



REPORT

NORTH LAMPBRIGHT STOCKPILE AND NORTHEAST STOCKPILE EXTENSION AREAS BIOLOGICAL STUDY

Chino Mine

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1.0 INTRODUCTION

Freeport-McMoRan Chino Mines Company (Chino) is evaluating the extension of the Main Lampbright and Northeast Stockpiles. The extension of Main Lampbright is called the North Lampbright Stockpile Extension. Similarly, further development of the Northeast Stockpile is called the Northeast Stockpile Extension. These facilities would be located north and northwest of the Santa Rita Open Pit, which is near Silver City, New Mexico. The proposed projects are on lands owned by Chino. This report documents the results of a baseline biological study completed at the proposed locations of the North Lampbright and the Northeast Stockpile Extensions. Golder Associates Inc. (Golder) performed the study in August 2015, evaluating about 300 acres for ecological setting, vegetation communities, common wildlife species, and potential presence of special-status species in the project area. This study was performed to provide information on the existing conditions for due diligence.

1.1 Project Background

The Chino mine plan requires further stockpile capacity and extensions of the Lampbright and Northeast Stockpiles are being considered (Figure 1). The North Lampbright Stockpile area occupies the ridge crest and valley slopes north of the Lampbright Stockpile. The area is underlain mostly by sedimentary rocks (limestone, shale, and sandstone) associated with the Syrena and Oswaldo Formations and is vegetated with trees, grasses, and shrubs.

The Northeast Stockpile Extension parallels Highway 152 on the north and the SXEW plant on the south-southeast and extends from the eastern flanks of the Northeast Stockpile, which will cover a process water pond (Reservoir 6). Reservoir 6 is an operational impoundment with a permitted capacity of approximately 93,000,000 gallons (maximum area of 11.5 acres). As part of the Chino's water management system, Reservoir 6 is connected through pipelines to a number of mine facilities and is part of Chino's SXEW process water circuit. The North Stockpile Extension area is underlain mostly by sedimentary rocks (limestone, shale, and sandstone) associated with the Oswaldo Formation and is vegetated with trees and shrubs.

Chino requested that Golder perform a baseline biological study of the areas of the proposed stockpiles. The proposed Northeast Stockpile Extension study area occupies about 110 acres, while the North Lampbright Stockpile study area occupies about 220 acres. The assessment study areas included the stockpile footprint areas and a buffer zone of about 200 to 500 feet in the undisturbed areas around the proposed stockpile toes.

1.2 Objectives

The main objective of this study is to provide baseline biological data from the project areas. Several environmental policies apply to any stockpile development at the site. Golder considered the State and



Federal guidelines and policies when determining the extent of environmental baseline studies necessary for these areas.



2.0 METHODS

2.1 Desktop Review

Golder reviewed previous wildlife and vegetation studies of the Chino area, including the *Assessment of Wildlife Communities in the Chino Mine Proposed Action Area* (Golder, 1998) and the *Comprehensive Vegetation Survey of the Chino Mine, Grant County, New Mexico* (DBS&A, 2000). Golder then reviewed agency databases to determine the species of wildlife and plants that had potential to occur at the site of the proposed North Lampbright and Northeast Stockpiles extensions that would be subject to the environmental policies.

Special Status Species

The US Fish and Wildlife Service (USFWS) database for Grant County, New Mexico was queried to determine the endangered, threatened, or candidate species of wildlife and plants that occur or have potential to occur within the county (USFWS, 2015). This search was focused primarily on listed species known to or believed to occur in the area.

Species listed as endangered or threatened by the State of New Mexico were also reviewed. The New Mexico Department of Fish and Game (NMDGF) Biota Information System of New Mexico (BISON-M) website was consulted for species in Grant County.

Species accounts of USFWS and State of New Mexico listed species were then examined to determine if these species have the potential to occur in the proposed project areas. Through this analysis, the following species were considered unlikely to occur in the study area:

- Aquatic species such as fish, aquatic turtles, and hot spring obligates. These species were not considered further because the reservoir does not contain waters suitable for wildlife and no perennial water sources are present in the study area.
- Aquatic or fish-dependent birds such as the bald eagle. The reservoir currently contains bird-deterrents to discourage such species from accessing the reservoir.
- Plant and bird species requiring lower-elevation Sonoran, Chihuahuan desert, or lowland cottonwood/sycamore habitats;
- Bird species only occurring in isolated habitats in extreme southwestern New Mexico or southeastern Arizona.
- Species with known, restricted ranges that are not in the vicinity of the study area.

The remaining species that may occur in Grant County are presented in Table 1, including their status under the USFWS and State of New Mexico.



Noxious Weeds

Golder determined which noxious weeds were of possible concern in Grant County by reviewing the New Mexico Department of Agriculture's updated noxious weed list (NMDA, 2009). The list includes weeds in the following categories:

- 21 Class A species – limited or absent in the state; management focuses on eradicating all infestations, should they occur
- 10 Class B species – limited to portions of the state; management focuses on containing infestations from further spread
- 6 Class C species – widespread in the state; management is determined at the local level
- 8 watch-list species – these species have the potential to become problematic; management focuses on alerting appropriate authorities when these plants are found

**Table 1. Federal and State Listed Species with Potential to Occur in the Study Area or Grant County**

Species	Scientific Name	USFWS Status	State of NM Status
Birds			
American peregrine falcon	<i>Falco peregrinus anatum</i>		Threatened
Arctic peregrine falcon	<i>Falco peregrinus tundrius</i>	Delisted	Threatened
Northern Aplomado falcon	<i>Falco femoralis</i>	Experimental	Endangered
Common black hawk	<i>Buteogallus anthracinus</i>		Threatened
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened	
Broad-billed hummingbird	<i>Cynanthus latirostris</i>		Threatened
Costa's hummingbird	<i>Calypte costae</i>		Threatened
Common ground-dove	<i>Columbina passerina pallescens</i>		Endangered
Yellow-billed cuckoo (W. Pop.)	<i>Coccyzus americanus</i>	Threatened	
Southwestern willow flycatcher	<i>Empidonax traillii eximius</i>	Endangered	Endangered
Bell's vireo	<i>Vireo bellii</i>		Threatened
Gray vireo	<i>Vireo vicinior</i>		Threatened
Baird's sparrow	<i>Ammodramus bairdii</i>		Threatened
Yellow-eyed junco	<i>Junco phaeonotus palliates</i>		Threatened
Varied bunting	<i>Passerina versicolor versicolor</i>		Threatened
Mammals			
Spotted bat	<i>Euderma maculatum</i>		Threatened
Lesser long-nosed bat	<i>Leptonycteris yerbabuenae</i>	Endangered	Endangered
Mexican long-nosed bat	<i>Leptonycteris nivalis</i>	Endangered	
Mexican gray wolf	<i>Canis lupus baileyi</i>	Endangered	Endangered
Reptiles			
Mexican gartersnake	<i>Thamnophis eques</i>	Threatened	Endangered
Narrow-headed gartersnake	<i>Thamnophis rufipunctatus</i>	Threatened	Threatened
Reticulate Gila monster	<i>Heloderma suspectum suspectum</i>		Endangered
Amphibians			
Chiricahua leopard frog	<i>Rana chiricahuensis</i>	Threatened	
Lowland leopard frog	<i>Rana yavapaiensis</i>		Endangered
Plants			
Wright's marsh thistle	<i>Cirsium wrightii</i>		Endangered
Slender spiderwort	<i>Cleome multicaulis</i>		Endangered
Golden lady's slipper	<i>Cypripedium parviflorum var. pubescens</i>		Endangered
Wilcox pincushion cactus	<i>Mammillaria wrightii var. wilcoxii</i>		Endangered
Night blooming cereus	<i>Peniocereus greggii</i>		Endangered
Parish's alkali grass	<i>Puccinellia parishii</i>		Endangered

Sources: USFWS – Based on species known to or believed to occur in Grant County, New Mexico, ECOS: Accessed October, 2015
NMDGF BISON-M, Accessed August 24, 2015.

2.2 Field Assessment

Golder conducted a pedestrian field survey to evaluate the vegetation communities and wildlife species present in the proposed North Lampbright Stockpile and Northeast Stockpile extension areas. This survey included an assessment of the potential presence of species listed in Table 1 with special status under USFWS and the State of New Mexico. The areas were also assessed to determine if noxious weeds were present. The proposed stockpile extension footprints are shown on Figure 1.

The field survey was conducted during the last week of August, beginning within 1 hour of dawn to correspond with the morning activity period of many wildlife species. Weather conditions were overcast to



partly cloudy and approximately 70–82 degrees Fahrenheit. The surveyors walked throughout the proposed stockpile extension areas covering the existing habitats that would be affected including a buffer area (Figure 1).



3.0 RESULTS

3.1 Ecological Setting

The climate at Chino is warm and dry, with mean annual precipitation of about 400 mm (16 inches) and a mean annual temperature near 10°C (50°F). Precipitation falls mainly as rain, but snow may occur from November to March. Most of the precipitation in the area falls during July through October in the form of rain during short, intense, thunderstorms. Monthly precipitation is generally less than an inch each month from March through June, peaks in July and August at between 2 and 3 inches each month, and generally falls to less than 2 inches each month from September through February. Evaporative demand in this region is high and annual evaporation far exceeds annual precipitation.

Chino operations are located near the base of the Cobre Mountains in southwestern New Mexico. The Chino or Santa Rita Deposit is a porphyry copper body that includes mostly intrusive and skarn-hosted copper mineralization. Mineralization is associated with a generally porphyritic composite intrusion varying in composition from granodiorite to quartz monzonite that has domed surrounding Paleozoic and Cretaceous sedimentary rocks during the early Tertiary. The sedimentary section was also intruded by late Cretaceous quartz diorite sills that predate the main stock intrusion but are not believed to be associated with mineralization. Post-mineralization, mid-Tertiary volcanic rocks were extruded over the deposit and included rhyolitic tuffs and basaltic andesite flows.

The soils in the Chino area were mapped by the US Soil Conservation Service (SCS) (Parnham et al., 1983). The SCS map units were composed primarily of complexes of soil series and miscellaneous land areas. The dominant soils in the northern portion of the survey area (Luzena and Muzzler series) are shallow (<50 cm) and fine-textured with moderate to high rock fragment contents. The soils in the uplands are mostly shallow, although moderately deep (50 to 100 cm) and deep (>100 cm) soils occur to a minor extent.

The distribution of native vegetation around Chino reflects the combined influences of environmental gradients (soils and climate), disturbance histories (drought, floods, fire, and predation) and management practices. The major structural characteristics of vegetation are controlled primarily by the prevailing environment gradients. The vegetation at Chino was classified using the nomenclature and hierarchical classification of the US National Vegetation Classification (USNVC) system (Grossman et al., 1998) and mapped at the Alliance level, which represents the sixth tier in a seven-tiered hierarchy. The vegetation alliances in the area surrounding Chino (DBS&A, 2000) are listed in Table 2.

**Table 2. Vegetation Map Units in the Chino Survey Area (DBS&A, 2000)**

Name	Acreage	Elevation Range (ft amsl)
Mixed Grama Herbaceous Alliance	6,717	5,200-5,750
Mesquite/Mixed Grama Shrubland Alliance	8,858	5,200-5,800
Fluvial Forest and Shrubland Alliance	1,585	5,200-5,600
Alligator juniper-Oak/Grama Woodland Alliance	10,257	5,800-7,700
Alligator juniper-Oak Woodland Alliance	4,456	5,800-7,400
Mountain mahogany Shrubland Alliance	10,038	5,600-7,600
Ponderosa pine-Oak Forest Alliance	1,552	6,000-7,600
Mine Facilities/Urban	10,122	NA

Notes: ft msl = Feet above mean sea level
NA = Not applicable

3.2 General Study Area Description

The Northeast Stockpile extension area is located in a small valley that includes the process water facility. Drainages in the area are ephemeral and no perennial or intermittent streams are present. A diversion routes stormwater around the process water facility. During the August 2015 site visit, solutions were present in the reservoir and dried mud was present in the drainage upstream of the reservoir. State Highway 152 bounds the Northeast Stockpile extension on the north. South and southeast of the reservoir, land slopes steeply up the SX/EW facility, which bounds the area on the south.

The North Lampbright Stockpile study area consists of a weakly dissected pediment with moderate to steep slope segments. No permanent streams are present in the study area. The proposed North Lampbright Stockpile area is an extension to the north of the existing Main Lampbright Stockpile and is bounded on the south by access roads and on the north by a ridge with scattered rock outcrops of limestone and shale. The SX/EW facility abuts the northwest corner of the project area.

Riparian habitat is generally lacking, and no wetlands are present in the study area. Riparian areas are defined in the New Mexico Mining Act (NMMA) as “a geographically delineated area with distinct resource values, that is characterized by plant species that depend on having roots in the water table or its capillary zone and that occurs within or adjacent to a perennial or intermittent stream, lake, pond, spring, or marsh bed maintained by natural water sources”. Wetlands are defined in the NMMA as “areas which are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions in New Mexico”. For the purposes of 19.10 NMAC, riparian areas and wetlands do not include areas in or adjacent to man-made bodies of water which neither were originally created in a natural watercourse nor resulted in an impoundment of a natural watercourse.



3.3 Vegetation Communities

Golder evaluated terrestrial habitats using the alliance floristic level and confirmed that two USNVC alliances were present in the study areas:

- Alligator juniper-Oak Woodland Alliance
- Ponderosa pine-Oak Forest Alliance

The two habitats in the project area are described below. The area of each proposed stockpile and amount of disturbed and undisturbed land is summarized in Table 3.

Table 3. Proposed Stockpile Facility Areas and Existing Disturbance

Facility	Total	Undisturbed	Disturbed
	Acres		
Northeast Stockpile Extension	96	61	35
North Lampbright Stockpile Extension	210	105	105

Alligator Juniper-Oak Woodland Alliance

This habitat is characterized by open stands of oaks such as grey oak (*Quercus grisea*) and emory oak (*Q. emoryi*), junipers (alligator [*Juniperus deppeana*] and/or one-seed juniper [*J. monosperma*]) and pinyon pine (*Pinus edulis*) with tree canopy cover ranging from 10 to 50 percent (Appendix A – Photos 1-5). This alliance covers roughly 20% of the Northeast Stockpile extension area and approximately 50% of the North Lampbright Stockpile expansion area. The Alligator Juniper-Oak Woodland Alliance is present on the north side of the Northeast Stockpile extension area. This alliance characterizes all of the vegetation communities of the North Lampbright Stockpile area, excluding the area covered by roads or other disturbed ground.

Common shrubs observed include sotol (*Dasylirion wheeleri*), banana yucca (*Yucca baccata*), mountain mahogany (*Cercocarpus montanus*), rabbitbrush (*Ericameria nauseosus*), beargrass (*Nolina microcarpa*), Parry's agave (*Agave parryi*) in rocky areas, tassleflower (*Brickellia grandiflora*), and snakeweed (*Gutierrezia sarothrae*). Less common shrubs included a barrel cactus species, tree cholla (*Opuntia imbricata*), prickly pear cactus (*Opuntia sp.*), Sensitive briar (*Mimosa rupertiana*), California brickelbush (*Brickellia californica*), and three-lobed skunkbush (*Rhus trilobata*).

Grass species observed included Muhlenbergia spp., Harvard's three-awn (*Aristida harvardii*) and other *Aristida* spp., sand dropseed (*Sporobolus cryptandrus*), hairy grama (*Bouteloua hirsuta*), blue grama (*Bouteloua gracilis*), occasional sideoats grama (*Bouteloua curtipendula*), cane bluestem (*Bothriochloa barbinodis*), green sprangletop (*Leptochloa dubia*), and stinkgrass (*Eragrostis cilianensis*). Yellow nutgrass (*Cyperus esculentus*) occurred in scattered locations in both areas of the proposed stockpiles.



Herbaceous species observed included giant goldeneye (*Viguiera dentata*), Wright's verbena (*Glandularia wrightii*), southern mountain paintbrush (*Castilleja austromonana*), Rockcress (*Arabis fendleri*), Spiderwort (*Melampodium leucanthum*), Wright's cudweed (*Pseudognaphalium canescens*), canyon morning glory (*Ipomoea barbatisejala*), scarlet creeper (*Ipomoea coccinea*), sweet four-o'clock (*Mirabilis longiflora*), clammyweed (*Polanisia dodecandra*) slimleaf plains mustard (*Hesperidanthus linearifolia*), Erigeron spp., and spurge (*Chamaesyce* spp.).

Ponderosa pine-Oak Forest Alliance

The Ponderosa pine-Oak Forest alliance is characterized by the presence of Ponderosa pine (*Pinus ponderosa*) and/or Chihuahuan pine (*Pinus leiophylla*) in stands of pinyon pine, Alligator juniper, gray and Emory Oaks. Also commonly occurring in this alliance is Silver leaf oak (*Q. hypoleucoides*) and Gambels Oak (*Quercus gambelli*). This alliance represents a transition from woodland to forest communities. Forest stands having dense canopy cover are often sparsely vegetated with grasses and forbs in the understory (Appendix A- Photo 6). This alliance is characterized by steep slopes with rock outcrop, north and east aspects, and it occurs at higher elevations ranging between 6,000 and 7,600 ft. More than 1,500 acres of this vegetation type were mapped at Chino (Table 2) and similar vegetation occurs in the Piños Altos range to the north.

This plant community was observed in the Northeast Stockpile extension area, and comprised roughly 40% of the area. The slopes are generally steeper than the adjacent Alligator juniper-Oak woodland, but have similarly fewer understory shrubs, forbs, and grasses.

3.4 Wildlife in the Study Area

The undisturbed lands surrounding the Chino mine harbor diverse vegetation and wildlife communities. General habitat types include riparian corridors, rock outcrops and cliffs, foothills, canyons, mixed woodlands, and grasslands. Previous studies of the entire Chino mine area recorded at least 18 mammal, 71 bird, and 5 reptile species. Surveys to identify federal and State threatened, endangered, and special status wildlife species were conducted at Chino (Golder, 1998). The peregrine falcon was the only federally listed endangered species to be recorded during the 1996 field investigations. Subsequently, this species was removed from the federal endangered species list, but is still listed as threatened by the State of New Mexico. Two other State-listed species, the common ground dove (endangered) and the gray vireo (threatened) were also observed in 1996. In addition, two species of bats (western small-footed myotis and fringed myotis) were observed in 1996 that were listed as sensitive species by the State of New Mexico. The Chiricahua leopard frog, a federally listed endangered species, occurs south and west of the project areas in association with Lampbright Draw and its tributaries, about 3 to 5 miles from the study area (See Section 3.5).



The vegetated portions of the proposed North Lampbright and Northeast Stockpile extension areas provide potential foraging, breeding, and nesting locations for different wildlife species. Twenty-seven wildlife species or their sign were observed during the August 27, 2015 site visit (Table 4). Most inhabited the juniper-oak woodland habitat, which is similar in structure to the alligator juniper/oak woodlands that occur extensively in the surrounding area. These included 20 birds, 5 mammals, and 2 reptiles.

The most common birds observed were spotted towhees, juniper titmouse, black-chinned hummingbirds and western scrub jays. Western wood-pewees were observed perched and foraging in juniper-oak woodland habitat in both the proposed North Lampbright and the Northeast Stockpile Extension areas. A rock wren was seen foraging around a rocky cut bank above an old road in the Ponderosa pine-Oak Forest habitat. Five of the bird species recorded during the site visit are migratory including the turkey vulture, black-chinned hummingbird, western wood-pewee, western kingbird, and townsend's warbler.

The most common mammal sighted was black-tailed jackrabbit, seen both in the North Lampbright and the Northeast Stockpile Extension areas. Mule deer tracks and possible mountain lion tracks were found in the North Lampbright Stockpile area. Whiptail and greater short-horned lizards were seen in various locations during the site visit. No amphibian species were seen.

**Table 4. Wildlife Observed in the Project Area during the 2015 Survey**

Species	Scientific Name
Birds	
Turkey vulture	<i>Cathartes aura</i>
Mourning dove	<i>Zenaida macroura</i>
Black-chinned hummingbird	<i>Archilochus alexandri</i>
Ladder-backed woodpecker	<i>Picoides scalaris</i>
Western kingbird	<i>Tyrannus verticalis</i>
Western wood-pewee	<i>Contopus sordidulus</i>
Common raven	<i>Corvus corax</i>
Western scrub jay	<i>Aphelocoma californica</i>
Mountain chickadee	<i>Parus gambeli</i>
Juniper titmouse	<i>Baeolophus ridgwayi</i>
Bushtit	<i>Psaltiriparus minimus</i>
Rock wren	<i>Salpinctes obsoletus</i>
Townsend's warbler	<i>Dendroica townsendi</i>
Spotted towhee	<i>Pipilo maculatus</i>
Canyon towhee	<i>Melospiza fusca</i>
Chipping sparrow	<i>Spizella passerina</i>
House finch	<i>Carpodacus mexicanus</i>
Pine siskin	<i>Carduelis pinus</i>
Lesser goldfinch	<i>Carduelis psaltria</i>
Unidentified raptor	
Reptiles	
Greater short-horned lizard	<i>Phrynosoma hernandesi</i>
Whiptail lizard	<i>Cnemidophorus sp.</i>
Mammals	
Rock squirrel	<i>Spermophilus variegatus</i>
Chipmunk sp.	<i>Tamias sp.</i>
Black-tailed jackrabbit	<i>Lepus californicus</i>
Mule deer	<i>Odocoileus hemionus</i>
Mountain Lion	<i>Felis concolor</i>



3.5 Special Status Species

No wildlife or plant species listed by the USFWS or State of New Mexico (Table 1) were observed in the study area.

Riparian Birds

Riparian habitat in the study area was generally lacking. The juniper, oak and shrub vegetation that is present may provide limited shelter for riparian species, but this vegetation is similar in diversity and structure to the alligator juniper/oak woodland found elsewhere. The woodland habitat does not provide the dense shrub layer or tree canopy structure required and used by the yellow-billed cuckoo and southwestern willow flycatcher, which prefer well-established riparian corridors and persistent saturation (NMDFG, 2012). The juniper-oak woodland present also does not provide suitable habitat for Bell's vireo. The dense willows, hackberry, and other riparian tree and shrub species this vireo normally nests in are not present (NMDFG, 2012).

Northern gray hawks prefer well-developed cottonwood woodlands along permanent streams or rivers; no cottonwoods or tall copses of trees are present in the study area. Common black hawks also nest near water, but would also require trees with more structure than present in the study area.

Raptors

A Peregrine falcon nest was historically located on a cliff near the Kneeling Nun rock formation at Chino Mine (Golder, 1998). This nest was eventually abandoned. None were sighted during our site visit. While the rock outcrops in the study area may provide perching habitat for peregrine falcons, the lack of tall cliff faces suggests that peregrine falcons are not likely to nest here.

Apomado falcons are extremely rare in New Mexico, with most observations resulting from captive-bred birds (NMDGF, 2012). In general, this species prefers grassland habitats rather than the woodland present at the study area.

Burrowing owls in New Mexico are known to inhabit shrub-steppe grasslands with sagebrush, saltbush, greasewood or creosote bush, primarily in south-central portions of the state (Klute et al., 2003). During the site visit, this type of habitat was not observed, and no possible burrows were found.

Mexican spotted owls may use a variety of habitats within their home range. In southern New Mexico, they are known to inhabit mixed conifer, Madrean pine-oak, and Arizona cypress forests, oak woodlands, and associated riparian forests, often in association with canyon systems or steep, montane terrain (USFWS, 2012). Critical habitat for the species includes dense coniferous and deciduous forest in shaded, steep-walled canyons (Golder, 1998). Marginal roosting or foraging habitat may be present in the piñon-juniper forest in the study area. However, extensive tracts of their critical habitat are not present, and the study



area valley does not provide either large, mature conifers or rocky ledges sheltered in steep canyons that would serve as potential nest trees for the species.

Migratory Songbirds, Hummingbirds, and Doves

Habitat is present throughout the woodlands for migratory songbirds to use during migration, including birds considered to be State-threatened. These include loggerhead shrike, broad-billed hummingbird, costa's hummingbird, and grey vireo. Grey vireos were observed at the Chino Mine during surveys in 1996 (Golder, 1998); these vireos can nest in a variety of habitats including oak-juniper woodlands, such as those present in the study area. Golder did not observe any features during the site visit that would indicate this site provides unique nesting habitat for these species, as similar habitat is found throughout this portion of Grant County.

Baird's sparrow (which winters in New Mexico) may also use the area during migration, but prefers to winter in grassland habitats. Yellow-eyed junco may pass through the area during altitudinal migration outside of the breeding season; this species normally breeds in high-elevation, coniferous mountains (NMDFG, 2012). Varied buntings, a primarily Mexican species, may use habitats similar to those found in the project area but prefer dense, shrubby vegetation in arid canyons (NMDFG, 2012).

The common ground-dove was previously observed in the vicinity of the Chino Mine (Golder, 1998). In New Mexico, it is known primarily from Hidalgo County, primarily in desert scrub and lowland woodland and riparian areas, especially near cienegas (springs), normally below 5,400 feet in elevation (BISON, 2013). Common ground-doves may occur in the study area's woodland, though the habitat present does not provide primary habitat for the species.

Reptiles

The two USFWS special-status reptiles listed for the area (Mexican gartersnake and narrow-headed gartersnake) require or are strongly associated with permanent water, often with riffles and pools. The narrow-headed gartersnake in particular is a habitat specialist, occurring only in shallow, swift, rocky rivers where fish are present (NMDFG, 2012). The unnamed drainage in the study area is ephemeral, rather than permanent. Thus, these species are not expected to occur here.

Gila monsters are only known in New Mexico from a few isolated records with native populations occurring west of a line drawn roughly from Silver City to Animas (NMDFG, 2014). Thus, they are unlikely to occur in the project area.

Amphibians

During the site visit, the Golder biologist inspected the ephemeral drainage. No water, pools, or amphibians were observed. The Chiricahua leopard frog is federally listed as threatened and has designated critical



habitat in New Mexico. Dr. Randy Jennings has conducted mine-wide surveys for the Chiricahua leopard frog. Surveys for the species were performed on the Chino Mine property in 1997 and 1998; and additional sightings were documented between 1998 and 2005 (Jennings, 2005). This species has not been observed and critical habitat has not been identified in the study area.

Ten sites on the Chino Mine property historically supported Chiricahua leopard frog. The nearest to the study area is the Lampbright watershed, about 3 miles south and east of the project area. However, as of 2005, the local populations were considered extinct in all the tributaries within this watershed, likely due to chytrid fungus, and non-native predators such as bullfrogs (*Rana catesbeiana*) (Jennings, 2005). As of 2005, the Chiricahua leopard frog populations were considered extinct in all but three sites on the property: Brown Springs (about 4.6 miles southwest of the study area), and Ash Springs and Bolton Canyon (about 5.5 miles south of the study area).

By 2012, critical habitat for the species was identified at in a 49 acre area around Ash and Bolton Springs, with the populations in the other areas extirpated (USFWS, 2012). The loss of the other populations was attributed to the chytrid fungus and non-native predators (USFWS, 2012). These sites are not connected to the study area drainage by either permanent or intermittent streams. This species is believed to disperse about one mile over land, 3 miles along intermittent drainages, and no more than 5 miles along perennial water courses (USFWS, 2012). The use of the 1-3-5 rule summarized above would also need to consider the topographic conditions separating the known population center instead of air miles.

The Chiricahua leopard frog requires permanent or semi-permanent aquatic systems, which are not present in the study area's drainage. Important general habitat needs of the species include emergent and/or perimeter vegetation for laying eggs and foraging; deeper areas of water, root masses, or undercut banks to provide shelter; clean water not overly polluted by livestock, and some mud substrate to support the growth of algae (USFWS, 2007). The North Lampbright and Northeast Stockpile study areas lacked perennial water features that satisfy these requirements.

The lowland leopard frog is a federal species of concern and also has special status under the State. This species is found in rocky streams in canyon habitats with forests, as well as rivers, springs, and livestock impoundments, normally at lower elevations than the North Lampbright and the Northeast Stockpile extension areas. Like the Chiricahua leopard frog, habitat for this species is not present in the study area.

Bats

Three bat species in Grant County have special federal and/or State status. The Lesser long-nosed and Mexican long-nosed bats are federal species of concern, while the spotted bat is State-threatened. These bats require appropriate foraging habitat (which for many species includes access to water), but are primarily limited by roosting habitat for shelter during the day, breeding during the summer, and hibernation



during the winter. Limited information is available on the specific requirements of each bat species for day, breeding, and hibernation roosts, though some preferences are known. In general, caves, mines, rock crevices, man-made structures, hollow trees, and foliage or loose bark may be used for day roosts; breeding and hibernation usually occurs in caves, mines, rock crevices, or hollows in large trees.

During mistnetting and ultrasonic monitoring performed in 1996 in the Chino Mine area, bat detections included Townsend's big-eared bat, western small-footed myotis, and the fringed myotis (Golder, 1998). At the proposed North Lampbright and the Northeast Stockpile extension areas, foraging habitat may be present for these three species, as well as the other bat species listed in Table 1. All three species are known to use a wide variety of habitats for foraging.

The study area generally lacked cliffs and cave features that would be required by Grant County's two bat species with federal status, or the tall cliffs preferred by the bat species in the county with State status (spotted bat; State-threatened). Day-roosting habitat may be present in the study area for other bat species that roost in under loose tree bark. Juniper and oaks may provide some tree-bark shelter for day roosts (though no larger trees are present that would provide hollow areas for breeding or hibernation roosts). Based on our survey, no whitewash or other bat sign was present that would indicate a bat colony or roost on the slopes.

Other Special-Status Mammals

Black-footed ferrets are endangered throughout their range, including New Mexico, and have been reintroduced in northeastern New Mexico. However, they require grasslands and shrub-steppe with prairie dog colonies, because prairie dogs provide their primary prey as well as burrows for shelter. Up to 40 to 60 hectares of prairie dog colony may be required to support each ferret (Belant et al., 2008). No prairie dogs or grassland areas with burrows were observed at the study area.

The Mexican wolf is extremely rare in New Mexico, with about 26 individuals known to occur in New Mexico as of 2013 (NMDGF, 2012). The current population is centered in the Gila Wilderness area north of the mine. Wolves could pass through the study area, though the proximity to the active Chino Mine makes this unlikely.

Special-Status Plants

Five endangered plants are known to occur in Grant County (Table 1). Wright's pinchusion cactus (*Mammillaria wrightii* var. *wilcoxii*) occurs in semi-desert grasslands and pinyon-juniper woodlands on alluvial or igneous substrates. The soils in the project area are not well-suited for this species, even though they can occur in association with the pinyon-juniper habitats. This species was found not found during the August survey. Night blooming cereus (*Peniocereus greggii*) typically occurs at lower elevations in association



with creosote (*Larrea divaricata*) and mesquite (*Prosopis glandulosa*). The remaining plants listed require wetlands or higher elevation forest communities that are not present in the study area.

Surveys for the Piños Altos flameflower (PAF) were conducted even though it is not a listed species. PAF habitat is not present in the study area because this area is underlain by limestone, shale, and sandstone, rather than Kneeling Nun Rhyolite. This low-growing, succulent species blooms June to September and generally prefers dry, shallow, gravelly, well-drained rhyolitic soils, and is known to occur in shallow pockets of soil among rhyolite outcrops (ADFG, 2004). Even though PAF habitat was lacking, Golder surveyed representative areas for this species during the site visit, which took place during the plant's blooming season. Rains were well distributed in July and August, 2015, so if PAF was present, blooming was likely. During these representative surveys, no PAF's were located.

3.6 Noxious Weeds

No species listed as Class A, C or watch-list noxious weeds by the New Mexico Department of Agriculture (NMDA, 2009) were observed during the survey. One Class B species was observed: a few sapling tree of heaven (*Ailanthus altissima*) plants were seen growing near the upstream edge (east end) of Reservoir 6.



4.0 CLOSING

Golder performed a biological assessment at the proposed locations of the North Lampbright and the Northeast Stockpile extension areas. The assessment included a review of past studies, species databases, and a field inspection in late-August 2015. The areas contains a process water reservoir, mine materials, disturbed lands, and native vegetation composed primarily of Alligator juniper-Oak woodland and Ponderosa Pine-Oak forest.

No special-status species of wildlife or plants were observed in the project areas during the survey. Potential habitat for bats may occur in the form of crevices in the rock outcrops, but no roosts were identified. Surveys for Piños Altos flameflower were conducted in representative areas but none were found, which is consistent with the lack of likely habitat for this plant. One tree of heaven (Class B Weed) was observed in the study area.



5.0 REFERENCES

- Arizona Department of Fish and Game (ADFG). 2006. *Asclepias uncialis*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Fish and Game Department, Phoenix, AZ. 6 pgs.
- Arizona Department of Fish and Game (ADFG). 2004. *Talinum humile*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Fish and Game Department, Phoenix, AZ.. 6 pgs.
- Biota Information System of New Mexico (BISON). 2015. Common ground-dove. Booklet data available online. Last updated August 22, 2013. Accessed October 2015.
- Daniel B. Stephens & Associates, Inc. (DBS&A). 2000. Comprehensive Vegetation Survey of the Chino Mine, Grant County, New Mexico. Report prepared for Chino Mines Company, Hurley, New Mexico. June 5.
- Ecosphere Environmental Services (Ecosphere). 2013. Cobre Mining Company Amended Mine Plan of Operations, Amendment No. 5, General Baseline Biology Report. Prepared for Freeport-McMoRan Cobre Mining Company. 72 pp.
- Golder Associates Inc. (Golder). 1998. Assessment of Wildlife Communities in the Chino Mine Proposed Action Area.
- Grossman, D. H., D. Faber-Langendoen, A. S. Weakley, M. Anderson, P. Bourgeron, R. Crawford, K. Goodin, S. Landaal, K. Metzler, K. D. Patterson, M. Pyne, M. Reid, and L. Sneddon. 1998. International classification of ecological communities: terrestrial vegetation of the United States. Volume I. The National Vegetation Classification System: development, status, and applications. The Nature Conservancy, Arlington, Virginia, USA.
- Jennings, R.D. 2005. Status of the Chiricahua Leopard Frog, *Rana Chiricahuensis*, in Southwestern New Mexico and Chino Mines Property and Suggestions for their Conservation. Report submitted to Chino Mines Company. Gila Center for Natural History, Western New Mexico University, Silver City, NM. 27 pp.
- Klute, D. S., L. W. Ayers, M. T. Green, W. H. Howe, S. L. Jones, J. A. Shaffer, S. R. Sheffield, and T. S. Zimmerman. 2003. Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States. U.S. Department of Interior, Fish and Wildlife Service, Biological Technical Publication FWS/BTP-R6001-2003, Washington, D.C.
- New Mexico Department of Agriculture (NMDA). 2009. Memorandum: New Mexico Noxious Weed Update. Office of the Director/Secretary. April 1, 2009.
- New Mexico Department of Game and Fish (NMDGF). 2014. Threatened and Endangered Species of New Mexico. 2014 Biennial Review Draft Final. 2014.
- Sivinski, R. 2007. *Adenophyllum wrightii* var. *wrightii* (Wright's dogweed). New Mexico Rare Plants. Available at http://nmrareplants.unm.edu/rarelist_single.php?SpeciesID=3. Accessed on September 2, 2013.
- US Fish and Wildlife Service (USFWS). 2007. Chiricahua Leopard Frog (*Rana chiricahuensis*) Final Recovery Plan. Southwest Region USFWS, Albuquerque, NM. April 2007.
- USFWS. 2012. Endangered and Threatened Wildlife and Plants; Listing and Designation of Critical Habitat for the Chiricahua Leopard Frog. Final Rule. Federal Register Vol. 77 No. 54. March 20, 2012.



US Fish and Wildlife Service. 2012. Final Recovery Plan for the Mexican Spotted Owl (*Strix occidentalis lucida*), First Revision. Albuquerque, New Mexico, USA. 413 pp.

US Fish and Wildlife Service (USFWS). 2015. Listed species in Grant County, New Mexico. Website, USFWS New Mexico Ecological Services Field Office. Accessed October, 2015.

FIGURES



LEGEND

- PROPOSED STOCKPILE EXPANSION AREAS
- MMD DESIGN LIMIT BOUNDARY
- MINE PERMIT BOUNDARY
- APPROXIMATE MAX POND ELEVATION

NOTES

- 1. MAP COORDINATES ARE BASED ON THE NEW MEXICO STATE PLANE (NMSP) NAD 83, WEST ZONE
- 2. SOURCE: SEPTEMBER 2014 AERIAL IMAGE FROM CHINO MINE COMPANY.

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CHINO MINES COMPANY
BAYARD, NEW MEXICO

PROJECT
NORTH LAMPBRIGHT AND NORTHEAST STOCKPILE EXTENSION
AREAS BIOLOGICAL STUDY

TITLE
NORTH LAMPBRIGHT STOCKPILE EXTENSION AREA AND
NORTHEAST STOCKPILE EXTENSION AREA BIOLOGICAL STUDY

CONSULTANT	YYYY-MM-DD	2015-09-16
	PREPARED	CM
	DESIGN	TS
	REVIEW	TS
	APPROVED	LM



APPENDIX A
STUDY AREA PHOTOGRAPHS

Project Title: North Lampbright and Northeast Stockpile Expansion Areas Biological Study**PHOTO 1**

Opening in Alligator Juniper-Oak Woodland Alliance. Northeast End of North Lampbright Stockpile Expansion Area

**PHOTO 2**

Slopes in the Alligator Juniper-Oak Woodland Alliance. East Side of North Lampbright Stockpile Expansion Area



PHOTO 3

Low slope gradient area in the Alligator Juniper-Oak Woodland Alliance. Southeast End of North Lampbright Stockpile Expansion Area

**PHOTO 4**

Revegetating road in the Alligator Juniper-Oak Woodland Alliance. South End of North Lampbright Stockpile Expansion Area



PHOTO 5

**Alligator Juniper-Oak
Woodland Alliance on
the North Side of the
Northeast Stockpile
Expansion Area.**

**PHOTO 6**

**Steep north facing
slope in the Ponderosa
pine-Oak Forest
Alliance. South Side of
Northeast Stockpile
Expansion Area**



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