THEMAC RESOURCES

July 21, 2015

DJ Ennis, PG
Permit Lead, Reclamation Specialist
Mining and Minerals Division
1220 South St. Francis Drive
Santa Fe, NM 87505

RE: Baseline Data Report Addendum: Nine Mill Sites and Two Substation Alternatives, Copper Flat Mine, Sierra County, New Mexico

Dear Mr. Ennis,

New Mexico Copper Corporation (NMCC), a wholly owned subsidiary of THEMAC Resources Group, Ltd. is pleased to submit two hard copies and two cds containing reports on additional Baseline Data collected for the Copper Flat mine in Sierra County. The enclosed reports on Biological Resources and Paleontology Resource Surveys were conducted in March, April and May 2015. These surveys cover nine mill site claims, five acres each, all located on land held by the Bureau of Land Management (BLM), and two potential substation sites approximately 60 acres each, located on New Mexico State land. Based on the results of these surveys, NMCC has selected one 30 acre area for the location of the proposed substation. The mill site claims would be impacted during mine operation and the proposed substation area may be, depending on BLM's decision regarding mine plans. The enclosed map shows the proposed mine area, the nine mill site claims and the 30 acre proposed substation area identified by NMCC.

In addition to the surveys enclosed, a Cultural Resource Survey was conducted in these areas and documented in a report prepared by Okun Consulting Solutions in April 2015. This report was submitted to David Legare of the BLM Las Cruces District office and has been shared by BLM with the State Historic Preservation Office (SHPO). This report is not included with this submission, however the survey will be included with the Programmatic Agreement being prepared by BLM regarding cultural resource sites associated with the proposed development of the Copper Flat mine. I understand MMD is a Consulting Party in the Programmatic Agreement.

If you have any questions or would like to discuss, please call me at 505-400-7925.

Best regards,
THEMAC Resources Group, Ltd.

Katie Emmer

Katie Emmer
Permitting & Environmental Compliance

CC: Doug Haywood, Project Manager, BLM Las Cruces District Office

PW-3
PW-1
PW-4
PW-2

Legend

- Production Wells
- Pipeline Corridor
- Highway 152
- Proposed Substation Area
- Copper Flat Mine Area
- Millsite Claims

Surface Ownership

- BLM
- Private
- State

0 1,500 3,000 6,000 Feet

THE MAC RESOURCES

Copper Flat Project

N
W E
S

1 inch = 3,000 feet

Biological Resources Survey Copper Flat Mine: Nine Mill Sites and Two Substation Alternatives

GeoSystems Analysis, Inc.
Innovations in Hydrology

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DOCUMENT CONTROL SUMMARY

Title:	Biological Resources Survey Copper Flat Mine: Nine Mill Sites and Two Substation Alternatives		
Client Company:	New Mexico Copper Corporation		
Client Contact:	Katie Emmer		
Status:	Final		
GeoSystems Analysis Job #:	1515		
Project Manager:	Chad McKenna		
Author(s):	Chad McKenna, Quentin Hays		
Field Biologists	William Widener, Chad McKenna, Quentin Hays		
Survey Timing:	April and May 2015 Field Surveys		
Date:	May 12, 2015		
Checked By:	Quentin Hays (GSA); Katie Emmer (NMCC)		
Distribution (Number of Copies):	Client	Other	GSA Library

TABLE OF CONTENTS

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INTRODUCTION

THEMAC Resources Group (THEMAC) is expanding the assessment area in the Draft Copper Flat Mine Environmental Impact Statement (EIS) to include a total of eleven new sites east of the proposed Copper Flat Mine Permit Area. These sites were not surveyed during biological fieldwork completed for the mine's Baseline Data Report (NMCC, 2012). The 11 sites include nine mill site claims plus two potential alternative sites under evaluation for electrical substation construction. The impact area of the proposed substation will be 30-acres. The specific location within the site alternatives was not determined prior to survey work, thus, the entire areas originally considered were surveyed. The mill sites are each five acres each and the entire substation survey area was 110-acres. Biologists from GeoSystems Analysis completed biological resources surveys at the 11 sites during Spring, 2015. This report summarizes the survey methods and results and discusses wildlife habitat type and quality through the project area.

PROJECT LOCATION

Copper Flat Mine is in the Chihuahuan Desert region of Sierra County, New Mexico (NM); approximately 20 miles southwest of Truth or Consequences and 4 miles east of Hillsboro. The 11 sites evaluated in this report lie along state highway 152 from 2 to 6 miles east of the THEMAC's proposed Copper Flat mine permit area (Figure 1). The nine mill site locations are on federal land managed by the Bureau of Land Management (BLM). The substation survey areas are on property owned and managed by the State of NM.

Typical elevation in the project area is 4,800 feet above mean sea level. In nearby Hillsboro, NM; precipitation averages 12.5 inches annually with 6.3 inches of average winter snowfall (WRCC, 2015). High temperatures exceed 90°F during summer months and 50°F during winter months. Average lows are approximately 60°F during the summer and 25°F during the winter (WRCC, 2015).

With the exception of the Rio Grande and portions of nearby Animas and Percha Creeks, streamflow along most waterways is ephemeral and/or intermittent in this region with flows supplemented by an isolated spring source, monsoonal storm event, or sometimes spring snowmelt runoff. Greyback Arroyo is the most prominent landform feature near the project area and it is dry through most of the year. The reach of Greyback that flows below the proposed mill sites and substation alternatives only wets during localized precipitation events; particularly during monsoon season.

The project area falls in (Natural Resources Conservation Service (NRCS) Major Land Resource Area 042-Southern Desertic Basins, Plains, and Mountains, soil survey area NM660 (Sierra County, NM). According to electronic soil survey data, (SSURGO, 2015) affected soils include map units 4 (Akela very gravelly loam, moderately rolling), 62 (Nickel very gravelly fine sandy loam, very steep), and 63 (Nickel-Chamberino association, gently sloping) and the dominant ecological site is Gravelly

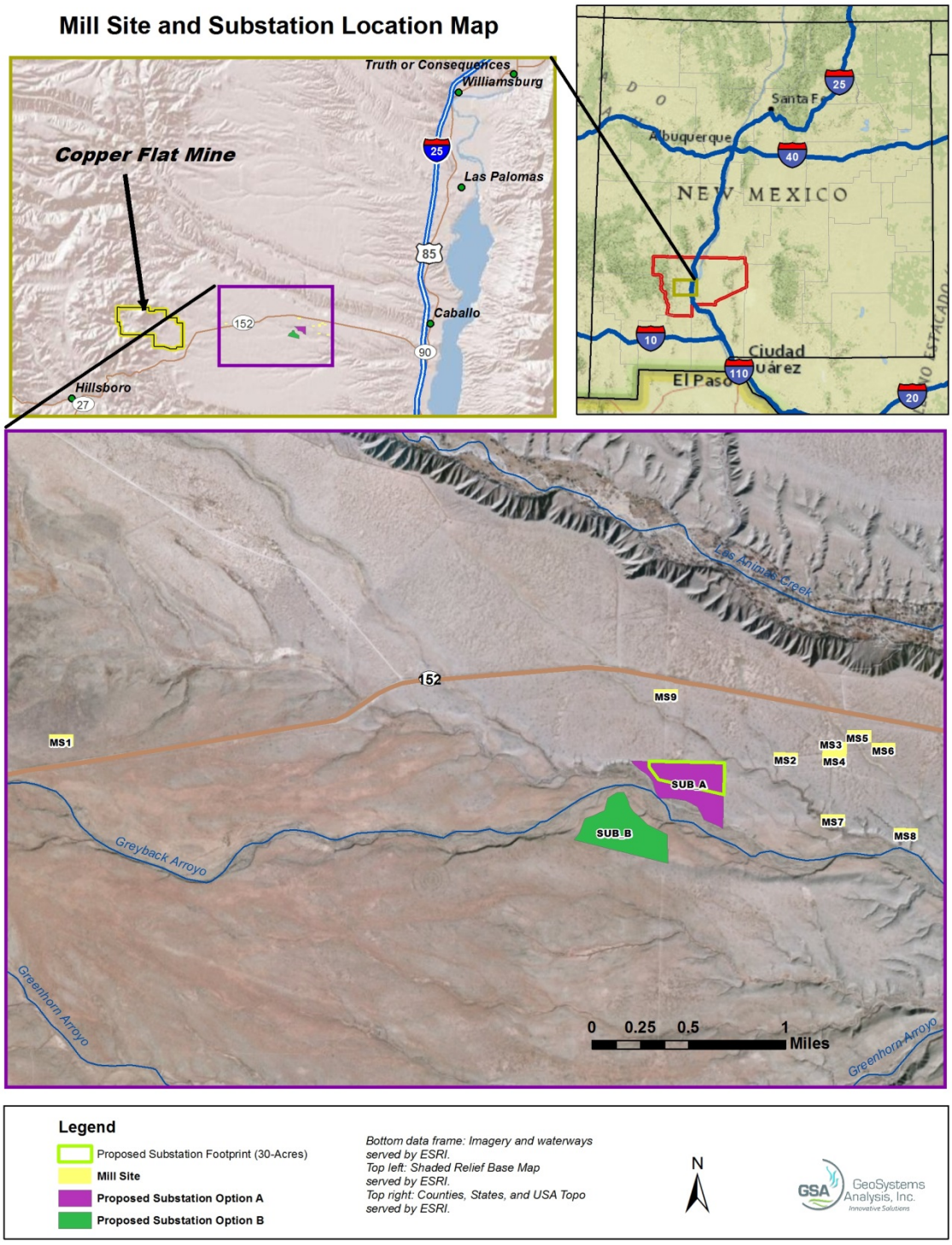

Figure 1. Project Location Map

(R042XB010NM). The Gravelly ecological site is characterized by shallow soils with underlying caliche or limestone layers within 20 inches (ESIS, 2015). That underlying restriction limits vegetation productivity and is also an important aspect of the site ecology. Slopes in these soil types exhibit a high degree of topographic diversity but average less than 5 percent. The historic plant community type for the Gravelly ecological site is generally assumed to exhibit co-dominance between grasses, including black grama (*Bouteloua eriopoda*) and bush muhly (*Muhlenbergia porteri*), and shrubs and half-shrubs, chiefly creosotebush (*Larrea tridentata*) and mariola (*Parthenium incanum*) but the project area has deviated from climax potential and become more of a creosotebush shrubland. Other regional vegetation maps classify the project area as Chihuahuan Desert Scrub (Dick Peddie, 1999 and Brown and Lowe, 1981) with creosotebush as the dominant species. The Southwest Regional Gap Program vegetation maps include Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub; and Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe as the two dominant types in the project area.

Portions of the project area have been previously developed and disturbed during installation of a water pipeline, wells, and access roads. The project area is also grazed by cattle. Tebuthiuron brush killer (brand name Spike) was applied by managing agencies to control creosotebush and promote grass establishment in 2012 (Chatfield, 2015). The herbicide pellets appeared to be variably effective in controlling creosotebush, with an estimated observable effect on 10% to 60% of the creosotebush individuals, depending on the specific location.

Figure 2. Fenced perimeter surrounding a production well (PW-1) at one of the mill sites in the project area. Existing access roads, wells, and other facilities have been developed.

SURVEY METHODS

Field biologists from GeoSystems Analysis, Inc. surveyed the 11 sites over the course of two field visits: April 21-25, 2015 and May 2-4, 2015. For the purpose of this survey, each mill site area and the two substation alternatives were assigned a unique identifier as shown on the map (Figure 1). Mill sites were numbered one through nine and the substations were named "A" and "B". A table displaying the relationship between our mill site identifier and the mill site claim name more commonly used by THEMAC is included below (Table 1).

Table 1. Mill site identifiers used in this report compared to the names typically used by THEMAC.

Mill site ID	**Claim Name**
MS1	Greer No. 2
MS2	Chatfield 6
MS3	Chatfield 9
MS4	Chatfield 10
MS5	Chatfield
MS6	Chatfield 4
MS7	Chatfield 25
MS8	Chatfield 5
MS9	Chatfield 3

PEDESTRIAN SURVEYS

During the site assessments, our biologists completed pedestrian level surveys to evaluate affected habitats, record flora and fauna observed, assess presence/absence of attributes regulated by state and federal environmental protection policies, and note observations on other biological features that managing agencies communicated to be of high importance during comments to the Copper Flat Mine Sampling and Analysis Plan (SAP) and Baseline Data (BDR) reports. More specifically, field surveys for the following list of site conditions were completed:

1. Comprehensive list of plant species encountered in each area along with information on distribution and relative abundance;

2. Wildlife observations and indications;
3. Riparian and wetland habitats, including Waters of the U.S.;
4. Springs and seeps;
5. Suitable habitat for state-, federal- and agency-listed threatened, endangered, and special status species;
6. Potential and active raptor nesting substrate;
7. Abandoned mine adits and/or shafts suitable for bat hibernation and/or roosting;
8. Noxious weeds designated by New Mexico Department of Agriculture (NMDA) and U.S. Department of Agriculture (USDA);
9. Other regionally unique biological resources that might be encountered.

If any of the above listed jurisdictional or regionally important site conditions was observed; the location would have been mapped in the field with a Global Positioning System (GPS) device. If highly suitable habitat for a federally-listed threatened or endangered species was determined to be present, additional surveys for that species were proposed during the optimal detection season for that species; if it could not have been correctly identified during the spring survey.

Plant species were inventoried through the project area using regularly spaced walking transects (approximately 50 feet apart) across each site. A relative abundance class was assigned to each species encountered in an individual site using representative classes (abundant, common, uncommon, and rare). Any wildlife (reptiles, amphibians, mammals) observed or signs such as burrows, dens, scat, and tracks were also recorded along the paced transects.

BIRD SURVEYS

In addition to pedestrian level surveys, avian diversity and abundance was assessed via bird point counts completed over the course of four mornings in late-April and early-May. Initially, and because replicability was presumed to be a concern, avian use point counts modeled after the US Geological Survey Breeding Bird Survey protocol were utilized. The counts were ten minutes in length, and included collection of data related to how the bird was detected, recognizable behavior, and distance and direction from the observer. Because point counts often rely on auditory clues, these surveys can be useful for detecting species which are particularly secretive, difficult to detect, or might only be detectable during short periods of time in the early morning, such as owls and similar species. Point counts are also more generally useful for long-term studies aiming to produce trend-related data, and are inherently replicable, which can help reduce observer bias. Fifteen points were distributed throughout the project area, and were surveyed in sequence in late-April (23 April) beginning during pre-dawn civil twilight. The second round of point count surveys in late-April (24 April) was conducted in reverse sequence to minimize bias among points due to time of day.

However, because the mill site areas are relatively small and in reasonably close proximity to one another, and because one of the stated goals of these surveys was to detect possible use by avian migrants, a different protocol was established for the early-May surveys. During this round, timed area searches were utilized in order to capture a more comprehensive picture of avian use at the mill site and proposed substation areas, and because sites in close proximity are prone to repeated

observations of the same individuals using point counts, which could then skew results. Additionally, area searches were deemed to be more appropriate during this time as birds are volant, and thus highly mobile, and migrants are often sparse, and thus less likely to be detected during point count surveys. Indeed, several species that went undetected during point count surveys were detected during area searches, including migrants. Area searches were conducted during the early-May survey period (3 May) beginning at sunrise, and lasting for 90 minutes in both shrubland and arroyo/draw habitat types. The habitats were surveyed in reverse order the following day (4 May) to minimize time of day bias.

Although birds are highly mobile, many species are also tied to specific or general habitat types, and for the purposes of this data collection effort avian use of the project area was classified broadly according to availability into shrubland and arroyo/draw habitats. Specifically, some species are generalists according to habitat usage and may be found in multiple habitat types (black-throated sparrows), while others are tied to grassland or the vertical structure provided by arroyo or draw vegetation (Gambel's quail, blue-gray gnatcatcher). Migrant species which do not breed in the geographic area encompassing the project site are often stopping over en route to breeding grounds in order to refuel for the northward journey by replenishing fat stores. As a result, migrants utilize landscape clues when making stopover decisions which allow focus on areas with requisite foraging opportunities. In the desert Southwest during vernal migration, much of the available forage for insectivorous migrants is associated with vegetation that is flowering, such as honey mesquite. Indeed, most of the known migratory species detected during avian use surveys were observed foraging in patches of flowering honey mesquite (Wilson's warbler, white-crowned sparrow), which attracts insects that make up the majority of these species' diets during migration.

RESULTS

Results of the spring 2015 biological survey are presented in the following section of this report. Of the list of site conditions surveyed for, no riparian or wetland habitats, springs and seeps were found, raptor nesting substrate is relatively limited through the project area, no abandoned mine adits or shafts were located, no regionally unique biological resources were encountered. No rare, threatened, or endangered species or plant species of concern were encountered during field surveys. One special status wildlife species, loggerhead shrike, was recorded during the survey. No additional surveys are recommended based on the results of this investigation. Details on other findings follow below; our results are divided into the following subsections:

- Vegetation types
- Plant species inventory
- Noxious weeds
- Special status plant species
- Wildlife habitat overview
- Bird surveys
- Raptor nesting substrate

- Mammalian and herbetofauna observations
- Special status wildlife species
- Wetlands, springs, and seeps
- Adits and shafts

VEGETATION TYPES

A vegetation map was developed for the project location that includes the areas immediately surrounding the mill sites and substation alternatives (Figure 3). A total of 5 typical vegetation types were described for the broad area: creosotebush shrubland, draw vegetation, arroyo vegetation, grassland flat, and tabosagrass (*Pleuraphis mutica*) swale. The following section includes a brief description of each of the vegetation types described. Representative photos of each type are included in Figure 4).

- **Creosotebush shrubland**: Most of the site is dominated by creosotebush flats. In addition to creosote, other shrubs regularly observed included American tarwart (*Flourensia cernua*), mariola (*Parthenium incanum*), Christmas cactus (*Cylindropuntia leptocaulis*), purple prickly pear (*Opuntia macrocentra*), honey mesquite (*Prosopis glandulosa*), and longleaf jointfir (*Ephedra trifurca*). Common forbs in this type include snakeweed (*Gutierrezia microcephala*), dwarf desertpeony (*Acourtia nana*), desert marigold (*Baileya multiradiata*), spreading fleabane (*Erigeron divergens*), Indian rushpea (*Hoffmannseggia glauca*), Coulter's horseweed (*Laennecia coulteri*), bristly nama (Nama hispidum), fiveneedle prickly leaf (*Thymophylla pentachaeta*), and skyblue phacelia (*Phacelia caerulea*). Bush muhly, burrograss (*Scleropogon brevifolius*), and low woollygrass (*Dasyochloa pulchella*) are the most common grasses. This type was the most dominant community through all of the mill sites and in Substation A. While MS1 is not included in the map view (Figure 3), it is the prominent type in that site. Soils in MS1 are even more gravelly compared to the other mill site locations, and this was the only site that included ocotillo (*Fouquieria splendens*) and plains blackfoot daisy (*Melampodium leucanthum*). The southern portion of Substation B is composed of creosote hills that transition into a creosote flat on the southernmost edge of the site.
- **Arroyo vegetation:** The bottom of Greyback Arroyo is dominated by honey mesquite, singlewhorl burrobrush (*Ambrosia monogyra*), and Apache plume (*Fallugia paradoxa*). Tall shrubs and trees such as littleleaf sumac (*Rhus microphylla*), Netleaf hackberry (*Celtis reticulata*), whitethorn acacia (*Acacia constricta*), and desert willow (*Chilopsis linearis*) are also present; primarily in the arroyo bottom or in the confluence of the arroyo bottom with the draws. The trees and taller shrubs appear to diversify the habitat at the site because they add significant vertical structure. Common forbs and grasses include side-oats grama (*Bouteloua curtipendula*), low woolly grass, rose heath (*Chaetopappa ericoides*), and absinth leaf bahia (*Bahia absinthifolia*). This type only intersects two small corners of Substation A. The arroyo vegetation type is entirely avoided in the Substation B site and the mill sites.
- **Draws:** Side slopes of the draws that feed into Greyback Arroyo are dominated by honey mesquite and tabosagrass. Other species often found on draw slopes include side-oats grama, featherplume (*Dalea formosa*), and longleaf jointfir. The draw bottoms contain similar

species as the arroyo vegetation type but individuals are typically shorter statured and littlefeaf sumac and catclaw mimosa (*Mimosa aculeaticarpa*) are more prominent than in the arroyo type. The draw vegetation type intersects portions of Substation A, Substation B, and mill sites 7 and 8.

- **Grassland flat:** The northern half of Substation B contains a large area dominated by annual grasses, tabosagrass, halfmoon milkvetch (*Astragalus allochrous*), and honey mesquite. Annual grasses, primarily six weeks grama (*Bouteloua barbata*), compose most of the plant cover in this type.
- **Tabosagrass swale:** A tabosagrass swale has developed in a narrow zone where finer textured soils have accumulated over the gravelly loams that are more characteristic of the project area. This vegetation type crosses through MS5 and the small depression eventually drains into a draw vegetation type. Honey mesquite is the most common woody plant in this type.

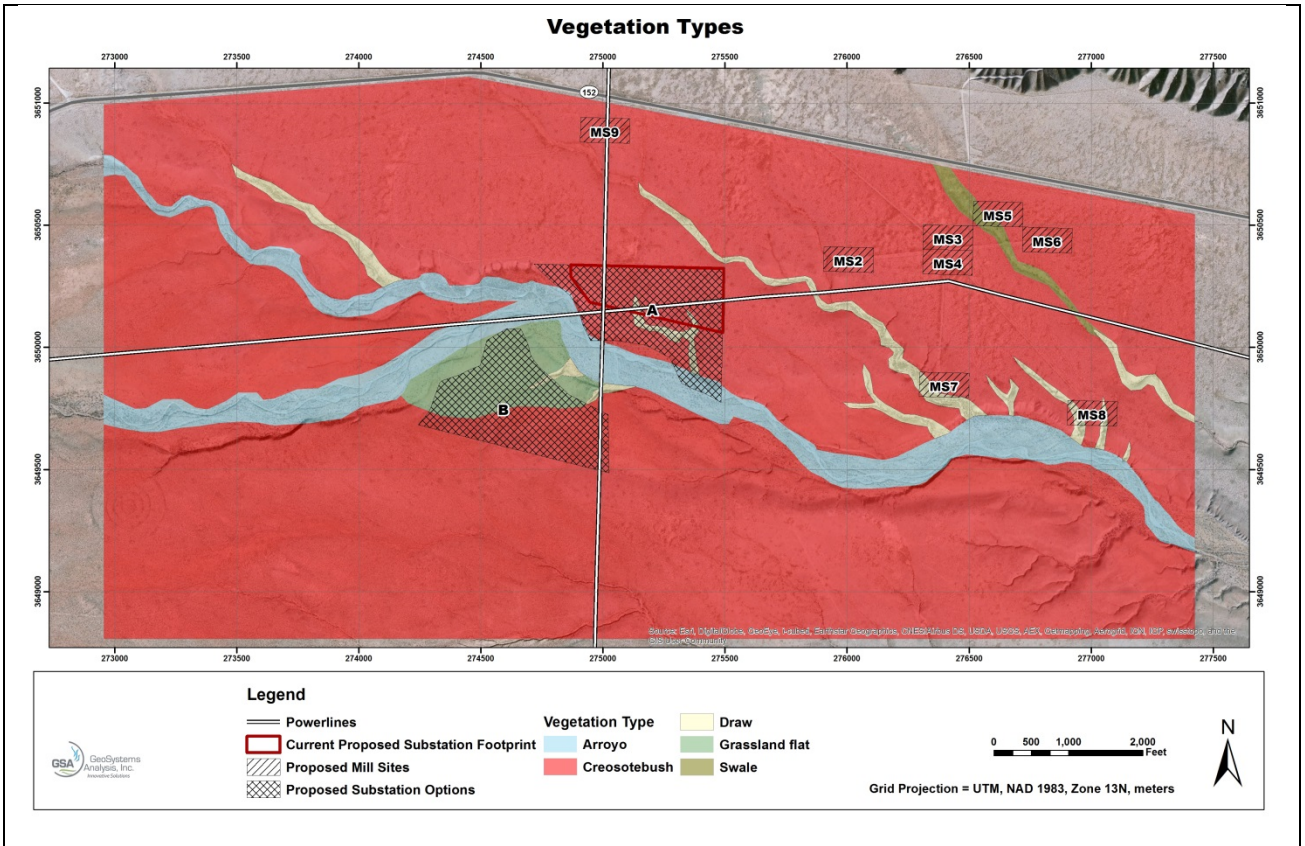

Figure 3. Map showing the primary vegetation types identified in the project area. Note that one mill site (MS1) is west of this map extent.

Creosotebush Shrubland

Draw Vegetation

Arroyo Vegetation

Tabosagrass Swale

Grassland Flat

Figure 4. Representative photos of the vegetation/habitat types identified in the project area.

PLANT SPECIES INVENTORY

A total of 123 plant species were observed during the survey (Table 2). Perennial forbs were the most common lifeform in the project area (44 species), and perhaps in response to above average winter and spring moisture, 24 annual forb species were also encountered during the April survey. A total of 26 shrub species and three tree species were recorded within the site footprints. Three perennial subshrubs were encountered along with 22 graminoid species (18 perennials plus 4 annual graminoids).

Most of the plant species encountered were native to New Mexico. Only 5 introduced species (of 123 species observed) were recorded during the field survey. The introduced species in the project area include bermudagrass (*Cynodon dactylon*), herb sophia (*Descurainia sophia*), Lehmann lovegrass (*Eragrostis lehmanniana*), Russian thistle (*Salsola tragus*), and spreading fanpetals (*Sida abutifolia*). Of these introduced species, herb sophia and Lehmann lovegrass were the most widespread and abundant but note that none of the introduced species observed in the project area seem to pose a serious management issue.

Since the relative commonality was recorded within each individual site, the information provides a snapshot of relative plant species abundance and distribution through the project area (a summary table is included in Appendix 1). A total of eight species were found in all 11 assessment areas (see the "Count" column in Table 2) while nine species were found in 10 assessment areas. The commonly observed species significantly ranged in abundance. For example littleleaf sumac was only classified as "Rare" or "Uncommon" but it was observed in 10 of the 11 assessment areas since we only encountered isolated individuals when it was observed; however, many of the species with a widespread distribution were also typically more abundant in the assessment area.

Table 2. Plant species observed in the project area along with their growth duration (P = perennial, B = biennial, A = annual), habit (T = tree, S = shrub, SubS = sub-shrub, F = forb, G = graminoid), native status (N = native, I = introduced), and the count (frequency) of sites the species was recorded out of the 11 sites surveyed.

Scientific Name	Common Name	Duration	Growth Habit	Native Status	Count
Acacia constricta	whitethorn acacia	P	S	N	1
Acourtia nana	dwarf desertpeony	P	F	N	8
Allionia incarnata	trailing windmills	A	F	N	2
Aloysia wrightii	Wright's beebrush	P	S	N	2
Ambrosia confertiflora	weakleaf bur ragweed	P	F	N	4
Ambrosia monogyra	singlewhorl burrobrush	P	S	N	2

Scientific Name	Common Name	Duration	Growth Habit	Native Status	Count
Aristida adscensionis	sixweeks threeawn	A	G	N	3
Aristida purpurea	purple threeawn	P	G	N	5
Aristida ternipes	spidergrass	P	G	N	2
Astragalus allochrous	halfmoon milkvetch	P	F	N	8
Astragalus flexuosus	flexile milkvetch	P	F	N	9
Astragalus nuttallianus	smallflowered milkvetch	P	F	N	3
Baccharis pteronioides	yerba de pasmo	P	S	N	2
Bahia absinthifolia	Absinth leaf bahia	P	F	N	11
Baileya multiradiata	desert marigold	P	F	N	11
Berlandiera lyrata	lyreleaf greeneyes	P	F	N	1
Bothriochloa barbinodis	cane bluestem	P	G	N	6
Bothriochloa ischaemum	yellow bluestem	P	G	N	1
Bouteloua barbata	Six weeks gramma	A	G	N	6
Bouteloua curtipendula	sideoats grama	P	G	N	10
Bouteloua eriopoda	black grama	P	G	N	4
Bouteloua gracilis	blue grama	P	G	N	5
Brickellia laciniata	splitleaf brickellbush	P	SubS	N	7
Carlowrightia linearifolia	heath wrightwort	P	F	N	1
Celtis reticulata	netleaf hackberry	P	T	N	3
Chaetopappa ericoides	rose heath	P	F	N	7
Chamaesaracha sordida	hairy five eyes	P	F	N	7
Chamaesyce albomarginata	whitemargin sandmat	P	F	N	9

Scientific Name	Common Name	Duration	Growth Habit	Native Status	Count
Chenopodium album	lambsquarters	A	F	N	2
Chilopsis linearis	desert willow	P	T	N	3
Chloris virgata	feather fingergrass	A	G	N	2
Cirsium ochrocentrum	yellowspine thistle	P	F	N	3
Conyza canadensis	Canadian horseweed	A	F	N	5
Coryphantha robustispina	long-tubercle beehive cactus	P	S	N	1
Croton pottsii	leatherweed	P	F	N	5
Cryptantha pusilla	low cryptantha	A	F	N	11
Cucurbita foetidissima	Missouri gourd	P	F	N	1
Cylindropuntia imbricata	tree cholla	P	S	N	5
Cylindropuntia leptocaulis	Christmas cactus	P	S	N	10
Cynodon dactylon	Bermudagrass	P	G	I	1
Dalea formosa	featherplume	P	SubS	N	4
Dalea lanata	woolly prairie clover	P	F	N	3
Dasyochloa pulchella	low woollygrass	P	G	N	11
Datura wrightii	sacred thorn-apple	P	S	N	1
Delphinium sp.	larkspur	A	F	N	2
Descurainia pinnata	western tansymustard	A	F	N	3
Descurainia sophia	herb sophia	A	F	I	5
Echinocereus fendleri	pinkflower hedgehog cactus	P	S	N	7
Echinocereus	kingcup cactus	P	S	N	1

Scientific Name	Common Name	Duration	Growth Habit	Native Status	Count
triglochidiatus					
Enneapogon desvauxii	nineawn pappusgrass	P	F	N	1
Ephedra trifurca	longleaf jointfir	P	S	N	6
Eragrostis lehmanniana	Lehmann lovegrass	P	G	I	10
Eragrostis mexicana	Mexican lovegrass	A	G	N	1
Eriastrum diffusum	miniature woollystar	A	F	N	1
Erigeron divergens	spreading fleabane	B	F	N	9
Erigeron tracyi	Tracy's fleabane	P	F	N	3
Eriogonum polycladon	sorrel buckwheat	A	F	N	3
Eriogonum rotundifolium	roundleaf buckwheat	A	F	N	4
Erodium texanum	Texas stork's bill	A	F	N	1
Evolvulus nuttallianus	shaggy dwarf morning-glory	P	F	N	3
Fallugia paradoxa	Apache plume	P	S	N	5
Flourensia cernua	American tarwort	P	S	N	11
Fouquieria splendens	ocotillo	P	S	N	1
Glandularia bipinnatifida	Dakota mock vervain	P	F	N	6
Gutierrezia microcephala	threadleaf snakeweed	P	SubS	N	11
Heterotheca villosa	hairy false goldenaster	P	F	N	1
Hoffmannseggia glauca	Indian rushpea	P	F	N	10
Hopia obtusa	vine mesquite	P	S	N	3
Hybanthus verticillatus	babyslippers	P	F	N	3
Hymenoxys odorata	bitter rubberweed	A	F	N	3

Scientific Name	Common Name	Duration	Growth Habit	Native Status	Count
Koeberlinia spinosa	crown of thorns	P	S	N	2
Laennecia coulteri	Coulter's horseweed	A	F	N	8
Lappula occidentalis	flatspine stickseed	A	F	N	5
Larrea tridentata	creosote bush	P	S	N	11
Lepidium lasiocarpum	shaggyfruit pepperweed	A	F	N	6
Lesquerella fendleri	Fendler's bladderpod	P	F	N	9
Machaeranthera tanacetifolia	tanseyleaf tansyaster	A	F	N	9
Malacothrix fendleri	Fendler's desertdandelion	A	F	N	3
Melampodium leucanthum	plains blackfoot	P	F	N	1
Mentzelia sp.	blazingstar	P	F	N	3
Mimosa aculeaticarpa	catclaw mimosa	P	S	N	8
Mirabilis sp.	four o'clock	P	F	N	1
Muhlenbergia porteri	bush muhly	P	G	N	10
Nama hispidum	bristly nama	P	F	N	10
Oenothera brachycarpa	shortfruit evening primrose	P	F	N	1
Oenothera sp.	evening primrose	P	F	N	6
Oenothera suffrutescens	scarlet gaura	P	F	N	1
Opuntia engelmannii	cactus apple	P	S	N	9
Opuntia macrocentra	purple pricklypear	P	S	N	10
Opuntia polyacantha	plains pricklypear	P	S	N	1

Scientific Name	Common Name	Duration	Growth Habit	Native Status	Count
Parthenium confertum	Gray's feverfew	P	F	N	2
Parthenium incanum	mariola	P	S	N	11
Pectis filipes	fivebract chinchweed	A	F	N	4
Pectis prostrata	spreading chinchweed	A	F	N	1
Phacelia caerulea	skyblue phacelia	A	F	N	9
Plantago patagonica	woolly plantain	A	F	N	2
Pleuraphis mutica	tobosagrass	P	G	N	10
Prosopis glandulosa	honey mesquite	P	T	N	10
Rafinesquia neomexicana	New Mexico plumeseed	A	F	N	1
Rhus microphylla	littleleaf sumac	P	S	N	10
Rumex hymenosepalus	canaigre dock	P	F	N	1
Salsola tragus	prickly Russian thistle	A	F	I	3
Schizachyrium scoparium	little bluestem	P	G	N	1
Scleropogon brevifolius	burrograss	P	G	N	5
Senecio flaccidus	threadleaf ragwort	P	F	N	6
Sida abutifolia	spreading fanpetals	A	F	I	4
Sida neomexicana	New Mexico fanpetals	P	F	N	1
Solanum elaeagnifolium	silverleaf nightshade	P	F	N	7
Sphaeralcea ambigua	desert globemallow	P	F	N	2
Sphaeralcea emoryi	Emory's globemallow	P	F	N	8
Sporobolus contractus	spike dropseed	P	G	N	1
Sporobolus cryptandrus	sand dropseed	P	G	N	2
Sporobolus giganteus	giant dropseed	P	G	N	1

Scientific Name	Common Name	Duration	Growth Habit	Native Status	Count
Stephanomeria pauciflora	brownplume wirelettuce	P	F	N	5
Thymophylla acerosa	pricklyleaf dogweed	P	F	N	4
Thymophylla pentachaeta	fiveneedle pricklyleaf	P	F	N	6
Tiquilia canescens	woody crinklemat	P	F	N	1
Tragia amblyodonta	dogtooth noseburn	P	F	N	1
Tridens muticus	slim tridens	P	G	N	1
Yucca baccata	banana yucca	P	S	N	5
Yucca elata	soaptree yucca	P	S	N	3
Zinnia grandiflora	Rocky Mountain zinnia	P	F	N	1
Ziziphus obtusifolia	lotebush	P	S	N	3

NOXIOUS WEEDS

Pursuant to the Noxious Weed Management Act of 1998, the NMDA targets specific weed species as noxious weeds for control or eradication (NMDA, 2015). The NMDA designates noxious weeds into three categories (Class A, B, and C) related to their distribution and abundance, potential impact on the economy, management complexity, and invasiveness. A species "watch list" was also developed in 2009 for problematic species that require additional information to properly classify. The Class A noxious weeds have limited distribution but pose a high potential economic or ecological impact because they are predicted to spread quickly. Class B species are limited to portions of the state while Class C species are already widespread. NMDA considers Class A species to be the highest management priority while Class C weeds are the lowest priority. No noxious weeds were observed in the project area.

SPECIAL STATUS PLANT SPECIES

Based on queries of regional floristic databases, a total of 23 rare and/or special status plant species are known to occur within Sierra County, NM (Table 3). Our biologists surveyed for these species and their habitat during the field effort. No rare, threatened, or endangered species, or plant species of concern were encountered during field surveys but potential habitat does exist for three species. General habitat requirements were present for Sandberg pincushion cactus (*Escobaria sandbergii*)

and Wright's campion (*Silene wrightii*); both are species of concern listed by the State of NM. Habitat criteria for the U.S. Fish and Wildlife Service (USFWS) species of concern and state-listed endangered Duncan's pincushion cactus (*Escobaria duncanii*) was marginally present in the Permit Area. The only known New Mexico population of Duncan's pincushion is at the base of Mud Mountain near Black Chute Mine (SEINet, 2015), which lies approximately 10 miles north of this project area.

Table 3. Rare, sensitive, threatened, and/or endangered plant species known to occur in Sierra County, NM. (adapted from Copper Flat BDR).

Species Name	Common Name	Habitat Notes	USFWS	NM	Habitat Present (Y/N)
Agastache cana	Grayish-white giant hyssop	Crevices and bases of granite cliffs or in canyons with small-leaved oaks at the upper edge of the desert and lower edge of the piñon-juniper zone, at 1,400-1,800 m (4,600-5,900 ft).	–	Species of Concern	No
Astragalus castetteri	Castetter's milkvetch	Dry, rocky slopes in montane scrub and open juniper woodland; 1,520 - 2,150 m (5,000 - 7,050 ft).	–	Species of Concern	No
Chenopodium cycloides	Sandhill goosefoot	Open sandy areas especially around blowouts on sand dunes; 800 - 1,500 m (2,600 - 5,000 ft).	Species of Concern	Species of Concern	No
Cirsium wrightii	Wright's marsh thistle	Wet, alkaline soils in spring seeps and marshy edges of streams and ponds; 1,130 -2,600 m (3,450 - 8,500 ft).	–	Endangered	No
Cuscuta warneri	Warner's	Grows on Phyla in open wet areas that support	–	Species of	No

Species Name	Common Name	Habitat Notes	USFWS	NM	Habitat Present (Y/N)
	dodder	the host species; 1,430 - 1,460 m (4,700 - 4,800 ft.)		Concern	
Desmodium metcalfei	Metcalfe's ticktrefoil	Rocky slopes, canyons in grasslands, oak/pinion-juniper woodland, and riparian forests at 1,310 - 2,000 m (4,000 - 6,500 ft.)	–	Species of Concern	No
Draba mogollonica	Mogollon whitlowgrass	Cool, moist northern slopes of mountains, ravines and canyons on volcanic rocks and soil in montane forests at 1,500 - 2,900 m (5,000 - 9,000 ft.)	–	Species of Concern	No
Draba standleyi	Standley's whitlowgrass	Igneous rock faces, bases of overhanging cliffs, clefts of porphyritic and andesitic rocks and soil; 1,675-1,980 m (5,500-6,500 ft).	–	Species of Concern	No
Erigeron scopulinus	Rock fleabane	Crevices in cliff faces of rhyolitic rock in lower montane coniferous forests at 1,800 - 2,800 m (6,000 - 9,000 ft).	–	Species of Concern	No
Escobaria (Corypantha) duncanii	Duncan's pincushion cactus	Cracks in limestone and limy shale in broken terrain in Chihuahuan desert scrub at 1,550 (5,100 ft).	Species of Concern	Endangered	Potential habitat present but species not observed

Species Name	Common Name	Habitat Notes	USFWS	NM	Habitat Present (Y/N)
Escobaria sandbergii	Sandberg pincushion cactus	Rocky, igneous and limestone soils in Chihuahuan desert scrub and open oak and pinion-juniper woodland in mountainous terrain; 1,300 - 2,250 m (4,200 - 7,400 ft).	–	Species of Concern	Potential habitat present but species not observed
Grindelia arizonica var. *neomexicana*	New Mexico gumweed	Rocky slopes and ledges in pinion-juniper woodland and lower montane coniferous forests at 2,000 - 2,300 m (6,500 - 7,500 ft.)	–	Species of Concern	No
Hedeoma todsenii	Todsen's pennyroyal	Plants grow in loose, gypseous-limestone soils associated with or position immediately below the Permian Yeso Formation; usually on steep north or east-facing slopes in pinon-juniper woodland at 1,900 - 2,300 m (6,200 - 7,400 ft).	Endangered	Endangered	No
Hexalectris spicata var. *arizonica*	Arizona coralroot	In heavy leaf litter in oak, pine, or juniper woodlands over limestone.	–	Endangered	No
Hymenoxys vaseyi	Vasey's bitterweed	Dry sites with coarse soils in montane scrub and pinon-juniper woodland at 2,100 -	–	Species of Concern	No

Species Name	Common Name	Habitat Notes	USFWS	NM	Habitat Present (Y/N)
		2,500 m (6,900 - 8,200 ft).			
Penstemon metcalfei	Metcalfe's penstemon	Cliffs or steep, north-facing slopes in lower and upper montane coniferous forest at 2,000 - 2,900 m (6,600 - 9,500 ft).	–	Species of Concern	No
Perityle staurophylla var. *homoflora*	San Andres rock daisy	Crevices in limestone clifss, usually on protected north and east exposures at about 1,950-2,150 m (6,400 - 7,000 ft).	–	Species of Concern	No
Perityle staurophylla var. *staurophylla*	New Mexico rock daisy	Crevices in limestone cliffs and boulders, usually on protected north and east exposures; 1,500 - 2,100 m (4,900 - 7,000 ft).	–	Species of Concern	No
Physaria gooddingii	Goodding's bladderpod	Open areas in piñon-juniper woodland and ponderosa pine forest. It occurs occasionally on highway rights-of-way where some populations may be susceptible to disturbance.	–	Species of Concern	No
Silene plankii	Plank's campion	Igneous cliffs and rocky outcrops, 1,500 - 2,800 m (5,000 - 9,200 ft.)	–	Species of Concern	No

Species Name	Common Name	Habitat Notes	USFWS	NM	Habitat Present (Y/N)
Silene thurberi	Thurber's campion	In protected locations on rocky areas and slopes; in arroyos and mountains at elevations possibly between 1,520 - 2,130 m (5,000 - 7,000 ft.)	–	Species of Concern	Potential habitat present but species not observed
Silene wrightii	Wright's campion	Cliffs and rocky outcrops in Rocky Mountain montane and subalpine conifer forests; about 2,070 - 2,440 m (6,800 - 8,000 ft).	–	Species of Concern	No
Talinum humile (Phemeranthus humilis)	Pinos Altos flame flower	Shallow, gravelly, usually clayey soils overlying rhyolite, usually on rock benches in sloping terrain, but also in soil pockets overlying rock in nearly level areas; Madrean grassland, oak woodland or pinion-juniper woodland; often growing with *Nolina microcarpa* and *Agave parryii*.	Species of Concern	Species of Concern	No

WILDLIFE HABITAT OVERVIEW

As noted above, the project area includes several distinct habitat types, but is generally representative of Chihuahuan Desert grassland/shrubland. Creosotebush shrubland dominates the area by habitat-type, although the highest quality habitat in terms of wildlife diversity and abundance is more likely tied to Greyback Arroyo, which dissects the project area but falls mostly outside the proposed mill site and substation locations. In arid areas, certain habitat features, such

as perennial water, may become very important despite occupying a relatively small footprint and/or being anthropogenic. A single perennial standing water source is found within the project area in the form of a steel cattle tank near MS9. This water source is almost certainly an important feature for a variety of wildlife species in the area, including birds, bats, small, medium and large-sized mammals. Bats, which must drink from standing water while in flight, are known to travel long distances to utilize perennial water sources. The need for reliable water is particularly important for pregnant or lactating female bats, which may consume considerably more water than other members of their population. This water source is likely a very important landscape feature for bats in the area.

Additionally, although the predominant habitat type is creosotebush shrubland, the highest avian diversity and abundance was found in arroyo or draw habitats (see next section for those results) with increased vertical structure from small trees and tall shrubs. This vertical structure provides nesting habitat for shrub and tree-nesting birds, and when flowering, provides a substantial food resource for insectivorous avian migrants and residents. Additionally, the small trees and shrubs found in arroyo and draw habitats are generally more vegetatively dense on an individual basis, and tend to grow in more dense aggregations; both conditions provide substantial cover habitat for all wildlife generally. It is also worth noting that following the onset of monsoonal precipitation, the only areas likely to maintain pooled water for extended periods are in or directly adjacent to Greyback Arroyo. For this reason, in addition to the increased structural complexity mentioned above, the on-site arroyo habitat should be considered higher-quality wildlife habitat than the nearby creosotebush shrubland.

The creosotebush-dominated shrubland is not devoid of value, however, and several breeding bird species utilize this habitat including Black-throated sparrows. Grassy swales that interlace creosotebush shrubland are also important microhabitat features for species such as scaled quail. Also, the relative sparseness of vegetation in this shrubland provides ideal foraging conditions for raptorial species feeding on small and medium-sized mammals, particularly nocturnal species such as owls. The rocky nature of the soils found in this habitat-type are also suitable for a number of reptile species, including most lizards detected during surveys and those known to occur in the area.

BIRD SURVEYS

Bird data was collected utilizing both standardized point counts and timed area searches. Though point counts are more replicable, they may fail to detect species which are rare, uncommon, or limited to specific habitat types because of the relatively short survey period for each point. The two main habitat-types useful for distinguishing avian activity within the project area were classified as creosotebush shrubland (shrubland habitat), and arroyo/draw habitat, which includes important vertical structure. Most of the mill site areas, with the exception of MS7 and a small area of MS8, are located completely within shrubland habitat. The proposed substation locations are also predominantly shrubland habitat, but both border or include small areas of arroyo habitat. Because birds are highly mobile and the project area is relatively small geographically, it is more appropriate to classify avian use according to habitat type.

A total of 34 avian species were detected during the survey (Table 4); including 31 resident species and three probable migrants. Birds were more abundant and diverse in the arroyo and draw habitats versus the surrounding shrublands. All of the encountered species were classified as least concern conservation status by the International Union for Conservation of Nature.

Table 4. Bird species observed in the project area by habitat type (shrubland and arroyo/draw), and relative abundance. Relative abundance categories include: absent, rare, uncommon, common and abundant. These rankings are only reflective of data collected onsite during surveys efforts, not of known natural history of individual species. Information about migrant or resident status is only reflective of whether individual species are resident in the project area, not whether they are seasonally migratory; many species winter outside of New Mexico but return to breed in spring. The conservation status data is from the International Union for Conservation of Nature (IUCN).

Common Name	**Scientific Name**	**Shrubland Habitat**	**Arroyo/Draw Habitat**	**Migrant/ Resident**	**International Conservation Status**
Black-throated sparrow	*Amphispiza belineata*	Abundant	Abundant	Resident	Least concern
Chipping sparrow	*Spizella passerina*	Uncommon	Common	Resident	Least concern
Brewer's sparrow	*Spizella breweri*	Rare	Common	Migrant	Least concern
White-crowned sparrow	*Zonotrichia leucophrys*	Absent	Uncommon	Migrant	Least concern
Sage sparrow	*Artemisiospiza nevadensis*	Rare	Absent	Resident	Least concern
House finch	*Haemorhous mexicanus*	Rare	Uncommon	Resident	Least concern
Canyon towhee	*Melazone fusca*	Rare	Common	Resident	Least concern
Green-tailed towhee	*Pipilo clorurus*	Rare	Common	Resident	Least concern
Cactus wren	*Campylorhynchus brunneicapillus*	Uncommon	Common	Resident	Least concern
Rock wren	*Salpinctes obsoletus*	Rare	Uncommon	Resident	Least concern
Wilson's warbler	*Wilsonia pusilla*	Absent	Uncommon	Migrant	Least concern

Common Name	Scientific Name	Shrubland Habitat	Arroyo/Draw Habitat	Migrant/ Resident	International Conservation Status
Blue-gray gnatcatcher	*Polioptila caerulea*	Absent	Uncommon	Resident	Least concern
Loggerhead shrike	*Lanius ludovicianus*	Uncommon	Uncommon	Resident	Least concern
Northern mockingbird	*Mimus polyglottus*	Abundant	Abundant	Resident	Least concern
Crissal thrasher	*Toxostoma crissale*	Rare	Uncommon	Resident	Least concern
Western kingbird	*Tyrannus verticalis*	Common	Common	Resident	Least concern
Brown-crested flycatcher	*Myiarchus tyrannulus*	Rare	Uncommon	Resident	Least concern
Ash-throated flycatcher	*Myiarchus cinerascens*	Common	Common	Resident	Least concern
Say's phoebe	*Sayornis saya*	Uncommon	Uncommon	Resident	Least concern
Cordilleran flycatcher	*Empidonax occidentalis*	Rare	Uncommon	Resident	Least concern
Eastern meadowlark	*Sturnella magna*	Rare	Absent	Resident	Least concern
Mourning dove	*Zenaida macroura*	Abundant	Abundant	Resident	Least concern
White-winged dove	*Zenaida asiatica*	Uncommon	Uncommon	Resident	Least concern
Gambel's quail	*Callipepla gambelii*	Uncommon	Abundant	Resident	Least concern
Scaled quail	*Callipepla squamata*	Uncommon	Uncommon	Resident	Least concern
Red-tailed hawk	*Buteo jamaicensis*	Common	Common	Resident	Least concern
Swainson's hawk	*Buteo swainsoni*	Common	Common	Resident	Least concern
American kestrel	*Falco sparverius*	Uncommon	Uncommon	Resident	Least concern
Cooper's hawk	*Accipiter cooperii*	Absent	Uncommon	Resident	Least concern
Common raven	*Corvus corax*	Common	Common	Resident	Least concern

Common Name	Scientific Name	Shrubland Habitat	Arroyo/Draw Habitat	Migrant/ Resident	International Conservation Status
Chihuahuan raven	*Corvus cryptoleucus*	Abundant	Abundant	Resident	Least concern
Turkey vulture	*Cathartes aura*	Abundant	Abundant	Resident	Least concern
Great-horned owl	*Bubo virginianus*	Rare	Uncommon	Resident	Least concern
Common poorwill	*Phalaenoptilus nuttallii*	Rare	Uncommon	Resident	Least concern

RAPTOR NESTING SUBSTRATE

Nesting substrate for raptors is relatively limited throughout the project area. Potential substrate consists of powerlines and associated towers that cross the project area and isolated trees and tall shrubs that are more concentrated in the arroyo and draw vegetation types. Indeed, at least one large stick nest was noted in a relatively large mesquite tree in Greyback Arroyo, though it did not appear to be active currently. This nest was most likely utilized previously by Swainson's hawks, which were seen in the area during avian use surveys and are known to nest in small trees. In desert habitats, where suitable nesting substrate is often limited for raptorial species, many hawks are known to utilize trees and shrubs which elsewhere might be unsuitable because of short height and relative exposure.

Additional raptor nesting substrate, particularly in arid areas, is often found along cliffs or rock outcrops. On the project area surveyed during this effort, no obviously suitable rock outcrop or cliff nesting habitat was identified. However, it is worth noting that most raptors have very large areas which are routinely used for hunting. Several raptorial species were noted during avian use surveys, and although none were confirmed as nesting on the project area this season, it is likely that use of the project area for hunting and foraging by raptors is a year-round occurrence.

Finally, two substantial transmission lines with associated towers traverse the project area. Although transmission towers are often not sufficient as nesting platforms in windy areas, towers and transmission lines do provide ideal perch locations for a variety of raptor species as part of normal foraging or hunting behavior. Indeed, transmission lines and towers may be important landscape features for raptors, and for this reason nesting locations are often found in relatively close proximity to these perch sites. Because the project area is crossed by these lines, it is likely that raptors will continue to attempt to nest in suitable substrate nearby.

MAMMALIAN AND HERPETOFAUNA OBSERVATIONS

Burrow systems were observed for several small mammal species including; kangaroo rat (*Dipodomys* sp.), pocket mouse (*Perognathus* sp.), and Botta's pocket gopher (*Thomomys bottae*). At least one kangaroo rat mound was observed in eight of the nine mill sites and in both substation areas. Pocket mouse burrows were abundant in each of the 11 assessment areas. Gopher mounds were recorded in five of the nine mill sites and multiple mounds were encountered in the two substation areas. Woodrat (*Neotoma* sp.) middens were also observed throughout the project area but appeared most prevalent in the arroyo.

One abandoned badger (*Taxidea taxus*) den and another den that appeared to be active was detected. Black tailed jackrabbits (*Lepus californicus*) were observed regularly during the field survey, as well as avian surveys, and desert cottontails (*Sylvilagus audubonii*) were also observed sporadically. No indications of game species or predators were recorded, although use of this area by coyotes (*Canis latrans*), is nearly certain. Additionally, it is likely that gray fox (*Urocyon cinereoargenteus*) also use habitat on the project area, and collared peccary (*Pecari tajacu*) are known occupants in Lake Valley as well as along the Rio Grande nearby, and likely use the arroyo habitat as travel and foraging corridors.

The only reptiles detected during our pedestrian surveys include whiptail lizard (*Aspidoscelis sp*.), lesser earless lizard (*Holbrookia maculata*), prairie lizard (*Sceloporus undulatus*), and short-horned lizard (*Phrynosoma douglasii*). However, reptiles, particularly snakes, are notoriously sparse and difficult to detect in the absence of concentrated, species-specific surveys, so it is likely that a number of other reptiles are found within the project area but went undetected during general surveys. Common snakes known to occupy the area and that could be reasonably expected to occur on the project site include the Great Basin gopher snake (*Pituophis catenifer deserticola*) and the western diamond-backed rattlesnake (*Crotalus atrox*).

SPECIAL STATUS WILDLIFE SPECIES

According to regional databases (NMDGF, 2015), 55 threatened, endangered, sensitive, or other special status species occur in Sierra County, NM. One state sensitive species, the loggerhead shrike (*Lanis ludovicianus*), was detected during the mill site and substation survey (Table 5). Potential habitat may be present in the project area for 17 species described as sensitive or threatened by the State. Four of these species were also considered species of concern by the USFWS. The project area does not support potential habitat for any federally-listed threatened or endangered species. Several sensitive bat species were detected in the Copper Flat mine permit area during BDR surveys (Table 5) and it's likely these species could also be detected in the mill site and substation project area (particularly near the livestock watering tank in MS-9) if a formal bat survey was completed; but that was outside the scope of this survey.

Table 5. Wildlife species with special status described by the State of NM and/or the USFWS that are known to occur in Sierra County, NM as described by regional databases (NMDGF, 2015) and their habitat potential in the project area. Abbreviations as follows; E = Endangered, T = Threatened, Sen = Sensitive, SoC = Species of Concern, Candidate = Can.

Common Name	Scientific Name	Status	State	Detected	Habitat Present	Notes
Allen's Big-eared Bat	*Idionycteris phyllotis*	FWS SoC	Sen	No	yes	
Pale Townsend's Big-eared Bat	*Corynorhinus townsendii*	FWS SoC	Sen	No	yes	Detected during Copper Flat Mine BDR Surveys
Arizona Myotis	*Myotis occultus*		Sen	No	yes	
Fringed Myotis	*Myotis thysanodes*		Sen	No	yes	Detected during Copper Flat Mine BDR Surveys
Long-eared Myotis	*Myotis evotis*		Sen	No	yes	
Long-legged Myotis	*Myotis volans*		Sen	No	yes	
Western Small-footed Myotis	*Myotis ciliolabrum*		Sen	No	yes	
Yuma Myotis	*Myotis yumanensis*		Sen	No	yes	Detected during Copper Flat Mine BDR Surveys
Mexican Gray Wolf	*Canis lupus baileyi*	E	E	No	no	
Common Hog-nosed Skunk	*Conepatus leuconotus*		Sen	No	no	
Western Spotted Skunk	*Spilogale gracilis*		Sen	No	no	

Common Name	Scientific Name	Status	State	Detected	Habitat Present	Notes
Ringtail	*Bassariscus astutus*		Sen	No	yes	
Gunnison's prairie dog	*Cynomys gunnisoni zuniensis*		Sen	No	yes	
Desert Pocket Gopher	*Geomys arenarius brevirostris*	FWS SoC	Sen	No	yes	
Pecos River Muskrat	*Ondatra zibethicus ripensis*	FWS SoC	Sen	No	no	
White Sands Wood Rat	*Neotoma micropus leucophaea*	FWS SoC		No	no	
Brown Pelican	*Pelecanus occidentalis*		E	No	no	
Reddish Egret	*Egretta rufescens*	FWS SoC		No	no	
Common Black Hawk	*Buteogallus anthracinus*	FWS SoC	T	No	no	
Bald Eagle	*Haliaeetus leucocephalus*		T	No	no	
Northern Goshawk	*Accipiter gentilis*	FWS SoC	Sen	No	no	
Aplomado Falcon	*Falco femoralis*	E	E	No	no	
Peregrine Falcon	*Falco peregrinus*	FWS SoC	T	No	no	
Arctic Peregrine	*Falco peregrinus tundrius*	FWS SoC	T	No	no	

Common Name	Scientific Name	Status	State	Detected	Habitat Present	Notes
Falcon						
Mountain Plover	*Charadrius montanus*		Sen	No	no	
Black Tern	*Chlidonias niger*	FWS SoC		No	no	
Least Tern	*Sternula antillarum*	E	E	No	no	
Neotropic Cormorant	*Phalacrocorax brasilianus*		T	No	no	
Common Ground-dove	*Columbina passerina*		E	No	no	
Yellow-billed Cuckoo	*Coccyzus americanus occidentalis*	T	Sen	No	no	
Burrowing Owl	*Athene cunicularia*	FWS SoC		No	yes	
Mexican Spotted Owl	*Strix occidentalis lucida*	T	Sen	No	no	
Broad-billed Hummingbird	*Cynanthus latirostris*		T	No	yes	
Costa's Hummingbird	*Calypte costae*		T	No	yes	
Lucifer Hummingbird	*Calothorax lucifer*		T	No	yes	
Elegant Trogon	*Trogon elegans*		E	No	no	
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	E	E	No	no	

Common Name	Scientific Name	Status	State	Detected	Habitat Present	Notes
Thick-billed Kingbird	*Tyrannus crassirostris*		E	No	no	
Loggerhead Shrike	*Lanius ludovicianus*		Sen	Yes	yes	Detected during Copper Flat Mine BDR Surveys and Mill site-Substation Surveys
Bell's Vireo	*Vireo bellii*	FWS SoC	T	No	no	
Gray Vireo	*Vireo vicinior*		T	No	no	
Sprague's Pipit	*Anthus spragueii*	Can		No	no	
Baird's Sparrow	*Ammodramus bairdii*	FWS SoC	T	No	no	
Varied Bunting	*Passerina versicolor*		T	No	no	
Big Bend Slider	*Trachemys gaigeae*		Sen	No	no	
Southwestern Fence Lizard	*Sceloporus cowlesi*		Sen	No	yes	
Arizona Toad	*Anaxyrus microscaphus*		Sen	No	no	
Chiricahua Leopard Frog	*Lithobates chiricahuensis*	T	Sen	No	no	
Rio Grande Chub	*Gila pandora*		Sen	No	no	
Headwater Chub	*Gila nigra*	Can	E	No	no	
Rio Grande Cutthroat	*Oncorhynchus*		Sen	No	no	

Common Name	Scientific Name	Status	State	Detected	Habitat Present	Notes
Trout	*clarkii virginalis*					
Gila Trout	*Oncorhynchus gilae*	T	T	No	no	
White Sands Pupfish	*Cyprinodon tularosa*	FWS SoC	T	No	no	
Mineral Creek Mountainsnail	*Oreohelix pilsbryi*	FWS SoC	T	No	no	
Moore's Fairy Shrimp	*Streptocephalus moorei*		Sen	No	no	

WETLANDS, SPRINGS, AND SEEPS

Wetlands and Waters of the U.S. are defined are protected by Section 404 of the Clean Water Act, which is administered and enforced by the U.S. Army Corps of Engineers (Corps) and protects wetlands from modification, disturbance, or distruction. The Corps defines wetlands as: *Those areas that are inundated or saturated by surface or ground water (hydrology) at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation (hydrophytes) typically adapted for life in saturated soil conditions (hydric soils). Wetlands generally include swamps, marshes, bogs, and similar areas* (40 CFR 232.2(r)). The project area was assessed for the presence of jurisdictional wetlands using standard field procedures for wetland delineation. The biologist also searched for other moist soil or open water features such as springs and seeps that may not technically fit jurisdictional criteria as Waters of the U.S. but might still be ecologically significant. No wetlands, springs, or seeps were identified within the project area.

ADITS AND SHAFTS

Adits, shafts, and other abandoned mine features are critical to the survival of numerous bat species due to the loss of natural roosting and hibernation areas (NPS, 2015) but they also pose a human safety risk. Recent efforts to close and reclaim abandoned mine features have threatened bat populations (NPS, 2015). The New Mexico Department of Game and Fish comments for the Copper Flat Mine BDR specifically requested an evaluation of abandoned mine features in the permit area to determine use by roosting or hibernating bats, particularly if the features are expected to be disturbed or destroyed during future mining. Since agency representatives emphasized the regional importance of these features throughout the Copper Flat permitting process, our biologists searched for abandoned mine features during our field survey. No adits or shafts were observed during field assessments at the mill site and substation locations.

CONCLUSION

The Spring 2015 biological survey in the mill site and substation areas yielded 123 plant species, most of which were native. A total of 34 bird species were also detected in the project area during field surveys and most of the species were residents. One special status wildlife species, loggerhead shrike, was recorded during the survey. No special status plant species, wetlands, springs/seeps, noxious weeds, adits/shafts, or other biological features critically unique to the region were observed.

The majority of the proposed mill sites are located in areas with existing developments such as production wells or monitoring wells and each of the sites is bisected by a road. Affected habitats are primarily Chihuahuan desert scrubland with a plant community that has deviated from its ecological potential (as described in the Ecological site report for Gravelly). However, perhaps unintentionally, small portions of the mill site boundaries include draws and/or arroyo habitats that contain relatively unique microhabitats for the area. As indicated by the results of this survey, the arroyo habitats and draws contain a higher biological diversity and abundance than the surrounding creosote flats. Thus, we recommend avoiding disturbance in draws or in the arroyo during future developments in this area.

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APPENDIX I: PLANT SPECIES RELATIVE ABUNDANCE

Table A-1: Relative abundance of plant species recorded in the project area by site. A = Abundant, C = Common, U = Uncommon, R = Rare.

Scientific name	Common name	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7	MS 8	MS 9	SUB A	SUB B
Acacia constricta	whitethorn acacia								C			
Acourtia nana	dwarf desertpeony		C	C	C	C	C			C	C	C
Allionia incarnata	trailing windmills							U			C	
Aloysia wrightii	Wright's beebrush							U	U			
Ambrosia confertiflora	weakleaf bur ragweed	U	U						U	U		
Ambrosia monogyra	singlewhorl burrobrush							C			U	
Aristida adscensionis	sixweeks threeawn	U	U						U			
Aristida purpurea	purple threeawn				U		U	U			U	U
Aristida ternipes	spidergrass			R							U	
Astragalus allochrous	halfmoon milkvetch	U	U	U			U	U	U		C	A
Astragalus flexuosus	flexile milkvetch	U	C			C	U	U	C	U	C	C
Astragalus nuttallianus	smallflowered milkvetch		U								U	U

Scientific name	Common name	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7	MS 8	MS 9	SUB A	SUB B
Baccharis pteronioides	yerba de pasmo	R				U						
Bahia absinthifolia	Absinth leaf bahia	C	U	C	C	U	C	C	U	U	C	C
Baileya multiradiata	desert marigold	C	C	C	C	C	C	C	C	C	C	C
Berlandiera lyrata	lyreleaf greeneyes									R		
Bothriochloa barbinodis	cane bluestem			U	U		U	U	U		U	
Bothriochloa ischaemum	yellow bluestem						R					
Bouteloua barbata	Six weeks gramma	A	R					C	U		U	A
Bouteloua curtipendula	sideoats grama		C	U	C	C	U	C	C	C	C	C
Bouteloua eriopoda	black grama							C	U		U	U
Bouteloua gracilis	blue grama				R		U			U	U	U
Brickellia laciniata	splitleaf brickellbush	R		R	U		R	U	U		U	
Carlowrightia linearifolia	heath wrightwort											U
Celtis reticulata	netleaf hackberry			R				U	U			
Chaetopappa ericoides	rose heath		C		U		U		U	U	C	U
Chamaesaracha	hairy five eyes	U	U		U				U	U	U	U

Scientific name	Common name	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7	MS 8	MS 9	SUB A	SUB B
sordida												
Chamaesyce albomarginata	whitemargin sandmat		C	C	U	U		C	U	C	C	C
Chenopodium album	lambsquarters				R		U					
Chilopsis linearis	desert willow						U	U			U	
Chloris virgata	feather fingergrass				R						U	
Cirsium ochrocentrum	yellowspine thistle				U	U	U					
Conyza canadensis	Canadian horseweed	U		R			U			U	U	
Coryphantha robustispina	long-tubercle beehive cactus						R					
Croton pottsii	leatherweed		C					C	C		C	C
Cryptantha pusilla	low cryptantha	C	U	C	U	C	C	U	U	C	C	C
Cucurbita foetidissima	Missouri gourd							R				
Cylindropuntia imbricata	tree cholla	U				U	U			U		U
Cylindropuntia leptocaulis	Christmas cactus	U	C	A	A	C	U		U	U	U	U
Cynodon dactylon	Bermudagrass									U		
Dalea formosa	featherplume		U						U		C	U
Dalea lanata	woolly prairie							U	U			U

Scientific name	Common name	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7	MS 8	MS 9	SUB A	SUB B
	clover											
Dasyochloa pulchella	low woollygrass	C	A	A	A	A	A	C	A	A	A	C
Datura wrightii	sacred thorn-apple			R								
Delphinium sp.	larkspur			R							U	
Descurainia pinnata	western tansymustard	U									C	U
Descurainia sophia	herb sophia			C	U	U	C				U	
Echinocereus fendleri	pinkflower hedgehog cactus	U	U	R	R	U				U		R
Echinocereus triglochidiatus	kingcup cactus						R					
Enneapogon de svauxii	nineawn pappusgrass										U	
Ephedra trifurca	longleaf jointfir		U			U		U	U		U	U
Eragrostis lehmanniana	Lehmann lovegrass	U	U	C	C	U	C	A	C	U	U	
Eragrostis mexicana	Mexican lovegrass										U	
Eriastrum diffusum	miniature woollystar											U
Erigeron divergens	spreading fleabane	U	C	C	C	A	A			C	C	U
Erigeron tracyi	Tracy's fleabane	U									U	U

Scientific name	Common name	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7	MS 8	MS 9	SUB A	SUB B
Eriogonum polycladon	sorrel buckwheat			U	U	U						
Eriogonum rotundifolium	roundleaf buckwheat	U							U		C	U
Erodium texanum	Texas stork's bill				R							
Evolvulus nuttallianus	shaggy dwarf morning-glory				R						U	U
Fallugia paradoxa	Apache plume		U					U	U		U	U
Flourensia cernua	American tarwort	C	U	C	C	C	C	C	U	U	C	A
Fouquieria splendens	ocotillo	R										
Glandularia bipinnatifida	Dakota mock vervain	C	U		U	U	U				U	
Gutierrezia microcephala	threadleaf snakeweed	C	C	A	A	A	A	C	U	C	C	U
Heterotheca villosa	hairy false goldenaster	U										
Hoffmannseggia glauca	Indian rushpea	U	C	C	C	C	C	C		C	C	C
Hopia obtusa	vine mesquite		U	U						U		
Hybanthus verticillatus	babyslippers	R								U		U
Hymenoxys odorata	bitter rubberweed							U			U	C
Koeberlinia spinosa	crown of thorns										U	R

Scientific name	Common name	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7	MS 8	MS 9	SUB A	SUB B
Laennecia coulteri	Coulter's horseweed	U	C	C	C		C			C	C	U
Lappula occidentalis	flatspine stickseed	U							U	U	U	U
Larrea tridentata	creosote bush	A	A	A	A	A	A	U	C	A	A	A
Lepidium lasiocarpum	shaggyfruit pepperweed				U		U	U	U		U	U
Lesquerella fendleri	Fendler's bladderpod		U	C	C	U	C	U		U	U	U
Machaeranthera tanacetifolia	tanseyleaf tansyaster	C	C	C	C	U	U			U	U	U
Malacothrix fendleri	Fendler's desertdandelion			U						U		U
Melampodium leucanthum	plains blackfoot	U										
Mentzelia sp.	blazingstar	R		R				R				
Mimosa aculeaticarpa	catclaw mimosa		U	R	U			C	U	U	U	U
Mirabilis sp.	four o'clock			U								
Muhlenbergia porteri	bush muhly		C	C	C	C	C	C	U	C	C	C
Nama hispidum	bristly nama	U	C	C	C	C	C		U	C	C	C
Oenothera brachycarpa	shortfruit evening primrose								U			
Oenothera sp.	evening primrose	R		R	R		U		R			U

Scientific name	Common name	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7	MS 8	MS 9	SUB A	SUB B
Oenothera suffrutescens	scarlet gaura								R			
Opuntia engelmannii	cactus apple	C	U	U	U	U	U			U	U	U
Opuntia macrocentra	purple pricklypear	R	C	C	C	C	C		U	C	C	C
Opuntia polyacantha	plains pricklypear											U
Parthenium confertum	Gray's feverfew				U							C
Parthenium incanum	mariola	C	U	C	C	C	U	U	C	U	U	U
Pectis filipes	fivebract chinchweed		U					U	U		U	
Pectis prostrata	spreading chinchweed											U
Phacelia caerulea	skyblue phacelia	C	C	C	C	C	C		C	C	U	
Plantago patagonica	woolly plantain									U		U
Pleuraphis mutica	tobosagrass		C	C	U	C	C	A	A	U	A	A
Prosopis glandulosa	honey mesquite		U	U	U	U	U	A	U	U	C	U
Rafinesquia neomexicana	New Mexico plumeseed											R
Rhus microphylla	littleleaf sumac		U	R	R	U	U	U	U	U	C	U
Rumex	canaigre dock										U	

Scientific name	Common name	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7	MS 8	MS 9	SUB A	SUB B
hymenosepalus												
Salsola tragus	prickly Russian thistle	U				U				U		
Schizachyrium scoparium	little bluestem										U	
Scleropogon brevifolius	burrograss			A	A	A	A			C		
Senecio flaccidus	threadleaf ragwort			R	U	U	U				U	R
Sida abutifolia	spreading fanpetals	R		R				U			U	
Sida neomexicana	New Mexico fanpetals							U				
Solanum elaeagnifolium	silverleaf nightshade			U	U		U	C		U	U	U
Sphaeralcea ambigua	desert globemallow				U		U					
Sphaeralcea emoryi	Emory's globemallow	C		C	X	U	C		C	U		U
Sporobolus contractus	spike dropseed		R									
Sporobolus cryptandrus	sand dropseed				U					U		
Sporobolus giganteus	giant dropseed			R								
Stephanomeria pauciflora	brownplume wirelettuce				U	U			U		U	U
Thymophylla acerosa	pricklyleaf dogweed			R					U	U	C	

Scientific name	**Common name**	**MS 1**	**MS 2**	**MS 3**	**MS 4**	**MS 5**	**MS 6**	**MS 7**	**MS 8**	**MS 9**	**SUB A**	**SUB B**
Thymophylla pentachaeta	fiveneedle pricklyleaf	U		C	U		C		C		C	
Tiquilia canescens	woody crinklemat										U	
Tragia amblyodonta	dogtooth noseburn										U	
Tridens muticus	slim tridens					R						
Yucca baccata	banana yucca			U	R	U	R				U	
Yucca elata	soaptree yucca		U						U			U
Zinnia grandiflora	Rocky Mountain zinnia								U			
Ziziphus obtusifolia	lotebush		U						U		U	

New Mexico Copper Corporation Copper Flat Project:
Paleontology Resource Survey Summary Report

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April 9, 2015

Introduction

This report serves as a summary of the results of pedestrian survey performed for THEMAC Resources for paleontological resources in the Copper Flat Project area. The area surveyed is located approximately 14 miles southwest of Truth or Consequences, New Mexico and consists of nine 5 acre mill sites and two larger proposed areas for a substation site (each approximately 60 acres). All of these proposed sites are located on broad expanses of the Miocene-Pliocene Santa Fe Group, which is designated as a Potential Fossil Yield Class (PFYC) 3 area. The farthest west mill site is located on the south-central edge of section 28, T15S, R6W (Figure 1). A second mill site is located in the northwest corner of the southeast corner of section 25, T15S, R6W. Five mill sites are clustered in the southern third of section 30, T15S, R5W and two are located in the northern third of section 31, T15S, R5W. The two potential substation sites are located in the northeast corner of section 36 (Substation Plan A) and the north-center of section 36 (Substation Plan B), T15S, R6W (Figure 2).

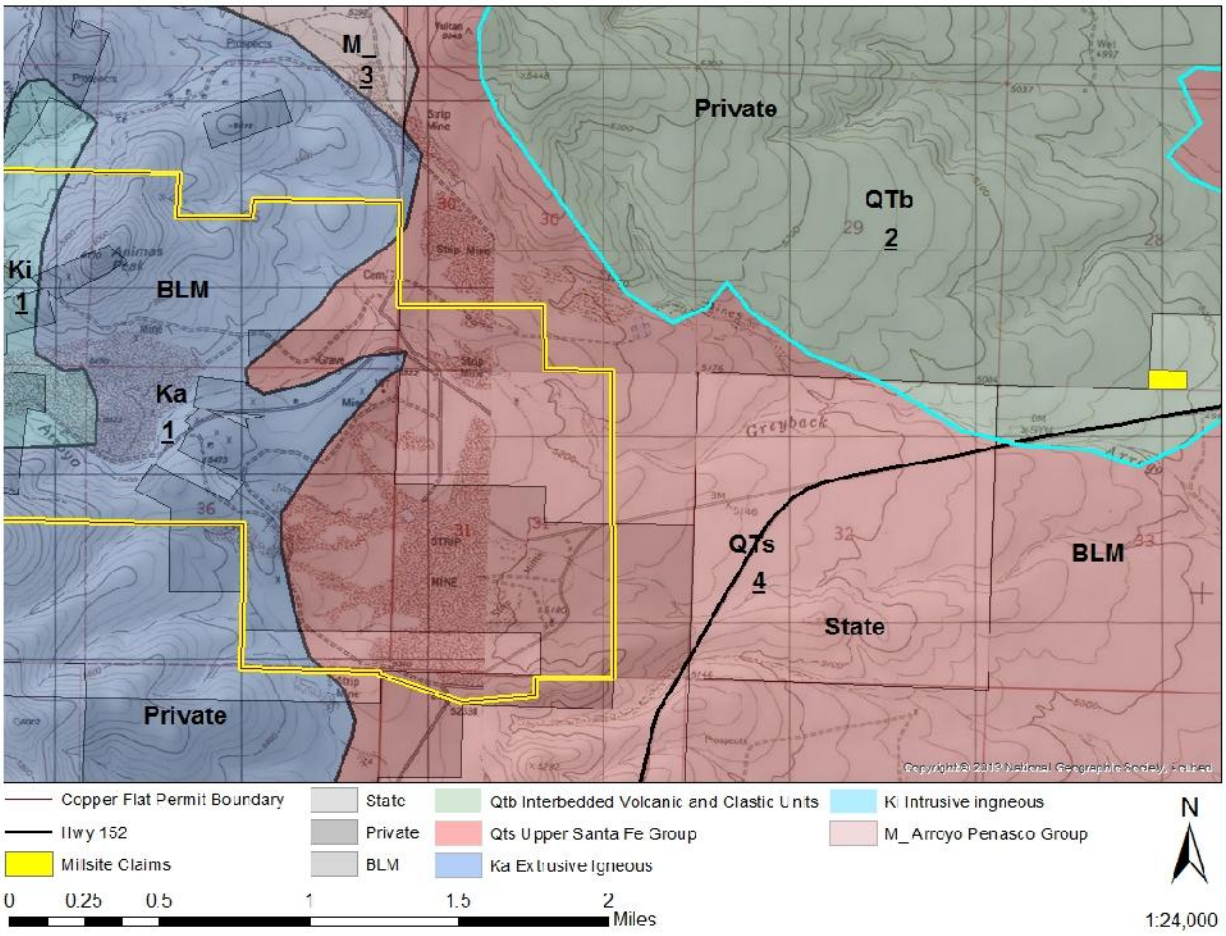

Figure 1. Location of western proposed mill site.

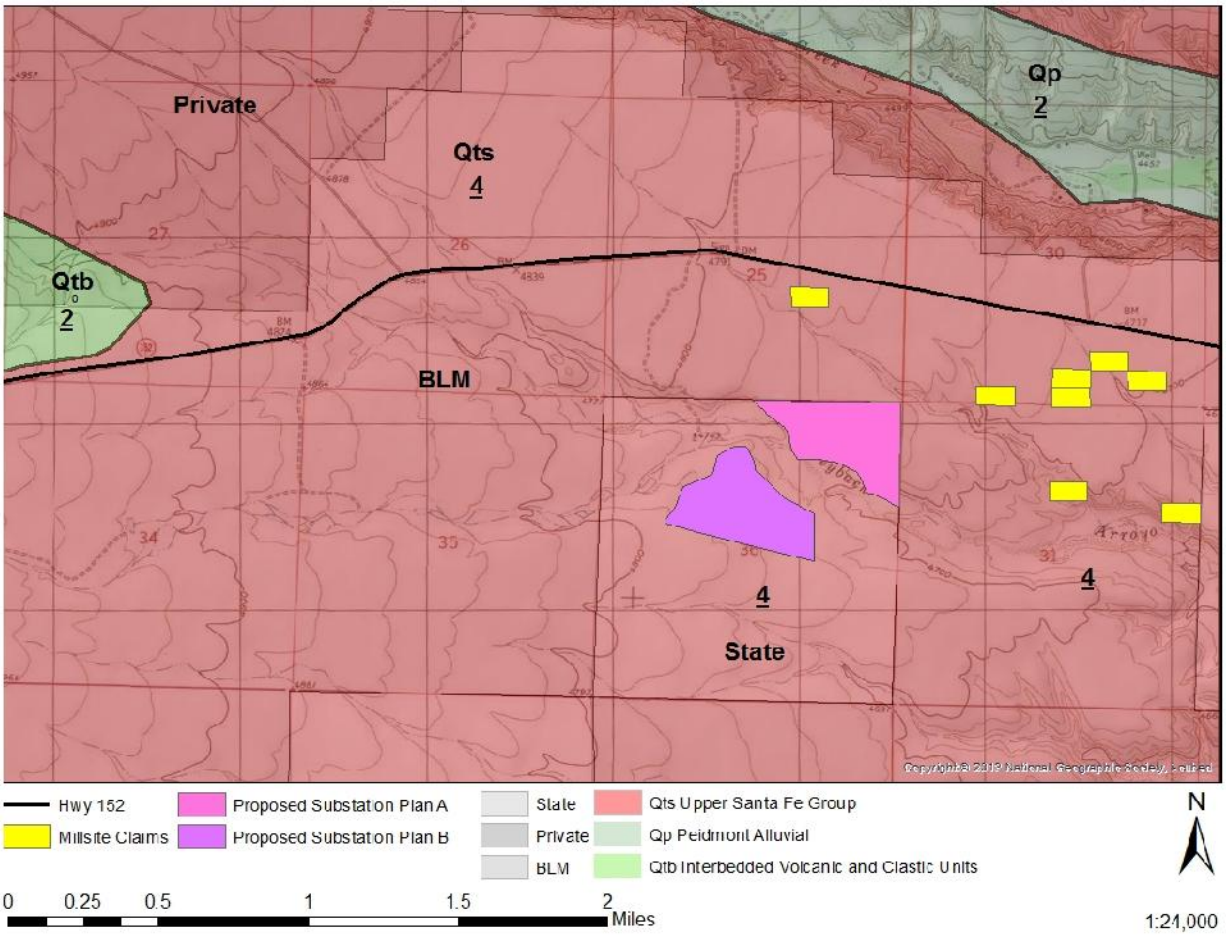

Figure 2. Proposed mill sites and area of potential impact for substations option A and option B.

Geologic History

The Copper Flat Project is located in the Palomas Basin, bordered on the west by the Animas Mountains and Salado Hills as well as the Black Range. To the east is Caballo Lake on the Rio Grande and beyond it the Caballo Mountains. This area is part of the Basin and Range Province/Rio Grande Rift and is just east of the extensive Mogollon-Datil volcanic field (MDVF). The Rio Grande Rift, along which the Rio Grande flows, is an extensional feature in Earth's crust that formed under the same stresses as the Basin and Range province and is generally considered one of the more eastern basins of this physiographic area. As the Rift opened, material eroded from the corresponding uplifts on either side and began to fill in the newly created basin. This basin-fill material is a sedimentary record of the opening of the Rio

Grande Rift and as a whole is called the Santa Fe Group (Mack et al., 1998). West of Caballo Lake, the unit exposed is termed the Palomas Formation of the Santa Fe Group (Clemons and Osburn, 1986). The Palomas Formation represents two basic depositional environments that interfingered with one another: alluvial fan deposits from the surrounding uplifts and axial river deposits from the ancestral Rio Grande (Clemons and Osburn, 1986; Lozinsky and Hawley, 1986; Mack et al., 1998). The survey area is located on the Cuchillo geomorphic surface and local incisions, including Grayback Arroyo expose medial and distal alluvial fan deposits of the Palomas Formation. These deposits primarily consist of poorly sorted pebble to cobble gravels or poorly lithified conglomerates with clast composition including basalt, andesite, rhyolite, tuff, chert and chalcedony.

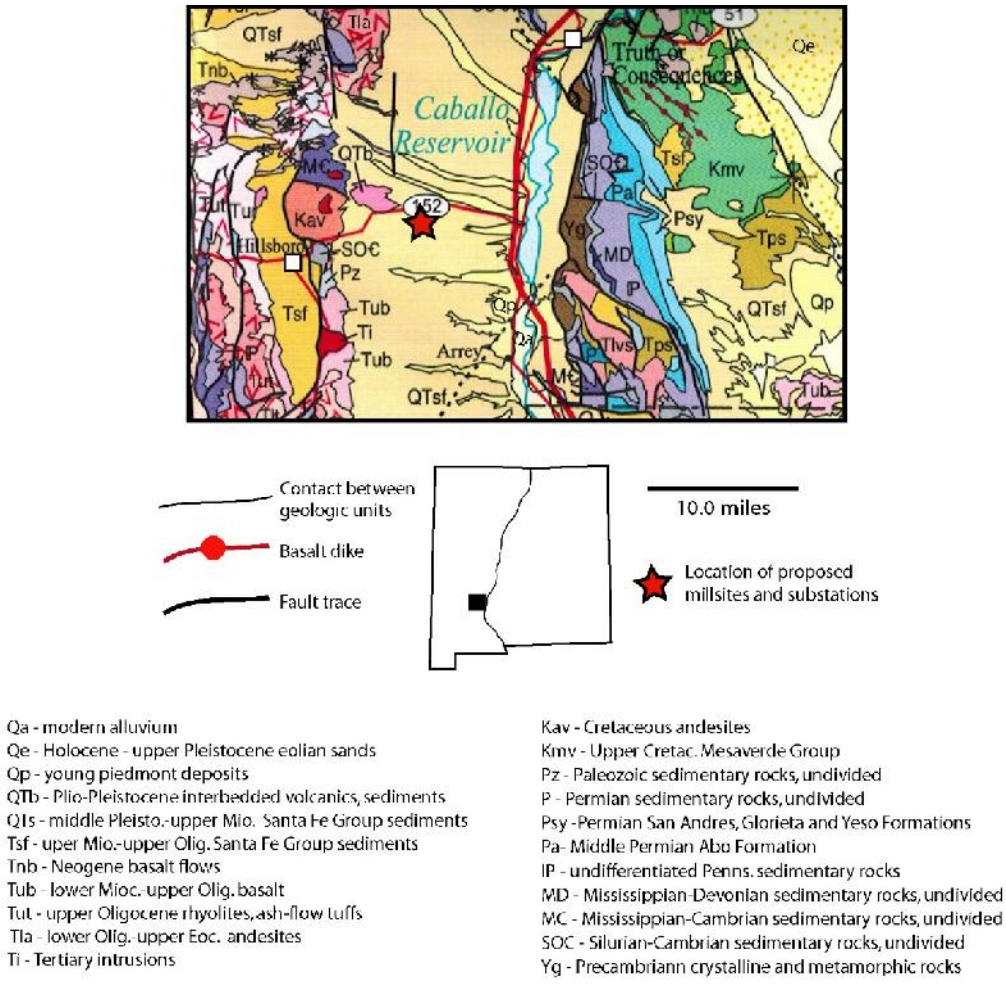

Figure 3. Geology in the vicinity of the proposed mill sites and substation. From Anderson and Jones, 2003.

Palomas Formation Paleontology

The Santa Fe and Gila Groups are Miocene to Pliocene in age and are age-equivalents of one another as well as to the Ogallala Formation in eastern New Mexico. These strata have produced a variety of mammalian faunas that have been important in understanding depositional timing of each of these units (e.g., Cope, 1874; Gawne, 1975; Tedford, 1981; Lozinsky and Tedford, 1991). A number of vertebrate fossil localities have been found in the Palomas Formation in the Palomas Basin area, but almost all of them occur in the axial river deposits (Lozinsky and Hawley, 1986; Lucas and Oakes, 1986; Repenning and May, 1986; Morgan and Lucas, 2012). Fossil material found in the general area of Copper Flat includes the Kelly Canyon local fauna, found just north of Caballo, the Caballo local fauna which was found along the western shore of Caballo Lake and the Palomas Creek local fauna, discovered just eight km southwest of Truth or Consequences (Morgan and Lucas, 2012). The Kelley Canyon local fauna includes fish, frogs, salamanders, snakes, birds, woodrat and muskrat fossil material. Much of this was recovered by screenwashing methods from a diatomite horizon. The Caballo local fauna is dominated by much larger animals, including large land tortoises, glyptodonts, horses, camels, cervids and gomphotheres. The Palomas Creek faunan is similar to the Caballo fauna and fossil material pertaining to rodents, horses, peccary, camels, mastodons, tortoises and ground sloths have been recovered from this locality.

Results of Pedestrian Survey

On Monday, April 7, 2015, I performed pedestrian survey of the surface and arroyo exposures of the Palomas Formation in each of the nine mill sites and in both of the proposed area of potential impact for substation areas. The surface is part of the Cuchillo geomorphic surface and consists of a well-developed desert pavement of igneous rock cobbles. Locally, eolian sheet deposits have accumulated to moderate thicknesses in small depressions on this surface. Arroyos draining into as well as the side walls of Grayback Arroyo expose the Palomas Formation and demonstrate that this area is well within the medial alluvial fan deposits. Outcrop exposure consists of unlithified cobble gravel with rare, small lenses of coarse grained sand. These outcrops are indicative of a high energy depositional environment, given the size of the clasts in the gravel.

During the course of survey, I observed no fossil material at any of the mill sites, nor at either proposed substation survey area. Given that the majority of fossil material found in the Palomas Formation has come from the finer grained axial river deposits to the east and no fossil material has been documented from medial alluvial fan deposits, it is unlikely that vertebrate fossil material will be found during the course of excavation. However, I do recommend spot monitoring of spoil piles during construction activities on the possibility that more robust fossil material (such as tortoise or gomphothere material) may have survived the higher energy deposition of the fan gravels.

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