%	+/-4.5
Females 16 years and over	1,063	+/-84	1,063	(X)
In labor force	414	+/-55	38.9%	+/-4.2
Civilian labor force	414	+/-55	38.9%	+/-4.2
Employed	293	+/-39	27.6%	+/-3.3
Own children of the householder under 6 years	238	+/-54	238	(X)
All parents in family in labor force	125	+/-36	52.5%	+/-10.1
Own children of the householder 6 to 17 years	550	+/-80	550	(X)
All parents in family in labor force	358	+/-68	65.1%	+/-7.4
COMMUTING TO WORK				
Workers 16 years and over	507	+/-56	507	(X)
Car, truck, or van -- drove alone	345	+/-47	68.0%	+/-5.5
Car, truck, or van -- carpooled	84	+/-26	16.6%	+/-4.5
Public transportation (excluding taxicab)	3	+/-4	0.6%	+/-0.8
Walked	33	+/-12	6.5%	+/-2.5
Other means	3	+/-4	0.6%	+/-0.8
Worked at home	39	+/-17	7.7%	+/-3.3

Subject	Census Tract 9400.14, Navajo County, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
Mean travel time to work (minutes)	43.9	+/-5.4	(X)	(X)
OCCUPATION				
Civilian employed population 16 years and over	512	+/-57	512	(X)
Management, business, science, and arts occupations	123	+/-28	24.0%	+/-4.4
Service occupations	150	+/-34	29.3%	+/-5.7
Sales and office occupations	90	+/-24	17.6%	+/-4.7
Natural resources, construction, and maintenance occupations	105	+/-23	20.5%	+/-3.8
Production, transportation, and material moving occupations	44	+/-15	8.6%	+/-2.8
INDUSTRY				
Civilian employed population 16 years and over	512	+/-57	512	(X)
Agriculture, forestry, fishing and hunting, and mining	20	+/-16	3.9%	+/-3.0
Construction	70	+/-21	13.7%	+/-3.9
Manufacturing	8	+/-10	1.6%	+/-1.9
Wholesale trade	0	+/-12	0.0%	+/-6.6
Retail trade	30	+/-16	5.9%	+/-3.1
Transportation and warehousing, and utilities	26	+/-13	5.1%	+/-2.6
Information	4	+/-5	0.8%	+/-0.9
Finance and insurance, and real estate and rental and leasing	7	+/-6	1.4%	+/-1.1
Professional, scientific, and management, and administrative and waste management services	6	+/-6	1.2%	+/-1.1
Educational services, and health care and social assistance	216	+/-37	42.2%	+/-5.7
Arts, entertainment, and recreation, and accommodation and food services	37	+/-19	7.2%	+/-3.4
Other services, except public administration	26	+/-20	5.1%	+/-3.8
Public administration	62	+/-22	12.1%	+/-4.4
CLASS OF WORKER				
Civilian employed population 16 years and over	512	+/-57	512	(X)
Private wage and salary workers	276	+/-49	53.9%	+/-6.8
Government workers	218	+/-39	42.6%	+/-6.6
Self-employed in own not incorporated business	18	+/-18	3.5%	+/-3.5
Unpaid family workers	0	+/-12	0.0%	+/-6.6
INCOME AND BENEFITS (IN 2015 INFLATION-ADJUSTED DOLLARS)				
Total households	801	+/-48	801	(X)
Less than \$10,000	234	+/-36	29.2%	+/-3.8
\$10,000 to \$14,999	104	+/-28	13.0%	+/-3.8
\$15,000 to \$24,999	114	+/-25	14.2%	+/-3.1
\$25,000 to \$34,999	114	+/-30	14.2%	+/-3.3
\$35,000 to \$49,999	83	+/-23	10.4%	+/-2.8
\$50,000 to \$74,999	77	+/-23	9.6%	+/-2.9
\$75,000 to \$99,999	43	+/-16	5.4%	+/-2.0
\$100,000 to \$149,999	27	+/-13	3.4%	+/-1.6
\$150,000 to \$199,999	5	+/-5	0.6%	+/-0.7
\$200,000 or more	0	+/-12	0.0%	+/-4.3
Median household income (dollars)	19,728	+/-3,521	(X)	(X)
Mean household income (dollars)	29,844	+/-2,434	(X)	(X)
With earnings	369	+/-40	46.1%	+/-4.3
Mean earnings (dollars)	41,494	+/-4,628	(X)	(X)
With Social Security	289	+/-36	36.1%	+/-4.2
Mean Social Security income (dollars)	12,271	+/-1,087	(X)	(X)
With retirement income	168	+/-26	21.0%	+/-3.0
Mean retirement income (dollars)	15,277	+/-2,681	(X)	(X)

Subject	Census Tract 9400.14, Navajo County, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
With Supplemental Security Income	168	+/-29	21.0%	+/-3.4
Mean Supplemental Security Income (dollars)	8,777	+/-959	(X)	(X)
With cash public assistance income	41	+/-18	5.1%	+/-2.1
Mean cash public assistance income (dollars)	3,729	+/-971	(X)	(X)
With Food Stamp/SNAP benefits in the past 12 months	258	+/-29	32.2%	+/-3.4
Families	596	+/-40	596	(X)
Less than \$10,000	129	+/-24	21.6%	+/-3.6
\$10,000 to \$14,999	71	+/-24	11.9%	+/-4.2
\$15,000 to \$24,999	94	+/-21	15.8%	+/-3.6
\$25,000 to \$34,999	108	+/-28	18.1%	+/-4.3
\$35,000 to \$49,999	70	+/-19	11.7%	+/-3.1
\$50,000 to \$74,999	56	+/-18	9.4%	+/-3.1
\$75,000 to \$99,999	36	+/-15	6.0%	+/-2.5
\$100,000 to \$149,999	27	+/-13	4.5%	+/-2.1
\$150,000 to \$199,999	5	+/-5	0.8%	+/-0.9
\$200,000 or more	0	+/-12	0.0%	+/-5.7
Median family income (dollars)	25,286	+/-3,949	(X)	(X)
Mean family income (dollars)	33,552	+/-2,929	(X)	(X)
Per capita income (dollars)	9,202	+/-873	(X)	(X)
Nonfamily households	205	+/-35	205	(X)
Median nonfamily income (dollars)	9,738	+/-821	(X)	(X)
Mean nonfamily income (dollars)	17,179	+/-3,731	(X)	(X)
Median earnings for workers (dollars)	22,318	+/-3,400	(X)	(X)
Median earnings for male full-time, year-round workers (dollars)	33,571	+/-1,885	(X)	(X)
Median earnings for female full-time, year-round workers (dollars)	34,191	+/-2,634	(X)	(X)
HEALTH INSURANCE COVERAGE				
Civilian noninstitutionalized population	2,858	+/-199	2,858	(X)
With health insurance coverage	2,256	+/-181	78.9%	+/-3.2
With private health insurance	581	+/-100	20.3%	+/-3.3
With public coverage	1,780	+/-175	62.3%	+/-4.0
No health insurance coverage	602	+/-101	21.1%	+/-3.2
Civilian noninstitutionalized population under 18 years	868	+/-106	868	(X)
No health insurance coverage	99	+/-43	11.4%	+/-4.9
Civilian noninstitutionalized population 18 to 64 years	1,497	+/-121	1,497	(X)
In labor force:	804	+/-84	804	(X)
Employed:	492	+/-56	492	(X)
With health insurance coverage	389	+/-50	79.1%	+/-5.8
With private health insurance	271	+/-44	55.1%	+/-6.5
With public coverage	149	+/-33	30.3%	+/-6.0
No health insurance coverage	103	+/-32	20.9%	+/-5.8
Unemployed:	312	+/-56	312	(X)
With health insurance coverage	207	+/-43	66.3%	+/-6.6
With private health insurance	33	+/-15	10.6%	+/-4.2
With public coverage	181	+/-42	58.0%	+/-7.5
No health insurance coverage	105	+/-28	33.7%	+/-6.6
Not in labor force:	693	+/-79	693	(X)
With health insurance coverage	430	+/-63	62.0%	+/-6.5
With private health insurance	33	+/-15	4.8%	+/-2.3

Subject	Census Tract 9400.14, Navajo County, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
With public coverage	399	+/-61	57.6%	+/-6.0
No health insurance coverage	263	+/-56	38.0%	+/-6.5
PERCENTAGE OF FAMILIES AND PEOPLE WHOSE INCOME IN THE PAST 12 MONTHS IS BELOW THE POVERTY LEVEL				
All families	(X)	(X)	45.6%	+/-5.5
With related children of the householder under 18 years	(X)	(X)	52.3%	+/-7.9
With related children of the householder under 5 years only	(X)	(X)	50.0%	+/-23.7
Married couple families	(X)	(X)	39.4%	+/-6.4
With related children of the householder under 18 years	(X)	(X)	49.1%	+/-10.0
With related children of the householder under 5 years only	(X)	(X)	45.5%	+/-37.0
Families with female householder, no husband present	(X)	(X)	54.5%	+/-7.5
With related children of the householder under 18 years	(X)	(X)	55.4%	+/-12.4
With related children of the householder under 5 years only	(X)	(X)	36.4%	+/-39.0
All people	(X)	(X)	53.4%	+/-4.7
Under 18 years	(X)	(X)	62.8%	+/-6.7
Related children of the householder under 18 years	(X)	(X)	62.7%	+/-6.7
Related children of the householder under 5 years	(X)	(X)	67.7%	+/-11.0
Related children of the householder 5 to 17 years	(X)	(X)	61.3%	+/-7.6
18 years and over	(X)	(X)	49.2%	+/-4.7
18 to 64 years	(X)	(X)	51.4%	+/-5.3
65 years and over	(X)	(X)	42.6%	+/-6.4
People in families	(X)	(X)	52.3%	+/-5.2
Unrelated individuals 15 years and over	(X)	(X)	62.8%	+/-8.1

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DP03

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Subject	Greasewood CDP, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
EMPLOYMENT STATUS				
Population 16 years and over	341	+/-67	341	(X)
In labor force	175	+/-55	51.3%	+/-8.6
Civilian labor force	175	+/-55	51.3%	+/-8.6
Employed	118	+/-36	34.6%	+/-7.3
Unemployed	57	+/-32	16.7%	+/-7.4
Armed Forces	0	+/-12	0.0%	+/-9.7
Not in labor force	166	+/-34	48.7%	+/-8.6
Civilian labor force	175	+/-55	175	(X)
Unemployment Rate	(X)	(X)	32.6%	+/-11.5
Females 16 years and over	181	+/-39	181	(X)
In labor force	91	+/-34	50.3%	+/-11.5
Civilian labor force	91	+/-34	50.3%	+/-11.5
Employed	72	+/-27	39.8%	+/-10.2
Own children of the householder under 6 years	30	+/-14	30	(X)
All parents in family in labor force	16	+/-9	53.3%	+/-21.1
Own children of the householder 6 to 17 years	167	+/-53	167	(X)
All parents in family in labor force	122	+/-49	73.1%	+/-13.4
COMMUTING TO WORK				
Workers 16 years and over	118	+/-36	118	(X)
Car, truck, or van -- drove alone	81	+/-35	68.6%	+/-12.8
Car, truck, or van -- carpooled	20	+/-13	16.9%	+/-9.6
Public transportation (excluding taxicab)	0	+/-12	0.0%	+/-25.2
Walked	17	+/-8	14.4%	+/-7.7
Other means	0	+/-12	0.0%	+/-25.2
Worked at home	0	+/-12	0.0%	+/-25.2

Subject	Greasewood CDP, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
Mean travel time to work (minutes)	32.6	+/-9.0	(X)	(X)
OCCUPATION				
Civilian employed population 16 years and over	118	+/-36	118	(X)
Management, business, science, and arts occupations	44	+/-16	37.3%	+/-10.0
Service occupations	27	+/-18	22.9%	+/-10.5
Sales and office occupations	26	+/-15	22.0%	+/-10.0
Natural resources, construction, and maintenance occupations	18	+/-10	15.3%	+/-8.5
Production, transportation, and material moving occupations	3	+/-4	2.5%	+/-3.5
INDUSTRY				
Civilian employed population 16 years and over	118	+/-36	118	(X)
Agriculture, forestry, fishing and hunting, and mining	0	+/-12	0.0%	+/-25.2
Construction	15	+/-10	12.7%	+/-7.8
Manufacturing	0	+/-12	0.0%	+/-25.2
Wholesale trade	0	+/-12	0.0%	+/-25.2
Retail trade	10	+/-10	8.5%	+/-7.7
Transportation and warehousing, and utilities	0	+/-12	0.0%	+/-25.2
Information	0	+/-12	0.0%	+/-25.2
Finance and insurance, and real estate and rental and leasing	4	+/-5	3.4%	+/-3.6
Professional, scientific, and management, and administrative and waste management services	0	+/-12	0.0%	+/-25.2
Educational services, and health care and social assistance	56	+/-16	47.5%	+/-11.4
Arts, entertainment, and recreation, and accommodation and food services	11	+/-11	9.3%	+/-8.1
Other services, except public administration	10	+/-12	8.5%	+/-9.2
Public administration	12	+/-10	10.2%	+/-7.3
CLASS OF WORKER				
Civilian employed population 16 years and over	118	+/-36	118	(X)
Private wage and salary workers	50	+/-26	42.4%	+/-13.9
Government workers	56	+/-16	47.5%	+/-11.9
Self-employed in own not incorporated business workers	12	+/-17	10.2%	+/-12.8
Unpaid family workers	0	+/-12	0.0%	+/-25.2
INCOME AND BENEFITS (IN 2015 INFLATION-ADJUSTED DOLLARS)				
Total households	134	+/-22	134	(X)
Less than \$10,000	24	+/-13	17.9%	+/-9.2
\$10,000 to \$14,999	4	+/-4	3.0%	+/-3.0
\$15,000 to \$24,999	23	+/-10	17.2%	+/-7.8
\$25,000 to \$34,999	29	+/-13	21.6%	+/-8.8
\$35,000 to \$49,999	15	+/-9	11.2%	+/-6.8
\$50,000 to \$74,999	26	+/-13	19.4%	+/-9.0
\$75,000 to \$99,999	8	+/-6	6.0%	+/-4.5
\$100,000 to \$149,999	5	+/-5	3.7%	+/-3.4
\$150,000 to \$199,999	0	+/-12	0.0%	+/-22.7
\$200,000 or more	0	+/-12	0.0%	+/-22.7
Median household income (dollars)	27,222	+/-5,132	(X)	(X)
Mean household income (dollars)	37,497	+/-5,526	(X)	(X)
With earnings	88	+/-21	65.7%	+/-11.2
Mean earnings (dollars)	43,590	+/-6,660	(X)	(X)
With Social Security	40	+/-15	29.9%	+/-10.4
Mean Social Security income (dollars)	15,045	+/-3,277	(X)	(X)
With retirement income	18	+/-9	13.4%	+/-6.4
Mean retirement income (dollars)	18,394	+/-7,034	(X)	(X)

Subject	Greasewood CDP, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
With Supplemental Security Income	11	+/-7	8.2%	+/-4.8
Mean Supplemental Security Income (dollars)	11,055	+/-2,673	(X)	(X)
With cash public assistance income	7	+/-5	5.2%	+/-4.0
Mean cash public assistance income (dollars)	N	N	N	N
With Food Stamp/SNAP benefits in the past 12 months	38	+/-14	28.4%	+/-8.8
Families	106	+/-21	106	(X)
Less than \$10,000	12	+/-8	11.3%	+/-7.2
\$10,000 to \$14,999	2	+/-4	1.9%	+/-3.9
\$15,000 to \$24,999	21	+/-10	19.8%	+/-8.4
\$25,000 to \$34,999	32	+/-14	30.2%	+/-10.8
\$35,000 to \$49,999	14	+/-9	13.2%	+/-8.2
\$50,000 to \$74,999	15	+/-9	14.2%	+/-7.8
\$75,000 to \$99,999	5	+/-5	4.7%	+/-4.5
\$100,000 to \$149,999	5	+/-5	4.7%	+/-4.2
\$150,000 to \$199,999	0	+/-12	0.0%	+/-27.5
\$200,000 or more	0	+/-12	0.0%	+/-27.5
Median family income (dollars)	27,500	+/-6,669	(X)	(X)
Mean family income (dollars)	38,282	+/-5,627	(X)	(X)
Per capita income (dollars)	9,907	+/-1,796	(X)	(X)
Nonfamily households	28	+/-13	28	(X)
Median nonfamily income (dollars)	(X)	(X)	(X)	(X)
Mean nonfamily income (dollars)	28,500	+/-13,737	(X)	(X)
Median earnings for workers (dollars)	27,500	+/-6,450	(X)	(X)
Median earnings for male full-time, year-round workers (dollars)	32,500	+/-7,274	(X)	(X)
Median earnings for female full-time, year-round workers (dollars)	31,354	+/-1,168	(X)	(X)
HEALTH INSURANCE COVERAGE				
Civilian noninstitutionalized population	519	+/-104	519	(X)
With health insurance coverage	436	+/-95	84.0%	+/-6.9
With private health insurance	155	+/-54	29.9%	+/-8.2
With public coverage	299	+/-78	57.6%	+/-10.4
No health insurance coverage	83	+/-40	16.0%	+/-6.9
Civilian noninstitutionalized population under 18 years	210	+/-59	210	(X)
No health insurance coverage	23	+/-14	11.0%	+/-7.0
Civilian noninstitutionalized population 18 to 64 years	251	+/-58	251	(X)
In labor force:	172	+/-56	172	(X)
Employed:	115	+/-37	115	(X)
With health insurance coverage	104	+/-33	90.4%	+/-6.4
With private health insurance	69	+/-23	60.0%	+/-11.3
With public coverage	41	+/-19	35.7%	+/-12.7
No health insurance coverage	11	+/-9	9.6%	+/-6.4
Unemployed:	57	+/-32	57	(X)
With health insurance coverage	35	+/-19	61.4%	+/-16.5
With private health insurance	9	+/-7	15.8%	+/-12.3
With public coverage	26	+/-19	45.6%	+/-19.6
No health insurance coverage	22	+/-19	38.6%	+/-16.5
Not in labor force:	79	+/-20	79	(X)
With health insurance coverage	62	+/-19	78.5%	+/-14.1
With private health insurance	7	+/-5	8.9%	+/-6.4

Subject	Greasewood CDP, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
With public coverage	55	+/-18	69.6%	+/-13.9
No health insurance coverage	17	+/-12	21.5%	+/-14.1
PERCENTAGE OF FAMILIES AND PEOPLE WHOSE INCOME IN THE PAST 12 MONTHS IS BELOW THE POVERTY LEVEL				
All families	(X)	(X)	34.9%	+/-10.8
With related children of the householder under 18 years	(X)	(X)	41.3%	+/-12.5
With related children of the householder under 5 years only	(X)	(X)	66.7%	+/-38.1
Married couple families	(X)	(X)	23.5%	+/-12.0
With related children of the householder under 18 years	(X)	(X)	34.0%	+/-15.8
With related children of the householder under 5 years only	(X)	(X)	0.0%	+/-100.0
Families with female householder, no husband present	(X)	(X)	63.6%	+/-20.6
With related children of the householder under 18 years	(X)	(X)	65.2%	+/-26.2
With related children of the householder under 5 years only	(X)	(X)	100.0%	+/-100.0
All people	(X)	(X)	41.2%	+/-11.4
Under 18 years	(X)	(X)	47.1%	+/-15.3
Related children of the householder under 18 years	(X)	(X)	47.1%	+/-15.3
Related children of the householder under 5 years	(X)	(X)	34.8%	+/-23.9
Related children of the householder 5 to 17 years	(X)	(X)	48.7%	+/-16.6
18 years and over	(X)	(X)	37.2%	+/-10.4
18 to 64 years	(X)	(X)	35.1%	+/-11.1
65 years and over	(X)	(X)	46.6%	+/-20.4
People in families	(X)	(X)	40.1%	+/-12.5
Unrelated individuals 15 years and over	(X)	(X)	50.0%	+/-20.6

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Estimates of urban and rural population, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2010 data. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

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7. An 'N' entry in the estimate and margin of error columns indicates that data for this geographic area cannot be displayed because the number of sample cases is too small.
8. An '(X)' means that the estimate is not applicable or not available.



DP03

SELECTED ECONOMIC CHARACTERISTICS

2011-2015 American Community Survey 5-Year Estimates

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Subject	Navajo County, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
EMPLOYMENT STATUS				
Population 16 years and over	80,446	+/-210	80,446	(X)
In labor force	39,846	+/-869	49.5%	+/-1.1
Civilian labor force	39,838	+/-868	49.5%	+/-1.1
Employed	31,955	+/-928	39.7%	+/-1.2
Unemployed	7,883	+/-531	9.8%	+/-0.7
Armed Forces	8	+/-13	0.0%	+/-0.1
Not in labor force	40,600	+/-904	50.5%	+/-1.1
Civilian labor force	39,838	+/-868	39,838	(X)
Unemployment Rate	(X)	(X)	19.8%	+/-1.3
Females 16 years and over	40,338	+/-163	40,338	(X)
In labor force	19,114	+/-546	47.4%	+/-1.4
Civilian labor force	19,114	+/-546	47.4%	+/-1.4
Employed	15,697	+/-582	38.9%	+/-1.5
Own children of the householder under 6 years	9,089	+/-250	9,089	(X)
All parents in family in labor force	4,921	+/-365	54.1%	+/-3.9
Own children of the householder 6 to 17 years	18,739	+/-384	18,739	(X)
All parents in family in labor force	11,561	+/-680	61.7%	+/-3.1
COMMUTING TO WORK				
Workers 16 years and over	31,165	+/-910	31,165	(X)
Car, truck, or van -- drove alone	22,433	+/-834	72.0%	+/-1.8
Car, truck, or van -- carpooled	4,104	+/-439	13.2%	+/-1.3
Public transportation (excluding taxicab)	474	+/-159	1.5%	+/-0.5
Walked	1,168	+/-193	3.7%	+/-0.6
Other means	726	+/-147	2.3%	+/-0.5
Worked at home	2,260	+/-306	7.3%	+/-1.0

Subject	Navajo County, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
With Supplemental Security Income	3,188	+/-270	9.3%	+/-0.8
Mean Supplemental Security Income (dollars)	8,797	+/-456	(X)	(X)
With cash public assistance income	1,336	+/-172	3.9%	+/-0.5
Mean cash public assistance income (dollars)	3,384	+/-411	(X)	(X)
With Food Stamp/SNAP benefits in the past 12 months	9,001	+/-433	26.4%	+/-1.1
Families	24,289	+/-638	24,289	(X)
Less than \$10,000	2,991	+/-332	12.3%	+/-1.3
\$10,000 to \$14,999	1,386	+/-210	5.7%	+/-0.8
\$15,000 to \$24,999	3,081	+/-281	12.7%	+/-1.1
\$25,000 to \$34,999	2,962	+/-302	12.2%	+/-1.3
\$35,000 to \$49,999	3,444	+/-333	14.2%	+/-1.3
\$50,000 to \$74,999	4,911	+/-427	20.2%	+/-1.7
\$75,000 to \$99,999	2,405	+/-272	9.9%	+/-1.1
\$100,000 to \$149,999	2,075	+/-268	8.5%	+/-1.1
\$150,000 to \$199,999	564	+/-147	2.3%	+/-0.6
\$200,000 or more	470	+/-148	1.9%	+/-0.6
Median family income (dollars)	42,673	+/-1,485	(X)	(X)
Mean family income (dollars)	54,594	+/-2,508	(X)	(X)
Per capita income (dollars)	16,486	+/-649	(X)	(X)
Nonfamily households	9,840	+/-622	9,840	(X)
Median nonfamily income (dollars)	21,948	+/-1,893	(X)	(X)
Mean nonfamily income (dollars)	30,700	+/-1,870	(X)	(X)
Median earnings for workers (dollars)	22,871	+/-1,179	(X)	(X)
Median earnings for male full-time, year-round workers (dollars)	41,000	+/-1,226	(X)	(X)
Median earnings for female full-time, year-round workers (dollars)	31,842	+/-1,011	(X)	(X)
HEALTH INSURANCE COVERAGE				
Civilian noninstitutionalized population	105,475	+/-233	105,475	(X)
With health insurance coverage	86,661	+/-1,069	82.2%	+/-1.0
With private health insurance	42,278	+/-1,326	40.1%	+/-1.3
With public coverage	55,563	+/-1,593	52.7%	+/-1.5
No health insurance coverage	18,814	+/-1,042	17.8%	+/-1.0
Civilian noninstitutionalized population under 18 years	30,386	+/-43	30,386	(X)
No health insurance coverage	3,928	+/-508	12.9%	+/-1.7
Civilian noninstitutionalized population 18 to 64 years	58,915	+/-246	58,915	(X)
In labor force:	37,346	+/-792	37,346	(X)
Employed:	29,890	+/-870	29,890	(X)
With health insurance coverage	22,571	+/-687	75.5%	+/-1.9
With private health insurance	17,155	+/-742	57.4%	+/-2.0
With public coverage	6,252	+/-435	20.9%	+/-1.6
No health insurance coverage	7,319	+/-674	24.5%	+/-1.9
Unemployed:	7,456	+/-515	7,456	(X)
With health insurance coverage	4,846	+/-410	65.0%	+/-3.8
With private health insurance	981	+/-173	13.2%	+/-2.2
With public coverage	4,020	+/-370	53.9%	+/-3.9
No health insurance coverage	2,610	+/-354	35.0%	+/-3.8
Not in labor force:	21,569	+/-759	21,569	(X)
With health insurance coverage	16,905	+/-739	78.4%	+/-2.0
With private health insurance	5,752	+/-453	26.7%	+/-1.9

Subject	Navajo County, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
With public coverage	12,203	+/-656	56.6%	+/-2.3
No health insurance coverage	4,664	+/-458	21.6%	+/-2.0
PERCENTAGE OF FAMILIES AND PEOPLE WHOSE INCOME IN THE PAST 12 MONTHS IS BELOW THE POVERTY LEVEL				
All families	(X)	(X)	25.1%	+/-1.5
With related children of the householder under 18 years	(X)	(X)	35.6%	+/-2.4
With related children of the householder under 5 years only	(X)	(X)	43.9%	+/-7.1
Married couple families	(X)	(X)	15.1%	+/-1.5
With related children of the householder under 18 years	(X)	(X)	23.3%	+/-2.7
With related children of the householder under 5 years only	(X)	(X)	29.0%	+/-10.4
Families with female householder, no husband present	(X)	(X)	49.4%	+/-3.3
With related children of the householder under 18 years	(X)	(X)	54.2%	+/-4.2
With related children of the householder under 5 years only	(X)	(X)	63.3%	+/-9.1
All people	(X)	(X)	30.6%	+/-1.4
Under 18 years	(X)	(X)	40.4%	+/-2.6
Related children of the householder under 18 years	(X)	(X)	40.3%	+/-2.6
Related children of the householder under 5 years	(X)	(X)	44.4%	+/-4.6
Related children of the householder 5 to 17 years	(X)	(X)	38.9%	+/-2.8
18 years and over	(X)	(X)	26.7%	+/-1.3
18 to 64 years	(X)	(X)	29.8%	+/-1.5
65 years and over	(X)	(X)	15.4%	+/-1.7
People in families	(X)	(X)	29.0%	+/-1.5
Unrelated individuals 15 years and over	(X)	(X)	40.9%	+/-2.4

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ACS DEMOGRAPHIC AND HOUSING ESTIMATES

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Subject	Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
SEX AND AGE				
Total population	6,641,928	*****	6,641,928	(X)
Male	3,299,088	+/-845	49.7%	+/-0.1
Female	3,342,840	+/-845	50.3%	+/-0.1
Under 5 years	433,835	+/-280	6.5%	+/-0.1
5 to 9 years	455,634	+/-3,864	6.9%	+/-0.1
10 to 14 years	456,495	+/-3,877	6.9%	+/-0.1
15 to 19 years	456,343	+/-963	6.9%	+/-0.1
20 to 24 years	478,317	+/-868	7.2%	+/-0.1
25 to 34 years	886,173	+/-676	13.3%	+/-0.1
35 to 44 years	833,412	+/-774	12.5%	+/-0.1
45 to 54 years	840,625	+/-480	12.7%	+/-0.1
55 to 59 years	402,381	+/-3,517	6.1%	+/-0.1
60 to 64 years	378,638	+/-3,516	5.7%	+/-0.1
65 to 74 years	588,977	+/-316	8.9%	+/-0.1
75 to 84 years	312,535	+/-2,323	4.7%	+/-0.1
85 years and over	118,563	+/-2,304	1.8%	+/-0.1
Median age (years)	36.8	+/-0.1	(X)	(X)
18 years and over	5,024,639	+/-358	75.7%	+/-0.1
21 years and over	4,736,626	+/-2,699	71.3%	+/-0.1
62 years and over	1,244,720	+/-2,805	18.7%	+/-0.1
65 years and over	1,020,075	+/-266	15.4%	+/-0.1
18 years and over	5,024,639	+/-358	5,024,639	(X)
Male	2,473,872	+/-648	49.2%	+/-0.1
Female	2,550,767	+/-554	50.8%	+/-0.1
65 years and over	1,020,075	+/-266	1,020,075	(X)
Male	468,074	+/-198	45.9%	+/-0.1

Subject	Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
Female	552,001	+/-168	54.1%	+/-0.1
RACE				
Total population	6,641,928	*****	6,641,928	(X)
One race	6,430,083	+/-4,480	96.8%	+/-0.1
Two or more races	211,845	+/-4,480	3.2%	+/-0.1
One race	6,430,083	+/-4,480	96.8%	+/-0.1
White	5,210,335	+/-10,167	78.4%	+/-0.2
Black or African American	281,576	+/-2,672	4.2%	+/-0.1
American Indian and Alaska Native	294,721	+/-2,084	4.4%	+/-0.1
Cherokee tribal grouping	2,817	+/-452	0.0%	+/-0.1
Chippewa tribal grouping	1,258	+/-480	0.0%	+/-0.1
Navajo tribal grouping	145,393	+/-2,297	2.2%	+/-0.1
Sioux tribal grouping	1,862	+/-442	0.0%	+/-0.1
Asian	200,090	+/-1,909	3.0%	+/-0.1
Asian Indian	43,322	+/-2,482	0.7%	+/-0.1
Chinese	38,663	+/-2,165	0.6%	+/-0.1
Filipino	36,976	+/-2,216	0.6%	+/-0.1
Japanese	10,269	+/-1,180	0.2%	+/-0.1
Korean	15,987	+/-1,505	0.2%	+/-0.1
Vietnamese	27,573	+/-2,095	0.4%	+/-0.1
Other Asian	27,300	+/-2,239	0.4%	+/-0.1
Native Hawaiian and Other Pacific Islander	12,471	+/-774	0.2%	+/-0.1
Native Hawaiian	4,284	+/-810	0.1%	+/-0.1
Guamanian or Chamorro	1,797	+/-427	0.0%	+/-0.1
Samoan	2,001	+/-496	0.0%	+/-0.1
Other Pacific Islander	4,389	+/-623	0.1%	+/-0.1
Some other race	430,890	+/-9,216	6.5%	+/-0.1
Two or more races	211,845	+/-4,480	3.2%	+/-0.1
White and Black or African American	44,339	+/-2,157	0.7%	+/-0.1
White and American Indian and Alaska Native	44,708	+/-2,128	0.7%	+/-0.1
White and Asian	40,054	+/-1,867	0.6%	+/-0.1
Black or African American and American Indian and Alaska Native	5,868	+/-804	0.1%	+/-0.1
Race alone or in combination with one or more other races				
Total population	6,641,928	*****	6,641,928	(X)
White	5,391,169	+/-9,838	81.2%	+/-0.1
Black or African American	348,422	+/-2,388	5.2%	+/-0.1
American Indian and Alaska Native	360,878	+/-2,924	5.4%	+/-0.1
Asian	260,295	+/-1,777	3.9%	+/-0.1
Native Hawaiian and Other Pacific Islander	27,497	+/-1,277	0.4%	+/-0.1
Some other race	482,227	+/-9,372	7.3%	+/-0.1
HISPANIC OR LATINO AND RACE				
Total population	6,641,928	*****	6,641,928	(X)
Hispanic or Latino (of any race)	2,014,711	*****	30.3%	*****
Mexican	1,813,659	+/-4,816	27.3%	+/-0.1
Puerto Rican	38,540	+/-2,151	0.6%	+/-0.1
Cuban	12,888	+/-1,289	0.2%	+/-0.1
Other Hispanic or Latino	149,624	+/-3,874	2.3%	+/-0.1
Not Hispanic or Latino	4,627,217	*****	69.7%	*****
White alone	3,752,853	+/-834	56.5%	+/-0.1
Black or African American alone	264,119	+/-2,194	4.0%	+/-0.1
American Indian and Alaska Native alone	265,099	+/-1,532	4.0%	+/-0.1
Asian alone	194,757	+/-1,797	2.9%	+/-0.1
Native Hawaiian and Other Pacific Islander alone	11,422	+/-633	0.2%	+/-0.1

Subject	Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
Some other race alone	7,077	+/-816	0.1%	+/-0.1
Two or more races	131,890	+/-2,706	2.0%	+/-0.1
Two races including Some other race	4,917	+/-668	0.1%	+/-0.1
Two races excluding Some other race, and Three or more races	126,973	+/-2,631	1.9%	+/-0.1
Total housing units	2,890,664	+/-492	(X)	(X)
CITIZEN, VOTING AGE POPULATION				
Citizen, 18 and over population	4,526,594	+/-6,598	4,526,594	(X)
Male	2,224,133	+/-4,161	49.1%	+/-0.1
Female	2,302,461	+/-3,517	50.9%	+/-0.1

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Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

Explanation of Symbols:

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Subject	Census Tract 9400.14, Navajo County, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
SEX AND AGE				
Total population	2,858	+/-199	2,858	(X)
Male	1,414	+/-106	49.5%	+/-2.0
Female	1,444	+/-124	50.5%	+/-2.0
Under 5 years				
5 to 9 years	195	+/-53	6.8%	+/-1.7
10 to 14 years	260	+/-48	9.1%	+/-1.3
15 to 19 years	236	+/-40	8.3%	+/-1.3
20 to 24 years	278	+/-60	9.7%	+/-1.9
25 to 34 years	157	+/-38	5.5%	+/-1.1
35 to 44 years	276	+/-43	9.7%	+/-1.3
45 to 54 years	299	+/-47	10.5%	+/-1.4
55 to 59 years	380	+/-48	13.3%	+/-1.6
60 to 64 years	154	+/-29	5.4%	+/-1.0
65 to 74 years	130	+/-28	4.5%	+/-1.0
75 to 84 years	258	+/-41	9.0%	+/-1.5
85 years and over	183	+/-32	6.4%	+/-1.1
Median age (years)	52	+/-18	1.8%	+/-0.6
18 years and over				
21 years and over	35.8	+/-3.3	(X)	(X)
62 years and over	1,990	+/-129	69.6%	+/-2.3
65 years and over	1,854	+/-117	64.9%	+/-2.2
65 years and over	563	+/-55	19.7%	+/-2.1
65 years and over	493	+/-54	17.2%	+/-2.0
18 years and over				
Male	1,990	+/-129	1,990	(X)
Female	965	+/-76	48.5%	+/-2.3
Female	1,025	+/-82	51.5%	+/-2.3
65 years and over				
Male	493	+/-54	493	(X)
Male	211	+/-33	42.8%	+/-5.0

Subject	Census Tract 9400.14, Navajo County, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
Female	282	+/-40	57.2%	+/-5.0
RACE				
Total population	2,858	+/-199	2,858	(X)
One race	2,832	+/-193	99.1%	+/-1.0
Two or more races	26	+/-28	0.9%	+/-1.0
One race	2,832	+/-193	99.1%	+/-1.0
White	21	+/-14	0.7%	+/-0.5
Black or African American	3	+/-5	0.1%	+/-0.2
American Indian and Alaska Native	2,801	+/-192	98.0%	+/-1.6
Cherokee tribal grouping	0	+/-12	0.0%	+/-1.2
Chippewa tribal grouping	0	+/-12	0.0%	+/-1.2
Navajo tribal grouping	2,664	+/-196	93.2%	+/-2.8
Sioux tribal grouping	0	+/-12	0.0%	+/-1.2
Asian	0	+/-12	0.0%	+/-1.2
Asian Indian	0	+/-12	0.0%	+/-1.2
Chinese	0	+/-12	0.0%	+/-1.2
Filipino	0	+/-12	0.0%	+/-1.2
Japanese	0	+/-12	0.0%	+/-1.2
Korean	0	+/-12	0.0%	+/-1.2
Vietnamese	0	+/-12	0.0%	+/-1.2
Other Asian	0	+/-12	0.0%	+/-1.2
Native Hawaiian and Other Pacific Islander	4	+/-7	0.1%	+/-0.2
Native Hawaiian	4	+/-7	0.1%	+/-0.2
Guamanian or Chamorro	0	+/-12	0.0%	+/-1.2
Samoan	0	+/-12	0.0%	+/-1.2
Other Pacific Islander	0	+/-12	0.0%	+/-1.2
Some other race	3	+/-4	0.1%	+/-0.1
Two or more races	26	+/-28	0.9%	+/-1.0
White and Black or African American	0	+/-12	0.0%	+/-1.2
White and American Indian and Alaska Native	6	+/-8	0.2%	+/-0.3
White and Asian	0	+/-12	0.0%	+/-1.2
Black or African American and American Indian and Alaska Native	0	+/-12	0.0%	+/-1.2
Race alone or in combination with one or more other races				
Total population	2,858	+/-199	2,858	(X)
White	47	+/-41	1.6%	+/-1.4
Black or African American	3	+/-5	0.1%	+/-0.2
American Indian and Alaska Native	2,807	+/-192	98.2%	+/-1.5
Asian	0	+/-12	0.0%	+/-1.2
Native Hawaiian and Other Pacific Islander	24	+/-33	0.8%	+/-1.1
Some other race	3	+/-4	0.1%	+/-0.1
HISPANIC OR LATINO AND RACE				
Total population	2,858	+/-199	2,858	(X)
Hispanic or Latino (of any race)	59	+/-44	2.1%	+/-1.5
Mexican	26	+/-19	0.9%	+/-0.7
Puerto Rican	5	+/-7	0.2%	+/-0.2
Cuban	0	+/-12	0.0%	+/-1.2
Other Hispanic or Latino	28	+/-38	1.0%	+/-1.3
Not Hispanic or Latino	2,799	+/-191	97.9%	+/-1.5
White alone	13	+/-9	0.5%	+/-0.3
Black or African American alone	3	+/-5	0.1%	+/-0.2
American Indian and Alaska Native alone	2,773	+/-189	97.0%	+/-1.7
Asian alone	0	+/-12	0.0%	+/-1.2
Native Hawaiian and Other Pacific Islander alone	4	+/-7	0.1%	+/-0.2

Subject	Census Tract 9400.14, Navajo County, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
Some other race alone	0	+/-12	0.0%	+/-1.2
Two or more races	6	+/-8	0.2%	+/-0.3
Two races including Some other race	0	+/-12	0.0%	+/-1.2
Two races excluding Some other race, and Three or more races	6	+/-8	0.2%	+/-0.3
Total housing units	1,154	+/-42	(X)	(X)
CITIZEN, VOTING AGE POPULATION				
Citizen, 18 and over population	1,990	+/-129	1,990	(X)
Male	965	+/-76	48.5%	+/-2.3
Female	1,025	+/-82	51.5%	+/-2.3

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Subject	Greasewood CDP, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
SEX AND AGE				
Total population	519	+/-104	519	(X)
Male	240	+/-54	46.2%	+/-5.5
Female	279	+/-65	53.8%	+/-5.5
Under 5 years	23	+/-13	4.4%	+/-2.2
5 to 9 years	71	+/-30	13.7%	+/-4.2
10 to 14 years	67	+/-27	12.9%	+/-4.4
15 to 19 years	60	+/-22	11.6%	+/-3.9
20 to 24 years	17	+/-13	3.3%	+/-2.4
25 to 34 years	39	+/-18	7.5%	+/-3.0
35 to 44 years	90	+/-30	17.3%	+/-4.3
45 to 54 years	46	+/-21	8.9%	+/-3.3
55 to 59 years	15	+/-10	2.9%	+/-1.8
60 to 64 years	33	+/-13	6.4%	+/-2.6
65 to 74 years	17	+/-11	3.3%	+/-2.1
75 to 84 years	36	+/-16	6.9%	+/-3.3
85 years and over	5	+/-7	1.0%	+/-1.3
Median age (years)	32.5	+/-7.6	(X)	(X)
18 years and over	309	+/-61	59.5%	+/-5.9
21 years and over	294	+/-57	56.6%	+/-6.0
62 years and over	77	+/-23	14.8%	+/-4.6
65 years and over	58	+/-21	11.2%	+/-4.1
18 years and over	309	+/-61	309	(X)
Male	144	+/-33	46.6%	+/-5.2
Female	165	+/-37	53.4%	+/-5.2
65 years and over	58	+/-21	58	(X)
Male	26	+/-14	44.8%	+/-18.1

Subject	Greasewood CDP, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
Female	32	+/-14	55.2%	+/-18.1
RACE				
Total population	519	+/-104	519	(X)
One race	499	+/-96	96.1%	+/-5.0
Two or more races	20	+/-27	3.9%	+/-5.0
One race	499	+/-96	96.1%	+/-5.0
White	11	+/-12	2.1%	+/-2.1
Black or African American	0	+/-12	0.0%	+/-6.5
American Indian and Alaska Native	484	+/-96	93.3%	+/-7.9
Cherokee tribal grouping	0	+/-12	0.0%	+/-6.5
Chippewa tribal grouping	0	+/-12	0.0%	+/-6.5
Navajo tribal grouping	481	+/-97	92.7%	+/-8.0
Sioux tribal grouping	0	+/-12	0.0%	+/-6.5
Asian	0	+/-12	0.0%	+/-6.5
Asian Indian	0	+/-12	0.0%	+/-6.5
Chinese	0	+/-12	0.0%	+/-6.5
Filipino	0	+/-12	0.0%	+/-6.5
Japanese	0	+/-12	0.0%	+/-6.5
Korean	0	+/-12	0.0%	+/-6.5
Vietnamese	0	+/-12	0.0%	+/-6.5
Other Asian	0	+/-12	0.0%	+/-6.5
Native Hawaiian and Other Pacific Islander	4	+/-7	0.8%	+/-1.2
Native Hawaiian	4	+/-7	0.8%	+/-1.2
Guamanian or Chamorro	0	+/-12	0.0%	+/-6.5
Samoan	0	+/-12	0.0%	+/-6.5
Other Pacific Islander	0	+/-12	0.0%	+/-6.5
Some other race	0	+/-12	0.0%	+/-6.5
Two or more races	20	+/-27	3.9%	+/-5.0
White and Black or African American	0	+/-12	0.0%	+/-6.5
White and American Indian and Alaska Native	0	+/-12	0.0%	+/-6.5
White and Asian	0	+/-12	0.0%	+/-6.5
Black or African American and American Indian and Alaska Native	0	+/-12	0.0%	+/-6.5
Race alone or in combination with one or more other races				
Total population	519	+/-104	519	(X)
White	31	+/-38	6.0%	+/-7.0
Black or African American	0	+/-12	0.0%	+/-6.5
American Indian and Alaska Native	484	+/-96	93.3%	+/-7.9
Asian	0	+/-12	0.0%	+/-6.5
Native Hawaiian and Other Pacific Islander	24	+/-33	4.6%	+/-5.9
Some other race	0	+/-12	0.0%	+/-6.5
HISPANIC OR LATINO AND RACE				
Total population	519	+/-104	519	(X)
Hispanic or Latino (of any race)	30	+/-38	5.8%	+/-7.0
Mexican	2	+/-3	0.4%	+/-0.6
Puerto Rican	0	+/-12	0.0%	+/-6.5
Cuban	0	+/-12	0.0%	+/-6.5
Other Hispanic or Latino	28	+/-38	5.4%	+/-6.9
Not Hispanic or Latino	489	+/-95	94.2%	+/-7.0
White alone	3	+/-4	0.6%	+/-0.8
Black or African American alone	0	+/-12	0.0%	+/-6.5
American Indian and Alaska Native alone	482	+/-96	92.9%	+/-8.0
Asian alone	0	+/-12	0.0%	+/-6.5
Native Hawaiian and Other Pacific Islander alone	4	+/-7	0.8%	+/-1.2

Subject	Greasewood CDP, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
Some other race alone	0	+/-12	0.0%	+/-6.5
Two or more races	0	+/-12	0.0%	+/-6.5
Two races including Some other race	0	+/-12	0.0%	+/-6.5
Two races excluding Some other race, and Three or more races	0	+/-12	0.0%	+/-6.5
Total housing units	193	+/-20	(X)	(X)
CITIZEN, VOTING AGE POPULATION				
Citizen, 18 and over population	309	+/-61	309	(X)
Male	144	+/-33	46.6%	+/-5.2
Female	165	+/-37	53.4%	+/-5.2

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While the 2011-2015 American Community Survey (ACS) data generally reflect the February 2013 Office of Management and Budget (OMB) definitions of metropolitan and micropolitan statistical areas; in certain instances the names, codes, and boundaries of the principal cities shown in ACS tables may differ from the OMB definitions due to differences in the effective dates of the geographic entities.

Estimates of urban and rural population, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2010 data. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

Explanation of Symbols:

1. An '***' entry in the margin of error column indicates that either no sample observations or too few sample observations were available to compute a standard error and thus the margin of error. A statistical test is not appropriate.
2. An '-' entry in the estimate column indicates that either no sample observations or too few sample observations were available to compute an estimate, or a ratio of medians cannot be calculated because one or both of the median estimates falls in the lowest interval or upper interval of an open-ended distribution.
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5. An '***' entry in the margin of error column indicates that the median falls in the lowest interval or upper interval of an open-ended distribution. A statistical test is not appropriate.
6. An '*****' entry in the margin of error column indicates that the estimate is controlled. A statistical test for sampling variability is not appropriate.
7. An 'N' entry in the estimate and margin of error columns indicates that data for this geographic area cannot be displayed because the number of sample cases is too small.
8. An '(X)' means that the estimate is not applicable or not available.



DP05

ACS DEMOGRAPHIC AND HOUSING ESTIMATES

2011-2015 American Community Survey 5-Year Estimates

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the Data and Documentation section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the Methodology section.

Tell us what you think. Provide feedback to help make American Community Survey data more useful for you.

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.

Subject	Navajo County, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
SEX AND AGE				
Total population	107,656	*****	107,656	(X)
Male	53,984	+/-48	50.1%	+/-0.1
Female	53,672	+/-48	49.9%	+/-0.1
Under 5 years	8,010	+/-48	7.4%	+/-0.1
5 to 9 years	8,795	+/-382	8.2%	+/-0.4
10 to 14 years	8,449	+/-377	7.8%	+/-0.3
15 to 19 years	8,253	+/-135	7.7%	+/-0.1
20 to 24 years	6,989	+/-134	6.5%	+/-0.1
25 to 34 years	12,359	+/-125	11.5%	+/-0.1
35 to 44 years	11,480	+/-76	10.7%	+/-0.1
45 to 54 years	13,420	+/-72	12.5%	+/-0.1
55 to 59 years	7,379	+/-356	6.9%	+/-0.3
60 to 64 years	6,205	+/-357	5.8%	+/-0.3
65 to 74 years	10,068	+/-29	9.4%	+/-0.1
75 to 84 years	4,732	+/-199	4.4%	+/-0.2
85 years and over	1,517	+/-197	1.4%	+/-0.2
Median age (years)	35.7	+/-0.2	(X)	(X)
18 years and over	77,218	+/-20	71.7%	+/-0.1
21 years and over	72,626	+/-237	67.5%	+/-0.2
62 years and over	19,870	+/-307	18.5%	+/-0.3
65 years and over	16,317	+/-30	15.2%	+/-0.1
18 years and over	77,218	+/-20	77,218	(X)
Male	38,400	+/-32	49.7%	+/-0.1
Female	38,818	+/-31	50.3%	+/-0.1
65 years and over	16,317	+/-30	16,317	(X)
Male	7,640	+/-24	46.8%	+/-0.1

Subject	Navajo County, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
Female	8,677	+/-24	53.2%	+/-0.1
RACE				
Total population	107,656	*****	107,656	(X)
One race	104,447	+/-534	97.0%	+/-0.5
Two or more races	3,209	+/-534	3.0%	+/-0.5
One race	104,447	+/-534	97.0%	+/-0.5
White	52,106	+/-615	48.4%	+/-0.6
Black or African American	721	+/-180	0.7%	+/-0.2
American Indian and Alaska Native	47,216	+/-466	43.9%	+/-0.4
Cherokee tribal grouping	107	+/-121	0.1%	+/-0.1
Chippewa tribal grouping	35	+/-41	0.0%	+/-0.1
Navajo tribal grouping	27,146	+/-807	25.2%	+/-0.7
Sioux tribal grouping	98	+/-71	0.1%	+/-0.1
Asian	630	+/-115	0.6%	+/-0.1
Asian Indian	112	+/-85	0.1%	+/-0.1
Chinese	144	+/-97	0.1%	+/-0.1
Filipino	163	+/-81	0.2%	+/-0.1
Japanese	52	+/-49	0.0%	+/-0.1
Korean	34	+/-25	0.0%	+/-0.1
Vietnamese	20	+/-30	0.0%	+/-0.1
Other Asian	105	+/-95	0.1%	+/-0.1
Native Hawaiian and Other Pacific Islander	100	+/-34	0.1%	+/-0.1
Native Hawaiian	19	+/-30	0.0%	+/-0.1
Guamanian or Chamorro	20	+/-25	0.0%	+/-0.1
Samoan	0	+/-29	0.0%	+/-0.1
Other Pacific Islander	61	+/-56	0.1%	+/-0.1
Some other race	3,674	+/-595	3.4%	+/-0.6
Two or more races	3,209	+/-534	3.0%	+/-0.5
White and Black or African American	229	+/-111	0.2%	+/-0.1
White and American Indian and Alaska Native	1,683	+/-426	1.6%	+/-0.4
White and Asian	119	+/-77	0.1%	+/-0.1
Black or African American and American Indian and Alaska Native	228	+/-105	0.2%	+/-0.1
Race alone or in combination with one or more other races				
Total population	107,656	*****	107,656	(X)
White	54,728	+/-740	50.8%	+/-0.7
Black or African American	1,312	+/-271	1.2%	+/-0.3
American Indian and Alaska Native	49,520	+/-353	46.0%	+/-0.3
Asian	1,016	+/-142	0.9%	+/-0.1
Native Hawaiian and Other Pacific Islander	322	+/-125	0.3%	+/-0.1
Some other race	4,306	+/-629	4.0%	+/-0.6
HISPANIC OR LATINO AND RACE				
Total population	107,656	*****	107,656	(X)
Hispanic or Latino (of any race)	11,905	*****	11.1%	*****
Mexican	10,295	+/-359	9.6%	+/-0.3
Puerto Rican	266	+/-161	0.2%	+/-0.1
Cuban	94	+/-88	0.1%	+/-0.1
Other Hispanic or Latino	1,250	+/-334	1.2%	+/-0.3
Not Hispanic or Latino	95,751	*****	88.9%	*****
White alone	45,842	+/-34	42.6%	+/-0.1
Black or African American alone	499	+/-139	0.5%	+/-0.1
American Indian and Alaska Native alone	46,385	+/-444	43.1%	+/-0.4
Asian alone	630	+/-115	0.6%	+/-0.1
Native Hawaiian and Other Pacific Islander alone	100	+/-34	0.1%	+/-0.1

Subject	Navajo County, Arizona			
	Estimate	Margin of Error	Percent	Percent Margin of Error
Some other race alone	50	+/-52	0.0%	+/-0.1
Two or more races	2,245	+/-497	2.1%	+/-0.5
Two races including Some other race	162	+/-136	0.2%	+/-0.1
Two races excluding Some other race, and Three or more races	2,083	+/-462	1.9%	+/-0.4
Total housing units	57,414	+/-101	(X)	(X)
CITIZEN, VOTING AGE POPULATION				
Citizen, 18 and over population	75,710	+/-345	75,710	(X)
Male	37,439	+/-235	49.5%	+/-0.1
Female	38,271	+/-158	50.5%	+/-0.1

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. The value shown here is the 90 percent margin of error. The margin of error can be interpreted roughly as providing a 90 percent probability that the interval defined by the estimate minus the margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see Accuracy of the Data). The effect of nonsampling error is not represented in these tables.

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Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates

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COLORADO

Page

UNIT 8

UNIT 10

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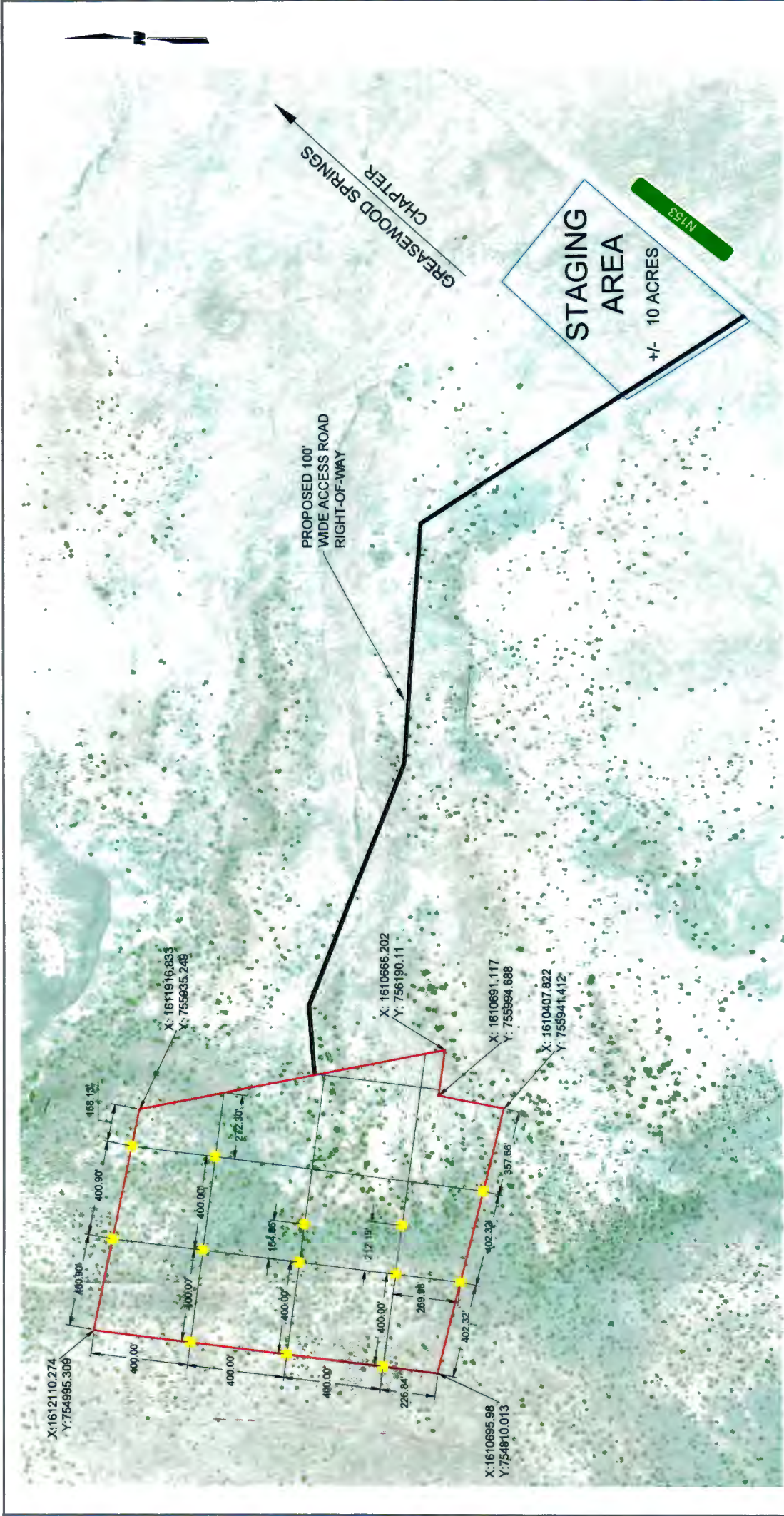
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APPENDIX B

PROJECT PLANS



NDOT GRAVEL PIT STUDY		GREASEWOOD SPRINGS SITE #1	
WILSON & COMPANY 4900 LANG AVE. N.E. ALBUQUERQUE, NEW MEXICO 87109 (505) 346-4000		M153	
REVISIONS		DESIGN	
NO.		DATE	
BY		REMARKS	
SHEET NO.		PROJECT NO.	
2017		DATE	
DRAWN		SHEET NO.	
CHECK		OF	

GREASEWOOD SPRINGS GRAVEL PIT #1 APPROXIMATE BORING LOCATIONS

SCALE 1"=200'

- LEGEND**
- PROPOSED 40 ACRE PIT SITE
 - APPROXIMATE BORING LOCATION

APPENDIX C

TRIBAL AGENCY COORDINATION LETTERS



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April 13, 2017

Mr. Lucas Lucero
Deputy State Director, Lands and Minerals
Bureau of Land Management
One North Central Avenue, Suite 800
Phoenix, AZ 85004-4427

**RE: Greasewood Springs Gravel Project – Navajo Nation, Navajo County, Arizona
Agency Consultation Regarding Minerals**

Dear Mr. Lucero:

The Navajo Division of Transportation (NDOT) is proposing to establish a gravel extraction pit and associated access and infrastructure within the Greasewood Springs Chapter community. The project area appears on the *Greasewood Springs, Arizona*, US Geological Survey 7.5-minute quadrangle map (see attached figure). The project would provide roadway surfacing materials for NDOT transportation projects. Under the proposed action, a gravel pit permit would be granted to NDOT to remove gravel from approximately 40 acres of trust lands. Associated actions would include the following:

- Exploration (drilling/sampling)
- Roadway access along N153
- Construction of a new unpaved roadway from N153 to N15
- 10.5-acre staging area to crush and stock-pile materials
- Construction of roadways for one-time drilling rig access as well as hauling gravel and pit access

An environmental assessment is being prepared and submitted to the Bureau of Indian Affairs (BIA) Branch of Environmental Quality Compliance and Review for their review. Biological and cultural resources surveys of the project area were conducted and reports are in progress. Agencies with potential interest in the Greasewood Springs Gravel Project are being contacted to satisfy agency consultation guidelines under the BIA National Environmental Policy Act procedures.

I am requesting information on applicable Bureau of Land Management procedures regarding minerals, including exploration, extraction, and land rehabilitation. Please identify any Bureau of Land Management requirements or standards that will apply to this project. I can provide you with copies of project plans once they are ready. Please inform me of any additional information or documentation that you need on the Greasewood Springs Gravel Project.

Mr. Lucas Lucero
Deputy State Director, Lands and Minerals
Bureau of Land Management
Page 2

If you have questions or require additional information, please contact me by phone at 505-898-8848 or by email at eric@marroninc.com. Thank you for your assistance.

Sincerely,

A handwritten signature in black ink that reads "Eric R. Johnson". The signature is written in a cursive style with a large, stylized "E" and "J".

Eric Johnson
Senior Environmental Project Manager

CC: NDOT-Project Management



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April 13, 2017

Mr. Ronald Gishey, Sr.
President
Greasewood Spring Chapter
P.O. Box 1260
Ganado, AZ 86505

**RE: Greasewood Springs Gravel Project – Navajo Nation, Navajo County, Arizona
Agency Consultation and Request for a Copy of the Greasewood Springs Chapter Land Use Plan**

Dear Mr. Gishey:

The Navajo Division of Transportation (NDOT) is proposing to establish a gravel extraction pit and associated access and infrastructure within the Greasewood Springs Chapter community. The project area appears on the *Greasewood Springs, Arizona*, US Geological Survey 7.5-minute quadrangle map (see attached figure). The project would provide roadway surfacing materials for NDOT transportation projects. Under the proposed action, a gravel pit permit would be granted to NDOT to remove gravel from approximately 40 acres of trust lands. Associated actions would include the following:

- Exploration (drilling/sampling)
- Roadway access along N153
- Construction of a new unpaved roadway from N153 to N15
- 10.5-acre staging area to crush and stock-pile materials
- Construction of roadways for one-time drilling rig access as well as hauling gravel and pit access

An environmental assessment is being prepared and submitted to the Bureau of Indian Affairs (BIA) Branch of Environmental Quality Compliance and Review for their review. Biological and cultural resources surveys of the project area were conducted and reports are in progress. Agencies with potential interest in the Greasewood Springs Gravel Project are being contacted to satisfy agency consultation guidelines under the BIA National Environmental Policy Act procedures.

I am requesting information on any issues or concerns that should be considered when developing plans for the Greasewood Springs Gravel Project. In addition, I am requesting a copy of the Greasewood Springs Chapter Land Use Plan for reference in the environmental assessment.

Mr. Ronald Gishey, Sr.
President
Greasewood Spring Chapter
Page 2

If you have questions or require additional information, please contact me by phone at 505-898-8848 or by email at eric@marroninc.com. Thank you for your assistance.

Sincerely,

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Eric Johnson
Senior Environmental Project Manager

CC: NDOT-Project Management



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April 13, 2017

Mr. Leo Watchman, Jr., Department Manager III
Ms. Roxie June, Principal Planner
Navajo Nation Department of Agriculture
P.O. Box 4889
Window Rock, AZ 86515

**RE: Greasewood Springs Gravel Project – Navajo Nation, Navajo County, Arizona
Agency Consultation on Agriculture and Request for Greasewood Springs Agricultural Data**

Dear Mr. Watchman & Ms. June:

The Navajo Division of Transportation (NDOT) is proposing to establish a gravel extraction pit and associated access and infrastructure within the Greasewood Springs Chapter community. The project area appears on the *Greasewood Springs, Arizona*, US Geological Survey 7.5-minute quadrangle map (see attached figure). The project would provide roadway surfacing materials for NDOT transportation projects. Under the proposed action, a gravel pit permit would be granted to NDOT to remove gravel from approximately 40 acres of trust lands. Associated actions would include the following:

- Exploration (drilling/sampling)
- Roadway access along N153
- Construction of a new unpaved roadway from N153 to N15
- 10.5-acre staging area to crush and stock-pile materials
- Construction of roadways for one-time drilling rig access as well as hauling gravel and pit access

An environmental assessment is being prepared and submitted to the Bureau of Indian Affairs (BIA) Branch of Environmental Quality Compliance and Review for their review. Biological and cultural resources surveys of the project area were conducted and reports are in progress. Agencies with potential interest in the Greasewood Springs Gravel Project are being contacted to satisfy agency consultation guidelines under the BIA National Environmental Policy Act procedures.

I am requesting any agricultural information that might impact the Greasewood Springs community's crop production data, livestock grazing information, and number of farms and ranches. Please identify any issues or concerns that should be considered when developing plans for the Greasewood Springs Gravel Project.

Mr. Leo Watchman, Jr., Department Manager III
Ms. Roxie June, Principal Planner
Navajo Nation Department of Agriculture
Page 2

If you have questions or require additional information, please contact me by phone at 505-898-8848 or by email at eric@marroninc.com. Thank you for your assistance.

Sincerely,

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Eric Johnson
Senior Environmental Project Manager

CC: NDOT-Project Management



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April 13, 2017

Mr. Alex Becenti
Senior Department Manager, Forestry Services
Navajo Nation Forestry Department
P.O. Box 230
Fort Defiance, AZ 86504

**RE: Greasewood Springs Gravel Project – Navajo Nation, Navajo County, Arizona
Agency Consultation on Forestry and Request for Greasewood Springs Forestry Data**

Dear Mr. Becenti:

The Navajo Division of Transportation (NDOT) is proposing to establish a gravel extraction pit and associated access and infrastructure within the Greasewood Springs Chapter community. The project area appears on the *Greasewood Springs, Arizona*, US Geological Survey 7.5-minute quadrangle map (see attached figure). The project would provide roadway surfacing materials for NDOT transportation projects. Under the proposed action, a gravel pit permit would be granted to NDOT to remove gravel from approximately 40 acres of trust lands. Associated actions would include the following:

- Exploration (drilling/sampling)
- Roadway access along N153
- Construction of a new unpaved roadway from N153 to N15
- 10.5-acre staging area to crush and stock-pile materials
- Construction of roadways for one-time drilling rig access as well as hauling gravel and pit access

An environmental assessment is being prepared and submitted to the Bureau of Indian Affairs (BIA) Branch of Environmental Quality Compliance and Review for their review. Biological and cultural resources surveys of the project area were conducted and reports are in progress. Agencies with potential interest in the Greasewood Springs Gravel Project are being contacted to satisfy agency consultation guidelines under the BIA National Environmental Policy Act procedures.

I am requesting forestry information on the Greasewood Springs Chapter such as forest types, timber production, and harvesting data. Please identify any issues or concerns that should be considered when developing plans for the Greasewood Springs Gravel Project.

Mr. Alex Becenti
Senior Department Manager, Forestry Services
Navajo Nation Forestry Department
Page 2

If you have questions or require additional information, please contact me by phone at 505-898-8848 or by email at eric@marroninc.com. Thank you for your assistance.

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Eric Johnson
Senior Environmental Project Manager

CC: NDOT-Project Management



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April 13, 2017

Ms. Elerina Yazzie
Program Manager
General Land Development
Navajo Nation Land Department
P.O. Box 2249
Window Rock, AZ 86515

**RE: Greasewood Springs Gravel Project – Navajo Nation, Navajo County, Arizona
Agency Consultation on Land Use and Request for Greasewood Springs Chapter Land Use Plan**

Dear Ms. Yazzie:

The Navajo Division of Transportation (NDOT) is proposing to establish a gravel extraction pit and associated access and infrastructure within the Greasewood Springs Chapter community. The project area appears on the *Greasewood Springs, Arizona*, US Geological Survey 7.5-minute quadrangle map (see attached figure). The project would provide roadway surfacing materials for NDOT transportation projects. Under the proposed action, a gravel pit permit would be granted to NDOT to remove gravel from approximately 40 acres of trust lands. Associated actions would include the following:

- Exploration (drilling/sampling)
- Roadway access along N153
- Construction of a new unpaved roadway from N153 to N15
- 10.5-acre staging area to crush and stock-pile materials
- Construction of roadways for one-time drilling rig access as well as hauling gravel and pit access

An environmental assessment is being prepared and submitted to the Bureau of Indian Affairs (BIA) Branch of Environmental Quality Compliance and Review for their review. Biological and cultural resources surveys of the project area were conducted and reports are in progress. Agencies with potential interest in the Greasewood Springs Gravel Project are being contacted to satisfy agency consultation guidelines under the BIA National Environmental Policy Act procedures.

I am requesting information on land use at the Greasewood Springs Chapter community. Please identify any issues or concerns that should be considered when developing plans for the Greasewood Springs Gravel Project. In addition, I am requesting a copy of the Greasewood Springs Chapter Land Use Plan for reference in the environmental assessment.

Ms. Elerina Yazzie
Program Manager
General Land Development
Navajo Nation Land Department
Page 2

If you have questions or require additional information, please contact me by phone at 505-898-8848 or by email at eric@marroninc.com. Thank you for your assistance.

Sincerely,

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Eric Johnson
Senior Environmental Project Manager

CC: NDOT-Project Management



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April 13, 2017

Ms. Eugenie Quintana
Air Quality Control
Navajo Nation Environmental Protection Agency
P.O. Box 339
Window Rock, AZ 86515

**RE: Greasewood Springs Gravel Project – Navajo Nation, Navajo County, Arizona
Agency Consultation on Air Quality and Permits**

Dear Ms. Quintana:

The Navajo Division of Transportation (NDOT) is proposing to establish a gravel extraction pit and associated access and infrastructure within the Greasewood Springs Chapter community. The project area appears on the *Greasewood Springs, Arizona*, US Geological Survey 7.5-minute quadrangle map (see attached figure). The project would provide roadway surfacing materials for NDOT transportation projects. Under the proposed action, a gravel pit permit would be granted to NDOT to remove gravel from approximately 40 acres of trust lands. Associated actions would include the following:

- Exploration (drilling/sampling)
- Roadway access along N153
- Construction of a new unpaved roadway from N153 to N15
- 10.5-acre staging area to crush and stock-pile materials
- Construction of roadways for one-time drilling rig access as well as hauling gravel and pit access

An environmental assessment is being prepared and submitted to the Bureau of Indian Affairs (BIA) Branch of Environmental Quality Compliance and Review for their review. Biological and cultural resources surveys of the project area were conducted and reports are in progress. Agencies with potential interest in the Greasewood Springs Gravel Project are being contacted to satisfy agency consultation guidelines under the BIA National Environmental Policy Act procedures.

I am requesting information on air quality including dust control and permitting. Please identify any issues or concerns that should be considered when developing plans for the Greasewood Springs Gravel Project. In addition, I am requesting information on the application process for air permits for crushing operations and any other mining activities requiring air permit coverage.

Ms. Eugenie Quintana
Air Quality Control
Navajo Nation Environmental Protection Agency
Page 2

If you have questions or require additional information, please contact me by phone at 505-898-8848 or by email at eric@marroninc.com. Thank you for your assistance.

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Eric Johnson
Senior Environmental Project Manager

CC: NDOT-Project Management



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April 13, 2017

Waste Regulatory and Compliance Department
Navajo Nation Environmental Protection Agency
P.O. Box 339
Window Rock, AZ 86515

**RE: Greasewood Springs Gravel Project – Navajo Nation, Navajo County, Arizona
Agency Consultation on Hazardous Waste and Leaking Petroleum Storage Tanks Sites**

To Whom it May Concern:

The Navajo Division of Transportation (NDOT) is proposing to establish a gravel extraction pit and associated access and infrastructure within the Greasewood Springs Chapter community. The project area appears on the *Greasewood Springs, Arizona*, US Geological Survey 7.5-minute quadrangle map (see attached figure). The project would provide roadway surfacing materials for NDOT transportation projects. Under the proposed action, a gravel pit permit would be granted to NDOT to remove gravel from approximately 40 acres of trust lands. Associated actions would include the following:

- Exploration (drilling/sampling)
- Roadway access along N153
- Construction of a new unpaved roadway from N153 to N15
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- Construction of roadways for one-time drilling rig access as well as hauling gravel and pit access

An environmental assessment is being prepared and submitted to the Bureau of Indian Affairs (BIA) Branch of Environmental Quality Compliance and Review for their review. Biological and cultural resources surveys of the project area were conducted and reports are in progress. Agencies with potential interest in the Greasewood Springs Gravel Project are being contacted to satisfy agency consultation guidelines under the BIA National Environmental Policy Act procedures.

I am requesting information on hazardous materials sites in the Greasewood Springs Gravel Project Area including Superfund sites, remediation sites, mines, sheep dips, and leaking petroleum storage tanks. Please identify any issues or concerns that should be considered when developing plans for the Greasewood Springs Gravel Project.

Waste Regulatory and Compliance Department
Navajo Nation Environmental Protection Agency
Page 2

If you have questions or require additional information, please contact me by phone at 505-898-8848 or by email at eric@marroninc.com. Thank you for your assistance.

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Eric Johnson
Senior Environmental Project Manager

CC: NDOT-Project Management



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April 13, 2017

Navajo Nation Environmental Protection Agency (NNEPA)-
Surface and Ground Water Protection Department
P.O. Box 339
Window Rock, AZ 86515
(928)871-7690

**RE: Greasewood Springs Gravel Project – Navajo County, Arizona
Request for Clean Water Act Section 404/401 Permit Determination**

To Whom It May Concern:

The Navajo Division of Transportation (NDOT) is proposing to establish a gravel extraction pit and associated access and infrastructure within the Greasewood Springs Chapter community. The project area appears on the Greasewood Springs, Arizona, US Geological Survey 7.5-minute quadrangle map. The project would provide roadway surfacing materials for NDOT transportation projects.

Natural and cultural resources surveys of the project area have been conducted and reports are in progress. An environmental assessment is being prepared and submitted to the Bureau of Indian Affairs (BIA) Branch of Environmental Quality Compliance and Review for their review. Under the proposed action, a gravel pit permit would be granted to NDOT to remove gravel from approximately 40 acres of trust lands. Associated actions would include the following:

- Exploration (drilling/sampling)
- Roadway access along N153
- Construction of a new unpaved roadway from N153 to N15
- Staging area to crush and stock-pile materials
- Construction of roadways for one-time drilling rig access as well as hauling gravel and pit access

Four unnamed waterways appear to cross the project area on topographic mapping (see attached figure). However, nine small unnamed washes/waterways were identified within the project area during field surveys. Most of these support no bed and bank features at the project crossing, and none appear to have recently conveyed surface flows that connect to the downstream named arroyo, Steamboat Wash. Attached please find an aerial image overlain with the Arizona State Land Department waterway layer, as well as locations of observed waterways enumerated from south to north in the proposed project area. Also attached are photos associated with each of these waterway points.

NNEPA-
Surface and Ground Water Protection Department
Page 2

I am requesting your determination regarding NNEPA Section 401 and/or US Army Corps of Engineers Section 404 permitting for the project under the Clean Water Act. Please inform me of the permitting requirements for this project.

If you have questions or require additional information, please contact me by phone at 505-898-8848 or by email at eric@marroninc.com. Thank you for your assistance.

Sincerely,

A handwritten signature in black ink that reads "Eric R. Johnson". The signature is written in a cursive, flowing style.

Eric Johnson
Senior Environmental Project Manager

CC: NDOT-Project Management



7511 Fourth Street NW
Albuquerque, NM 87107
tel 505.898.8848
fax 505.897.7847
www.marroninc.com

Your Vision. Our Expertise. Exceptional Results.

April 20, 2017

Mr. Calvin Castillo
Supervisor Highway Engineer
Bureau of Indian Affairs
Fort Defiance Agency
P.O. Box 7H
Fort Defiance Agency, AZ 86504

**RE: Greasewood Springs Gravel Project – Navajo Nation, Navajo County, Arizona
Agency Consultation Regarding Roads**

Dear Mr. Castillo:

The Navajo Division of Transportation (NDOT) is proposing to establish a gravel extraction pit and associated access and infrastructure within the Greasewood Springs Chapter community. The project area appears on the *Greasewood Springs, Arizona*, US Geological Survey 7.5-minute quadrangle map (see attached figure). The project would provide roadway surfacing materials for NDOT transportation projects. Under the proposed action, a gravel pit permit would be granted to NDOT to remove gravel from approximately 40 acres of trust lands. Associated actions would include the following:

- Exploration (drilling/sampling)
- Roadway access along N153
- Construction of a new unpaved roadway from N153 to N15
- 10.5-acre staging area to crush and stock-pile materials
- Construction of roadways for one-time drilling rig access as well as hauling gravel and pit access

An environmental assessment is being prepared and submitted to the Bureau of Indian Affairs (BIA) Branch of Environmental Quality Compliance and Review for their review. Biological and cultural resources surveys of the project area were conducted and reports are in progress. Agencies with potential interest in the Greasewood Springs Gravel Project are being contacted to satisfy agency consultation guidelines under the BIA National Environmental Policy Act procedures.

I am requesting information on BIA road construction procedures. Please identify any standards or criteria that will apply to this project. The NDOT can provide you with copies of project plans once they are ready. Please inform us of any additional information that you need on the Greasewood Springs Gravel Project.

Mr. Calvin Castillo
Supervisor Highway Engineer
Bureau of Indian Affairs
Fort Defiance Agency
Page 2

If you have questions or require additional information, please contact me by phone at 505-898-8848 or by email at eric@marroninc.com. Thank you for your assistance.

Sincerely,

A handwritten signature in black ink that reads "Eric R. Johnson". The signature is written in a cursive style with a large, stylized "E" and "J".

Eric Johnson
Senior Environmental Project Manager

CC: NDOT-Project Management

APPENDIX D

BIOLOGICAL RESOURCE COMPLIANCE FORM

**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.

BRCF

PROJECT NAME & NO.: Greasewood Springs Gravel Pit

DESCRIPTION: The NDOT proposes to develop a gravel pit within a 40-acre mine lease and construct 3 new roadways for mine access, exploration activities, and transport route. The new mine access road would be 0.75 miles in length, the one-time access for exploration activities would be 1.5 miles in length, and the transport route would be 2.45 miles in length. The widths of the new roads are unknown. The project would also require a 10.5-acre staging area to crush and stock pile mined materials.

LOCATION: 10-11 miles SW of the community of Greasewood in Sections 1, 2, 3, 11, T23N, R22E, Sections 12, 36, T24N, R22E, and Sections 7, 18, 19, 30, 31, T24N, R23E, Navajo County, Arizona

REPRESENTATIVE: Taft Blackhorse, Department of Project Management, Navajo Division of Transportation

ACTION AGENCY: Navajo Nation and Bureau of Indian Affairs

B.R. REPORT TITLE / DATE / PREPARER: BE-Greasewood Springs Gravel Project/MAY2017/Marron & Associates, Inc.

SIGNIFICANT BIOLOGICAL RESOURCES FOUND: Area 1 & 3.

POTENTIAL IMPACTS

NESL SPECIES POTENTIALLY IMPACTED: NA

FEDERALLY-LISTED SPECIES AFFECTED: NA

OTHER SIGNIFICANT IMPACTS TO BIOLOGICAL RESOURCES: NA

AVOIDANCE / MITIGATION MEASURES: The NNDFW highly recommends that NDOT follows the mitigation measures outlined in the BE Section 5.0 Summary of Findings.

CONDITIONS OF COMPLIANCE*: NA

FORM PREPARED BY / DATE: Pamela A. Kyselka/19 JUL 2017

COPIES TO: (add categories as necessary)

☐☐

2 NTC § 164 Recommendation:

Signature

Date

☒ Approval

☐ Conditional Approval (with memo)

☐ Disapproval (with memo)

☐ Categorical Exclusion (with request letter)

☐ None (with memo)

[Handwritten Signature]

7/19/17

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

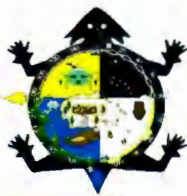
*I understand and accept the conditions of compliance, and acknowledge that lack of signature may be grounds for the Department not recommending the above described project for approval to the Tribal Decision-maker.

Representative's signature

Date

APPENDIX E

CULTURAL RESOURCE COMPLIANCE FORM



THE NAVAJO NATION
HERITAGE & HISTORIC PRESERVATION DEPARTMENT

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

CULTURAL RESOURCES COMPLIANCE FORM

ROUTE COPIES TO:	NNHPD NO.: HPD-17-539 - REVISED
<input checked="" type="checkbox"/> MAR	OTHER PROJECT NO.: MAR 17004.01

PROJECT TITLE: A Cultural Resource Survey for Proposed Gravel Pit, Greasewood Springs Chapter, Navajo Nation, Navajo County, Arizona

LEAD AGENCY: BIA/NR

SPONSOR: Navajo Division of Transportation, Attn: Garret Silversmith, Division Director, PO Box 4620, Window Rock, Arizona 86515

PROJECT DESCRIPTION: *The proposed undertaking includes developing a gravel along with an access & infrastructure. A gravel pit lease will be granted to NDOT to remove approximately 40-acres. Associated actions include the construction of two new roadways for long-term use and one new roadway for one-time access; exploration (drilling/sampling) of the proposed gravel pit; long term use of a portion of N153 as a haul route; and the construction of a staging area to crush and stock-pile materials for the gravel pit operation. The gravel pit APE is 40-acres; the roads & other areas is 87.45-acres; therefore, the total area of effect is 127.45-acres. Ground disturbance will be intensive & extensive with the use of heavy equipment.*

LAND STATUS:	Navajo Tribal Trust	CRCF
CHAPTER:	Greasewood Springs	
LOCATION:	The project is located on the Greasewood Quadrangle, Navajo County, Arizona G&SRPM	
	T. <u>23</u> N., R. <u>22</u> E- Sec. <u>01, 02, 03, 11</u>	
	T. <u>24</u> N., R. <u>22</u> E- Sec. <u>12, 36</u>	
	T. <u>24</u> N., R. <u>23</u> W- Sec. <u>07, 18, 19, 30, 31</u>	
PROJECT ARCHAEOLOGIST:	Christina Chavez, Toni R. Groar, Christopher Carlson & Ardale Delena	
NAVAJO ANTIQUITIES PERMIT NO.:	B17042	
DATE INSPECTED:	03/14/17 – 03/16/17	
DATE OF REPORT:	09/2017	
TOTAL ACREAGE INSPECTED:	237.86 – ac (127.45 ac=APE & 110.41 ac=Buffer Zones)	
METHOD OF INVESTIGATION:	Class III pedestrian inventory with transects spaced <u>15</u> m apart.	
LIST OF CULTURAL RESOURCES FOUND:	(5) Sites AZ-P-33-8, AZ-P-33-9, AZ-P-33-10, AZ-P-33-11, AZ-P-33-13 (14) Isolated Occurrences (IO)	
LIST OF ELIGIBLE PROPERTIES:	(2) Sites AZ-P-33-11, AZ-P-33-13	
LIST OF POTENTIALLY ELIGIBLE PROPERTIES:	(1) Site	

LIST OF NON-ELIGIBLE PROPERTIES:

(3) Sites
AZ-P-33-8, AZ-P-33-9, AZ-P-33-10

(14) IO

LIST OF ARCHAEOLOGICAL RESOURCES:

None

EFFECT/CONDITIONS OF COMPLIANCE: No historic properties affected with the following conditions:

SITES AZ-P-33-11, AZ-P-33-13 (ALSO TRADITIONAL CULTURAL PROPERTIES):

1. SITE BOUNDARIES WILL BE FLAGGED BY A QUALIFIED ARCHAEOLOGIST PRIOR TO ALL CONSTRUCTION ACTIVITIES.
2. A TEMPORARY FENCE WILL BE INSTALLED AROUND THE SITES DURING CONSTRUCTION ACTIVITIES FOR PROTECTION.
3. SITES WILL BE AVOIDED BY A MINIMUM OF 100-FT FROM SITE BOUNDARIES.

SITES AZ-P-33-8, AZ-P-33-9, AZ-P-33-10:

RECORDATION OF THESE SITES HAVE EXHAUSTED ALL RESEARCH POTENTIAL. NO FURTHER WORK IS REQUIRED.

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) 871-7198.

FORM PREPARED BY: Tamara Billie


FINALIZED: October 5, 2017

Notification to Proceed
Recommended

☒ Yes ☐ No

Conditions:

☒ Yes ☐ No


Richard M. Begay, Dept Mgr / THPO
The Navajo Nation
Heritage & Historic Preservation Department
Date 10/5/17

Navajo Region Approval

 Yes ☐ No


BIA - Navajo Regional Office
Date 10/12/17



COPY

01/26/18

THE NAVAJO HERITAGE & HISTORIC PRESERVATION DEPARTMENT

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

EXHIBIT

F

CULTURAL RESOURCES COMPLIANCE FORM

ROUTE COPIES TO:

☒ MAR

NNHPD NO.: **HPD-17-539 - REVISED**

OTHER PROJECT NO.: **MAR 17004.01**

PROJECT TITLE: A Cultural Resource Survey for Proposed Gravel Pit, Greasewood Springs Chapter, Navajo Nation, Navajo County, Arizona

LEAD AGENCY: BIA/NR

SPONSOR: Navajo Division of Transportation, Attn: Garret Silversmith, Division Director, PO Box 4620, Window Rock, Arizona 86515

PROJECT DESCRIPTION: *The proposed undertaking includes developing a gravel along with an access & infrastructure. A gravel pit lease will be granted to NDOT to remove approximately 40-acres. Associated actions include the construction of two new roadways for long-term use and one new roadway for one-time access; exploration (drilling/sampling) of the proposed gravel pit; long term use of a portion of N153 as a haul route; and the construction of a staging area to crush and stock-pile materials for the gravel pit operation. The gravel pit APE is 40-acres; the roads & other areas is 87.45-acres; therefore, the total area of effect is 127.45-acres. Ground disturbance will be intensive & extensive with the use of heavy equipment.*

**LAND
STATUS:**

Navajo Tribal Trust

CHAPTER:

Greasewood Springs

LOCATION:

The project is located on the Greasewood Quadrangle, Navajo County, Arizona G&SRPM

T. 23 N., R. 22 E- Sec. 01, 02, 03, 11

T. 24 N., R. 22 E- Sec. 12, 36

T. 24 N., R. 23 W- Sec. 07, 18, 19, 30, 31

PROJECT ARCHAEOLOGIST:

Christina Chavez, Toni R. Groar, Christopher Carlson & Ardale Delena

NAVAJO ANTIQUITIES PERMIT NO.:

B17042

DATE INSPECTED:

03/14/17 – 03/16/17

DATE OF REPORT:

09/2017

TOTAL ACREAGE INSPECTED:

237.86 – ac (127.45 ac=APE & 110.41 ac=Buffer Zones)

METHOD OF INVESTIGATION:

Class III pedestrian inventory with transects spaced 15 m apart.

LIST OF CULTURAL RESOURCES FOUND:

(5) Sites

AZ-P-33-8, AZ-P-33-9, AZ-P-33-10, AZ-P-33-11, AZ-P-33-13

(14) Isolated Occurrences (IO)

LIST OF ELIGIBLE PROPERTIES:

(2) Sites

AZ-P-33-11, AZ-P-33-13

LIST OF POTENTIALLY ELIGIBLE PROPERTIES:

(1) Site

LIST OF NON-ELIGIBLE PROPERTIES:

(3) Sites

AZ-P-33-8, AZ-P-33-9, AZ-P-33-10

(14) IO

LIST OF ARCHAEOLOGICAL RESOURCES:

None

EFFECT/CONDITIONS OF COMPLIANCE: No historic properties affected with the following conditions:

SITES AZ-P-33-11, AZ-P-33-13 (ALSO TRADITIONAL CULTURAL PROPERTIES):

1. SITE BOUNDARIES WILL BE FLAGGED BY A QUALIFIED ARCHAEOLOGIST PRIOR TO ALL CONSTRUCTION ACTIVITIES.
2. A TEMPORARY FENCE WILL BE INSTALLED AROUND THE SITES DURING CONSTRUCTION ACTIVITIES FOR PROTECTION.
3. SITES WILL BE AVOIDED BY A MINIMUM OF 100-FT FROM SITE BOUNDARIES.

SITES AZ-P-33-8, AZ-P-33-9, AZ-P-33-10:

RECORDATION OF THESE SITES HAVE EXHAUSTED ALL RESEARCH POTENTIAL. NO FURTHER WORK IS REQUIRED.

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) 871-7198.

FORM PREPARED BY: Tamara Billie

FINALIZED: October 5, 2017

Notification to Proceed
Recommended

☒ Yes ☐ No

Conditions:

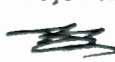
☒ Yes ☐ No

 10/5/17
Richard M. Begay, Dept Mgr / THPO Date
The Navajo Nation
Heritage & Historic Preservation Department

Navajo Region Approval

 Yes ☐ No

 10/12/17
BIA - Navajo Regional Office Date

 10/11/17

Cultural Resource Survey

Greasewood Springs Gravel Pit Project Navajo County, Arizona



Prepared for
Wilson & Company, Inc.



April 2017

Archaeological Inventory Report Document Page (HPD APR/93)

1. HPD REPORT NO.	
2. TITLE OF REPORT: A Cultural Resource Survey for Proposed Gravel Pit, Greasewood Springs Chapter, Navajo Nation, Navajo County, Arizona	3. FIELDWORK DATES: March 14 through March 16, 2017
5. CONSULTANT NAME AND ADDRESS: Marron and Associates 7511 Fourth Street NW Albuquerque, NM 87101	4. REPORT DATE: April 2017
	6. PERMIT NO.: B17042
	7. CONSULTANT REPORT NO.: 17004.01
8. SPONSOR NAME AND ADDRESS: Navajo Division of Transportation Garret Silversmith, Division Director PO Box 4620, Window Rock, AZ, 86515 505-371-8341	9. SPONSOR PROJECT NO. : 14-100-040-01
	10. AREA OF EFFECT: 127.45 ac (50.36 ha) TOTAL AREA SURVEYED: 127.45 ac (50.36 ha)

11. LOCATION (MAP ATTACHED): See report

a. Chapter: Greasewood Springs	f. UTM Zone: 12 N153A BOP, 596618 3924833 N153S EOP 595254 3928001 N153 BOP 593674 3920323 N153 EOP 596677 3924869 Rig Access BOP 593222 3919524 Rig Access EOP 592257 3920669 Gravel Pit NW 592310 3921104 Gravel Pit SW 592257 3920669 Gravel Pit NE 592601 3921047 Gravel Pit SE 592608 3920582 Staging Area NW 593724 3920710 Staging Area SW 593573 3920523 Staging Area NE, 593879 3920586 Staging Area SE, 593725 3920399 Access Road BOP, 593714 3920389 Access Road EOP, 592648 3920825
b. Agency: Navajo Nation's Fort Defiance Agency	g. Legal: Township: Range: Sections: T23N R22E 01, 02, 03, 11 T24N R22E 12 and 36 T24N R23E 07, 18, 19, 30, 31
c. County: Navajo	h. 7.5' Map(s): Greasewood Springs 35109-D8 (1972)
d. State: Arizona	i. Lead Agency: Navajo Nation
e. Land Status: Navajo Nation Trust Lands	

12. REPORT ATTACHMENTS:

a. Description of Undertaking:

The Navajo Division of Transportation (NDOT) proposes to develop a gravel pit and associated access and infrastructure within the Greasewood Springs Chapter in Arizona (Figures 1 and 2). The Greasewood Chapter is located within the Navajo Nation's Fort Defiance Agency in Navajo County, Arizona.

The project purpose is to provide roadway surfacing materials for NDOT transportation projects. The NDOT needs a materials source for roadway construction and maintenance projects in the Navajo Nation as identified in their Transportation Improvement Program (TIP).

Under the proposed action, a gravel pit lease would be granted to NDOT from Navajo Minerals to remove gravel material from approximately 40 acres of trust lands. Associated actions would include the construction of 2 new roadways for long-term use (5 years) and 1 new roadway for one-time access; exploration (drilling/sampling) of the proposed gravel pit; long-term use of a portion of N153 as a haul route; and the construction of a staging area to crush and stock-pile materials from the gravel pit operation. These activities are described in further detail below. The total volume of material removed should be 250,000 cubic yards, or 330,000 tons, over approximately 2 years. The gravel would be used intermittently for approximately 50 miles (mi) of road construction projects on the Navajo Nation.

Prior to the proposed gravel pit extraction activities, an approximately 1.5 mi long drilling rig access road would be constructed approximately 0.64 mi south of the staging area beginning at N153. This access road would allow the drilling rig one-time use to complete boring samples and to exit the gravel pit area once boring has been completed.

Once exploration activities have established the viability of gravel material for road construction projects, a 10.5 acre (ac) staging area would be constructed with an associated access road approximately 0.75 mi east of the gravel pit. The staging area would serve to crush and stock-pile mined materials because of the terrain and limited space at the gravel pit site. Additionally, a new haul transport route is proposed to extend from N15 approximately 2.45 mi south to N153. This proposed haul route is approximately 5.5 mi west of Greasewood and would divert the gravel trucks from using N153 through the community of Greasewood. Approximately 3.4 mi along N153 is proposed to be used as a haul route for gravel pit operations.

b. Existing Data Review:

Records on file at the Cultural Resources Compliance Section of the Navajo Nation Heritage and Historic Preservation Department in Window Rock, Arizona, were examined March 14, 2017 by Ardale Delena and Christopher Carlson. The search revealed a single site previously recorded within 0.5 km (0.3 mi) of the project area. This site, AZ-P-33-05, is a few hundred meters east of the proposed gravel pit portion of the site, and is a cairn with no associated artifacts and a cultural temporal affiliation of Navajo: Unspecific Navajo (AD 1500 – 2009). The site was recommended not eligible to the NRHP. The site is outside the project area and will not be affected.

In addition, 3 archaeological surveys were recorded within 0.5 km (0.3 mi) of the project area (Table 2). Published listings for the NRHP were consulted. No listed property is within the project area.

On March 14, 2017, Ardale Delena and Christopher Carlson also met with a Navajo Cultural Specialist of the Traditional Cultural Program, to determine if any culturally significant properties might be affected or if any ethnographic research was required. The staff indicated that the project area was near 2 traditionally significant cultural properties (Property Numbers 76 and 827) and that local research within the Greasewood Chapter House was required (see Appendix C for search form). Property Number 76 is listed as "Chezín Biyí/Within the Lava Buttes/Moqui Buttes/Polacca AZ and Winslow AZ/76/AZ Township 23 North Range 20 East

(T23N R20E) and large surrounding zone". Property 827 is listed as "Chéé Aní 'ííhí, Chezín N'ííhí/Thief Traprock/Twin Buttes/south of Greasewood/Sanders, AZ/827/AZ T23N R23E.

Also, on March 14, 2017 the crew visited the Greasewood Chapter House to see if any culturally significant properties were known to exist in the vicinity of the project area. None were known. The chapter house indicated that the Property 827 Twin Buttes Traditional Cultural Places may be misplaced on the NNHPD map, based on Property 827's location a few miles southeast of the project area, as opposed to the butte above and west of the project area. No residences were in the area and no information on culturally significant properties was required.

c. Area Environmental and Cultural Setting:

Physiography

The project area is in the southern portion of the Navajo Nation within the Fort Defiance Agency, Greasewood Chapter. Landforms in and around the project area include the prominent volcanic Hopi Buttes (the proposed gravel pit is on the eastern edge of this landform), Twin Buttes a few miles southeast of the project area with Steamboat Wash intersecting a northern portion of the project area; grasslands are interspersed between these features in the lowlands and foothills with patches of pinyon-juniper woodlands in the upper regions of Hopi Buttes and the project area.

The proposed project area ranges between 1,788 m (5,867 ft) and 1,902 m (6,241 ft) above mean sea level (amsl). Sediment in the uplands is a silty loam overlaying an often-exposed matrix of igneous, fine-grained black basalt outcrops and subsequent colluvium and alluvium. Slopes and the valley below hosting the Steamboat Wash are also silty alluvium, with basalt boulders, cobble, and gravel decreasing with proximity to the drainage bottoms.

The project is located in the Navajo Section of the Colorado Plateau. The Colorado Plateau is characterized by deep canyons, steep escarpments, and flat plateaus composed of gently dipping sedimentary rocks (Thornbury 1965). The most distinctive structural feature of the province is its large number of monoclines. The monoclines are broken throughout the province by structural basins and upwarps of considerable relief. Volcanic structures are concentrated around the plateau's margin but are also scattered throughout its interior (Kelley 1955). The exposed rocks of the Colorado Plateau range from Precambrian to Recent in age (Thornbury 1965). The Colorado Plateau has eroded to a greater degree than any other part of the United States (Thornbury 1965).

The Navajo Section is defined as a basin, with thick layers of gently dipping Mesozoic and Cenozoic sedimentary shale, mudstone, and sandstone that contain coal seams. The region is characterized by mesas, buttes, and cuestas, rather than clinal ridges and hogbacks. The Navajo Section is bounded on the west and south by the Little Colorado River and the Echo Cliffs monocline near the Colorado River. The northern boundary is along the lower San Juan River to the Four Corners area, then northeast to the San Juan Mountains. The southeast boundary extends from the Sierra Nacimiento to Mt. Taylor and onward to the Puerco River.

The Navajo Section has numerous volcanic features that include vents, flows, and pyroclastic deposits that are referred to collectively as the Navajo-Hopi Volcanic Field. Other major structural features of the section include the Black Mesa Basin, the Defiance Upwarp, and the San Juan Basin. Geologically, a majority of the area in the alluvial slopes and Steamboat Wash is typified by Pliocene to Middle-Miocene deposits (Middle Miocene to Pliocene) with strongly consolidated conglomerate and sandstone deposits in basins post-Tertiary faulting. Deposits are tan or light gray, commonly forming high rounded hills and ridges and bluffs. The western edge of the project area including the west edge of proposed gravel pit and the northeast-southwest-trending segment of the existing drill-rig road includes Pliocene to late Miocene basaltic rocks

(Late Miocene to Pliocene), a mostly dark, mesa-forming basalt deposited during lava flows. Hopi Buttes volcanic field is included in this geological area.

Soils

Several common soil mappings units encompass the project and will be briefly described in this section. These include the Redlands-Whitecone complex, the Kinutsa-Strych families rock-outcrop complex, the Begay-Milok family-Mathis family complex, the Redlands-Monue complex, and the Wepo-Ives-Jocity association. The latter is found in the valley while the other soils are also located in the valley, as well as the mesa slope and the mesa top. The Redlands-Whitecone complex is characterized by fan terraces. The parent material for the Redlands is fan alluvium derived from sandstone and shale while the Whitecone is fan alluvium derived from shale as its parent material. The Redlands complex has a 1 to 4 percent slope while the Whitecone complex has a 1 to 3 percent slope. Both have an elevation range of 1,767 m to 1,889 m (5,800 ft to 6,200 ft) amsl. The Kinutsa-Strych families rock-outcrop complex is characterized by escarpments on plateaus and mesas. The parent material for the Kinutsa family is colluvium and residuum derived from siltstone or colluvium (or both) and residuum weathered from limestone and sandstone. The parent material for the Strych family is fan alluvium and colluvium derived from conglomerate or fan alluvium (or both) and colluvium derived from sandstone and shale. This complex has an elevation range of 1,828 m to 2,133 m (6,000 ft to 7,000 ft) amsl with a 30 to 65 percent slope.

The Begay-Milok family-Mathis family complex is the next soil. The Begay is characterized by fan terraces with aeolian deposits and fan alluvium derived from sandstone as the parent material. It has a 1 to 8 percent slope. The Milok family is characterized by hills and fan terraces with aeolian material and slope alluvium derived from sandstone as the parent material. It has a 2 to 8 percent slope. The Mathis family is characterized by hills with colluvium derived from sandstone as the parent material. It has an 8 to 60 percent slope. This soil has an elevation range of 1,828 m to 2,072 m (6,000 ft to 6,800 ft) amsl. The Redlands-Monue is the next common soil. The Redlands is characterized by stream and fan terraces with aeolian and fan alluvium derived from sandstone or stream (or both) and fan alluvium derived from sandstone and shale as the parent material. It has a 2 to 8 percent slope. The Monue is characterized by fan terraces with aeolian deposits derived from calcareous sandstone or slope alluvium derived from calcareous sandstone as the parent material (or both). It has a 1 to 4 percent slope. The complex has an elevation range of 1,767 m to 1,889 m (5,800 ft to 6,200 ft) amsl. The Wepo-Ives-Jocity is solely in the valley and is characterized by stream terraces on valley floors and flood plains. The parent material from the Wepo is stream alluvium derived from shale, the parent material for the Ives is stream alluvium derived from sandstone while the parent material of the Jocity is stream alluvium derived from sandstone and shale. The Ives and Jocity have a 0 to 2 percent slope while the Wepo has a 1 to 2 percent slope. This complex has an elevation range of 1,767 m to 1,889 m (5,800 ft to 6,200 ft) amsl (National Resource Conservation Service (NRCS) Web Soil Survey [accessed March 2017]).

Climate

The climate is characterized as arid to semi-arid with hot summers and mild winters. Temperatures across northeastern Arizona vary as a result of elevation and latitude. Climatic data were collected at a weather station in Painted Desert National Park from 1973 to 2016 (Western Regional Climate Center 2017). During this period, mean annual precipitation was 28.74 centimeters (cm) (10.53 inches) with rainfall heaviest in the months of July–October. Average annual snowfall totaled 26.92 cm (10.60 inches), with the highest monthly averages in December and January. Average minimum temperature was 4 degrees Celsius (°C) (39.2 degrees Fahrenheit [°F]), while average maximum temperature was 21.3°C (70.34°F).

Flora

The project corridor supported three major natural vegetation types—Plains/Mesa Grassland, Juniper Savanna, and Arroyo Riparian (Dick-Peddie 1993). The most abundant of these communities within the project area was the Plains/Mesa Grassland which occurred along all of the proposed haul road (to the site,

the drill rig access road and the staging area, as well as the base of Wood Chop Mesa. Juniper Savanna dominated the top of the mesa at the proposed gravel pit location. Arroyo riparian vegetation was scarce forming in the bottom of the few ephemeral waterways that cross the haul road and drill rig access roads to the gravel pit.

Shrubs were generally scarce throughout most of the project area with winterfat (*Kraschninnikovia lanata*) being the most common subshrub scattered throughout most of the grasslands and (four-wing saltbush (*Atriplex canescens*) being the most common shrub scattered along the edges of roadways and along arroyos within the grasslands. Rubber rabbitbrush (*Ericameria nauseosa*) was also locally abundant occurring along waterways and headwater swales. Although both subshrubs and shrubs scattered were locally abundant sometimes forming grassland/shrub communities, there were no cohesive shrub communities in the project area.

Fauna

Fauna in this area can include Townsend's ground squirrel, dark kangaroo mouse, and sagebrush vole. The pallid kangaroo mouse and chisel-toothed kangaroo rat apparently favor the saltbush and associated desert plants. Desert high altitudes also have Merriam's shrew, Great Basin pocket mouse, Ord's kangaroo rat, and the montane vole. The coyote and black-tailed jackrabbit are found throughout the province. The pronghorn occurs as an incursionary species from adjacent or former grasslands and the desert bighorn is rare, probably as a result of historic domestic sheep grazing in its former habitat (Turner 1994:155).

Several avian species are characteristic of the area. These include the black-throated sparrow, vesper sparrow, and rock wrens. More common reptile taxa include the Great Basin spadefoot toad, leopard lizard, collared lizard, and northern side-blotched lizard, wandering garter snake, and the Great Basin and Hopi rattlesnakes (Turner 1994:155).

CULTURAL OVERVIEW

The following brief overview is based on Hogan (1986), Dello-Russo (1992), Schutt et al. (1997), Binford and Amsden (1992), Hogan and Winter (1983), Vivian (1990), and Wozniak (1982).

Paleoindian Period (10,000–5500 bc)

The earliest substantiated cultural manifestation in the Southwest, the Paleoindian period, is divided into three subperiods or complexes—Clovis (10,000–9000 bc), Folsom (9000–8000 bc), and Plano (8000–5500 bc)—named for different cultural groupings. Stylistically distinct projectile points associated with late Pleistocene and early Holocene megafauna characterize these complexes. In addition, Paleoindian sites are typically identified by lithic assemblages that exhibit a very refined and standardized technology.

Clovis components are characterized by large lanceolate spear points with a single short basal flute on both faces. The Clovis toolkit also includes spurred endscrapers; large, unifacially flaked side scrapers; keeled scrapers on large blades; flake knives; backed, worked blades; graters; perforators; shaft straighteners; and bone points and foreshafts (Gunnerson 1987:10). Folsom assemblages are characterized by the presence of small, finely made, diagnostic lanceolate projectile points with a single flute on each face, extending almost the entire length of the point. Technologically, the Folsom point developed from the preceding Clovis point form. Plano complexes are characterized by a variety of projectile point types that include laterally thinned, indented base, and constricted base series. Plano complex projectile points lack flutes and consist, instead, of large lanceolate forms with basal grinding and large parallel flaking (Wheat 1972; Wormington 1957). The Plainview complex contains laterally thinned points—Midland, Plainview, Meserve, Milnesand, and Frederick—and is generally considered the earliest Plano complex. The indented base series includes Firstview, Alberta, and Cody complex points, such as Eden and Scottsbluff. Agate Basin and Hell Gap points comprise the constricted base series (Cordell 1979:21). Dissertation research beginning in 1966 conducted by George J. Gumerman (1988) found little evidence of Paleoindian or subsequent Archaic occupation in

the vicinity; most evidence for occupations in his study begins roughly 33 miles (53 kilometers [km]) west of the project area (Gumerman 1988 in Wero et al. 2009:6)

Archaic Period (5500 BC–AD 400)

The Archaic period (5500 BC–AD 400) was characterized by a subsistence pattern that shifted from a focus on large mammal procurement to hunting smaller mammals and to gathering wild plant foods. In other words, the Archaic adaptation was a "diffuse" economy in which a wide variety of plant and animal resources were exploited (Judge 1982:49). Consequently, the Archaic settlement pattern reflects reoccupation of areas where the distribution and density of key plant resources could be predicted on a seasonal basis. It is likely that the Archaic peoples were primarily dependent on plant foods, had a seasonally mobile settlement pattern, and had a flexible social structure in which group size and composition varied in response to changing economic opportunities (Hogan 1986:7).

Archaic sites are usually identified as lithic artifact scatters with fire-cracked rock, hearths, specific projectile point types, and ground-stone tools (e.g., basin metates, cobble manos). Although varied, the remainder of the stone tool assemblage—scrapers, drills, choppers, knives—is undiagnostic and chipping debris is abundant. Pottery is absent. The Archaic is also associated with a biface-oriented chipped-stone technology and a diversity of lithic raw materials (Lintz et al. 1988).

Anasazi Period (AD 400–1600)

Although maize and other cultigens were introduced into the Southwest during the Late Archaic, agriculture was not a major subsistence strategy. The Anasazi period, however, was an era of increasing dependence on cultigens—maize, beans, squash—and of concurrent changes in sedentary residence patterns. The following section summarizes cultural developments in the project area, using temporal sequences proposed by Kidder (1927) and Kearns and McVickar (2007).

Basketmaker III (AD 400–700)

Climatic changes during Basketmaker III favored expanded horticulture and greater sedentism, leading to a probable population increase. Basketmaker III, therefore, was characterized by greater sedentism, more permanent architecture, pottery production, use of the bow and arrow, and increased reliance on cultigens (Vivian 1990:111–112). Sites occur most frequently on alluvial terraces and benches, as well as on bluffs and ridges adjacent to drainages, including large washes such as the Pueblo Colorado in the project vicinity (Wartburton 2002 in Wero et al. 2009:7). Basketmaker III sites often contain shallow pithouses with numerous interior and extramural storage pits and hearths. Some larger sites contain probable ceremonial structures—large pit structures spatially segregated from the habitation structures (Hogan 1986:13–14). Plain grayware pottery, small projectile points indicative of the bow and arrow, and trough metates characterize Basketmaker III artifact assemblages. Ceramic types include Lino Gray and La Plata Black-on-white. Projectile points include large stemmed, side-notched types and small corner- and side-notched arrow points. Basketry, turquoise, and shell ornaments are present also (Cordell 1979:42). Although the environmental setting of the villages and the proliferation of storage pits indicate an increased dependence on agriculture, wild floral and faunal resources remained important components of the diet (Cordell 1979:99–100).

Pueblo I (AD 700–900)

The Pueblo I period was characterized by "population dispersal, more permanent architecture, larger storage facilities, greater standardization in ceramic production, and increased exchange" (Vivian 1990:135). Villages became more numerous and expanded into more mountainous settings. Deteriorating climatic conditions—a decrease in effective moisture and a shift in the seasonality of rainfall—which lowered the water table and decreased the amount of arable land—probably contributed to the population shifts and the need for increased food storage space (Vivian 1990:135–136, Wartburton 2002 in Wero et al. 2009:7).

The harsh climatic conditions of the Pueblo I period necessitated the exploitation of a variety of wild and domesticated plants. Several varieties of maize, beans, and squash were cultivated. The enlargement and

improvement of storage facilities probably reflects a greater dependence on cultigens. Caches of amaranth, however, have been found, and hunting was still an important subsistence strategy (Vivian 1990:146). The appearance of aboveground rooms and neck-banded pottery characterized the Pueblo I period. Pithouses, some with architectural features similar, or transitional, to kivas, were present in the open area in front of the surface structures (Cordell 1982:66; Vivian 1990:141). Pit structures were deeper than those of Basketmaker III and had ventilators and occasional sipapus (Bradley et al. 1998:53).

Pueblo II (AD 900–1100)

During the Pueblo II period, the number of sites in the northern Cibola region increased sharply and population reached its maximum geographic dispersal, in part due to more precipitation (Wartburton 2002 in Wero et al. 2009:7). By AD 1100, the shift to aboveground residential architecture was complete, and subterranean structures (kivas) were used primarily for ritual (versus domestic) purposes (Wozniak and Marshall 1991: 4-17). However, continued construction and use of pit structures as residential units after this transition are not uncommon in other areas of the Anasazi world.

Pueblo III (AD 1100–1300)

The beginning of the Pueblo III period (AD 1100-1300) is associated with significant social and demographic reorganization following the collapse of the Chaco System. This "Post-Chaco" period is particularly interesting, as certain elements of Chacoan culture were retained, but in modified form. Large, aggregated communities began to appear in the Cibola area around AD 1150 to 1225, the same time as surrounding regions were depopulated (Duff and Schachner 2007; Schachner and Kintigh 2004). These villages, often located on valley margins, were comprised of clusters of large individual roomblocks (Schwendler 2008) associated with Chacoan features such as great kivas (unroofed), road segments, and core-veneer masonry (Duff 2002; Kintigh 1994).

A major period of drought occurring from AD 1276 to 1299, (the "Great Drought") is associated with massive population movement in the northern Southwest, including the virtual abandonment of the Four Corners area and a corresponding population influx into the Rio Grande and Cibola areas (Ansuetz et al. 1997; Stuart and Gauthier 1981; Wendorf and Reed 1955). After AD 1250, aggregated communities in the Cibola region became even larger and increasingly oriented around enclosed plazas, rather than great kivas. Kintigh (1985, 1996) suggests that this may be related to the introduction of kachina ceremonialism, which served to integrate the large numbers of people migrating to the area. LeBlanc (2001) suggests that the nucleation may have also been necessitated by increasing violence and conflict in the area.

Compared to preceding periods, late Pueblo III pueblos were located at higher elevations (6,600-7,600 ft amsl), as drought conditions likely made riverine floodplain farming more difficult and less predictable. In addition, a diversification in agricultural strategies is apparent at this time, including evidence for run-off irrigation and the use of check dams. A majority of sites found by Gumerman in the project vicinity are Pueblo II and III periods (Wartburton 2002 in Wero et al. 2009:7). Although large, these aggregated towns were relatively short-lived with occupation spans averaging 50 years (Schachner and Kintigh 2004).

Historic Period (AD 1540–Present)

The earliest Spanish references to the Navajo were in the early seventeenth century. Writing in 1626, Zárate Salmerón first used the name Nabaju (Navajo). Salmerón reported that the Navajo could be reached by ascending the Chama River, a major tributary of the upper Rio Grande (Schroeder 1963:5). It is likely, however, that the Navajo were known earlier by another name. In assigning Franciscans to various missions in 1598, Don Juan de Oñate included the Cocoyes in the mission province of Jemez. The Cocoyes were described "...as a people who farmed and lived in jacales somewhere near the source of the Rio Grande." The only non-Pueblo Indians of the early 1600's in any drainage near the upper Rio Grande that are known to have been farmers were Navajos" (Schroeder 1963:5-6). The Cocoyes, therefore, were probably Navajos.

By the early 1700s, the Navajo homeland had expanded toward the west. It was bounded on the west by Canyon de Chelly, on the north by the New Mexico–Colorado line, on the east by the continental divide, and on the south by the Chaco Canyon headwaters. By the 1770s, the Navajo range had stabilized with many Navajo settled in the vicinity of Laguna and Zuni, the southern boundary of the new Navajo homeland.

The late 1850s and 1860s were a period of great stress and change for the Navajo. Kit Carson led an invasion into Navajo territory during the winter of 1863 to 1864. Although there were few direct encounters between the troops and the Navajo, the invasion was very successful because Carson focused on destruction of the Navajo economy—sheep and crops—and on keeping the Navajo constantly on the move. As a result, nearly 10,000 Navajo had surrendered by the end of 1864 and were forced to walk—the "Long Walk"—to the Bosque Redondo at Fort Sumner on the Pecos River. Many died along the way and many died at the Bosque. A number of Navajo, however, eluded capture and were joined by escapees from Bosque Redondo (Schroeder 1963:13–14). "Enough refugees eluded the troops to trace a line of Navajo occupation stretching from the San Francisco Mountains up the Little Colorado through Escudilla Mountain and Rito Quemado to the Datil and Gallina Mountains of New Mexico on the east" (Schroeder 1963:14).

The confinement at Fort Sumner was a disaster for a number of reasons—poor management, internal strife between the Navajo and Apache, alkaline soils, and drought resulting in repeated crop failures (Kelley 1982:32–33; Schutt et al. 1997:23). The Treaty of 1868 ended the Bosque Redondo "experiment" and the Navajo were allowed to return to a portion of their former territory. The treaty also established a reservation for the Navajo. Government officials, however, recognized the Navajo need for more land and, over succeeding years, the Navajo Reservation was expanded several times.

Greasewood

Díwózii Bli'Tó is the Navajo name for the Greasewood area, meaning "Spring in the greasewood", and occupation is believed to have started in this region in the 18th century (Goodman 1982 in Wero et al. 2009:7); the area and vicinity was settled by Navajo families after the Long Walk in 1686 (Iverson 2002). The early 20th Century saw the creation of churches, schools, and trading posts, water wells, farms, and pastures, with the raising of cattle, sheep, and horses (Wero et al. 2009:7).

d. Field Methods: Marron conducted an intensive, 100 percent, cultural resource survey March 14 through March 16, 2017. The survey was completed by Ardale Delena and Christopher Carlson. Christina Chavez served as Principal Investigator for the project. The total survey was 127.45 ac (50.36) ha. Site definition criteria and recording procedures are detailed in the body of the report.

13. CULTURAL RESOURCE FINDINGS:

a. Location/Identification of Each Resource:

During the course of the survey, 7 sites were newly recorded (AZ-P-33-8, AZ-P-33-9, AZ-P-33-10, AZ-P-33-11, AZ-P-33-12, AZ-P-33-13, and AZ-P-33-14), and 12 isolated occurrences were recorded. Location information is in Appendix A.

b. Evaluation of Significance of Each Resource:

Seven (7) sites and 12 isolated occurrences were recorded. AZ-P-33-8 and AZ-P-33-10 are artifact scatters, AZ-P-33-9 and AZ-P-33-14 are a single feature, AZ-P-33-11 and AZ-P-33-13 are ranching/agriculture features and artifact scatters, and AZ-P-33-12 is a feature and artifact scatter. All 7 of the sites date to a Historic to recent time period. None of the 7 archaeological sites are recommended eligible for nomination to the NRHP. The 7 sites are likely not significant under the Archaeological Resources Protection Act (ARPA). Also the sites do not appear to be significant under American Indian Religious Freedom Act (AIRFA). No further treatment is recommended for any of the 7 sites. The isolated occurrences do not meet eligibility criteria to the NRHP, and no further treatment is recommended.

14. MANAGEMENT SUMMARY (RECOMMENDATIONS):

Table — Cultural Resource Summary

Resource No.	Type	NRHP Eligibility Recommendation	Treatment Recommendation
AZ-P-33-8	Artifact scatter	Not eligible	No further treatment
AZ-P-33-9	Feature	Not eligible	No further treatment
AZ-P-33-10	Artifact concentration	Not eligible	No further treatment
AZ-P-33-11	Ranching/agriculture	Not eligible	No further treatment
AZ-P-33-12	Features	Not eligible	No further treatment
AZ-P-33-13	Ranching/Agriculture	Not eligible	No further treatment
AZ-P-33-14	Feature	Not eligible	No further treatment

This undertaking complies with the provisions of the ARPA, AIRFA, and NHPA. This report is consistent with all applicable tribal, federal, and state standards for cultural resource management.

15. CERTIFICATION:

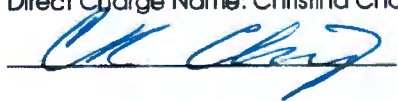
SIGNATURE:

General Charge Name: Christina Chavez



SIGNATURE:

Direct Charge Name: Christina Chavez



DATE:



DATE

Cultural Resources Report

**A Cultural Resource Survey for
Proposed Gravel Pit, Greasewood Springs Chapter,
Navajo Nation, Navajo County, Arizona**

**By
Christina Chavez
Toni R. Goar
Christopher Carlson
and
Ardale Delena**

**Edited By
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**Under
Navajo Nation Permit No. B17042**

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Marron Project No. 17004.01
April 2017

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INTRODUCTION

The Navajo Division of Transportation (NDOT) proposes to develop a gravel pit and associated access and infrastructure within the Greasewood Springs Chapter in Arizona (Figures 1 and 2). The Greasewood Chapter is located within the Navajo Nation's Fort Defiance Agency in Navajo County, Arizona.

The project purpose is to provide roadway surfacing materials for NDOT transportation projects. The NDOT needs a materials source for roadway construction and maintenance projects in the Navajo Nation as identified in their Transportation Improvement Program (TIP).

Under the proposed action, a gravel pit lease would be granted to NDOT from Navajo Minerals to remove gravel material from approximately 40 acres of trust lands. Associated actions would include the construction of 2 new roadways for long-term use (5 years) and 1 new roadway for one-time access; exploration (drilling/sampling) of the proposed gravel pit; long-term use of a portion of N153 as a haul route; and the construction of a staging area to crush and stock-pile materials from the gravel pit operation. These activities are described in further detail below. The total volume of material removed should be 250,000 cubic yards, or 330,000 tons, over approximately 2 years. The gravel would be used intermittently for approximately 50 miles (mi) of road construction projects on the Navajo Nation.

Prior to the proposed gravel pit extraction activities, an approximately 1.5 mi long drilling rig access road would be constructed approximately 0.64 mi south of the staging area beginning at N153. This access road would allow the drilling rig one-time use to complete boring samples and to exit the gravel pit area once boring has been completed.

Once exploration activities have established the viability of gravel material for road construction projects, a 10.5 acre (ac) staging area would be constructed with an associated access road approximately 0.75 mi east of the gravel pit. The staging area would serve to crush and stock-pile mined materials because of the terrain and limited space at the gravel pit site. Additionally, a new haul transport route is proposed to extend from N15 approximately 2.45 mi south to N153. This proposed haul route is approximately 5.5 mi west of Greasewood and would divert the gravel trucks from using N153 through the community of Greasewood. Approximately 3.4 mi along N153 is proposed to be used as a haul route for gravel pit operations.

Marron and Associates (Marron) conducted an intensive (100 percent) cultural resource survey from March 14 to March 16, 2017. Christina Chavez served as the Principal Investigator. Christopher Carlson served as a crew member and Ardale Delena (Field Supervisor) completed the survey. Forty-nine (49) person-hours (not including driving time) were required to complete the survey. The Navajo Nation is the lead agency. Work was conducted under Navajo Nation Permit No. B17042.

Seven (7) sites and 12 isolated occurrences were recorded. AZ-P-33-8 and AZ-P-33-10 are artifact scatters, AZ-P-33-9 and AZ-P-33-14 are a single feature each, AZ-P-33-11 and AZ-P-33-13 are ranching/agriculture features and artifact scatters, and AZ-P-33-12 is a feature and artifact scatter. All 7 of the sites date to a historic to recent time period. The 7 archaeological sites are recommended as not eligible for nomination to the NRHP. The 7 sites are likely not significant under the Archaeological Resources Protection Act



(ARPA). Also the sites do not appear to be significant under American Indian Religious Freedom Act (AIRFA). No further treatment is recommended for the 7 sites. The isolated occurrences do not meet eligibility criteria to the NRHP, and no further treatment is recommended.

This undertaking complies with the provisions of the National Historic Preservation Act (NHPA) of 1966, as amended, and applicable regulations. This report is consistent with applicable tribal, federal, and state standards for cultural resource management.

Project Location

The project area is located near Greasewood Springs, Greasewood Springs Chapter, Navajo Nation, Navajo County, Arizona. The corresponding United States Geological Survey (USGS) 7.5-minute topographic quadrangle is *Greasewood Springs* (35109-D8, 1972). Legal descriptions for the proposed project are Township (T) 23 North (N), Range (R) 22 East (E), Sections 1, 2, 3, and 11; T24N, R22E, Sections 12 and 36; T24N, R23E, Sections 07, 18, 19, 30, and 31.

The project required 2 block surveys of multiple 15 meter (m) (50 foot [ft]) transects for a gravel pit and staging area for a total of 20.98 hectares (ha) (51.86 ac). Five (5) access roads were surveyed for a total length of 14.0 kilometers (km) (8.39 mi). The width of the surveyed corridors varied from 15 m (50 ft) to 30 m (100 ft). The Navajo Nation Service Road 15 measures 457.2 m (1,500 ft) long, for a surveyed space of 1.54 ha (3.80 ac). The Navajo Nation Service Road N153 measures 5,515 m (18,094 ft) in length, for a surveyed space of 11.42 ha (28.22 ac). N153A measures 3,953.4 m (12,971 ft) long, for a surveyed space of 10.74 ha (29.54 ac). The access road measures 1,200 m (3,936 ft) in length, for a surveyed space of 3.80 ha (9.39 ac). The drill rig access road measures 2,363 m (7,753 ft), for a surveyed space of 1.88 ha (4.64 ac). A total of 50.36 ha (127.45 ac) was surveyed for the project. Universal Transverse Mercator (UTM) coordinates for the beginning and end points of each block project parcel and road segments of surveyed Navajo Nation land are listed in Table 1.

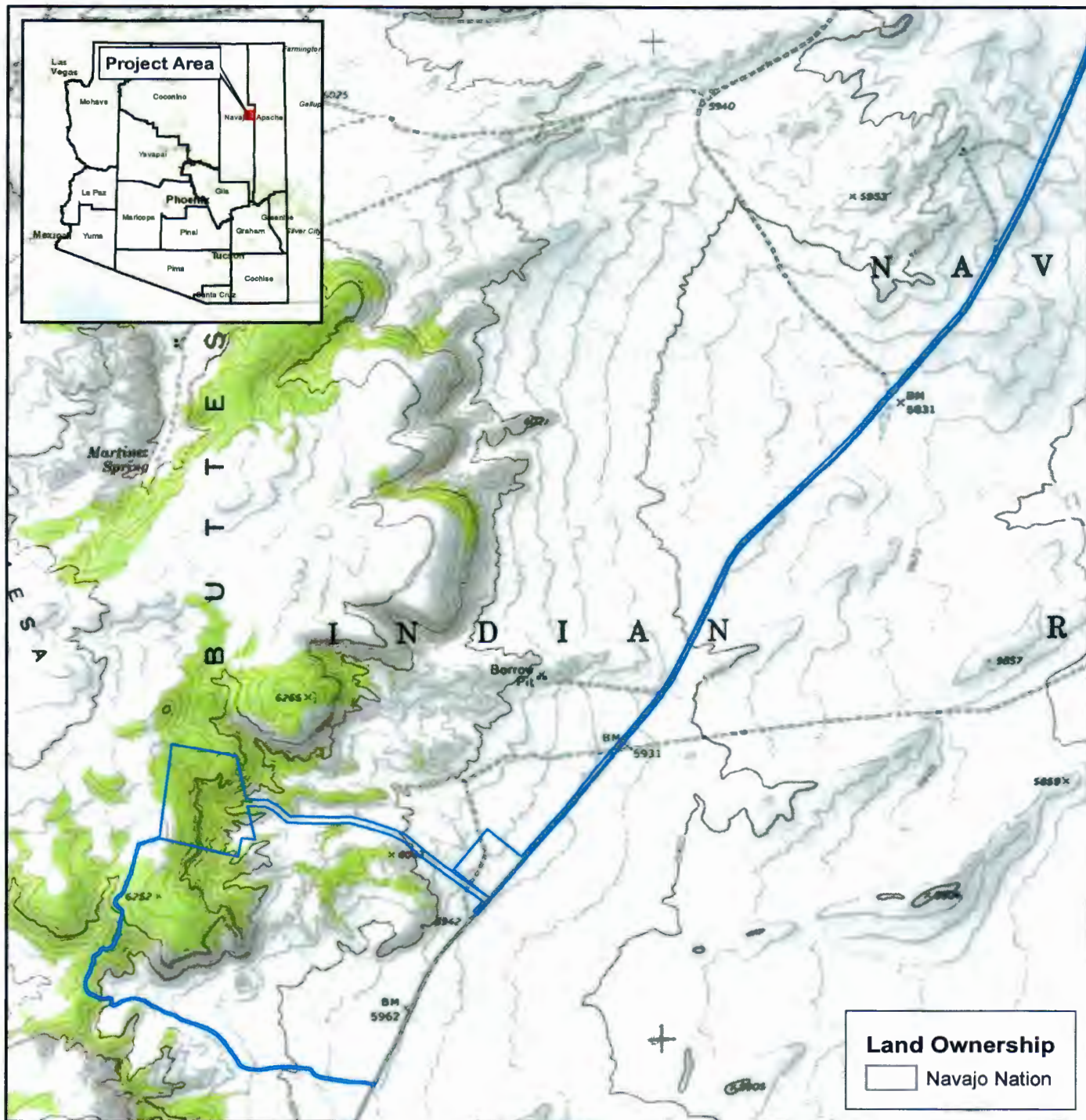




Figure 1
Project Location Map
(South)



 Project Area


T23N, R22E, Sec. 01, 02, 03, 11
T24N, R22E, Sec. 12, 36
T24N, R23E, Sec. 07, 18, 19, 30, 31

Greasewood Springs, AZ;
7.5' USGS Quadrangle;
Navajo County, Arizona

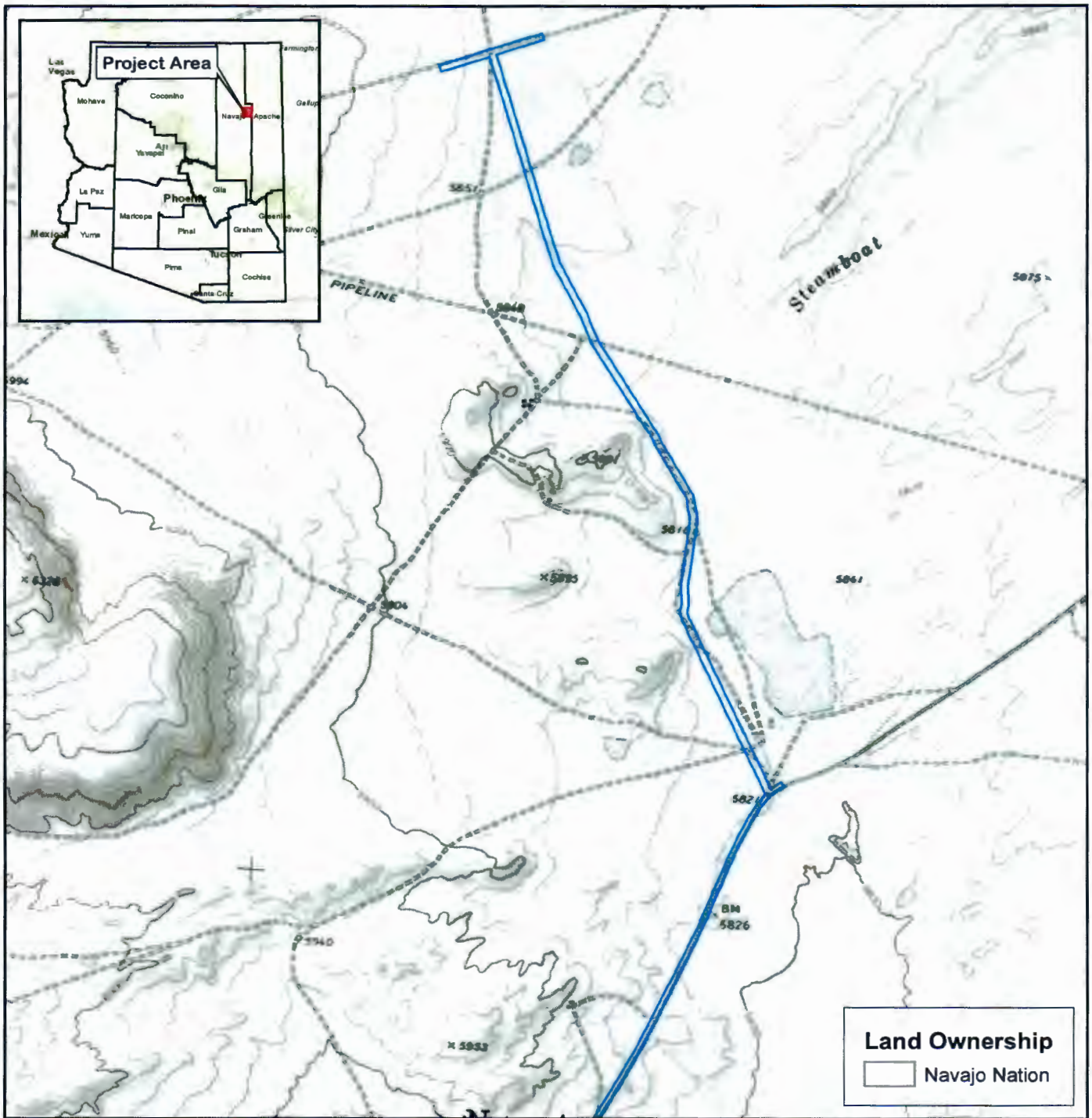
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Kilometers

0 0.25 0.5 1
Miles

N



1:25,450







Figure 2
Project Location Map
(North)

 Project Area	T23N, R22E, Sec. 01, 02, 03, 11	Greasewood Springs, AZ; 7.5' USGS Quadrangle; Navajo County, Arizona
	T24N, R22E, Sec. 12, 36	
T24N, R23E, Sec. 07, 18, 19, 30, 31		




0	0.375	0.75	1.5	 Kilometers
				
0	0.25	0.5	1	Miles 1:24,000
				

Table 1 — Project Coordinates

Description	UTMs (NAD 83, Zone 13)	
	Easting	Northing
N153A beginning point	596618	3924833
N153A end point	595254	3928001
N153 beginning point	593674	3920323
N153 end point	596677	3924869
Drill-rig access road beginning point	593222	3919524
Drill-rig access road end point	592257	3920669
Gravel Pit – northwest	592310	3921104
Gravel pit – southwest	592257	3920669
Gravel pit – northeast	592601	3921047
Gravel pit – southeast	592608	3920582
Staging area – northwest	593724	3920710
Staging area – southwest	393573	3920523
Staging area –northeast	593879	3920586
Staging area – southeast	593725	3920399
Access road beginning point	593714	3920389
Access road end point	592648	3920825

ENVIRONMENT

Physiography

The project area is in the southern portion of the Navajo Nation within the Fort Defiance Agency, Greasewood Chapter. Landforms in and around the project area include the prominent volcanic Hopi Buttes (the proposed gravel pit is on the eastern edge of this landform), Twin Buttes a few miles southeast of the project area with Steamboat Wash intersecting a northern portion of the project area; grasslands are interspersed between these features in the lowlands and foothills with patches of pinyon-juniper woodlands in the upper regions of Hopi Buttes and the project area.

The proposed project area ranges between 1,788 m (5,867 ft) and 1,902 m (6241 ft) above mean sea level (amsl). Sediment in the uplands is a silty loam overlaying an often-exposed matrix of igneous, fine-grained

black basalt outcrops and subsequent colluvium and alluvium. Slopes and the valley below hosting the Steamboat Wash are also silty alluvium, with basalt boulders, cobble, and gravel decreasing with proximity to the drainage bottoms.

The project is located in the Navajo Section of the Colorado Plateau. The Colorado Plateau is characterized by deep canyons, steep escarpments, and flat plateaus composed of gently dipping sedimentary rocks (Thornbury 1965). The most distinctive structural feature of the province is its large number of monoclines. The monoclines are broken throughout the province by structural basins and upwarps of considerable relief. Volcanic structures are concentrated around the plateau's margin but are also scattered throughout its interior (Kelley 1955). The exposed rocks of the Colorado Plateau range from Precambrian to Recent in age (Thornbury 1965). The Colorado Plateau has eroded to a greater degree than any other part of the United States (Thornbury 1965).

The Navajo Section is defined as a basin, with thick layers of gently dipping Mesozoic and Cenozoic sedimentary shale, mudstone, and sandstone that contain coal seams. The region is characterized by mesas, buttes, and cuestas, rather than clinal ridges and hogbacks. The Navajo Section is bounded on the west and south by the Little Colorado River and the Echo Cliffs monocline near the Colorado River. The northern boundary is along the lower San Juan River to the Four Corners area, then northeast to the San Juan Mountains. The southeast boundary extends from the Sierra Nacimiento to Mt. Taylor and onward to the Puerco River.

The Navajo Section has numerous volcanic features that include vents, flows, and pyroclastic deposits that are referred to collectively as the Navajo-Hopi Volcanic Field. Other major structural features of the section include the Black Mesa Basin, the Defiance Upwarp, and the San Juan Basin. Geologically, a majority of the area in the alluvial slopes and Steamboat Wash is typified by Pliocene to Middle-Miocene deposits (Middle Miocene to Pliocene) with strongly consolidated conglomerate and sandstone deposits in basins post-Tertiary faulting. Deposits are tan or light gray, commonly forming high rounded hills and ridges and bluffs. The western edge of the project area including the west edge of proposed gravel pit and the northeast-southwest-trending segment of the existing drill-rig road includes Pliocene to late Miocene basaltic rocks (Late Miocene to Pliocene), a mostly dark, mesa-forming basalt deposited during lava flows. Hopi Buttes volcanic field is included in this geological area.

Soils

Several common soil mappings units encompass the project and will be briefly described in this section. These include the Redlands-Whitecone complex, the Kinutsa-Strych families rock-outcrop complex, the Begay-Milok family-Mathis family complex, the Redlands-Monue complex, and the Wepo-Ives-Jocity association. The latter is found in the valley while the other soils are also located in the valley, as well as the mesa slope and the mesa top. The Redlands-Whitecone complex is characterized by fan terraces. The parent material for the Redlands is fan alluvium derived from sandstone and shale while the Whitecone is fan alluvium derived from shale as its parent material. The Redlands complex has a 1 to 4 percent slope while the Whitecone complex has a 1 to 3 percent slope. Both have an elevation range of 1,767 m to 1,889 m (5,800 ft to 6,200 ft) amsl. The Kinutsa-Strych families rock-outcrop complex is characterized by escarpments on plateaus and mesas. The parent material for the Kinutsa family is colluvium and residuum



derived from siltstone or colluvium (or both) and residuum weathered from limestone and sandstone. The parent material for the Strych family is fan alluvium and colluvium derived from conglomerate or fan alluvium (or both) and colluvium derived from sandstone and shale. This complex has an elevation range of 1,828 m to 2,133 m (6,000 ft to 7,000 ft) amsl with a 30 to 65 percent slope.

The Begay-Milok family-Mathis family complex is the next soil. The Begay is characterized by fan terraces with aeolian deposits and fan alluvium derived from sandstone as the parent material. It has a 1 to 8 percent slope. The Milok family is characterized by hills and fan terraces with aeolian material and slope alluvium derived from sandstone as the parent material. It has a 2 to 8 percent slope. The Mathis family is characterized by hills with colluvium derived from sandstone as the parent material. It has an 8 to 60 percent slope. This soil has an elevation range of 1,828 m to 2,072 m (6,000 ft to 6,800 ft) amsl. The Redlands-Monue is the next common soil. The Redlands is characterized by stream and fan terraces with aeolian and fan alluvium derived from sandstone or stream (or both) and fan alluvium derived from sandstone and shale as the parent material. It has a 2 to 8 percent slope. The Monue is characterized by fan terraces with aeolian deposits derived from calcareous sandstone or slope alluvium derived from calcareous sandstone as the parent material (or both). It has a 1 to 4 percent slope. The complex has an elevation range of 1,767 m to 1,889 m (5,800 ft to 6,200 ft) amsl. The Wepo-Ives-Jocity is solely in the valley and is characterized by stream terraces on valley floors and flood plains. The parent material from the Wepo is stream alluvium derived from shale, the parent material for the Ives is stream alluvium derived from sandstone while the parent material of the Jocity is stream alluvium derived from sandstone and shale. The Ives and Jocity have a 0 to 2 percent slope while the Wepo has a 1 to 2 percent slope. This complex has an elevation range of 1,767 m to 1,889 m (5,800 ft to 6,200 ft) amsl (National Resource Conservation Service (NRCS) Web Soil Survey [accessed March 2017]).

Climate

The climate is characterized as arid to semi-arid with hot summers and mild winters. Temperatures across northeastern Arizona vary as a result of elevation and latitude. Climatic data were collected at a weather station in Painted Desert National Park from 1973 to 2016 (Western Regional Climate Center 2017). During this period, mean annual precipitation was 28.74 centimeters (cm) (10.53 inches) with rainfall heaviest in the months of July–October. Average annual snowfall totaled 26.92 cm (10.60 inches), with the highest monthly averages in December and January. Average minimum temperature was 4 degrees Celsius (°C) (39.2 degrees Fahrenheit [°F]), while average maximum temperature was 21.3°C (70.34°F).

Flora

The project corridor supported three major natural vegetation types—Plains/Mesa Grassland, Juniper Savanna, and Arroyo Riparian (Dick-Peddie 1993). The most abundant of these communities within the project area was the Plains/Mesa Grassland which occurred along all of the proposed haul road (to the site, the drill rig access road and the staging area, as well as the base of Wood Chop Mesa. Juniper Savanna dominated the top of the mesa at the proposed gravel pit location. Arroyo riparian vegetation was scarce forming in the bottom of the few ephemeral waterways that cross the haul road and drill rig access roads to the gravel pit.

Shrubs were generally scarce throughout most of the project area with winterfat (*Kraschninnikovia lanata*) being the most common subshrub scattered throughout most of the grasslands and (four-wing saltbush (*Atriplex canescens*) being the most common shrub scattered along the edges of roadways and along arroyos within the grasslands. Rubber rabbitbrush (*Ericameria nauseosa*) was also locally abundant occurring along waterways and headwater swales. Although both subshrubs and shrubs scattered were locally abundant sometimes forming grassland/shrub communities, there were no cohesive shrub communities in the project area.

Fauna

Fauna in this area can include Townsend's ground squirrel, dark kangaroo mouse, and sagebrush vole. The pallid kangaroo mouse and chisel-toothed kangaroo rat apparently favor the saltbush and associated desert plants. Desert high altitudes also have Merriam's shrew, Great Basin pocket mouse, Ord's kangaroo rat, and the montane vole. The coyote and black-tailed jackrabbit are found throughout the province. The pronghorn occurs as an incursionary species from adjacent or former grasslands and the desert bighorn is rare, probably as a result of historic domestic sheep grazing in its former habitat (Turner 1994:155).

Several avian species are characteristic of the area. These include the black-throated sparrow, vesper sparrow, and rock wrens. More common reptile taxa include the Great Basin spadefoot toad, leopard lizard, collared lizard, and northern side-blotched lizard, wandering garter snake, and the Great Basin and Hopi rattlesnakes (Turner 1994:155).

CULTURAL OVERVIEW

A well-organized and concise summary of the culture history for northeastern Arizona is provided by Eck (1994:5-12).

Paleoindian Period (11,000 to 6000 BC)

Paleoindian peoples are defined as early Holocene hunters and foragers who were the first to inhabit the North American continent. Originally assumed to be dependent on now-extinct megafauna such as *Bison antiquus*, mammoth, and mastodon, research has shown that Paleoindian groups also utilized varied floral and faunal resources (Cordell 1997). Regional settlement is believed to have been seasonal although some reoccupation of campsites may have occurred. Kelley and Todd (1988) suggest that, given the new migrants unfamiliarity with newly encountered floral and faunal species, Paleoindians would have naturally tended to concentrate on proven sources of food, i.e., migratory game animals such as mammoth and bison. Paleoindian mobility is, therefore, explained by the necessity of following such wide-ranging herd animals. Paleoindian sites are often found on promontories near water sources and are generally within the seasonal range of herbivorous animals (Judge 1973:330).

The various Paleoindian cultures represented in the region include Clovis (9500–9000 BC), Folsom (8800–8300 BC), and Plano (7000–6000 BC) complexes (Irwin-Williams and Haynes 1970). The Paleoindian toolkit included lanceolate projectile points/knives, end and side scrapers, knives, graters, chisel graters, drills, spokeshaves and utility flakes (Judge 1973). There was a growing diversification in toolkits throughout the period, possibly explained by the extinction of megafauna later in the period and the tendency for groups to settle in territories and focus on local resources in a more restricted area (Stone 1999).



Archaic Period (6000 BC to AD 400)

The Archaic period was characterized by continuation of the hunting and foraging economy of the preceding Paleoindian period, however, with technological adaptations to changing climatic conditions. Around 6000 BC, the North American climate changed to a much warmer and drier Altithermal pattern, causing widespread faunal and floral changes (Cordell 1997). Most megafauna became extinct and smaller modern species became predominant. Human populations apparently adapted to these changes and material culture diversified. A distinction is made between northern Archaic groups, referred to as the Oshara tradition (Irwin-Williams 1973) and more southerly groups, referred to as the Cochise tradition (Sayles and Antevs 1941). Projectile point types from both traditions frequently overlap. Both groups employed smaller points styles with shouldered hafting elements by ca. 3200 BC.

The Oshara tradition was based on research conducted primarily northwest of Albuquerque in the Arroyo Cuervo area. Five phases—Jay (5500–4800 BC), Bajada (4800–3300 BC), San Jose (3000–1800 BC), Armijo (1800–800 BC) and En Medio (800 BC–AD 400)—have been defined (Hicks 1987; Irwin-Williams 1973, 1987; Irwin-Williams and Tompkins 1968). The Oshara phases are associated with changes in subsistence, projectile point styles, and features. Irwin-Williams (1973) proposed two major changes in Archaic foraging strategies, the addition of seed processing technology in the form of ground stone implements during the San Jose phase and the use of cultigens during the Armijo phase. During the 1970s and 1980s, research of Archaic period occupations included work on Cedar Mesa in southeast Utah (Matson 1991) and Black Mesa in northeast Arizona (Christenson and Parry 1985; Nichols and Smiley 1984).

Basketmaker II Period (100 BC to AD 400/500)

The Pecos Conference assigned Basketmaker II to the period 100 BC to AD 400 (Kidder 1927) while other researchers (e.g., Gratz 1991) terminate it at AD 500. In some areas of northeastern Arizona, it may have lasted a few hundred years longer (Gumerman and Dean 1989). Basketmaker II sites tend to be associated with caves or rockshelters or on promontories with a view of the surrounding terrain (Plog 1979). Structures are generally oval with outwardly sloping walls. The most common artifacts are chipped-stone tools and associated debitage (Eck 1994:6).

Basketmaker II sites have been excavated in the Hopi Buttes region, the Puerco River Valley, Black Mesa area, and the Petrified Forest National Park (Gumerman 1988). The earliest known maize found in western Anasazi sites dates from 3000 to 2000 BC, Basketmaker II peoples may have been primarily dependent upon hunting and gathering of wild species with horticulture as an additional source of food (Eck 1994:6). Gumerman and Dean (1989) believe the evidence from Black Mesa indicates Basketmaker II peoples had a fairly stable mix of gathered and domesticated foods by AD 100, with a slightly greater reliance on cultigens at the end of the period. Pottery technology developed ca. AD 300 (Vivian 1990:99) with the manufacture of early brownwares. In addition, small projectile point forms indicate the use of the bow and arrow.

Anasazi (AD 400/500 to 1540)

Although maize and other cultigens were introduced into the Southwest during the Late Archaic, agriculture was not a major subsistence strategy. The Anasazi period, however, was an era of increasing

dependence on cultigens—maize, beans, squash—and of concurrent changes in sedentary residence patterns. Below are periods based on the Pecos Conference chronology (Kidder 1927).

Basketmaker III Period (AD 400/500 to 720)

The Pecos Conference chronology placed the Basketmaker III period from AD 400 to 700 (Kidder 1927), but Mills et al. (1993) terminate it at AD 720 while it may have lasted until AD 825 in the Black Mesa area (Gumerman and Dean 1989). In the Winslow, Arizona area, it may have appeared ca. AD 650 and ended by 800 (Hays et al. 1991). The Basketmaker III period is the first for which there is good evidence of settlements in much of the western Anasazi region (Plog 1979). Sites generally exhibit three or four deep circular pit structures with interior and exterior storage pits and hearth features. Some sites also have kivas some distance from the other structures. Storage features are commonly stone-lined cists. Sites occur on alluvial terraces, ridges, and bluffs near drainages (Eck 1994:7).

Basketmaker III sites have been reported from the Kayenta, Black Mesa, Chambers, and Flagstaff areas (Gratz 1991), as well as in the vicinity of Winslow (Hays et al. 1991) and Hopi Buttes (Gumerman 1988). The pottery from this period includes graywares—Lino Gray and Lino Black-on-gray. Some plain redware pottery appeared toward the end of the period. The stone-tool assemblage is marked by small projectile points, probably used to tip arrows, and the earliest trough metates with rectangular manos.

Subsistence shifted toward greater reliance on agriculture, based on the presence of domesticated plant remains and numerous storage facilities (Gratz 1991). Gumerman and Dean (1989) see the change in settlement pattern as reflecting a greater degree of sedentism that was related to a significant increase in farming. Gumerman (1988) maintains Basketmaker III peoples preferred the better-watered drainages, such as the Rio Puerco, where large numbers of sites of this period have been reported.

Pueblo I Period (AD 720 to 920)

The Pueblo I period spans AD 700 to 900 according to the Pecos Conference chronology (Kidder 1927), but Mills et al. (1993) date it from AD 720 to 920. It may have ended in the Winslow area by AD 850 (Hays et al. 1991) and at AD 1000 in the Black Mesa area (Gumerman and Dean 1989). Sites consist of groups of pitstructures in conjunction with rectangular or curvilinear blocks of masonry rooms. The paucity of building stone indicates these surface rooms were constructed of jacal (wattle and daub). Surface rooms are believed to have functioned as storage facilities. In some instances, roomblocks were replaced with rows of semi-subterranean slab-lined storage pits. Kivas also occur in the villages (Eck 1994:8).

There was greater reliance upon agriculture (Plog 1979) with some regions exhibiting evidence of agricultural terracing and irrigation. Sites continued to be small villages with some lowland villages displaying some aggregation (Gumerman and Dean 1989). Dendrochronological evidence suggests the climate deteriorated during this period. Deterioration included a lower water table, greater erosion, and a decrease in growing season precipitation. Toward the end of the Pueblo I period, the population apparently increased in the Kayenta and Cibola areas (Gumerman 1984). There was also an increase in site size and structure size (Gratz 1991; Gumerman 1984).

Pueblo II Period (AD 920 to 1120)

The Pecos Conference chronology places the Pueblo II period from AD 900 to 1100, but Gumerman and Dean (1989) assign it to AD 1000 to 1150 on Black Mesa. Sites are characterized by pitstructures that were used for habitation, but some surface rooms were also used. Roomblocks were more frequently masonry rather than jacal (Gratz 1991). Typical Pueblo II sites consist of a rectangular or U-shaped roomblock with a kiva between the structure and the refuse area. Pitstructures are sometimes clustered beside and in front of the roomblock, flanking the kiva (Eck 1994:8).

Artifact assemblages include increasing varieties of black-on-white pottery and a predominance of corrugated utility vessels. By the latter half of the Pueblo II period, black-on-red wares from southern regions appeared in increasing quantities. By AD 1000, evidence for economic specialization, trade, and social status differentiation was apparent. Stone tools were expediently made for specific functions. The most common stone tools were used flakes rather than formal tools. Two-hand manos and flat slab metates were the most common ground stone forms (Eck 1994:9).

There was an increased reliance upon agriculture, but hunting and gathering contributed important resources to the diet. Agricultural practices included a greater number and variety of water control structures, such as canals and terraces. The number of sites increased toward the end of the period, indicating a growing population. The Black Mesa population, however, stabilized and began to decline ca. AD 1100 (Gumerman and Dean 1989). The climate during the early part of the period was degraded but improved in the last hundred years. Precipitation became more consistent by AD 1000 and water tables began to rise after AD 900 (Dean et al. 1985).

The early Pueblo II sites are characterized by a high incidence of Black Mesa Black-on-white pottery. Later sites are recognized by large quantities of Holbrook Black-on-white—the first of the Little Colorado White Wares—a distinctive local type. In the Ganado area, Pueblo II sites commonly have above-ground masonry pueblos and fewer pitstructures (Eck 1994:9).

Pueblo III Period (AD 1120 to 1320)

The Pecos Conference chronology dates the Pueblo III period from AD 1100 to 1300 (Kidder 1927) but Mills et al. (1993) assign it to AD 1120 to 1320. The end date coincides with that proposed for the Kayenta area (Gumerman and Dean 1989). Pitstructures continued as habitations but masonry roomblocks with jacal wings enclosing kivas also occurred. Some late Pueblo III sites had enclosed plazas and special-purpose surface structures, such as mealing rooms, attached to the northeast side of the roomblocks (Gumerman 1984). Sites became large and some exhibit evidence of planning (Plog 1979). Toward the end of the Pueblo III period, formal multi-story pueblos were built around large plazas (Eck 1994:10).

Pueblo III artifact assemblages were a continuation of the preceding Pueblo II assemblages, with increased variety in the design of pottery items (Plog 1979). Orange wares and polychrome pottery occurred. Lithic and ground-stone artifacts were identical to those of the preceding period.

A widespread drought during the first half of the Pueblo III period is thought to have caused major population shifts throughout much of the Southwest. By AD 1150, the climate had degraded into a major drought. Some archaeologists believe there was an actual population decline, while others identify a

redistribution of the population across the landscape resulting in a major reorganization of settlement patterns and subsistence strategies. This drought was followed by increased precipitation until AD 1275 (Dean et al. 1985).

The Kayenta area probably attained its highest population immediately prior to the end of the Pueblo III period (Gumerman and Dean 1989). Large aggregated villages and cliff dwellings were built or expanded by entire lineage groups with preplanned ideas regarding residential construction (Gumerman 1984). Between AD 1275 and 1300, there was a period of extreme drought—referred to as the Great Drought—in which precipitation declined, water tables fell, and drainages underwent severe downcutting (Eck 1994:10).

In the southwestern Hopi Buttes area the early Pueblo III period was characterized by Walnut Black-on-white pottery and by the absence of Holbrook Black-on-white. Walnut Black-on-white is another local, distinctive type in the Little Colorado White ware series. Typical pitstructures were deep square structures with two roof support posts.

Pueblo IV Period (AD 1320 to 1540)

The Pecos Conference dates the Pueblo IV period from AD 1300 to 1600 (Kidder 1927), while Mills et al. (1993) place it from AD 1320 to Spanish contact, or 1540. The tendency toward fewer and larger sites begun during the Pueblo III period continued into the Pueblo IV period. Very large villages of hundreds to thousands of rooms were built, as were smaller sites (Plog 1979). Populations became concentrated in the Zuni, New Mexico and Hopi, Arizona areas. Only a few other well-watered areas—the Puerco River and the Little Colorado River valleys and a few larger washes—were occupied. The Homol’ovi area near Winslow was occupied until ca. AD 1400, after which it was abandoned (Hays et al. 1991).

Climatic degradation that began during the end of the Pueblo III period continued until about AD 1500 (Gumerman and Dean 1989). Heavy reliance upon agriculture continued, with increased labor investment in water control structures such as reservoirs. Distinctive pottery styles developed in each of the densely populated areas (Plog 1979). Yellow wares characterize the Hopi region and glaze polychromes characterize the Zuni region (Eck 1994:11).

Although the southwestern Hopi Buttes were essentially abandoned by AD 1200 (Gumerman 1988), occupation in the southeastern Hopi Buttes continued into the Pueblo IV period (Warburton and Geib 1991). Except for the Hopi and Zuni areas, the region had been abandoned prior to Spanish contact in 1540 (Eck 1994:11).

Historic Period (AD 1540 to Present)

The earliest Spanish references to the Navajo were in the early seventeenth century. Writing in 1626, Zárate Salmerón first used the name Nabaju (Navajo). Salmerón reported that the Navajo could be reached by ascending the Chama River, a major tributary of the upper Rio Grande (Schroeder 1963:5). It is likely, however, that the Navajo were known earlier by another name. In assigning Franciscans to various missions in 1598, Don Juan de Oñate included the Cocoyes in the mission province of Jemez. The Cocoyes were described "...as a people who farmed and lived in jacales somewhere near the source of the Rio Grande." The only non-Pueblo Indians of the early 1600s in any drainage near the upper Rio Grande that

are known to have been farmers were Navajos" (Schroeder 1963:5–6). The Cocoyes, therefore, were probably Navajos. The Chama River remained the principal route to Navajo settlements on the Colorado Plateau during the Spanish Colonial period (Wozniak 1988).

As suggested by Navajo documents from 1598 to 1630, the Navajo were reported near the source of the Rio Grande, west of Taos, west or northwest of Santa Clara, and beyond Jemez. Navajo country could be entered via the Chama River or via Jemez Pueblo (Schroeder 1963:6). This area remained the Navajo homeland until 1692, when documentary evidence placed them farther west (Schroeder 1963:6).

By the early 1700s, the Navajo homeland had expanded toward the west. It was bounded on the west by Canyon de Chelly, on the north by the New Mexico-Colorado line, on the east by the continental divide, and on the south by the Chaco Canyon headwaters. By the 1770s, the Navajo range had stabilized with many Navajo settled in the vicinity of Laguna and Zuni, the southern boundary of the new Navajo homeland. Canyon Largo—formerly in the heart of Navajo territory—formed the northern border and was the dividing line between the Navajo and Ute ranges.

The late 1850s and 1860s were a period of great stress and change for the Navajo. Kit Carson led an invasion into Navajo territory during the winter of 1863 to 1864. Although there were few direct encounters between the troops and the Navajo, the invasion was very successful because Carson focused on destruction of the Navajo economy—sheep and crops—and on keeping the Navajo constantly on the move. As a result, nearly 10,000 Navajo had surrendered by the end of 1864 and were forced to walk—the "Long Walk"—to the Bosque Redondo at Fort Sumner on the Pecos River. Many died along the way and many died at the Bosque. A number of Navajo, however, eluded capture and were joined by escapees from Bosque Redondo (Schroeder 1963:13–14). "Enough refugees eluded the troops to trace a line of Navajo occupation stretching from the San Francisco Mountains up the Little Colorado through Escudilla Mountain and Rito Quemado to the Datil and Gallina Mountains of New Mexico on the east" (Schroeder 1963:14).

The confinement at Fort Sumner was a disaster for a number of reasons—poor management, internal strife between the Navajo and Apache, alkaline soils, and drought resulting in repeated crop failures (Kelley 1982:32–33; Schutt et al. 1997:23). The Treaty of 1868 ended the Bosque Redondo "experiment" and the Navajo were allowed to return to a portion of their former territory. The treaty also established a reservation for the Navajo. Government officials, however, recognized the Navajo need for more land and, over succeeding years, the Navajo Reservation was expanded several times.

Historically, the primary economic activity in the area has been livestock grazing, first sheep and then cattle. In the 1920s, sheep herding began to give way to cattle ranching. The latter was less labor-intensive than the former. Beginning in the 1940s northeastern Arizona has boomed as oil, gas, and uranium deposits have been extracted in the area.

Greasewood

Díwózii Bít'ó is the Navajo name for the Greasewood area, meaning "Spring in the greasewood", and occupation is believed to have started in this region in the 18th century (Goodman 1982); the area and vicinity was settled by Navajo families after the Long Walk in 1686 (Iverson 2002). The early 20th Century



saw the creation of churches, schools, and trading posts, water wells, farms, and pastures, with the raising of cattle, sheep, and horses (Wero et al. 2010:7).

PREVIOUS ARCHAEOLOGICAL RESEARCH

Records on file at the Cultural Resources Compliance Section of the Navajo Nation Heritage and Historic Preservation Department in Window Rock, Arizona, were examined March 14, 2017 by Ardale Delena and Christopher Carlson. The search revealed a single site previously recorded within 0.5 km (0.3 mi) of the project area. This site, AZ-P-33-05, is a few hundred meters east of the proposed gravel pit portion of the site, and is a cairn with no associated artifacts and a cultural temporal affiliation of Navajo: Unspecific Navajo (AD 1500 – 2009). The site was recommended not eligible to the NRHP. The site is outside the project area and will not be affected.

In addition, 3 archaeological surveys were recorded within 0.5 km (0.3 mi) of the project area (Table 2). Published listings for the NRHP were consulted. No listed property is within the project area.

On March 14, 2017, Ardale Delena and Christopher Carlson also met with a Navajo Cultural Specialist of the Traditional Cultural Program, to determine if any culturally significant properties might be affected or if any ethnographic research was required. The staff indicated that the project area was near 2 traditionally significant cultural properties (Property Numbers 76 and 827) and that local research within the Greasewood Chapter House was required (see Appendix C for search form). Property Number 76 is listed as “Chezín Biyii/Within the Lava Buttes/Moqui Buttes/Polacca AZ and Winslow AZ/76/AZ Township 23 North Range 20 East (T23N R20E) and large surrounding zone”. Property 827 is listed as “Chéé Aní ‘ííhí, Chezín N’ííhí/Thief Traprock/Twin Buttes/south of Greasewood/Sanders, AZ/827/AZ T23N R23E.

Also, on March 14, 2017 the crew visited the Chapter House to see if any culturally significant properties were known to exist in the vicinity of the project area. None were known and the 2 mentioned above are not in the vicinity of the project. No further work was required.

Table 2 – Previously Archaeological Surveys within 0.5 km (0.3 mi) of the Project Area

NNHPD No.	Description	Acres	No. of Sites	Author, Date
01-434	A Cultural Resource Inventory for a Proposed 1 Acre Homesite for Nelson and Mary Etta Soue near Greasewood, Apache County, Arizona	2.88	0	Nelson, Lily A. 2001
87-202	Archaeological Survey of the Proposed Larry Marlene Nez NHIRC Homestead Site, Navajo County, Greasewood, Arizona	1.00	0	Francis and Kelly 1988
89-30	An Archaeological Puebloan Survey 30.35 Miles for a proposed NTUA Powerline near Greasewood	183.93	1	Miner and Watts 1989

FIELD METHODS

Marron conducted an intensive, 100 percent, cultural resource survey March 14 through March 16, 2017. The survey was completed by Ardale Delena and Christopher Carlson. Christina Chavez served as Principal Investigator for the project. The project required 2 block surveys of multiple 15 m (50 ft) transects for a gravel pit and staging area for a total of 20.98 ha (51.86 ac). Five (5) access roads were surveyed for a total length of 14.0 km (8.39 mi). The width of the surveyed corridors varied from 15 m (50 ft) to 30 m (100 ft). A total of 50.36 ha (127.45 ac) was surveyed for the project. A total of 49 person-hours (not including driving time) were required to complete the fieldwork. Work was conducted under Navajo Nation Permit No. B17042 and the Navajo Nation is the lead agency. The weather was generally sunny and warm, with no winds. Ground visibility was typically 70 to 90 percent.

Archaeological sites were defined by the presence of either a feature or 10 or more artifacts separated by no more than 20 m (66 ft). Areas where cultural material was sparse (fewer than 10 items or separated by more than 20 m) were recorded as isolated occurrences. Areas where cultural activity was recent or ongoing were recorded as historic, modern, or contemporary abandoned sites as per *NNHPD Guidelines for the Treatment of Historic, Modern, and Contemporary Abandoned Sites*.

Sites were recorded on NNHPD site forms. A rebar datum with an aluminum cap stamped with the site number was placed at each site, if the site was not in an area prone to vehicle traffic. Color photographs were taken of each site.

Archaeological sites were mapped both digitally and manually on graph paper. Digital maps were created using a Trimble Juno Global Positioning System (GPS) device. Each map included the site boundary and the locations of the datum, any identified features, artifact concentrations, important or diagnostic artifacts, and drainages or other landscape features.

All artifacts were analyzed in the field unless more than 50 artifacts of a given class (lithic, prehistoric ceramic, and historic) were present, in which case a sample of at least 50 was analyzed. Lithic and ceramic

artifacts were analyzed using standard in-field techniques. Lithic analysis included identifying raw material, size range, presence or absence of cortex, and type of artifact. Ceramic analysis included identifying type and shape of vessel, paint or surface treatment characteristics, and a count. Ceramics, projectile points, and other diagnostic artifacts were identified by type and cultural affiliation when sufficient attributes for a reliable determination were present.

Isolated occurrences were recorded on an isolated occurrence form, analyzed in entirety, and location coordinates were recorded with a Trimble Juno GPS device.

Following field investigations, all GPS data are downloaded and differentially corrected to ensure submeter accuracy. Project area maps and site maps are produced using shapefiles created from the downloaded data and existing background layers. In addition, digital photographs are downloaded.

RESULTS

During the course of the survey, 7 sites were newly recorded (AZ-P-33-8, AZ-P-33-9, AZ-P-33-10, AZ-P-33-11, AZ-P-33-12, AZ-P-33-13, and AZ-P-33-14), and 12 isolated occurrences were recorded.

Location topographic quadrangle maps, UTM coordinates, and PLSS data for the resources are in confidential Appendix A. Traditional Cultural Properties information on file with the Navajo Nation is summarized in confidential Appendix B. A copy of the project specific permit and the executed check is in Appendix C.

Newly Recorded Sites

NNHPD Site No. AZ-P-33-8

Field Number:	Field Site 1
Site Type:	Artifact scatter
Land Status:	Navajo Nation Trust Lands
Affiliation:	Navajo: WWII–Recent (AD 1944 to 1970)
NRHP Recommendation:	Not eligible
Project Recommendation:	No further treatment

AZ-P-33-8 (Figures 3 and A3) is a small, single episode trash dump located on a 20 degree, east-facing hill slope east of the butte, near the southern terminus of the proposed gravel pit. The northern edge of the site is delineated by an intermittent east-west drainage. The area exhibits mild-to-moderate slope wash and presumed minor cattle grazing; vegetation consists of grasses and forbs. The soil is an unconsolidated silty loam with approximately 30 percent basalt gravels to cobbles throughout. Surface visibility is 70 percent. The site measures 27 m north-south by 30 m east-west (88 ft by 98 ft) and is located at an elevation of 1,897 m (6,225 ft) amsl. The site is estimated to be about 90 percent intact.



Figure 3 – AZ-P-33-8, Overview, View East

Features

No features were observed at the site.

Artifacts

The assemblage is composed of historic artifacts, 100 percent of which were analyzed in the field (Table 3). Artifacts included 30 glass fragments, 25 metal artifacts including cans, can lids, grommets and nails, and 1 bone fragment of probable ungulate origin. A single bottle base manufactured by Alexander H. Kerr bottle company post-dates AD 1944; the assemblage dates deposition between AD 1944–1970.

Table 3 – AZ-P-33-8 Artifact Assemblage

Material	Artifact Type	Description	Count
Glass	Bottle	Beverage bottle fragment	20
	Jar	Ball jar fragment from external-threaded neck	8
	Bottle	Bottle base, 3 3/16-inch diameter with stippled base, Alexander H. Kerr maker's mark (post- AD 1944 [Toulouse 1971: 44])	1
	Lid	Gravity lid fragment, Orig. approximately 6-inch diameter	1
Metal	Grommet	Copper Levi-jean-style grommet, 6/16-inch diameter	2
	Nail	Wire nails	3



Material	Artifact Type	Description	Count
	Cap	Bottle cap	5
	Can	Metal can fragments, approximately 2 by 2 inches	3
	Can	Potted meat, side key-opened, 2 8/16 by 3 4/16 inches	1
	Can	Sanitary, gear opened, 2 3/16 by 2 14/16 inches	2
	Can	Sanitary, gear opened, embossed "2D241 D0MH" on lid, 3 by 4 7/16 inches	1
	Can	Sanitary, gear opened, 4 5/16 by 2 5/16 inches	1
	Can	Potted meat, side key-opened, 2 10/16 by 7/16 inches	1
	Can	Potted, side key-wind opening, 3 by 2 3/16 inches	1
	Can	External friction lid, 2 10/16-inch diameter	1
	Can	External friction lid, 1 8/16-inch diameter	1
	Unknown	Machine part, removable portion, 8 by 1 8/16 inches	1
Bone	Bone	Fragment of probable ungulate origin, 13/16-inch diameter	1
Total			55

Evaluation

AZ-P-33-8 consists of a small, single-episode dump of 55 historic artifacts, located on a hill slope below the top of the butte where the proposed gravel pit is proposed. No features were found. The historic artifacts include cans, bottle and jar glass, a machine part, an ungulate bone, and a grommet, indicating that most of the trash is food and beverage related. The cultural and temporal affiliation is Navajo: WWII–Recent (AD 1944 to 1970), based on an Alexander H. Kerr bottle company post-dating AD 1944. The surface of the site is rocky and on a slope suggesting that subsurface cultural remains are unlikely. The surficial assemblage is a single-episode trash dump that lacks numerous diagnostics to refine the date of deposition and the potential for additional significant information potential is very low. AZ-P-33-8 is recommended not eligible to the NRHP. The site is less than 100 years old, and is likely not significant under ARPA. The site has no known AIRFA significance.

Impacts and Recommendations

AZ-P-33-8 is located near the southern central edge of the proposed gravel pit area. However, the site is recommended as not eligible to the NRHP. No further treatment is recommended.

NNHPD Site No. AZ-P-33-9

Field Number:	Field Site 2
Site Type:	Single feature
Land Status:	Navajo Nation Trust Lands
Affiliation:	Navajo: Recent (AD 1950s–late 1990s)
NRHP Recommendation:	Not eligible
Project Recommendation:	No further treatment

AZ-P-33-9 is a single hearth feature, which included a single can and a burned juniper stump, located on a small hill with prominent views of a valley to the east, north, and south (Figures 4 and A4). The ground surface consists of silty loam. The site is roughly 20 m (65 ft) from the northern terminus of the proposed gravel pit. The site measures 14 m by 11 m (45 ft by 36 ft) and sits at an elevation of 1,908 m (6,260 ft) amsl. Disturbances include minor wind and water erosion around the feature, wind-borne deposition within the feature, as well as probable cattle trampling. The site is in good condition and is estimated to be 75 percent intact. Visibility is approximately 80 percent. Vegetation includes grasses and forbs.



Figure 4 – AZ-P-33-9, Site Overview, Facing Northeast

Feature

One feature was observed. Feature 1 is a roughly ring-shaped concentration of local, fine-grained basalt that is consistent with a fire ring/hearth. The feature measures 1.45 m by 1.95 m (Figure 5). It includes roughly 60 pieces of rock ranging in size from 15 cm to 20 cm. A few rocks appear fire-cracked, although no charcoal staining was observed. The feature appears slightly scattered by alluvial and cattle trampling,

and aeolian processes have slightly filled in the feature with 2 cm to 5 cm of silty loam. It is unknown, but likely that the nearby juniper was burned during the occupation of the site, as there are no other burned trees/stumps in the vicinity.



Figure 5 – AZ-P-33-9, Feature 1, Facing South

Artifacts

A single artifact was observed, a gear-opened, crushed sanitary can measuring approximately 3 inches by 5 inches. No other artifacts were noted and this is likely associated with the feature.

Evaluation

AZ-P-33-9 consists of a single feature, a burned stump, and artifact situated on a small hill slope, overlooking a valley to the east. The single feature is a thermal campfire hearth. No charcoal staining was observed in the feature, but a burned stump was noted, which is located approximately 5 m from the feature. One sanitary can was found that is associated with the feature. The cultural and temporal affiliation for the site is Navajo Recent (AD 1950s–late 1990s), based on the sanitary can, and the relatively intact feature. The lack of staining does suggest that the site has been there for some time. It seems unlikely that the single feature and artifact can provide information regarding settlement and land use of the area. AZ-P-33-9 is therefore recommended as not eligible to the NRHP. The site is not 100 years or older, and is likely not significant under ARPA. The site has no known AIRFA significance.

Impacts and Recommendations

AZ-P-33-9 is located near the western edge of the proposed gravel pit area. However, the site is recommended as not eligible to the NRHP. No further treatment is recommended.

NNHPD Site No. AZ-P-33-10

Field Number:	Field Site 3
Site Type:	Artifact concentration
Land Status:	Navajo Nation Trust Lands
Affiliation:	Navajo: Recent (AD 1950s to 1980s)
NRHP Recommendation:	Not eligible
Project Recommendation:	No further treatment

AZ-P-33-10 is a single-episode dump north of a two-track road and is part of the proposed drill-rig road. The site is on a gentle, east-northeast alluvial slope in a small valley east of a prominent butte (Figures 6 and A5). The ground surface is a silty loam. The site measures 12 m by 15 m (39 ft by 49 ft) and sits at an elevation of 1,855 m (6,086 ft) amsl. The site is in good condition and is estimated to be 80 percent intact, impacted by minor cattle trampling. Vegetation includes grasses and forbs; visibility is approximately 90 percent.



Figure 6 – AZ-P-33-10, Site Overview, Facing East-Northeast

Features

No features were observed.

Artifacts

All 102 observed artifacts were analyzed (Table 4) including a Depression glass fragment, a liquor bottle fragment partially embossed with "...BEAM" (probably Jim Beam) with Fairmount Bottle and Glass Company maker's mark (AD 1945–1960) (Toulouse 1971: 201); an Anchor Hocking Glass Corporation (>AD 1946) (Toulouse 1971: 50) embossed with "WINE 7489" on oval with a stippled base; and a clear glass baby food jar from Brockway Machine Bottle Company (post-AD 1925) (Toulouse 1971: 60). Three (3) bottles were embossed with 67 and 68, likely representing 1967 and 1968. Fifty-eight (58) glass artifacts, 60 cans, and 1 whiteware teacup fragment were observed and recorded, detailed in Table 4. Objects in the assemblage that are less than 50 years old include 15 post-AD 1973 aluminum top/steel sided ring-pull beverage cans; 1 all-aluminum, partially crushed beverage can, church-key opened (1935 to 1970s and 1 oil lid for a cardboard-sided oil container.

Table 4 – AZ-P-33-10 Historic Artifact Assemblage

Material	Description	Number
Glass	Liquor bottle fragment. Partial embossment of "...BEAM" with Fairmount Bottle and Glass Company maker's mark (AD 1945–1960) (Toulouse 1971: 201)	1
	Anchor Hocking Glass Corporation (>AD 1946) (Toulouse 1971: 50) embossed with "WINE 7489" on oval, stippled base	1
	Light-green Depression glass from probable bowl	1
	Beverage bottle fragment, painted with "SPARKLE BEVERAGE – REFRESHMENT IN EVERY BIG BOTTLE"	5
	Clear baby food jar from Brockway Machine Bottle Company (post-AD 1925) (Toulouse 1971: 60), 2 3/4 by 2 3/16 inches	1
	External-threaded clear glass jar neck and partial body with a partial read of "...EVE"	1
	Green beverage bottle fragments from a single bottle	17
	Clear beverage bottle fragments from numerous bottles	31
Metal	Crushed sanitary cans, approximately 4 1/2 by 3 1/2 inches	30
	Solder-dot milk can, knife-punch opening, 3 15/16 by 3 inches	7
	Gear opened and machine crimped and soldered can, 4 11/16 by 3 1/4 inches	1
	Solder-dot milk can, knife-punch opening, 2 1/2 by 2 3/8 inches	5
Ceramic	Whiteware teacup fragment, (reads "...ACE, ...INA), 1/4-inches thick	1
Total		102

Evaluation

AZ-P-33-10 consists of a single-episode trash dump just north of a two-track road, on an east-northeast alluvial slope in a small valley east of a prominent butte. The site is located in the survey corridor for the



proposed drill-rig road. No features were found. Artifacts recorded include Depression green glass, bottle fragments, jar fragments, cans, and a piece of whiteware, indicating that the assemblage is mostly related to food and beverage consumption. Based on the Depression Green glass, solder-dot milk cans, aluminum cans, and glass with maker's marks, the site tentatively dates to the Navajo: Recent AD 1950s to 1980s. The site appears to be fairly intact, related to trash disposal, was recorded during this investigation, and likely is surficial. AZ-P-33-10 is recommended as not eligible for the NRHP. The site is less than 100 years old, and is likely not significant under ARPA. The site has no known AIRFA significance.

Impacts and Recommendations

AZ-P-33-10 is located within the proposed drill access road. However, the site is recommended as not eligible to the NRHP. No further treatment is recommended.

NNHPD Site No. AZ-P-33-11

Field Number:	Field Site 4
Site Type:	Ranching/agriculture
Land Status:	Navajo Nation Trust Lands
Affiliation:	Navajo: Recent (post-AD 1950)
NRHP Recommendation:	Not eligible
Project Recommendation:	No further treatment

AZ-P-33-11 is a concrete stock-tank-trough foundation with a nearby mound, probably the base of a removed windmill. The site is on a very low rise with prominent views of a valley to the east, north, and south (Figures 7 and A6). The ground surface consists of silty loam. The site measures 40 m by 40 m (131 ft by 131 ft). The site is at an elevation of 1,829 m (6,003 ft) amsl. Disturbances include minor-to-moderate wind and water erosion around the features, as well as cattle trampling. The site is in fair condition and is estimated to be 50 percent intact. Vegetation includes grasses and forbs; visibility is approximately 80 percent.



Figure 7 – AZ-P-33-11, Site Overview, Facing North

Features

Two (2) features were observed. Feature 1 is a concrete stock-tank-trough foundation oriented on a north-south long axis of 30 ft, with an east-west width of 6 ft and thickness of 3 inches. Wind and water erosion have undercut the foundation primarily on the sides and downhill portion 6 to 10 inches. From there, a shallow, barely discernable erosional drainage leads from this feature across the survey corridor road through the area where 4 concrete fragments were placed to mitigate this erosion. A threaded bolt protrudes from near the south edge of the tank to fasten a stock tank; to the north a few meters from the presumed windmill locus, a 5 inch, white PVC pipe containing a threaded water pipe extends from the concrete foundation (The Early History of PVC Pipe 2017). Three (3) abandoned two-track roads are visible from aerial imagery radiating from Feature 2 and is 1.5 m (5 ft) north of the stock foundation. Feature 2 is a low mound roughly 25 ft in diameter and 2 ft above the surrounding landscape. A north-south, 8 inch by 48 inch depression in the middle of the mound. This feature is likely where a windmill once was located.

Artifacts

Five (5) artifacts were observed in association with the features and include 1 milled lumber fragment (8 inches by 2 ft) and 4 pieces of concrete ranging in size from 6 inch to 23 inch. The concrete pieces were placed as erosion control in the bottom of a shallow drainage leading from the stock tank area.

Evaluation

AZ-P-33-11 consists of a 2 features related to a now-abandoned and mostly dismantled stock tank (Feature 1) and windmill (Feature 2), a handful of construction-debris artifacts. All that remains of Feature 1 is a concrete foundation and PVC pipe. Feature 2 is a mound and depression. Based on the concrete and PVT piping, the site tentatively dates to Navajo: Recent (post-1950s). Aerial imagery noted 2 two-track roads extending from the stock tank, which have not been used for some time. It is likely that this area was used for ranching practices in the area, but was abandoned. AZ-P-33-11 is recommended as not eligible to the NRHP. The site is not more than 100 years old, and is likely not significant under ARPA. The site has no known AIRFA significance.

Impacts and Recommendations

AZ-P-33-11 is located on both sides of the proposed drill access road. However, the site is recommended as not eligible to the NRHP and no further treatment is recommended.

NNHPD Site No. AZ-P-33-12

Field Number:	Field Site 5
Site Type:	Features
Land Status:	Navajo Nation Trust Lands
Affiliation:	Navajo: Middle Reservation–Recent (AD 1920–Present)
NRHP Recommendation:	Not eligible
Project Recommendation:	No further treatment

AZ-P-33-12 consists of 2 cairns of local basalt, each placed on the 2 highest points of a low hill near the northern terminus of the proposed staging area (Figures 8 and A7). The ground surface consists of silty loam. The site is located roughly 20 m (65 ft) from the northern terminus of the proposed staging area. The site measures 19 m by 47 m (62 ft by 154 ft) and sits at an elevation of 1,821 m (5,975 ft) amsl. Disturbances include minor wind and water erosion around the feature, wind-borne deposition within the feature, as well as probable cattle trampling. The site is in good condition and is estimated to be 75 percent intact. Vegetation includes grasses and forbs; visibility is approximately 80 percent.



Figure 8 – AZ-P-33-12, Site Overview with Feature 1 in the Foreground, Facing Northeast

Features

Two (2) features were observed. Feature 1 is a mostly intact, low cairn (Figure 9). Material for both cairns likely came from similar basalt eroding from the southwest portion of the hill comprising the site. The feature—a single course above the surrounding landscape—measures 2.4 m north-south by 1.2 m east-west. It includes roughly 60 pieces of rock ranging from 15 to 20 cm; a few appear fire-cracked. The feature appears slightly scattered by alluvial processes and cattle trampling, although aeolian processes have slightly filled in the feature with sediment an estimated 2 cm. Feature 2 (Figure 10) is similar to Feature 1 and is approximately 22 m (72 ft) east of Feature 1 on a high point of a hill. It is composed of approximately 80 pieces of basalt, is closely scattered, and still contains 2 courses remaining in the eastern half.



Figure 9 – AZ-P-33-12, Facing South



Figure 10 – AZ-P-33-12, Feature 2, Facing North

Artifacts

A 5 inch diameter, coffee can lid that is key-opened. The lid was observed in association between Features 1 and 2. It is likely associated with the cairns.

Evaluation

AZ-P-33-12 consists of 2 basalt cairns atop a small hill, overlooking a valley to the east. The function of the cairns is unknown, but is likely boundary marker. The site is assigned a cultural/temporal affiliation of Navajo: Middle Reservation–Recent (AD 1920–Present), based on the coffee can lid and how it was opened, and the condition of the cairns. No additional artifacts were noted, suggesting that the cairns were not checked frequently. Also, no other cairns could be seen in the distance. AZ-P-33-12 is recommended as not eligible to the NRHP. Based on the historic artifact the site is less than 100 years old, and is likely not significant under ARPA. The site has no known AIRFA significance.

Impacts and Recommendations

AZ-P-33-12 is located near the northeast edge of the proposed staging area. However, since the site is recommended as not eligible for nomination, no further treatment is recommended.

NNHPD Site No. AZ-P-33-13

Field Number:	Field Site 6
Site Type:	Ranching/agriculture
Land Status:	Navajo Nation Trust Lands
Affiliation:	Navajo: Recent (AD 1950–Present)
NRHP Recommendation:	Not eligible
Project Recommendation:	No further treatment

AZ-P-33-13 consists of a recently removed water tank area, including 2 remaining stock-watering-related artifacts bisected by a two-track road in the eastern portion of the proposed gravel pit (Figures 11 and A8). The ground surface consists of silty loam with approximately 20 basalt gravels and cobbles. The site is located in the eastern portion of the proposed gravel pit portion of the project on a north slope near the bottom of a prominent, unnamed canyon. The site measures 17 m by 20 m (55 ft by 65 ft) and sits at an elevation of 1,873 m (6,146 ft) amsl. Disturbances include moderate mechanical blading and tracks within the site, including the removal of the water tank, which left a fresh depression behind. The ground consists of a silty loam with basalt cobble and gravels. The site is in poor condition and is estimated to be 20 percent intact. Vegetation includes grasses and forbs; visibility is approximately 90 percent.



Figure 11 – AZ-P-33-13, Site Overview Showing Decommissioned Road and Area of Removed Water Tank

Feature

One (1) feature remnant was observed. Feature 1 is a 7 ft diameter, 2 ft deep depression, which is the impression from a freshly removed water tank. A piece black PVC pipe leading from upslope protrudes into this depression and was once connected to the water tank.

Artifacts

Two (2) artifacts were observed, a small, 4 ft by 3 ft galvanized open-top water tank (Figure 12) directly west of the depression. Roughly 3 m (10 ft) to the south on the other side of the two-track road is a stock tank, made from 2 joined 55 gallon drums (Figure 13).



Figure 12 — AZ-P-33-13, Small Tank Artifact, Facing North



Figure 13 — AZ-P-33-13, Small Tank Artifact, Facing North

Evaluation

AZ-P-33-13 consists of a recently removed water tank, and 2 remaining stock-watering-related artifacts. The water tank area is now a depression with PVC piping extending up the hill. The 2 artifacts are a metal trough and a barrel stock tank, indicating that this area has been used for ranching in the past. Given the first manufacture date of PVC, the site dates between AD 1950–Recent and is of Navajo cultural affiliation. At the Greasewood Chapter House, relayed that this water tank was illegally placed, that had been in place for an unknown number of years, was no longer used due to drought trends, and that the tank had been recently removed (Arthur Hardy, personal communication 2017). AZ-P-33-13 is recommended not eligible to the NRHP. The site is less than 100 years old and is likely not significant under ARPA. The site has no known AIRFA significance.

Impacts and Recommendations

AZ-P-33-13 is located almost in the center of the proposed gravel pit area. However, since the site is recommended as not eligible to the NRHP, no further treatment is recommended.

NNHPD Site No. AZ-P-33-14

Field Number:	Field Site 7
Site Type:	Single feature
Land Status:	Navajo Nation Trust Lands
Affiliation:	Navajo: Recent (AD 1945–Present)
NRHP Recommendation:	Not eligible
Project Recommendation:	No further treatment

AZ-P-33-14 consists of a single cairn made of local basalt that is directly south of a two-track road. The cairn is near a drainage in the eastern portion of the proposed gravel pit to the north is an unnamed canyon (Figures 14 and A9). The ground surface consists of silty loam. The site measures 7 m by 5 m (22 ft by 16 ft) and sits at an elevation of 1,865 m (6,122 ft) amsl. Disturbances include minor water erosion around the feature. The site is in excellent condition and is estimated to be 95 percent intact. Vegetation includes grasses and forbs and a nearby juniper; visibility around the cairn is approximately 80 percent.



Figure 14 — AZ-P-33-14, Site Overview with Feature 1, Facing South

Features

One (1) feature was observed (Figure 15). Feature 1 is a mostly intact cairn of approximately 90 pieces of local basalt ranging from 12 inches to 50 inches in diameter. Overall the feature measures 1.8 m in diameter and is 0.3 m high, or a maximum of 3 courses. The feature appears only slightly scattered by alluvial processes, and there is relatively little sodding of the feature. A turnout associated with a two-track road is nearby.



Figure 15 — AZ-P-33-14, Close Up of Feature 1, Facing North

Artifacts

No artifacts were observed.

Evaluation

AZ-P-33-14 is a single cairn that may be associated with construction of an adjacent turnout associated with a nearby two-track road. No artifacts were found. The feature is intact with little vegetation growing within the feature and little accumulation of sediments suggesting that it is associated with a later Navajo time period (Recent: AD 1945–Present). AZ-P-33-14 is recommended not eligible to the NRHP. It is unlikely that the site is more than 100 years old, and is likely not significant under ARPA. The site has no known AIRFA significance.

Impacts and Recommendations

AZ-P-33-14 is located near the west edge of the proposed gravel pit. However, since the site is recommended as not eligible to the NRHP, no further treatment is recommended.

Isolated Occurrences

Twelve (12) isolated occurrences were identified within the surveyed area. These are summarized in Table 5. Isolated occurrences do not meet the criteria for eligibility to the NRHP and no further treatment is recommended.

Table 5 — Isolated Occurrence Summary

IO No.	Setting	Description
1	Roadside	1 church-key opened steel beverage can, crushed
2	Roadside	1 church-key opened steel beverage can, crushed
3	Roadside	1 church-key opened steel beverage can, crushed
4	Flat/open	1 lard pail, 6 inches height x 5 ⁵ / ₁₆ inches diameter, crushed
5	Flat/open	1 gray quartzite cortical core-reduction flake, 40% cortex, 2 cm
6	Escarpment top	1 opaque red chert cortical core-reduction flake, 50% cortex, 2-3 cm
7	Escarpment top	1 white chalcedony unifacial scraper, worked on all margins, 25% cortex, 36 millimeter (mm) x 25 mm x 9 mm; 1 white chalcedony non-cortical flake, 4-5 cm
8	Hillslope	1 solder-dot evaporated milk can, knife-opened, 2 ¹⁵ / ₁₆ inches x 3 ⁷ / ₈ inches
9	Hillslope	1 opaque red chert shatter, 50% cortex, 5 to 6 cm
10	Hillslope	1 white chalcedony non-cortical flake, 4 to 5 cm
11	Flats near windmill	1 tan-red sandstone one-hand mano, 99 mm x 63 mm x 31 mm
12	Flats	1 solder-dot milk can, crushed, approximately 3 inches x 4 inches

CULTURAL RESOURCE MANAGEMENT

Marron conducted an intense cultural resource survey between March 24 and March 27, 2014. Work was conducted under Navajo Nation Permit No. B14024 and the NDOT is the lead agency. The survey included a survey of Indian Service Roads, the proposed gravel pit and staging parcels, and roads connecting these areas, for a total surveyed area of 50.36 ha (127.45 ac).

Table 6 summarizes the cultural resources found during the survey and recommendations for these resources. Seven (7) newly recorded sites were documented and 12 isolated occurrences were recorded. The 7 archaeological sites are recommended as not eligible for nomination to the NRHP. The 7 sites are likely not significant under ARPA or AIRFA. The isolated occurrences do not meet the criteria for eligibility to the NRHP and no further treatment is recommended.

Table 6— Cultural Resource Summary

Resource No.	Type	NRHP Eligibility Recommendation	Treatment Recommendation
AZ-P-33-8	Artifact scatter	Not eligible	No further treatment
AZ-P-33-9	Feature	Not eligible	No further treatment
AZ-P-33-10	Artifact concentration	Not eligible	No further treatment
AZ-P-33-11	Ranching/agriculture	Not eligible	No further treatment
AZ-P-33-12	Features	Not eligible	No further treatment
AZ-P-33-13	Ranching/Agriculture	Not eligible	No further treatment
AZ-P-33-14	Feature	Not eligible	No further treatment

In the event that cultural resource materials are uncovered during any future work in the project area, work in the area should cease immediately and the NNHPD and NDOT will be notified. NDOT and the NNHPD will determine the necessary steps to evaluate, document, protect, or remove the material or remains, in compliance with the law.

REFERENCES CITED

Christenson, A. L., and W. J. Parry, editors

1985 *Excavations on Black Mesa, 1983: A Descriptive Report*. Center for Archaeological Investigations Research paper No. 46. Southern Illinois University at Carbondale.

Cordell, Linda S.

1997 *Archaeology of the Southwest*, 2nd edition. Academic Press, New York.

Dean, J. S., R. C. Euler, G. J. Gumerman, F. Plog, R. H. Hevly, and T. N. V. Karlstrom

1985 Human Behavior, Demography, and Paleoenvironment on the Colorado Plateaus. *American Antiquity* 50:537–554.

Dick-Peddie, William A.

1993 *New Mexico Vegetation: Past, Present, and Future*. University of New Mexico Press, Albuquerque.

Eck, David C.

1994 Overview and Summary of Previous Research, Chapter 2. In *Across the Colorado Plateau: Anthropological Studies for the Transwestern Pipeline Expansion Project, Volume XI: The Anasazi of Wide Ruin Wash and the Hopi Buttes*, edited by David C. Eck, pp. 5–12. Office of Contract Archeology and Maxwell Museum of Anthropology, University of New Mexico, Albuquerque.

Francis, Harris and Klara Kelly

1988 *Archaeological Survey of the Proposed Larry Marlene Nez NHIRC Homestead Site, Navajo County, Greasewood, Arizona*. Navajo Nation Archaeology Department, Window Rock, Arizona.

Goodman, James M.

1982 *The Navajo Atlas: Environment, Resources, People, and History of the Dine Bikeyah*. University of Oklahoma Press, Norman, Oklahoma.

Gratz, K. E.

1991 Prehistoric Cultural Resource Overview. In *Summary of Archeological Survey and Test Excavations and Preliminary Ethnological Studies—A Phase 2 Management Report, Across the Colorado Plateau: Anthropological Studies Along the San Juan Basin and Transwestern Mainline Expansion Pipeline Routes, Vol. I*, edited by Joseph C. Winter, pp. VI.1–1 to 1–18. Prepared for the Transwestern Pipeline Company. Office of Contract Archeology, University of New Mexico, Albuquerque.

Gumerman, George J.

1984 *A View from Black Mesa: The Changing Face of Archaeology*. University of Arizona Press, Tucson.

1988 *The Archaeology of the Hopi Buttes District, Arizona*. Center for Archaeological Investigations, Research paper No. 49, Southern Illinois University, Carbondale.

Gumerman, George J., and J. Dean

- 1989 Prehistoric Cooperation and Competition in the Western Anasazi Area. In *Dynamics of Southwest Prehistory*, edited by Linda S. Cordell and G. J. Gumerman, pp. 99–148. Smithsonian Institution Press, Washington D.C.

Hays, K. A., E. C. Adams, and R. C. Lange

- 1991 Regional Prehistory and Research. In *Homol'ovi II: Archaeology of an Ancestral Hopi Village, Arizona*, edited by E. C. Adams and K. A. Hays, pp. 1–9. Anthropological Papers of the University of Arizona No. 55, University of Arizona, Tucson.

Hicks, P. A.

- 1987 Dating the Undiagnostic Lithic Scatter Through the Use of Patterned Changes in Debitage Attributes. In *Archaic Hunter-Gatherer Archeology in the American Southwest*, edited by B. J. Vierra. Contributions in Anthropology No. 13. Eastern New Mexico University, Portales.

Irwin-Williams, Cynthia

- 1973 *The Oshara Tradition: Origins of Anasazi Culture*. Eastern New Mexico University Contributions in Anthropology. 5:1, Eastern New Mexico University, Paleo-Indian Institute, Portales.

- 1987 The Archaic of the Southwestern United States: Changing Goals and Research Strategies in the Last Twenty-five Years 1964–1989. . In *Archaic Hunter-Gatherer Archeology in the American Southwest*, edited by B. J. Vierra. Contributions in Anthropology No. 13. Eastern New Mexico University, Portales.

Irwin-Williams, Cynthia, and C. Vance Haynes

- 1970 Climatic Change and Early Population Dynamics in the Southwestern United States. *Quaternary Research* 1(1):59-71.

Irwin-Williams, Cynthia, and S. Tompkins

- 1968 *Excavations at En Medio Shelter, New Mexico*. Eastern New Mexico Contributions in Anthropology Vol. 1, No. 2. Portales.

Iverson, Peter

- 2002 *Diné: A History of the Navajos*. University of New Mexico Press, Albuquerque, New Mexico.

Judge, James W.

- 1973 *Paleoindian Occupation of the Central Rio Grande Valley in New Mexico*. University of New Mexico Press, Albuquerque.

Kelley, Klara B.

- 1982 *Anasazi and Navajo Land Use in the McKinley Mine Area Near Gallup, New Mexico, Volume Two: Navajo Ethnohistory*. Office of Contract Archeology, University of New Mexico, Albuquerque.

Kelley, Robert L., and Lawrence C. Todd

- 1988 Coming into the Country: Early Paleoindian Hunting and Mobility. *American Antiquity*, 53:231–244.

Kelley, V. C.

1955 Monoclines of the Colorado Plateau. *Geological Society of America Bulletin* No. 66, pp. 789–804.

Kidder, A. V.

1927 Southwestern Archaeological Conference. *Science* 66(1716):489–491.

Matson, R. G.

1991 *The Origins of Southwestern Agriculture*. University of Arizona Press, Tucson.

Mills, Barbara J., C. E. Goetze, and M. N. Sedeño (editors)

1993 Interpretation of Ceramic Artifacts. In *Across the Colorado Plateau: Anthropological Studies for the Transwestern Pipeline Expansion Project, Vol. XVI*. Prepared for the Transwestern Pipeline Company. Office of Contract Archeology and Maxwell Museum of Anthropology, University of New Mexico, Albuquerque.

Miner, Mark and Tim Watts

1989 *An Archaeological Survey 30.35 Miles for a proposed NTUA Powerline near Greasewood, Arizona (NTUA Work Order No. 880-8103.1)(NNAD 89-011)*. Navajo Nation Archaeology Department, Window Rock, Arizona

Natural Resources Conservation Service, United States Department of Agriculture, Web Soil Survey. Available online at <http://websoilsurvey.nrcs.usda.gov/>. Accessed (March 2017).

Nelson, Lily A.

2001 A Cultural Resource Inventory for a Proposed 1 Acre Homesite for Nelson and Mary Etta Soue near Greasewood, Apache County, Arizona. Native Preservation Consultants, Gallup, New Mexico

Nichols, D. L., and F. E. Smiley, editors

1984 *Excavations on Black Mesa, 1982: A Descriptive Report*. Center for Archaeological Investigations Research Paper No. 39. Southern Illinois University, Carbondale.

Plog, Fred

1979 Prehistory: Western Anasazi. In *Handbook of North American Indians, Southwest, Vol. 9*, edited by A. A. Ortiz, pp. 108–130. Smithsonian Institution Press, Washington, D.C.

Sayles, E. B., and E. Antevs

1941 *The Cochise Culture*. Medallion Papers no. 29. Gila Pueblo, Globe, Arizona.

Schroeder, Albert H.

1963 Navajo and Apache Relationships West of the Rio Grande. *El Palacio* 70(3):5–23.

Schutt, Jeanne A., Carolyn L. Daniel, and Richard C. Chapman

1997 Cultural Overview, Previous Research, and Research Orientation. In *Cycles of Closure: A Cultural Resources Inventory of Fort Wingate Depot Activity, New Mexico*, edited by Jeanne A. Schutt and Richard C. Chapman, pp. 13–36. Report No. 185-551. Office of Contract Archeology, University of New Mexico, Albuquerque.



Stone, Tammy

1999 *The Prehistory of Colorado and Adjacent Areas*. University of Utah Press, Salt Lake City.

Thornbury, W. D.

1965 *Regional Geomorphology of the United States*. John Wiley and Sons, New York.

Toulouse, Julian Harrison

1971 *Bottle Makers and Their Marks*. Thomas Nelson, Inc. New York.

Turner, Raymond M.

1994 Great Basin Desert Scrub. In *Biotic Communities Southwestern United States and Northwestern Mexico*, edited by David E. Brown, pp. 145–155. University of Utah Press, Salt Lake City.

Vivian, R. Gwinn

1990 *The Chacoan Prehistory of the San Juan Basin*. Academic Press, San Diego.

Warburton, Miranda, and Phil R. Geib

1991 *An Archaeological Survey of Six NTUA Proposed Powerline Extensions on Black Mesa, Arizona for NTUA*. Navajo Nation Archaeology Department, Window Rock.

Wero, Shane, Jason Nez, Neomie Tsosie, and Natalia Reeder

2010 *Living Among the Pueblo Colorado's Path: Results of Archaeological Survey of a Proposed Bus Route Maintenance Project for the Greasewood Springs Community School, Inc., Greasewood Springs, Navajo County, Arizona*. Navajo Nation Archaeology Department, HPD-10-098.

Western Regional Climate Center.

2017 Western U.S. Historical Summaries (Individual Stations). Website: <http://www.wrcc.dri.edu/CLIMATEDATA.html>

Wheat, Joe Ben

1972 *The Olsen-Chubbuck Site: A Paleo-Indian Bison Kill*. Memoir 26. Society for American Archaeology, Washington, D.C.

Wozniak, Frank E.

1982 *A Cultural Overview and Predictive Model in the Eastern San Juan Basin for the Continental Divide Pipeline Company's Pipeline Route from Thoreau, New Mexico to near Ignacio, Colorado*. Office of Contract Archeology, University of New Mexico, Albuquerque.

1988 The Location of the Navajo Homeland in the Seventeenth Century: An Appraisal of the Spanish Colonial Records. Paper presented at the New Mexico Archaeological Council Conference on the Protohistoric Period in New Mexico, Albuquerque.

Woznaik, Frank and Michael P. Marshall

1991 *The Prehistoric Pueblo World, A.D. 1150-1350*, Edited by Michael A. Adler, pp 4-17. University of Arizona Press, Tucson.

Wormington, H. Marie

1957 *Ancient Man in North America*. 4th edition. Popular Series No. 4. Denver Museum of Natural History, Denver.



APPENDIX A: CULTURAL RESOURCES LOCATION DATA

Confidential: The public disclosure of the location of archaeological sites is prohibited by Section 18-6-11.1 New Mexico Statutes Annotated 1978 and by 36 CFR 296.18.



Table A.1 –Site UTM and PLSS Coordinates (NAD 83, Zone 12)

Site No.	Easting	Northing	Township	Range	Section	1/4 1/4 1/4	Quadrangle Name/Code/Year
AZ-P-33-8	592424	3920662	23N	22E	2	SE/SW/NW	Greasewood Springs/ 35109-D8/1972
AZ-P-33-9	592336	3920948	23N	22E	2	SW/NW/NW	Greasewood Springs/
AZ-P-33-10	592092	3919904	23N	22E	3	SE/SE/SE	35109-D8/1972
AZ-P-33-11	592923	3919579	23N	22E	11	NE/NE/NW	Greasewood Springs/
AZ-P-33-12	593781	3920628	23N	22E	1	SW/SW/NW	35109-D8/1972
			23N	22E	2	SE/SE/NE	Greasewood Springs/
AZ-P-33-13	592501	3920844	23N	22E	2	NE/SW/NW	35109-D8/1972
AZ-P-33-14	592590	3920814	23N	22E	2	NW/SE/NW	Greasewood Springs/

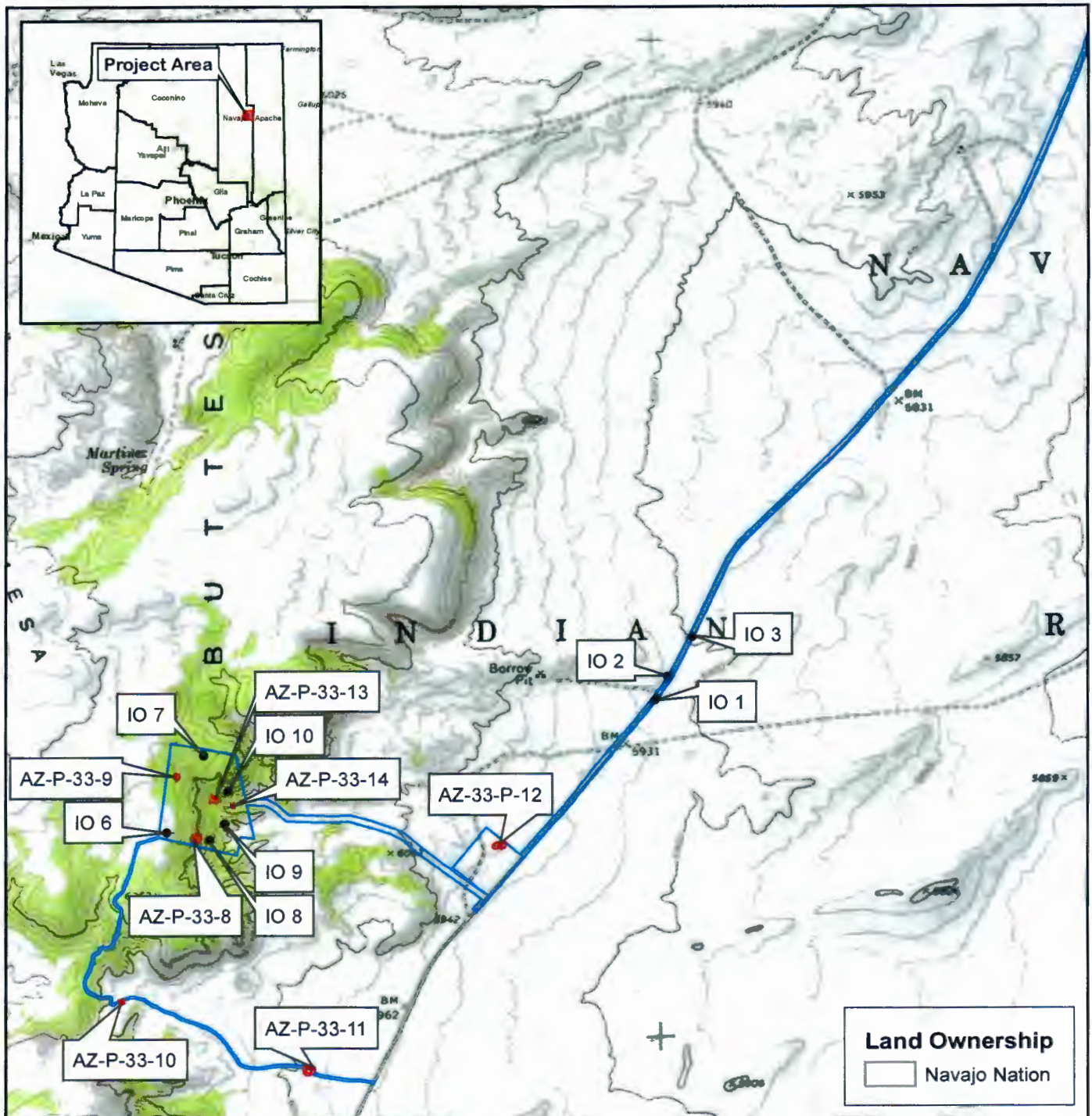
Table A.2 – Isolated Occurrences UTM Coordinates (NAD 83, Zone 12)

IO No.	Easting	Northing
1	594485	3921305
2	594540	3921414
3	594651	3921599
4	595741	3926785
5	595364	3927710
6	592292	3920690
7	592458	3921045
8	592486	3920656
9	592551	3920728
10	592565	3920878
11	596477	3925088
12	595865	3926599

APPENDIX B:
Site File Search Maps

Confidential: The public disclosure of the location of archaeological sites is prohibited by Section 18-6-11.1 New Mexico Statutes Annotated 1978 and by 36 CFR 296.18.





Land Ownership
 [White Box] Navajo Nation



Figure A1
Cultural Resource Map
(South)

- Project Area
- Site Boundary
- Isolate

T23N, R22E, Sec. 01, 02, 03, 11
 T24N, R22E, Sec. 12, 36
 T24N, R23E, Sec. 07, 18, 19, 30, 31

Greasewood Springs, AZ;
 7.5' USGS Quadrangle;
 Navajo County, Arizona

0 0.4 0.8 1.6
 Kilometers

0 0.25 0.5 1
 Miles



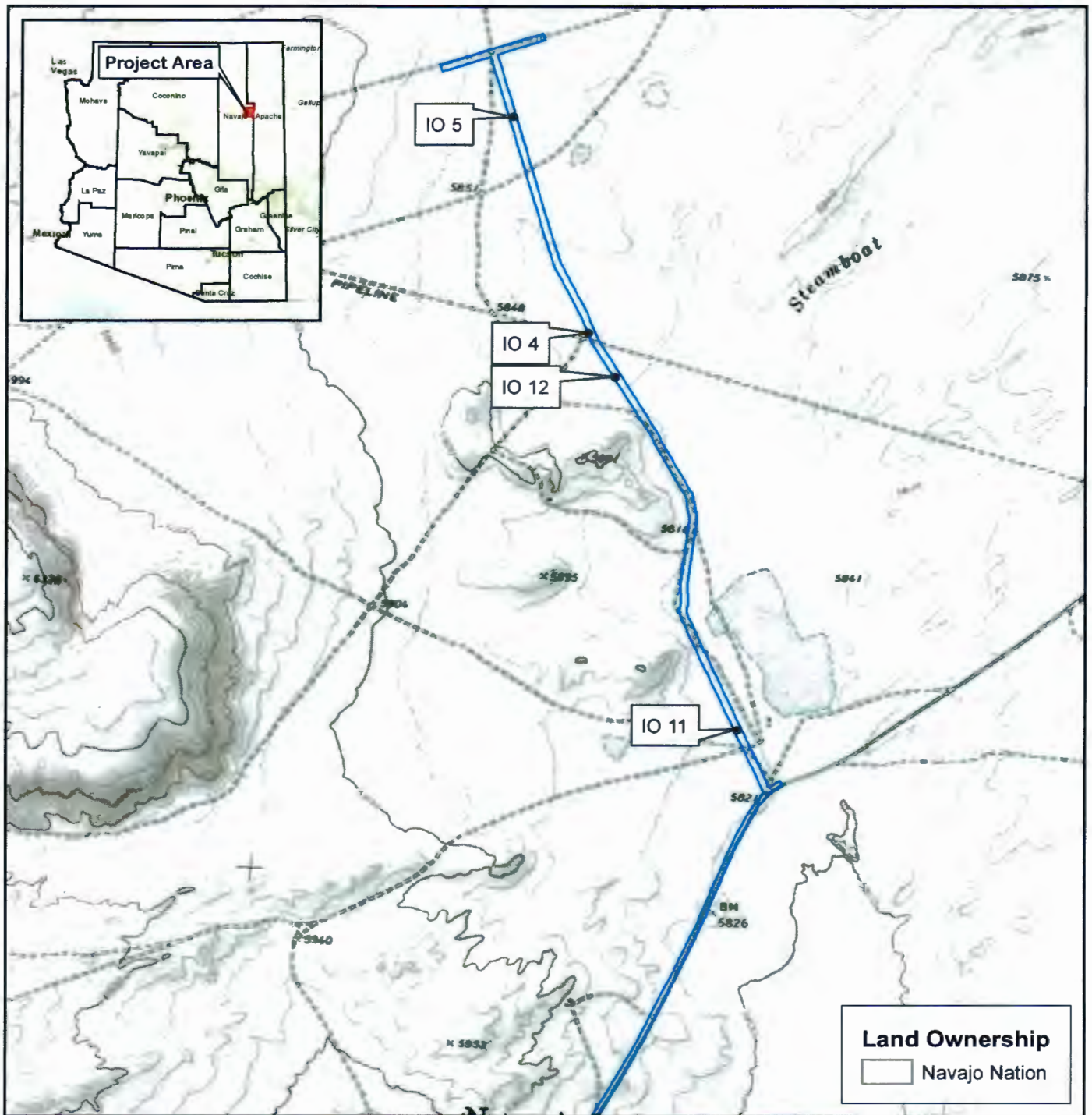


Figure A2
Cultural Resource Map
(North)

- Project Area
- Isolate

T23N, R22E, Sec. 01, 02, 03, 11
T24N, R22E, Sec. 12, 36
T24N, R23E, Sec. 07, 18, 19, 30, 31

Greasewood Springs, AZ;
7.5' USGS Quadrangle;
Navajo County, Arizona

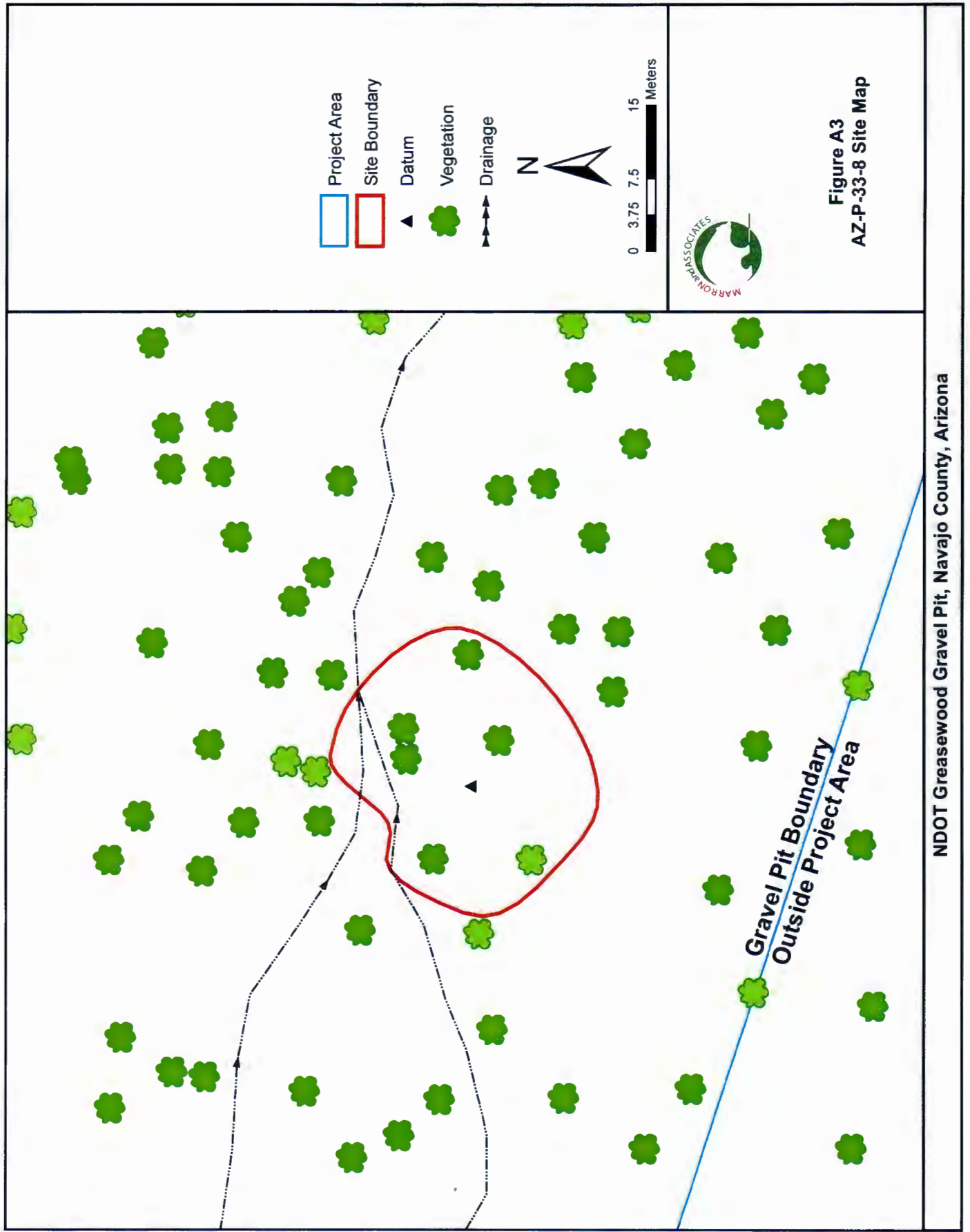
0 0.375 0.75 1.5
Kilometers

0 0.25 0.5 1
Miles



1:24,000

NDOT Greasewood Gravel Pit, Navajo County, Arizona



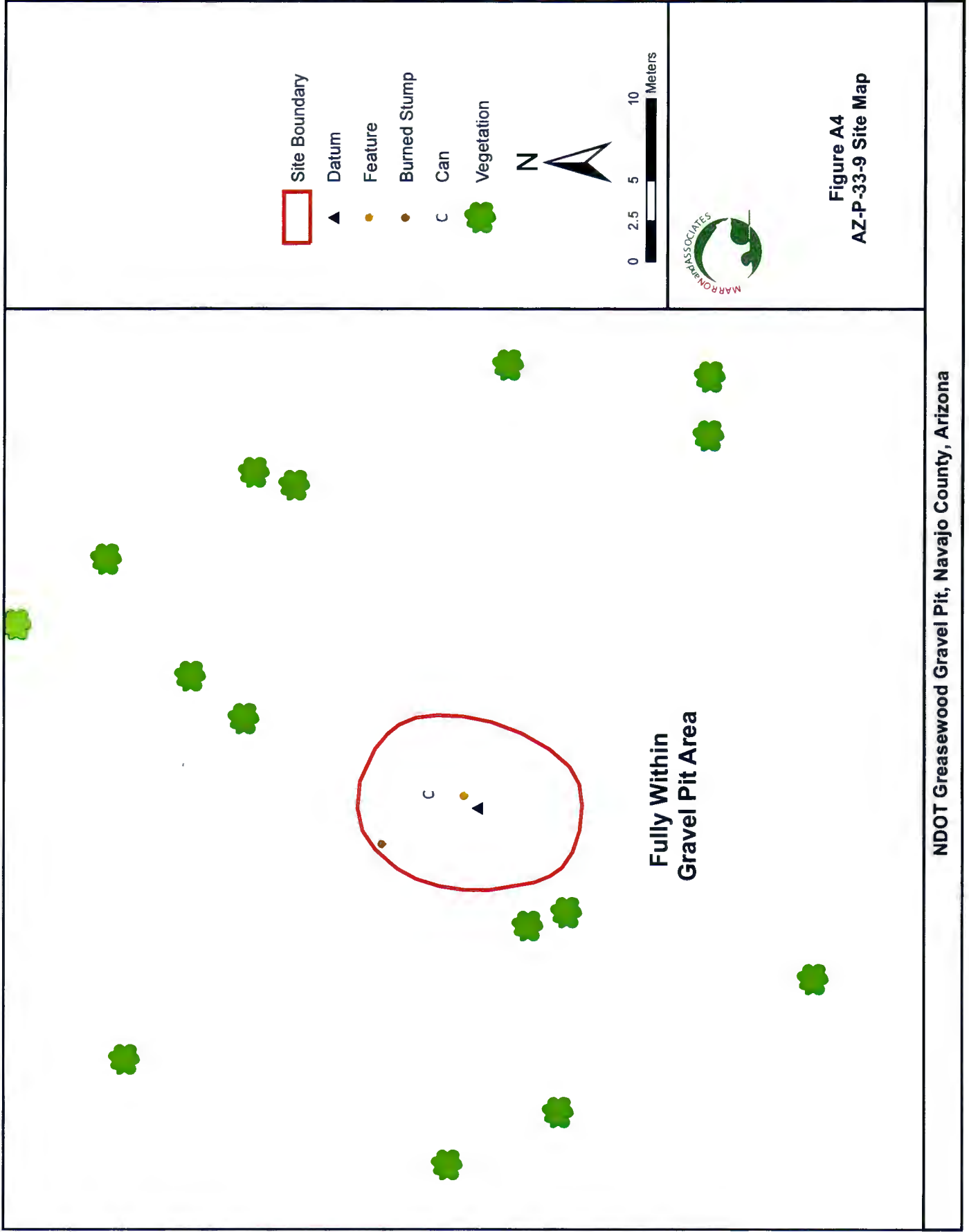
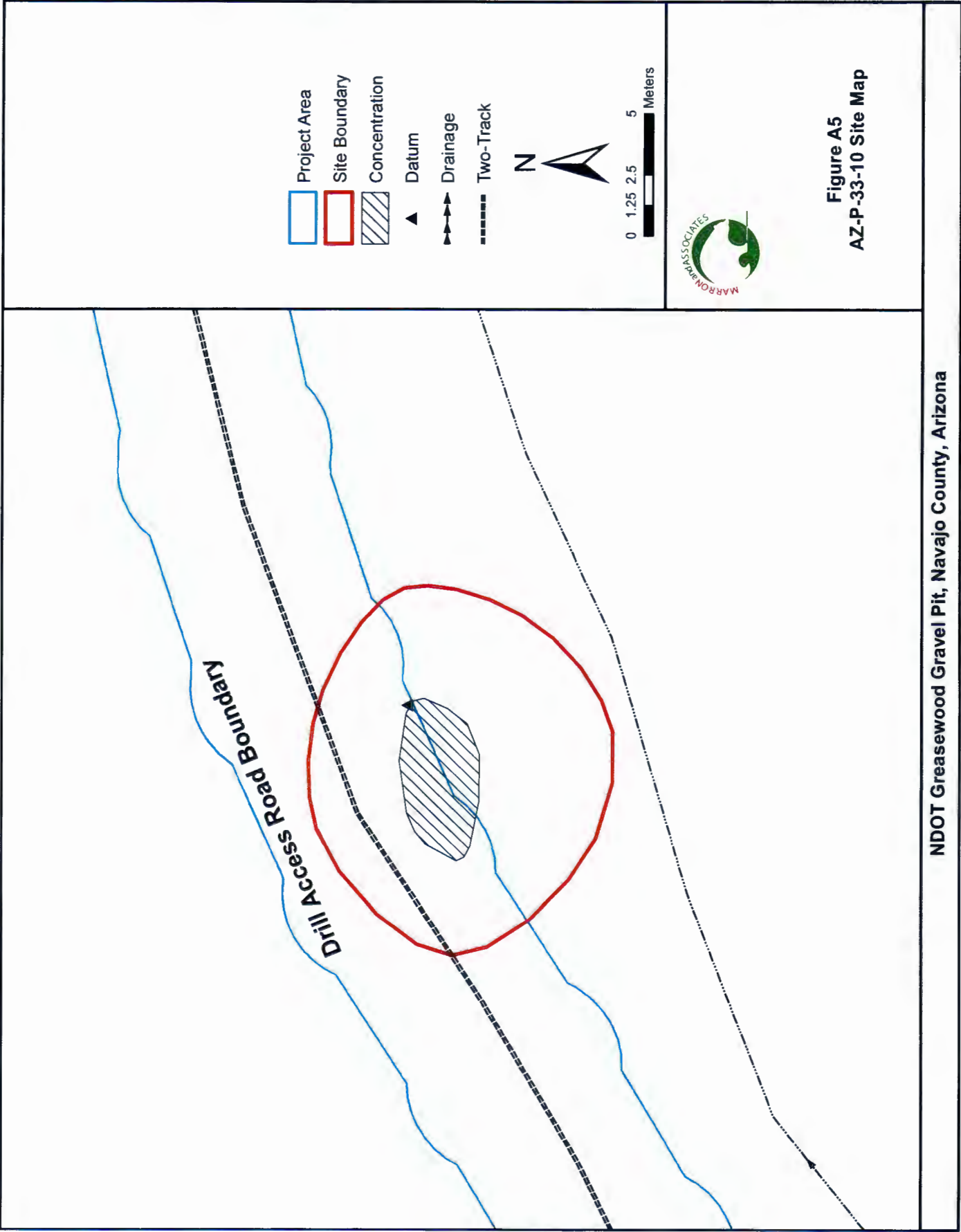
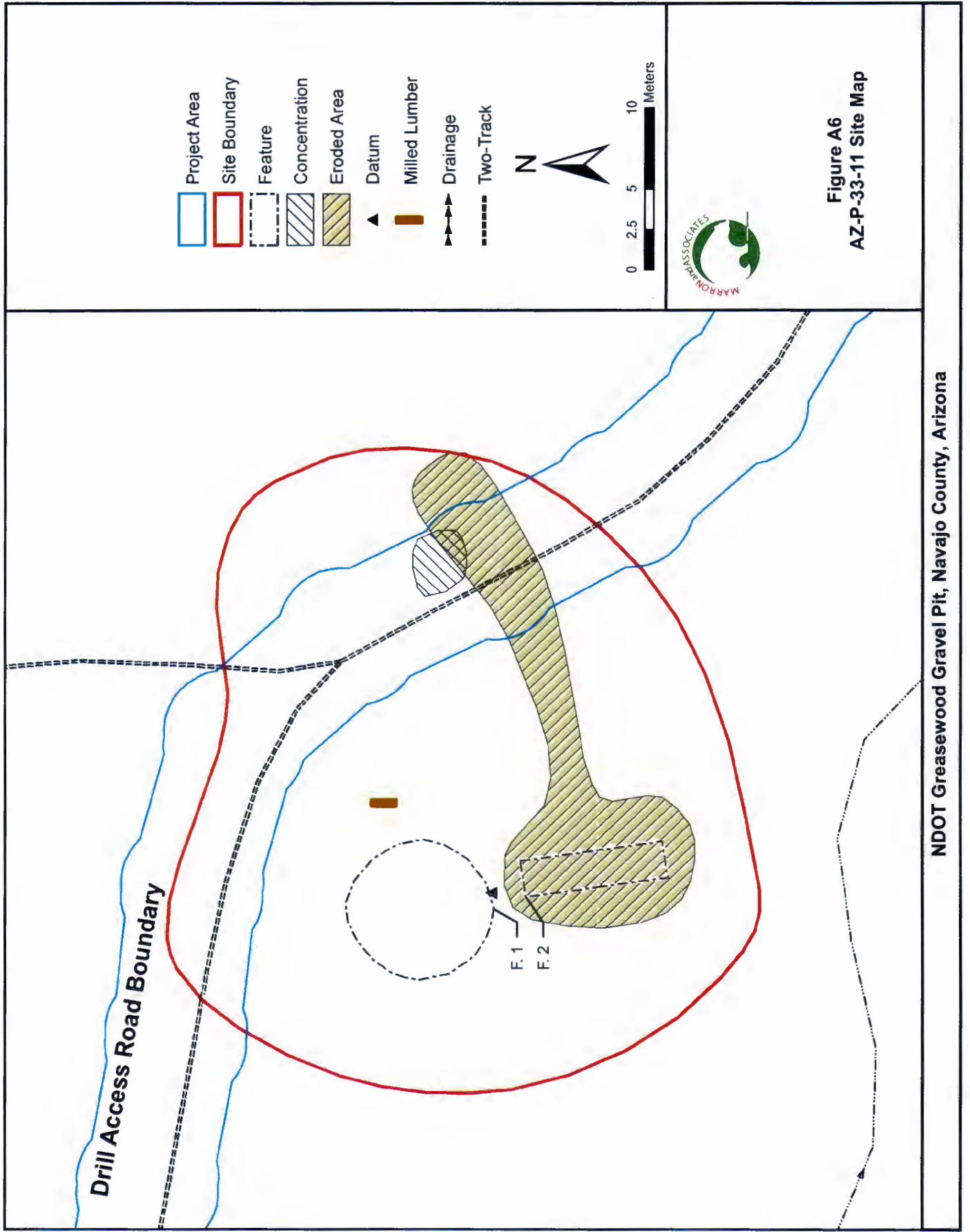
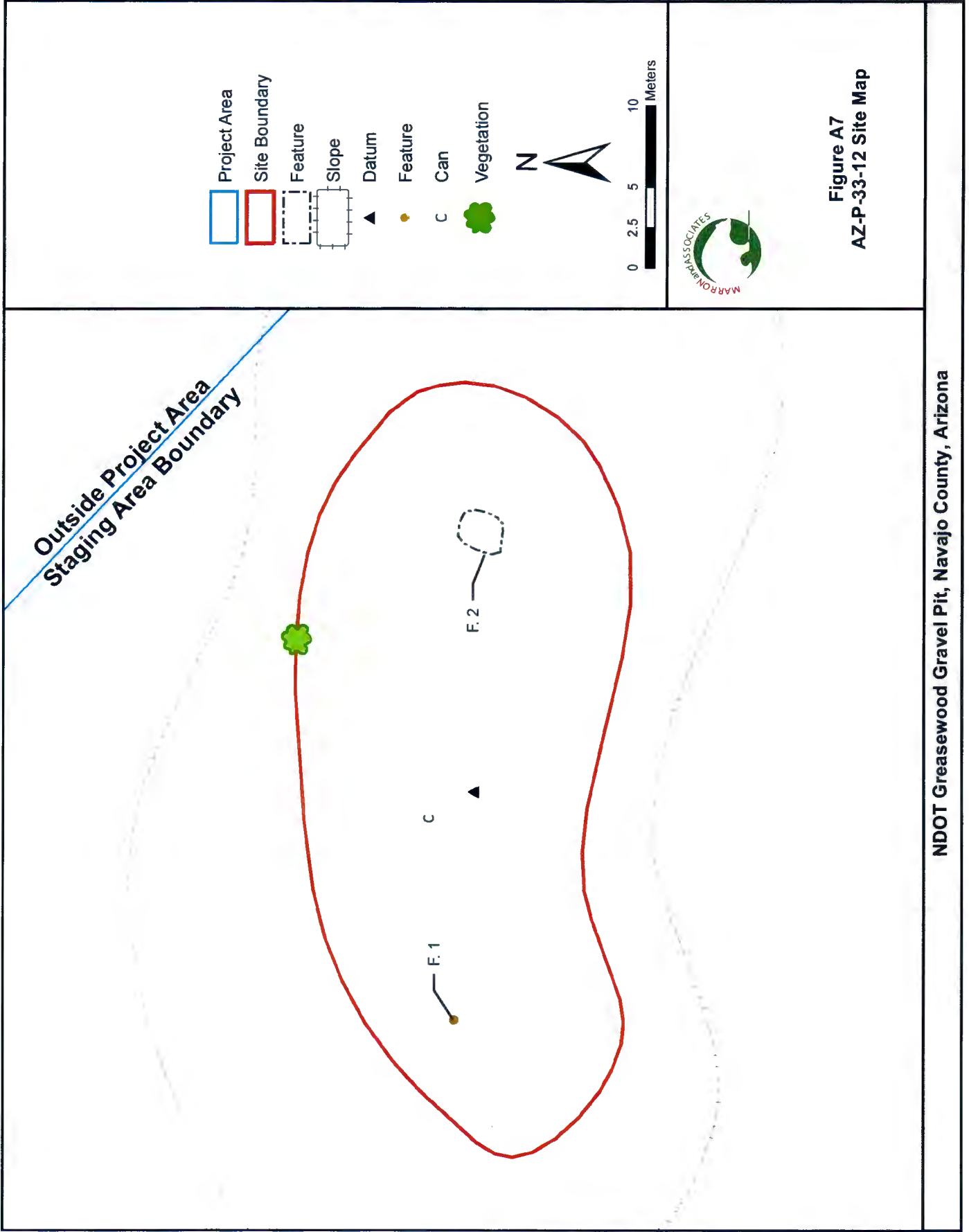
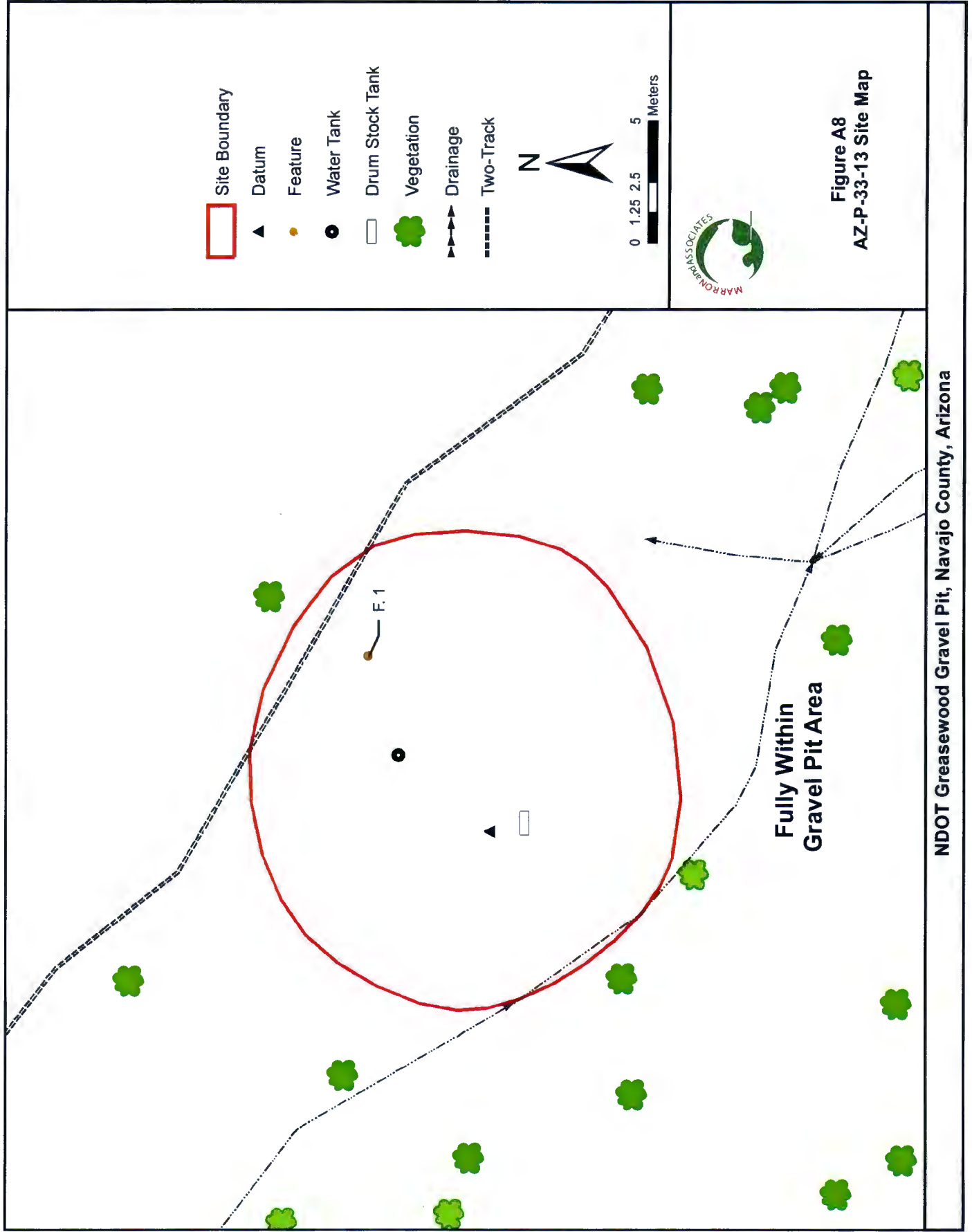


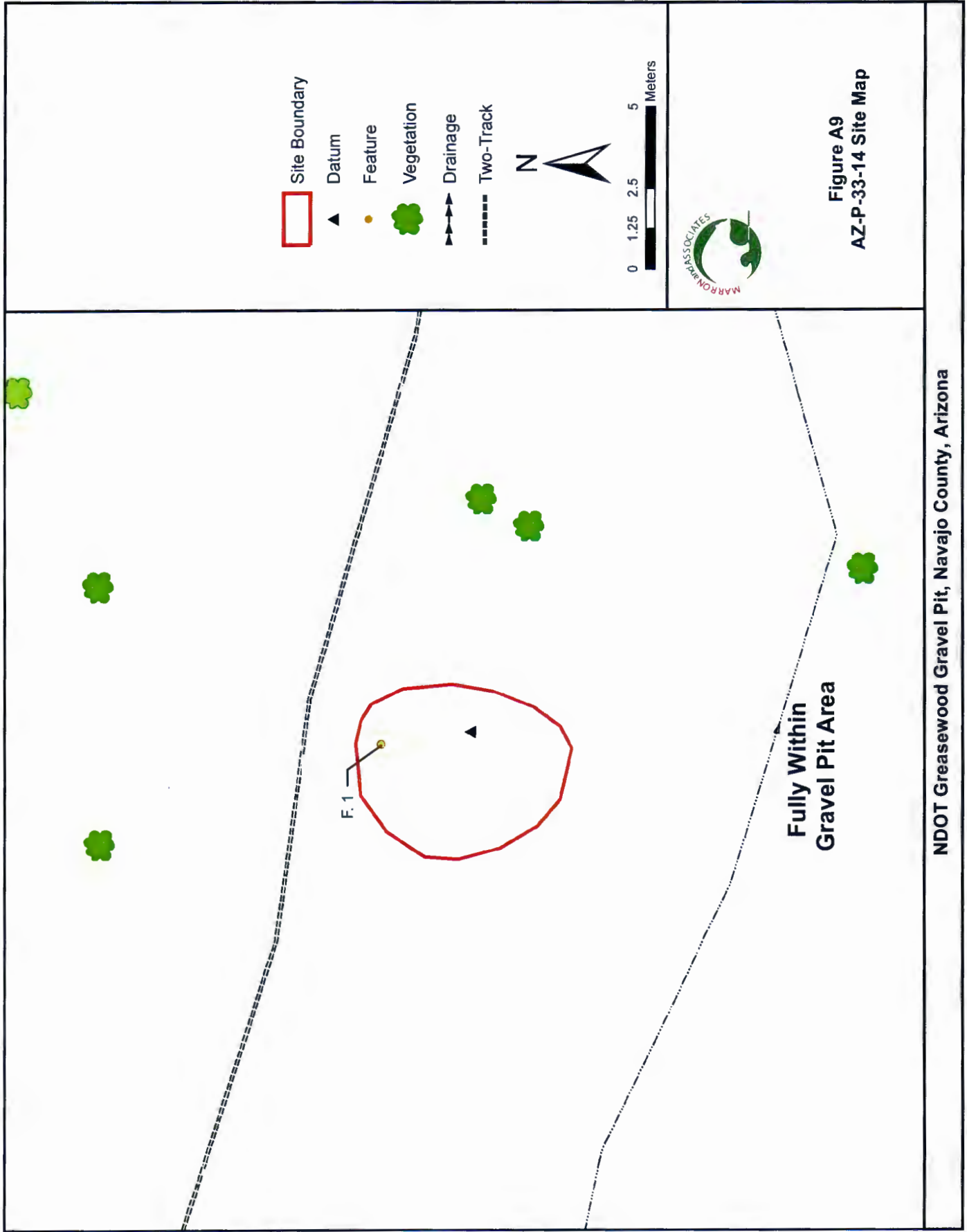
Figure A4
AZ-P-33-9 Site Map











APPENDIX C: TCP Information

Confidential: The public disclosure of the location of archaeological sites is prohibited by Section 18-6-11.1 New Mexico Statutes Annotated 1978 and by 36 CFR 296.18.





THE NAVAJO NATION
Historic Preservation Department
PO Box 4950, Window Rock, AZ 86515
TEL: (928) 871-7198 / 7134 FAX: (928) 871-7886

TRADITIONAL CULTURAL PROPERTY (TCP) RECORD
SEARCH VERIFICATION FORM

****TCP WILL NOT SIGN/APPROVE IF THIS PORTION IS LEFT BLANK****

Project Information:

DATE	3-14-17
RESEARCHER & COMPANY	Ardale Dolena & Christopher Carlson
PROJECT NAME	Proposed Greasewood Gravel Pit
PROJECT/PERMIT NUMBER	B17042
PROJECT LOCATION	Near Greasewood, AZ

*****TO BE FILLED OUT & SIGNED BY AUTHORIZED NNHPD STAFF ONLY*****

A literature search of TCP Records at NNHPD on the above date indicates the following:

<input type="checkbox"/>	There are <u>no</u> TCP(s) present within the project area and/or buffer zone. The project may proceed as proposed.
<input type="checkbox"/>	TCP(s) <u>are</u> present within the project area and/or buffer zone. Project may have the potential to adversely affect TCP(s). Please document TCP(s) as a summary (with only general location information) in the body of reports submitted for review to HPD/CRCs. Give full detail on the TCP Documentation Forms in a separate, and clearly labeled, confidential appendix.
<input type="checkbox"/>	Project may proceed with the following stipulations:
<input checked="" type="checkbox"/>	Further consultation is required. Consult with the following: <i>note 5/5/17 Greasewood chapter officials / communities include info in final Report. TCP# 716, 827 in final Report.</i>
<input type="checkbox"/>	There are no mitigative measures. Project may not proceed.

NNHPD/TCP Program
Reviewer:

[Signature]

Date: 3/14/17

****Return this form along with report to the NNHPD/Compliance Section****

Note: In addition to the TCP Record search, the consultant must demonstrate that a good-faith effort to consult with 1.) Surface user(s): grazing-permit holder(s) (individuals whose consents for right-of-way have been sought by developer); any other residents in or within view of the proposed project area. 2. Chapter(s) within which the proposed project is located: chapter officers and/or delegate(s) of the Navajo Nation Council; at the request of any of these individuals, the developer's consulting anthropologist will also make a presentation at a meeting of general chapter membership. 3. Other knowledgeable people recommended by the present surface user(s), chapter officials, and chapter members.

APPENDIX D:
Copy of Permit and Check

Confidential: The public disclosure of the location of archaeological sites is prohibited by Section 18-6-11.1 New Mexico Statutes Annotated 1978 and by 36 CFR 296.18.





THE NAVAJO NATION

P.O. Box 4950 • Window Rock, Arizona 86515 • (928) 871-7198

Russell Begaye
President



Jonathan Nez
Vice President

CULTURAL RESOURCE INVESTIGATION PERMIT

PERMIT NUMBER: **B17042**

DATE: March 01, 2017

CULTURAL RESOURCES INVENTORY PERMIT(s):

Pursuant to the authority of the Navajo Nation Cultural Resources Protection Act (CMY-19-88) Section 302, permission is hereby granted to: Marron and Associates, 7511 Fourth Street NW, Albuquerque, New Mexico 87107

PURPOSE OF PERMIT: To conduct a Class III Inventory for a Proposed Grave Pit, Staging Area, Access Road and Potential Haul Routes on N153 in Greasewood Chapter, Navajo County, Arizona.

Personnel Authorized to Conduct Field Work Under the Authority of the Permit:

PERSON IN GENERAL CHARGE: Christina Chavez and Toni Goar

PERSON IN DIRECT CHARGE: Christina Chavez, Toni Goar and Stanley Kerr

Permission is granted for a Period of: Beginning February 27, 2017 through June 27, 2017.

Standard Stipulations: This permit is granted subject to the Permittee adhering to the following stipulations. Failure to conform strictly to these conditions may result in suspension or revocation of this Permit and affect the Permittee's ability to obtain similar Permits from the Navajo Nation in the future.

- A. A copy of this Permit must be in the possession of field workers at all times when they are conducting fieldwork under the authority of this Permit.
- B. The Permittee will exclusively employ Navajos for all positions, to the extent that qualified Navajos are available.
- C. This Permit is not a grant of authority.
 - (1) Prior to initiating fieldwork, the Permittee must notify chapter officials (President, Vice President, Secretary, or Chapter Project Coordinator) to familiarize them with the proposed fieldwork and the provisions of the Permit.
 - (2) The Permittee must inform any potential interviewee that he/she is not required to consent to interviews or to otherwise cooperate with the Permittee.

PERMIT GRANTED,

Richard M. Begay, Department Manager III
Navajo Nation Heritage & Historic Preservation Department

MARRON AND ASSOCIATES, INC.

ALBUQUERQUE, NM 87107-6526

63220

The Navajo Nation

Check Number: 63220

Check Date: Apr 18, 2017

Check Amount: \$550.00

Discount Taken Amount Paid
550.00

Item to be Paid - Description

Permit # B17042 CR-50624

Memo: Permit #B17042

MARRON AND ASSOCIATES, INC.
7511 FOURTH STREET NW
ALBUQUERQUE, NM 87107-6526
(505) 898-8848

SOUTHWEST CAPITAL BANK
www.southwestcapital.com
800-748-2408

63220

95-37/1070
06

CHECK ONE

DATE
Apr 18, 2017

AMOUNT
*****\$550.00

Five Hundred Fifty and 00/100 Dollars

PAY
TO THE
ORDER
OF

The Navajo Nation
PO Box 3150
Window Rock, AZ 86515


AUTHORIZED SIGNATURE

⑈063220⑈ ⑆107000372⑆

7099444⑈

Outside on Back



Security Features Included



SECTION 6

Detailed Mining and Reclamation Plan

Greasewood Springs Pit #1 Navajo County, Arizona

Prepared for:



P.O. Box 4620
Window Rock, AZ 86515
Phone: (505) 371-8300
Fax: (505) 371-8399

Prepared by:



350 Indiana Street, Suite 500
Golden, CO 80401
(303) 217-5700
Fax: (303) 217-5705

May 18, 2017

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Figure 2: Greasewood Springs Pit #1, Phase 1 Mining Contours

Figure 3: Greasewood Springs Pit #1, Phase 2 Mining Contours

Figure 4: Greasewood Springs Pit #1, Phase 3 Mining Contours

Figure 5: Greasewood Springs Pit #1, Phase 4 Mining Contours

Figure 6: Greasewood Springs Pit #1, Phase 5 Mining Contours

Figure 7: Greasewood Springs Pit #1, Post Mining Contours

1. Mining and Reclamation Plan

The Navajo DOT is applying for a permit to extract natural gravel from an area within Navajo County Arizona, on the Navajo Nation, within the Greasewood Chapter. The topography in the area is a mesa and the gravel will be mined from the side of the mesa. The gravel will be crushed and utilized as roadway gravel. The target material is a cap on the mesa created by a lava flow event and is an estimated 30 to 60 feet thick by observation in the field.

2. Mine Plan

Gravel will be extracted from the side of the mesa. The lease that is to be permitted is 40 acres, for a time period of 5 years. As prior exploration of the area has not included drilling, the layout of the mining area has been planned in a conservative manner. Delineation drilling of the resource will be performed and the mine plan will be adjusted accordingly in the future to detail the resource information. Additional material can likely be sourced from this area after exploration has proved the material exists further from the main outcrop. The production rate of material in this pit will be determined by demand. The crusher and conveyor equipment will be located a short distance down the road from the gravel pit, on an approved 10 acre parcel of land. This area was selected due to its flat nature.

2.1 Site Access and Security

Current access is provided part way to the site by a maintained dirt/gravel road from Highway BIA 15, near the Greasewood chapter. The remainder of the access way to the site is provided by an unmaintained gravel road and a two track road. This road will need to be improved for use by the haul trucks and ease of site access. A cut across roadway will be constructed/improved from the crushing and stockpile area to the main highway to reduce wear and the inconvenience of truck traffic on the local road.

A locking gate will be installed at the process site to prevent unauthorized users for safety and for the security of the site. Due to the steep walls of the pit, a fence will be installed at the crest for safety.

2.2 Mining Methods

The mining will take place in five phases, starting near the existing outcrop. This plan will be focused on reducing the hauling distance and generating a more efficient working area. The mine plan was laid out conservatively based on the material observed in the field. Additional material is probable at the site, but is unproven at this time. The phased approach of mining also allows for concurrent reclamation of the site, which plans for closing each phase as mining is completed. This method allows the cost of the reclamation to be spread out throughout the mine life.

The project will be separated into five mining phases. Each phase will consist of one 30 foot bench, with Phase 4 and Phase 5 being completed beneath Phase 1 and Phase 2. The central phase will be opened first, providing alternatives to mining sequence in Phase 2 and Phase 3 in the event the plan is modified. This plan assumes an average of 60 foot thickness in the area, but drilling will be performed to prove the thickness in this area. If the thickness is not 60 foot in the delineation drilling, the mine plan will be revised. If additional material is discovered under Phase 2, it can be mined in two benches, each at 30-foot in height. The phases of the pits can be seen in Figures 1-6. The total volume of material that is available for removal, which has been estimated by Vulcan software, is approximately 350,000 cubic yards

in place. This number is based on assumptions provided by field surveys and should be verified through delineation drilling. The total tonnage of the pit will be approximately 433,000 tons of crushed material, this utilizes a density of 1.65 t/yd³ and a total loss from blasting and crushing of 25%.

A 30 foot wide access road will be used to haul the material at site, which is marked on all the figures. Internal roads will need to be maintained for access to Phase 2 and Phase 3.

Based on the criteria to define the available material, the current estimates for volume produced by phase is the following:

- Phase 1 – Is the central phase and contains the main visible outcrop from the field visit. The pit will be 30 feet in depth, approximately 209 feet in width, and approximately 365 feet in length. It will be mined in one bench of 30 feet, Phase 4 will consist of a second bench below this phase. The bottom elevation of this phase is 6,195 feet. Phase 2 contains approximately 37,000 cubic yards of in place material, which will provide 46,000 tons of gravel product after losses and crushing. Phase 1 contours are shown on Figure 2.
- Phase 2 – Is east of Phase 1. The pit will be 30 feet in depth, approximately 270 feet in width, and approximately 195 feet in length. It will be mined in one bench, with a bottom elevation of 6195 feet. Phase 2 contains approximately 80,000 cubic yards of in place material, which will provide 99,000 tons of gravel product after losses and crushing. Additional drilling may prove resources in the area and it is possible that the mine plan can be expanded to two benches. Phase 2 contours are shown on Figure 3.
- Phase 3 –Is west of Phase 1 and contains some of the main visible outcrop from the field visit. The pit will be 30 feet in depth, approximately 290 feet in width, and approximately 444 feet in length. It will be mined in one bench of 30 feet with a bottom elevation of 6,195 feet. A second bench will be completed below this area in Phase 5. Phase 3 contains approximately 75,000 cubic yards of in place material, which will provide 93,000 tons of gravel product after losses and crushing. Phase 3 contours are shown on Figure 4.
- Phase 4 –Is under Phase 1 and will be mined as a second bench. The pit will be 30 feet in depth, approximately 270 feet in width, and approximately 360 feet in length. It will be mined in one bench of 30 feet with a bottom elevation of 6,165 feet. Phase 4 contains approximately 69,000 cubic yards of in place material, which will provide 85,000 tons of gravel product after losses and crushing. Phase 4 contours are shown on Figure 5.
- Phase 5 –Is below Phase 3 and will be mined as a second bench. The pit will be 30 feet in depth, approximately 290 feet in width, and approximately 415 feet in length. It will be mined in one bench of 30 feet with a bottom elevation of 6,165 feet. Phase 5 contains approximately 89,000 cubic yards of in place material, which will provide 110,000 tons of gravel product after losses and crushing. Phase 5 contours are shown on Figure 6.

The five mining phases together total 350,000 cubic yards of material in place. After applying the density of the crushed material, and accounting for losses of a combined 25% for blasting, transportation, and crushing, the current resource can be expected to produce approximately 433,000 tons of gravel. With the given equipment list, it is possible to have a maximum production rate of 800 tons per day, but because the production rate is based on demand, it is not expected to produce 800 tons per day every on a continuous basis. If material is produced at a maximum rate of 800 tons per day, 260 days per year, the current resource will be mined out in just over two years.

Volcanic material to be used for gravel will be excavated from the pit, and because the rock is very competent, blasting will be required at the site to remove the material from the ground. It is recommended that the Navajo DOT hires a professional blasting contractor to perform the blasting. This method will ensure a properly licensed and experienced blasting crew, as well as save on equipment costs, such as a drilling rig. If a contractor is not retained, a licensed and trained crew member will be required, as well as a drilling rig to drill the blasting holes, and secure storage and transport of the explosive material.

To ensure that the rock to be mined is not mixed with other materials below the basalt layer, and depending on the adopted mining method of one or two benches, the drilling depth will be controlled according to the thickness of the rock layer. Over drilling will be avoided to ensure good product quality before the following steps of the process, while also maintaining an even floor for efficient operations in the quarry. It is recommended to have an experienced drilling contractor to obtain good ground control, and not over drill in areas where is not required. Blasting design will be focused on providing control in rock size, ground vibration, and noise, which will reduce any impact on the local population. Again, it is recommended to have an experienced contractor that can perform all the explosive loading and blasting preparation of the production holes to have the desired rock fragmentation. After blasting, and as needed, the material will be moved by dozer to the access point near the road. It will then be loaded into 15 yard dump trucks by a front end loader. It is expected that after the first blasting event, there will be enough space to directly have the front end loader and truck loading and hauling without the need of a dozer.

For ground stability, care will be used to ensure the pit bottoms are sloped to provide drainage in a storm event, and for easier reclamation. Final pit walls will also be left at 70 degrees at the end of mining and fenced off.

The material will be taken from the mine site by truck to be reduced to the required size at a mobile crusher. Haul trucks will dump the rock directly to the crusher, but if that is not possible, a front end loader will load the material into the crushing equipment. It is recommended that the Navajo DOT selects an experienced contractor to provide the crushing services of the material, this will provide efficiency, as well as reducing capital investment in screening and crushing equipment. If a contractor is not maintained, a screening and mobile crushing unit will need to be purchased or leased for use at the site. Material will also be stockpiled in this area. Gravel stockpiles will be kept at an angle of repose for stability.

Spoils piles will be maintained at an angle of no more than 2:1 for stability. Traffic on the spoils pile will not be allowed and will be located in an area that will not be affected by mining.

2.3 Equipment and Site Infrastructure

For the mining operation described above, the following equipment will be utilized:

- Bulldozer
- Front end loader-5 cubic yard (2: one for pit, and one for processing and loading trucks, but it depends on material demand)
- Water Truck
- Haul Truck(s) (two trucks minimum)
- Screening plant and mobile crusher (this can be leased, if not performed by a contractor)

- Conveyors (it can be leased, if not performed by a contractor)
- Pickup or access vehicle
- Fuel truck

As described above, a dozer and a front end loader will be utilized at the mining site to move the blasted material and to load the trucks. If a contract blaster is not utilized, a drill rig will also need to be secured to drill the blast holes. The drilling process will also require an experienced driller to develop this activity in an efficient manner, if a contractor is not retained.

Fifteen (15) yard dump trucks will be utilized to transport the blasted material from the pit to the crusher, and, as capacity permits, may also be used to transport the crushed material to the road site. A second front end loader may be used at the process facility to load the material into the crushing equipment, if the front end loader in the pit cannot be used, and the trucks cannot dump the material directly to the crusher.

If a contract crusher is employed, the screening plant and crusher should be included with their contract. A mobile cone crusher can be brought to the site by the contractor, or, if a contractor is not used, can be leased or purchased. Conveyors will then transport the final product from the crusher a short distance to be stockpiled.

Power can be provided to the site from an overhead line approximately 3 miles away. Water will be required for domestic use, as well as for dust control at the operation, and can be provided from a pump site approximately one mile from the quarry. Additional water may need to be trucked in if the capacity cannot be maintained at a level consistent with site needs.

At the process site, a gate with a lock will be installed to prevent unwanted access to the crushing area, as well as the gravel site to ensure safety. In addition, an office trailer should be setup at the crushing area, which would include sanitary facilities, a place that can be used as relief from the weather, and office space. A portable toilet may also be utilized at the gravel site, so staff do not have to drive to the crushing area. A truck scale will be installed at the process site to weigh the material as it leaves the yard.

As part of good housekeeping and reclamation, all waste produced should be removed from the site. The material will be disposed of properly in a land fill or removed through a contract service with local authorities. To facilitate the proper disposal of solid waste, a dumpster or other trash receptacles should be provided at the site.

Fuel for the equipment will be needed. Fuel tanks can be stored on site or a fuel truck can be acquired. It is far enough for the mine site equipment to refuel at the crushing area, so it is recommended that a fuel truck be utilized to refuel the mining equipment.

2.4 Highwall Slope Stability

Slope stability in the mining area is dependent on the structure of the rock. Current faces stand 30 feet in height and are stable, but the rock contains many fractures. Additional rock material testing should be done to ensure rock competency, as well as mapping of rock planes and joints. Rock slopes should be monitored for movement during operations for safety. In areas of the mine that are double benched to 60 foot, a safety berm of 10 feet will be maintained between benches.

2.5 Geology

The Greasewood site is located in what is known as the Hopi Buttes Volcanic field, which are Miocene to Pliocene in age. The buttes are on the southwestern end of the Colorado Plateau. The layer of interest is a basalt lava flow that caps the mesa, which overlies fine grained playa sediments. The basalt layer is exposed in the mesa side and is observed to be nearly 30 to 60 feet in thickness. Some of the fine grained sediments have been transported by wind to the top of the mesa. It is reasonable to expect the basalt to cover the mesa, as a hard cap has prevented its erosion, however, the thickness can only be assumed by field observation and delineation drilling will prove the existence or absence of additional material that is acceptable for road way use at the site.

2.6 Hydrology and Drainage Control Plan

No major drainages or water ways will be affected by the mining in this area. Best Management Practices (BMPs) should be employed to keep site water from coming in contact with the environment as needed during a storm event. Diversion channels will be constructed around the areas where extraction operations will be developed, including the crushing area.

2.7 Erosion and Sediment Control

The operation will comply with Navajo Nation Environmental Protection Agency and U.S. Environmental Protection agency regulations and requirements. BMPs will be implemented at the project site for erosion and sediment control.

3. Reclamation

After mining ceases at the operation, the pit will be reclaimed. In general, the disturbed areas will be reclaimed to return them as much as possible to their previous use. The disturbed area will be recontoured to a 2.5:1 slope for stability and to match existing lands and blended into the surrounding mesa where possible. In areas with double benches, recontouring will not be feasible and a safety fence should be installed at the crest of the pit to ensure safety. A post mining contour map is shown in Figure 7. Concurrent reclamation will be performed in areas where operations are completed. Where possible, any lands that were compacted will be disced/scarrified to provide a suitable growing medium for native plants. All debris will be removed and disposed of properly.

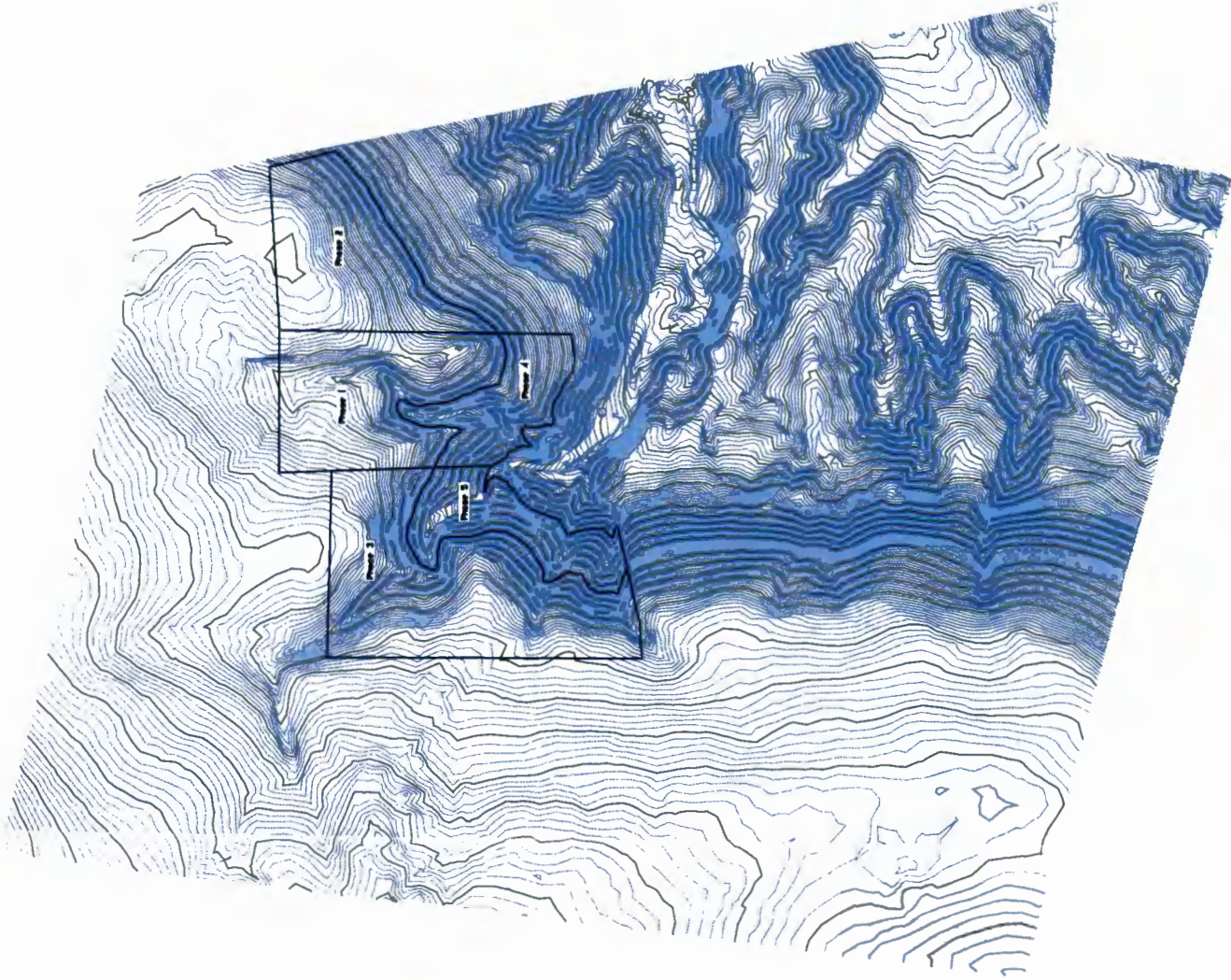
After regrading, any topsoil stockpiled at the beginning of operations will be distributed on the regraded surfaces. No reseeding is necessary in this area, and it is acceptable to expect that native plants will encroach on and move into the area once regraded and covered in topsoil. Seeding with a native seed mix will speed up the recovery of vegetation. Revegetation on slopes can be difficult due to grade, but natural weathering of the material and weather will cause an accumulation of grow medium, allowing for natural vegetation to regain hold.

The road from the crushing site to the gravel pit will be closed if this is considered necessary at the end of the operations. Other roads will remain for the use of the local population.

3.1 Top Soil Removal and Storage

Top soil, including organics, will be removed from any disturbance before mining or construction. A dozer will be used to collect the material into piles, then removed from the mining area via truck. A topsoil stockpile, in an area not affected by mining, will be used to store the soil until reclamation starts. The soil should be kept at a 2:1 slope for stability, and should not be used for any other purpose than reclamation. Traffic on the soil stock pile should not allowed.

FIGURES



Issued by:



TETRA TECH

350 Indiana Street, Suite 500
Golden, Colorado 80401
(303) 217-5700 (303) 217-5702 fax

Title:

Greasewood Springs Pit #1
Original Contours with Phases



Project:

Greasewood Springs Pit #1

DRAWING/FIGURE

Figure 1

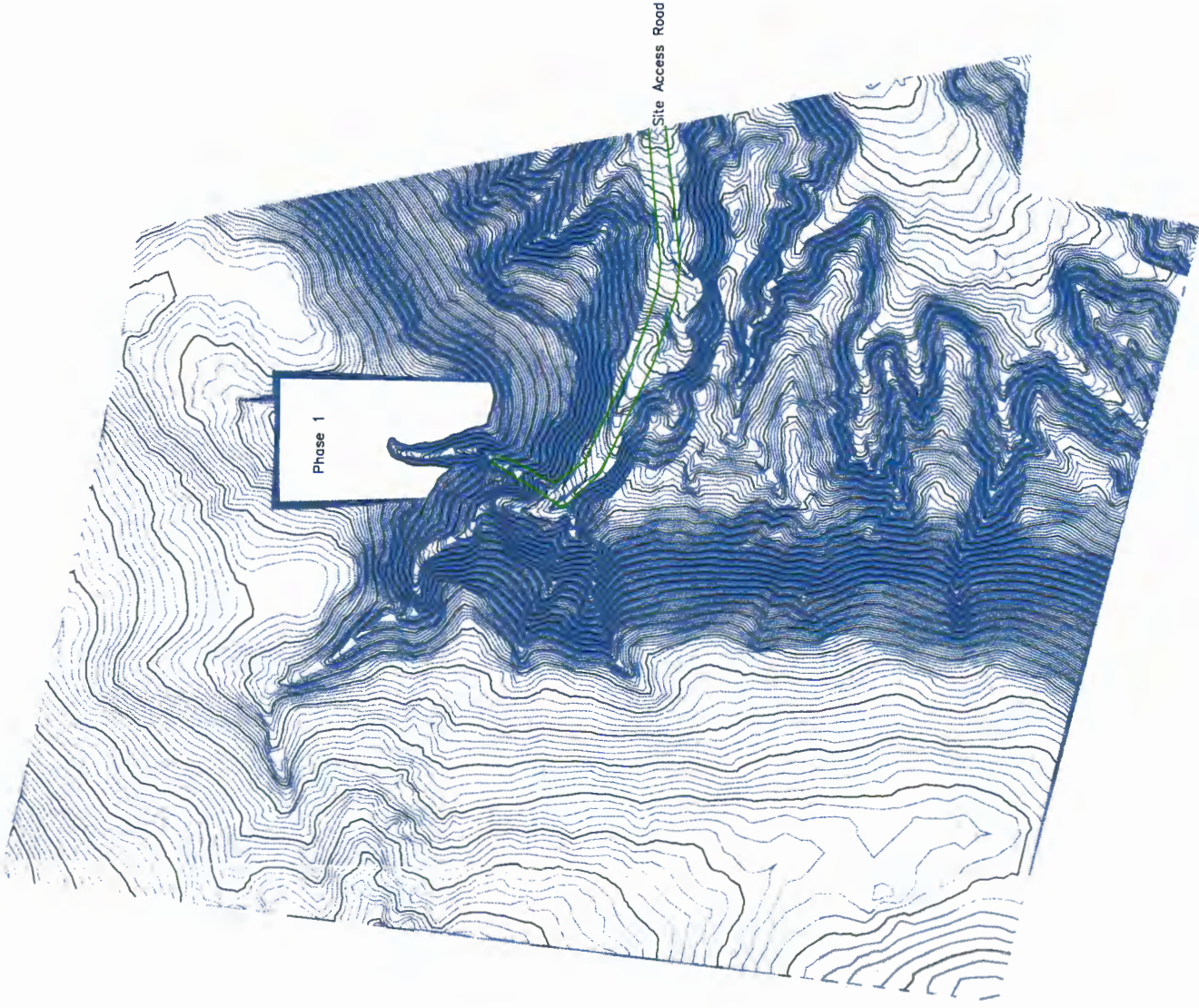
Location:

Navajo County, AZ

Date:

5/18/2017

0 25 50 75 100
SCALE IN FEET



0 25 50 75 100
SCALE IN FEET



Phase	Width	Length	Depth	Cubic Yards	Tonnage (gravel)
Phase 1	209'	385'	30'	37,000	46,000



Issued by:



Title:

Greasewood Springs Pit #1
Phase 1 Mining Contours

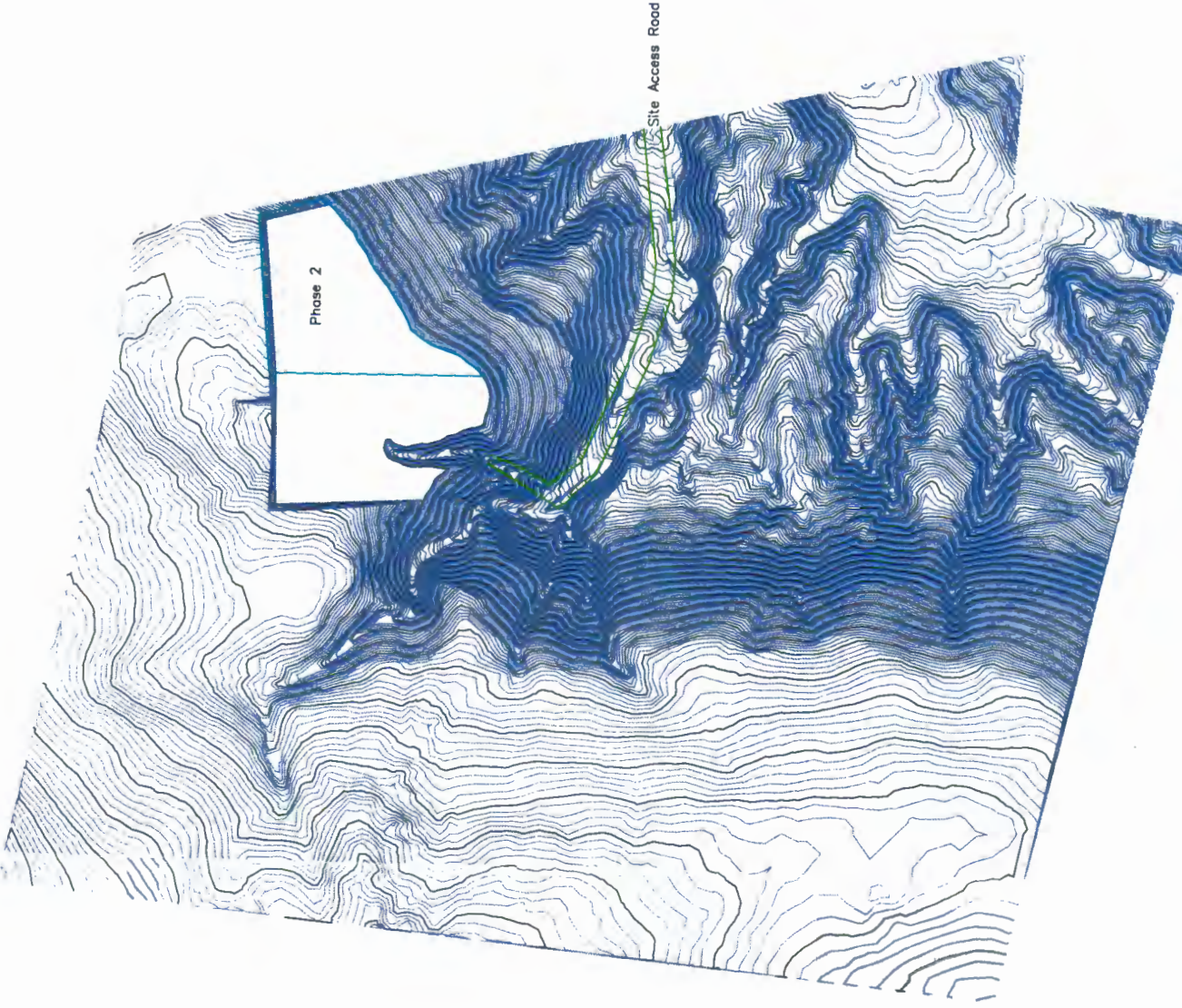


Project:
Greasewood Springs Pit #1

Location:
Navajo County, AZ

Date:
5/18/2017

DRAWING/FIGURE
Figure 2



Phase	Width	Length	Depth	Cubic Yards	Tonnage (gravel)
Phase 1	209'	365'	30'	37,000	46,000
Phase 2	270'	195'	30'	80,000	99,000



Issued by:



350 Indiana Street, Suite 500
Golden, Colorado 80401
(303) 217-9700 (303) 217-9700 fax

Title:

Greasewood Springs Pit #1
Phase 2 Mining Contours



Project:

Greasewood Springs Pit #1

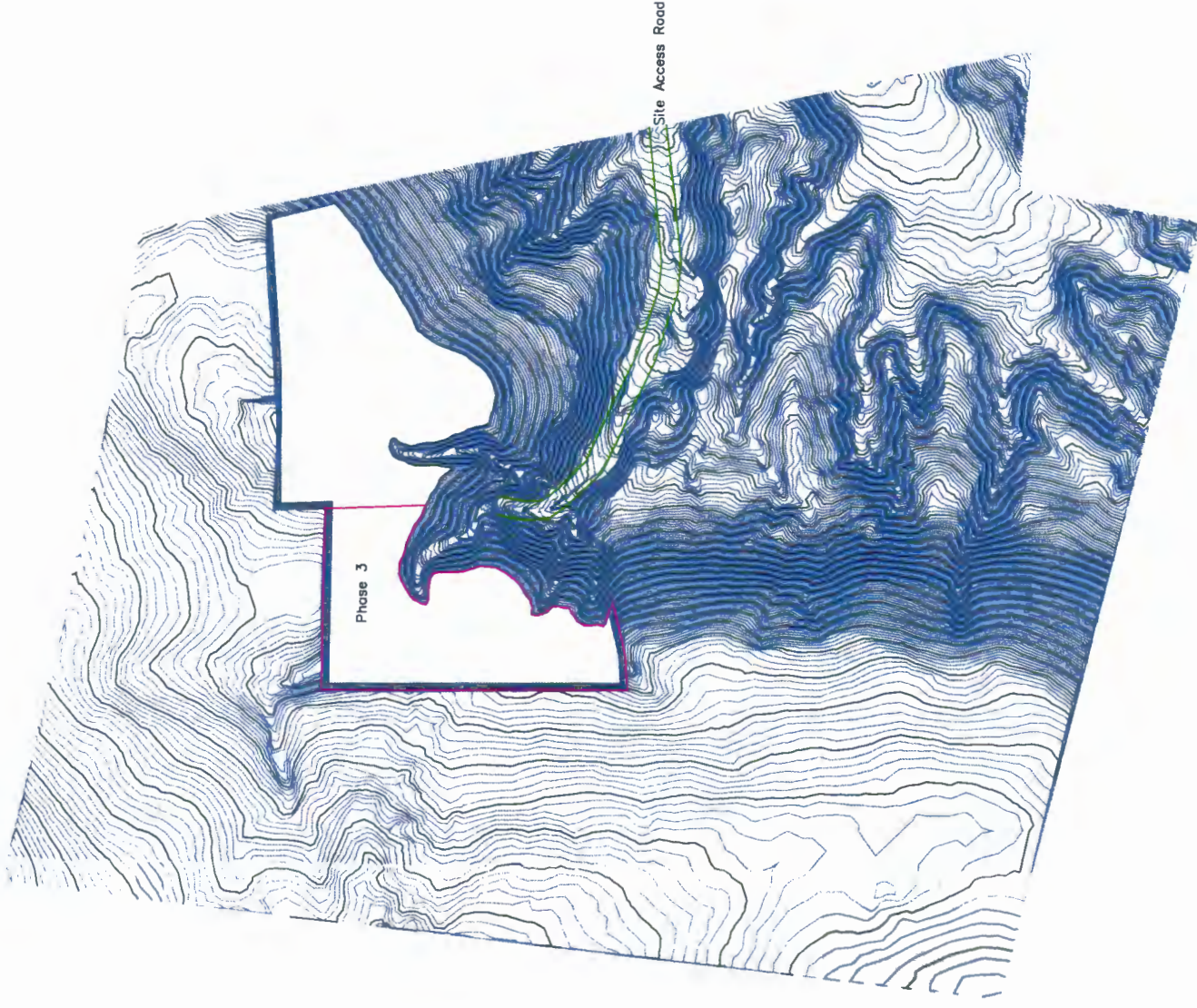
DRAWING/FIGURE
Figure 3

Location:

Navajo County, AZ

Date:


5/18/2017



Phase	Width	Length	Depth	Cubic Yards	Tonnage (gravel)
Phase 1	209'	365'	30"	37,000	46,000
Phase 2	270'	195'	30"	80,000	99,000
Phase 3	290'	444'	30"	75,000	93,000



Issued by:

**TETRA TECH**
350 Indiana Street, Suite 500
Golden, Colorado 80401
(303) 217-5700 (303) 217-5705 fax

Title:

Greasewood Springs Pit #1
Phase 3 Mining Contours

Project:

Greasewood Springs Pit #1

Location:

Navajo County, AZ

DRAWING/FIGURE

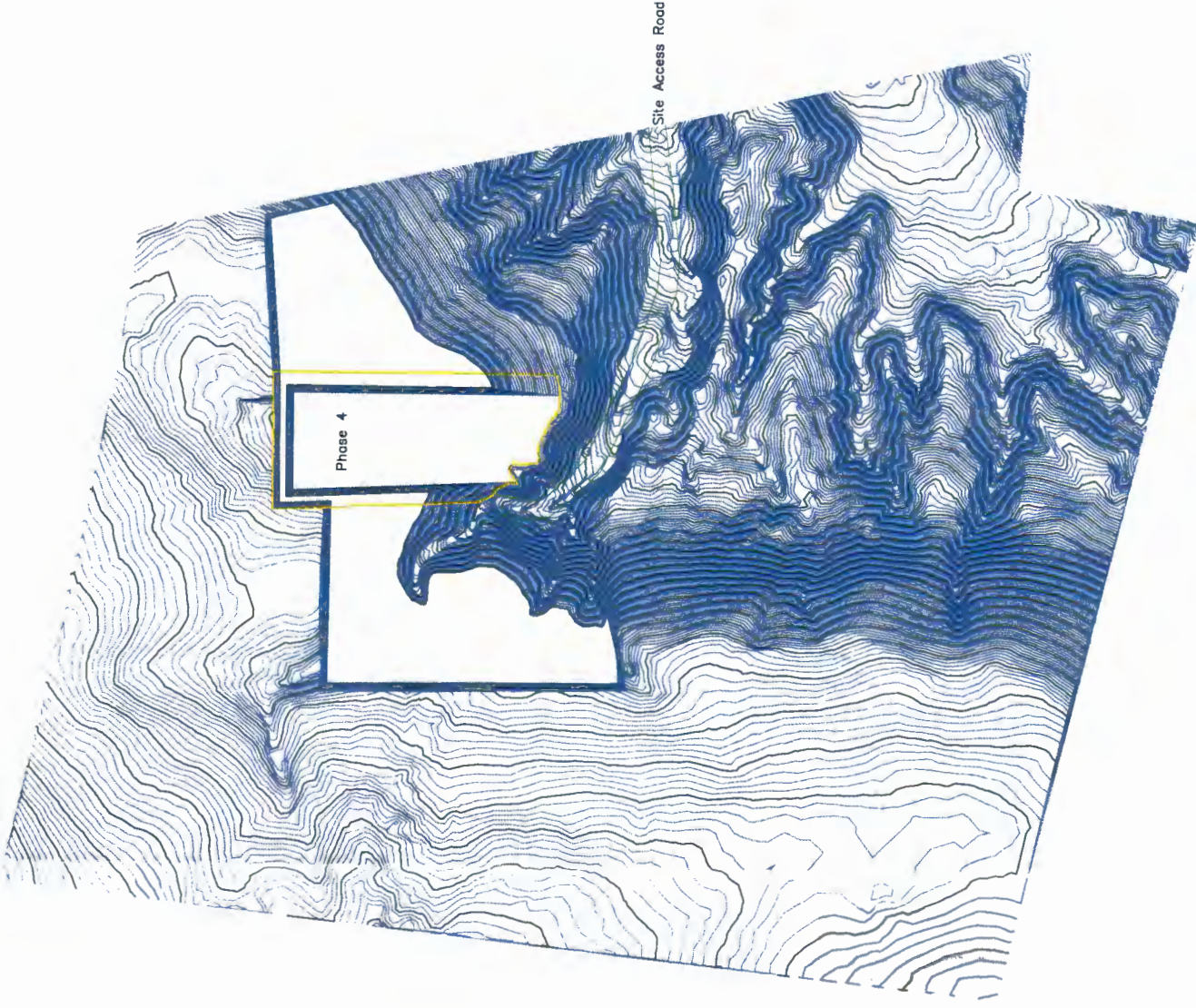
Figure 4

Date:

5/18/2017

REVISION

A



Phase	Width	Length	Depth	Cubic Yards	Tonnage (gravel)
Phase 1	209'	365'	30'	37,000	46,000
Phase 2	270'	195'	30'	80,000	99,000
Phase 3	290'	444'	30'	75,000	93,000
Phase 4	270'	360'	30'	69,000	85,000



Issued by:



TETRA TECH

350 Indiana Street, Suite 500
Golden, Colorado 80401
(303) 217-5700 (303) 217-5705 fax

Title:

Greasewood Springs Pit #1
Phase 4 Mining Contours



Project:

Greasewood Springs Pit #1

DRAWING/FIGURE

Figure 5

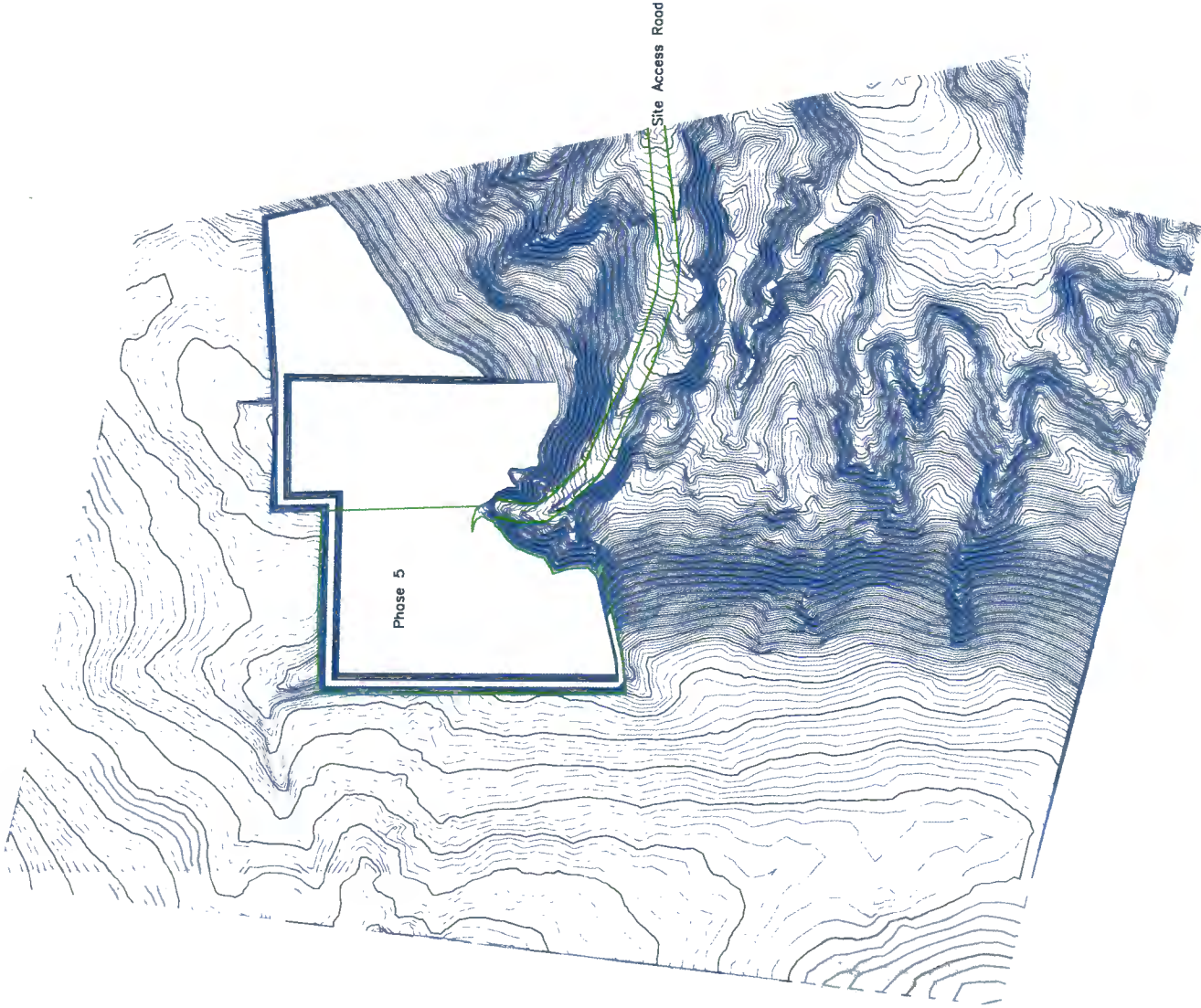
Location:

Navajo County, AZ

Date:

5/18/2017





0 25 50 75 100
SCALE IN FEET



Phase	Width	Length	Depth	Cubic Yards	Tonnage (gravel)
Phase 1	209'	385'	30'	37,000	46,000
Phase 2	270'	195'	30'	80,000	99,000
Phase 3	290'	444'	30'	75,000	93,000
Phase 4	270'	360'	30'	69,000	85,000
Phase 5	290'	415'	30'	89,000	110,000



Issued by:



TETRA TECH

350 Indiana Street, Suite 500
Golden, Colorado 80401
(303) 217-5700 (303) 217-5705 fax

Title:

Greasewood Springs Pit #1
Phase 5 Mining Contours



REVISION

Project:

Greasewood Springs Pit #1

DRAWING/FIGURE

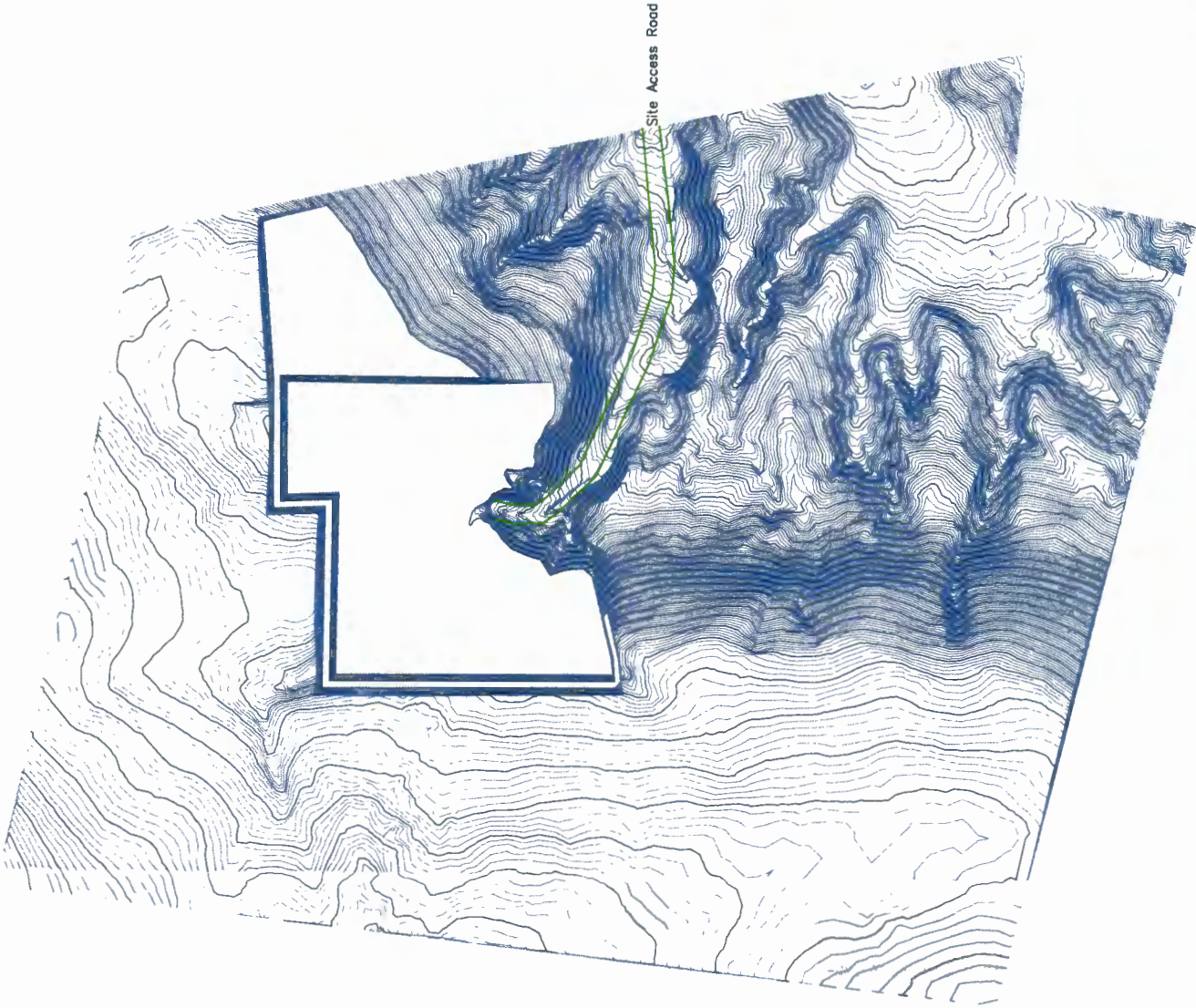
Figure 6

Location:

Navajo County, AZ

Date:

5/18/2017



Phase	Width	Length	Depth	Cubic Yards	Tonnage (gravel)
Phase 1	209'	365'	30'	37,000	46,000
Phase 2	270'	195'	30'	80,000	99,000
Phase 3	280'	444'	30'	75,000	93,000
Phase 4	270'	360'	30'	69,000	85,000
Phase 5	290'	415'	30'	89,000	110,000
Total				350,000	433,000



Issued by:



TETRA TECH
350 Indiana Street, Suite 500
Golden, Colorado 80401
(303) 217-5700 (303) 217-5700 fax

Title:

Greasewood Springs Pit #1
Post Mining Contours



Project:

Greasewood Springs Pit #1

DRAWING/FIGURE

Figure 7

Location:

Navajo County, AZ

Date:

5/18/2017



Greasewood Springs Chapter

Diwozhii Bii' To doo' Bi'Naha'ta'

Calvin F. Lee, President
Emery Lester, Vice-President
Omercita Begay, Secretary/Treasurer

Bill Spencer., Grazing Committee Member
Lee Jack, Sr., Council Delegate



GSC07-17-0743

RESOLUTION OF THE GREASEWOOD SPRINGS CHAPTER

Resolution to approve amended language for paragraph 9 of Resolution GSC04-17-0718 "The Greasewood Springs Chapter hereby supports and recognizes this Land Withdrawal Designation for the sole purpose of industrial development. Industrial development shall be considered the economic activity concerned with the manufacture, and processing of materials or construction".

WHEREAS:

1. The Greasewood Springs Chapter exists as a local unit of government recognized as a political sub-division of the Navajo Nation, pursuant of the Navajo Nation Code No. 26, Section (a) and is authorized to review all matter effecting the community in order to address the needs of the local residents with the authority to act in the best interest of the general welfare of its community membership; and
2. Pursuant to Resolution No. CAP-34-98, the Navajo Nation council approved the Historic Local Governance Act, which authorized the local Navajo Communities to plan develop and implement a restructuring process to improve community decision making allowing communities to excel and flourish enabling Navajo leaders to lead toward a prosperous future and improve the strength of the Navajo Nation Sovereignty; and
3. The Greasewood Springs Chapter respectfully request to approve amended language for paragraph 9 of Resolution GSC04-17-0718 "The Greasewood Springs Chapter hereby supports and recognizes this Land Withdrawal Designation for the sole purpose of industrial development. Industrial development shall be considered the economic activity concerned with the manufacture, and processing of materials or construction"; and
4. The Greasewood Springs Chapter passed a Resolution GSC04-17-0718 Resolution to Approve the Use of Sand and Gravel Pit Access Road, Hauling Routes, and Route Identified to Haul the Drilling Rigs Equipment for Exploratory Drilling within the proposal Sand and Gravel Pit Project Site in Greasewood Springs, Arizona. Amended; and
5. The Greasewood Springs Chapter requests that the Navajo Nation Land Department recognize the language change for Resolution GSC04-17-0718.

NOW THEREFORE IT BE RESOLVED THAT:

1. The Greasewood Springs Chapter hereby approves the amended language for paragraph 9 of Resolution GSC04-17-0718 "The Greasewood Springs Chapter hereby supports and recognizes this Land Withdrawal Designation for the sole purpose of industrial development. Industrial development shall be considered the economic activity concerned with the manufacture, and processing of materials or construction; and

2. The Greasewood Springs Chapter passed a Resolution GSC04-17-0718 Resolution to Approve the Use of Sand and Gravel Pit Access Road, Hauling Routes, and Route Identified to Haul the Drilling Rigs Equipment for Exploratory Drilling within the proposal Sand and Gravel Pit Project Site in the Greasewood Springs, Arizona. Amended; and
3. The Greasewood Springs Chapter requests that the Navajo Nation Land Department recognize the language change for Resolution GSC04-17-0718.

CERTIFICATION

We, hereby certify that the foregoing was duly considered by the Greasewood Springs Chapter at a duly called regular chapter meeting in Greasewood Springs (Navajo Nation) Arizona, at which a quorum of community membership was present and the same had passed with a vote of; 29 in favor, 0 in opposed and 1 in abstained on this 23rd day of July, in the year 2017.

Motioned By: Joni Begay

Seconded By: Larry Begay



Calvin F. Lee, President



Greasewood Springs Chapter

Diwozhii Bii' To doo' Bi'Naha'ta'

Calvin F. Lee, President
Emery Lester, Vice-President
Omercita Begay, Secretary/Treasurer

Bill Spencer., Grazing Committee Member
Lee Jack, Sr., Council Delegate

GSC04-17-0718

RESOLUTION OF THE GREASEWOOD SPRINGS CHAPTER

Resolution to Approve the Use of Sand and Gravel Pit Access Road, Hauling Routes, and Route Identified to Haul the Drilling Rigs Equipment for Exploratory Drilling within the proposal Sand and Gravel Pit Project Site in Greasewood Springs, Arizona.

WHEREAS:

1. The Greasewood Springs Chapter exists as a local unit of government recognized as a political sub-division of the Navajo Nation, pursuant of the Navajo Nation Code No. 26, Section (a) and is authorized to review all matter effecting the community in order to address the needs of the local residents with the authority to act in the best interest of the general welfare of its community membership; and
2. Pursuant to Resolution No. CAP-34-98, the Navajo Nation council approved the Historic Local Governance Act, which authorized the local Navajo Communities to plan develop and implement a restructuring process to improve community decision making allowing communities to excel and flourish enabling Navajo leaders to lead toward a prosperous future and improve the strength of the Navajo Nation Sovereignty; and
3. The Greasewood Springs Chapter hereby supports the use of access, hauling routes, drill rig and staging area for the development of a sand and gravel pit by the Navajo Nation for the beneficial use of general public, chapter projects, and the Greasewood Springs Chapter community. The 40 Acre Pit Site has been approved under a prior Chapter Resolution. The 40 Acre Pit Site is comprised of six corners and the locations of these corners are as follows:

Coordinates for 40 Acre Pit Site

N: 1612133.10; E: 754978.13
N: 1611936.96; E: 755931.15
N: 1610666.20; E: 756190.11
N: 1610691.12; E: 755994.69
N: 1610407.82; E: 755941.41
N: 1610700.95; E: 754790.49

4. The Sand and Gravel Pit will have a 10 Acre staging area located adjacent to N153. This area will be utilized to crush and process large aggregate that is transported from the pit site and store the aggregate until it is transported for projects across the Navajo Nation. The four locations of the four corners comprising this staging area are as follows:

Coordinates for Staging Area Pit Site

N: 1610709.05; E: 759578.81

N: 1610323.96; E: 760038.93

N: 1609767.22; E: 759572.97

N: 1610152.31; E: 759112.85

5. The access route will be used by the operators of the Sand and Gravel Pit and will not be open to the general public. This route is strictly for transporting the aggregate from the 40 Acre pit site to the staging area. It is approximately 0.77 miles and it starts from N153 and leads directly to the Sand and Gravel Pit location.

<u>Access Road Coordinates</u>	<u>Northing</u>	<u>Easting</u>
BOP	1611217.00	756077.87
EOP	1609722.90	759590.59

6. The hauling routes will be used to transport aggregate material to road projects across the Navajo Nation. The haul route starts from the Staging Area along the existing N153, heading northeast for approximately 3.38 miles. The haul route will then take aggregate material north to join with N15. This portion will be a newly constructed aggregate road. This portion is approximately 2.18 miles long.

<u>Haul Road Coordinates</u>	<u>Northing</u>	<u>Easting</u>
Existing N153 Start	1609722.90	759590.59
Existing N153 Finish	1624237.15	769232.72
Un-Inventoried Haul Road BOP	1624237.15	769232.72
Un-Inventoried Haul Road EOP	1634621.30	764852.79

7. The drilling rig route will be a one-time use and only used for purposes of hauling the drilling rig equipment for exploratory drilling. It is approximately 1.57 miles. It starts from N153 and generally heads west then north to access the pit.

<u>Drill Rig Road Coordinates</u>	<u>Northing</u>	<u>Easting</u>
BOP	1606916.71	757911.26
EOP	1612566.87	754671.63

8.

<u>Drill Rig Road Coordinates</u>	<u>Northing</u>	<u>Easting</u>
BOP	1606916.71	757911.26
EOP	1612566.87	754671.63

9. This land withdrawal will be considered an industrial Development, which is for Economic activity concerned with the manufacture, and processing of material and construction.

NOW THEREFORE IT BE RESOLVED THAT:

1. The Greasewood Springs Chapter hereby supports and recognizes the use of the access, hauling, and drilling rig routes for the development of the Sand and Gravel Pit within the Greasewood Springs, Arizona, which is well suitable for the community of Greasewood Springs Chapter community as well as the Navajo Nation.


2. The Greasewood Springs Chapter hereby recognizes the access and hauling routes for community development to benefit the local community, improve local routes, and major thoroughfare within the Navajo Nation.

CERTIFICATION

We, hereby certify that the foregoing was duly considered by the Greasewood Springs Chapter at a duly called regular chapter meeting in Greasewood Springs (Navajo Nation) Arizona, at which a quorum of community membership was present and the same had passed with a vote of; 30 in favor, 4 in opposed and 3 in abstained on this 23th day of April, in the year 2017.

Motioned By: Joni Begay

Seconded By: Theresa McCraith



Calvin F. Lee, President

Greasewood Springs Chapter

Ronald Gishey, Sr., President
Immanuel Harlan Charley, Vice President
Emery Lester, Secretary/Treasurer



Bill Spencer, Grazing Official
Lee Jack, Sr., Council Delegate

PO Box 2239, Ganado, AZ 86505 • Phone (928) 654-3239 • Fax (928) 654-3232

August 5, 2016

Mr. Mike Halona, Department Manager III
Navajo Land Department
PO Box 2249
Window Rock, AZ 86515

Dear Mr. Halona:

The Greasewood Springs Chapter hereby requests to the Navajo Land Department to officially designate the proposed Sand and Gravel operation in the amount of 40 acres as indicated on the Greasewood Springs Resolution GSC05-16-0630 (Attached Exhibit A) to provide gravel and maintenance for the community major thoroughfare to benefit the community of Greasewood Springs.

The GSC has been planning for a gravel pit for many years; however, a feasibility study was never initiated to move the proposal forward. Recently, the Division of Transportation hired a consultant to conduct a feasibility study across the Navajo Nation for possible Sand and Gravel operations. The Greasewood Springs has been identified as a prime location for a gravel pit operation to benefit Navajo Nation.

When the gravel lease documents are developed, the Greasewood Springs Chapter will have terms and conditions to the lease along with the Navajo Nation Minerals Department for approval.

If you need additional information, please contact the Mr. Art Hardy, Chapter Manager at (928) 654-3239. Thank you.

Sincerely,


Ronald Gishey, Chapter President
Greasewood Springs Chapter

xc: Navajo Department of Transportation
Minerals Department
Department of Justice
Chrono/File



NAVAJO DIVISION OF TRANSPORTATION

POST OFFICE BOX 4620, WINDOW ROCK, AZ 86515

TEL: 505.371.8300/8301 FAX: 505.371.8399

Russell Begaye
PRESIDENT

Jonathan Nez
VICE PRESIDENT

June 1, 2017

Howard Draper, Director
General Land Development Department
P.O. Box 2249
Window Rock, Arizona 86515

RE: Navajo Nation Sand and Gravel Lease

Dear Mr. Draper

The Navajo Nation Division of Transportation is pursuing the development of a gravel pit near Greasewood, Arizona. Attached is the Navajo Nation Sand and Gravel Lease application. The Navajo DOT has worked with the Navajo Nation Mineral Department to develop this application. We are prepared to proceed with developing this pit as soon as the lease is approved. I would request your assistance in processing this application.

Sincerely,

Garret Silversmith
Director
Navajo Division of Transportation





Document No. 009643

Date Issued: 02

EXECUTIVE OFFICIAL REVIEW

Title of Document: NDOT, Grease Spring S&G Contact Name: YAZZIE, ELERINA B

Program/Division: DIVISION OF NATURAL RESOURCES

Email: elerinayazzie@frontier.com Phone Number: 928-871-6447

<input type="checkbox"/>				Sufficient	Insufficient
<input type="checkbox"/>	Business Site Lease				
	1. Division:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
	2. Office of the Controller:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
	(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: _____	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	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: _____	<input type="checkbox"/>	<input type="checkbox"/>
	2. Office of the Attorney General:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Fund Management Plan, Expenditure Plans, Carry Over Requests, Budget Modifications				
	1. Office of Management and Budget:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
	2. Office of the Controller:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
	3. Office of the Attorney General:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Navajo Housing Authority Request for Release of Funds				
	1. NNEPA:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
	2. Office of the Attorney General:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Lease Purchase Agreements				
	1. Office of the Controller:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
	(recommendation only)				
	2. Office of the Attorney General:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Grant Applications				
	1. Office of Management and Budget:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
	2. Office of the Controller:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
	3. Office of the Attorney General:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	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: _____	<input type="checkbox"/>	<input type="checkbox"/>
	2. Office of the Attorney General:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Relinquishment of Navajo Membership				
	1. Land Department:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
	2. Elections:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>
	3. Office of the Attorney General:	_____	Date: _____	<input type="checkbox"/>	<input type="checkbox"/>

☐ **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 and Gravel Lease**

1. NLD _____ Date: _____ ☐ ☐
2. Minerals _____ Date: _____ ☐ ☐
3. HHPD _____ Date: _____ ☐ ☐
4. F&W _____ Date: _____ ☐ ☐
5. DWR _____ Date: _____ ☐ ☐
6. DNR _____ Date: _____ ☐ ☐
7. NNEPA _____ Date: _____ ☐ ☐
8. DOJ - (ic) _____ *J Blomquist* Date: *2/21/18* ☒ ☐
9. OPVP _____ Date: *2/21/18* ☒ ☐

Tier 1 Document Voting Results

User Name (Facility)	Job Title	Department	Vote Cast	Comments	Replies	Vote Date	Signature
Eugenia Quintana EPA (Navajo Land Title Data System - Windowrock AZ)	Air and Toxics - Reviewer	Navajo Nation Environmental Protection Agency	Approved	1. Due to notices for expediting this project, the ATD supports the general sufficient nature of this project and also reserves our opportunity to complete follow-up comments for this project.	1. No Reply	09-Feb-2018	
Lee Anna Martinez EPA (Navajo Land Title Data System - Windowrock AZ)	Water Quality - Reviewer	Navajo Nation Environmental Protection Agency	Approved	1. *CONDITIONAL* Last year June 2017 this project was consulted with our office and it was determined that a CWA Section 401 Certification would be required for the future transportation line development for this upcoming Sand and Gravel Operation. I have attached that letter that was sent to the consultants (Marron & Associates) hired by NDOT.	1. No Reply	02-Feb-2018	
Najamh Tariq (Navajo Land Title Data System - Windowrock AZ)	Approver	Department of Water Resources	Approved	no comments	No Reply	01-Feb-2018	
Pam Kyselka F&W (Navajo Land Title Data System - Windowrock AZ)	Technical Review	Fish and Wildlife	Approved	1. #17m&a101	1. No Reply	01-Feb-2018	
Pam Maples EPA (Navajo Land Title Data System - Windowrock AZ)	Storage Tanks Program - Reviewer	Navajo Nation Environmental Protection Agency	Approved	no comments	No Reply	12-Feb-2018	

Patrick Antonio (Navajo Land System - Windowrock AZ)	Water EPA Quality - (Navajo Land Supervisor Title Data System - Windowrock AZ)	Navajo Nation Environmental Protection Agency	Approved	1. Sand & gravel operations are covered by the federal Multi-Sector General Permit for storm water discharges from industrial sites. A Notice of Intent (NOI) must be submitted to USEPA 30 days prior to commencing discharge. A storm water pollution prevention plan must be prepared before submitting the NOI.	1. No Reply	01-Feb-2018	<i>Peter Abreu</i>
Robert Allan DNR (Navajo Land System - Windowrock AZ)	Deputy Director DNR	DNR Administration	Approved	1. Subject to complete, verified grazing permittees with their signed consent forms and Min.s Dept. determination of adequacy.	1. No Reply	01-Feb-2018	<i>Robert O. Allan</i>
Tamara Billie NNHP (Navajo Land System - Windowrock AZ)	HPD Reviewer	Historic Preservation Department	Approved	1. HPD-17-539. Adhere to stipulations on CRCF for sites AZ-P-33-11 & AZ-P-33-13. 2. Adhere to stipulations on CRCF HPD-17-539R.	1. No Reply 2. No Reply	14-Feb-2018	<i>Tamara Billie</i>
Yolanda Barney (Navajo Land System - Windowrock AZ)	Public EPA Water System - Supervision Program	Navajo Nation Environmental Protection Agency	Approved	no comments	No Reply	05-Feb-2018	<i>Yolanda Barney</i>

Tier 2 Document Voting Results

User Name (Facility)	Job Title	Department	Vote Cast	Comments	Replies	Vote Date	Signature
Bidtah N. Becker (FBFA)	FBFA Users	FBFA Action Team	Approved	no comments	No Reply	20-Feb-2018	B N Becker
				2. I am marking this document sufficient. Please note that Minerals has provided the correct version of the sand and gravel lease. In addition, I take this opportunity to point out one issue to monitor, which is the bond requirement. The Nation has been advised that because the lessee is the Navajo Nation government itself through the Navajo Division of Transportation (NDOT), that no bond is required. It is advised that NDOT confirm this with BIA before submitting the lease to BIA. Thank you.	2. No Reply		
Richard Begay NNHP (Navajo Land Title Data System - Windowrock AZ)	Navajo Nation Historic Preservation Officer	Historic Preservation Department	Approved	no comments	No Reply	15-Feb-2018	Rell M Begay
				2. HPD-17-539R. Follow conditions for sites on CRCF.	2. No Reply		
Ronnie Ben EPA (Navajo Land Title Data System - Windowrock AZ)	Underground Injection Control - Reviewer	Navajo Nation Environmental Protection Agency	Approved	1. Conditional Approval granted and contingent on compliance with all NNEPA and US EPA environmental laws.	1. No Reply	14-Feb-2018	Noi he
				2. a 401 Certification and a Multi-Sector General Permit is required for the	2. No Reply		

Greasewood
Springs Sand
& Gravel Pit.

Sam Diswood Technical Fish and Wildlife Approved no comments No Reply 12-Feb-2018
(Navajo Land Review
Title Data
System -
Windowrock
AZ)

Samuel E. Diswood

Steven Prince Technical Navajo Nation Approved no comments No Reply 14-Feb-2018
MIN Reviewer Minerals
(Navajo Land Management
Title Data
System -
Windowrock
AZ)

2. This vote is contingent on replacing "C. Sand and Gravel Lease.pdf" with the uploaded replacement which is in the new standard format approved by Legislative Counsel. slp

2. No Reply

Steven L Prince

W. Mike Manager III NLD Approved no comments No Reply 15-Feb-2018
Halona Navajo Land Administration
(Navajo Land Department
Title Data
System -
Windowrock
AZ)

W. Mike



Navajo Nation Environmental Protection Agency
P. O. Box 339, Window Rock, AZ 86515
Phone: 928-871-7690 • Fax: 928-871-7996



Russell Begaye,
President

Jonathan Nez,
Vice-President

June 6, 2017

Eric Johnson
Sr. Environmental Project Manager
Marron and Associates
7511 4th Street NW
Albuquerque, NM 87107

Re: Clean Water Act Section 401 Certification Assessment for Greasewood Springs Gravel Project,
Greasewood, Arizona

Dear Mr. Johnson,

Navajo Nation Environmental Protection Agency (NNEPA) Water Quality has received your document requesting consultation for Clean Water Act (CWA) § 401 for the propose NDOT Greasewood Springs Gravel Project, located in Greasewood Springs, Arizona. According to the Topo Maps and coordinates submitted of the project area it has been determined, that a CWA § 401 Certification application **will be** required for the future roadway project for the sand and gravel operation project based on the information submitted to our Water Quality Office.

Please consider the timeline for the review process of the § 401; thirty days to review application, and if considered a complete application 30-days of Public Notice. The 401 application can be found on our website at www.navajonationepa.org. Please contact Chris Wrbas, US Army Corps of Engineers regarding the CWA § 404 Permit, at Christopher.r.wrbas@usace.army.mil.

Please be aware of the Storm Water Construction General Permit required for construction activities that result in land disturbance of equal to or greater than once acre. In addition, all Navajo Nation environmental Laws and regulations should be adhere to.

Should you have any question please contact me at lamartinez@navajo-nsn.gov. Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read 'Lee Anna Martinez-Silversmith'.

Lee Anna Martinez-Silversmith
Sr. Environmental Specialist/401 Coordinator
NNEPA-Water Quality Program

Cc: Chris Wrbas, USACOE
Ronnie Ben, NNEPA
File



NAVAJO NATION DEPARTMENT OF JUSTICE

DOCUMENT REVIEW REQUEST FORM

☐ RESUBMITTAL



DOJ	
02-20-18 @ 1037am	
DATE / TIME	
<input type="checkbox"/> 7 Day Deadline	
DOC #:	009643
SAS #:	
UNIT:	NRH

*** FOR NNDOJ USE ONLY - DO NOT CHANGE OR REVISE FORM. VARIATIONS OF THIS FORM WILL NOT BE ACCEPTED. ***

CLIENT TO COMPLETE

DATE OF REQUEST:	2/20/2018	DIVISION:	Division Natural Resources
CONTACT NAME:	Michelle Hoskie or Stevie Hudson	DEPARTMENT:	General Land Development Department
PHONE NUMBER:	871-6447 or 6401	E-MAIL:	michellehoskie@frontier.com

TITLE OF DOCUMENT: NDOT GREASEWOOD SPRINGS SAND AND GRAVEL

DOJ SECRETARY TO COMPLETE

DATE/TIME IN UNIT: 2/20/18 940 REVIEWING ATTORNEY/ADVOCATE: Imme Chee

DATE TIME OUT OF UNIT: 2/21/18 4:40 dm

DOJ ATTORNEY / ADVOCATE COMMENTS

- Document is legally sufficient.

REVIEWED BY: (Print)	Date / Time	SURNAMED BY: (Print)	Date / Time
Imme Chee	2/20/18	V Blackfoot	2/21/18 8:10am

DOJ Secretary Called: Michelle Hoskie for Document Pick Up on 2/21/18 at 807 By: dm

PICKED UP BY: (Print) DATE / TIME:

☐ **Land Withdrawal or Relinquishment for Commercial Purposes**

Sufficient Insufficient

1. Division:	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
2. Office of the Attorney General:	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>

☐ **Land Withdrawals for Non-Commercial Purposes, General Land Leases and Resource Leases**

1. NLD	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
2. F&W	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
3. HPD	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
4. Minerals	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
5. NNEPA	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
6. DNR	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
7. DOJ	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>

☐ **Rights of Way**

1. NLD	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
2. F&W	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
3. HPD	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
4. Minerals	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
5. NNEPA	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
6. Office of the Attorney General:	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
7. OPVP	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>

☐ **Oil and Gas Prospecting Permits, Drilling and Exploration Permits, Mining Permit, Mining Lease**

1. Minerals	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
2. OPVP	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
3. NLD	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>

☐ **Assignment of Mineral Lease**

1. Minerals	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
2. DNR	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
3. DOJ	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>

☐ **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:	_____	<input type="checkbox"/>	<input type="checkbox"/>
2. F&W	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
3. HPD	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
4. Minerals	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
5. NNEPA	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
6. DNR	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
7. DOJ	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
8. OPVP	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>

☒ **OTHER: Sand and Gravel Lease**

1. NLD	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
2. Minerals	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
3. HHPD	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
4. F&W	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
5. DWR	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
6. DNR	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
7. NNEPA	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>
8. DOJ - (ic)	_____	Date:	2/21/12	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9. OPVP	_____	Date:	_____	<input type="checkbox"/>	<input type="checkbox"/>

RESOURCES AND DEVELOPMENT COMMITTEE
Regular Meeting
March 28, 2018

ROLL CALL
VOTE TALLY SHEET:

Legislation # 0101-18: An Action Relating to Resources and Development Committee, An Action Relating to Resources and Development, Approving a Sand and Gravel Lease to the Navajo Department of Transportation to Operate and Maintain a Sand and Gravel Pit to Occupy 50 acres, More or Less, And an Access Road of 9.0331 Acres, More Or Less, of Navajo Nation Trust Lands Located Within The Greasewood Springs Chapter Vicinity, Navajo Nation (Navajo County, Arizona) *Sponsor: Honorable Alton Joe Shepherd; Co-Sponsors: Honorable Benjamin Bennett; Honorable Jonathan Perry; Honorable Walter Phelps*

MAIN MOTION: Jonathan Perry S: Leonard Pete V: 3-1-1 (CNV)

ROLL CALL VOTE TALLY:

YEAS: Alton Joe Shepherd, Benjamin Bennett and Davis Filfred

NAYS: Leonard Pete

NOT VOTING: Jonathan Perry (Presiding)

NOTE: Honorable Jonathan Perry was appointed Pro Tem Chairperson during the debate of the legislation.


Jonathan Perry, Presiding Pro Tem Chairman
Resources and Development Committee


Shammie Begay, Legislative Advisor
Resources and Development Committee