U.S. Department of the Interior
Bureau of Land Management

Copper Flat Copper Mine Record of Decision

Las Cruces District Office
Environmental Impact Statement BLM/NM/ES/16-02-1793
DOI-BLM-NM-L000-2016-0140-EIS
August 2019

COPPER FLAT COPPER MINE

RECORD OF DECISION

Environmental Impact Statement: BLM/NM/ES/16-02-1793

Bureau of Land Management
Las Cruces District Office,
Las Cruces, New Mexico

Cooperating Agencies:
New Mexico Environment Department
New Mexico Mining and Minerals Division
New Mexico Department of Game and Fish
New Mexico Office of the State Engineer

SUMMARY

The Copper Flat project is the proposed reestablishment of a polymetallic mine and processing facility located near Hillsboro, New Mexico, previously owned and operated by Quintana Minerals Corporation (Quintana Minerals). The Bureau of Land Management (BLM) manages surface ownership of 56 percent of the Copper Flat site; 44 percent is privately owned. The mineral interest of the mining proponent, New Mexico Copper Corporation (NMCC), in the Copper Flat mine includes 26 patented mining claims and 231 unpatented mining claims (202 lode claims and 29 placer claims), 9 unpatented mill sites, and 16 fee land parcels in contiguous and noncontiguous land parcels and claim blocks. The BLM also manages substantial mineral ownership in the vicinity of the Copper Flat project.

On January 9, 2012, the BLM Las Cruces District Office (LCDO) published a Notice of Intent in the Federal Register (vol. 77, no. 5, pp. 1080-1081, Doc 2012-128) to prepare an EIS for this project in compliance with NEPA and the Council on Environmental Quality's regulations for implementing NEPA (40 CFR 1500–1508). Exploration and mining activities on BLM-administered land are controlled by the Secretary of the Interior's regulations contained in 43 CFR 3715 and 3809.

On December 4, 2015, the BLM LCDO published a Notice of Availability (NOA) in the FR (vol. 80, no. 233, p. 75862, Doc 2015-338) for the Draft EIS for this project. The initial 60-day public comment period was eventually extended through April 4, 2016. During the comment period, two public meetings were conducted in Hillsboro, New Mexico on December 16, 2015 and in Truth or Consequences, New Mexico on December 17, 2015. The public meetings offered interested parties the opportunity to express concerns and support for the project. There were 54 attendees at the Hillsboro public meeting and 51 attendees at the Truth or Consequences public meeting.

The Environmental Protection Agency (EPA) published a Notice of Availability for the Final EIS in the Federal Register (Volume 84, April 19.2019, Page 16532) releasing the Final EIS for public review. The Final EIS is available on the BLM Las Cruces District website at:
https://www.blm.gov/programs/planning-and-nepa/plans-in-development/new-mexico/copper-flat-eis

The BLM's selection of an Approved Alternative was based on the BLM's NEPA analysis of the Project, including comments received throughout the NEPA process. The decision of the LCDO Manager is to select the Accelerated Operations - 30,000 Tons Per Day Alternative along with the Applicant (NMCC)-committed environmental protection measures included in the Mine Plan of Operations (MPO) and the mitigation measures specified in Sections 3.2 through 3.26 of the Final EIS, as the BLM's Approved Alternative. The Approved Alternative is the alternative that best fulfills the agency's statutory mission and responsibilities, considering economic, environmental, technical, and other factors. The BLM has determined that implementation of this decision with the identified monitoring and mitigation measures will not cause unnecessary or undue degradation of the public lands.

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RECORD OF DECISION

Copper Flat Copper Mine

Final Environmental Impact Statement

Environmental Impact Statement: BLM/NM/ES/16-02-1793

Prepared By:
Bureau of Land Management
Las Cruces District Office
Las Cruces, New Mexico

Cooperating Agencies:
New Mexico Environment Department
New Mexico Mining and Minerals Division
New Mexico Department of Game and Fish
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INTRODUCTION

The Copper Flat project is the proposed reestablishment of a polymetallic mine and processing facility located near Hillsboro, New Mexico, previously owned and operated by Quintana Minerals Corporation (Quintana). The Bureau of Land Management (BLM) manages surface ownership of 56 percent of the Copper Flat site; 44 percent is privately owned. The mineral interest of the mining proponent, New Mexico Copper Corporation (NMCC), in the Copper Flat mine includes 26 patented mining claims and 231 unpatented mining claims (202 lode claims and 29 placer claims), 9 unpatented millsites, and 16 fee land parcels in contiguous and noncontiguous land parcels and claim blocks. The BLM also manages substantial mineral ownership near the Copper Flat project.

The primary source for the Proposed Action is the Copper Flat Mine Plan of Operations (MPO), dated December 2010 and revised June 2011. As the project has evolved, additional or revised information has been developed to more accurately describe the Proposed Action and to correct errors in the original MPO document. The technically feasible elements within the Proposed Action as well as the scale and intent of the Proposed Action have remained unchanged. Alternatives to the Proposed Action include engineering solutions that were developed after the MPO was initially accepted for evaluation. The term "Proposed Action" means information contained in the MPO, as modified to correct errors.

The Proposed Action would consist of an open pit mine, flotation mill, tailings storage facility (TSF), waste rock disposal areas, a low-grade ore stockpile, and ancillary facilities such as millsites and a reconstructed electrical substation. The Proposed Action was intentionally developed to reuse the existing foundations, production wells, and water pipeline that were employed by the previous Quintana operation. Reuse of this infrastructure would allow mine planners to limit the overall impact of the proposed mine. Proposed land reclamation efforts during mine operations and following mine closure would result in significant improvement of an existing brownfield site.

The previous Quintana operation operated at a 15,000 ton per day (tpd) rate; the alternative defined as the Proposed Action proposes to increase that throughput to 17,500 tpd. The NMCC Proposed Action includes a lined TSF to increase water recycling and meet new regulation standards in New Mexico. The proposed lined TSF would be a substantial upgrade from the unlined TSF previously employed at the site.

The 2011 MPO was based on the resource information and engineering studies available at that time. The current Proposed Action was deemed feasible and appropriate for the initiation of the Environmental Impact Statement (EIS) evaluations by the BLM. Subsequent engineering studies and exploration drilling have been completed to inform the EIS process. NMCC carried out a series of exploration activities at Copper Flat from 2009 to 2012 to confirm, characterize, and expand the known limits of the Copper Flat mineral deposit. NMCC's exploration program comprised drilling, geologic mapping, geophysical surveys and sampling for mineral content, metallurgical testing, geochemical characterization, and geotechnical analysis. During this period, NMCC completed 47,500 feet of drilling in 48 drill holes. No exploration activities at Copper Flat have taken place since completion of the 2012 program.

On January 9, 2012, the BLM LCDO published a Notice of Intent in the Federal Register (vol. 77, no. 5, pp. 1080-1081, Doc 2012-128) to prepare this EIS in compliance with National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Quality's regulations for implementing NEPA (40 CFR 1500 –1508). Exploration and mining activities on BLM-administered land are controlled by the Secretary of the Interior's regulations contained in 43 CFR 3715 and 3809. These regulations require mining operations to apply for a permit to use public land for activities that are reasonably incidental to mining, to prevent unnecessary or undue degradation of the land, and to reclaim disturbed areas.

The Proposed Action, Alternative 1: Accelerated Operations – 25,000 Tons Per Day, Alternative 2: Accelerated Operations – 30,000 Tons Per Day Alternative and the No Action Alternative were analyzed in the Final EIS. In addition, five alternatives were considered but eliminated from detailed analysis. The action alternatives were considered relative to their means of addressing the identified purpose and need, their technological and economic feasibility, as well as their potential to address environmental issues and reduce potential impacts. The No Action Alternative considered the cleanup of an existing sulphate plume, without the development of the Copper Flat Mine Project. The Proposed Action was analyzed to reflect the largest possible impact of the proposed mining footprint at Copper Flat. At the conclusion of the EIS process, the MPO would be revised to accurately represent the Approved Alternative selected by the BLM for the Record of Decision (ROD).

DECISION

The decision of the Assistant Secretary Lands and Minerals Management (ASLM), is to select Alternative 2: Accelerated Operations – 30.000 Tons Per Day along with the Applicant-committed environmental protection measures described in the MPO and included in Section 2.3.16 of the Final EIS and the mitigation measures specified in Sections 3.2 through 3.26 of the Final EIS and included in this ROD. In making this decision, the BLM is relying on the Final EIS and the data and analyses prepared in connection with that document. The BLM has determined that implementation of this decision with the identified Applicant-committed environmental protection measures, as stated in the MPO and included in Section 2.3.16 of the Final EIS, along with the monitoring and mitigation measures included in Sections 3.2 through 3.26 of the Final EIS will not cause unnecessary or undue degradation of the public lands and is consistent with other applicable legal requirements.

All mitigation measures that have been developed and adopted are consistent with regulations and policies to reduce environmental impacts resulting from the selection of the BLM's Approved Alternative. All mitigation within the BLM's authority will be implemented and enforced. The mitigation measures are summarized below.

MITIGATION MEASURES

Methods to minimize environmental effects from the BLM's Approved Alternative have been identified in the Final EIS and made part of this ROD. A full discussion of these measures can be found in Chapters 1 and 3 of the Final EIS. NMCC will implement and adhere to all mitigation measures within the BLM's authority as identified below.

Water Rights

The New Mexico Office of the State Engineer (OSE) will ultimately determine the availability of adequate water rights and all operations must be conducted in a manner consistent with the requirements of the OSE. The approval of this project is conditional on the proponent acquiring the necessary water rights to operate the mine. Surface disturbance will not be allowed until sufficient water rights are acquired.

In a March 23, 2017 letter from NMCC to the BLM, NMCC committed to fully offset calculated and actual depletions to the Rio Grande resulting from mining operations. In a subsequent letter to the BLM on June 29, 2017, NMCC confirmed that the offset was to be provided with water obtained from a lease executed with the Jicarilla Apache Nation for a period of 15 years from when ore crushing would begin. After that, the lease would be extended or another water source secured that would provide offsets up to year 29 after mine operations begin. The BLM authorization of this mine project and any operations are premised on the acquisition of necessary water rights under the authority of the OSE for the life of the mine plan. Thereafter, NMCC would retire an existing water right that holds a legal entitlement to deplete water from the river in an amount equal to NMCC's effects on the river at the time of retirement.

Finally, in an August 24, 2017 letter to the BLM, NMCC reaffirmed its intent to fully offset all NMCC pumping impacts on the Rio Grande, including years beyond year 29 with actual water. These "wet offsets," would ensure that no net effect on the river would occur due to the proposed operation of Copper Flat. NMCC would accomplish this by taking one or more of the following actions: extending the previously described Jicarilla Apache Nation water lease; securing another lease of equally effectual water; or securing and permanently retiring water rights that physically affect the river today, subject to the approval of the OSE. Regarding the permanent retirement of a water right, the offset would continue to have a positive effect on the Rio Grande as the NMCC effects on the river decline and entirely cease.

Water Quality

Pit reclamation would include the following mitigation strategies:

- "Rapid fill" of the pit to bring the pit water to a steady-state water level elevation in less than a year through the addition of groundwater from the mine production wells, rather than the many years it would take for the pit water elevation to rise to this level if it were to refill naturally.
- Reclamation of disturbed areas in the watershed surrounding the open pit to minimize infiltration and promote vegetative growth. This reclamation measure would create a vegetative cover, minimize infiltration of stormwater around the pit perimeter, and limit water–rock interaction in the upper pit walls.
- Reclamation of an existing waste rock stockpile west of the pit such that the western portion of the pit perimeter would be graded to drain away from the pit into a proposed toe channel that drains to the Greyback Arroyo diversion.
- Development of a controlled pathway for the pit watershed area to direct excess runoff to the pit bottom to protect water quality and prevent erosion. Additional water collected in the pit through storm events would provide dilution of naturally occurring constituents.
- Limitations on vehicle access to the pit during the initial stage of the rapid fill scenario to only vehicles and equipment needed for reclamation work and monitoring. In the second stage, vehicular access would be further restricted, through the placement of berms, to only that which would be necessary for monitoring or emergencies.

- Construction of an earthen berm around the perimeter of the open pit to limit public access and ensure that the pit area does not pose a current or future hazard to public health or safety.
- Construction of surface water conveyance channels around the perimeter of the pit (immediately upstream of the perimeter berm/security fence) to direct surface water around the pit to the newly constructed open pit conveyance channel.
- Construction of an open pit conveyance channel along the existing haul road to direct surface water flows from around the perimeter of the pit to the pit lake.
- Construction of energy-dissipation structures at channel outlets to reduce erosive velocities where necessary.
- Grading of the disturbed areas associated with the pit perimeter, perimeter channels, and safety berm construction.
- Ripping and seeding of disturbed areas around the pit perimeter to reestablish vegetation using a seed mix approved by the BLM and MMD.
- Installation, operation, and maintenance of groundwater monitoring wells that may be required for post-closure monitoring in accordance with 20.6.7.35.B NMAC.

Installation of a thicker soil cover over the waste rock dumps during reclamation would reduce the volume of water percolating through the waste rock. This would further reduce the potential that the reclaimed waste rock dumps or the low-grade stockpile would generate acid rock drainage (ARD) or other deleterious leachates that would affect the environment. The following mitigation is intended to address potential water quality effects that could be caused by the waste rock dumps:

- Construction of run-on diversions designed to divert stormwater generated in areas upslope from the waste rock facilities during active mining. The run-on diversions would be designed to convey the 24-hour 100-year storm event.

The following TSF mitigations would be required with approval of the EIS.

- Prior to land application of seepage water from the TSF to reclaimed areas, the proponent would provide detailed chemical analyses of the water and an assessment of potential effects to vegetation or soils to the BLM. If the seepage water has the potential to adversely affect vegetation or soils, the proponent would propose an alternative management approach to the BLM for approval.
- Prior to approval of the proposed MPO, the proponent shall include a post-closure TSF seepage monitoring and management plan and a cost estimate to complete this work.
- The cost of post-closure seepage monitoring and management shall be incorporated into a post-closure trust fund (or other long-term funding mechanism) established in accordance with 43 CFR 3809.552(c).

The following mitigations address potential non-point source pollution. These mitigations would be required as conditions of approval of the proposed MPO.

- Prior to initiation of mine construction or other surface-disturbing activities, NMCC shall obtain a Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity and comply with all requirements of that permit.
- Prior to initiation of mine construction or other surface-disturbing activities, the operator shall provide final designs for stormwater diversion structures and other associated Best Management Practices (BMP) to the BLM for review.
- The Storm Water Pollution Prevention Plan (SWPPP) and all associated inspection and maintenance records shall be available for inspection by the BLM upon request.
- The existing TSF would be modernized with placement of a low-permeability liner, which would cover existing tailings and mitigate potential future discharges of waste from the existing TSF.

During operations, NMCC would periodically review and update the geochemical and hydrogeological predictions, mine waste characterization studies, and pit lake studies to incorporate new information accumulated during operations. NMCC would review the data every 5 years and make updates as necessary. These updates would provide quantitative predictions of water quality during the operational and post-closure period. Additional mitigation would be developed as necessary.

Surface Water Use

NMCC has committed to work with OSE to incorporate into their OSE permit "all monitoring, offsets, and replacement requirements deemed necessary to avoid impairment to other water users and impacts to the Rio Grande." NMCC would fully offset calculated and actual depletions to the Rio Grande resulting from mining operations by obtaining water for the offset through a surface water lease executed with the Jicarilla Apache Nation for a period of 15 years. The 15-year period would start when the crushing of ore begins. After 15 years, the lease would be extended, or another water source secured. The BLM may authorize this mine project and any operations are premised on the acquisition of necessary water rights under the authority of the OSE for the life of the mine plan. In an August 24, 2017 letter to the BLM, NMCC reaffirmed to fully offset depletions to the Rio Grande to ensure no net effect on the river due to proposed mining operations, including offsets for any depletions beyond year 29 (NMCC 2017d). Offsets for these later years would be obtained by taking one or more of the following actions: extending the Jicarilla Apache Nation water lease; securing another lease of equally effectual water; or securing and permanently retiring water rights that physically affect the river today.

Ground Water Use

In a March 23, 2017 letter from NMCC to the BLM, NMCC committed to fully offset calculated and actual depletions to the Rio Grande resulting from mining operations, which would be evaluated by OSE and addressed as a condition for permit approval. In a subsequent letter to the BLM on June 29, 2017, NMCC confirmed that the offset was to be provided with water obtained from a lease executed with the Jicarilla Apache Nation for a period of 15 years from when ore crushing would begin. After that, the lease would be extended, or another water source secured that would provide offsets to year 29. The BLM will authorize this mine project and any operations are premised on the acquisition of necessary water rights under the authority of the OSE for the life of the mine plan. Thereafter, NMCC would retire an existing water right that holds a legal entitlement to deplete water from the river in an amount equal to NMCC's effects on the river at the time of retirement.

In an August 24, 2017 letter to the BLM, NMCC reaffirmed their intent to fully offset all NMCC pumping impacts on the Rio Grande, including years beyond year 29 with actual water, "wet offsets," to ensure no net effect on the river would occur due to the proposed operation of Copper Flat. NMCC would accomplish this by taking one or more of the following actions: extending the previously described Jicarilla Apache Nation water lease; securing another lease of equally effectual water; or securing and permanently retiring water rights that physically affect the river today. Regarding the permanent retirement of a water right, the offset would continue to have a positive effect on the Rio Grande as the NMCC effects on the river decline and entirely cease.

The BLM EIS team coordinated with the agencies that have direct permitting oversight of the Copper Flat mine at the State level. In September 2014, the BLM consulted with the NMED and OSE with specific reference to potential well monitoring programs that would be used to evaluate and manage actual mine impacts. The OSE has the responsibility for measuring, appropriating and distributing the public waters of the state. NMCC's appropriation of water is thus subject to the OSE's conclusion that any water appropriation by NMCC would not impair existing water rights, is not contrary to conservation of water within the state and is not detrimental to the public welfare of the state.

The BLM understands that a particular concern is the seasonal flow that occurs along the perched reach of Las Animas Creek, which supports irrigation, vegetation, and habitat. No direct impact to the highly valued resource in this reach is expected to result from the project. This conclusion results from the fact that the shallow groundwater in the reach is not hydrologically connected to the regional aquifer which is the source of water to the

wells that would supply the project, although it is subject to a small reduction in water supply due to upstream effects. Indeed, the perched water table would not exist if there were a connection to the main regional aquifer, which at present lies at substantial depth below the river. Extensive monitoring is proposed to validate ongoing hydrologic conditions.

Soils

BMPs would be used to limit erosion and reduce sediment in precipitation runoff from proposed project facilities and disturbed areas during construction, operations, and initial stages of reclamation. BMPs that would be used during construction and operation to minimize erosion and control sediment runoff would include:

- Surface stabilization measures – dust control, mulching, riprap, temporary and permanent revegetation/reclamation, and placing growth media;
- Runoff control and conveyance measures – hardened channels, runoff diversions;
- Sediment traps and barriers – check dams, grade stabilization structures, sediment detention, sediment/silt fence and straw bale barriers, and sediment traps;
- Application of water to control dust on haul roads and other disturbance areas;
- Regrading and shaping of all disturbed areas to a final contour that achieves positive drainage and reconstructs slopes with lengths and gradients that would provide long-term stability;
- Revegetation of disturbed areas would reduce the potential for wind and water erosion;
- Following construction activities, seeding of areas such as cut and fill embankments and growth media/cover stockpiles as soon as it is practicable and safe;
- Contemporaneous reclamation maximized to the extent practicable to accelerate revegetation of disturbed areas; and
- Periodic inspection of all sediment and erosion control measures with repairs performed as needed.

Wildlife and Migratory Birds

In addition to the BMPs listed in Section 2.7 of the Final EIS, Best Management Practices, the following BMP would be required and implemented for activities associated with the Approved Alternative to protect wildlife and migratory birds.

Fencing: Wildlife exclusion fences would be constructed around the pit and other water and solution ponds to keep out wildlife such as deer, antelope, and smaller animals. This fencing would meet New Mexico Department of Game and Fish (NMDGF) standards for wildlife exclusion fencing that require an 8-foot-high fence, chain link or welded wire material. The bottom portion of the 8-foot chain link fence should be finer meshed and wrapped in a durable and corrosion-resistant material that would exclude small mammals and other terrestrial species and should extend from ground level to a height of at least three feet. Additionally, the bottom of the fence should be buried to prevent animals from digging underneath.

NMCC would monitor the fences on a regular basis and repairs would be made by NMCC as needed. In the event that livestock manage to enter the proposed mine area via a gate or opening in a fence, the grazing permittee would be contacted immediately. NMCC would assist as requested in moving these animals out of the proposed mine area.

Vegetation, Invasive Species, and Wetlands

To prevent the introduction and minimize the spread of non-native vegetation and noxious weeds, mitigation measures would be implemented during project activities including:

- On-site biological monitoring in areas of noxious weed concern or presence would be conducted before, during, and after project activities. NMCC would be responsible for providing the monitoring.
- Vehicle and equipment parking would be limited to within construction limits or approved staging areas.
- Heavy equipment would be cleaned and weed-free before entering a mine area.
- Monitoring and follow-up treatment of exotic vegetation would occur after project activities are completed.
- All gravel and fill material imported on-site would be source-identified to ensure that the originating site is noxious weed-free.
- During the reclamation phase of the project, all areas disturbed by construction would be reseeded with the seed mixture described in Section 2.1.15.9 of the EIS.

Threatened, Endangered, and Special Status Species

A detailed discussion of provisions for mitigation of threatened, endangered, and special status species may be found in the biological opinion issued for this project by the U.S. Fish and Wildlife Service, which is included with this ROD, Appendix A.

NM and BLM-listed Special Status Species: The special status bird species are provided protection from harm under the Migratory Bird Treaty Act, as discussed in Section 3.10, Wildlife and Migratory Birds. Therefore, mitigation measures applicable to migratory birds would also apply to special status bird species, including avoiding ground clearing and other mine development activities during breeding and nesting season (generally March 1 through August 31) until the area is surveyed by a qualified biologist to confirm the absence of nests (on the ground and in burrows and vegetation) and nesting activity to avoid impacting migratory birds. Active nests (containing eggs or young) would be avoided until they are no longer active or the young birds have fledged. The area to be avoided around the nest would be appropriate to the species, and the size of the avoided area would be confirmed by a BLM biologist.

Prior to starting mine development activities, a bat survey of old mine shafts would be conducted to determine the seasonal occupancy and type of roost habitat provided by the shafts, such as migratory, hibernaculum, breeding, or maternity. The survey results would guide the method and time of exclusion of bats before the shafts are closed or reopened. To avoid hibernation and maternity periods, exclusion is usually scheduled for early spring or late summer/early fall (April or September-October) (Brown et al. no date). Eviction would not be attempted if the weather during any month becomes cold and windy, since the bats may not exit to forage during these conditions (Brown et al. no date).

Riparian species would be planted after mining operations cease to replace any riparian vegetation loss that may have occurred during the conduct of mining if such mitigation appears warranted from post-mining field surveys.

Threatened and Endangered Species: No specific measures are proposed to mitigate impacts to T&E species apart from those described above for special status wildlife populations, with the following exceptions.

1. Water rights would be purchased in the Rio Grande watershed above Elephant Butte Reservoir to offset losses of water to the Rio Grande system from mine operations pumping of the Santa Fe aquifer underlying Las Animas Creek. These voluntary purchases would mitigate water losses in Caballo for users of Caballo water for local purposes, as well as mitigate any potential impacts to Southwestern willow flycatcher and yellow billed cuckoo nesting in the Caballo reservoir perimeter.
2. The NMCC would voluntarily fund a conservation measure to benefit the Chiricahua leopard frog in Recovery Unit 8 to compensate for potential take of the frog in artesian-well-fed irrigation ponds affected by operational deep aquifer pumping. The frog conservation measure proposed for the Copper Flat project would consist of the NMCC transferring funds in an amount agreed to by USFWS, BLM and NMCC to a third-party entity to be approved by the USFWS. The funds will be used for the purchase or lease, and management of a

conservation easement to conserve existing, occupied suitable habitat or to provide suitable habitat for the establishment and continued support of a newly introduced or expanded local population of the Chiricahua leopard frog

3. As part of ongoing project environmental monitoring, NMCC will use monitoring wells to track changes in water levels at points along the Las Animas and Percha Creeks to determine if the hydrologic modeling analysis metrics were an accurate and adequate predictor of impacts to surface waters in the creeks, in the artesian wells, and in the surficial alluvium feeding Caballo Reservoir. Monitoring of blast noise and ground vibration at measured distances from the mine will also be done to determine if the noise and vibration levels predicted at the mine site in the analysis of noise and blasting impacts at various distances was accurate and adequate in predicting no effects to potentially affected species. Should any substantive deviation from the modeled predictors occur that would increase impacts to potential affected species, additional conservation measures would be considered.

Cultural Resources

The BLM has determined that there would be a significant impact to historic properties from the Proposed Action and action alternatives, and any of the actions would result in an adverse effect to historic properties. The majority of these impacts would occur due to facility construction, surface activities at the mine area, removal of mineralized ore, and traffic. The Proposed Action and the action alternatives would each result in an adverse effect to historic properties as determined under Section 106 of the National Historic Preservation Act (NHPA). In accordance with Section 106, the BLM conducted extensive consultation with the State Historic Preservation Officer (SHPO) and other consulting parties to develop a Programmatic Agreement (PA) that stipulates how the adverse effects to historic properties would be avoided, minimized, or mitigated. The Advisory Council on Historic Preservation (ACHP) chose not to participate in the consultation process, though they will receive a copy of the fully-executed PA in accordance with 36 CFR 800.6(b)(1). The other consulting parties included NMCC, New Mexico State Land Office, Hopi Tribe, and New Mexico Energy, Minerals, and Natural Resources Department (NMEMNRD). The consulting parties were provided multiple opportunities to review and comment on drafts of the PA, and all comments were addressed by the BLM. The fully-executed PA is included in the Final EIS as Appendix L, will be incorporated into the BLM's ROD, and will be made part of the MPO.

The PA presents the roles and responsibilities of the BLM (Lead Agency), NMCC, New Mexico State Land Office (as a land managing agency), and the SHPO in carrying out the stipulations of the agreement, and it describes multiple opportunities for the consulting parties to continue to review and provide input on the implementation of the PA. The PA stipulates that a Historic Properties Treatment Plan (HPTP) will be developed by NMCC that describes in detail the mitigation measures to be undertaken. The BLM, SHPO, and the consulting parties will have opportunities to review and comment on the drafts of the HPTP, and NMCC will make revisions under direction from BLM. The final HPTP will be incorporated into the PA and will become a binding condition of the MPO.

Specific mitigation elements designated in the PA and to be described in detail in the HPTP include:

- Collection of oral history and archival information to develop a detailed historic context for the permit area, complete with an annotated bibliography.
- A research design and data recovery plan to guide excavation of historic properties that would be subject to damage or destruction.
- A Burial Plan of Action that sets forth procedures for the treatment of marked and unmarked burials and graves encountered during the project.
- Documentation of standing buildings (per standards in Historic American Buildings Survey Level II/III), engineered features (per Historic American Engineering Record Level III), and the historic mining district as a whole (per Historic American Landscape Survey Level III).

- Development of interpretive materials for distribution to the public. These materials could include pamphlets, popular reports, interpretive displays, or outdoor signage. Public presentations in Hillsboro and Truth or Consequences are also included.
- Fencing of historic properties and activity areas to prevent impacts.
- Implementation of a monitoring program to ensure avoidance measures are effective and to modify such measures if not effective.
- Procedures for treatment of unanticipated discoveries of historic properties and discovery of unanticipated effects to historic properties.
- Historic property protection procedures including implementation of best management practices and conducting cultural resource sensitivity training of NMCC personnel and contractors.
- Curation of recovered cultural materials and associated records.

While the effects to the resources would remain, the PA and HPTP, and stipulations and measures contained within these documents, resolve these effects and reduce the significance of the impacts. The PA addresses all anticipated and unanticipated effects to historic properties from the project, and documents the BLM's commitment to ensure these mitigation measures are implemented.

Special Management Areas

Mitigation measures include the addition of more informational signs along the BLM Lake Valley Backcountry Byway that identify the Copper Flat mine as a resource feature that is consistent with BLM multiple-use goals. Implementation of these signs at key points may inform drivers or recreational users of the history of copper mining in the area.

Range and Livestock

The proposed mine area would be fenced to prevent injury or loss of livestock from mining operations. The location of the boundary fence would maintain connectivity for livestock movement throughout the Copper Flat Ranch allotment. Health and safety training of mine workers would include the provision of information on livestock open range and operation of vehicles to minimize the risk of collisions with livestock.

Socioeconomics/ Environmental Justice

The BLM will hold discussions with the proponent that would be designed to develop mitigation measures that would be acceptable to all parties. Potential mitigations could include the job training programs and employee benefits such as community monitoring and outreach programs, financial training to employees. No mitigation for socioeconomic or environmental justice issues would be required.

Utilities and Infrastructure

Mitigation measures identified for the Approved Alternative include implementing alternative power generation where practical; recycling of gray water and process water to reduce overall fresh water use in mining operations; implementing fugitive dust control on roads; and reusing existing haul and access roads, structures, foundations, facilities, and disturbance footprints to the extent practical.

Paleontological Resources

NMCC would immediately notify the BLM Authorized Officer of any paleontological resources discovered as a result of operations. NMCC would suspend all activities in the vicinity of such a discovery until notified to proceed by the Authorized Officer and would protect the discovery from damage or looting. NMCC may not be required to suspend all operations if activities can be adjusted to avoid further impacts to a discovered locality or be continued elsewhere. The Authorized Officer would evaluate such discoveries as soon as possible, but not later than 10 working days after being notified. Appropriate measures to mitigate adverse effects to significant

paleontological resources would be determined by the Authorized Officer after consulting with the operator. Within 10 days, the operator would be allowed to continue construction through the site or would be given the choice of either: 1) following the Authorized Officer's instructions for stabilizing the fossil resource in place and avoiding further disturbance to the fossil resource, or 2) following the Authorized Officer's instructions for mitigating impacts to the fossil resource prior to continuing construction through the mine area.

Hazardous Waste and Hazardous Materials Management

NMCC has developed a preliminary Spill Control Plan (SCP) to prevent and limit the impacts of a reagent or fuel spill. The plan would be finalized by NMCC before commencing operations. This plan describes the reporting and response that would take place in the event of a spill, release, or other upset condition, as well as procedures for cleanup and disposal. The plan would be posted and distributed to key site personnel and would be used as a guide in the training of employees. Also, the plan would address mitigation of potential spills associated with project facilities as well as activities of on-site contractors. The use, transportation, and storage of reagents and fuels would be covered in the plan. The emergency reporting procedures would be posted in key locations throughout the mine area. Containment structures designed to prevent the migration of a spill are included in the design of the facilities.

Air Quality

BMPs would be required and implemented for activities associated with the Approved Alternative. Appropriate emission control equipment would be installed and operated in accordance with the air quality construction permit. Air quality and dust control BMPs for mine operations may include the following:

- Water would be applied on haul roads and other disturbed areas and other dust control measures would be used as per accepted and reasonable industry practice.
- Disturbed areas and stockpiles would be seeded with an interim seed mix to minimize fugitive dust emissions from unvegetated surfaces where appropriate.
- Crusher and conveyor drop points and deposition of tailings would utilize spigotting or cyclone discharge. The surface would be wetted by implementing NMED and Mine Safety and Health Administration (MSHA)-approved Sonic Misting Systems, which are considered to be the Best Available Control Technology (BACT).
- Lime storage would be fitted with a baghouse for capture of fugitive dust during loading of the lime bin. The sample preparation lab would be equipped with fans and filters.
- Tailings deposits would be wetted by spigotting or cyclone discharge. By this procedure, the surface would be wet, thereby eliminating or reducing fugitive dust. As necessary, control of fugitive dust in the vicinity of the tailings pond would be attained by watering, sprinkling, and vegetation.
- Drilling operations would be performed wet or with other efficient dust control measures as set by the MSHA/the New Mexico Office of the State Mine Inspector, and New Mexico mining and exploration permit requirements.
- Combustion emissions from mobile mining machinery and support vehicles would be controlled by manufacturer pollution control devices.

MANAGEMENT CONSIDERATIONS

The rationale for the above decision is supported by the Surface Management regulations (43 CFR § 3809 *et seq.*), the Federal Land Policy and Management Act (FLPMA), and the Mining Law of 1872, as amended. The Project has been analyzed under the Council on Environmental Quality implementing regulations for NEPA (40 CFR § 1500 *et seq.*) and none of the alternatives that were analyzed in detail were found to result in unnecessary or undue degradation of public lands. Selection of the BLM's Approved Alternative will allow NMCC to undertake a legitimate use of the public lands in an environmentally sound manner without causing unnecessary or undue degradation to the public lands.

The BLM's selection of the Approved Alternative was primarily based on the protection and efficient use of water resources, while still allowing recovery of the identified mineral resource within the Project area. Implementing the Approved Alternative will allow NMCC to employ approximately 287 permanent work force employees for the 12-year production life of the mine. In addition, up to 130 workers will be hired for a period of approximately 24 months during construction of the mine.

Under the No Action Alternative, the mineral resources would not be developed. Also, no additional permanent jobs would be made available to New Mexico and local economies. Selection of this alternative would not comply with BLM minerals policy.

The BLM, State cooperating agencies, and NMCC have collaborated to develop measures designed to reduce environmental impacts that may result from the Project. The Applicant has committed to environmental protection measures contained in the MPO, and the mitigation measures outlined below will reduce adverse environmental impacts identified in the Final EIS. Monitoring requirements of the MPO and the Final EIS will assist NMCC, the BLM, and others in identifying, mitigating, or avoiding unforeseen environmental impacts that may occur.

The BLM in coordination with the State of New Mexico has determined that a reclamation bond adequate to cover surface reclamation of the Project facilities is required.

LAND USE PLAN CONFORMANCE

The BLM has the responsibility and authority to manage the surface and subsurface resources on public lands located within the jurisdiction of the LCDO and has designated lands within the project area as open for mineral exploration and development. The objectives for Geology and Mineral Extraction in the White Sands ROD and the approved Resource Management Plan (RMP) are to provide for the responsible development of mineral resources to meet local, regional, and national needs, while providing for the protection of other resources and uses.

The management decision for this project that is applicable to these objectives is as follows:

- **Locatable minerals**. "Open to locatable - Allow locatable mineral development on approximately 9.9 million acres of federal mineral estate, subject to the prevention of unnecessary or undue degradation of public lands."

The Approved Alternative is in conformance with the White Sands RMP and its ROD.

SUMMARY OF THE PROPOSED ACTION AND OTHER ALTERNATIVES

The Copper Flat Mine Expansion Project EIS analyzed the Proposed Action and three alternatives: the No Action Alternative, the Accelerated Operations – 25,000 Tons Per Day Alternative, and the Accelerated Operations – 30,000 Tons Per Day Alternative. The Proposed Action and the three alternatives are described below.

PROPOSED ACTION

The project is a copper mine expansion and includes four groundwater production wells, a water supply line, an ore excavation area (open pit), and associated mine- processing facilities. Specifically, proposed project components would include:

- One main open pit
- Crushing facilities and associated stockpiles;
- Two areas of waste rock disposal facility (WRDF);
- Tailings Storage Facility (TSF);
- Groundwater production wells;

- Runoff diversion structure;
- Conveyors, processing plant facilities, and ponds;
- Water supply wells and delivery/storage system;
- Haul and secondary roads;
- Growth media stockpiles;
- Additional exploration within the MPO; and
- Ancillary facilities including a mine administration building, an assay lab, a mobile equipment shop, a truck scale, the security gatehouse, two existing septic tanks, an equipment washing facility, a reconstructed electrical substation, and millsites.

The project boundary is composed of approximately 2,190 acres of both public lands administered by the BLM LCDO and private lands.

Construction and operation of the project would be initiated following NMCC's receipt of all required permits and approvals. The life of the mine would include approximately 16 years of active mining and ore processing. Reclamation and monitoring would continue for an additional 15 years following completion of operations.

NO ACTION ALTERNATIVE

Under the No Action Alternative, NMCC would not be authorized to develop the project or mine the ore body as currently defined under the Proposed Action. In addition, NMCC would be obligated to clean up an existing sulphate plume in the TSF area that resulted from previous mining operations by Quintana. The area would remain available for future mineral development or for other purposes as approved by the BLM.

ALTERNATIVE 1: ACCELERATED OPERATIONS – 25,000 TONS PER DAY

Overall, this alternative to the Proposed Action would have the same general scale and scope of operation, with differences largely attributable to higher process rates to improve project viability, and some increases in efficiency wherever possible. Alternative 1: Accelerated Operations proposes to increase material processing at the mine from 17,500 tpd in the Proposed Action to 25,000 tpd. Annually, the mining operation would process an estimated 9.1 million tons of copper ore mill feed.

As with the Proposed Action, the plant facilities would be constructed at the site of the original Quintana plant site, and, to the extent practicable, would use most of the original concrete foundations. The plant site, which would include the crusher, concentrator, assay lab, mine shop, warehouse, security, and administration buildings, would occupy approximately 129 acres and would be located between the open pit and the TSF area. Scheduled operations and saleable products would be the same as with the Proposed Action. The main differences are derived from an increase in the process rate to improve project economics and increases in efficiency where possible, and are summarized below:

- Process rate increased to nominal 25,000 tpd to improve project economics
- Mine life shortened to 11 years due to higher process rate
- Whole tailings thickener removed from tailings flowsheet in order to improve TSF stability
- Non-process water use decreases due to more efficient designs
- Annual water use increases due to higher process rate
- Duration of water use decreases due to higher process rate
- Total water use over the life of the mine increases slightly due to higher process rate
- Total disturbance footprint reduced due to more efficient design
- Number and disturbance footprint of rock storage piles reduced due to more efficient design
- Power requirements increase due to increased process rate
- Concentrate loads trucked on NM-152 and US I-25 increase due to higher process rate

ALTERNATIVE 2: ACCELERATED OPERATIONS – 30,000 TONS PER DAY (BLM'S APPROVED ALTERNATIVE)

The BLM's Approved Alternative is the Alternative 2: Accelerated Operations- 30,000 Tons Per Day along with the Applicant committed environmental protection measures included in the MPO and the mitigation measures specified in Sections 3.2 through 3.26 of the Final EIS. The BLM has designated this alternative as the Approved Alternative in accordance with the requirements stated in 40 CFR 1500-1508.

The BLM's Approved Alternative would allow the construction and operation of the proposed copper mine expansion, creating a total of 1,586 acres of disturbance, of which 745 acres are public land managed by the BLM and 841 acres are private land.

The BLM's Approved Alternative is also the Environmentally Approved Alternative. In 2013, NMCC advanced their mine plans by conducting a definitive feasibility study, which refines the preliminary feasibility study, to further fine-tune the internal plan of development for the Copper Flat mine. This study applied a more detailed approach to evaluating the mine processing circuit and overall initiative. The definitive feasibility study found that the mine would be more efficient with an increase to the TSF capacity and an increase to the annual ore processing rate. The Approved Alternative, EIS Alternative 2, is based on the definitive feasibility study for Copper Flat and has a TSF that fits in the same footprint as the Proposed Action but has a larger volume for storage. The Approved Alternative has a 30,000 tpd plan with a 12-year mine life but remains within the mine area evaluated for the Proposed Action.

This alternative has the same general scale and scope of the Proposed Action but proposes to process 25 million tons of ore more than the Proposed Action over the life of the project. The other main differences are derived from an increase in the process rate to improve project economics and increases in efficiency where possible, and are summarized below:

- Process rate increased to nominal 30,000 tpd to further improve project economics to meet minimum finance requirements;
- Total life of mine tons processed increased 25 million tons due to exploration success;
- Mine life shortened to 12 years due to higher process rate;
- Whole tailings thickener removed from tailings flowsheet in order to improve TSF stability;
- Non-process water use decreases due to more efficient designs;
- Annual water use increases due to higher process rate;
- Duration of water use decreases due to higher process rate;
- Total water use over the life of the mine increases slightly due to higher process rate;
- Total disturbance footprint reduced due to more efficient designs;
- Number and disturbance footprint of rock storage piles reduced due to more efficient design;
- Power requirements increase due to increased process rate;
- Alternate power source selected;
- Concentrate loads trucked on NM-152 and US I-25 increase due to higher process rate;
- Lime silo increased to 300-ton capacity due to increased processing rate;
- Mine workforce increases due to increased process rate;
- A package wastewater treatment plan proposed instead of septic tanks and leach field;
- Reclamation & closure: At time of closure, the BLM would determine whether buried pipelines and electrical conduits would be left in place.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Three alternatives were identified and proposed by the BLM and NMCC but were eliminated from further analysis. These alternatives included dry stack tailings disposal, tailings thickener alternatives, and backfilling the pit. These alternatives were considered relative to their means of addressing the identified purpose and need for the project; their technological and economic feasibility; and their potential to address environmental issues and reduce potential impacts. Each of these potential alternatives was ultimately rejected and not further analyzed in the EIS for the following reasons:

Dry Stack Tailings Disposal

Dry stack tailings was eliminated as an alternative because it would incur increased operating costs, it requires additional water consumption for dust suppression, and using this alternative means that a failure in the filter plant would require the entire plant to shut down because there would be no alternative for tailings disposition. Additionally, the dry stack tailings disposal method is not considered reasonable because its implementation is economically infeasible (reducing the internal rate of return below 15 percent).

Tailings Thickener Alternatives

The Copper Flat TSF water balance model has water inputs from the tailing overflow and underflow, direct precipitation within the TSF limits, and precipitation run-on from undiverted and up gradient areas. The model has water losses of evaporation from the supernatant pond, the tailings beach, the sand embankment areas, and water locked up or entrained within the tailings mass. Of these losses, the most significant is the water locked up or entrained within the tailings mass.

Additional water conservation can be achieved by reducing the volume of water loss due to lock-up. Water loss due to lock-up is a function of the density and saturation of the tailings mass. By increasing the density of the tailings, the volume of water loss is reduced, assuming no change in tailings saturation. One method of achieving an increase in the tailings density is to thicken the slurry being deposited. All of the thickened tailings alternatives were eliminated from further consideration because they would result in a return on investment that would be considered economically infeasible.

Backfilling the Pit

Backfilling the pit at Copper Flat was considered in response to public comments suggesting that this alternative be considered. The concerns to be addressed are primarily related to post-mining water quality in the pit lake. Discussions with NMCC determined that backfilling the pit is not viable for a number of reasons:

- The Copper Flat pit would be mined in sequence vertically, and it would not be possible to backfill portions of it as mining continues. The spatial characteristics of the mineral deposit results in a mine plan that does not support backfilling sections of the open pit during mining.
- Mine plans for the Copper Flat project involve removing approximately 158 million tons of material from the pit. Of this, about 74 percent (113 million tons) would be deposited in the lined tailings facility and would not be suitable for backfill material.
- Backfilling the pit after mining is not economically viable. Because the majority of material removed from the pit would be processed and sent to the TSF, additional material would have to be mined to provide backfill material at the end of mining. Assuming a reasonable swell factor, excavating for the volume of additional material needed for backfill (material in addition to the non-ore material mined from the pit), would likely create a pit approximately 50 percent the size of the planned open pit; after producing backfill the new excavation would also require reclamation. Moving 45 million tons of existing mined material back to the pit would add approximately $50 million to project costs. Producing an additional 50 million tons for backfill to completely fill the pit could add at least another $100 million in costs due to added mining, administrative, and reclamation costs.

PUBLIC INVOLVEMENT

On January 9, 2012, the BLM Las Cruces District Office published a Notice of Intent in the Federal Register (vol. 77, no. 5, pp. 1080-1081, Doc 2012-128) to prepare an EIS for this project in compliance with NEPA and the Council on Environmental Quality's regulations for implementing NEPA (40 CFR 1500–1508). Exploration and mining activities on BLM-administered land are controlled by the Secretary of the Interior's regulations contained in 43 CFR 3715 and 3809. These regulations require mining operations to apply for a permit to use public land for activities that are reasonably incidental to mining, to prevent unnecessary or undue degradation of the land, and to reclaim disturbed areas.

Pursuant to NEPA Section 102(2) (c), the EIS will provide agencies and the public with a general understanding of the proposed Copper Flat mine project by evaluating the environmental impacts of the proposed MPO. The EIS also evaluate alternatives to the proposed MPO. The purpose of this evaluation is to determine whether to approve the plan as proposed, or to require additional mitigation measures to minimize impacts to the environment, in accordance with BLM regulations.

EXTERNAL SCOPING

Two public meetings were held during the scoping period, which began January 9, 2012 and ended March 9, 2012. Media advertisements notified the public that scoping meetings would be held in Hillsboro and Truth or Consequences, New Mexico on February 22 and 23, 2012, respectively. Public participants at the meetings numbered 59 in Hillsboro and 72 in Truth or Consequences. The open house portion of the meeting was used to encourage discussion and information sharing and to ensure that the public had opportunities to speak with representatives of the BLM's LCDO, the State of New Mexico, and NMCC.

Several display stations with exhibits, maps, and other informational materials were staffed by representatives of the BLM LCDO, MMD, the NMED, NMCC, and Solv (the EIS contractor). The BLM and NMCC provided fact sheets and informational materials at the meetings. In addition to the scoping meetings, the BLM solicited comments through use of scoping letters, a website, a toll-free telephone number, and an email address.

ISSUES IDENTIFIED IN SCOPING

The key issues identified during the public scoping process focused on water, biological resources, traffic, and social and economic concerns. The four topics that received the highest number of comments related to resource issues are briefly summarized below.

Socioeconomics: Fifty-nine commenters provided 266 comments concerning socioeconomics. The comments addressed the current state of Sierra County's economy and the pressing need for jobs and increased tax revenue. Some commenters suggested using the mine as a source of tourism. Other commenters expressed concerns that the presence of the mine and mining operations might negatively impact current tourism revenue that depends on the quality of the environment and surface water recreation. Several commenters requested information on how the community might be compensated for potential problems associated with mining, such as loss of land use and water (both quality and quantity). Information was also requested on how loss of land and water use might affect the economy. Some commenters stated that the mine would be an economic opportunity and there may not be other economic opportunities as large in the area in the future.

Groundwater: Forty commenters provided 168 comments about groundwater. Commenters expressed concern that mining activities might either reduce available groundwater or pollute groundwater, which in turn would affect the community and environment. Concern was also expressed about the development of a cone of depression if mining operations pull water from the aquifer, and how this would affect wells, surface water, and wildlife. Some commenters questioned water use during droughts and water conservation practices in general to maintain groundwater.

Water Quantity: Thirty-six commenters provided 146 comments concerned with water quantity. Commenters expressed concern that the water use of the mine coupled with potential water pollution would affect the amount of safe drinking water available to the people, agriculture, plants, and wildlife of Sierra County. Several commenters asked how they can be assured that the amount of water proposed to be used would not affect the amount of water available for other uses or permanently deplete the aquifer.

Surface Water: Twenty-nine commenters provided 98 comments concerned with surface water, which mainly focused on water quantity and water quality. Commenters expressed concern that mining operations would reduce stream levels and pollute surface water areas, which can affect wildlife, plants, and livestock operations. Commenters expressed concern that the aquifer would be permanently affected by mining activities and that this drawdown would affect surface water over the long term.

These key issues were considered in an alternatives development session attended by the BLM, State cooperating agencies, and the third-party EIS contractor and were then incorporated into the following impact questions used to develop the alternatives to the Proposed Action:

- How would groundwater withdrawal affect surface ecosystems and other users?
- How would mining activities impact surface water and groundwater quality for present or foreseeable future use?
- How would mining activities use water efficiently?
- How would mining activities directly or indirectly affect wildlife species, their habitat, and their behavior?
- How would the mine affect public services, health and safety, and local economies?

PUBLIC COMMENT

Draft EIS

On December 4, 2015, the BLM LCDO published a Notice of Availability (NOA) in the FR (vol. 80, no. 233, p. 75862, Doc 2015-338) for the Draft EIS for this project. The initial 60-day public comment period was eventually extended through April 4, 2016. During the comment period, two public meetings were conducted in Hillsboro, New Mexico on December 16, 2015 and in Truth or Consequences, New Mexico on December 17, 2015. The public meetings offered interested parties the opportunity to express concerns and support for the project. There were 54 attendees at the Hillsboro public meeting and 51 attendees at the Truth or Consequences public meeting.

During the comment period, 103 comments were received from 11 separate commenters from public agencies, 318 comments were received from seven separate commenters from non-governmental organizations, and 776 comments were received from 159 separate commenters from the public. These comments and their responses are included in Appendix N as two documents:

- **Comments, Categories, and Responses (CCR):** A summary document that groups similar individual comments, such that one or more comments may be addressed by a single comment response; and
- **Comment Response Matrix (CRM):** Individual comments with their responses and source information for the comment appear on their own line of a summary matrix. Each submitted comment has an individual response.

Final EIS

On April 19, 2019 the BLM LCDO published an NOA in the FR for the Copper Flat Copper Mine Final EIS. Following notification in the FR, the Final EIS was available for a 30-day availability period. Although not a formal comment period, the BLM did receive substantive comments on the document. Based on these comments, the BLM decided to supplement the existing air analysis in the Final EIS with the following information:

Direct Emissions

Table 3-7a shows the estimated direct GHG emissions by alternative from mine development activities. The GHG emissions under the proposed alternative shows 689 tons per year (tpy) would be generated from the *Use of ANFO* and 12,319 tpy would be generated from *Chemical reactions* during blasting. Alternatives 1 and 2 show factor increases of 1.43 and 1.71, respectively, from emissions of GHGs as more ore would be blasted per year. The 1.43 figure was calculated by taking the total GHG tons per year for Alternative 1 and dividing it by the total GHG tons per year of the Proposed Alternative. The 1.71 figure was calculated by taking the total GHG tons per year for Alternative 2 and dividing it by the total GHG tons per year of the Proposed Alternative.

The Final EIS estimates that emissions from diesel-powered vehicles and generators will be 1,680 tons of CO2e under the proposed action. It is assumed that as the amount of ore extracted by alternative increases, the GHG emissions will increase by the same percentage. When comparing the proposed action to alternative one, ore the amount of ore extracted will increase by 42.8 percent. When comparing the proposed action to alternative two, the amount of ore extracted will increase by 71.4 percent. The BLM's preferred alternative would process more ore over a decreased number of years when compared to alternative one. Table 3-7a below replaces table 3-7 from the Final EIS.

Table 3-7a. Estimated GHG Emissions by Alternative (Emissions of CO_2e-tpy)

Project Component	**Proposed**	**Alternative 1**	**Alternative 2**
Use of ANFO	689	985	1,182
Chemical reactions	12,319	17,599	21,118
Use of Vehicles/diesel fuel	1,680	2,400	2,880
Rate Compared to Proposed Action	NA	1.43	1.71

Indirect emissions

Mine development activities that would affect climate change also would include indirect GHG emissions generated by activities such as electricity use, end-use transportation of the materials, and finally small amounts of end-use GHG emissions from the refinement process of the material itself. Other direct emissions have been previously quantified above and in the Final Copper Flat Mine Final Environmental Impact Statement.

***Electrical Demand*:** Average project electrical demand (Table 2-8) is 22.54 kwh/ton of ore. Using the eGrid Sub region of WECC Southwest (AZNM) emission factors for CO_2, CH_4 and N_2O were used to calculate the total GHG project-related emissions. Based on emission factors of 0.079, 0.012, and 1043.6 lbs/MWh for CH_4, N_2O and CO_2 respectively, total annual GHG emissions under Alternative 1 resulting from electricity demand is 97,907 metric tons of CO_2 equivalent. GHG emissions under Alternative 2 resulting from electricity demand is 117,487.82 metric tons of CO_2 equivalent.

***End-Use transportation*:** Copper concentrate shipment schedules to offsite points are detailed in the Mine/Development Operation Section of the Proposed Action (Section 3.20.2.1). The exact location of where the copper concentrate will be transported and used (end-user) is unknown. The materials would be transported by rail to a smelter in North America or to port facilities for shipping to Asia or Europe. As a proxy we use a U.S. port location of New Orleans, Louisiana and the furthest possible destination (China) to calculate GHG emissions associated with the transportation of the product. All other potential destinations associated with export of this commodity lay within the distance provided.

***Trucking*:** Copper concentrate would be transported from the mine to a rail-load out point in Rincon, New Mexico (Rincon). The total round-trip distance from the mine site to Rincon is 82-miles. Emission factors of 0.0051 and 0.0048 g/mile for CH_4 and N_2O respectively and 10.21 kg/gallon for CO_2 were used to determine annual GHG emission from truck deliveries to the rail-load out point (EPA 2018). Fuel efficiency was assumed to be 4-miles per gallon for a 25-ton heavy-duty diesel vehicle. Under Alternative 1, 25,000 tons per day of copper concentrate, 14 truckloads per day at a rate of 5-days per week was used as a volume and frequency schedule. Total annual emissions from delivery of concentrate shipments to the rail-load out point is estimated at 66,988 metric tons/year of CO_2 equivalent. GHG emissions from trucking of the copper concentrate would be 95,457.64 metric tons/year of CO_2 equivalent under alternative 2, see Table 1-1 (EPA 2018).

- ***Rail Transport*:** Copper concentrate would be transported from the rail-load out point in Rincon, New Mexico (Rincon) to a port facility. New Orleans, Louisiana was chosen as a proxy to represent a port of export for the material. The total distance from the rail-load out in Rincon, New Mexico to the New Orleans port of export is 1,167 miles. Emission factors of 0.0018 and 0.0006 g/ton-mile for CH_4 and N_2O respectively and 0.023 kg/ton-mile for CO_2 were used to determine annual GHG emission from rail transport to the port of export in New Orleans (EPA 2018). Twenty-five thousand (25,000) tons per-day at a frequency of 5-days per week of copper concentrate under Alternative 1 was used to determine annual GHG emissions. Total annual GHG emissions from rail delivery of copper concentrate shipments to the rail-load out point is estimated at 563,725 metric tons/year of CO_2 equivalent. GHG emissions from rail transport of the copper concentrate under alternative 2 would be 803,308.46 metric tons/year of CO_2 equivalent, see Table 1-1 (EPA 2018).

- ***Waterborne Vessel Transport*:** Copper concentrate would be transported from the port of New Orleans to a potential destination in Europe or Asia. Shanghai, China was chosen as the international destination port for the end-use product. The total distance from the port of New Orleans to the Shanghai port is 10,013 nautical miles. Emission factors of 0.004 and 0.0005 g/ton-mile for CH_4 and N_2O respectively and 0.059 kg/ton-mile for CO_2 were used to determine annual GHG emission from waterborne vessel transport to the port of Shanghai in China. Twenty-five thousand (25,000) tons per-day at a frequency of 5-days per week of copper concentrate under Alternative 1 was used to determine annual GHG emissions. Total annual GHG emissions from waterborne transport of copper concentrate shipments to Shanghai is estimated at 3.9 million metric tons/year of CO_2 equivalent. GHG emissions from waterborne vessel transport of the copper concentrate would be 4,702,055.74 metric tons/year of CO_2 equivalent under alternative 2, see Table 1-1 (EPA 2018).

***Molybdenum concentrate*:** Molybdenum concentrate and any other mineral (other than copper concentrate) would be filtered, dried, and packaged on-site and then transported to an off-site refinery by truck. Molybdenum concentrate shipment schedule (hauling weekdays only) would be: Life of mine: ship two truckloads per month (NMCC 2014a). GHG emissions would be generated from trucking, rail or watercraft vessels during the transportation of the molybdenum and other materials however not enough information as to the route or exact refinery has been provided for molybdenum concentrate or other minerals therefore calculating GHG emissions for the transportation of the materials would be highly speculative and unreasonable. No further GHG analysis was performed for transportation of these materials outside the mine-site.

***Refinement of Copper concentrate*:** Actual end-use refinement methods are best understood and calculated with more available information. Whether carbon is emitted or not depends on the production process. Some ores are not reduced with carbon. Hence, CO2 emissions from these processes are low (IPCC, 1996).

Table 1.1 Indirect Annual GHG Emissions (CO2e) (Metric Tons/Year)			
Activity	Proposed Action	Alternative 1	Alternative 2
Electricity Demand	68,534.56	97,906.52	117,487.82
Trucking (to Rincon, NM)	32,824.03	66,987.82	95,457.64
Rail (to New Orleans, LA)	345,281.70	563,725.23	803,308.46
Waterborne Vessel (to Shanghai, China)	2,194,292.68	3,918,379.78	4,702,055.74
Total Annual Indirect GHG Emissions	2,640,932.97	4,646,999.35	5,718,309.65

Table 1.2 Total GHG Emissions by Alternative (CO2e) (Metric Tons)			
Alternative	Proposed Action (16 years)	Alternative 1 (11 years)	Alternative 2 (12 years)
Total Annual Direct GHG Emissions	14,688	20,984	25,180
Total Annual Indirect GHG Emissions	2,640,932.97	4,646,999.35	5,718,309.65
Total Annual GHG Emissions (Direct and Indirect)	2,655,620.97	4,667,983.35	5,743,489.65
Total GHG Emissions (Direct and Indirect) for the life of the project	42,489,935.50	51,347,816.80	68,921,875.80

References

EPA eGreid2016. February 2018. Emission Factors for Greenhouse Gas Inventories. Table 6. Last modified March 9, 2018.

Intergovernmental Panel of Climate Change. (IPCC). 1996. Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook obtained from https://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch2wb2.pdf"

COOPERATING AGENCY COORDINATION

Regular coordination efforts were performed with the cooperating agencies throughout the project. During the EIS development process, quarterly conference calls were held between the BLM, NMCC, and the cooperating agencies to provide status updates, discuss emergent issues, and gather feedback and information requests from the cooperating agencies. Additionally, the BLM sought input from each of the cooperating agencies to address individual concerns raised through comments on the Draft EIS, the Administrative Final EIS, and at other points in the project. Correspondence between the BLM, NMCC, and the cooperating agencies is documented in the Administrative Record.

NATIVE AMERICAN CONSULTATION AND COORDINATION

Per EO 13175, the BLM is required to establish regular and meaningful consultation and coordination with Native American tribal governments on the development of regulatory policies and issuance of permits that could significantly or uniquely affect their communities. Tribal consultation letters were sent on November 7, 2012, to the Comanche Indian Tribe, Fort Sill Apache Tribe, Hopi Tribe, Isleta Pueblo, Kiowa Tribe, Mescalero Apache Tribe, Navajo Nation, White Mountain Apache Tribe, Ysleta del Sur Pueblo, and Zuni Pueblo. The letters described the proposed Copper Flat mine project and requested information from the Tribes on any concerns they had for potential impacts to tribally-significant resources.

Two Tribes provided responses:

1. The Hopi Tribe sent a letter stating their desire to continue consultation because they believe that archaeological sites with which they are affiliated would potentially be impacted by the proposed project. They asked to receive copies of the final archaeological survey reports and the Draft EIS.
2. The White Mountain Apache Tribe stated that unless human remains or materials related directly to them were discovered, they were not interested in further consultation.

During the time between the availability of the Draft EIS and the issuance of the Final EIS and this ROD, consultation with the Tribes by the BLM and State agencies continued to ensure that Tribal concerns are understood and presented in the documentation, to identify appropriate mitigation measures, and to fulfill the requirements of relevant Federal and State statutes. In compliance with Section 106 requirements, a PA documenting the tribal consultation efforts was signed in November 2016.

Decision and Approval

I have received and reviewed the FEIS prepared for the Copper Flat Copper Mine Project and for the reasons stated above, I select the Alternative 2: Accelerated Operations. I have determined that Alternative 2 is in conformance with the approved RMPs.

I hereby approve this decision. My approval of this decision constitutes the final decision of the DOI, and in accordance with the regulations at 43 CFR 4.410{a}(3), is not subject to appeal under Departmental regulations at 43 CFR Part 4.

THE UNITED STATES OF AMERICA

Department of Interior
Bureau of Land Management

By _____ Date 8/22/19

Joseph R. Balash
Assistant Secretary for Land and Minerals Management

APPENDIX A: BIOLOGICAL OPINION

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New Mexico Ecological Services Field Office
2105 Osuna Road NE
Albuquerque, New Mexico 87113
Telephone 505-346-2525 Fax 505-346-2542
www.fws.gov/southwest/es/newmexico/

February 25, 2019

Cons. # 02ENNM00-2018-F-0602

Memorandum

To: District Manager, U.S. Bureau of Land Management, Las Cruces District Office, Las Cruces, New Mexico

From: Field Supervisor, U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office, Albuquerque, New Mexico

Subject: Section 7 Endangered Species Act Consultation for the proposed Copper Flat Mine Project

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. § 1531 et seq.), as amended, for the proposed Copper Flat Mine Project. The U.S. Bureau of Land Management (BLM) is the lead federal agency for the environmental review of the Copper Flat Mine Project under the National Environmental Policy Act and other applicable statutes, and BLM has developed an Environmental Impact Statement (EIS) for the Project. The Copper Flat Mine Project would reestablish a poly-metallic mine and processing facility near the community of Hillsboro in Sierra County, New Mexico. The proposed project would include an open-pit mine, flotation mill, tailings impoundment, waste rock disposal areas, and ancillary facilities.

We received your final Biological Assessment (BA) dated July 2018, which evaluates impacts to the federally endangered Mexican gray wolf (*Canis lupus baileyi*) (captive and wild non-essential experimental populations), Bolson tortoise (*Gopherus flavomarginatus*), northern Aplomado falcon (*Falco femoralis septentrionalis*) (nonessential experimental population), and Southwestern willow flycatcher (*Empidonax traillii extimus*), and the federally threatened Chiricahua leopard frog (*Lithobates chiricahuensis*), Mexican spotted owl (*Strix occidentalis lucida*), and yellow-billed cuckoo (*Coccyzus americanus*) from implementing the proposed Copper Flat Mine Project.

The BLM determined that the proposed action "may affect, is likely to adversely affect" the federally threatened Chiricahua leopard frog. Your July 31, 2018, request to initiate formal consultation for the effects of this action to the frog, along with the final BA, was received on July 31, 2018. Critical habitat does not occur for the Chiricahua leopard frog in the project area; therefore, effects to its designated critical habitat were not analyzed.

The BLM also determined that the proposed action will have no effect on the federally endangered Mexican gray wolf (wild nonessential experimental population) and "may affect, is not likely to adversely affect" the federally endangered Mexican gray wolf (captive population), Bolson tortoise, northern Aplomado falcon (nonessential experimental population), and Southwestern willow flycatcher, or the federally threatened Mexican spotted owl and yellow-billed cuckoo. Based on information provided in the final BA, the Service concurs that the proposed project will not likely adversely affect the Mexican gray wolf (captive population), Bolson tortoise, Southwestern willow flycatcher, Mexican spotted owl, or yellow-billed cuckoo. The Service also concurs that the proposed project would not likely adversely affect the nonessential experimental population of the northern Aplomado falcon and determines that the proposed project would not likely jeopardize the continued existence of this nonessential experimental population. Our rationale for concurring with these determinations can be found in Appendix A of the attached biological opinion. Although the Endangered Species Act does not require action agencies to consult on "no effect" determinations, we appreciate notification of your determination for the wild nonessential experimental population of the Mexican gray wolf.

The attached biological opinion is based on information contained in the BA, meetings, electronic mail conversations, data in our files, and other information available to the Service. The Service hereby incorporates the BA and the contents of all written communications referenced above. In addition, references cited at the end of the biological opinion are not a complete bibliography of all literature available for the species addressed. A complete administrative record of this consultation is on file at this office.

We appreciate the Bureau of Land Management's efforts to identify and minimize effects resulting from this project to federally listed species and designated critical habitat. In future communications regarding this project, please refer to consultation number 02ENNM00-2018-F-0602. If you have any questions or would like to discuss any part of this consultation, please contact James Gruhala of my staff at (505) 761-4768 or james_gruhala@fws.gov.

Electronic cc:

Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division, Santa Fe, New Mexico

BIOLOGICAL OPINION FOR THE COPPER FLAT MINE PROJECT

02ENNM00-2018-F-0602

February 2019

Susan S. Millsap
Field Supervisor
New Mexico Ecological Services Field Office

25 February 2019
Date

INTRODUCTION

This document constitutes the U.S. Fish and Wildlife Service's (Service) biological opinion in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq*.), for the Copper Flat Mine Project. The U.S. Bureau of Land Management (BLM) is the lead federal agency for the environmental review of the Copper Flat Mine Project under the National Environmental Policy Act and other applicable statutes, and BLM has developed an Environmental Impact Statement (EIS) for the project. The Copper Flat Mine Project would reestablish a poly-metallic mine and processing facility near the community of Hillsboro in Sierra County, New Mexico. The proposed project would include an open-pit mine, flotation mill, tailings impoundment, waste rock disposal areas, and ancillary facilities. The final Biological Assessment (BA), dated July 2018, evaluated impacts to the federally endangered Mexican gray wolf (*Canis lupus baileyi*) (captive and wild non-essential experimental populations), Bolson tortoise (*Gopherus flavomarginatus*), northern Aplomado falcon (*Falco femoralis septentrionalis*) (non-essential experimental population), and Southwestern willow flycatcher (*Empidonax traillii extimus*), and the federally threatened Chiricahua leopard frog (*Lithobates chiricahuensis*), Mexican spotted owl (*Strix occidentalis lucida*), and yellow-billed cuckoo (*Coccyzus americanus*) from implementing the proposed Copper Flat Mine Project.

The BLM determined that the proposed action "may affect, is likely to adversely affect" the federally threatened Chiricahua leopard frog. Critical habitat does not occur for the Chiricahua leopard frog in the project area; therefore, effects to its designated critical habitat were not analyzed. Your July 31, 2018, request to initiate formal consultation for the effects of this action to the Chiricahua leopard frog, along with the final BA, was received on July 31, 2018.

The BLM also determined that the proposed action will have no effect on the federally endangered Mexican gray wolf (wild nonessential experimental population) and "may affect, is not likely to adversely affect" the federally endangered Mexican gray wolf (captive population), Bolson tortoise, northern Aplomado falcon (non-essential experimental population), and Southwestern willow flycatcher, or the federally threatened Mexican spotted owl and yellow-billed cuckoo. Based on information provided in the final BA, the Service concurs that the proposed project will not likely adversely affect the Mexican gray wolf (captive population), Bolson tortoise, Southwestern willow flycatcher, Mexican spotted owl, or yellow-billed cuckoo. The Service also concurs that the proposed project would not likely adversely affect the non-essential experimental population of the northern Aplomado falcon and determinations that the proposed project would not likely jeopardize the continued existence of this non-essential experimental population. Our rationale for concurring with these determinations can be found in Appendix A of this document. Although the Endangered Species Act does not require action agencies to consult on "no effect" determinations, we appreciate notification of your determination for the wild nonessential experimental population of the Mexican gray wolf.

A biological opinion is a document that states the opinion of the Service as to whether a federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of designated critical habitat. "*Jeopardize the continued existence of*" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02). "*Destruction or adverse modification*" is defined as a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations

may include, but are not limited to, those that alter the primary constituent elements (PCEs) that are essential to the conservation of a species or that preclude or significantly delay development of such elements (50 CFR § 402.02; 81 FR 7214-7226). Please note that PCEs of critical habitat are now referred to as physical and biological features (PBFs) based on the final rule implementing changes to regulations for designating critical habitat (81 FR 7414-7440).
This biological opinion is based on information provided in the final BA, meetings, electronic mail conversations, data in our files, and other information available to the Service. The Service hereby incorporates the BA and the contents of all written communications referenced above. In addition, references cited at the end of this biological opinion are not a complete bibliography of all literature available for the species addressed.

CONSULTATION HISTORY

- On March 16, 2016, the Service received a draft BA for the proposed Copper Flat Copper Mine Project.
- On July 6, 2016, the Service responded to the draft BA with a Request for Additional Information (RAI). The RAI requested clarification regarding the potential impacts to Las Animas Creek, Percha Creek, and Cabello Reservoir, the groundwater modeling used, and the potential effects to artesian-well fed irrigation ponds that are potentially inhabited by the Chiricahua leopard frog and how the effects will be offset.
- On September 9, 2016, the Service met with representatives from BLM, New Mexico Copper Corporation, Solv LLC., and GSA Analysis. The discussion was in regards to the groundwater modeling results, potential impacts to riparian and wetland habitat, and potential impacts to federally listed species, species of concern, and water rights associated with the proposed project.
- On December 19, 2016, the Service again met with representatives from BLM, New Mexico Copper Corporation, Solv LLC., and GSA Analysis. The discussion was a follow-up to the September 9, 2016, meeting and was focused on the same issues and potential conservation measures that could be included as part of the proposed project.
- On April 4, 2018, the Service received a Revised Draft BA from BLM.
- On June 14, 2018, the Service responded to the Revised Draft BA with a RAI requesting clarification of the action area, the hydrology and hydrogeology analysis, interrelated and interdependent actions, and the potential effects to the Chiricahua leopard frog, Mexican spotted owl, Mexican gray wolf, and migratory birds.
- On July 31, 2018, the Service received a final BA along with a request to enter formal consultation under section 7 of the ESA for the proposed project's effects to the Chiricahua leopard frog and informal consultation for six other federally listed species.
- On August 1, 2018, the Service sent an email informing BLM that the 135-day formal consultation process officially started on July 31, 2018.
- On August 6, 2018, the Service sent an email to BLM requesting clarification of the proposed conservation measures to offset the project's effects to the Chiricahua leopard frog on page 102 of the BA. The Service stated that this request will not restart the 90-day clock, and provided a step-by-step detail of a voluntary conservation measure involving placing Chiricahua leopard frog habitat into a conservation easement.
- On August 29, 2018, BLM submitted a memo to the Service, serving as an addendum to the BA, to include a voluntary conservation measure as described in the Service's August 6, 2018, email.

- On November 2, 2018, the Service sent the draft biological opinion to the BLM for review.

A complete administrative record of this consultation is on file in the New Mexico Ecological Services Field Office located in Albuquerque, New Mexico.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Copper Flat Copper Mine Project (Project) is the proposed reestablishment of a poly-metallic mine and processing facility located near Hillsboro, New Mexico (Figure 1). The need for BLM to authorize the Project is under the General Mining Law of 1872, as amended. The Project would consist of an open pit mine, flotation mill, tailings impoundment, waste rock disposal areas, a low-grade ore stockpile, and ancillary facilities. In most respects, the facilities, disturbance, and operations would be similar to the former mining operation at this location. The Project is owned and would be operated by the New Mexico Copper Corporation (NMCC), a wholly owned subsidiary of THEMAC Resources Group Limited (THEMAC 2011).

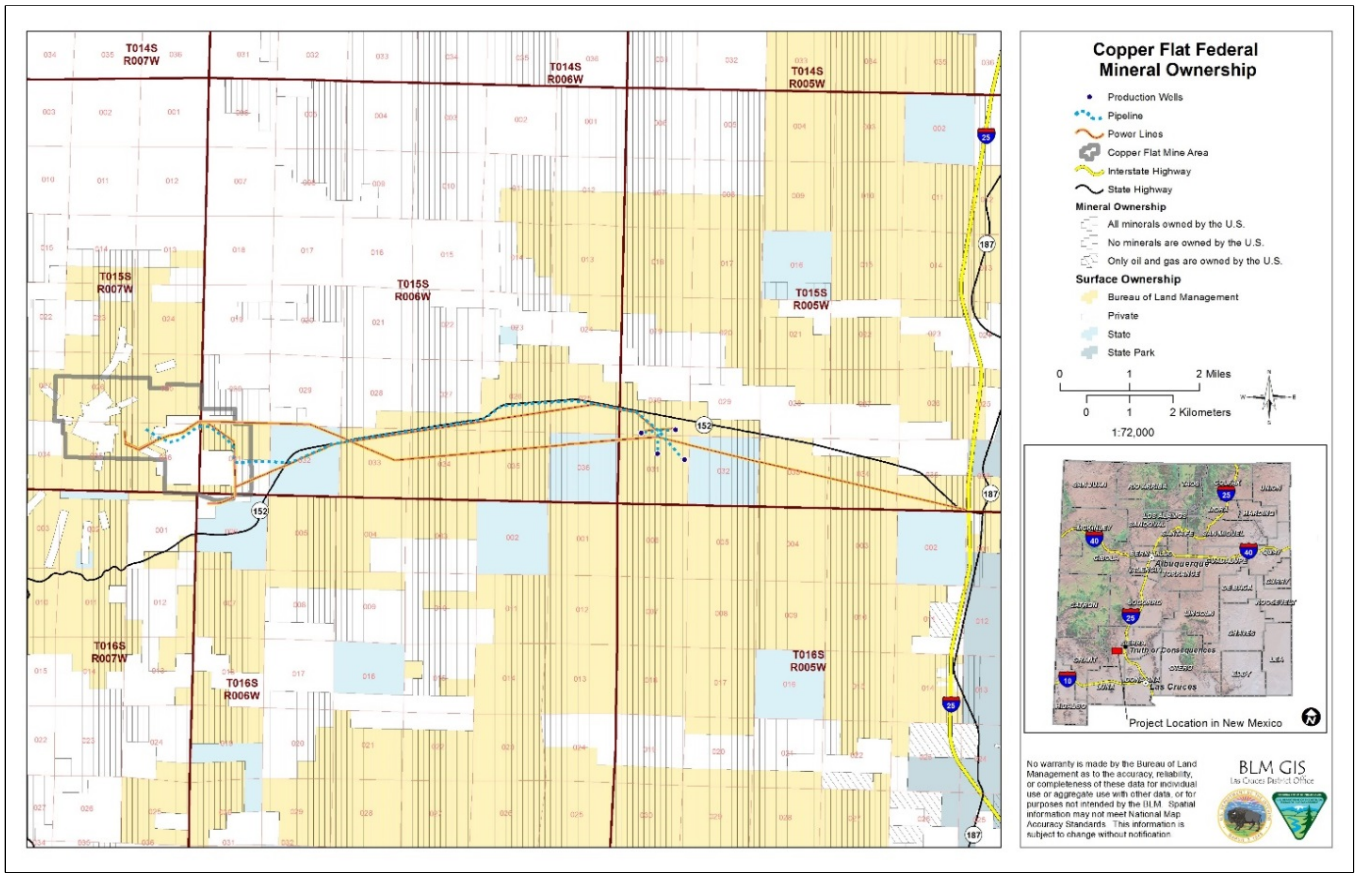

Figure 1. Copper Flat Mine Project location in Sierra County, New Mexico

In 2013, NMCC followed the standard industry practice of conducting a definitive feasibility study, which follows and refines the preliminary feasibility study, to further fine-tune the internal plan of development for the Copper Flat Mine. This study applied a more detailed approach to

evaluating the mine processing circuit and overall initiative. The definitive feasibility study found that the mine would be more efficient with an increase to the Tailings Storage Facility (TSF) capacity and an increase to the annual ore processing rate. Alternative 2 is defined as the Preferred Alternative in the EIS and is subsequently referred to as the "Proposed Action" in this biological opinion. The Proposed Action is based on the definitive feasibility study for Copper Flat Mine and has a 30,000 tons per day (tpd) processing plan with a 12-year mine life.

The NMCC proposed project operation under the Proposed Action includes the following activities:

- Expand the mine area to include additional land controlled by NMCC;
- Provide for exploration over the entire proposed plan area;
- Expand the existing open pit;
- Re-activate existing haul and secondary mine roads;
- Expand, operate, and reclaim existing waste rock disposal facilities;
- Construct, operate, and reclaim low-grade ore stockpiles;
- Construct, operate, and reclaim the mill and associated processing facilities;
- Construct, operate, and reclaim the tailings impoundment facility;
- Construct ancillary buildings (administration offices, laboratory, truck shop, reagent building, substation, gatehouse, etc.);
- Re-activate and maintain an existing water supply network;
- Construct growth media stockpiles for use in future reclamation of the site;
- Re-activate and maintain surface water diversions; and
- Construct wildlife exclusion fencing to keep wildlife, such as deer, from entering the Waste Rock Disposal Facilities (WRDFs), the Tailings Storage Facility (TSF), and pits and other water and solution ponds.

A detailed description of these activities is included in the BA which is on file as part of the administrative record for this consultation in the New Mexico Ecological Services Field Office located in Albuquerque, New Mexico.

The proposed action would directly impact 1,444 acres of the total 2,190 acres within the boundary of the mine (Table 1). The affected lands within the mine area would consist of 630 acres of BLM land and 814 acres of private land.

Table 1. Summary of Disturbance within the Mine Area for the Proposed Action

Disturbance	**Total (Acres)**
Tailings Storage Facility	633
Open pit	161
Waste Rock Disposal Facilities	155
Low-grade ore stockpile	134
Haul roads	34
Plant site area	139
Growth media stockpiles	114
Diversion structures	33
Exploration	40
Total Mine Area Disturbance	**1,444**

Disturbance	Total (Acres)
Total Public land disturbance	630
Total Private land disturbance	814

Source: NMCC 2014a.

The proposed action would also directly impact 127.2 acres outside the boundary of the mine as shown in Table 2, with 125.2 acres being on public land and 2.0 acres being on private and.

Table 2. Summary of Disturbance to Install Ancillary Facilities – Proposed Action

Disturbance	Total (Acres)	BLM Land	NM State Land	Private Land
Pipeline corridor	44.4	34.6	7.8	2.0
Millsites	45.0	45.0		
Production well roads	7.8	7.8		
Electrical substation	30.0		30.0	
Total Disturbance Outside Mine Area	**127.2**	**87.4**	**37.8**	**2.0**
Public Land	125.2			
Private Land	2.0			

Source: NMCC 2015.

Annually, the mining operation would process an estimated 10.8 million tons of copper ore mill feed. The operations include the phases and activities summarized below. In general, these phases are sequential, but there would be some overlap as the activities of an earlier phase continue during the implementation of subsequent phases.

- Pre-construction (permitting) - 2 years;
- Construction (site preparation) - 2 years;
- Operations (mineral beneficiation) - 12 years;
- Closure/reclamation - 3 years; and
- Post-closure monitoring, care, and maintenance - 12 years.

The plant facilities would be constructed at the site of the original Quintana plant site, and to the extent practicable, would use most of the original concrete foundations. The plant site, which would include the crusher, concentrator, assay lab, mine shop, warehouse, security, and administration buildings, would occupy approximately 139 acres and would be located between the open pit and the tailings impoundment area.

Scheduled operating time for the mill would be 24 hours per day, 7 days per week, and 365 days per year. Products produced by the mine would be two mineral concentrates: a copper concentrate, which would contain the recovered copper, gold, and silver; and a separate molybdenum concentrate. The concentrate would be sold to an off-site buyer and transported from the mine by truck to another location for smelting and refining. A general depiction of the proposed mine layout is provided in Figure 2, and a general description of mine operations is provided below. For a more detailed description of the proposed action, see the BA that has also been incorporated by reference.

CONSERVATION MEASURE

The BLM will ensure that NMCC will offset the Project's adverse effects to the Chiricahua leopard frog by voluntarily providing a payment to a third party for the perpetual protection of Chiricahua leopard frog habitat that has equivalent or greater value to the species than what is being impacted by the proposed project based on size, quality, location, and the presence of PCEs for Chiricahua leopard frog critical habitat as identified in the Final Rule Listing and Designation of Critical Habitat for the Chiricahua Leopard Frog (USFWS 2012). The protected area will preferably be located within Recovery Unit 8 as described in the Chiricahua leopard frog Final Recovery Plan (USFWS 2007). If such a property is not available within Recovery Unit 8, properties in other Recovery Units as described in the Chiricahua leopard frog Final Recovery Plan (USFWS 2007) will be considered. The property shall be approved by the Service. Since the mine's pumping of production wells is the specific action that would likely adversely affect the Chiricahua leopard frog, and those effects will not likely be significant until no earlier than one year after initiation, the BLM will provide a copy of proof of payment to the Service to document that the conservation measure has been executed within one year from the date when the pumping of production wells for the Copper Flat Mine is initiated. This conservation measure will not be required if pumping of production wells does not occur.

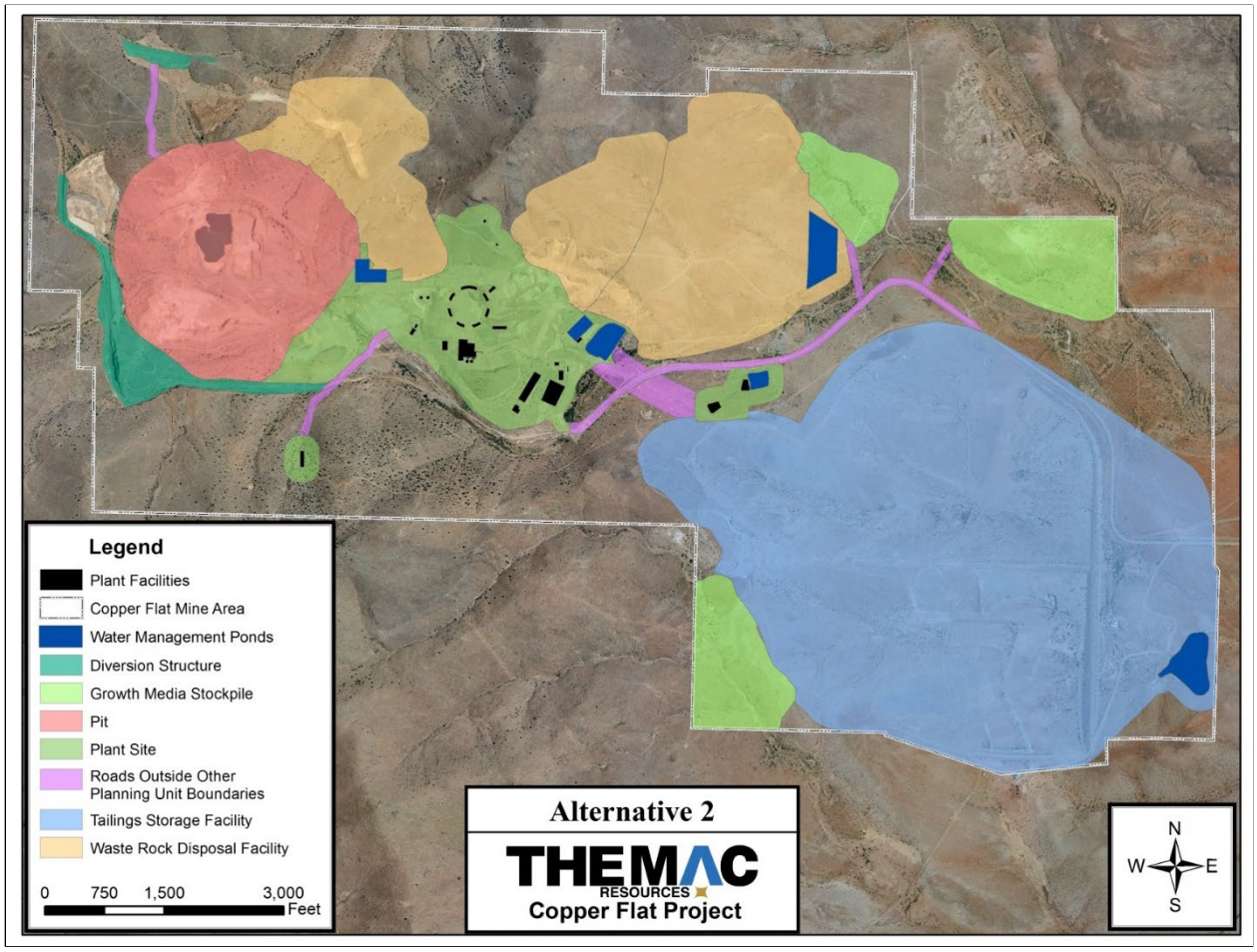

Figure 2. Mine Layout for the Proposed Action

DESCRIPTION OF THE ACTION AREA

The "*Action Area"* is defined under the ESA as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate areas (50 CFR § 402.02). It encompasses the geographic extent of environmental changes (i.e., the physical, chemical, and biotic effects) that will result directly and indirectly from the action. The Action Area is typically larger than the area directly affected by the action."

For the Copper Flat Mine Project, the "action area" includes the extent of any resource base that could potentially be affected by the different types of impacts mine construction and operation would cause. The geographic extent of the Copper Flat Mine action area, including all potential direct and indirect impacts, is shown in Figure 3. It includes the immediately-adjacent roads, pipelines, and power lines and associated rights-of-ways, the millsite and substation site, and adjacent areas potentially affected outside the mine boundary, but excludes noise impacts. Noise impacts are shown in Figure A-1 of Appendix A; they are not discussed here, however, because Chiricahua leopard frogs are not likely significantly impacted by noise associated with mine construction or blasting operations. Impacts to species such as the Mexican gray wolf and Mexican spotted owl from noise associated with project implementation are discussed in Appendix A.

Figure 3 also shows the extent of the estimated Artesian system drawdown (the change in water level) in the bedrock surrounding the mine pit and in the deep Santa Fe aquifer that may affect Las Animas Creek and Percha Creek by groundwater pumping for mine operations. In addition, Figure 3 shows the 1-foot drawdown perimeter (the area that will be drawn down 1-foot) in the artesian aquifer that feeds the irrigation ponds in the lower Las Animas Creek floodplain and the 1-foot drawdown perimeter in the deep Santa Fe aquifer that was evaluated for its potential to affect surface waters in Percha Creek and Caballo Reservoir and in perennial reaches of Las Animas Creek. The scope of the groundwater and surface water effects encompass approximately 14 square miles (mi^2) in the mine bedrock drawdown area, 113 mi^2 in the overlapping zones with the Santa Fe deep aquifer, and 8.3 mi^2 of Caballo Reservoir, for a total impact area of approximately 135 mi^2.

Known-occupied Chiricahua leopard frog habitat is highlighted in Figure 3 to show its relationship to where surface and artesian water effects may occur. This area is within the Las Animas and Percha Creek systems. This area is not believed to be significantly affected by water drawdown, because the entirety of the site is contained in the Greyback-Greenhorn Arroyos watershed. Any surface contamination that might reach the ground surface at the site from blasting or an accidental ore-truck or process-chemical container truck spill, for example, would have no chance of reaching the Las Animas or Percha Creek systems (Figure 7).

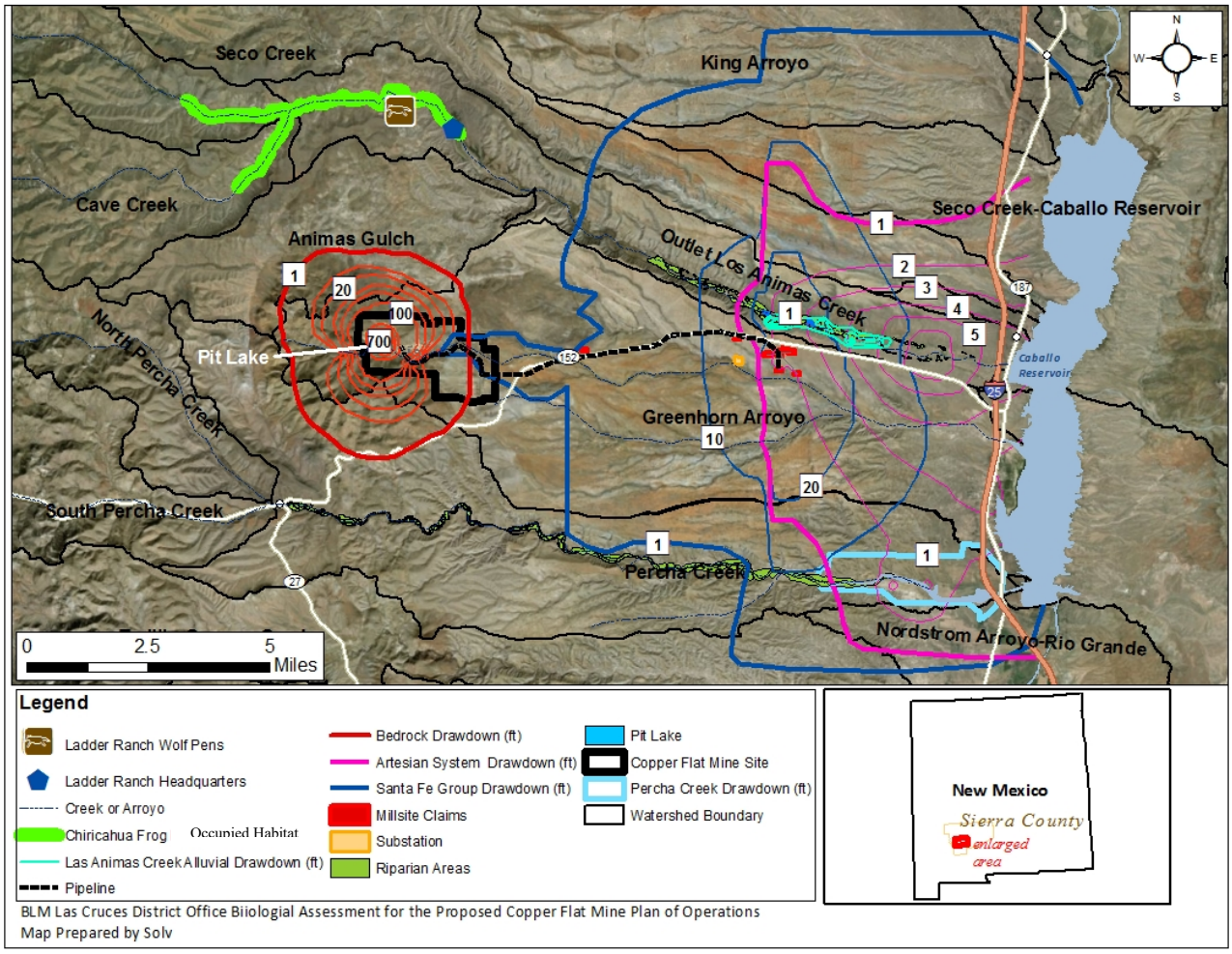

Figure 3. Copper Flat Project Action Area (excluding Noise Impacts)

Lands Directly Disturbed by Construction Operations

The Copper Flat Mine action area is composed of a mixture of public and private lands that include patented and unpatented mining claims (lode, placer, and millsite). The proposed mine area encompasses 2,190 acres. Activity at the Copper Flat Mine in 1982 disturbed approximately 361 acres of BLM-administered public land and 549 acres of private land (THEMAC 2011).

As previously noted, the proposed project would directly impact 1,444 acres of the total 2,190 acres within the boundary of the mine (Table 2). The affected lands within the mine area would consist of 630 acres of BLM land and 814 acres of private land. The project would also directly impact 127.2 acres outside the boundary of the mine as shown in Table 2, with all but 2 acres being on public land.

Portions of the waste rock disposal areas, as well as the crushing facility and the mill facility, would be located on public land subject to unpatented mining claims controlled by NMCC. Approximately 28 percent of the tailings impoundment and 10 percent of the open pit would be located on public land subject to mining claims controlled by NMCC (THEMAC 2011).

Surface Hydrology

The Copper Flat Mine action area is within the Creosote Rolling Upland and Grass Mountain region of southern New Mexico, a warm arid region where annual evaporation greatly exceeds annual precipitation. Precipitation generally comes in the form of local, high-intensity summer (July through September) rain showers. These storms are typically of short duration. Annual precipitation in the area of Copper Flat Mine ranges from 5 to 20 inches per year, averaging approximately 13 inches per year (JSAI 2013). Daily precipitation of 1 inch or more occurs twice per year on average, with daily storm events of greater than 2 inches expected about once every 5 years (JSAI 2013). The 100-year 24-hour storm event is about 3.6 inches (NOAA 2014).

Within the project area, estimated annual potential evapotranspiration (ET), which includes evaporation and plant transpiration, ranges from 60 to 65 inches per year (JSAI 2013). Actual ET is less and depends on water availability and climatic conditions such as temperature, sun, and wind exposure. Evaporation from the Copper Flat pit lake is approximately 65 inches per year (JSAI 2013).

The Copper Flat Mine project area lies within the Lower Rio Grande watershed of south-central New Mexico. This approximately 5,000-square-mile watershed, located east of the Continental Divide, extends from the Elephant Butte reservoir to the junction of the Mexico-New Mexico-Texas international boundary (USGS 2014). The watershed is dominated by the Rio Grande and the Elephant Butte and Caballo Reservoirs, which lie along the river. Caballo Reservoir, located at the eastern margin of the proposed project area, is an earthen dam reservoir constructed in the late 1930s. The estimated storage capacity of the reservoir is 227,000 Acre Feet (AF) (BOR 2015). The average volume of water stored in the reservoir between January 1 and June 9, 2015, was 36,715 AF (BOR 2015), approximately 16 percent of the total capacity.

Headwaters to the Rio Grande are fed by the Rocky Mountains in Colorado. Numerous tributary drainages within the Lower Rio Grande watershed also contribute water to the Rio Grande. However, none of these drainages provide perennial flow; they contribute flow primarily during storm events.

The mine area is located within the Greenhorn Arroyo drainage basin, a basin within the Lower Rio Grande watershed. This basin contains small, ephemeral washes (arroyos) that drain generally from west to east toward Caballo Reservoir; major washes include the Greyback and Greenhorn arroyos. Surface water runoff at Copper Flat Mine is generated predominantly by precipitation at higher elevations (Davie and Spiegel 1967). The Percha Creek and Las Animas Creek topographic drainage basins are located immediately south and north, respectively, of the Greenhorn Arroyo drainage basin. Both Percha Creek and Las Animas Creek flow from west to east toward Caballo Reservoir and have ephemeral, intermittent, and perennial reaches. Three drainage basins: Greenback Arroyo, Las Animas Creek, and Percha Creek, and their associated surface water features, are located in the area of the Copper Flat Mine (Figure 4).

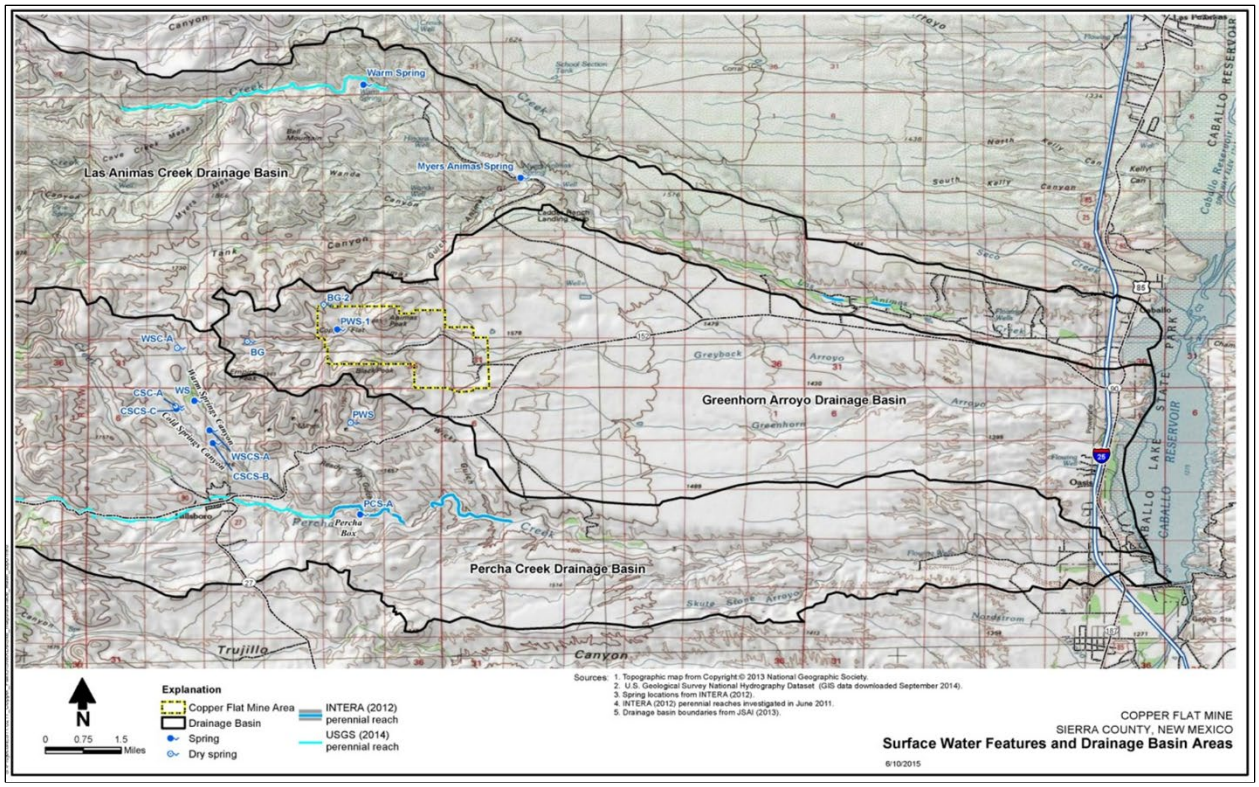

Figure 4. Surface Water Features and Drainage Basin Areas of Copper Flat Mine

The following subsections provide a description of each of the three drainage basins based on information documented in existing reports. These reports include recent baseline characterization and groundwater supply and modeling studies (Intera 2012; JSAI 2012 and 2013), a previous EIS (BLM 1999), and other historical documents (Davie and Spiegel 1967; Newcomer 1993).

Greenhorn Arroyo Drainage Basin

The Copper Flat Mine area lies within the Greenhorn Arroyo drainage basin. The area of this drainage basin is approximately 35,000 acres, including a 230-acre watershed that drains to the existing open pit (JSAI 2013). Current surface water uses within this basin are primarily livestock watering.

Major washes within the Greenhorn Arroyo drainage basin include the Greenhorn and Greyback Arroyos (Figure 5). Several smaller arroyos are tributaries to these two larger arroyos, which drain to the east and converge approximately 8 miles east of the Copper Flat Mine. The Greyback Arroyo is the predominant surface water drainage feature in the area of the mine. It originates west of the mine and was rerouted around the southern perimeter of the mine area during the earlier mining activities in the 1980s. Before mining in the 1980s, the Greyback Arroyo ran directly through the current mine area. An arroyo that is tributary to the Greyback Arroyo is located just north of the existing waste rock disposal facilities that are situated north of the pit lake. The arroyo runs along the north side of Animas Peak, and its confluence with the Greyback Arroyo is located east of the mine site. The Greenhorn Arroyo is located south of the Greyback Arroyo.

From August 2010 through April 2011, stormwater flows were monitored at three locations along Greyback Arroyo within the proposed mine area as part of the baseline characterization study (Intera 2012). Stormwater flows during this period were minimal, with dry conditions often observed. In March 1993, Newcomer et al. (1993) (as cited in Intera 2012) recorded a surface water flow rate of 0.028 cubic feet per second (cfs) (20 Acre Feet per Year (AFY)) in the Greyback Arroyo east of the former plant area.

Springs and seeps have been identified within the Greenhorn Arroyo drainage basin (Newcomer 1993; BLM 1999; Intera 2012). The baseline characterization study monitored springs located north and west of the open pit and identified several seeps emanating from the fractured bedrock of the open pit highwalls shortly after precipitation events (Figure 4). Flow rates at these features were minimal; the springs were dry, and pit wall seepage was too low to accurately measure flow during routine monitoring events (Intera 2012). Previously reported seeps and springs (BLM 1999; Newcomer et al. 1993) were dry during the baseline characterization study. Below average precipitation during the period of the baseline characterization study was likely a factor in the low flow rates and dry conditions observed at the springs and seeps. Precipitation recorded at the mine between October 2010 and September 2011 was 4.82 inches.

The existing open pit has filled with water to form a small pit lake. The pit lake covers approximately 5.2 acres and holds approximately 60 Acre Feet (AF) of water (Intera 2012). The water level at the pit lake is influenced by several factors, including the following:

- Stormwater runoff to the open pit;
- Groundwater inflow from the adjacent saturated bedrock; and
- Evaporation from the lake surface.

Las Animas Creek Drainage Basin

The Las Animas Creek drainage basin is adjacent to and north of the Greenhorn Arroyo drainage basin. The basin is approximately 84,000 acres (JSAI 2013) and is drained by Las Animas Creek (Figure 4). This creek originates in the Black Range Mountains west of the project area and flows to the east to Caballo Reservoir – a distance of approximately 32 miles. Like other drainages in the region, Las Animas Creek is deeply incised into an east-sloping alluvial plain. Springs have been identified within Las Animas Creek basin (Davie and Spiegel 1967). Several are present along Las Animas Creek, including Warm Spring and Myers Animas Spring.

Surface water flow characteristics in Las Animas Creek vary; the creek has ephemeral, intermittent, and perennial reaches but does not contribute perennial surface water flow to the Rio Grande. Surface water flow rates were measured in August 2010, November 2010, January 2011, and April 2011 along Las Animas Creek and ranged from 0.04 to 7.09 cfs (30 to 5,140 AFY) (Intera 2012). The greatest flow rates were generally recorded just downstream of Warm Spring in August, when precipitation was higher. During the period of the baseline characterization study, two short perennial reaches located 4 to 6 miles west of Caballo Reservoir were monitored, and Las Animas Creek was predominantly a losing stream where water infiltrates into the ground recharging the local groundwater, because the water table is below the bottom of the stream channel (Intera 2012) (Figure 4). Historical surface water flow

rates of Las Animas Creek range from less than 1 to 60.3 cfs (700 to 43,700 AFY) (Davie and Spiegel 1967; ABC 1998). The higher flow rates are most likely associated with snowmelt and late summer precipitation.

From 2010 and 2011, the flow rate at Warm Spring was nearly constant, ranging from approximately 0.73 to 1.1 cfs (530 to 800 AFY) (Intera 2012). Historical flow rate measurements vary from 0.007 cfs (5 AFY) (Newcomer 1993) to 0.81 cfs (590 AFY) (Davie and Spiegel 1967). A second, unnamed spring was identified during the 2010-2011 baseline characterization study (Intera 2012). This spring is located 3 miles downstream of Warm Spring and is designated as Myers Animas Spring on U.S. Geological Survey (USGS) topographic maps.

The Ladder Ranch uses water from the upper portion of Las Animas Creek basin for irrigation and to fill stock ponds (Intera 2012). This includes both surface water from Las Animas Creek and groundwater pumped from the shallow alluvium. Local residents use water resources in the lower portion of Las Animas Creek basin for agricultural and domestic purposes. A number of diversion ditches and return flow ditches exist along the lower portion of Las Animas Creek. In addition, many residents have shallow wells (NMOSE 2014), some of which are artesian. The use of diversion ditches and shallow wells along Las Animas Creek causes local and seasonal changes in alluvial groundwater levels and surface water flows (Davie and Spiegel 1967; Intera 2012).

Percha Creek Drainage Basin

The Percha Creek drainage basin encompasses approximately 77,000 acres (JSAI 2013), and is located immediately south of the Greenhorn Arroyo basin. The basin is drained by Percha Creek, which originates in the Black Range Mountains and flows to the east toward Caballo Reservoir (Figure 4). Surface water flow characteristics in Percha Creek vary, but are considered intermittent in many reaches (BLM 1999). Percha Creek is intermittent in the area of Hillsboro and perennial east of Hillsboro in an area known as the Percha Box, a steep-walled reach of the creek that is incised into Paleozoic carbonate rocks (BLM 1999) (Figure 4). The creek is perennial through the box due to its geological structure. Downstream of the Percha Box, the creek is ephemeral, as the surface geology changes from carbonate rocks to alluvial sands and gravels. At the east end of the creek, artesian groundwater conditions create local springs and flowing wells near Caballo Reservoir (BLM 1999). Percha Creek does not contribute perennial flow to the Rio Grande.

Between 2010 and 2011, surface water flow rates along perennial reaches of Percha Creek ranged from 0.002 to 7.45 cfs (1 to 5,400 AFY) (Intera 2012). The highest surface water flow rates were recorded in August, when precipitation was higher. Three separate perennial reaches were observed in the area of and immediately down gradient of the Percha Box (Figure 4). The reaches range from approximately 0.2 mile to 2 miles in length (Intera 2012). During the period of the baseline characterization study, the creek exhibited both losing and gaining reaches, with surface water flow decreasing significantly downstream of the Percha Box, eventually disappearing as the creek enters the Tertiary Palomas Basin alluvial gravels and sands. Earlier surface water investigations report perennial flow characteristics in the area of the Percha Box, with measurable flow rates ranging from approximately 0.3 to 1 cfs (200 to 700 AFY) (SRK 1995; ABC 1996).

Several springs have been identified in the Percha Creek drainage basin (Intera 2012). Springs exist in Warm Springs and Cold Springs canyons and the Percha Box (Figure 4). Warm Springs and Cold Springs canyons are tributary drainages to Percha Creek and are located northwest of the Percha Box. Between 2010 and 2011, surface water flow rates at springs in these canyons ranged from 0 cfs (0 AFY) (i.e., stagnant water or dry conditions) to 0.75 cfs (540 AFY), with the highest flow rates recorded in August (Intera 2012). The flow rate at a spring monitored within the Percha Box was nearly constant, ranging from 0.41 to 0.64 cfs (300 to 460 AFY) (Intera 2012), and exhibited little seasonal variability. Springs are also present at the eastern terminus of Percha Creek.

Water resources within the Percha Creek drainage basin are used for domestic purposes, livestock, and irrigation (Intera 2012). Many of the residents of Hillsboro and the surrounding area have shallow alluvial wells (NMOSE 2014). Some residents also divert surface water for irrigation. Ranches east of Hillsboro obtain stock water from shallow alluvial wells or diversion ditches when surface water is available. The shallow wells are generally located in the alluvium along Percha Creek.

Groundwater Hydrology

Groundwater resources within the affected environment include those near the Copper Flat Mine area and those near the water supply wells, as shown in Figure 5. Related geologic information is discussed in Section 3.7 of the EIS, Mineral and Geologic Resources. References used in compiling information on area groundwater include Davie and Spiegel (1967); Wilson et al. (1981); BLM (1999); JSAI (2011); Intera (2012); Jones et al. (2012); and Jones et al. (2013).

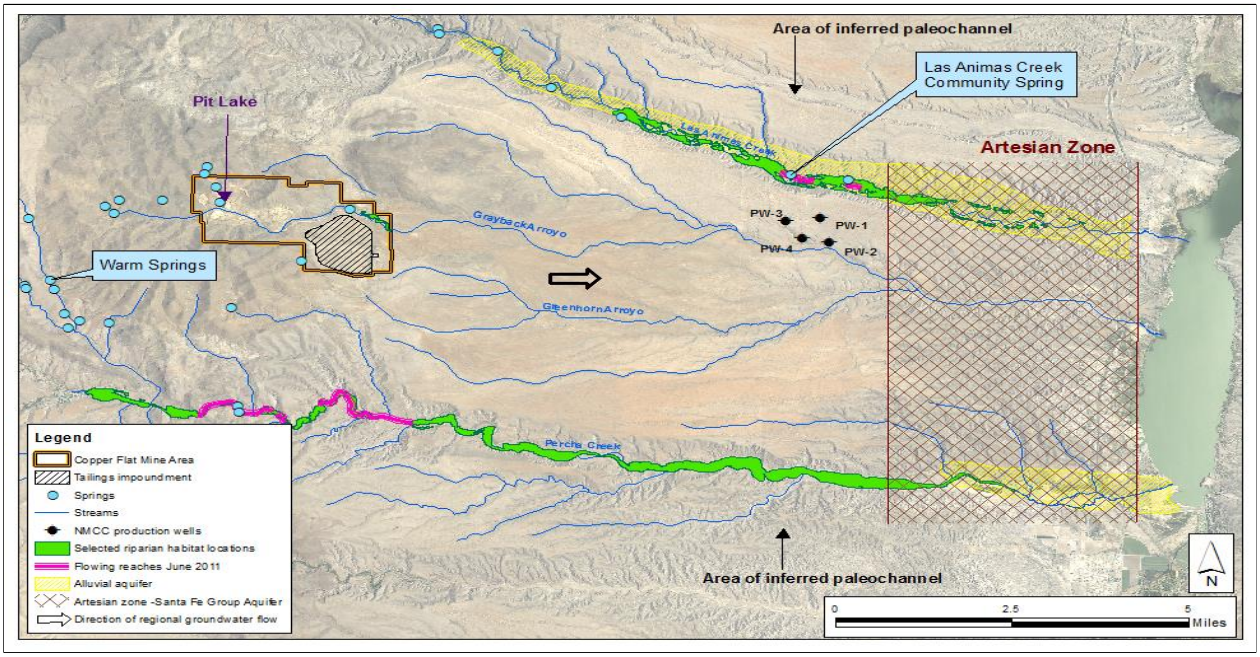

Figure 5. Hydrologic Features in the Project Area

Regional Hydrogeology

The principal water-bearing materials of the project area include the coarser sediments in the Santa Fe Group of the Palomas Basin and Warm Springs Valley, and saturated alluvium in the principal drainages. As documented in Jones et al. (2012), groundwater recharge occurs primarily in the uplands, where periodic rainfall and snowmelt are greater than elsewhere, and

along the arroyos and losing stream reaches where ephemeral and intermittent surface flows can seep downward. Regional-scale groundwater flow is west to east, from about 5,800 feet above mean sea level (amsl) at the western edge of the Warm Springs graben (an elongated block of the earth's crust lying between two faults and displaced downward relative to the blocks on either side) to less than 4,200 feet amsl at Caballo Reservoir.

Except near the mine, data on groundwater levels are sparse, making it difficult to accurately map the water table. The water level information that is available (e.g., Wilson et al. 1981, Plate 5) indicates that map contours are closely spaced in the Animas Uplift and westernmost Palomas Basin, which indicates a relatively steep water level gradient and is evidence of lower transmissivity. Transmissivity is the ability of an aquifer to transmit water through it. This indicates that groundwater movement is more restricted in the Animas Uplift and westernmost Palomas Basin than the NMCC well field.

Map contour spacing is much wider around the NMCC well field, which indicates the water table gradient is flatter and the aquifer has a higher transmissivity and better potential to supply mine wells. The gradient steepens again east of the well field, indicating more restricted water movement toward Caballo Reservoir, as a result of substantial clays in the Santa Fe Group east of the well field.

Groundwater discharge is primarily to the Rio Grande valley, including river alluvium and Caballo Reservoir. Some discharge occurs locally to springs, to tributary streamflow, and to riparian vegetation along tributaries (primarily Las Animas and Percha Creeks). Discharge also occurs to area wells, most of which withdraw less water in comparison to the production expected from the NMCC wells.

Hydrogeology of the Mine Pit Area

John Shomaker and Associates, Inc. (JSAI 2011) estimate hydraulic conductivity of the saturated crystalized bedrock in the mine area to be in the range of 0.05 to 0.1 feet per day, with the higher values in the fractured monzonite. These values are consistent with the findings of (DBSA 1998). This equates to a transmissivity of no more than 10 square feet per day for each 100 feet of thickness, which is low. Because the rocks in the uplift are poorly transmissive, which means water moves slowly through it, most groundwater from the highly transmissive Santa Fe Group sediments in the Warm Springs Valley flows around the uplift northeast toward Las Animas Creek or southeast toward Percha Creek. Disturbed areas at the mine area, such as areas of waste rock, are likely more permeable than the natural material. These areas may be locations of minor recharge to the local groundwater system.

The existing pit was excavated to below the local water table, and thus required dewatering for mining to occur. The pit lake elevation is currently as much as 100 feet below the regional groundwater table. Reflecting the lower transmissivity of the bedrock, inflows to the lake are less despite the gradient. Thus pumping rates for dewatering were no more than 50 gpm for the Quintana pit (Jones et al. 2013). In the absence of pumping for dewatering, the level of water in the pit lake reflects an approximate balance in which evaporation is the only depletion. Evaporation is offset by the inflows from precipitation, local runoff, and groundwater. For these reasons, net outflow to groundwater is likely to be insignificant at the pit.

Hydrogeology of the Tailings Storage Facility
A portion of the existing Tailings Storage Facility (TSF) overlies Santa Fe Group materials. Local hydrologic conditions in this area have been extensively studied as part of a program to abate elevated levels of dissolved solids in groundwater caused by seepage from the existing tailings. Information below is taken from Intera (2011), which was submitted by NMCC to the New Mexico Environmental Department (NMED).

Seepage from the western part of the TSF flows directly into gravels of the Santa Fe Group. In the eastern part of the TSF, the Santa Fe is overlain by a shallow clay layer which in turn is beneath surficial stream terrace gravels. These gravels include old placer workings. Seepage from the eastern part of the TSF flows eastward through the gravels that overlie the clay, creating a water level mound that is higher than the regional water table. Tests on both the shallow and deeper gravels indicate a hydraulic conductivity of 1 to 5 feet per day.

A fault lies east of the TSF. The fault may act as a barrier to groundwater flow from the mound that occurs beneath the tailings. It may limit the extent of a sulfate plume that extends east of the TSF in the shallow gravels.

Hydrogeology of the Palomas Basin in the Vicinity of the Supply Well Field
The existing water supply wells for the mine are located within the Palomas Basin on a mesa between Animas Creek (north) and Greyback Arroyo (south), about 8 miles due east of the mine and within 6 miles of Caballo Reservoir to the east. The production wells were located following an exploration program that determined this to be the nearest location to the mine with sediments that have both sufficient thickness and permeability to support large capacity supply wells (Dunn 1982). The location coincides with a graben and paleo-channel (Figure 6). Figure 6 is a cross-section along Lower Las Animas Creek near the supply wells. In addition to showing the graben in which the supply wells are located, the figure shows a shallow clay layer that serves as a perching horizon that would isolate flows in Las Animas Creek from direct effects of pumping of the mine supply wells. The presence of a clay layer is demonstrated in well logs and in aquifer test results. The cross-section also shows a substantial amount of clay east of the well field that is responsible for the artesian conditions found in many wells between the supply well field and the Rio Grande.

Groundwater flow in the area depicted by the cross-section is consistent with the overall flow in the Palomas Basin, which is west to east toward the Rio Grande valley. In the well field area the slope of the water table is less than 20 feet per mile, compared to 150 feet per mile near the mine (Wilson et. al., 1981). As previously noted, this difference in gradient is due to the differences in transmissivity in different parts of the aquifer.

The 4 large-diameter (16-inch) production wells were originally tested to have individual well yields on the order of 1,000-2,000 gallons per minute (gpm) (Dunn 1982). Wilson et al. (1981) indicates that the wells penetrate a thickness of 950 to 1,000 feet of sand and gravel before encountering any thick clay beds. According to data in Intera (2012), the wells are typically screened over the bottom 600 feet. Depths to water exceed 300 feet, and the average static water level in the wells is at 4,380 feet amsl.

Aquifer tests of the supply wells conducted by NMCC in 2012 resulted in a generalized estimate of the transmissivity of the upper 1,000 feet of the Santa Fe Group to be 20,000 square feet per day (i.e., hydraulic conductivity was estimated at 20 feet per day; see JSAI 2014). This is higher

than the 11,000 square feet per day reported in BLM (1999), but that reference did not specify aquifer thickness and thus cannot be directly compared to the recent test result. (DBSA 1998) also indicated a possible value of 11,000 square feet per day.

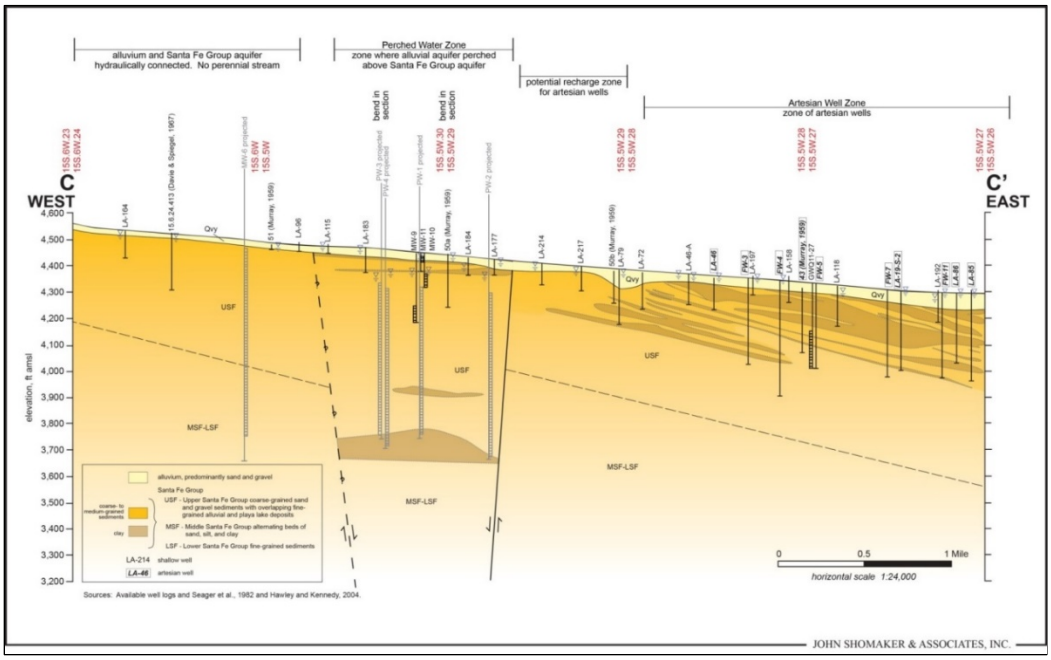

Figure 6. Cross-Section North of Supply Well Field

Hydrogeology of Alluvial Valleys in the Vicinity of the Mine and Well Field

The alluvial valleys potentially affected by the Copper Flat Mine and well field are those streams and arroyos that drain the area near the mine and supply wells: Las Animas Creek, Percha Creek, Greyback and Greenhorn Arroyos, and the Rio Grande including Caballo Reservoir.

Las Animas Creek: The only published report specific to the hydrology of Las Animas Creek is Davie and Spiegel (1967). This reference provides information on area groundwater, for both pre-development and the historic conditions resulting from the development of surface irrigation systems and drilling of artesian wells, and was an important source of information used to construct the groundwater model used in this analysis. In the area near the mine project well field, the valley of Las Animas Creek is locally underlain by alluvial materials in the range of 20-60 feet thick. The materials contain shallow groundwater that is generally close enough to the land surface to be within the riparian root zone. Intera (2012) provides the results of a seepage study along Las Animas Creek. In most areas the creek is a losing stream (water losses exceed water gains when there is runoff) and a source of recharge to the water moving in the underlying alluvium. Reaches with perennial flow occur near the water supply well field; the stream dries up below these reaches, as shown above (Figures 4 and 5).

Wilson et al. (1981) observed that the static water levels in the area of what is now the mine project well field were 25 to 50 feet lower than the water table in the Las Animas alluvium. That relationship is also shown in Intera (2012), is consistent with BLM (1999), and is illustrated by Figure 7 above which depicts a shallow water table in the area labeled 'Perched Water Zone'. The data indicate that perched alluvial groundwater occurs in Las Animas Creek in the reach near the supply wells. This perched water has limited hydraulic connection to the main aquifer

that will be directly impacted by the supply wells. Hydrology within the perched layer reflects localized conditions such as seepage from irrigation canals and irrigated fields, and pumping of domestic and other small capacity wells. The amount of downward seepage from the perched groundwater to the Santa Fe Group sediments is considered small (BLM 1999) and is independent of water levels in the Santa Fe Group.

The clays in the Santa Fe Group east of the well field created artesian conditions, in which water levels were above the land surface before the aquifer was developed (Intera 2012). In that area there are large capacity irrigation wells that penetrate several hundred feet or more into the permeable materials of the Santa Fe Group. Artesian flows of up to a few hundred gpm have been reported in these wells at various points in time. Pressures have declined over time, and some wells no longer flow (Jones et al. 2013). However, such wells can still produce several hundred gpm if pumped. According to Jones et al. (2012), the decline in artesian pressure may be due in part to poor well construction that resulted in leakage upward from the artesian zone by means of flow in and around the well casings.

Percha Creek: Near the supply wells, the valley of Percha Creek is underlain by alluvial materials up to 50 feet thick that contain groundwater (Wilson et al. 1981). The primary area where groundwater supports riparian vegetation or surface flow is in and just downstream of the Percha Box, where Paleozoic bedrock is at the surface and groundwater flows to the surface. Elsewhere the stream is typically dry and flow that does occur (e.g., from storm runoff) provides recharge to groundwater.

Many wells are found near Percha Creek near Hillsboro, New Mexico. These wells typically draw from shallow alluvium or from silts and clays in the Santa Fe Group (Seager et al. 1984) and yields are generally low. Data are not available on the water table elevation in the Percha Creek alluvium in the area of the supply wells, and the extent of perched conditions (if any) is not defined. Some artesian wells do occur near the downstream end of the creek, where the hydrogeology is similar to that in lower Las Animas Creek.

Arroyos: Alluvium is found along Greyback and Greenhorn Arroyos and consists primarily of sand and gravel; thickness varies between 5 and 50 feet (Intera 2012). Alluvium in Greyback Arroyo may be locally and seasonally saturated in the vicinity of the mine. Hydrologic conditions in arroyos near the supply wells have not been defined. No wells are known to obtain their water supply from arroyo alluvium.

Rio Grande: Wilson et al. (1981) provide information on hydrogeology along the Rincon Valley. Alluvium deposited by the Rio Grande underlies the valley, including Caballo Reservoir. The material is up to 100 feet thick and overlies clays in the Santa Fe Group. Water levels are generally within 15 feet of the ground surface, with a flow direction south at the same slope as the ground surface (about 5 feet per mile). Specific capacities of wells in the Rincon Valley average 50 gpm per foot, a value which indicates a high hydraulic conductivity. Flow from the Palomas Basin to the discharge zone along the Rio Grande Valley is presumably affected by the elevation of water in Caballo Reservoir, but details on this relationship are not established.

Springs: Numerous springs are known to occur in the vicinity of the proposed mine and supply well field, as shown in Figure 6. In this area, spring flows can originate in several ways. Most springs occur along the main creeks upstream of the well field where groundwater discharges

from perched horizons, or from the emergence of shallow groundwater that overlies low permeability materials (e.g., Percha Box). Several small seeps and springs are located in the area of the mine pit (Intera 2012). These are higher in elevation than the regional water table and are interpreted as discharge from local perched water.

Springs in Warm Springs Valley (including Warm Springs itself) are understood as an emergence of water due to the barrier effect of the Animas Uplift. Consequently, the generally eastward flow of groundwater in the valley is diverted around the low permeability rocks in the uplift, south to toward Percha Creek and north toward Las Animas Creek. Upflow of deep geothermal water along faults is an additional source of spring flow (Kelley et al. 2013).

Many of the springs have been observed to be dry at times; flow is thus often intermittent or ephemeral. However, limited data on "NWS" spring on Las Animas Creek indicate a measured flow of 0.7 to 1.1 cfs (Intera 2012). Water from NWS spring is warmer than in other local springs and is believed to have a deep source. None of the published reports identify any springs that discharge from groundwater that is in direct hydrologic communication with the NMCC supply wells, pit lake, or TSF.

Existing Uses of Groundwater

The New Mexico Office of the State Engineer (OSE) maintains records on wells and water use. There is no compilation of data specific to the Palomas Basin. The New Mexico Water Rights Reporting System (NMWRRS) is the designation of OSE's database which contains scanned copies of various documents in the State's water rights files. Kevin Myers, staff hydrologist at OSE provided the results of a search of the NMWRRS database for the Palomas Basin area. The search identified nearly 700 separate points of diversion or well locations, mostly located along the valleys and in the area where artesian wells are found. Mr. Myers indicated the OSE files identify a number of claimed or permitted water rights that total in excess of 6,000 AFY, most of which are for irrigation use; in addition, many domestic and stock wells are listed.

The NMWRRS database includes information as reported by drillers and well owners, which commonly does not reflect any process of independent quality control to ensure the files are complete or the content not originating with the agency is accurate. In this instance, documents relating to the Quintana Mine water rights were not found in the database and location coordinates for some irrigation wells do not appear to correspond to areas where irrigated land is observed on air photos. Moreover, there are no data that indicate the amount of groundwater pumping that actually occurs within the area.

For some files, the database can provide unverified information on actual water use. The Hillsboro Mutual Domestic Water Consumers Association has the largest water right not associated with mining or irrigation. This water right is 217.75 AFY. Actual use was about 30 AFY in 2001, the most recent year when data from all three community wells were found in the OSE files.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY DETERMINATIONS

Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components in our evaluation for each species: (1) the *Status of the Species*, which evaluates the species' range-wide condition, the factors responsible for that condition, and its

survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and, (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the species' current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the species and the role of the action area in the survival and recovery of the species as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

STATUS OF SPECIES AND CRITICAL HABITAT

Chiricahua Leopard Frog

The Chiricahua leopard frog was originally listed as a threatened species under the ESA with the taxonomic scientific name *Rana chiricahuensis* in 2002 (67 FR 40790). A summary of the species and status of the frog can be found in the final 5-year review for the Chiricahua leopard frog (Service 2011). A final rule published on March 20, 2012 (77 FR 16324), designated critical habitat and included a reassessment of the status and threats to the species along with a taxonomic scientific name change to *Lithobates chiricahuensis*. There is no critical habitat within the action area. The nearest critical habitat unit is the North Seco Creek Unit, which is approximately 8 miles northwest of the project area. Additional information regarding the status of the species can be found in the Chiricahua Leopard Frog Final Recovery Plan (Service 2007). These documents are hereby incorporated by reference.

The range of the Chiricahua leopard frog includes central and southeastern Arizona; west-central and southwestern New Mexico; and in Mexico, northeastern Sonora, the Sierra Madre Occidental of northwestern and westcentral Chihuahua, and possibly as far south as northern Durango (Platz and Mecham 1984; Degenhardt et al. 1996; Sredl and Jennings 2005; Brennan and Holycross 2006; Lemos-Espinal and Smith 2007; and Rorabaugh 2008). The distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially *Lithobates lemosespinali* (no common name)) in the southern part of the range of the Chiricahua leopard frog. Based on 2010 data, the species still occurs in most major drainages in Arizona and New Mexico where it occurred historically; the exception to this is the Little Colorado River drainage in Arizona. In Arizona and New Mexico, the species likely occurs at about 14 percent and 16 to 19 percent of its historical localities, respectively (Service 2007).

The most recent 5-year status review (Service 2011) estimates that there are 90, 29, and 45 Chiricahua leopard frog occupied sites in Arizona, New Mexico, and Mexico, respectively.

Occupied sites are defined as sites that range from 1 individual Chiricahua leopard frog (i.e., egg mass, tadpole, metamorph, or adult) to a robust breeding population. The occupied sites have increased in Arizona and New Mexico; however, to a lesser extent in New Mexico than in Arizona. The increase in occupied sites is primarily the result from active management, which includes removing American bullfrogs (*Lithobates catesbeianus*), habitat creation, and habitat enhancement, and from the reintroduction of Chiricahua leopard frogs.

The Chiricahua leopard frog is known currently and historically to occupy cienegas (mid-elevation wetland communities often surrounded by arid environments), pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3281 - 8890 feet (994 – 2694 meters) in central and southeastern Arizona, west-central and southwestern New Mexico, and northern Sonora and the Sierra Madre Occidental of Chihuahua and Durango, Mexico. Extensive research was conducted to determine the extent of populations remaining, resulting in the listing of the species as threatened in 2002 (77 FR 16324).

Shallow waters with emergent and perimeter vegetation provide tadpole and adult basking habitats, while deeper water, root masses, and undercut banks provide refuge from predators and potential sites for hibernation (Sredl and Jennings 2005). Most perennial waters supporting frogs possess fractured rock substrate, emergent or submergent vegetation, deep water, root masses, undercut banks, or some combination of these features that frogs may use as refugia from predators and climatic conditions. Frogs may over-winter at or near breeding sites, although these microsites have not been studied. Other leopard frog species typically over-winter at the bottom of well-oxygenated ponds and may bury themselves in the mud (Nussbaum et al. 1983, Harding 1997).

Range-wide, the most serious threats to the Chiricahua leopard frog include predation by nonnative organisms, especially American bullfrogs, spiny-rayed fishes, and non-native crayfish (*Oronectes virilis; Oronectes spp.*), and a fungal skin disease (Chytridomycosis) that is killing frogs and toads around the globe. The introduced crayfish (*Oronectes spp*.) is having major negative effects on native populations of frogs in North America (Kats and Ferrer 2003), and likely is having adverse effects to Chiricahua leopard frogs in Arizona and New Mexico. Bullfrogs are also significant predators of native frogs and recent eradication efforts in southern Arizona (Atascosa Mountains and Cienega Valley) appear to have established conditions that are favorable to the reestablishment of the Chiricahua leopard frog. Efforts are underway to expand bullfrog eradication efforts into New Mexico. Chytridiomycosis and nonnative organisms, in addition to habitat fragmentation, disruption of metapopulation dynamics (relationships among populations of frogs), and loss of habitat resulting from water diversion, groundwater pumping, drought, floods, wildfires, and pollution remain as factors adversely affecting the species and limiting its recovery. Climate change and increases in ultra violet radiation will likely indirectly impact this species in the future in the form of increased drought and warmer temperatures.

ENVIRONMENTAL BASELINE

Under section 7(a)(2) of the ESA, when considering the effects of the action on federally listed species, the Service is required to take into consideration the environmental baseline. Regulations implementing the ESA (50 CFR § 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the

action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in progress. The environmental baseline defines the status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Chiricahua Leopard Frog

The action area of the project in terms of surface hydrology and related groundwater resources encompasses the lower reach of the Las Animas Creek, the lower reach of Percha Creek, and the Greyback and Greenhorn Arroyo drainages (Figure 7). The Chiricahua leopard frog is not known to occur in Percha Creek or any of its tributaries. The Greyback and Greenhorn Arroyos are ephemeral so they may provide dispersal habitat, but not permanent habitat. The effects to dispersal habitat are reasonably certain to reduce the dispersal capabilities of Chiricahua leopard frogs located on the Ladder Ranch and at other nearby potential sites.

Cave Creek and the mainstem of Las Animas Creek on Ladder Ranch have been used as frog restoration sites by the Turner Endangered Species Fund (TESF) frog project for a number of years. However, due to the groundwater hydrology, Cave Creek and the portion of Las Animas Creek transecting the Ladder Ranch would not likely be affected by the Copper Flat Mine groundwater pumping near the lower reaches of the Las Animas Creek. Therefore, the analysis of effects of the action on the frog focuses on the lower portion of the Las Animas Creek downgradient of Ladder Ranch.

In addition to potential adverse effects caused by the mine project's groundwater pumping, there is a concern that occupied Chiricahua leopard frog habitat may be adversely affected by contamination resulting from chemicals in mine waters that are sprayed on project site roads for dust abatement. The contaminated water could run off site roads and into stream systems containing the frogs. However, the contamination of stream systems where frogs may be found could only occur if the sprayed roads were within the local watershed where the runoff would flow during rain events. The project site roads are in the Greenhorn Arroyo drainage, which, with the Greyback Arroyo, drains to a watershed entirely separate from Las Animas, Seco, Las Palomas, and Cuchillo creeks. Therefore, there would be no risk that contaminated mine water used for dust abatement would be channeled to Chiricahua leopard frog habitat or populations. The same conclusion holds for any contamination that might occur at the mine site itself. The entirety of the mine site is contained in the Greyback-Greenhorn Arroyos watershed, so any surface water contamination that might reach the ground water surface at the site from blasting or an accidental ore-truck or process-chemical container truck spill, for example, would not be channeled to the Las Animas or Percha Creek systems.

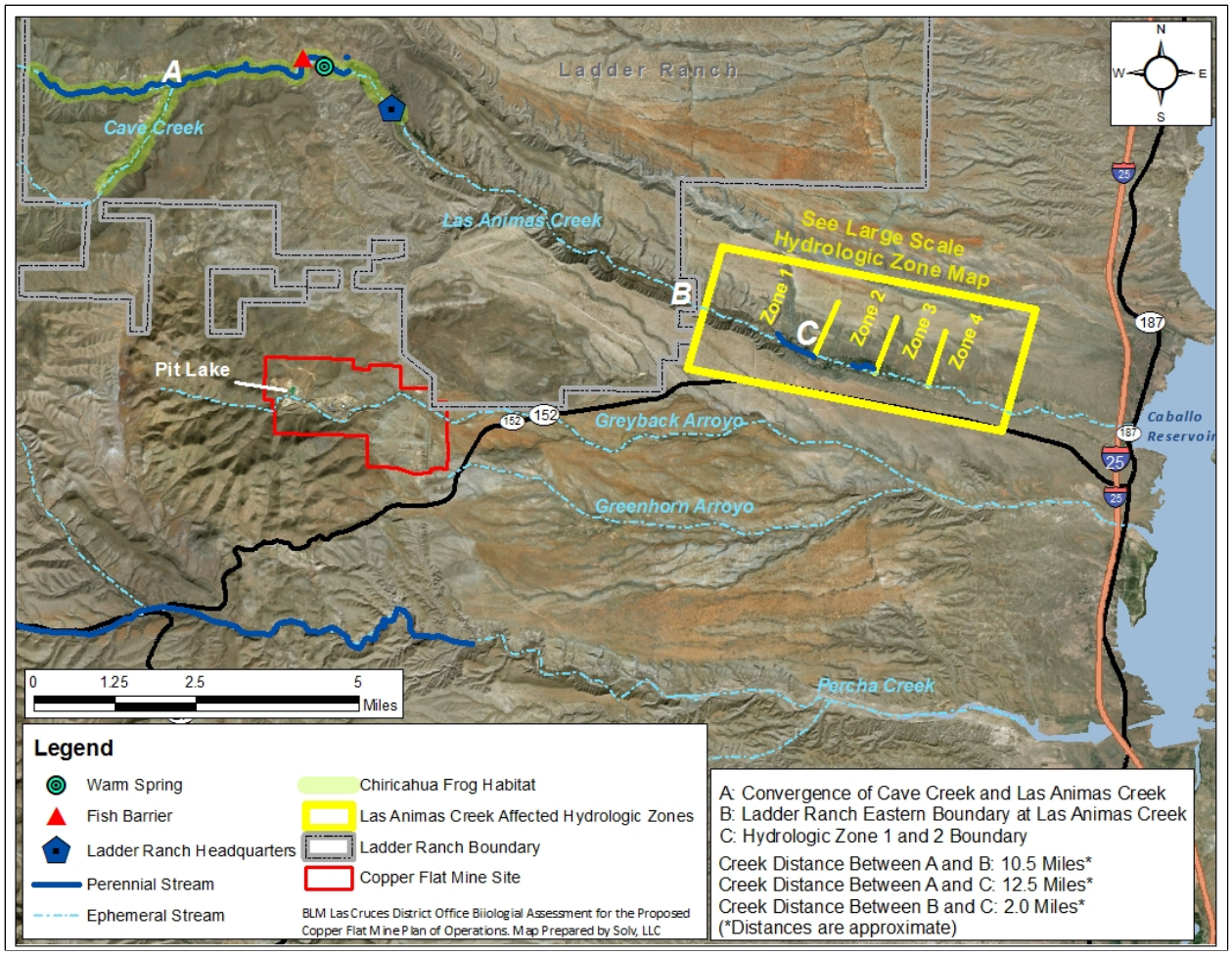

Figure 7. Surface Hydrologic Features of the Project Action Area Evaluated for Chiricahua Leopard Frog Effects

The lower portions of Las Animas Creek and its floodplain include small sections of permanent surface waters comprising two segments of less than 2,000 feet and the adjacent riparian areas along Las Animas Creek. These surface water and riparian habitat features are sustained by a perched aquifer which overlies a portion of the deep groundwater zone that would be pumped during mine operations. East of and downgradient from these segments, Las Animas Creek has ephemeral, intermittent, and perennial segments connecting to the floodplain. The floodplain of the lower Las Animas Creek contains twelve man-made and maintained irrigation ponds that may provide frog habitat for portions of the year, depending on size and frequency of drainage for field irrigation. Based on observations of various ranids in Arizona and New Mexico, reasonable dispersal distances for the Chiricahua leopard frog are (1) one mile overland, (2) three miles along intermittent drainages, and (3) five miles along permanent water courses, or some combination thereof (USFWS 2008).

As illustrated in Figure 8, there is potential Chiricahua leopard frog dispersal habitat along Las Animas Creek for approximately 1.5 miles south of the five-mile buffer of the nearest known Chiricahua leopard frog wild site to the twelve ponds of interest. Wild sites are defined as wetland sites that are open and have no impediments to Chiricahua leopard frog entry or exit, and include streams, tinajas, earthen tanks, steel tanks, and natural ponds. Therefore, the twelve manmade irrigation ponds of concern are considered to be “wild sites”. Considering the one-,

three-, and five-mile reasonable dispersal distances from known Chiricahua leopard frog wild sites, with potential undocumented wild sites in closer proximity, it is reasonable to assume that Chiricahua leopard frogs could disperse (or may have already dispersed) to inhabit the twelve man-made irrigation ponds.

Chiricahua leopard frog populations are also known to occur in Cuchillo Creek and in at least three other drainages (and in dirt tanks in the vicinity of these drainages) in Sierra County (BLM 2013), but these locations are not within a reasonable dispersal distance from the irrigation ponds.

The Chiricahua leopard frog was not observed in the riparian areas of Las Animas Creek and Percha Creek during the project's biological surveys (NMCC 2012 and 2015), and there are no recent reports of the frog being present on the reaches of Las Animas Creek that would be considered potentially affected by the project or in Percha Creek. It must be noted that the project's biological surveys did not employ standard protocols for identifying or inventorying the Chiricahua leopard frog, though, and that the surveys were not conducted on private lands in the lower portions of the Las Animas Creek drainage. This means that the analysis was conducted without the benefit of accurate frog population estimates.

Surveys of portions of Las Animas Creek above the action area (i.e., upgradient from the portions of lower Las Animas that might be affected by pumping for mine operations) have been conducted by agencies and entities not affiliated with the Copper Flat project. Surveys of the Las Animas drainage during the summer of 2001 using Service approved species-specific protocols documented four frogs in Cave Creek, but none in Las Animas Creek (Christman 2002 as cited in USFWS-NMESFO, 2003). TESF began a captive rearing program to provide stock for reintroductions and in November of 2014 released 420 tadpoles and 52 metamorph/adults into Las Animas Creek (McCaffrey and Phillips 2015).

In 2014, the New Mexico Department of Game and Fish (NMDGF), the Southwest Region of the Service, the U.S. Forest Service, Gila National Forest, and Turner Ranch Properties, LP prepared an Environmental Assessment (EA) for Restoration of Rio Grande Cutthroat Trout to the Las Animas Creek Watershed. The EA preparers noted that the Chiricahua leopard frog occurs in the project area on the Ladder Ranch in Las Animas Creek from Warm Springs (located below the fish barrier) upstream to approximately 2 miles above the confluence of Cave Creek and in lower Cave Creek (Kruse 2013).

In the lower reach of Las Animas Creek, where the surficial geology does not have the shallow inter-bedded clays that would support a perched aquifer, and the artesian well system does not contribute directly to creek flows, there is no riparian vegetation growth of any note. There are some minor patches of wetland emergent vegetation in the artesian-well fed ponds. The project did not conduct surveys on private land where the twelve manmade, artesian-fed ponds are being used for crop irrigation and livestock water.

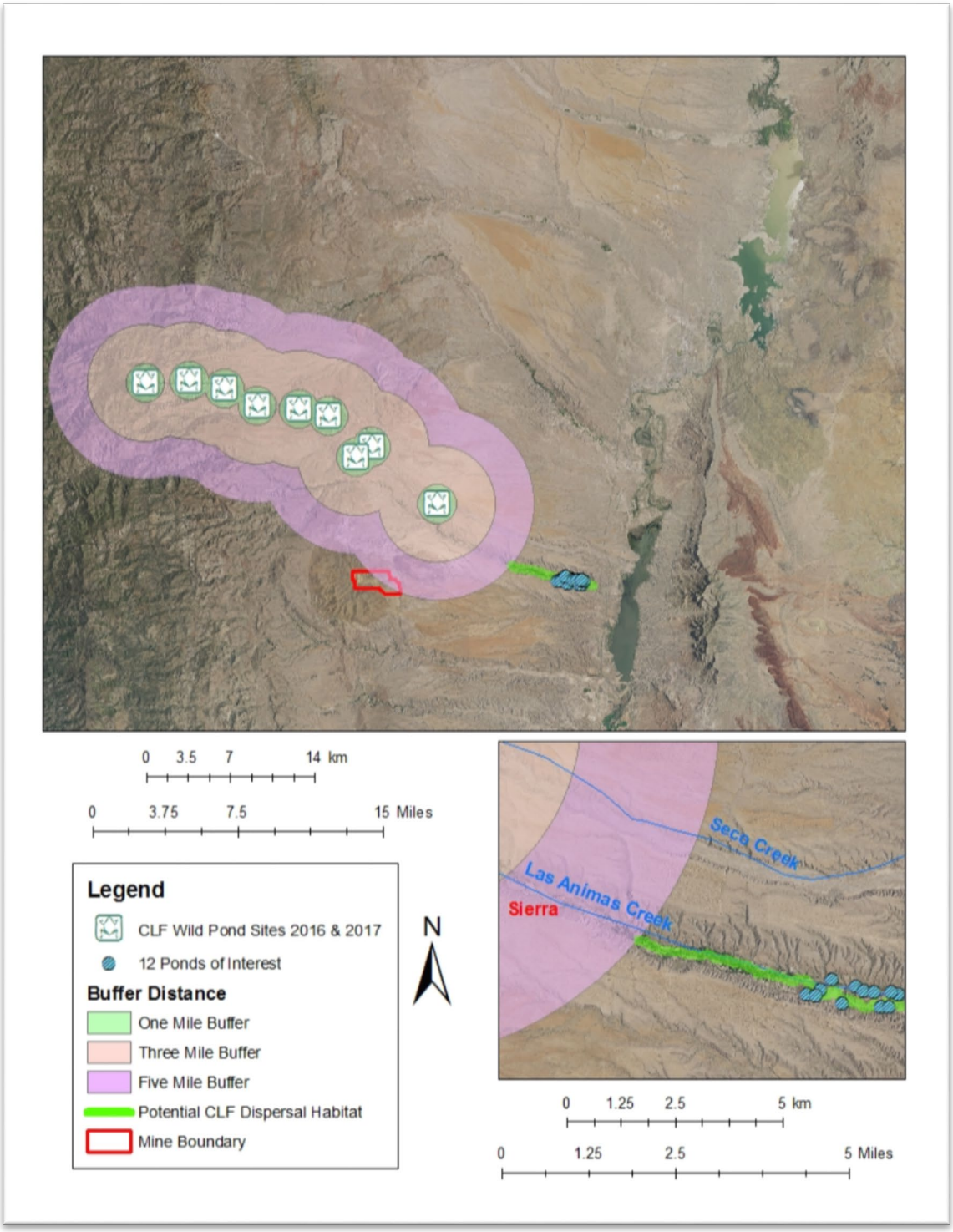

Figure 8. Map showing the proximity from nine known Chiricahua leopard frog wild pond sites on the Ladder Ranch to the twelve manmade irrigation ponds that will likely be affected by the proposed action. Please note the one, three, and five mile buffers illustrating the reasonable dispersal distance from wild sites to potential Chiricahua leopard frog dispersal habitat that connects to the twelve manmade irrigation ponds.

Factors affecting the species within the action area

As previously stated, the Copper Flat mine project is a proposed reestablishment of a poly-metallic mine and processing facility located near Hillsboro, New Mexico (Figure 1). The Proposed Action would consist of an open pit mine, flotation mill, tailings impoundment, waste rock disposal areas, a low-grade ore stockpile, and ancillary facilities. In most respects, the facilities, disturbance, and operations would be similar to the former mining operation at this location.

In addition to mining, past and ongoing state, local, and private actions that are reasonably certain to continue in the action area include the following:

- Agricultural activities including livestock grazing and crop farming;
- Recreational activities including water-based tourism that is prevalent along the nearby Elephant Butte, Caballo Lakes, and Hot Springs, and birding along the Rio Grande flyway; and
- Utility rights-of-way (Sierra County, 2006).

These past and ongoing activities have resulted in the removal or modification of vegetation, soil compaction, and alteration of hydrologic conditions to Chiricahua leopard frog habitat. The proposed Copper Flat Mine is expected to have a 2-year construction period followed by a 12-year operational period, a 3-year closure period, and a 12-year post-closure, monitoring period. Agricultural, recreational, and utility rights-of-way activities are expected to continue at current levels over the same time frame. When viewed collectively, these actions would continue to restrict Chiricahua leopard frog habitat within the action area.

Additionally, the American bullfrog (*Lithobates catesbeiana*), an introduced species, and canyon treefrog (*Hyla arenicolor*), a native species, occur in Las Animas Creek in the project area (Kruse and Christman 2007). Non-native crayfish are known to occur below the fish barrier and may also occur above the fish barrier in Las Animas Creek (Kruse 2013). As previously stated, range-wide, the most serious threats to the Chiricahua leopard frog include predation by nonnative organisms, especially American bullfrogs, and non-native crayfish.

Furthermore, a fungal skin disease (Chytridomycosis) that is killing frogs and toads around the globe is a threat to the Chiricahua leopard frog. Chytridiomycosis and nonnative organisms, in addition to habitat fragmentation, disruption of metapopulation dynamics (relationships among populations of frogs), and loss of habitat resulting from water diversion, groundwater pumping, drought, floods, wildfires, and pollution, remain as factors adversely affecting the frog and limiting its recovery. Additionally, climate change and increases in ultra violet radiation will likely indirectly impact this species in the future in the form of increased drought and warmer temperatures.

In summary of these factors affecting the Chiricahua leopard frog in the action area, when added to past, present, and future state, private, or location actions, the proposed project is expected to contribute to overall adverse cumulative effects to the Chiricahua leopard frog within the action area.

EFFECTS OF THE ACTION

Factors to be considered

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that do not have independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Effects of the Action to the Chiricahua Leopard Frog

Potential adverse effects from the Copper Flat Mine project that are considered in this evaluation include direct effects such as the possibility of contamination of the flowing surface water in Las Animas Creek and reduction in the volume of water in the creek, and indirect effects such as removal or deterioration of riparian vegetation that protects the creek's aquatic environment. Also considered are effects on the twelve manmade artesian well-fed ponds near the intermittent lower reach of Las Animas Creek, which may provide suitable Chiricahua leopard frog habitat.

Potential Effects from Contamination

Surface Water
It is unlikely that contamination of Las Animas Creek surface water would occur, because, even in the event of an accidental spill or major runoff event directly from the mine site or on the roadway approaches to the mine site, contaminants would not flow to Las Animas Creek because of the creek's location in a separate watershed. Greyback Arroyo would channel any such contaminated runoff east, towards Caballo Reservoir, and the watershed of Las Animas Creek is separated from the arroyo watershed by the local topography.

Ground Water
The same conclusion for potential surface water contamination applies to the risk for groundwater contamination. The entirety of the mine site is contained in the Greyback-Greenhorn Arroyos watershed, so any surface contamination that might reach the ground surface at the site from blasting or an accidental ore-truck or process-chemical container truck spill, for example, would not be channeled to the Las Animas or Percha Creek systems. Any contaminated water would be channeled in the Greyback-Greenhorn Arroyos watershed.

Additionally, the operation of the Copper Flat Mine will include environmental controls of the New Mexico Environmental Department (NMED) discharge plan that prevents any discharges to ground water. The entire site will be operated in a manner to prevent spills and to keep groundwater from being adversely impacted. The installation of a liner beneath the Tailings Storage Facility, for example, will help to prevent any significant leaks from reaching groundwater.

The Copper Flat Mine water management plan will ensure that mine wastes are reclaimed for long term storage and will be monitored. As a further safeguard, the mine will use an extensive groundwater monitoring network that is required by NMED, so any potential discharges from the

mine operation can be detected if they occur and can be mitigated for within the mine permitted boundary. Plus, the physical properties of the mine, including hydrogeologic consequences analysis and report, which concluded that in an event of a discharge to groundwater from the proposed mining operation, the impact to groundwater chemistry is expected to be remain localized within the mine permit boundary. Considering the NMED operating requirements and detailed hydrogeologic analysis it is unlikely that the Copper Flat mining operations will contaminate groundwater and no groundwater impact will reach Las Animas or Percha Creeks.

Potential Effects in Las Animas Creek and in Artesian-Well Supplied Ponds

Depending on the hydrology of the underlying deep aquifer, the surficial aquifer, and surface waters in Las Animas Creek, groundwater drawdown from pumping the deep Santa Fe aquifer, which lies directly beneath Las Animas Creek, could adversely affect the riparian root zone as well as perennial flow reaches. These dynamics could adversely affect riparian plant growth and aquatic habitats that may support Chiricahua leopard frogs in the creek.

In-Creek and Irrigation Pond Effects

As previously stated, there have been no protocol surveys of the lower Las Animas Creek for Chiricahua leopard frogs, so it is not known if there are any frogs occupying habitats there. However, Chiricahua leopard frogs are known to be adapted to a wide range of habitats at different life stages. Therefore, the BA analysis evaluated the potential effects of the project on Chiricahua leopard frogs that may inhabit the lower Las Animas Creek in two different locations where habitat for the frogs may exist: 1) in perennial sections in Zone 2 of the creek where surface creek flows are sustained by the underlying impervious substrate ; and 2) in a total of twelve man-made irrigation ponds built in the Las Animas Creek floodplain in Zone 4 where landowners use artesian well water to fill their ponds before using them to irrigate their fields (Figure 9). Groundwater pumping by the mine is projected to reduce artesian pressure, resulting in reduced flow to artesian wells and to the shallow aquifer. Drawdown in the alluvial aquifer is projected to be less than 1 foot.

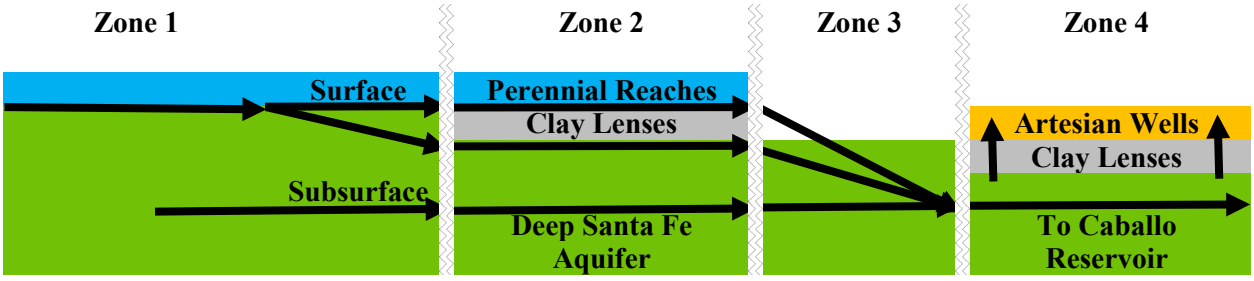

Figure 9. Simplified diagram of Las Animas Creek hydrogeology

Creek Flow Effects

Figure 6 illustrates the two separate affected zones where frog effects were evaluated. The four production wells for the mine project would be screened in the deep aquifer below the perennial reaches of Las Animas Creek. These perennial reaches are separated from direct pumping effects by the impermeable geologic layer in the perched water zone, so would not be directly affected by mine project pumping. Figure 9 is a simplified diagram illustrating this. The perennial reaches would be minimally affected by small reductions in upstream inflows because

pumping would draw down a portion of Zone 1 flows to the deep aquifer. As noted, because of the distance involved from the pumping source, the flows to the perennial surface reaches would be reduced, which could adversely affect Chiricahua leopard frog habitat.

Floodplain Pond Effects

The artesian water zone where the groundwater would be directly affected by mine pumping is located downgradient from the perched water zone. Therefore, it is expected that floodplain ponds would be insignificantly affected by pumping for mine operations.

Potential Surface-flow Sustained Chiricahua leopard frog Habitat

Segments of surface flow on Las Animas Creek will be unaffected by pumping of the deep aquifer for mine operations because the deep aquifer is disconnected from the perched surface alluvial flows. To the extent there will be any future change to flows in Animas Creek caused by pumping of the deep aquifer, those changes will likely be insignificant (in Zone 2) because of the hydrogeology.

The artesian system that provides flows to the mine wells located in the creek floodplain downgradient (in Zone 4) from the perched reach is not protected from pumping effects and it is expected that the artesian well-fed ponds would be adversely impacted by pumping for mine operations. Because these ponds may serve as Chiricahua leopard frog habitat, there is reasonable certainty that dewatering these ponds would likely adversely affect the Chiricahua leopard frog.

Modeling Analysis of In-Creek Effects

The hydrologic effects of the Copper Flat Mine project were evaluated using the NMCC hydrogeologic model (JSAI, 2014). Groundwater levels in the Quaternary alluvial aquifer along Las Animas Creek are projected to respond slightly to water-supply pumping from the underlying Santa Fe Group aquifer.

The projected hydrologic effects of the Copper Flat Mine project reach a maximum near the end of mining, when groundwater discharge to the perennial/riparian zones along Las Animas Creek is projected to decrease by 18 acre-feet per year, out of a pre-mining discharge of 4,848 acre-feet per year. After mining, discharge levels will gradually recover to pre-mining rates.

The gaining and losing perennial reaches of Las Animas Creek are shown in Figure 10 (Intera, 2012). In gaining reaches, water discharges from the alluvial aquifer overlying less transmissive geologic substrate to the surface to sustain perennial flow. In losing reaches, surface flow seeps into the creek bed rapidly over more transmissive geologic substrate and no longer constitutes surface flow, in this instance moving into the artesian strata underlying the creek. These reaches fall into four generally distinct zones from west to east from the mountain front as shown in the Figure 10. The named grabens are neighboring geologic rift zones east of the mountain front containing sediments of the Santa Fe deep aquifer.

- **Zone 1:** area west of the Animas Graben and east of the mountain front. The shallow alluvium is hydraulically connected to the Santa Fe Group; however, the Santa Fe Group west of the graben is not significantly transmissive and is isolated by clay beds from the shallow alluvium. No direct hydraulic effects in the alluvium would be caused by mine operations.
- **Zone 2:** the alluvial water table is perched above the Santa Fe Group aquifer and separated from it by clay beds that limit downward percolation of streamflow. Alluvial groundwater discharges to Las Animas Creek at the base of the graben. Due to the hydraulic disconnection, no direct hydraulic effects from the mine's pumping in the wellfield can or would occur.
- **Zone 3:** comprises an area of potential artesian zone recharge. The alluvial water table is isolated from the Santa Fe Group aquifer. Streamflow can percolate downward, but direct hydraulic effects from the mine's pumping in the wellfield cannot and would not occur.
- **Zone 4:** is the artesian zone without perennial streamflow where the creek bed is dry except after a substantial rainfall event. Groundwater pumping by the mine is projected to reduce artesian pressure, resulting in reduced flow to artesian wells and to the shallow aquifer. Drawdown in the alluvial aquifer is projected to be less than 1 foot.

Groundwater discharges to the surface just upstream of the faults bounding the main Santa Fe Group aquifer (the Palomas Graben, or Zone 2, Figure 8). The results of monitoring well MW-11 are representative of the hydrology of Zone 2. There is a gaining stretch in Zone 1, just above the Palomas Graben (Zone 2), and in the lower part of Zone 2 just above the fault bounding the eastern edge of the Palomas Graben (Figure 10).
where water gains from runoff exceed water loses from seepage. Downstream of the gaining stretches, across the faults, are losing perennial stretches (Figure 10). "Losing" perennial stretches

runoff. Downstream of these stretches, surface flow occurs after snowmelt or after major precipitation events.

Also shown in Figure 10 are contours of projected end-of-mining Quaternary alluvial groundwater level drawdown, reaching a maximum of about 3 inches. The groundwater model is conservative, and the contouring overstates the drawdown at MW-11, which is only about 0.5 inches, as shown in Figure 11.

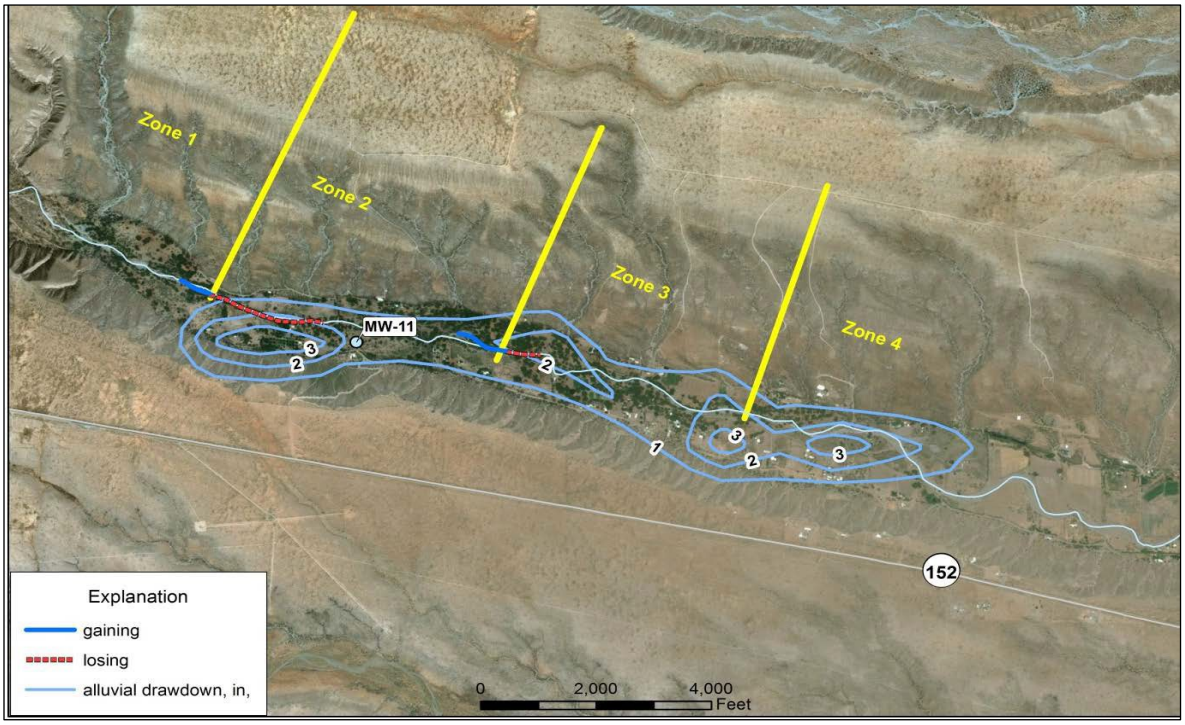

Figure 10. Projected shallow groundwater drawdown along Las Animas Creek, with perennial flow denoted as gaining sections

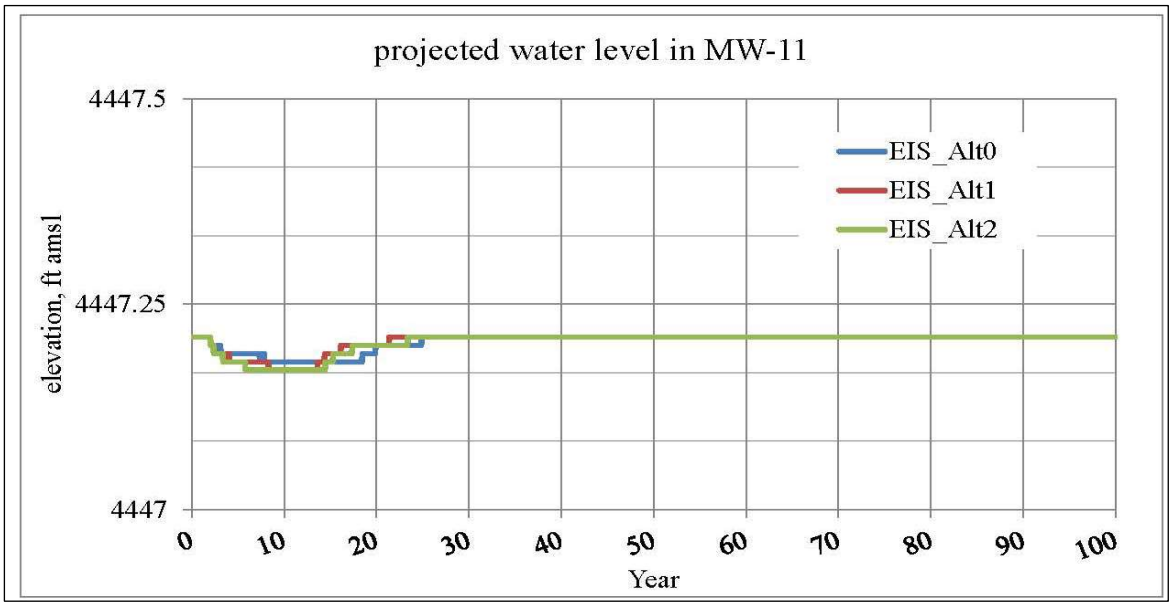

Figure 11. Projected drawdown at MW-11

Model-projected groundwater discharge to the Animas riparian zone is shown in Figure 12. Without an exaggerated vertical scale, the change is barely visible to the naked eye. The theoretically projected effect does not amount to a real effect in terms of streamflow or riparian habitat.

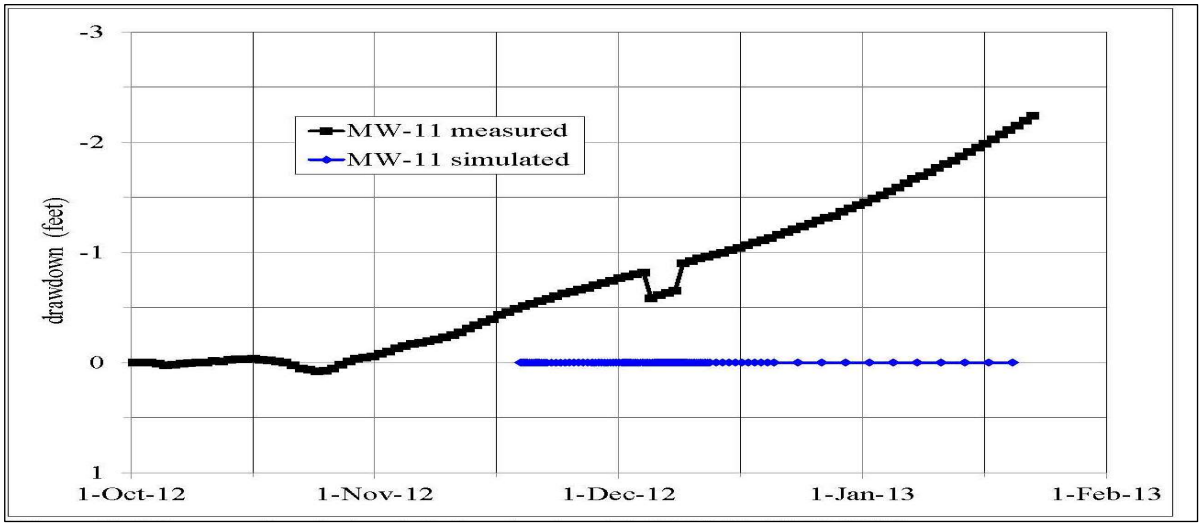

Figure 12. Projected discharge to the Las Animas Creek riparian/perennial zone

The projected theoretical effect would not be detectable by a monitoring network. However, if the effect were measurable (that is, much greater than projected) the proposed monitoring network illustrated on Figure 13 would detect it.

Figure 13. Proposed monitoring network near Las Animas Creek riparian/perennial zone

Monitoring and reporting data from the proposed monitoring network shown on Figure 13 will be performed by qualified NMCC personnel staff assigned to the Copper Flat Mine as part of standard procedures during project construction, operation, and reclamation. If NMCC's pumping is found by the Office of the State Engineer (OSE) to impair private water rights, NMCC will take all appropriate measures, as required.

If the groundwater monitoring demonstrates that the impacts of pumping are greater than the model predicted, the Service and BLM have the authority under Section 7 of the ESA to require reinitiation of consultation, which could result in additional evaluation and negotiation of monitoring and conservation measures necessary to protect threatened or endangered species. OSE's obligation to prevent impairment to water rights and the

requirements of Section 7 consultation will ensure that if the effects of NMCC pumping are greater than expected by groundwater modeling projections, then all appropriate measures required by state and federal agencies will be taken to offset or prevent impairment to senior water right holders or additional unanticipated impacts to threatened or endangered species.

Potential Effects to Irrigation Ponds

In the lower reach of Las Animas Creek (Figure 7, Zone 3) ancillary calculations and site inspection have indicated that water from the artesian wells does not create surface creek flows in the lower reach but is consumed in pond and irrigation evapotranspiration (ET) and subsurface alluvial recharge which eventually flows into Caballo Reservoir. This is because the artesian wells have been employed for crop irrigation purposes by landowners along the lower reach where the well water is retained in a number of irrigation ponds or otherwise seeps back into the subsurface alluvial flows to Caballo Reservoir. Because artesian water is captured to such a great extent in this system, surface creek flows occur only immediately after substantive rainfall events.

The zone of highest potential impact to the Chiricahua leopard frog is Zone 4 where 12 manmade irrigation ponds may provide Chiricahua leopard frog habitat. Figure 14 is a base location map covering the lower artesian zone (Zone 4) of Las Animas Creek. The twelve ponds are located within the framed areas on the base map. Although the zone extends farther east, farming operations end east of Pond 10. Figures 15, 16, and 17 show the ponds with outlines used to estimate their size. The estimates were obtained from measurements of Google Earth imagery. Accompanying Table 3 lists the pond size in terms of perimeter (edge habitat) and acreage for the 12 ponds.

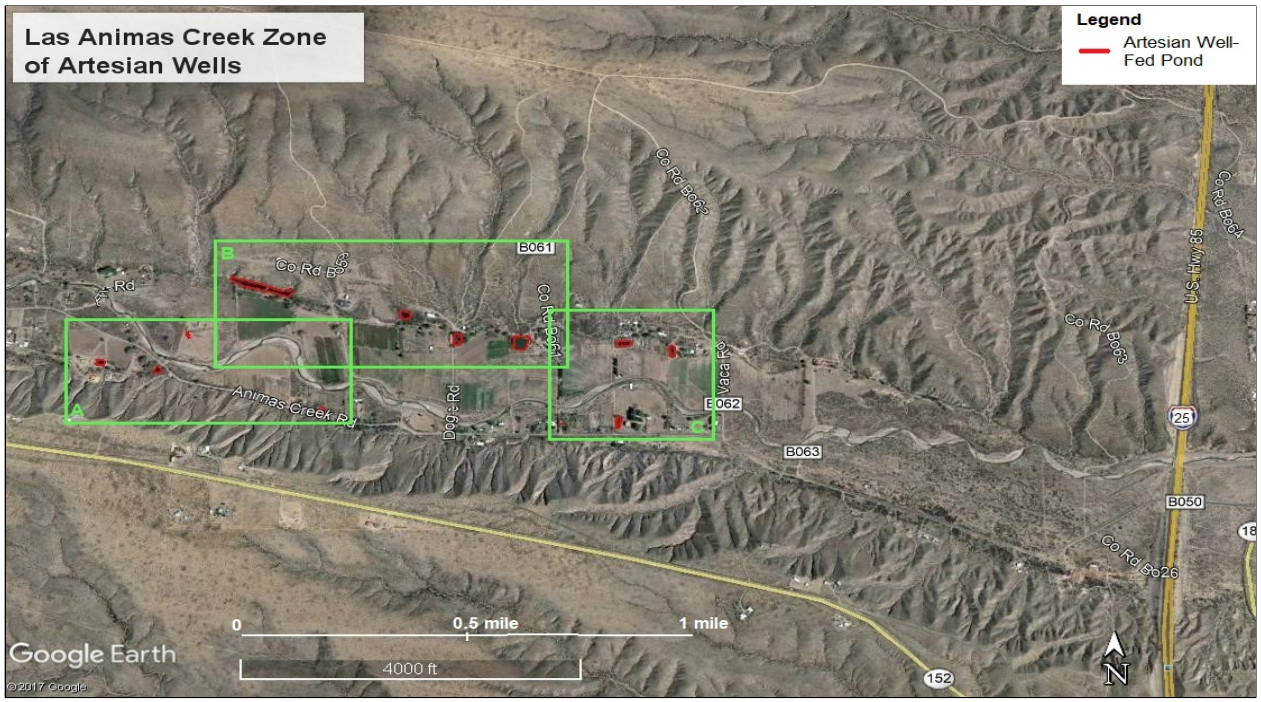

Figure 14. Artesian Zone (Zone 4) of Las Animas Creek, NM

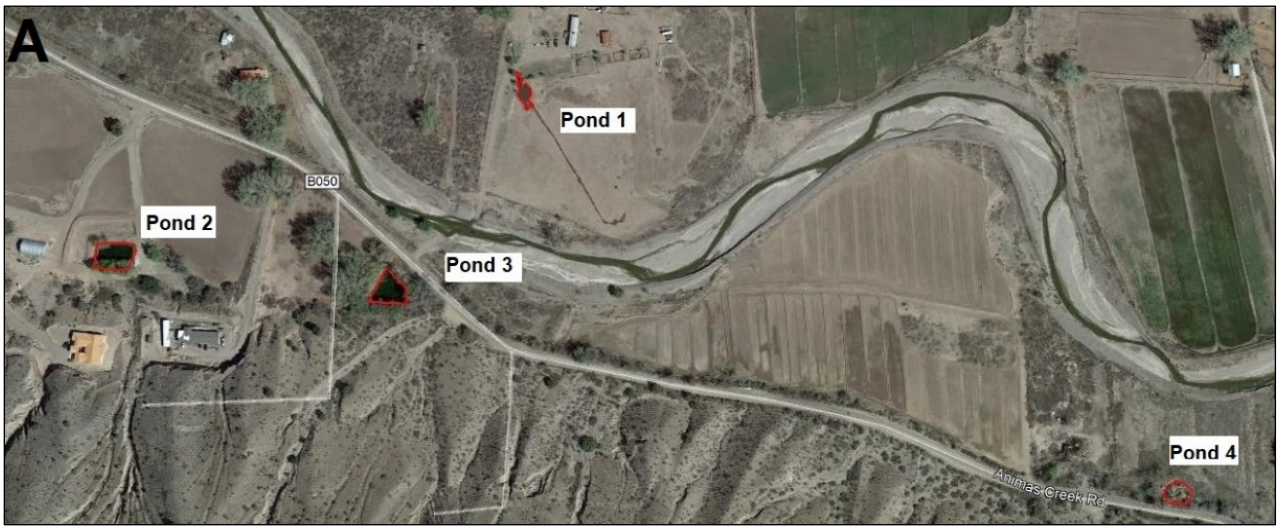

Figure 15. Irrigation Ponds 1 to 4 in the Artesian Zone of Las Animas Creek, NM

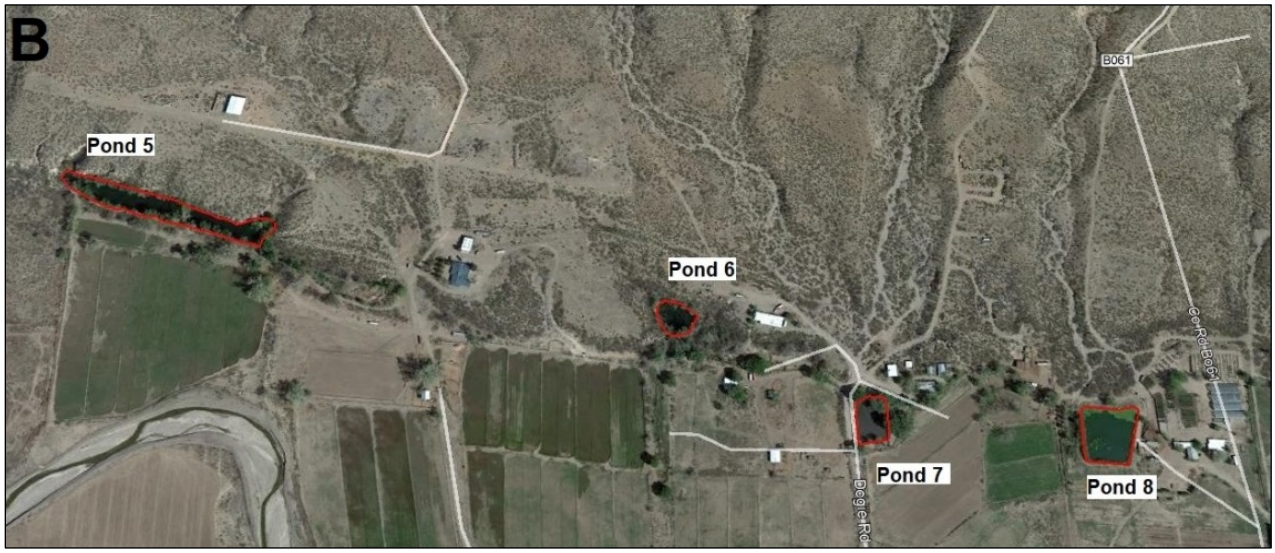

Figure 16. Irrigation Ponds 5 to 8 in the Artesian Zone of Las Animas Creek, NM

Figure 17. Irrigation Ponds 9 to 12 in the Artesian Zone of Las Animas Creek, NM

Table 3. Size of Las Animas Artesian-Fed Ponds

Pond ID Number	Perimeter (ft)	Surface Area (ac)
1	273	0.04
2	318	0.15
3	407	0.12
4	222	0.07
5	1,623	1.28
6	400	0.27
7	480	0.35
8	698	0.71
9	446	0.26
10	451	0.24
11	59	0.01
12	387	0.17
Total	**5,764**	**3.67**

Overall Direct and Indirect Effects

Based on the best available information concerning the Chiricahua leopard frog, the habitat needs of the species, the project description, the nearby documented occurrences, the proximity to water, and the vegetation structure within the action area, take is considered likely.

Depending on the hydrology of the underlying deep aquifer, the surficial aquifer, and surface waters in Las Animas Creek, groundwater drawdown from pumping the deep Santa Fe aquifer which lies directly beneath Las Animas Creek could affect the riparian root zone as well as perennial flow reaches. These dynamics could adversely affect riparian plant growth and aquatic habitats that may support Chiricahua leopard frogs in the creek. Additionally, potential Chiricahua leopard frog habitat along Las Animas Creek, and any frogs that may inhabit the man-made ponds in the floodplain of Las Animas Creek, may likely be affected directly by the project-associated pumping of production wells which is likely to result in a reduction of water supply to the ponds and indirectly by the loss of riparian habitat surrounding these ponds. These direct and indirect effects would occur throughout the projected 12-year operational period of the mine.

As previously stated, there have been no protocol surveys of the lower Las Animas Creek for Chiricahua leopard frogs, so it is not known if there are any Chiricahua leopard frogs occupying habitats there. However, we are certain that Chiricahua leopard frogs occur on the Ladder Ranch at wild sites upstream along Las Animas Creek from the twelve irrigation ponds built in the Las Animas Creek floodplain. As shown in Figure 8, considering that the reasonable dispersal capability of the Chiricahua leopard frog is: (1) one mile overland, (2) three miles along intermittent drainages, and (3) five miles along permanent water courses, or some combination thereof, it is reasonable to assume that Chiricahua leopard frogs that occur on the Ladder Ranch may have dispersed or may disperse to the twelve irrigation ponds that will likely be affected by the project-associated pumping of production wells. Thus, we are reasonably certain that take will occur to Chiricahua leopard frogs as a result of the proposed action because the effects to the twelve irrigation ponds will likely adversely affect Chiricahua leopard frogs that may inhabit these ponds, and will also likely indirectly adversely affect the dispersal and reproductive capabilities of the Chiricahua leopard frog populations on the Ladder Ranch and other nearby potential sites by limiting their dispersal and reproductive capabilities.

Because we have no valid survey data to determine the presence and density of Chiricahua leopard frogs that inhabit the twelve irrigation ponds that will likely be affected by the proposed action, we are using the best available data (TESF 2016 and 2017) to estimate the reasonable number of individual Chiricahua leopard frogs that may occur within the twelve irrigation ponds. Visual surveys were conducted during 2016 and 2017 at nine wild pond sites on the Ladder Ranch (Figure 8). The nine sites are identified as Davis (Upper), Davis (Lower), North Seco, Pague, LM Bar, South Seco, Fish-Steel Rim, Johnson, and Artesia.

Collectively, these sites total approximately 0.68 surface acres. When averaged together, the 2016 and 2017 survey results estimate that 134 egg masses, 505 tadpoles, 509 metamorphs, and 830 adults Chiricahua leopard frogs occur throughout the total 0.68 surface acres of wild pond habitat. This equates to an average density of 197 egg masses, 742 tadpoles, 749 metamorphs, and 1,220 adults per pond surface acre. These sites on the Ladder Ranch constitute part of the most robust breeding population within New Mexico (Christman, 2018).

It is significant to note that the wild pond sites on the Ladder Ranch are actively managed for bullfrogs and actively pumped to prevent them from drying and to maintain dispersal habitat for the Chiricahua leopard frog between ponds. The twelve manmade irrigation ponds are not managed for Chiricahua leopard frogs. Therefore, we believe that these ponds are not likely to be as densely populated with Chiricahua leopard frogs. However, because Chiricahua leopard frogs at the wild pond sites on the Ladder Ranch can disperse to these ponds (Figure 8), it is reasonable to conclude that the twelve manmade irrigation ponds may be occupied sites (as previously defined).

In summary of these findings, we estimate that no more than a total of twelve Chiricahua leopard frog occupied sites that collectively amount to total approximately 3.67 surface acres and 5,764 feet of edge habitat (Table 3) will likely be adversely affected as a result of the proposed action.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the mining proposal are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA. Cumulative effects are analyzed for listed species that may be adversely affected by the proposed project. Cumulative actions considered for the proposed project include:

- Increased use of water, including groundwater from the Las Animas Creek drainage for agricultural and private uses. Further use of artesian well water from the deep aquifer can reduce irrigation pond water levels and thereby decrease available habitat for the frog.
- Contamination of Las Animas Creek or pond surface waters (i.e., runoff from pasture and feed lots and from residential and any future commercial development). A decrease in water quality could adversely affect the frog.
- Intentional and unintentional destruction and fragmentation of riparian habitat, such as by increases in private development and urbanization in the historic floodplain, human caused wildfires, trash dumping, and cutting and removal of native riparian vegetation. Riparian vegetation provides shade, shelter, and food for the frog and contributes to proper functioning of the Las Animas Creek that will benefit frog habitat.
- Future local actions, including additional farming and grazing, recreation, and residential development in the Las Animas Creek floodplain. Livestock grazing can adversely impact the frog by negatively impacting native vegetation and injuring or killing frogs, tadpoles or eggs. The other human activities listed may adversely impact the frog by decreasing the amount and suitability of habitat.

BLM anticipates that these types of activities may continue to threaten the survival and recovery of the frog by reducing the quantity and quality of habitat and by possibly causing injury or death to frogs, tadpoles, or eggs.

CONCLUSION

Pursuant to 50 CFR § 402.02, "*jeopardize the continued existence of*" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the

reproduction, numbers, or distribution of that species. *Recovery* is defined as the improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the ESA (50 CFR § 402.02).

"*Destruction or adverse modification*" means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the PCE's essential to the conservation of a species or that preclude or significantly delay development of such features (50 CFR § 402.02; 81 FR 7214-7226).

Chiricahua Leopard Frog

After reviewing the current status of the Chiricahua leopard frog, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Chiricahua leopard frog. Consequently, we do not expect the effects of the proposed action to impede the survival or recovery of the Chiricahua leopard frog. We make these findings for the following reasons:

- The potential effects to the Chiricahua leopard frog and its habitat is confined to a total of 12 irrigation ponds (Table 3) with a total of 5,764 feet of edge habitat and 3.67 acres of surface area that is potentially inhabited by the Chiricahua leopard frog. As previously stated, each of the 12 irrigation ponds is considered to be a potential "occupied site" for the Chiricahua leopard frog. The most recent 5-year status review (Service 2011) estimates that there are 90, 29, and 45 Chiricahua leopard frog occupied sites in Arizona, New Mexico, and Mexico, respectively, totaling 164 total occupied sites. With the addition of these 12 irrigation ponds, the total number of occupied sites would amount to 176. Therefore, the loss of 12 occupied sites would amount to a loss of approximately 6.8% of the estimated number of Chiricahua leopard frog occupied sites rangewide.
- The conservation measure that will be implemented as part of the project should offset take to the Chiricahua leopard frog by perpetually protecting Chiricahua leopard frog habitat that has equivalent or greater value to the species than what is being impacted by the proposed project based on size, quality, location, and the presence of PCEs for Chiricahua leopard frog critical habitat as identified in the Final Rule Listing and Designation of Critical Habitat for the Chiricahua Leopard Frog (USFWS 2012).

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful

activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the BLM so that they become binding conditions of any grant or permit issued to an applicant/permittee, as appropriate, for the exemption in section 7(o)(2) to apply. The BLM has a continuing duty to regulate the activity covered by this incidental take statement. If the BLM (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the BLM must report the progress of the action and its impact on the species to the New Mexico Ecological Services Field Office as specified in the incidental take statement [see 50 CFR 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

Chiricahua Leopard Frog

As previously stated, we estimate that no more than a total of twelve Chiricahua leopard frog occupied sites that collectively amount to total approximately 3.67 surface acres and 5,764 feet of edge habitat (Table 3) will likely be adversely affected as a result of the proposed action.

We realize that there is no reasonable method to detect and monitor dead or injured egg masses, tadpoles, metamorphs, or adult Chiricahua leopard frogs. As a result, for purposes of this biological opinion, take will be considered exceeded if the conservation measure, which is re-stated below, is not executed within one year from the start of the Copper Flat supply well pumping. Then, as provided in 50 CFR § 402.16, reinitiation of formal consultation would be required.

The BLM will ensure that NMCC will offset the Project's adverse effects to the Chiricahua leopard frog by voluntarily providing a payment to a third party for the perpetual protection of Chiricahua leopard frog habitat that has equivalent or greater value to the species than what is being impacted by the proposed project based on size, quality, location, and the presence of PCEs for Chiricahua leopard frog critical habitat as identified in the Final Rule Listing and Designation of Critical Habitat for the Chiricahua Leopard Frog (USFWS 2012). The protected area will preferably be located within Recovery Unit 8 as described in the Chiricahua leopard frog Final Recovery Plan (USFWS 2007). If such a property is not available within Recovery Unit 8, properties in other Recovery Units as described in the Chiricahua leopard frog Final Recovery Plan (USFWS 2007) will be considered. The property shall be approved by the Service. Since the pumping of production wells is the specific action to likely adversely affect the Chiricahua leopard frog, and those effects will not likely be significant until no earlier than one year after initiation, the BLM will provide a copy of proof of payment to the Service to document that the conservation measure has been executed within one year from the date when the pumping of production wells for the Copper Flat Mine in initiated. This conservation measure will not be required if pumping of production wells does not occur.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determines the level of anticipated take described above is not likely to jeopardize the continued existence of the Chiricahua leopard frog.

REASONABLE AND PRUDENT MEASURES

No reasonable and prudent measures are necessary for the action addressed in this biological opinion due to the conservation measure that will be implemented as part of the action.

Terms and Conditions

No reasonable and prudent measures are necessary; therefore, no terms and conditions, which implement reasonable and prudent measures, are provided.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species, initial notification must be made to the Service's Law Enforcement Office, 4901 Paseo del Norte NE, Suite D, Albuquerque, New Mexico, 87113, telephone (505) 248-7889, within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to the New Mexico Ecological Services Field Office. Care must be taken in handling sick or injured animals to ensure effective treatment and in handling dead specimens to preserve the biological material in the best possible state. If possible, the remains of intact species shall be provided as soon as possible to the nearest Service office, New Mexico Department of Game and Fish office, or educational or research institutions (e.g., University of New Mexico) holding appropriate state and Federal permits. If the remains of the species are not intact or are not collected, the information noted above shall be obtained and the carcass left in place. Injured animals should be transported to a qualified veterinarian by an authorized biologist. Should the treated species survive, contact our office regarding the final disposition of the animal.

Monitoring and Reporting Requirements

All reports should be electronically submitted via email to NMESFO@fws.gov. Contact the project biologist, James Gruhala, at 505-761-4768 or by electronic mail at james_gruhala@fws.gov with any questions. If not available, contact the front desk at 505-346-2525 for immediate assistance.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. The term "conservation recommendations" has been defined as Service suggestions regarding discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of

information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's section 7(a)(1) responsibility. In order for the Service to be kept informed of activities that either minimize or avoid adverse effects or that benefit listed species or their habitats, the Service requests notification of the implementation of the conservation recommendations below.

The Service recommends for the Bureau of Land Management to implement the following conservation recommendation in accordance with Section 7(a)(1) of the ESA for the Chiricahua leopard frog:

- We recommend that the Bureau of Land Management continue to participate and support the ongoing Chiricahua leopard frog Captive Program by maintaining outdoor tanks, haplotypes, rearing tadpoles, and collaborating with partners to establish and maintain refugia populations.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation for the Bureau of Land Management's proposed Copper Flat Mine Project (Consultation # 02ENNM00-2018-F-0602). As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may adversely affect listed species or designated critical habitat in a manner or to an extent not considered in this biological opinion; 3) the action is subsequently modified in a manner that causes an effect to a listed species or designated critical habitat that was not considered in this biological opinion; or 4) a new species is listed or critical habitat designated that may be affected by this action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation of consultation with the Service.

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Appendix A

Detailed Justification for Concurrence on Not Likely to Adversely Affect Determinations and Jeopardy Determination

Effects of the action to the southwestern willow flycatcher

The southwestern willow flycatcher is known to nest in the riparian habitat surrounding Caballo Reservoir. It is possible that reductions in groundwater flow volumes to Caballo Reservoir from pumping groundwater for mine operations might, if not offset, affect nesting pairs near the reservoir.

In the Rio Grande watershed, reservoirs capture and store native Rio Grande water and water piped from northwestern New Mexico via the San Juan-Chama Project. This water is designated for particular users and managed under the legal control of the Rio Grande Compact. Elephant Butte and Caballo reservoirs, for example, hold Rio Grande Compact water for users in southern New Mexico and Texas. Heron, El Vado and Abiquiu reservoirs on the Chama River store water for cities like Albuquerque and Santa Fe, farmers and the six Middle Rio Grande Pueblos.

Elephant Butte Reservoir is managed to maintain required water levels in Caballo Reservoir under the terms of the Compact so any loss of water to Caballo Reservoir from project pumping would be offset from Elephant Butte Reservoir as part of their routine operations. Thus, the Caballo losses would shift to become Elephant Butte losses. To replace the Elephant Butte losses, NMCC has offered to purchase water rights in the Rio Grande basin above the Caballo Reservoir to offset the total of all water losses due to project pumping. The Jicarilla Tribe has affirmed that the water they have agreed to lease to NMCC, if it were not leased to NMCC, would still be released in the Rio Grande and so would not be diverted from some other place because of the NMCC lease. It would go into the Rio Grande via the San Juan Chama Project at Heron for use by some other lessee. The environmental impacts of the San Juan Charma Project were evaluated in an EIS in 2016 (BOR 2016).

Therefore, because the water level in Caballo Reservoir would remain constant, the Service concurs with the Bureau of Land Management's *may affect, and is not likely to adversely affect* determination for the Southwestern willow flycatcher. If NMCC is not able to purchase water rights in the Rio Grande basin above the Caballo Reservoir for the purpose of offsets prior to the initiation of mining operations, the BLM shall contact the Service to discuss reinitiation of consultation for the Southwestern willow flycatcher.

Effects of the action to the yellow-billed cuckoo

The yellow-billed cuckoo is known to occur in the action area and to use the riparian habitat around Caballo Reservoir and along Las Animas Creek and Percha Creek as nesting, foraging, and migration corridor habitat. The action would not likely result in significant changes in streamflow on Las Animas or Percha Creeks; therefore, no significant indirect effects from the potential alteration of surface flow volumes, stream characteristics, or riparian habitats would be expected. Reduced groundwater discharge to Caballo Reservoir could adversely affect riparian vegetation used for nesting and foraging by the yellow-billed cuckoo. However, as explained previously under the southwestern willow flycatcher section, NMCC would fully offset the loss

of water flow to Caballo Reservoir by purchase of water rights on the Rio Grande above Caballo Reservoir. So, there would be no net loss of flow or change in water levels resulting the action.

Therefore, because the action would not likely result in significant changes in streamflow on Las Animas or Percha Creeks, and because the water level in Caballo Reservoir would remain constant, the Service concurs with the Bureau of Land Management's *may affect, and is not likely to adversely affect* determination for the yellow-billed cuckoo. If NMCC is not able to purchase water rights in the Rio Grande basin above the Caballo Reservoir prior to the initiation of mining operations, the BLM shall contact the Service to discuss reinitiation of consultation for the yellow-billed cuckoo.

Effects of the action to the northern Aplomado falcon

The northern Aplomado falcon has the potential to occur in the action area. The northern Aplomado falcons that could potentially occur in Sierra County, including the action area, are designated as a "nonessential experimental population" under Section 10(j) of the ESA. "Nonessential experimental populations" are reintroduced populations whose loss would not be likely to appreciably reduce the likelihood of the survival of the species in the wild. For Section 7 consultation processes nonessential experimental populations are treated as if they are proposed (conference procedures).

The northern Aplomado falcon has not been detected near the mine site, but it has been recorded in Sierra County in habitat similar to that which occurs in the mine site (B. West, pers. comm. 2011). The 2011 survey indicated that suitable habitat for the species (i.e., desert grasslands with scattered mesquite and yucca, and riparian woodlands in open grassland) is present at the mine site, in the pipeline corridor, and in the Las Animas and Percha creek riparian areas. However, the Chihuahuan Desert grassland and shrubland habitats that exist in the project action area have been adversely affected by grazing practices and lack some of the yucca/grassland habitat preferred by the falcon. Falcon releases have occurred in Sierra County, but these releases have not resulted in known Aplomado falcon nests in the county (BLM 2013).

In summary of this information, the Service believes that the action's effects to the northern Aplomado falcon would be discountable because this species typically occupies its nesting territory year-round and no nests are known to occur within the action area. Therefore, the Service also concludes that the proposed action would not likely jeopardize the continued existence of the northern Aplomado falcon.

Effects of the action to the Mexican spotted owl

According to the Biological Assessment and Evaluation for Restoration of Rio Grande Cutthroat Trout (RGCT) to the Las Animas Creek Watershed (Pittenger 2014) which covered portions of Las Animas Creek to the west, upstream of the Copper Flat action area, including Ladder Ranch, two Mexican Spotted Owl Protected Activity Centers (PAC) are located in the RGCT project area: the East Curtis PAC and the Gooseberry PAC. Roosting/nesting sites for both of these PACs are located in tributary drainages of Las Animas Creek. No nesting/roosting habitat is found along Las Animas Creek or Cave Creek on the Ladder Ranch, but these riparian areas may provide wintering habitat for owls. Proposed RGCT restoration stream segments that begin at the Aldo Leopold Wilderness boundary of the Gila National Forest upstream are within

designated critical habitat for Mexican spotted owl. The 2011 NMCC survey lists the Mexican spotted owl as having been observed in the riparian areas of Las Animas and Percha creeks in the spring.

It appears evident that the Mexican spotted owl is using the portion of the action area that provides dense tree cover (i.e., the riparian areas), probably for lower elevation winter survival. Any Copper Flat mine project activities that would reduce the riparian cover would adversely affect the habitat value of these areas for owl survival. If supply well pumping affected the root zone of riparian trees causing leaf loss or killing trees, then there would be a concomitant loss of cover density and the habitat would lose value for the owl.

Although the Mexican spotted owl has been observed near the project site, the project would not likely cause any adverse change to the density or composition of the riparian plant community the owl is using for cover and foraging. Supply well pumping for mining operations would affect the deep Santa Fe aquifer, but the surface waters in Las Animas creek would not likely be significantly affected by the deep aquifer pumping. Similarly, there would not likely be significant effects to portions of Percha Creek where dense riparian growth currently exists. Pumping drawdown would affect the reach of Percha Creek just west of Interstate Highway 25, but as is the case with the lower reach of Las Animas Creek, that reach does not support suitable Mexican spotted owl habitat.

Blasting noise may affect owls using riparian habitats along Percha or Las Animas Creeks in the winter or spring; however, the distance from the mine blast to the locations of riparian habitats along either of the creeks is greater than 3 miles. The bowl-shape of the mine site and pit, the rugged intervening terrain, which would act as a series of effective sound barriers similar to the sound walls used to shield homes from highway noise (see text box, Source VDOT, 2018) and the fact that the riparian habitats are located in the deep-incised creek bottoms with steep hillsides surrounding all would combine to diminish blast sound levels to minimally above background noise. Noise levels in the riparian areas along Percha and Las Animas Creek are expected to be less than 64 decibels (dBs) and in most of the habitat, less than 49 dB which is approximately background level. By the time the sound reaches the PACs in the critical habitat, it would be below normal background. Further, the dense riparian areas used by the owls are not located close enough to mining operations to be subject to light disturbance that might cause the owls to disperse, reducing their survival ability.

Figure A-1 shows the concentric pattern of potential noise impacts from blasting during mine operations that may affect Mexican spotted owls using portions of the riparian areas along Las Animas or Percha Creek or in their critical habitat and Protected Activity Centers (PACs) within that habitat to the west of the mine site on the Gila National Forest.

Figure A-1 also shows the straight-line noise level in A-weighted decibels (dBAs) in parenthesis at each expanding doubling of distance from the blast site at the mine pit based on the 6dBA reduction in distance for each doubling that is known to occur in acoustic studies. The first number at each distance is the estimated expected noise level based on the attenuation of noise of minus 15dBA by the high intervening terrain that acts as a sound wall or sound berm of the kind used to attenuate highway traffic noise with residential properties nearby. The circular area outside of which blast noise is estimated to be reduced to less than 64dB is approximately 30 mi^2.

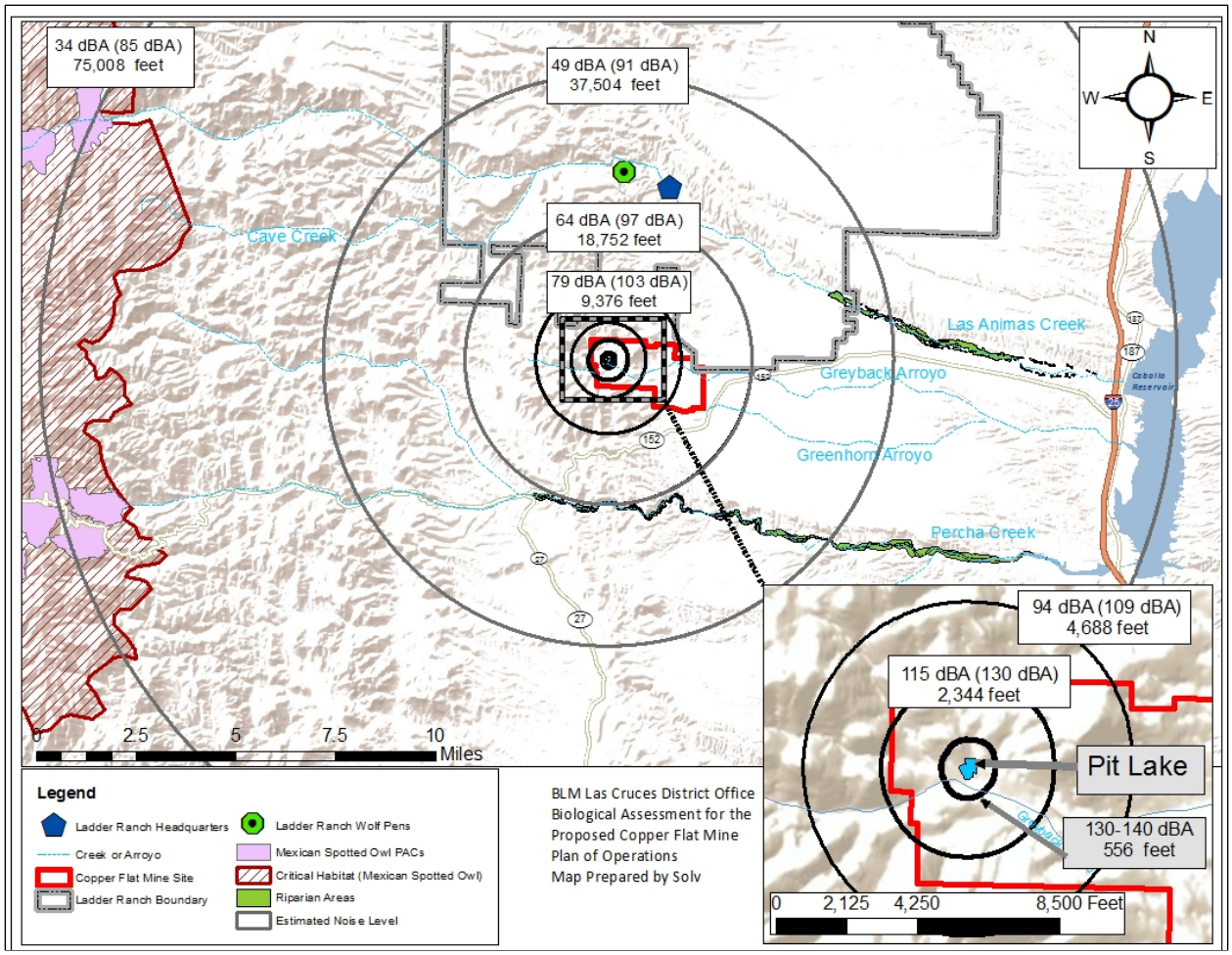

Figure A-1. Copper Flat Project Action Area for Evaluation of Noise Impacts

In summary of this information, pumping for mine operations would not likely adversely alter the riparian habitats the Mexican spotted owl may use. Blast noise would not likely significantly affect owls in the PACs or other locations on the Gila National Forest because those locations are too distant from the mine site and blast noise. Therefore, the Service concurs with the Bureau of Land Management's *may affect, and is not likely to adversely affect* determination for the Mexican spotted owl.

Effects of the action to the captive Mexican gray wolf

Mexican gray wolves are held at a holding facility, the Ladder Ranch Mexican Wolf Facility (LRMWF) on the Ladder Ranch which is located in Mexican Gray Wolf Recovery Area 21B. The LRMWF is a pre-release facility managed by Turner Endangered Species Fund (TESF) and the USFWS. Since this facility began operation in 1998, it has held over 100 wolves. The LRWMF comprises five enclosures, ranging in size from 0.3 acre to approximately 0.70 acre. Caretaking of wolves at the facility is carried out by the TESF, though the facility is managed and supported financially by the Service. During 2016, 16 individual wolves were housed at the Ladder Ranch. Ten wolves were transferred to the Ladder Ranch while twelve wolves were

transferred out. Six births and no deaths occurred at the Ladder Ranch in 2016. At year's end, the Ladder Ranch housed four Mexican gray wolves. As of November 1, 2018, there are 14 Mexican gray wolves housed at the Ladder Ranch (USFWS, 2018).

Potential Noise and Vibration Effects

As shown on Figure 3 of the biological opinion, the LRMWF is considered to be within the action area that may be significantly affected by noise. Figure A-1 shows the concentric pattern of potential noise impacts from blasting during mine operations that may affect the Mexican gray wolf in their holding facility at Ladder Ranch.

Noise from Copper Flat Mine Blasting

Blasting noise would be intermittent and greatest during initial phases; noise would decrease as mining activities progress. Although operations would take place 24 hours per day, blasting would be limited to daylight hours. Drill patterns would range from 60 to 120 blast holes, and a typical hole would contain approximately 175 pounds of ANFO (140 pounds of TNT equivalent). Typically, there would be 10 to 20 milliseconds of delay between each blast hole, and each blasting event would last between 1 to 2 seconds.

Peak noise levels provide the absolute maximum sound level for an individual acoustical event, not an average over several events or over a period of time like the DNL. Although not a good descriptor of the overall noise environment like the DNL, peak noise levels relate well to the level of concern and possibility of complaints among people living nearby after an individual blast event. Level of concern guidelines that use peak noise levels exist for impulsive noise and the distances these effects would take place after a blasting event.

Blast Noise Spectrum and Wolf Hearing

Blast overpressure produces sound waves in the very low frequency of 2 Hz while human hearing is in the 20 Hz to 20 KHz which is why buildings may experience structural effects from "noise" humans can't hear. Wolves' hearing is the same as humans at the low end of the range but more acute at the higher end. Wolves can hear well up to a frequency of 25 kHz with some researchers believing the maximum frequency detected by wolves is much higher, perhaps up to 80 kHz (Wolf Country, 2017). Therefore, the low frequency airborne noise from the blasting at 2 Hz is not likely to register with the higher frequency attuned wolves.

The Final Environmental Impact Statement on Mexican gray wolf reintroduction in the Southwest (USFWS 1996) evaluated blast effects from known human activities in the species AZ and NM recovery zone. Parts of the primary recovery zone are overlaid by the Yonder Air Force training impact area, but it is unlikely that the high altitude training that occurs there will impact wolves, or vice versa (Bednarz 1989). Gray wolves are able to tolerate noise and blast effects associated with heavy mining in Minnesota, which may be comparable to testing activities on WSMR (Mech 1993a). Further, red wolves exist in North Carolina in and adjacent to an Air Force and Navy training area without negative impacts (Phillips 1993).

Blast Effects Attenuation with Distance and Terrain

Noise at the mine blast site (Table A-1) would reach 130 to 140 dBP (peak pressure of impact noises like blasting). The 130-dBP peak noise levels would extend 556 feet from the point of detonation but diminish to 115 dBP within 2,344 ft. The unimpeded straight-line dBP would be diminished 6 dBP for each doubling of distance, and by the time the sound reached the wolves 4.6+ miles (24,658 feet) away at the closest wolf pen, (Table A-2) it would be more than 20 dBP less, or less than 95 dBP which is the noise level of a passing motorcycle.

Table A-1. Noise Risk. Risk of Noise Concern from Blasting

Table 4-5. Noise Risk. Risk of Noise Concern from Blasting		
Risk of Noise Concern	**Peak Noise Levels**	**Critical Distance (feet)**
Low	< 115 dBP	> 2,344 feet
Medium	115–130 dBP	556 - 2,344 feet
High	130 - 140dBP	< 556 feet

Source: Siskind 1989; U.S. Army 2007; Caltrans 2004.

Table A-2. Distances from Pit Lake to Wolf Facility Pens

Table 4-6. Distances from Pit Lake to Wolf Facility Pens		
Wolf Pen Number	**Distance (Miles)**	**Distance (feet)**
1	**4.84**	**25,555**
2	**4.90**	**25,872**
3	**4.89**	**25,819**
4	**4.67**	**24,658**
5	**4.72**	**24,922**

However, these estimates are based on a straight-line calculation. In fact, the mine blasts would primarily be contained within the mine pit itself, which is in a topographic bowl surrounded by ridges, so the straight-line calculated sound levels would apply only to points directly above the mine pit. Blasting would occur within the excavated mine pit with charges placed in the pit walls well below the ground surface level of the larger mine site area so that the sound would project primarily horizontally into the center of the mine pit and vertically above the pit, thus containing and diminishing the loudest sound levels. The blast sound that would reach the wolf holding facility would be greatly attenuated by the intervening terrain (Figure A-2). Blasting sound may reach the wolf holding facility at a perceptible level above ambient background noise but at the 4.6-mile distance (see Figure 3 of the biological opinion) would likely not be louder than trucks and equipment used on-site at Ladder Ranch which would be in the range of 49 to 64 dBP.

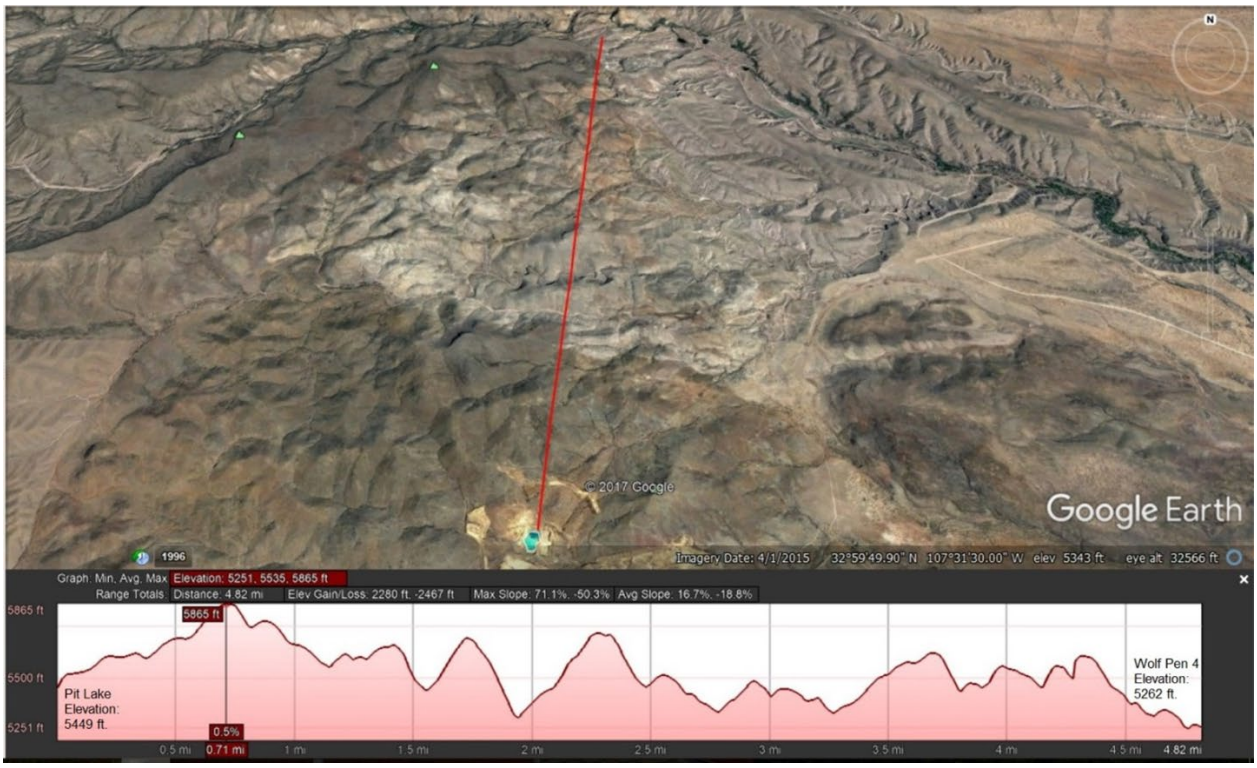

Figure A-2. Intervening topographic terrain between the Copper Flat mine pit and the wolf holding facility that would attenuate blast noise

The mine site is located within a relatively flat topographic bowl surrounded by higher elevation ridges including Animas Peak that would further intercept and diminish sound waves similar to the effect of roadside sound barriers on traffic noise.

Because the blasting would occur during daylight hours only, this timing constraint and the perception that the noise is coming from a long distance away may in combination allow the wolves to habituate to the noise after a few days although it may be argued that habituation to blast noise would be contrary to the objective of acclimating the wolves to an environment with humans absent.

Potential Vibration Effects

Ground shaking vibrations, if they are strong enough by the time they reach the holding facility to frighten them, might also adversely affect the Mexican gray wolves on Ladder Ranch. As noted in Section 3.5 of the BA, ground-borne vibration associated with blasting would be distinctly perceptible to humans at a distance of 500 feet but barely perceptible at 1,573 feet. Blasting activities within 792 feet, drilling activities within 116 feet, and general heavy equipment activities within 42 feet could cause minor cosmetic damage to extremely fragile historic buildings. Therefore, ground-borne vibration effects from blasting would diminish within a distance of less than 2,000 ft from the blast site to a level that would be barely perceptible by humans, so at 18 times that distance, the blast vibrations would likely not be perceptible to either humans or wolves.

Additionally, wolves are not known to be highly sensitive to loud sounds. Their hearing is similar to humans at lower frequencies but attuned to a greater range of higher frequency sounds rather than the much lower frequency sounds of the airborne concussive noise of blasting. The wolf holding facilities are a significant distance away, more than 4.5 miles, from the mine pit where blasting would occur.

In summary of this information, we conclude that the affects from noise and ground-vibrations resulting from blasting associated with mining operations would be insignificant and discountable to the Mexican gray wolf captive population on the Ladder Ranch. Therefore, the Service concurs with the BLM's determination that the proposed action would *not likely adversely affect* the Mexican gray wolf captive population.

Effects of the action to the Bolson tortoise

The proposed action area is within the northern Chihuahuan Desert, which constitutes part of the Bolson tortoise's (*Gopherus flavomarginatus*) prehistoric range. Bolson tortoises are held in large (approximately 8 – 16 acre) outdoor pens on the Ladder Ranch, and in a colony enclosure. According to the Ladder Ranch, the Bolson tortoise burrows are located 2.5 miles (13,200 feet) from the mine site. Figure A-2 shows the location of the Bolson tortoise pens and the colony enclosure on the Ladder Ranch with respect to the Copper Flat Mine site.

The Bolson tortoise was listed as an endangered species under the Endangered Species Act in 1979. The Final Rule, published April 17, 1979, lists the entire population of Bolson tortoises as endangered under the ESA, and lists Mexico as its historic range (USFWS 1979). Even though the tortoises on the Ladder Ranch are outside of the species' historic range, according to 50 CFR 17.11(d), ESA protections apply to all individuals of Bolson tortoise "wherever found". As such, the Bolson tortoises on the ladder Ranch are treated as an endangered species for purposes of this consultation.

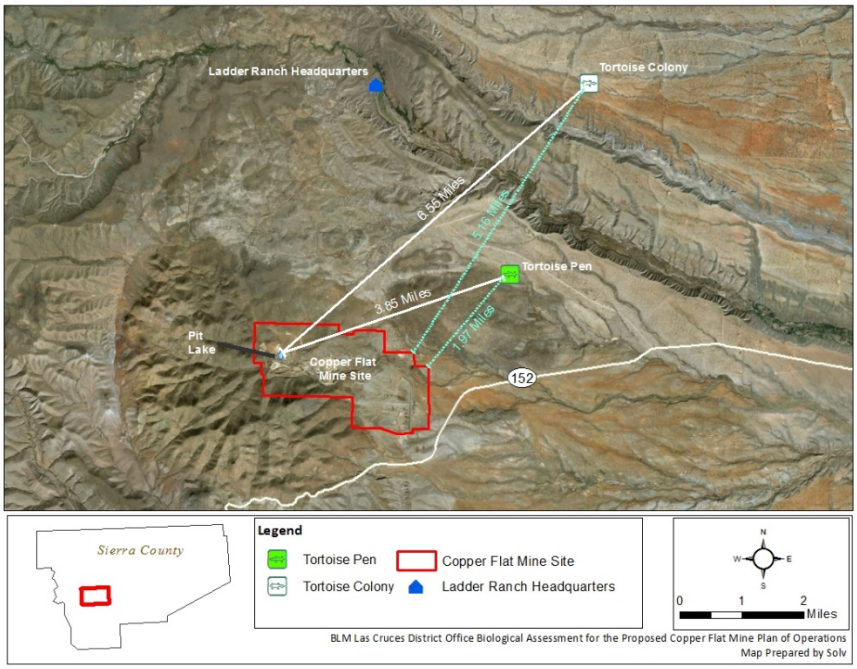

Figure A-3. Bolson Tortoise Pens and Colony Enclosure on the Ladder Ranch

With their powerful front legs, Bolson tortoises dig burrows in which they spend over 85% of their time. Bolson tortoises dig burrows up to 8 meters long and 2 meters deep as refuge from predators and extremes of climatic and weather conditions, and surface activity is correlated with rainfall and temperature. Adult individuals have a high fidelity to their burrow, spending approximately 95% of their life hibernating or aestivating within this structure, and spend only approximately 5% of time outside of their burrows during the summer season (Adest et al. 1989). Burrows are constructed in social aggregations, and clusters show social structuring of individuals (Morafka 1982, Morafka *et al*. 1989). Radio tracked juveniles preferred to excavate (or opportunistically use) burrows under *Opuntia* cacti (Tom 1994).

Ground-vibration resulting from blasting associated with mining operations may have the potential to affect Bolson tortoises. A recent study of the potential effects of blasting and traffic vibrations on tortoises (Barneich et al. 2004) indicates that an impact of 0.4 inches per second peak particle velocity (PPV) is a conservative estimate of the vibration level that could affect a tortoise burrow. A safe explosion distance would be 300 feet from the burrow to protect it from damage. Ground-vibration effects from the Copper Flat Mine blasts would radiate outward from the blast hole but would diminish to a level of 0.12 PPV at a distance of 792 feet away from the hole, and to a level ten times lower than the conservative impact level (0.04 PPV) at a distance of 1,573 ft. Because the Bolson tortoise burrows are located more than 8 times that distant from the mine than the distance at which the vibrations would be ten times *lower* than the conservative impact level, the Bolson tortoise burrows at Ladder Ranch would not be impacted.

Noise resulting from blasting associated with mining operations may have the potential to affect Bolson tortoises. There is little known about noise impacts to reptiles, though “dune-buggy” noise had an adverse effect on hearing of the fringe-toed lizard (*Uma scoparia*) at durations of 500 seconds or longer (95 dBA) (BLM, 1979). Blast events at the mine would be 1 to 2 seconds in duration. Therefore, airborne sounds from very short-duration blasting at 2.5 miles (13,200 feet) away with intervening terrain, as discussed in the preceding section on the Mexican gray wolf, would be substantially lower than 95 dBA and may be perceptible to the tortoises but would not likely cause adverse impacts because of the short noise duration, substantial distance, and intervening terrain which would reduce airborne sound impacts to well below 100 dBA. Additionally, because Bolson tortoises spend the majority of time in burrows, we believe it is unlikely the species can hear the noise from blasting at ground level.

In summary of this information, we conclude that the affects from ground-vibrations and noise resulting from blasting associated with mining operations would be insignificant and discountable to the Bolson tortoise. Therefore, the Service concurs with the Bureau of Land Management’s *may affect, and is not likely to adversely affect* determination for the Bolson tortoise.

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