



## United States Department of the Interior

Fish and Wildlife Service  
Arizona Ecological Services Office

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### In Reply refer to:

02EAAZ00-2020-F-0822

December 31, 2020

Tom Torres  
Acting Forest Supervisor, Tonto National Forest  
2324 East McDowell Road  
Phoenix, Arizona 85006

Dear Mr. Torres:

Thank you for your request for formal consultation with the U.S Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. § 1531-1544), as amended (ESA). We received your request and revised Biological Assessment (BA) dated June 26, 2020, the same day. At issue are effects that may result from the proposed Resolution Copper Mine located in Gila and Pinal counties, Arizona. The proposed action may affect the endangered Arizona hedgehog cactus (*Echinocereus triglochidiatus* var. *arizonicus*).

In your letter, you requested our concurrence that the proposed action is not likely to adversely affect the endangered Gila chub (*Gila intermedia*) and southwestern willow flycatcher (*Empidonax traillii extimus*) and their designated critical habitat; the threatened northern Mexican gartersnake (*Thamnophis eques megalops*); and the threatened yellow-billed cuckoo (*Coccyzus americanus*) and its proposed critical habitat. We concur with your determinations and include our rationales in Appendix A.

You also determined that this action will have “no effect” on the Acuña cactus (*Echinomastus erectocentrus* var. *acunensis*), desert pupfish (*Cyprinodon macularius*), Little Colorado spinedace (*Lepidomeda vittata*), loach minnow (*Tiaroga cobitis*), spikedace (*Meda fulgida*), Colorado pikeminnow (*Ptychocheilus lucius*), Chiricahua leopard frog (*Rana chiricahuensis*), razorback sucker (*Xyrauchen texanus*), woundfin (*Plagopterus argentissimus*), Mexican spotted owl (*Strix occidentalis lucida*) and their critical habitat, and Nichol’s turk’s head cactus (*Echinocactus horizonthalonius* var. *nicholii*), Apache trout (*Oncorhynchus apache*), gila trout (*Oncorhynchus gilae*), gila topminnow (*Poeciliopsis occidentalis*), Sonoran pronghorn (*Antilocapra americana sonoriensis*), Mexican wolf (*Canis lupus baileyi*), and ocelot (*Leopardus pardalis*). “No effect” determinations do not require our review and we will not address them further in this biological opinion.

On August 3, 2020, we reached a settlement agreement with WildEarth Guardians and Western Watershed Project to add the Sonoran desert tortoise (*Gopherus morafkai*) to the candidate species list under the Act. We provide our technical assistance for the tortoise in Appendix B.

This biological opinion is based on information provided in the revised June 26, 2020, BA (SWCA 2020), the August 9, 2019, draft National Environmental Policy Act (NEPA) Environmental Impact Statement (DEIS) (USFS 2019), technical memo project updates (SWCA 2020a, 2020b), baseline reports associated with the DEIS, meetings, telephone conversations, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, mining activities, ground clearing activities, invasive weed control, habitat restoration and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at the Arizona Ecological Services Field Office.

### **Consultation History**

- March 18, 2016: We received notice from the Tonto National Forest (TNF) of their intent to prepare a DEIS for the Resolution Copper Mine Project.
- August 19, 2016: We responded to the TNF's invitation to participate as a cooperating agency in the development of the DEIS.
- November 22, 2016: We attended the Cooperating Agency meeting.
- February 24, 2017: We provided general comments on biological resources in the Scoping Issues Report.
- March 1, 2017: We decided not to accept the cooperating agency invitation. We would continue to provide species information as requested.
- January 5, 2018: We received notice of the TNF's Final Decision Notice for the Apache Leap Special Management Area Management Plan Environmental Assessment and Finding of No Significant Impact.
- August 1, 2019: TNF publishes DEIS for Resolution Copper Mine.
- December 18, 2019: We received the TNF's letter designating SWCA Environmental Consultants (SWCA) as their non-federal agency representatives.
- January 24, 2020: We met with the TNF, SWCA, and U.S. Army Corps of Engineers (USACE) to discuss the initial Resolution Copper Mine project, the BA's development, and section 7 consultation.
- Jan. to May 2020: We participated in early coordination with SWCA regarding aspects of the consultation.
- May 8, 2020: We received a BA from the TNF for the Resolution Copper Mine.

- May 20, 2020: We met with the TNF and SWCA to discuss the proposed action, project timelines, and the scheduling of the BA.
- June 1, 2020: We submitted comments to the TNF and SWCA on the BA's analyses of the Arizona hedgehog cactus and Gila chub.
- June 2, 2020: We met with the TNF and SWCA to discuss our comments on the Gila chub, next steps, and consultation timelines.
- June 4, 2020: We provided technical information to SWCA regarding conservation measures for the Sonoran desert tortoise.
- June 5, 2020: We submitted comments to the TNF and SWCA on the BA's analyses of the Northern Mexican garter snake.
- June 8, 2020: We sent a letter to the TNF that there is insufficient information in the BA to initiate consultation. We also received correspondence by the TNF granting applicant status to Resolution Copper Mining, LLC.
- June 10, 2020: We met with the TNF, SWCA, Resolution Copper Mining, LLC, WestLand Resources, Inc. (applicant's consultants), and USACE to discuss species information regarding compensatory mitigation parcels under Section 404 of the Clean Water Act. WestLand Resources, Inc. also presented changes to the pipeline corridor alignment.
- June 19, 2020: We met with the TNF and SWCA to discuss and review our comments on the Arizona hedgehog cactus.
- June 26, 2020: We received the revised BA.
- July 9, 2020: We sent a letter to the TNF accepting the BA.
- July thru Oct., 2020: We received clarifications on the proposed action from the TNF, SWCA, and Resolution Copper Mining, LLC.
- September 1, 2020: We received information from SWCA (2020a) regarding Resolution Copper's addition of a conservation easement for the Arizona hedgehog cactus.
- September 9, 2020: We provided the TNF and SWCA an informal draft of the description of the proposed action to be included in the BO for review.
- September 16, 2020: We received comments from TNF and SWCA on the proposed action.
- October 2, 2020: We received information from SWCA (2020b) regarding Salt River Project's (SRP) proposed transmission line maintenance, vegetation maintenance underneath those lines, and associated conservation measures, recreation and USACE CWA 404 mitigation, and various clarifications.

November 2, 2020: We sent the draft BO to the TNF.

December 2, 2020: We received comments on the draft BO.

December 2020: We collaborated with the TNF and SWCA on addressing BO comments.

December 30, 2020: We received a letter from TNF describing that we have received a thorough and accurate description of the proposed action from the DEIS, BAs, technical memos, and communication between our offices, and all the information to be included in the Final EIS relevant to this biological opinion, has been provided for our consideration.

## BIOLOGICAL OPINION

### DESCRIPTION OF THE PROPOSED ACTION

Regulations implementing the Act (50 CFR 402.02) define “action” as “all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies of the United States or upon the high seas.”

#### Background

In 2014, Resolution Copper proposed developing an underground copper mine on unpatented mining claims on National Forest System (NFS) lands near Superior, Arizona. To consolidate land ownership above the copper deposit, located primarily on NFS lands, Resolution Copper pursued a land exchange with the United States of America Federal Government. In December 2014, Congress authorized a land exchange pending completion of an Environmental Impact Statement (EIS), as outlined in Section 3003, Southeast Arizona land exchange and conservation, of the Carl Levin and Howard P. ‘Buck’ McKeon National Defense Authorization Act for Fiscal Year 2015 (PL 113-291; NDAA 2015). The exchange parcel conveyed to Resolution Copper includes the NFS surface lands above the copper deposit and the lands of the Oak Flat Withdrawal Area. This collective 2,422-acre tract of land is the “Oak Flat Federal Parcel.” Resolution Copper will, in turn, exchange eight parcels located throughout Arizona (approximately 5,460 acres per the legal description of private land currently owned by Resolution Copper) to the Federal Government. The Forest Service and Bureau of Land Management will administer private lands transferred into Federal ownership from the land exchange under existing resource management plans. Congress dictated that conveyance of all right, title, and interest for the Oak Flat Federal Parcel will occur no more than 60 days after publication of the Final EIS. Therefore, the land exchange itself is not an action considered in the TNF’s BA or in this BO.

On behalf of the Secretary of Agriculture, the TNF is responsible for preparing a single EIS to address: the use Forest Service lands for the Resolution Copper Mine Project and any other decisions by federal agencies related to the mine, and to facilitate the land exchange of the Oak Flat Federal Parcel for the eight private parcels located throughout Arizona as directed by Section 3003 of the PL 113-291.

The TNF’s preferred NEPA alternative is Alternative 6, Skunk Camp North Tailings Facility. The federal action associated with Alternative 6 consists of three main components: (1) the Southeast Arizona Land Exchange, a congressionally mandated exchange of land between Resolution Copper and the United States; (2) TNF authorization of special use/road permits for Resolution Copper Mine operations on NFS land; and (3) USACE authorization of impacts to waters of the U.S. from mine activities.

The discretionary federal proposed actions taken by the TNF and USACE addressed under Section 7 of the Act for the life of the estimated overall 60-year project include: the TNF’s authorization of special use/road permits for Resolution Copper Mine Project operations on NFS land and the USACE’s permitting under the Section 404 of the Clean Water Act (CWA). Based upon these discretionary federal actions associated with Resolution Copper Mine (*e.g.*, special use/road permits for road use, pipeline construction/operation, transmission line construction/operation), the subsequent analysis addresses consequences that would not occur “but for” the proposed action and

are reasonably certain to occur (*e.g.*, all related mine development, operations, closure, and reclamation).

Resolution Copper Mine Project proposed actions occur on non-federal lands and current TNF lands. We anticipate the current TNF land where the mine will be located will become non-federal land once the land exchange occurs. The proposed location of the Alternative 6 tailings storage facility occurs on private land and Arizona state trust lands southeast of the mine site (which Resolution Copper is expected to acquire).

The TNF's proposed special use/road permits for Resolution Copper Mine operations on NFS lands are for roads (improvement, development, maintenance, and use) and new power transmission lines and tailings pipeline corridors that cross NFS lands. Resolution Copper will implement road management and construct and maintain tailings pipelines. SRP is the electrical service provider for the project and will update existing powerline capability and construct new power line corridors to provide service to the new tailings storage facility. SRP plans a new 115 kilovolt (kV) line to power Skunk Camp co-located with tailings pipelines, and also a new 115kV/230kV line from the West Plant Site to a SRP Substation. A separate special use permit for the SRP powerlines is necessary because while the pipeline and powerlines are colocated, they follow different routes in some areas, reflect different uses (as per 36 CFR 251/FSH 2709.11, use code 761 for slurry pipelines, and use code 643 for powerlines), and involve separate responsible parties. Though the TNF will issue a separate permit, SRP's actions to upgrade, construct, operate and maintain electrical facilities are solely mine related and considered in this consultation.

Since the proposed project will discharge fill materials into potentially jurisdictional waters of the U.S. at the tailings storage facility and along the transmission and tailings pipeline corridor, Resolution Copper has requested authorization from the USACE under Section 404 of the Clean Water Act (CWA). The USACE's CWA Section 404 permitted activities include compensatory mitigation actions at parcels located outside of the mining project footprint (see definition below). The federal permitting and mitigation actions by the USACE under Section 404 of the CWA require Section 7 ESA evaluation.

The proposed action analyzed in the BA and our BO includes the following aspects of the project:

1. The construction or expansion of the mine's main facilities (existing and new).
2. The mining processes and associated activities (*e.g.*, transmission and pipeline construction/operation) occurring during operations of the mine.
3. The closure and reclamation processes.
4. The CWA Section 404 permit activities and off-site compensatory mitigation lands.
5. The disturbance of land as part of mitigation measures associated with the project.

Much of Resolution Copper's General Plan of Operation (GPO) describes the TNF's proposed action; however, the TNF analyzed a number of changes in the GPO during the NEPA alternatives development (*e.g.*, recreation mitigation). Resolution Copper Mine's GPO describes the collection of mining actions, including the construction or expansion of the mine's main facilities (existing and new), mining processes and activities occurring during operation, as well as closure and reclamation processes. The proposed action analyzed in the TNF's BA reflects the anticipated activities that would take place under the preferred alternative described in the DEIS (USFS 2019), not the original GPO. Similarly, the effects in the TNF's BA reflect the entire body of analysis conducted to support the NEPA process (2016–present), not solely the effects disclosed in the GPO

(2015). In addition to changes in the GPO that occurred during the NEPA alternatives development process, the TNF and SWCA have incorporated certain other post-Draft EIS changes into the proposed action for this BA. These include:

- Relocation of a process water pond to fit within the boundaries of the West Plant Site, instead of on TNF land. This relocation was identified in the Draft EIS as an option, but not part of the preferred alternative;
- Post-Draft EIS changes in the alignment of the pipeline corridor to further avoid sensitive resources;
- Post-Draft EIS changes in the alignment of the power line corridor to further avoid sensitive resources;
- Post-Draft EIS changes in the closure plans for the Skunk Camp tailings storage facility; and,
- Impacts or disturbance associated with lands used for off-site mitigation activities brought forth during the NEPA process and compensatory mitigation required by the CWA Section 404 permitting process.

The TNF will not retain jurisdiction over any lands transferred to Resolution Copper's private ownership once the land exchange is completed. The Forest Service will retain limited future discretion for the proposed action's approximate 60-year duration under section 7 of the ESA due to the administrative oversight responsibilities required of the special use/road permits. Also, the USACE will retain limited future discretion for the specified duration of the Clean Water Act permit, under section 7 of the ESA due to the administrative oversight responsibilities required of the Clean Water Act permit.

The following is a summary describing relevant portions of the proposed action for inclusion in this biological opinion. A detailed description of the proposed action is found in the revised June 2020, BA (included herein by reference) (SWCA 2020) and the August 9, 2019, DEIS (USFS 2109).

### **Mine Phases: Construction, Operation, and Closure and Reclamation Time Frames**

Mining components and activities will occur at new mining facilities, existing mining facilities, and existing facilities proposed for expansion. The main project facilities are the East Plant Site, West Plant Site, Skunk Camp North Tailings Facility, the Transmission Line and Tailings Pipeline Corridor, the existing Magma Arizona Railroad Company (MARRCO) corridor, and the Filter Plant and Loadout Facility (Figures 1-6, Appendix C).

The proposed Resolution Copper Mine project consists of approximately 14,950 acres of land, of which 2,467 acres are TNF lands, Arizona State Land Department (ASLD) manages 8,218 acres, and 4,265 acres is private land. An additional 725 acres are associated with Clean Water Act mitigation for the project (described below). An additional 92 acres are associated with required recreation mitigations to offset impacts of the project.

The TNF and SWCA calculated the project component vegetation disturbance acreage by using the project footprint (*i.e.*, 14,950 acres). However, several components will not involve ground disturbance, including Pipeline North Tunnel (122.0 acres), Pipeline Devils Canyon Span (5.4 acres), Pipeline Queen Creek Span (3.2 acres), and Pipeline Underground Boring (60.9 acres). Thus, approximately 191.5 acres of mapped vegetation disturbance will not occur because the TNF does not anticipate construction of these components will include ground disturbance.

The estimated overall life of the mine will be 51 to 56 years. Resolution Copper estimates that the mine will take approximately 9 years to construct (mine years 1 to 9), an operational life of approximately 41 years (mine years 6 to 46), followed by 5 to 10 years (mine years 46 to 51 or 56) of reclamation activities. Mining operations will occur 24 hours a day, 365 days a year.

### Construction

- Mine years 1 through 9
- Specific activities will include:
  - Construction of new facilities at the East Plant Site, including new shafts, new roads, new substations, the refrigeration plant, and underground workings. Underground construction will be ongoing throughout the mine life.
  - Construction of new facilities at the West Plant Site, including the concentrator complex, process water pond, water treatment plant, substations, and new or rerouted Forest Service and private access roads. Ore processing facilities will be complete by mine year 6 and will begin processing ore from construction of the shaft and tunnels at the East Plant Site.
  - Construction of the Filter Plant and Loadout Facility by mine year 2.
  - Construction of power lines and tailings/copper concentrate/water pipelines within the various utility corridors, including new infrastructure within the MARRCO corridor.
  - Construction at the Skunk Camp tailings storage facility, including new roads, administrative facilities, stormwater controls and soil or growth media stockpiling. Resolution Copper expects the tailings storage facility construction to be ongoing throughout the mine life, as the facility will continually increase in both height and area.

Operators will construct a 20-foot-wide gravel access road generally adjacent to the tailings storage pipelines, located within a 500-foot wide right-of-way corridor. The access road will run almost the full length of the pipeline at the same grade and will be designed to allow all-weather access and to prevent scouring and erosion. Except in limited areas, road access will use existing roads only. These exceptions include where the pipeline is located in a tunnel north of U.S. 60, where the pipeline crosses underneath U.S. 60, where the pipeline bridges/spans the drainages of Queen Creek and Devil's Canyon, and where the pipeline is bored underneath Mineral/Mill Creek (activities occur at the intermittent/ephemeral Mill Creek and upper Mineral Creek confluence).

Crews will construct overhead power lines in the same vicinity generally parallel to the pipeline corridor. Construction of a few spur roads will occur outside of the corridor to allow SRP access to transmission towers. Catenary cable bridges will occur where required for the pipeline to span across major drainages or washes. Slope stabilization measures will mitigate unstable slope hazards, including horizontal drains and/or toe buttressing. In addition, erosion protection measures will occur, particularly at toe areas of watercourse crossings.

Constructed channels and culverts, designed to 100-year discharge rates, will allow passage of stormwater to maintain existing upland runoff and major drainage paths that cross the corridor. Where it is not practical to install a culvert along the alignment of an existing stream (e.g., where the corridor is in a cut), or where the discharges are small, runoff will be collected in the up gradient diversion channel and conveyed parallel to the corridor for conveyance through culverts

placed at desired locations.

### Operations and Maintenance

- Mine years 6 through 46
- Specific activities will include:
  - Production of 132,000 to 165,000 tons per day of ore from the East Plant Site. Ore partially crushed underground will travel underground to the West Plant Site for processing.
  - Ore will be processed into copper and molybdenum concentrate at the West Plant Site. A pipeline will pump copper concentrate in the MARRCO corridor to the Filter Plant and Loadout Facility. Trucks will take molybdenum concentrate directly from the West Plant Site.
  - Further dewatering of the copper concentrate occurs at the Filter Plant and Loadout Facility, then operators will load and transport copper concentrate by rail to market. The final smelter destination is unknown at this time. A pipeline will transport recycled water back to West Plant Site for use in the mining circuit.
  - Processing will create approximately 1.4 billion tons of tailings as waste material. Tailings will travel by pipeline to the Skunk Camp tailings storage facility. The tailings storage facility will continually expand over time and tailings would remain in the storage facility in perpetuity.

### Closure and Reclamation

- Mine years 46 through 51 to 56. Some reclamation activities will occur during construction and operation phases. Examples include revegetation and stabilization along utility corridors and temporary construction areas, and concurrent reclamation on portions of the tailings storage facility embankment once the final embankment face is complete.
- Specific activities include:
  - Decommissioning, removing, and closing facilities.
  - Recontouring and regrading disturbed surfaces.
  - Replacing growth media, which could be stockpiled soils or other material such as Gila conglomerate.
  - Revegetating surfaces with native vegetation.
  - Closure of the tailings storage facility. The sequence and timing of closure of the tailings storage facility depends primarily on water management. Closure activities regarding seepage will continue beyond the end of mining operations and consist of monitoring seepage and activities associated with water quality concerns.

The closure and reclamation phase will occur after the approximate 40-year operations phase and will have a duration of approximately 5 to 10 years, longer for the tailings storage facility (estimated seepage rates suggest that additional closure activities including monitoring and possible water treatment would be required up to 80 years after the end of operations). Crews may complete reclamation concurrent with operations on the outer slopes of the tailings storage facility, where practicable.

## **Underground Mining and Subsidence**

The GPO, submitted by Resolution Copper, proposes to conduct underground mining of a copper-molybdenum deposit located between approximately 4,500 to 7,000 feet below the area known as Oak Flat (Table 1, Appendix C). To obtain the ore, Resolution Copper will use a technique known as panel caving, which divides the ore into large sections or panels and depends on gravity and internal geological stresses to extract ore from underneath the ore body. Resolution Copper will construct a network of shafts and tunnels below the ore body using standard underground mining techniques including drilling, blasting, and removing the blasted rock. Access to the tunnels from vertical shafts will occur from the East Plant Site. Once crews build the tunnels below the copper deposit, explosives fracture the ore above and gravity moves the ore downward for removal and crushing. Primary crushing occurs underground. Operations will then convey the ore to a production shaft and hoist the ore approximately halfway to the surface (approximately 3,500 feet below surface). Operations will send the ore to the West Plant Site via an inclined underground-to-surface conveyor system. All of these steps occur underground.

The continued process of collapsing and excavating the ore repeatedly occurs until the copper deposit is exhausted or the grade of the collapsed ore is no longer economically viable. Over the 40-year operations phase, this process will occur at six panels adjacent to one another. Under the proposed action, mining will not occur within some sections of the one percent copper deposit shell nearest Apache Leap to minimize risk of subsidence at Apache Leap.

As the panel caving process is repeated, the volume of ore extracted from the underground mine is expected to cause the ground surface above the ore body to collapse or subside. Resolution Copper predicts the potential area that will subside will begin to show at the surface in about the sixth year of active mining. The overall subsidence will consist of the crater limit, the fracture limit, and the continuous subsidence limit, resulting in a 1,751-acre crater with maximum width of 1.8 miles and maximum depth of 800-1,115 feet at the end of mine life.

Dewatering of the deep groundwater system below the East Plant Site has taken place on private land with the appropriate permits since 2009, in order to allow for building of underground infrastructure (see Environmental Baseline). Currently, a thick sequence of poorly permeable Tertiary basin-fill sediments (the Whitetail Conglomerate) separates the Apache Leap Tuff aquifer from the deep groundwater system. Once mining proceeds, panel caving will create a hydraulic connection from the ground surface to the deep groundwater system and eliminate any intervening layers like the Whitetail Conglomerate that formerly were able to prevent or slow vertical groundwater flow. As the fractured zone of rock above the ore body extends to the surface, the fractures intersecting the overlying Apache Leap Tuff aquifer will partially dewater along with the deep groundwater system which can change the Apache Leap Tuff aquifer supply to springs and perennial streams. This dewatering will continue throughout the life of the mine.

## **East Plant Site**

The East Plant Site is the location of the existing Magma Mine #9 and #10 shafts. Resolution Copper will enhance the East Plant Site adjacent to the Oak Flat Federal parcel by expanding its current size of 39 acres to 188.8 acres. The East Plant Site will include surface support facilities for the underground mining activities, such as access to vertical shafts and tunnels, refrigeration, ventilation, and surface support buildings. The Magma Mine Road provides access to the East Plant Site. Resolution Copper will eventually reroute the Magma Mine Road due to anticipated

subsidence impacts. At present, four acres of the existing East Plant Site and 80 acres of the proposed East Plant Site are on Forest Service lands; following the land exchange, all of the East Plant Site will be private. The four acres of the existing East Plant Site has been previously disturbed.

Closure and reclamation at the East Plant site will consist of salvaging and demolishing all buildings, except for the headframes and hoists, which operators will use for post-closure groundwater monitoring. All salvageable and non-salvageable building materials will be disposed of off-site. All disturbed surfaces except those needed for long-term monitoring, including paved and graveled areas, will be regraded and reseeded with appropriate local seed mixes. Operators will close contact water basins in accordance with Aquifer Protection Permit (APP) requirements, and permanently seal shaft collars and subcollars by an engineered seal.

Reclamation activities will not occur within the subsidence area. There will be a berm and/or fence constructed around the perimeter of the continuous subsidence area to protect public safety from the unstable ground surface. To the extent practicable, operators will construct surface water diversions to divert stormwater away from the subsidence area and into natural drainages.

After closure, groundwater levels in the vicinity of the mine site will begin to recover; a process that will take centuries (USFS 2019, SWCA 2020). There is a remote and speculative possibility that eventually groundwater levels may rise high enough to encounter the subsidence crater, raising the possibility of a lake forming. The DEIS analysis modeled a range of groundwater recovery scenarios; and even with the fastest recovery, the models do not anticipate recovery to take place within 800-900 years after closure of the mine.

### **West Plant Site**

The 940-acre West Plant Site, formerly the location of the old Magma Mine processing and smelter facilities, will process crushed ore arriving from the East Plant Site. The West Plant Site consists of three main facilities: (1) the stockpile, which includes the development rock and intermediate rock stockpiles (the rock stockpiles generally only persist during construction and startup of the facility); (2) the concentrator complex, which includes the process water pond, ore stockpile facility, tailings thickeners, copper molybdenum and copper concentrator thickeners, and the molybdenum plant; and (3) the auxiliary facilities, which include the administration building, contractor and warehouse laydown yards, and parking areas. The footprint of the West Plant Site will be on private lands owned by Resolution Copper. The Silver King Mine Road (Forest Service Road (FS) 229), which is on both private and Forest Service lands provides access to the West Plant Site. Resolution Copper will reconstruct and maintain portions of FS 229 across private land to Mine Safety and Health Administration specifications. The mine will use this as an alternate road to transport mine personnel, equipment, supplies, and molybdenum and other mine products to and/or from the West Plant Site without needing to enter the Town of Superior proper. Employees would primarily enter the West Plant Site from Lone Tree/Smelter Town Road.

At the end of the project, Resolution Copper will decommission the West Plant Site facilities, and contour, grade, and reseed (with local species seed mixes) the land surface as necessary to blend into the surrounding topography and terrain. A diversion channel, stormwater channel, and an on-site channel will remain in place to route flow through a new diversion channel to the Apex Tunnel to existing drainages (e.g., Silver King Wash). Operators will grade non-contact water

basins to drain, and close, in accordance with Aquifer Protection Permit requirements, the process water pond and contact water basins.

Roads needed to support the reclamation and closure efforts will remain to provide access to monitoring stations and remediation areas. Resolution Copper will reclaim all other roads. Operators will salvage or demolish all buildings, with the exception of the historical cooling tower, and properly dispose all materials off-site. Operators will decommission, cap, and reclaim at the surface all portals, ventilation shafts, and tunnel entrances.

### **Skunk Camp Tailings Storage Facility**

The Skunk Camp tailings storage facility is located on a mixture of land administered by the ASLD and private land approximately two miles east of the existing ASARCO Ray Mine (Table 2, Appendix C). There will be approximately 14,950 acres of disturbance, of which 2,467 acres is Forest Service land, 8,218 acres is ASLD, and 4,265 acres is private land. Resolution Copper will eventually purchase the State trust land at auction. Additional project activities would occur on 92 acres for recreational mitigations and 725 acres of USACE CWA 404 permitting compensatory mitigation. This acreage includes the area of the tailings storage facility as well as the tailings conveyance pipeline and powerline corridor.

Mining operations will create and pipe approximately 1.4 billion tons of tailings waste material to the Skunk Camp tailings storage facility. The tailings storage facility will continually expand over the mine's life. The approximate size at fence line of the tailing storage facility will be 9,611 acres, with about 4,002 acres of disturbance within its footprint. The approximate embankment height will be 490 feet. The tailings will remain in the storage facility in perpetuity. Operators will create a pipeline and power line to convey tailings and power to the storage facility.

Ore processing at the West Plant Site will result in two separate streams of tailings: potentially acid generating (PAG) tailings representing about 16 percent of the tailings, and non-potentially acid generating (NPAG) tailings representing 84 percent of the tailings. Once at the tailings storage facility, operations will handle the two tailings streams differently, but independent pipelines will pump both as slurry to the tailings storage facility. Once delivered as a slurry, the NPAG tailings will be cycloned to separate the coarser particles for use as embankment fill, with the finer particles thickened at the site before discharge into the impoundment. Operations will deposit PAG tailings sub aqueously into two separate cells to the north (upstream) end of the facility. At mine closure, Resolution Copper will encapsulate the two PAG cells by the NPAG tailings. Pumped recycled water will return to West Plant Site for use in the operations.

Separate cross-valley starter embankments will impound PAG and NPAG cells. The impoundments will initially be constructed with borrow material from within the ultimate tailings facility footprint. Periodically, the impoundments will rise in elevation during operations with compacted cycloned sand fill. Resolution Copper has designed the two PAG embankments as downstream-type dams lined with a non-permeable layer to reduce seepage.

The NPAG cross-valley, centerline embankment will contain an underdrain system to maintain a low saturated surface in the tailings embankment and to intercept and direct seepage from the impoundment to the downstream seepage collection system ponds. Operators will place additional seepage controls (grout cutoff wall, seepage collection pond, pumpback wells) downstream of the tailings storage facility to collect seepage entering the environment. At full

buildout, the embankment containing the NPAG tailings will be approximately 490 feet in height.

Operators will construct 5 diversion dams, 5 diversion channels, and 2 non-contact water surface-water pipelines along the east and west sides of the tailings storage facility. Collection ditches will occur along the embankment toe and at underdrain discharges to convey contact water to the seepage collection pond. Resolution Copper will construct additional auxiliary facilities at the Skunk Camp site such as the cyclone processing system, an electrical substation and electrical distribution lines, and administration facilities. Traffic will access the tailings storage facility along the existing Dripping Springs Road.

At the end of mining operations, operators will salvage or demolish all buildings and their foundations at the tailings storage facility, and all materials and debris will be properly disposed of off-site. Roads that will not be required for closure and reclamation activities will be decommissioned, recontoured, and revegetated.

Operators will cover the remaining area of PAG tailings with a minimum 10-foot layer of NPAG tailings. The surfaces of both the NPAG and PAG facilities will be shaped to prevent standing water and divert runoff into channels leading to the downstream collection pond, and both NPAG and PAG areas will be covered by a 1- to 2-foot layer of low-permeability, erosion-resistant growth medium (e.g., Gila conglomerate or equivalent soil, sand, and gravel mix) and revegetated. The timing of reclamation is dependent of the surface being dry enough to allow equipment access for reclamation.

Crews will construct a perimeter fence or berm around the tailings storage facility to prevent access. Revegetation of some surface water diversion structures will occur to control water and wind erosion, and operators will reconfigure others to carry water along topography through and off the site. The diversion structures will stay in perpetuity and reinforced with riprap to minimize erosion.

Estimated seepage rates suggest active closure will be required from 10 to 80 years after the end of all mining operations and passive treatment of seepage may occur up to 250 years after the end of all mining operations. Resolution Copper estimates closure of the tailings recycled water pond to take up to 10 years after closure. Specifically, up to 10 years after closure, Resolution Copper will pump back excess seepage in seepage ponds to the recycled water pond, and reclamation will take place on the embankment and tailings beaches. After 10 years when the recycled water pond is closed and no longer present, Resolution Copper will use seepage ponds to evaporate seepage, and the remaining reclamation of the tailings surface would occur. The mine operators will expand seepage collection ponds to maximize evaporation in order to passively evaporate all incoming seepage (estimated from 10 to 80 years). If necessary, Resolution Copper may need to implement other active water control measures such as spray evaporators or active treatment and release downstream. The seepage ponds will close only after seepage is determined to meet standards acceptable for release downstream. Once closed, the sludge containing concentrated metals and salts from evaporation will likely require cleanup and handling as a solid or hazardous waste.

## Tailings Pipeline Corridor

Operators will transport the tailings within a corridor that includes four pipelines of varying sizes, access roads, and power and communication lines. The tailings corridor will follow existing roads or previously disturbed areas where possible. As mentioned above, operators will handle the tailings in separate split streams (PAG and NPAG) based on the ore processing at the West Plant Site. The pipelines will match the flow characteristics of materials and velocity and vary between 10-inch, 22-inch, or 34-inch diameter. Recycled water will travel back to the West Plant Site from the tailings storage facility via a 16-inch pipeline.

Pipeline installation, spill containment necessary based on pipeline installation method, and access roads would vary by topography. The pipeline designs will include being buried to the extent possible, horizontal directional drilling (underneath U.S. 60, cable-stay bridges (across Queen Creek and Devil's Canyon), tunnels (Silver King-Kings Crown Peak area), or underground boring (Mineral/Mill Creek). Installation design would vary based on topography throughout each corridor segment.

Throughout the life of the project, regular patrols will assess all areas of the tailings pipeline route. The patrol route would be conducted at least 26 times each calendar year at intervals not exceeding three weeks and serve to inspect the surface conditions on or adjacent to each pipeline right-of-way and the condition of crossings under navigable waterways. Methods of patrol would include walking, driving, or flying a drone. Pipelines have pressure indicators and flow indicators incorporated that allow instantaneous detection of leaks. A leak detection system would connect via fiber-optic cable to the control room at the West Plant Site and the control room at the tailings facility.

The right-of-way (ROW) for the tailings corridor will likely be 150-feet wide upon final approval. Where the pipeline runs parallel with the 115-kV transmission line, the right-of-way will be 225 to 280-feet wide upon final approval (i.e., SWCA used a width of 500-feet for their analysis while the corridor design was being finalized). The colocated corridor from the tailings pipeline north of U.S. 60 to the Skunk Camp tailings storage facility fence lines will result in 831.9 acres of disturbance. Disturbance will consist of excavation, stockpiles, laydown areas, vegetation clearing, and structures. Permanent disturbance will primarily be associated with an access road that overlaps these ROWs and infrastructure like tower footings. Operators will reclaim and revegetate other disturbed areas after construction.

The tailings pipeline will cross Queen Creek and Devil's Canyon and pass under Mill Creek. The Queen Creek and Devil's Canyon crossings will take place at locations that do not have perennial flow and will use a Catenary cable bridge for the pipelines to span these streams. No disturbance will take place to the streambed or habitat along the streams in these locations. The Mill Creek crossing will take place upstream of Government Springs Ranch. Specific design measures implemented to minimize potential effects at these crossings include:

- Using an underground boring method to install the pipelines at a minimum depth of 30-feet below the ground surface of Mill Creek.
- All power poles colocated with the tailings pipeline corridor will be located outside of the ordinary high-water mark of Mineral Creek and the transmission lines will pass overhead.
- Construction crews will use the existing Dripping Springs Road; no new access roads will occur at the Mineral and Mill creek crossing locations. Crews will deliver construction

materials to sites via helicopter, crane, or by foot, and access power pole locations on foot during construction and for general vegetation management to avoid effects to proposed yellow-billed cuckoo and designated Gila chub critical habitat.

The locations where the tailings pipeline will span Queen Creek and Devil's Canyon and cross under Mill Creek will have no additional ground disturbance, but the acres are included as part of the estimated amount of disturbance within the action area because of potential effects (such as noise, maintenance, dust, shading, etc). We describe these acreages below:

- 3.2 acres within the pipeline corridor with no ground disturbance where the pipeline will span Queen Creek.
- 5.4 acres within the pipeline corridor with no ground disturbance where the pipeline will span Devil's Canyon.
- 60.9 acres for the underground boring with no surface ground disturbance within the ordinary high-water mark of Mill Creek or within designated Gila chub and proposed yellow-billed cuckoo critical habitat.

Facilities associated with fresh water supply and distribution, such as pipelines, pump stations, and water tanks, may have a post-mining use and transferred to a third-party utility. These facilities are associated with the MARRCO corridor. Resolution Copper does not anticipate third-party uses within the tailings pipeline corridor at this time. No closure or reclamation activities would occur at these facilities if transferred to a third party.

Facilities that will not have a post-mining use include the tailings slurry lines, concentrate pipelines, and associated pump station with electrical power. Operators will decommission and remove these facilities and remove and scrap or salvage buried or aboveground pipelines. All disturbed areas will be recontoured and reseeded.

### **Electricity Supply and Transmission Lines**

SRP currently supplies electricity to the East Plant Site by an existing 115-kilovolt (kV) transmission line, and to existing facility substations at the West Plant Site by an existing 115-kV and 230-kV transmission line.

Construction and operation of the proposed mine requires new transmission lines between these main facilities to accommodate greater power needs, as well as new transmission lines to power the tailings storage facility, water pumps within the MARRCO corridor, and the Filter Plant and Loadout facility (Table 3, Figure 5 - Appendix C). Operators will upgrade substations and/or construct new 230-kV substations to accommodate electricity from the upgraded lines and to distribute electricity throughout the site.

Easements for the transmission lines will vary between 75 to 160 feet, depending on the size of the line and the requirements for construction, maintenance, and electrical clearances. Transmission lines corridors colocated (e.g., line would run parallel to the other) with the tailings pipeline will be from 225 to 280-feet wide upon final approval. Tower designs will be either lattice steel towers or tubular steel poles with footings up to 50 feet square. The foundations for the transmission line structures are auger-drilled reinforced concrete piers. A lattice tower typically has four legs, each attached to a concrete foundation set into the ground.

Wherever possible, operators will use existing roads to construct the transmission facilities. In some areas, crews will clear access roads on an as-required basis to ensure adequate access for construction and maintenance activities. Construction of a permanent access road will occur along the colocated transmission line and tailings pipelines but within the proposed corridor in drivable terrain. Staging areas immediately surrounding line structures will also occur within the proposed corridor. Spur access roads constructed for SRP to reach tower facilities would be 20-foot wide and use existing roads and trails where possible. Along Mineral Creek, SRP will deliver materials by hand, helicopter, or crane from existing roads to construct the 115-kV transmission line and stay within previously disturbed areas.

SWCA's (2020) analysis considered a 500-foot wide corridor to estimate total ground disturbance for section 7 purposes. Based on initial conceptual designs, the transmission line right-of-ways will vary from 75 to 160 feet wide (Table 4, Appendix C) with only a portion disturbed during construction. Disturbance will consist of excavation, stockpiles, laydown areas, vegetation clearing, and structures. Permanent disturbance would primarily be associated with an access road that overlaps these ROWs and infrastructure like tower footings. Operators will reclaim and revegetate disturbed areas after construction.

Amount of disturbance anticipated for the transmission lines include:

- Transmission line 115-kV only: 3.0 acres within the corridor
- Transmission line 115-kV/tailings pipeline colocated corridor: 294.9 acres within the 500-foot corridor
- Transmission line 115-kV/230-kV colocated: 57.3 acres within the 500-foot corridor

Unless operators identify a post-mining use, they may remove power transmission facilities, which include electrical substations, transmission lines, and power centers, as part of the reclamation program. SRP would continue to own the power lines and may have a post-mining use for ongoing power transmission in the area.

#### Vegetation Management and Line Maintenance at Transmission and Distribution Lines

SRP will be responsible for vegetation management and repairs/maintenance at and along power transmission and distribution lines that supply Resolution Copper Mine (Table 6 & 7, Appendix C).

##### *Line Inspection and Maintenance*

SRP will inspect overhead and underground lines, poles, and towers by helicopter and with a truck, utility vehicle, and by foot (Table 6, Appendix C). The variety of structures and lines will be evaluated at intervals ranging from every 6 months to every 10 years. The duration of these activities will typically last hours to weeks.

Routine aerial inspections of the transmission line will occur by helicopter flight just above conductor height (50 to 150 feet above ground level), except where terrain or trees require a higher observation elevation. The low-level flights are a reconnaissance of the power line, structures, and associated equipment, and identify areas that may require repair. Helicopter flight patterns may include hovering or circling, or occasional landing. During the flights, SRP will identify and record line maintenance issues, and follow up with scheduled treatments.

In addition to routine helicopter flights, SRP may conduct additional flights by helicopter and/or small fixed-wing aircraft to collect light detection and ranging (LIDAR) data along the length of

the lines between elevations of about 300 feet to 7,000 feet. LIDAR-related flights could occur during any time of year based on conditions within the right-of-way and maintenance needs. Prior to these flights, SRP may place and remove (when flights are complete) temporary ground control and/or weather stations (5-6 feet tall) along the line.

Should temporary helicopter refueling be required, SRP will conduct these in an open and previously disturbed area, following standard protocols to prevent spills, and at least 0.25 mile from protected or environmentally sensitive areas.

Routine ground inspection of the transmission line typically includes one or two utility employees driving a pickup truck, UTV, or traveling on foot to document problem areas for future repair. These employees could occasionally conduct minor repairs during the patrol.

Crews will maintain lines and structures by conducting repairs as needed (every 1-10 years) and structural replacement every 10-60 years (Table 5, Appendix C). These single location repairs or repair/replacement of line sections may last days or weeks. SRP estimates unscheduled and infrequent emergency inspections and repairs about 10 times per year. The repairs and replacement will involve various heavy equipment and air support, including backhoes; boom, bucket, cable puller, hole digger, and pickup trucks; D4 and D5 caterpillars; utility vehicles; and helicopters.

When SRP identifies maintenance issues with the line, poles, or other related structures, SRP prioritizes work to address non-hazardous issues in accordance with their priority schedule. SRP may need to replace the line or related structures at any time within the line's lifespan, making maintenance frequency difficult to predict. However, should pole replacement be required it will involve a large hole digger truck to drive in the right-of-way and dig a hole 20 to 36 inches wide and 5 to 15 feet deep near the existing pole. Crews will cut the old poles at ground level and take them off-site. The new pole is set with a hole digger truck or a boom truck. If access does not allow for the vehicle to enter the right-of-way, crews will walk in with a hand rock drill and air compressor to dig the hole. Pole replacement may involve a single pole or small group of poles, or multiple poles along a longer section of the line.

Line maintenance also may include erosion control and prevention work around pole bases if erosion has occurred. This work would involve a bulldozer or backhoe entering the area and fixing the eroded area. If a bulldozer or backhoe cannot access the area, crews will conduct work by hand.

SRP crews will conduct unscheduled emergency inspections by either helicopter or by ground inspection and follow procedures described above for those tasks. Unscheduled emergency inspections will differ from routine inspections in that they could occur at any time on a year-round basis.

When SRP identifies emergency hazardous issues with the line, poles, or other related structures, SRP will immediately address these issues as a priority. Emergency maintenance work involves the same types of work as the routine line maintenance tasks described above, but along a tighter timeframe and with a higher urgency. Additionally, hazardous line problems require immediate repair; therefore, SRP may not be able to reasonably implement all mitigation measures.

### *Vegetation Maintenance*

SRP will inspect vegetation condition at transmission and distribution lines from the air (twice a year) and from the ground (every 1-5 years) to evaluate routine vegetation maintenance needs and hazards (Table 7, Appendix C).

SRP will perform routine vegetation management every 1-5 years across the entire circuit and conduct hazard vegetation treatment infrequently, estimated at about a single instance a year (Table 7, Appendix C). The equipment and methods will involve bucket and pickup trucks, utility vehicles, mechanical mowers as needed, and chippers.

The methodologies for routine vegetation management include: 1) vegetation aerial inspection, 2) vegetation ground inspection, routine vegetation maintenance, and hazard vegetation treatment (Table 7, Appendix C).

SRP will conduct aerial inspections of transmission line right-of-way by helicopter flight just above conductor height (50 to 150 feet above ground level), except where terrain or trees require a higher observation elevation. The low-level flights are a reconnaissance of general vegetation conditions within the right-of-way, identify hazard vegetation, and help plan the next routine maintenance cycle. SRP may use information from inspections to plan access routes, collect data, refine the number of crews needed, and develop the vegetation treatment method and plan of work.

Crews in trucks, UTVs, or on foot (as dictated by site condition) will inspect the transmission line right-of-way. Ground inspection is a reconnaissance of the right-of-way that can occur in conjunction with aerial inspection or when/where aerial inspection is not practical. Ground inspection will record general vegetation conditions within the right-of-way, identify hazard vegetation, and plan the next routine maintenance cycle. SRP may use information from inspections to plan access routes, collect data, refine the number of crews needed, and develop the vegetation treatment method and plan of work.

Routine vegetation maintenance is the process of pruning or removing vegetation within the right-of-way to maintain safety and access. Pruning is typically limited to the edges of the right-of-way corridor. Pruning is also limited to where protected resources or where threatened and endangered species exist, and pruning is required rather than removal of a tree or vegetation. SRP separates routine vegetation maintenance into 1) lines cleared to the recommended clearance standards that require only routine follow-up maintenance, and 2) lines not cleared to the clearance standards and require extensive clearing. SRP plans the schedule of routine vegetation maintenance projects through the results of aerial and ground inspections. Crews clear power lines on a cyclical basis every 1 to 5 years depending on factors such as vegetation type and the clearance standards for the line type. Routine vegetation maintenance can involve mechanical (mowing) and manual (hand crew) treatments; mowing is unlikely to be used along the Resolution Copper powerline. Hand crew removal and pruning of trees generally involves the use of chainsaw felling and pruning techniques.

Hand crews and power cutting tools will conduct hazard vegetation operations to remove and/or prune vegetation that poses an immediate threat to a utility line or associated structure. Because hazard vegetation requires immediate treatment to maintain the line in a safe operating condition, SRP may not be able to reasonably implement all species conservation measures to minimize and/or avoid effects. Therefore, SRP may remove or prune hazard vegetation at any time of year, and at any location within the right-of-way.

## **MARRCO Corridor**

The 30-mile-long MARRCO corridor is an existing 685-acre railroad and utility corridor right-of-way running roughly east-west from Superior to Magma Junction (Figure 3, Appendix C). Hewitt Canyon Road (FS 357) provides access to the MARRCO corridor, which crosses private lands as well as lands administered by the TNF and the ASLD. Resolution Copper currently owns the MARRCO corridor ROW. The corridor is 200-feet wide, and private parcels along the MARRCO corridor have been developed, particularly east of Queen Station and near Magma Junction.

The corridor currently contains multiple utility lines and water pipelines and infrastructure, including an overhead transmission line and telephone line, buried natural gas pipelines, Arizona Water Supply Company pipelines and infrastructure providing water supply to the town of Superior, and an 18-inch dewatering line transporting water being dewatered from the East Plant Site to the New Magma Irrigation and Drainage District (NMIDD). New corridor facilities will include additional water pipelines, water pumps and recovery wells, and copper concentrate pipelines to transport ore concentrate to the Filter Plant and Loadout facility. Operators will upgrade the rail lines to allow use of freight car transport of concentrate from the Filter Plant and Loadout Facility to the main Union Pacific line to market. Resolution Copper anticipates the existing historic rail lines will stay in place between the West Plant Site and the Filter Plant and Loadout Facility.

The closure and reclamation of the MARRCO line is undetermined because Resolution Copper is not certain of the intended post-closure use of the railroad and utility lines. Resolution Copper does not foresee a use of the railroad or utility lines for project reclamation or post-closure use, but another entity might buy the facilities and continue use. However, Resolution Copper will remove the concentrate lines from the MARRCO corridor, and recontour and revegetate direct surface disturbance areas to the extent possible with adjacent utilities. Bridge structures will be assessed and either removed or upgraded.

## **Filter Plant and Loadout Facility**

The Filter Plant and Loadout Facility is located on 553 acres of private lands controlled by Resolution Copper. A pipeline within the MARRCO corridor will transport copper concentrate slurry from the concentrator complex at the West Plant Site 22 miles to the Filter Plant and Loadout Facility near San Tan Valley. The Filter Plant's primary function will be to filter the copper concentrate for transportation. The Loadout Facility's primary function will be to remove water from the copper concentrate to prepare the concentrate for delivery to an off-site smelter and recycle water for use in the concentrator.

After completion of the project, Resolution Copper will salvage or demolish all buildings at the Filter Plant and Loadout Facility, including building foundations, and all material and debris will be disposed of properly off-site. Resolution Copper will close and reclaim all tanks and ponds in accordance with Aquifer Protection Permits (APP) and Arizona Pollutant Discharge Elimination System (AZPDES) permit requirements. Crews will regrade all disturbed areas, with the exception of the diversion channel on the north side of the facility that routes surface water flows around the site to existing drainages.

### **Recreation Mitigation Parcels**

Resolution Copper is proposing to mitigate for the loss of public recreational opportunities (world-recognized rock-climbing areas, Oak Flat campground, nearby trails and Forest Service access to trails) on the Oak Flat Federal Parcel by proposed replacement areas (Figure 10, Appendix C). The total disturbance to these recreational areas is 92 acres. Recreation-related mitigation includes: 1) Arnett trailhead, 2) a comprehensive recreation mitigation package that includes motorized trails (9.3 miles) and non-motorized trails (11.5 miles), 3) a road extension to provide access to the Inconceivables Climbing Area, and 4) a replacement campground along Queen Creek named the Castleberry Campground, and associated infrastructure such as a water line to support the campground.

### **USACE Clean Water Act Section 404**

All effects to potential jurisdictional waters of the U.S. are solely associated with the Skunk Camp tailings storage facility or the pipeline/power line corridor between the West Plant Site and the tailings storage facility. Resolution Copper anticipates the direct fill and permanent loss of approximately 129.2 acres of ephemeral drainages, including Dripping Spring Wash, Skunk Camp Wash, Stone Cabin Wash and a number of unnamed drainages that are located within the tailings storage facility footprint. In addition, Resolution Copper anticipates 15.7 acres of temporary impacts to ephemeral drainages from the tailings pipeline/powerline corridor. The proposed project will also result in a total of 43.4 acres of indirect impact caused by dewatering of downstream drainages. In total, 188.3 acres of direct and indirect effects by discharges of dredged or fill material into potential jurisdictional waters of the U.S, primarily from levelling of existing topography through cut and fill of the ground surface. No wetlands or other special aquatic sites, springs, seeps, intermittent waters, or perennial waters that the USACE would consider to be potentially jurisdictional under the Clean Water Act are present in the proposed footprint of the tailings storage facility and related features.

### **Conservation Measures**

The following conservation measures (placed under specific subheadings) include Resolution Copper's actions to reduce, minimize, or eliminate effects to listed species, measures to minimize the effects of the action on the broader environment (and listed species) through Best Management Practices (BMP), CWA Section 404 mitigation actions for effects to waters of the U.S, and SRP's measures to conserve Arizona hedgehog cactus during transmission line maintenance.

### USACE Clean Water Act Section 404 Permit Mitigation Measures (addressed in *Effects of the Action and Concurrences*)

USACE permitting under Section 404 of the CWA will require compensatory mitigation to offset direct and indirect effects to waters of the U.S. Resolution Copper and USACE have developed a final compensatory mitigation plan with specific actions as part of the USACE permitting process. Resolution Copper will implement the following suite of off-site mitigation measures along the Gila River, Queen Creek, and the San Pedro River (Figures 6-9, Appendix C). Resolution Copper's compensatory mitigation actions for effects to waters of the U.S. at the Skunk Camp tailings facility and pipeline/transmission line corridor may result in future habitat improvements for listed species. We address any effects to listed species from issuing the permit for impacts to waters of the U.S. and implementing associated mitigation actions in the Effects of the Action and Concurrences (Appendix A).

### *MAR-5 Discharge Area/Olberg Road Vegetation Management Site*

Resolution Copper CWA Section 404 mitigation activities at the 23-acre Olberg Road Restoration Site (ORRS) will contribute to the Gila River Indian Community's broader strategy of using a portion of its Central Arizona Project (CAP) water allocation to recharge the Gila River at the MAR-5 Discharge Area to improve river and vegetation quality (Figure 6 & 7, Appendix C). The Gila River Indian Community, on behalf of Resolution Copper, will implement ORRS mitigation consisting of tamarisk (*Tamarix* spp.) removal and control, followed by seeding of native plant species. Exotic tree species removal and control, combined with seeding of native plant species, may allow for the establishment and maintenance of a riparian habitat dominated by native tree species and eliminate a large, local source of exotic tree species seed from that section of the Gila River.

### *Queen Creek*

A 1.8-mile segment of Queen Creek is a CWA Section 404 mitigation site (Figure 6 & 8, Appendix C). The overall site is composed of Resolution Copper and BHP Mineral Resources, Inc. parcels and is approximately 79 acres. The ephemeral reach of Queen Creek on the parcel is a medium to large, well-defined, single to multi-threaded, low-gradient drainage system. The entire Queen Creek site will be subject to a conservation easement and active vegetation management will take place on 33 acres of the property.

Resolution Copper's proposed mitigation activities for the Queen Creek site have been planned for three separate areas (Areas A, B, and C) (Figure 6 & 8, Appendix C) and would include ecological improvements to the riparian habitat totaling approximately 33 acres. Within the xeroriparian corridor (Area A), limited removal of sparsely populated tamarisk and other exotic plant species would occur, followed by planting and seeding of native plant species. In portions of the site where there are anthropogenic disturbances (Area B), crews would selectively remove debris while avoiding disturbance to existing mature woody vegetation; seeding of native plant species would follow. The remaining portions of the mitigation site (Area C) would be preserved, providing protection to riparian and wildlife habitat. Exotic plant species and debris removal in any area would occur outside of the yellow-billed cuckoo (May 15-September 30) and southwestern willow flycatcher breeding seasons (May 1 through September 15).

### *H&E Farm*

The H&E Farm is a 500-acre property owned by The Nature Conservancy and used for agriculture and cattle since at least the 1950s (Figure 6 & 9, Appendix C). The parcel contains an intermittent reach of the San Pedro River. The drainage system is large, well-defined, low-gradient, and braided within a broad, comparatively level floodplain.

H&E Farm has been separated into three areas with specific planned CWA Section 404 mitigation activities (Area A, B, and C) (Figure 6 & 9, Appendix C). Resolution Copper's proposed mitigation activities for Area A include earthwork to reconnect historic tributaries.

The proposed earthwork is to reestablish the San Pedro River's access to its floodplain and terrace and enhance the wetland features present in the area. The soils across the site on the terraces are compacted and causing earth fissures and sinkholes on the parcel, which will continue if no intervention occurs. Grading in some areas would reestablish the natural alluvial fan and floodplain terrace structure. Planting and seeding native species is to restore a more native vegetation community along the bank of the river. Resolution Copper intends to mirror previous mitigation strategies implemented by The Nature Conservancy as well as ongoing mitigation at the

Arizona Game and Fish Department Lower San Pedro Wildlife Area that is contiguous to the western and northern boundaries of the H&E Farm parcel. The terrace area to be reestablished encompasses 300 acres, and the wetland area to be reestablished encompasses 15 acres. The Nature Conservancy will conserve the remainder of the property in its current condition.

### Groundwater Dependent Ecosystems

Resolution Copper intends to replace any lost water that mine dewatering may have on groundwater-dependent ecosystems (GDEs). GDEs include seeps and springs, as well as perennial or intermittent streams like Devil's Canyon, Mineral Creek, Queen Creek, Arnett Creek, the Gila River, and Telegraph Canyon.

Resolution Copper has developed a Monitoring and Mitigation Plan for Groundwater Dependent Ecosystems and Water Wells, revised in 2020 for the TNF (Montgomery and Associates Inc. 2020). This document outlines a monitoring plan to assess potential impacts on each GDE, identifies triggers and associated actions to be taken by Resolution Copper to ensure that GDEs are preserved, and suggests mitigation measures for each GDE if it is shown to be impacted by future mine dewatering. The stated goal of the plan is "to ensure that groundwater supported flow that is lost due to mining activity is replaced and continues to be available to the ecosystem." The plan does not contain a specified duration over which monitoring and mitigation will take place, however, the TNF intends to specify the timeline in the FEIS and Draft ROD to include all of the operations and closure phases, with GDEs then being dropped from monitoring only upon approval of TNF, based upon accumulated monitoring results (C. Garrett, SWCA, pers. comm. 2020).

The Monitoring and Mitigation Plan identifies 16 springs that will be monitored, as well as surface water flows in 10 locations along Queen Creek, Arnett Creek, Telegraph Canyon, Devil's Canyon, and Mineral Creek. A variety of potential actions are identified that could be used to replace water sources if monitoring reaches a specified trigger. These include drilling new wells to supply water, installing spring boxes, installing guzzlers, or installing surface water capture systems such as check dams, alluvial capture, recharge wells, or surface water diversions. These methods can supplement diminished groundwater flow at GDEs by retaining precipitation in the form of runoff or snowmelt, making it available for ecosystem requirements. One further method for replacing flow would be to provide alternative water supplies from a nearby source (such as groundwater from the Desert Wellfield or Arizona Water Company, that deliver water to the town of Superior, both located in the same Active Management Area, as regulated by Arizona Department of Water Resources).

The effectiveness of these GDE mitigation measures will be verified by annual monitoring of areas, type of phreatophyte, and depend on the specific approach used to replace water. Engineered replacements like pipelines, guzzlers, or spring boxes would be effective at maintaining a water source and maintaining a riparian ecosystem, but the exact type, location, and extent of riparian vegetation could change to adapt to the new discharge location and frequency of the new water source. Changes in water quality are unlikely to be an issue, since new water sources would likely derive from the same source as natural spring flow (i.e., the Apache Leap Tuff aquifer, or stored precipitation).

### Best Management Practices (BMPs) and Other Conservation Measures

Resolution Copper commits to environmental protection BMPs to reduce potential impacts on habitat, air, water, non-listed wildlife, and other resources (including listed species in some instances). These measures are part of the proposed action and detailed information is available in Volume 1: Chapter 3, Volume 2: Chapter 3, Volume 4: Appendix J of the DEIS (USFWS 2019), and the BA (SWCA 2020). Resolution Copper will be responsible for ensuring implementation of these measures during construction, operation, and maintenance, including along the tailings pipeline corridor.

#### *Soils and Vegetation*

BMPs for soil and vegetation, specifically stabilization of slopes and implementing noxious weed management and control can minimize effects to Arizona hedgehog cactus adjacent to the project footprint by protecting the plants from rockslides, erosion, exotic plant encroachment, wildfire, and fugitive dust.

1. Road embankment slopes will be graded and stabilized with vegetation or rock as practicable to prevent erosion.
2. During construction and operations, crews will construct diversions around the affected areas to minimize erosion. Resolution Copper will also implement a number of best management practices, including check dams, dispersion terraces, and filter fences.
3. Resolution Copper will monitor newly reclaimed areas on the TNF for weeds and invasive plants for the first five years after reclamation. Crews will treat invasive species after identification as soon as possible, or as soon as weather conditions are appropriate for treatment.
4. Resolution Copper stipulates that on NFS lands, seed mixes used in reclamation will be certified free of seeds listed on the Forest Service's noxious weed list and contain only species native to the action area. Resolution Copper will develop seed mixes from a native species seed list approved by the Forest Service.
5. Resolution Copper has prepared a Noxious Weed and Invasive Species Management Plan on National Forest System Lands (Resolution Copper 2019). Resolution Copper will submit reports two years after construction begins and every five years during operation to provide an update on surveys, control, and activities related the noxious and invasive weed management to the TNF and FWS.

#### *Noise*

1. Mining activities, primary crushing and conveying, will take place underground, and exhaust fans will be equipped with silencers for noise reduction. Milling will take place within a fully enclosed building.

#### *Transportation*

1. Best management practices for road construction and maintenance include:
  - a. To the extent practicable, crews will not remove vegetation except from those areas directly affected by road reconstruction activities.
  - b. Road construction designs for cut-and-fill slopes will prevent soil erosion.
  - c. Crews will construct drainage ditches with cross drains where necessary. Resolution Copper will revegetate, mulch, or otherwise stabilize disturbed slopes to minimize erosion as soon as practicable following construction.
  - d. Road embankment slopes will be graded and stabilized with vegetation or rock as

- practicable to prevent erosion.
- e. Resolution Copper will address road runoff through best management practices, including sediment traps, settling ponds, berms, sediment filter fabric, wattles, etc. They will design of these features based on an analysis of local hydrologic conditions.
  - f. Crews will generally avoid off-road vehicle travel.
  - g. Construction and operation crews will construct diversions around affected areas to minimize erosion. Crews will implement a number of best management practices, including check dams, dispersion terraces, and filter fences during construction and operations.

### *Air Quality*

BMPs for air quality can help to reduce fugitive dust from affecting Arizona hedgehog cactus within the action area.

1. Dust control on roads will include regular watering, road base maintenance and dust suppression, paving of select access roads to the East Plant Site and West Plant Site with asphalt, and setting of reasonable speed limits on access roads within the operational footprint.
2. Dust control at the tailings storage facility will include delivering tailings to the storage facility via distribution pipelines and continuously wetting the tailings during active deposition. During non-active periods, dust emissions will be managed by wetting inactive beaches and embankment surfaces with sprinkler systems, and treatment with chemical or polymer dust suppressants, if necessary, as well as progressive reclamation on the outer embankment.
3. Dust control at the East Plant Site will include periodic water and/or chemical dust suppressant, normal mining controls such as wet drilling and the wetting of broken rock, application of water suppression spray to control dust ore conveyance, dedicated exhaust ventilation systems and/or enclosures for crushers and transfer points underground, performing primary crushing and conveying underground, and saturating underground exhaust ventilation.
4. Dust control at the West Plant Site will include housing main active ore stockpiles in fully covered buildings, applying water suppression spray to control dust ore conveyance, processing ore in a new enclosed building, and enclosing conveyor transfer points within the concentrator building.
5. Dust control during shipping will include bagging molybdenum concentrate at the concentrator facility before shipping and enclosing the loadout building and storage shed.

### *Groundwater and Surface Water Quality*

1. At no point during normal construction, operation, closure, or post-closure will Resolution Copper allow stormwater, or any other liquid such as seepage, water used for dust control, or chemical suppressants used for dust control, that has come into contact with tailings, ore, or processing areas to discharge downstream. After closure, precipitation falling on the tailings facilities will interact with the soil cover, not tailings. The seepage collection ponds represent a long-term commitment for managing seepage and stormwater. Eventually the collection ponds will become passive systems, fully evaporating collected water, or operators will remove them after demonstrating that collected water is of adequate quality to discharge.

### *Surface Water Quantity*

1. To the extent practicable, Resolution Copper will divert stormwater flows that are upgradient of the facilities around disturbed areas and to the natural drainage system.
2. As much water as possible will be recycled for reuse in the mining circuit.
3. Resolution Copper will design permanent diversion channels for operations and closure.
4. Resolution Copper will implement best management practices to address runoff from roads, buildings, and other structures, including sediment traps, settling ponds, berms, sediment filter fabric, wattles, etc.

### *Wildlife*

Wildlife management at ponds such as bird hazing and vegetation management reduces the risk of attracting listed bird species to ponds and coming in contact with contaminants. Transmission lines development in accordance with standards and use of line markers can reduce the likelihood of bird collision, including listed species.

1. In order to minimize the potential risk for bird collisions with transmission lines, operators will design the lines and structures in accordance with Reducing Avian Collision with Power Lines (Avian Power Line Interaction Committee 2012). Crews will place line marking devices (i.e., flight diverters) at the proposed crossings of Queen Creek, Devil's Canyon, and Mineral Creek, especially in areas where there is suitable habitat for the yellow-billed cuckoo.
2. Additional hazing devices to deter and disperse wildlife from the PAG tailings, non-contact and contact stormwater catchment basins, and process water ponds may also be considered and could include the following:
  - a. Plastic ball covers, vehicle lights and horns, motion-sensor lights, flags, perch deterrents, shell crackers, bird bangers, screamers, distress cries/electronic noise systems, bird scare balloons, propane cannons, and mylar scare tape.
  - b. Resolution Copper will develop a bird hazing protocol for its employees that will include a combination of harassment techniques, with the opportunity for additional or adjusted techniques based on field observations and ongoing research efforts. The protocol will include an inspection schedule, acceptable harassment techniques, a field log procedure, and incident reporting procedures. Resolution Copper will train its staff responsible for implementing the bird hazing program on the protocol prior to its initiation.
3. Resolution Copper will manage and periodically remove vegetation growth within the contact and non-contact stormwater catchment basins and process water ponds, as often as necessary, to further discourage the presence of wading birds.
4. Resolution Copper will implement a comprehensive wildlife management plan, as included in Appendix X of the GPO. A draft revised wildlife management plan was prepared in collaboration with AGFD (Resolution Copper 2020).

### *Sonoran Desert Tortoise*

1. Resolution Copper will conduct pre-construction surveys for Sonoran desert tortoise (*Gopherus morafkai*) and Gila monster (*Heloderma suspectum*) before surface ground-disturbing activities start in areas containing their suitable habitat. A biological monitor will monitor for Sonoran desert tortoise and Gila monster during construction activities. The monitor will flag Sonoran desert tortoise and Gila monster shelter sites/burrows. Biological monitors will inspect these flagged areas, and monitors will relocate any Gila monsters and tortoises discovered outside project activity areas.

2. Resolution Copper will inform project crews of the potential to encounter Sonoran desert tortoise and Gila monster within the surface action area and project footprint. Resolution Copper will instruct work crews to check below equipment prior to moving, and to cover and/or backfill holes that could potentially entrap these species. If work crews observe these species, they will stop work until the biological monitor has relocated these species out of harm's way.
3. Resolution Copper will establish tortoise crossings, as needed and applicable, for concentrate and tailings pipeline corridors, as well as the railroad tracks within the MARCCO corridor within areas containing suitable habitat.

#### *Public Health and Safety*

1. Pipelines will be buried where feasible, given the geological setting, and where buried they would be externally coated.
2. Any vegetation cleared from the site will be temporarily stored on-site at a location with minimal fire risk, well within a cleared area away from ignition sources. Handheld and large equipment (e.g., saws, tractors) used for vegetation clearing will be equipped with working spark arresters. Resolution Copper will take additional precautions if work occurs during the critical dry season, which may include larger amounts of extinguishing agents, shovels, and possibly a fire watch.
3. Resolution Copper will prohibit parking on vegetated areas outside the designated construction footprint and proper disposal of smoking materials will be required. All surface mine vehicles will be equipped with, at a minimum, fire extinguishers and first aid kits.
4. Resolution Copper will incorporate a number of environmental protection measures into the project design to reduce potential effects of hazardous materials. These are non-discretionary measures outlined in a variety of protection plans (listed below and included in the GPO).
  - a. Spill Prevention Control and Countermeasures Plan (Appendix O of the GPO)
  - b. Emergency Response and Contingency Plan (Appendix L of the GPO)
  - c. Stormwater Pollution Prevention Plan (Appendix W of the GPO)
  - d. Fire Prevention and Response Plan (Appendix M of the GPO)
  - e. Environmental Materials Management Plan (Appendix V of the GPO)
  - f. Explosives Management Plan (Appendix P of the GPO)
  - g. Hydrocarbon Management Plan (Appendix U of the GPO)
  - h. Tailings Pipeline Management Plan (AMEC Foster Wheeler Americas Limited 2019)
  - i. Concentrate Pipeline Management Plan (M3 Engineering and Technology Corporation 2019b)

#### *Scenic Resources*

1. Resolution Copper will implement an outdoor lighting plan that will reduce potential impacts from artificial night lighting (M3 Engineering, July 2018).
2. Resolution Copper will reduce illumination levels where appropriate while still meeting Mine Safety and Health Administration (MSHA) requirements for lighting sufficient to provide safe working conditions.
3. Resolution Copper will adhere to the Pinal County Outdoor Lighting Code.
4. Resolution Copper will use control systems that can turn off lights at particular times of night or activated by detecting motion while still meeting MSHA requirements for lighting sufficient to provide safe working conditions.

*Additional Environmental Protection Measures*

1. Resolution Copper will bury concentrate pipelines to the extent practicable. Concentrate pipelines will have approximately 3.3 feet of cover over buried sections.
2. Resolution Copper will bury tailings and other pipelines to the extent practicable.
3. Resolution Copper will perform concurrent reclamation of tailings embankment beginning at approximate year 10 of tailings operations.
4. Resolution Copper will use a reclamation seed mix of weed-free native species consistent with surrounding vegetation.

SRP Transmission Line and Vegetation Maintenance Conservation Measures for Arizona Hedgehog Cactus

SRP will be responsible for construction, operation, and maintenance of the powerlines, including the powerline to the tailings storage facility. SRP will adhere to the following BMPs and conservation measures related to powerline vegetation maintenance to conserve the Arizona hedgehog cactus through identification and avoidance.

1. Work crews will be educated on the avoidance of Arizona hedgehog cactus prior to scheduled work in potential habitat. The training for work crews will include one or more members of the crew and the supervisor or utility employee overseeing work. The training will include education on the appearance of the Arizona hedgehog cactus; reference materials to assist in avoidance in the field; field visit, if needed, for refinement of search image; and procedures on identifying and avoiding any Arizona hedgehog cactus or similar looking cacti not found during pre-work inventory.
2. Do not use a mechanical mower for routine vegetation maintenance within Arizona hedgehog cactus occupied habitat to avoid trampling and damaging cactus.
3. To avoid trampling and damaging Arizona hedgehog cactus, vegetation management workers will drive vehicles only on existing roads and utility access routes to access the ROW. Do not drive vehicles off-road within the ROW.
4. Prior to each vegetation management cycle, a qualified biologist or other experienced professional in the identification of this plant will survey for Arizona hedgehog cactus. They will record and report Global Positioning System (GPS) coordinates of found plants to the Forest Service.
5. For manual cutting of vegetation, surveyors will flag all Arizona hedgehog cacti within and immediately adjacent to the work area for avoidance.
6. In an effort to be conservative, all Arizona hedgehog cacti and those similar to it, may be included in the flagging for avoidance.
7. During vegetation management work, crews will check for any Arizona hedgehog cactus under target plants prior to treatment. If crews find a cactus, they will implement appropriate conservation measures to avoid the cactus.
8. During manual vegetation maintenance work, if an Arizona hedgehog cactus occurs underneath and shaded by a shrub, crews will leave the target shrub untreated. In very rare circumstances, crews may selectively trim the nurse plant in a manner to maintain the same shading protection for the Arizona hedgehog cactus. Crews will trim no more than 30% of the nurse plant.
9. Prior to ground disturbing line maintenance activities, a qualified botanist or other professional experienced in the identification of this plant will identify all Arizona hedgehog cacti within and immediately adjacent to the work area. SRP will flag plants for avoidance. In an effort to be conservative, SRP will flag and avoid all Arizona hedgehog cacti and those

similar to them.

10. For line maintenance, drive vehicles only on existing roads and utility access routes to access the ROW to avoid damaging cactus. If driving off road in the ROW is necessary for line maintenance repairs, inventory, flag, and avoid Arizona hedgehog cactus prior to the work.

### Resolution Copper Conservation Measures for Listed Species

Resolution Copper will implement the following conservation measures for the Arizona hedgehog cactus, Gila chub, southwestern willow flycatcher, and yellow-billed cuckoo to avoid, reduce, or minimize effects. There is no northern Mexican gartersnake habitat within the mining footprint or action area portion of the project, and therefore no conservation measures are proposed (see *Concurrences* associated with CWA mitigation activities).

#### *Arizona Hedgehog Cactus*

1. Prior to any ground-disturbing activities, biologists will survey suitable habitat within the project footprint for Arizona hedgehog cactus to identify cactus for salvage and transplant, or avoidance.
2. Before construction begins within the Arizona hedgehog cactus known range, a biological monitor shall establish and clearly flag Arizona hedgehog cactus avoidance areas based on preconstruction surveys and leave individual cacti in place. Flagging will extend out a minimum of 20 feet from the nearest Arizona hedgehog cactus within the project footprint but outside the area of ground disturbance.

Flagging is an effective and typical method to avoid the Arizona hedgehog cactus and other smaller cacti growing in Arizona desert habitats. Arizona hedgehog cactus habitat is typically open, with low stature shrubs. Crews are able to more easily see flags in these open areas. In locations where vegetation may be dense, crews will place flags at the top of shrubs or use tape to block an area.

3. Construction contractors shall stay outside of flagged Arizona hedgehog cactus avoidance areas to prevent effects to cactus from construction activities.
4. Prior to any ground-disturbing activities, a Forest Service–approved biological monitor with appropriate FWS permits, shall salvage Arizona hedgehog cacti that are inside the construction footprint in areas where ground disturbance will occur following the Waldron and Durham (2016) protocol as revised by the Forest Service (USFS 2020) and as required by the TNF biologist.
5. Biologists will replant healthy Arizona hedgehog cacti, salvaged from areas that will be disturbed, outside the construction footprint, but within the action area on Federal lands. At the time of salvage, if it is determined that individual Arizona hedgehog cactus are not healthy enough for transplanting, other measures such as transplanting individual healthy stems from otherwise dying individuals or collection of seed will be conducted. This could include having a Forest Service and FWS approved nursery hold plants that need additional time to increase root mass, such as with individual healthy stems before replanting into the action area on Federal lands. Resolution Copper will further develop these measures in an Arizona Hedgehog Cactus Relocation, Salvage, and Monitoring Plan (see Conservation Measure 11 below). Salvage activities will take place between October and May, whenever possible. If salvage activities must occur between May and October, biologists will provide additional water for salvaged plants when replanted.

6. Before construction begins, the biological monitor shall identify individual cactus that are growing downslope of construction areas that are at risk from rockfall and shifting material from above. Monitors and crews will use fencing or barriers or other forms of protection to prevent effects from rockfall and shifting material. A monitor will be present during work upslope of cactus known to be in areas where shifting materials occur.
7. Prior to the start of each phase of construction, operations and maintenance, or closure and reclamation activities, the biological monitor shall conduct a training for all crew members regarding identification and avoidance of Arizona hedgehog cactus and inform crews of the presence and location of all known Arizona hedgehog cacti proximate to the new, proposed construction activities and measures required to avoid adverse impacts. This training will include identification of Arizona hedgehog cactus locations and avoidance areas and the conservation measures provided in this biological opinion.
8. If crews find a previously undocumented Arizona hedgehog cactus during construction, operations and maintenance, or closure and reclamation activities, they will report it to the biological monitor. Crews will avoid or protect the cactus in place, or a qualified biologist will salvage and replant the cactus within the action area on Federal lands, if possible.
9. During construction, qualified biologists shall immediately replant any salvaged Arizona hedgehog cacti, when possible, within the action area on Federal lands and outside the area to be disturbed using the protocol in Waldron and Durham (2016) as modified (USFS 2020).
10. Biologists shall monitor any transplanted cacti yearly during the plant flowering period for the first 10 years following transplanting, and again every 5<sup>th</sup> year after that throughout the life of the project. Resolution Copper will provide monitoring results to the TNF and FWS by the end of the calendar year in which the monitoring occurs.
11. Prior to relocation and salvage efforts, Resolution Copper will work with the FWS and the TNF to develop an Arizona Hedgehog Cactus Relocation, Salvage, and Monitoring Plan. The plan will provide criteria for determining which cacti are suitable for immediate relocation, as well as measures to collect seed or salvage healthy stems from individuals that otherwise monitors could not salvage. The TNF and FWS will approve relocation areas.
12. Biologists will salvage and transplant the two known Arizona hedgehog cacti on private property in the project footprint near the East Plant Site in the 230-kV corridor outside the disturbance area and onto TNF lands. The TNF and FWS will approve relocation areas.
13. Resolution Copper will record a new conservation easement on portions of the JI Ranch, or a comparable location with suitable Arizona hedgehog cactus habitat, after the publication of a Record of Decision (by both the TNF and the USACE) and receipt of all requisite permits and approvals from the USACE (under CWA Section 404) and the Forest Service, and before construction of tailings pipeline and powerline infrastructure for the final selected alternative. The conservation easement's purpose shall be for the protection of the Arizona hedgehog cactus and will be at least 100 acres, comprised of one or multiple parcels, excluding roads and trails. The duration of the conservation easement will be for the life of the project or until the release of the reclamation bond from the Forest Service.

*Gila Chub* (addressed in *Concurrences*)

1. Resolution Copper will develop a site-specific wildlife mitigation plan in coordination with

AGFD, FWS, and TNF biologists to address construction-related actions to avoid, minimize, and mitigate impacts on special status species (e.g., timing of construction, species relocations, etc.).

2. All ground disturbing activities associated with tailings pipeline and power line work near Mineral Creek and Gila chub designated critical habitat will occur outside the ordinary high-water mark and Gila chub designated critical habitat to minimize and avoid effects to the stream and the chub.
3. In areas where project facilities intersect Mineral Creek trenchless/non-surface impact methods (i.e., horizontal drilling, micro-tunneling, etc.) will be used to avoid surface disturbance within the ordinary high-water mark and Gila chub designated critical habitat to minimize and avoid effects to the stream and the chub.
4. The contractor shall clearly delineate the perimeter of the construction footprint with flagging or other appropriate markers to restrict heavy equipment use and other surface-disturbing activities to areas within the construction footprint. The biological monitor will be present at all times during construction and will help ensure that construction activities and equipment remain within designated limits and outside the ordinary high-water mark and Gila chub designated critical habitat to minimize and avoid effects to the stream and chub.
5. Resolution Copper will develop and implement a stormwater pollution prevention plan (SWPPP) to reduce potential project related increases in sedimentation to Mineral Creek to avoid or minimize effects to Gila chub and its designated critical habitat.

*Southwestern Willow Flycatcher and Yellow-Billed Cuckoo* (addressed in *Concurrences*)

1. In project areas along Mineral/Mill Creek within the action area where FWS protocol surveys have detected the presence of the yellow-billed cuckoo, crews will not conduct construction or closure and reclamation activities within 500 feet of the ordinary high-water mark of Mineral/Mill Creek from May 15 through September 30 to remain outside the species breeding season, avoiding any disturbance to breeding cuckoos.
2. Between May and September each year, a qualified biological monitor will be present in work areas that contain southwestern willow flycatcher and yellow-billed cuckoo suitable habitat along Mineral Creek during all surface-disturbing activities and will monitor for the presence of the species.
3. Annual yellow-billed cuckoo surveys will be conducted in potentially suitable habitat of Devil's Canyon and Mineral Creek immediately upstream and downstream of disturbance areas and crossings, starting two years prior to surface-disturbing activities and continue until pipeline construction has been completed, including reclamation of temporary construction disturbance.
4. In areas where surveys show presence of yellow-billed cuckoo and to prevent effects on cuckoos (injuries or fatalities to adults, eggs, or young), vegetation clearing and ground disturbing activities associated with pipeline construction within 500 feet of the ordinary high water mark of Mineral Creek will occur outside of the May 15 to September 30 breeding season.
5. Large trees (greater than 12 inches in diameter), including Fremont cottonwood (*Populus fremontii*) and willow species (*Salix* spp.), as well as dense stands of vegetation, will be

avoided when possible.

6. Most ground-disturbing activities take place outside of the riparian corridor along Mineral Creek, and Resolution Copper anticipates they will not remove riparian trees unless required for safety. Riparian trees that are removed will be cut to ground level, but when possible, root masses will be left intact to help to stabilize soils and provide opportunities for regrowth through adventitious shoots (e.g., in the case of willows).
7. The contractor shall clearly delineate the perimeter of the construction footprint with flagging or other appropriate markers to restrict heavy equipment use and other surface-disturbing activities to areas within the construction footprint. The biological monitor will be present at all times during construction and will help ensure that construction activities and equipment remain within designated limits and outside the ordinary high-water mark to avoid effects to proposed yellow billed cuckoo critical habitat.
8. During mine operations, biologists will conduct yellow-billed cuckoo surveys every five years in potentially suitable habitat of Devil's Canyon and Mineral Creek immediately upstream and downstream of action area crossings to continue to monitor cuckoo presence in the area and prevent/minimize effects on cuckoos.
9. In areas where surveys show presence of possible, probable, or confirmed breeding yellow-billed cuckoos, large-scale, major noise-producing activities within 500 feet of the ordinary high-water mark of Mineral Creek will be avoided to the extent possible to prevent disturbance to cuckoos (e.g., maintenance activities associated with pipeline replacement and cleaning that may affect cuckoo habitat during the May 15 to September 30 breeding season, annually).
10. In order to minimize the potential risk for bird collisions with transmission lines, the lines and structures will be designed in accordance with Reducing Avian Collision with Power Lines (Avian Power Line Interaction Committee [APLIC] 2012) and line marking devices, (i.e., flight diverters) will be placed at the proposed crossings of Queen Creek, Devil's Canyon, and Mineral Creek, especially where suitable yellow-billed cuckoo habitat exists.

### **Action Area**

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR § 402.02). In delineating the action area, we evaluated the farthest-reaching physical, chemical, and biotic effects of the action on the environment.

The action area for this project is the entire proposed Resolution Copper Mine project footprint (see definition below) plus a 1-mile buffer (Figure 6, Appendix C). The 1-mile buffer keeps the same distance analyzed and determined by the TNF during the NEPA process (USFS 2019) to account for any consequences to listed species and their respective habitats that the mining project may affect by ground disturbance, noise, light, modeled changes in groundwater and surface water quality and quantity, changes in air quality (fugitive dust), temporal parameters, etc. The buffer for the USACE CWA compensatory and recreation mitigation parcels is 0.25 mile to account for any impacts from the proposed activities to any listed species in those areas and there is no buffer for the JI Ranch Conservation Easement. The size of the action area is approximately 99,648.7 acres.

The proposed Resolution Copper Project is located on a combination of federal, state, and private lands primarily in northeast Pinal County, with a portion of a project component in southwest Gila

County in central Arizona. The proposed mining project is within portions of the TNF's Mesa and Globe Ranger Districts near the town of Superior, about 60 miles east of Phoenix. Information describing the action area is in the June 2020 BA and summarized below (SWCA 2020).

The action area's regional climate is semiarid, including long periods with little or no precipitation. Precipitation falls in a bimodal pattern. Most of the annual rainfall within the region occurs during the winter and summer months, with dry periods mainly in the spring and fall. In general, the total average annual precipitation varies between 15.7 inches and 18.8 inches, with 52 percent of the precipitation falling between November and April. However, climate variables may change based on the elevation of specific areas. For example, the average total annual precipitation in a lower elevation location near to the MARRCO Corridor (Station Florence, Arizona, for 1981–2010) is 9.72 inches, whereas the average total precipitation in a higher elevation location is 23.91 inches (Station Superior 2 ENE, Arizona, 1981–2010) (SWCA 2020). Precipitation usually occurs with steady, longer-duration frontal storm events during the winter months (December through March). Rain events during the summer months (July to early September) are typically of shorter duration with more intensity associated with thunderstorms.

The action area has both bedrock-controlled soils (alluvium and colluvium up to five feet in thickness) and deeper soils formed in alluvial fans (more than 60 inches deep) (SWCA 2020). These soils have low organic matter (approximately 1 percent) and slightly acidic to slightly alkaline pH conditions that support annual rangeland productivity.

Basin and Range geomorphology characterizes the project area with mining occurring within the Transition Zone or Central Highlands province. The Basin and Range aquifers generally consist of unconsolidated gravel, sand, silt, and clay, or partly consolidated sedimentary or volcanic materials. These materials have filled deep fault-block valleys formed by large vertical displacement across faults. Mountain ranges that generally consist of impermeable rocks separate adjacent valleys leading to compartmentalized groundwater systems.

The semiarid climate in the region limits the amount of surface water available for infiltration, resulting in slow recharge of the groundwater with an average annual infiltration of 0.2 to 0.4 inch per year (SWCA 2020). Much of this recharge occurs as mountain-front recharge, where runoff concentrates along ephemeral channels.

Twelve vegetation communities and land cover types occur within the action area, including human dominated, interior chaparral, open pit-mine, pinyon-juniper, Ponderosa pine-evergreen oak, riparian, rock, semidesert grassland, Sonoran desertscrub, wash, water, and xeric riparian. The dominant vegetation communities represented by the highest acreage are Sonoran desertscrub, semidesert grassland, and interior chaparral. The Sonoran desertscrub vegetation community generally dominates in broad valleys, lower bajadas, plains, and low hills of lower elevations. Trees are sparse and the understory is bare ground or sparse grass and shrubs, typically whitethorn, creosote, and bursage. Cacti are also present, such as saguaro, prickly pear, and cholla. Common trees are paloverde, catclaw acacia, mesquite, and ironwood. This community occurs on a total of approximately 52,639 acres in the action area. Semidesert grassland typically occurs from 3,000 to 5,000 feet in elevation with diverse perennial grasses and an established shrub layer consisting of mesquite, snakeweed, wait-a-minute bush, turpentine bush, and catclaw acacia. This community occurs on about 20,420 acres in the action area. The interior chaparral community typically occurs from 3,000 to 7,000 feet in elevation on side slopes that transition into pinyon-juniper woodlands.

Interior chaparral has an open canopy and open space either bare or covered with grasses and forbs. This community occurs on about 15,693 acres in the action area.

### Project Footprint

Similar to the BA, we use the term *project or construction footprint* to primarily represent areas within the action area where Resolution Copper is planning construction activities with permanent and temporary surface disturbance from mining and associated activities (tailings facilities, mine facilities, roads, transmission and pipeline corridors, etc.). The project footprint also includes conservation and mitigation areas within the action area.

The primary Resolution Copper Mine facilities and properties, and other areas that comprise the project footprint include locations such as the Oak Flat Federal Parcel and subsidence area, East and West Plant sites, Filter Plant/Loadout Facility, MAARCO corridor, pipeline and transmission line corridors, Skunk Camp Tailings facility, access roads and realignments, JI Ranch easement, recreation mitigation lands, and USACE CWA 404 permit off-site mitigation areas (SWCA 2020, Table 2) (Figure 1-3, Appendix C).

The primary mining facilities that are part of the project or construction footprint occur near the Town of Superior. These primary mining sites are the Oak Flat Federal Parcel and subsidence area, and East and West Plant sites. The MAARCO corridor connects these facilities to the Filter Plant/Load Out Facility, which is west of the mine facilities near the San Tan Valley (Figure 2, Appendix C). SRP transmission lines and pipeline corridors help to connect mining and tailings facilities (Figure 5, Appendix C).

The Skunk Camp tailings facility footprint will occupy the upper portion of Dripping Spring Valley, the northeastern slopes and foothills of the Dripping Spring Mountains, and the southwestern foothills of the Pinal Mountains, including a 4-mile reach of Dripping Spring Wash, a 3.5-mile reach of Stone Cabin Wash, and a 4.8-mile reach of Skunk Camp Wash. The proposed site lies approximately two miles due east of the existing ASARCO Ray Mine and approximately 13 miles north of the point where Dripping Spring Wash drains into the Gila River (Figure 2, Appendix C).

USACE CWA compensatory mitigation parcels at the Gila River Indian Community (Gila River), The Nature Conservancy's H&E Farm (San Pedro River), and Resolution Copper and BHP Mineral's Queen Creek site will occur in areas of Pinal and Gila counties (addressed in *Effects of the Action and Concurrences*) (Figures 7-9, Appendix C).

Resolution Copper recreation mitigation lands occur near Queen Creek, Inconceivables Climbing Area, and Arnett Creek and associated motorized and non-motorized trails near the Town of Superior (Figure 10, Appendix C).

The 100-acre JI Ranch conservation easement is located on the overall 272-acre ranch owned by Resolution Copper. The JI Ranch is approximately five miles northwest of the Oak Creek Federal Parcel in Pinal County, near the Pinal/Gila County Line (Figure 13 & 14, Appendix C).

## STATUS OF THE SPECIES

The information in this section summarizes the Arizona hedgehog cactus' rangewide status considered in this BO. Further information on the status of the species is in the administrative record for this project, documents on our web page ([ECOS Environmental Conservation Online System](#)), and in other references cited in each summary below.

### Arizona hedgehog cactus

The FWS listed the Arizona hedgehog cactus rangewide as an endangered variety (*Echinocereus triglochidiatus* var. *arizonicus*) on October 25, 1979 (USFWS 1979). We cited the potential loss of habitat through mining activities, significant insect damage, and collection of wild plants as threats to the cactus' survival (USFWS 1979). We determined that designating critical habitat was not prudent because it would increase threats to the plant from illegal collection.

At the time of listing, accurate identification was difficult and multiple varieties of *Echinocereus triglochidiatus* were taxonomically difficult to separate. Subsequent to the listing rule, cytological (i.e., study of chromosome numbers for classification) and morphological studies within *E. triglochidiatus* led to separations of taxa based on ploidy levels (i.e., the number of copies of the complete genetic information) (Parfitt and Christy 1992; Cota and Philbrick 1994; Baker 2006). The diploids (two homologous copies of each chromosome (2n)) are now recognized as *E. triglochidiatus* or *E. arizonicus* Rose ex Orcutt (Blum et al. 1998; Zimmerman and Parfitt 2003). Parfitt and Christy (1992) found that *E. arizonicus* is geographically separated from varieties of *E. triglochidiatus* by its distribution and is restricted to areas between the town of Superior and the vicinity of the Globe/Miami communities.

Blum et al. (1998) classified *E. arizonicus* as an independent species with several subspecies including *E. arizonicus* subspecies *arizonicus* (Arizona hedgehog cactus) from central Arizona. The Flora of North America (Zimmerman and Parfitt 2003) and Integrated Taxonomic Information System (ITIS 2020) also follow this taxonomic treatment. We are currently working on a technical name change revision and will refer to the taxon by the scientific name, *Echinocereus arizonicus* subsp. *arizonicus*.

The Arizona hedgehog cactus is a dark-green perennial succulent in the Cactaceae family. Individual plants have large robust stems that distinguish it from other species of *Echinocereus*. Stems range in size from 2.5 to 16 inches height and 6 to 10 inches in diameter. Immature plants occur as a solitary stem while mature plants are multi-branched (caespitose) with stems forming at the base, most often occurring in loose clusters of 4 to 20 stems, occasionally exceeding 50 to 100 stems (Arizona Rare Plant Committee 2000; Cedar Creek Associates, Inc., 1996). Individual stems have 7 to 11 tuberculate ribs (Cedar Creek Associates, Inc., 1996, Baker 2006). There are 1 to 3 central spines gray or pinkish in color, largest deflexed, gradually tapering with minute striations; and 5 to 11 radial spines often slightly curved, pinkish-tan in color and shorter than central spine (Phillips et al. 1979).

Arizona hedgehog cactus flowers are a brilliant red to crimson red in color and claret-cup shaped with red or purple colored anthers and green stigma lobes (Blum et al. 1998; Zimmerman and Parfitt 2003). Floral buds burst through the epidermis from the upper one-third of the stem (Phillips et al. 1979; Sanchez et al. 2017) leaving a scar on the stem above the spine (AZGFD 2003). The flowers are perfect (i.e., flowers have both male (stamens) and female (carpel)

reproductive structures) and bloom from late-April to mid-May (AZGFD 2003). Fruiting occurs from May to July with germination in midsummer (Zimmerman and Parfitt 2003; Arizona Rare Plant Society 2000). Fruits are red in color, globose, and spiny taking three months to mature (AZGFD 2003). At maturity, the side of the fruit splits open (*e.g.*, dehiscence) releasing on average 424 (Aslan 2015) to 1466 (Siegwarth 2014) small black seeds. The mechanism of seed dispersal is unknown. Its pollinators include native bees (*Halictidae*), honeybees (*Apis mellifera*), and hummingbirds (Anna's hummingbird (*Calypte anna*), broad-billed hummingbird *Cynanthus latirostris*), and black-chinned hummingbird (*Archilochus alexandri*) (Aslan 2015).

The Arizona hedgehog cactus is endemic to central Arizona between the towns of Superior and Globe/Miami. Individual plants occur from 3,300 to 5,700 feet in elevation within the transition zone of the Mogollon Rim where the upland Sonoran Desert, montane woodlands, and interior chaparral communities converge. Its preferred habitat is exposed and stable bedrock or boulders exhibiting sufficient fracturing or rock fields. The cactus' roots invade cracks, fissures, or interstices within exposed rock or narrow pockets between boulders where the microclimate provides the necessary periodic moisture, moist soils, and shelter from high temperatures (Crosswhite 1992; Cedar Creek Associates, Inc., 1996). Parent materials of preferred habitat are Schultze granite and Apache Leap tuff (dacite), both igneous in origin (Crosswhite 1992). To a lesser degree, Pinal Schist and the Pioneer Formation also provide habitat to the Arizona hedgehog cactus, but only where these formations expressed themselves as exposed bedrock (Cedar Creek Associates, Inc., 1996). The majority of cacti occur scattered on open, rocky slopes of 20 to 90 degrees, and steep fissured cliffs (Philips et al. 1979; Crosswhite 1992). Some plants may be found on level ground within eroded areas and in the understory of shrubs, but moderate to high shrub densities and associated deeper soils tend to preclude the cactus (Cedar Creek Associates, Inc., 1996).

Surveys and other studies have defined and expanded the taxon's range beyond its type locality. Its current known range extends from Superstition Wilderness area south to Devils Canyon, east along US 60 Highway to Top of the World and south to the Mescal and Pinal Mountains (Arizona Rare Plant Committee 2000; AGFD 2003, Fehlberg et al. 2013). The range also includes two small populations, the El Capitan population south of Globe and the Apache Peak population north of the city of Globe, which merits further taxonomic verification (Cedar Creek Associates, Inc., 1996). Based on its distribution and potential habitat, its estimated range is approximately 54,734 acres. More than 90 percent of occupied Arizona hedgehog cactus is on the Globe Ranger District of the TNF. Remaining occupied habitat occurs on land managed by the Bureau of Land Management and ASLD, or is privately owned.

Fehlberg et al. (2013) studied population genetics of the Arizona hedgehog cactus, reaching the preliminary conclusion that the population maintains a high level of genetic diversity. They visited 14 sites across its range, Superior to Miami, and collected spine samples for DNA analyses from about 172 individual Arizona hedgehog cacti. They found that high levels of genetic diversity likely reflect healthy levels of cross-pollination, large effective population sizes, and an absence of inbreeding, isolation, and genetic drift. Fehlberg et al. (2013) also found that populations appear connected by high levels of gene flow and/or dispersal. That is, even though there is some genetic differences in the population, they concluded that there is good gene flow or connectivity and dispersal within the Arizona hedgehog cactus population, which occurs across several mountain ranges, and that is encouraging from a conservation perspective.

We have limited knowledge about Arizona hedgehog cactus abundance because of the difficulty accessing and surveying rugged areas, and correct species identification. Direct access to a large portion of the species range is limited due to the rugged topography and remoteness of its habitat making surveys difficult to conduct. In addition, this cactus variety can be difficult to distinguish from other red flowered hedgehog cactus, especially the *Echinocereus santaritensis* that grows near the Arizona hedgehog cactus. Federal agencies report most of the Arizona hedgehog cactus count information when implementing projects requiring section 7 consultations. According to the AZGFD Arizona Heritage Management Database (HDMS), surveyors observed approximately 1,302 cacti between 1922 and 2009 on the TNF (S. Schwartz, AZGFD, personal communication, 2009). Some of those records are anecdotal and some records are for red flowered hedgehog cacti in eastern Arizona identified through morphology, chromosome counts, or genetics as either *E. santaritensis* or *E. coccineus*.

The majority of Arizona hedgehog cactus occurrence data was reported by WestLand Resources, Inc. (WestLand Resources). From 2010 to 2012, WestLand Resources (2013) conducted surveys of the Arizona hedgehog cactus in conjunction with Resolution Copper's prefeasibility study for the proposed Resolution Copper Mine. Surveys took place along roadways, drill pads, and corridors within occupied and/or suitable Arizona hedgehog cactus habitat. This effort documented 4,035 individuals on TNF lands from east of Superior to the Gila/Pinal county boundary. However, WestLand Resources acknowledged that genetic analysis did not occur, and taxonomic status of the individual plants counted was not certain. Additional surveys and genetic studies identified some Arizona hedgehog cacti observed by WestLand Resources are actually the *Echinocereus santaritensis* (M. Baker, personal communication 2013; Fehlberg and Allen 2013).

In 2012, we estimated the current rangewide abundance of the Arizona hedgehog cactus at about 6,010 individuals based on georeferenced (GPS) data submitted supporting a section 6 grant (Baker 2013). Other various entities have also reported GPS data to the Arizona HDMS (J. Kuzek, AZGFD personal communication 2016).

As of October 2017, there were 6,679 or 6,769 Arizona hedgehog cactus records (numbers were likely transposed), depending on which source is relied upon (USFS 2018, Thomas et al. 2019, S. Tonn, AZGFD HDMS, personal communication, 2020). Thomas et al. (2019) stated that records submitted to the AZGFD's HDMS is voluntary and do not all include the date of observation nor the name of the observer. These records may also include hybrid plants, not fully quantified (USFS 2018). It is also unknown whether some records report on the same individual Arizona hedgehog cactus or if the total number of records includes Arizona hedgehog cacti that were removed, salvaged and/or planted during federally funded projects. Location information may also be inaccurate. The AZGFD HDMS has not received any new Arizona hedgehog cactus records since 2018 (S. Tonn, AZGFD HDMS, personal communication, 2020). WestLand (2019) found about 870 cacti in 2019 that may be in addition to AZGFD's HDMS tally, but not yet received or entered into their database. SWCA and the TNF (2020) estimated an overall abundance of 7,302 Arizona hedgehog cactus in the Resolution Copper Mine action area (2,087 cactus were actually counted). The approximate 6,700 number of Arizona hedgehog cactus by AZGFD's HDMS is an estimate and not an absolute number reflecting actual total abundance across its range. Trend information characterizing the rangewide population is not available.

Based upon the variety of current estimates and databases (Baker 2013, USFS 2018, Thomas et al. 2019, S. Tonn, AZGFD HDMS, pers. comm, 2020, and USFS 2020), cumulation of past effects authorized, combined with conservation measures, and other reporting and tracking challenges in

establishing a running tally, the approximate 6,010 to 6,700 Arizona hedgehog cactus records from 2012 to 2018 is our best and conservative estimate of the rangewide abundance.

Arizona hedgehog cactus conservation actions associated with recent biological opinions are helping to minimize the effects of projects and improve the success of future recovery actions. Waldron and Durham (2016) developed standardized transplant methodologies for the US 60 highway widening and improvement project (02EAAZ00-2012-F-0334). After three years of monitoring (i.e., repeat observations of the status of the cactus), no plant deaths have occurred from 24 Arizona hedgehog cactus being salvaged and transplanted to new locations. More long-term monitoring (>15 years) will help to better understand the effectiveness of Arizona hedgehog cactus salvage and transplant methods. Similarly, the Desert Botanical Garden salvaged 33 Arizona hedgehog cacti, 68 stems, and collected thousands of seeds prior to construction (S. Blackwell, Desert Botanical Garden, pers. comm. 2020) for the Pinto Bridge replacement project, which is currently in progress. The Desert Botanical Garden has completed controlled pollination of the plants to produce additional seeds for germination. Qualified biologists will replant all of these Arizona hedgehog cacti as part of the reclamation process following construction.

### **Previous Related Consultations**

Between 1983 and 2020, we completed 16 formal section 7 consultation for the Arizona hedgehog cactus. Recent section 7 consultations addressing the Arizona hedgehog cactus have included Resolution Copper's pre-feasibility study (22410-2009- F-0229), Frio Fire suppression activities (22410-2011-FE-0477), US 60 highway widening and improvements (02EAAZ00-2012-F-0334), Pinto Bridge replacement (02EAAZ00-2016-F-0450), and Pinto Valley Mine (02EAAZ00-2020-F-0490).

Because of the clarifications to species identification over time, different strategies in evaluating effects, and the implementation of conservation measures (such as salvage and transplant), the actual effects to individual Arizona hedgehog cactus through federal projects over its 40-year listed history may be less than the tabulation of numbers from individual biological opinions. For example, the estimated effect from the Phoenix Resource Management Plan consultation in the late 1980s (22410-88-F-167) addressing construction of US 60 and its realignment was that 2,348 cacti were lost from within approximately 67 acres of presumed occupied habitat is questionable. That estimated effect is questionable because nobody counted individual cacti affected by the project; rather, consultants estimated the number based upon habitat characteristics, topography, geologic material, and Arizona hedgehog cactus densities in similar habitats.

We have evaluated federal projects and authorized effects and loss of an estimated 3,382 individual cacti and adverse effects to approximately 948 acres of occupied and/or suitable Arizona hedgehog cactus habitat since the Arizona hedgehog cactus' listing (USFWS 1979). The 6,010 to 6,700 rangewide Arizona hedgehog cactus estimate takes into account previous authorized effects from section 7 consultations.

### **ENVIRONMENTAL BASELINE**

Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes 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 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 process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

### Mine Facilities

The Resolution Copper Mine project footprint will occur on a collection of partially developed, undeveloped, and developed federal, state, and private lands (SWCA 2020). The Oak Flat underground mining area, Skunk Camp Tailings area, and new transmission lines and corridors will occur in largely undeveloped desert areas, where the East and West Plant sites and MAARCO corridor are disturbed and developed areas with a history of active mining (USFS 2019, Appendix G). The East Plant Site contains existing mining facilities associated with Magma Mine (which ceased operations in the mid-1990s), including buildings, cooling towers, and wastewater facilities, etc. The West Plant Site consists of existing mine facilities constructed during historic mining operations that include tailings ponds, houses and offices in the upper basin, and a smelter complex. The MARRCO corridor is a historic mining railroad corridor originally built in the 1920s that ceased operations in the mid-1990s after the closure of the Magma Mine. Several utilities are currently colocated within the MARRCO corridor, including a buried fiber-optic line, an overhead transmission line and telephone line, buried natural gas pipelines, and water pipelines. The Filter Plant/Loadout Facility is currently undeveloped cleared creosote habitat.

### USACE Compensatory Mitigation Lands

The compensatory mitigation lands associated with USACE CWA 404 permitting are undeveloped riverine tribal and private lands. The Mar-5 and ORRS river management site, along the regulated Gila River on Gila River Indian Community land, is primarily composed of cattails (*Typha* spp.), Goodding's willow (*Salix gooddingii*) and tamarisk (*Tamarix* spp.) (SWCA 2020). The Queen Creek site, owned by Resolution Copper and BHP Mineral Resources, is an ephemeral single to multi-threaded, low-gradient drainage. Dense acacia-mesquite shrublands occur along Queen Creek, with mature, medium-stature catclaw acacia and velvet mesquite (*Prosopis velutina*) dominating the vegetation community (SWCA 2020). H&E Farm, owned by The Nature Conservancy, includes an intermittent reach of the San Pedro River. The San Pedro River is large, well-defined, low-gradient, and braided within a broad, comparatively level floodplain. The active San Pedro River channel within the parcel consists of narrow dense stands of trees and shrubs, including large-statured mesquite and tamarisk, along with a few individual cottonwoods and patches of single whorl burro brush (SWCA 2020). The San Pedro river floodplain terraces contain moderately dense medium to large statured mesquite and tamarisk.

### JI Ranch

Resolution Copper owns the 272.4-acre JI Ranch, located on both sides of US 60 near Top of the World and the Pinal/Gila county line (SWCA 2020a). Resolution Copper is proposing a 100-acre conservation easement on the ranch for the Arizona hedgehog cactus. The TNF borders the Ranch to the north, west, and south, and private property to the east. The ranch is primarily undeveloped with similar amounts of acreage on both sides of US 60 and is comprised of plant species such as scrub live oak (*Quercus turbinella*) and pointleaf manzanita (*Arctostaphylos pungens*). The JI

Ranch property has been an active cattle ranch in the uplands east of Superior for over 60 years (Buckles 2010). JI Ranch was built sometime between 1931 and 1948, and the property has been used for ranching and cattle grazing since that time. Historic and modern development on the property includes a ranch house, windmill, access road from U.S. Highway 60 in Iron Canyon, ranch road system south of the ranch, livestock watering tanks, corrals, pump houses, and barns (Buckles 2010). Integrity Land and Cattle, LLC, maintains a USFS grazing permit for the Devil's Canyon allotment, a portion of which is located within the JI Ranch property. Once Resolution Copper's records the conservation easement, they will prohibit future development and grazing activities within the conservation easement portion of the allotment for the duration of the Project. Limited roads and trails occur at the Ranch and ongoing operations include ranching and grazing.

Arizona hedgehog cactus occur throughout the ranch on both sides of US 60. The JI Ranch is home to hundreds of Arizona hedgehog cactus. In addition to the existing species detected, Resolution began propagating Arizona hedgehog cactus at JI Ranch in 2011. Resolution Copper selected two primary propagation techniques. The first approach involved planting seed by hand and by naturally pollinated fruits in the field, and the second approach involved collecting and planting vegetative offsets in pots, both approaches taking place onsite at JI Ranch. By 2020, Resolution Copper transplanted approximately 300 live potted Arizona hedgehog cacti into suitable habitat at JI Ranch.

#### Streams, Springs and Groundwater Dependent Ecosystem Monitoring

Perennial and intermittent streams occur in the action area, such as Queen Creek, Devil's Canyon, and Mineral Creek, as well as various springs and washes. For the most part, surface waters in the area consist of dry washes or ephemeral channels that flow only in response to moderate- to high-intensity rainfall events. Queen Creek drains the western part of the action area, which arises in the highlands around the Pinal Mountains and flows past Oak Flat and through the town of Superior. Queen Creek from its headwaters to Whitlow Dam is ephemeral in nature, with possibly some intermittent areas above the Town of Superior. Devil's Canyon is located on the east side of Oak Flat, and drains southward to join Mineral Creek, near the reservoir of Big Box Dam. Portions of Devil's Canyon are perennial or intermittent. The tailings pipeline corridor will span Queen Creek and Devil's Canyon where the streams are not perennial. Mineral Creek is similar in nature to lower Devil's Canyon, supported in part by near-surface storage of seasonal precipitation, and partially from the Apache Leap Tuff aquifer and regional sources. Dripping Spring Wash is located in the eastern part of the action area where the tailings storage facility is located. Dripping Spring Wash flows to the southeast for approximately 18 miles before discharging into the Gila River downstream of the Coolidge Dam. The main stem channel of Dripping Spring Wash is entirely ephemeral, with no known perennial reaches. Springs that occur include Bitter Spring, Bored Spring, Hidden Spring, McGinnel Mine Spring, McGinnel Spring, and Walker Spring.

Resolution Copper has been drilling, sampling, and monitoring wells at the project site since 2009, including wells in the deep groundwater system, the Apache Leap Tuff aquifer, and the shallow perched/fractured system. Resolution Copper's monitoring results associated with water levels, flow observations, water chemistry, and isotope sampling, has allowed detailed characterization of the groundwater in these three aquifer systems. Resolution Copper's dewatering of the deep groundwater system is anticipated to take place regardless of the construction of the proposed mine, as Resolution Copper has the legal right to continue to pump to protect the existing mine infrastructure on private land.

Over the same time period, Resolution Copper has been monitoring and sampling springs and streams in the project area. By comparing the various chemical characteristics of spring discharges or baseflow in perennial streams to the different types of groundwater, the TNF was able to ascertain the most likely source of groundwater feeding the springs and streams in the project area.

We note that Arizona hedgehog cactus is not groundwater dependent and these perennial and intermittent waters are outside the cactus' known range. The discussion of these waters has been included primarily to support the evaluation of other listed species in Appendix A (see *Concurrences*).

#### *Concentrator Fault and Apache Leap Tuff Aquifer*

The East Plant Site is located on Oak Flat, east of the Concentrator Fault. Three different types of groundwater occur in the East Plant Site located on Oak Flat, east of the Concentrator fault: shallow, perched groundwater systems; the regional Apache Leap Tuff aquifer; and a regional deep groundwater system.

The Concentrator Fault is a barrier to flow in the deep groundwater systems on either side of the fault. The shallow groundwater system consists of several shallow, perched aquifers of limited areal extent hosted in alluvial deposits and the uppermost weathered part of the Apache Leap Tuff aquifer. The primary shallow aquifers in this area are located near Top-of-the-World and JI Ranch, and to a lesser degree along some of the major drainages such as Hackberry Canyon and Rancho Rio Canyon.

The Apache Leap Tuff aquifer is a fractured-rock aquifer that extends throughout much of the Upper Queen Creek and Devil's Canyon watersheds, and the western part of the Upper Mineral Creek watershed. A thick sequence of poorly permeable Tertiary basin-fill sediments (the Whitetail Conglomerate) separates the Apache Leap Tuff aquifer from the deep groundwater system. In general, the direction of groundwater movement in the Apache Leap Tuff aquifer follows surface drainage patterns, with groundwater moving from areas of recharge at higher elevations to natural discharge areas in Devil's Canyon and in Mineral Creek.

The deep groundwater system east of the Concentrator Fault is compartmentalized, and faults separate individual sections of the groundwater system from each other. Depending on their character, faults can either inhibit or enhance groundwater flow. Based on available evidence, the faults in the project area tend to restrict groundwater flow between individual sections. The ore body and future block-cave zone lie within a geological structure called the Resolution Graben. A series of regional faults bounds the Resolution Graben geologic structure. A hydraulic connection connects the deep groundwater system in the Resolution Graben to existing mine workings, and Resolution Copper has observed a clear decrease in water levels in response to ongoing dewatering of the mine workings.

#### *Devil's Canyon Monitoring*

The upper reach of Devil's Canyon includes a reach of perennial flow. The geohydrology suggests that this section of Devil's Canyon lies above the water table in the Apache Leap Tuff aquifer and is most likely supported by snowmelt or precipitation stored in near-surface fractures, and/or floodwaters that have been stored in shallow alluvium along the stream, before slowly draining into the main channel. Further evaluation of hydrochemistry and flow data support this conclusion (Garrett 2018). The TNF does not consider there to be a connection between the Upper Devil's Canyon streamflow and the regional Apache Leap Tuff aquifer (SWCA 2020).

Moving downstream in Devil’s Canyon, persistent streamflow arises again at about km 9.3. From this point downstream, Devil’s Canyon contains stretches of perennial flow, aquatic habitat, and riparian galleries. Flow arises both from discrete springs along the walls of the canyon (four total: DC-8.2W, DC-6.6W, DC-6.1E, DC-4.1E), as well as groundwater inflow along the channel bottom. Near-surface storage of seasonal precipitation partially supports these reaches of Devil’s Canyon. The available evidence indicates that these waters arise primarily from the regional Apache Leap Tuff aquifer. The TNF considers there to be connection between the middle and lower Devil’s Canyon streamflow and the regional Apache Leap Tuff aquifer. Resolution Copper’s block cave mining, dewatering, and groundwater drawdown can potentially affect the Devil’s Canyon streamflow (SWCA 2020). These reaches of Devil’s Canyon also receive runoff from the area where the subsidence area would occur and therefore may also lose flow during runoff events.

Resolution Copper has analyzed 14 separate sampling points along Devil’s Canyon, extending from the headwaters to the confluence with Mineral Creek (USFS 2019, SWCA 2020). Four of these locations are discrete springs discharging along the banks or close to Devil’s Canyon and the remaining 10 locations represented surface water in the channel itself. Resolution Copper, SWCA and the TNF used a “weight-of-evidence” approach to assess the water source for each of these locations, which included diagnostic lines of evidence that can clearly show water sources (carbon-14, tritium, and Piper plots), physical constraints like the elevation of the spring compared to known aquifer water levels, and analysis of other less- diagnostic water quality characteristics (USFS 2019, SWCA 2020).

The upper reaches of Devil’s Canyon, from the headwaters (roughly kilometer 15.5) downstream to roughly kilometer 9.0, were determined to be disconnected from the regional aquifer, based on multiple and consistent lines of evidence. The lower part of this reach has persistent flow, but the various lines of evidence suggest that snowmelt and/or floodwaters that have entered streambank storage before slowly draining into the main channel, not regional groundwater, supports this persistent flow.

We note that Arizona hedgehog cactus does not occur along the stream in Devil’s Canyon and the discussion of this stream has been included primarily to support the evaluation of other listed species in Appendix A (see *Concurrences*).

#### *Mineral Creek Monitoring*

As with Devil’s Canyon, Resolution Copper studied a number of surface water and spring locations along Mineral Creek, and the likely groundwater sources supporting these locations were determined through multiple lines of evidence (USFS 2019, SWCA 2020).

Resolution Copper analyzed six separate sampling points along Mineral Creek in this way, extending from the headwaters to the confluence with Devil’s Canyon (USFS 2019, SWCA 2020). Three of these locations were discrete springs discharging along the banks or close to Mineral Creek (Government Springs, MC-8.4C, and MC-3.4W [also known as Wet Leg Spring]), and the remaining three locations represented surface water in the channel itself.

All samples along Mineral Creek have strong or mixed evidence that they are at least partially supported by groundwater associated with the Apache Leap Tuff aquifer. This includes a 2.9-mile long reach with persistent water (from kilometer 6.4 to 1.7) as well as at least three distinct riparian galleries.

We note that Arizona hedgehog cactus does not occur along Mineral Creek and the discussion of this stream has been included primarily to support the evaluation of other listed species in Appendix A (see *Concurrences*).

### **Status of the Species within the Action Area**

The Arizona hedgehog cactus occurs within the project or construction footprint and in adjacent areas that are within the broader action area (Figure 11, Appendix C). Multiple surveys conducted in portions of the East Plant Site, Oak Flat Federal parcel, and portions of the 230-kV transmission line corridor and the colocated 115-kV transmission line and tailings pipeline corridor occurred in 2004, 2007, 2008, 2010, 2012, 2014, 2015, 2017, 2019. A total of 165 Arizona hedgehog cacti were documented (Table 5, Appendix C) and briefly described below.

Surveyors found no Arizona hedgehog cactus in the western portions of the action area that includes the MARRCO corridor, Filter Plant and Loadout Facility, Skunk Camp tailings storage facility, and the West Plant Site. These areas do not contain suitable habitat for the cactus and are outside the cactus' known range. Similarly, the Recreation Mitigation Lands near the town of Superior and USACE CWA compensatory mitigation areas along Queen Creek, and the Gila and San Pedro rivers are also areas outside the Arizona hedgehog cactus' range.

Surveys conducted by WestLand Resources, Inc., (WestLand) since 2004 to document the Arizona hedgehog cactus occurred on about 745.4 acres of suitable habitat within the project footprint and on 2,662.7 acres within the action area. WestLand resurveyed Arizona hedgehog cactus habitat in more recent years (2015 to 2017) to confirm and re-assess the distribution and abundance of cacti found from 2004 to 2008. Overall, the surveys included about 80.8 percent of the total project footprint and about 28.6 percent of the total action area. Surveys did not cover about 167.7 acres within the project footprint and did not cover about 6,653.6 acres of the action area that contain suitable habitat for the cactus. The TNF estimates that the action area covers about 23.7 percent of the Arizona hedgehog cactus total known range (SWCA 2020). WestLand's surveys were conducted prior to determination of the final proposed action and for other efforts, and thus do not cover the entire project footprint and action area of this project. The TNF and SWCA estimated Arizona hedgehog cactus abundance in unsurveyed areas within the project footprint based upon the density of known Arizona hedgehog cacti in surveyed areas. The survey information documents the numbers of Arizona hedgehog cacti found within areas that are in or overlap with the action area.

WestLand conducted a survey for the Arizona hedgehog cactus on the 3,025-acre Oak Flat Federal Parcel in 2004. Nine individual Arizona hedgehog cacti were identified (SWCA 2020). Those surveyed areas overlap with portions of the East Plant Site, the subsidence area, and a portions of the 230-kV transmission line corridor and the colocated 115-kV transmission line and tailings pipeline corridor. WestLand re-surveyed these areas in 2015 and relocated these nine cacti (see below).

In 2007 and 2008, WestLand surveyed for the Arizona hedgehog cactus along areas proposed for their pre-feasibility activities. The survey area occurred on 738 acres and included portions of the East Plant Site, subsidence area, and the colocated 115-kV transmission line and tailings pipeline corridor (WestLand 2008). WestLand located 63 Arizona hedgehog cacti on the TNF and an additional 26 individuals outside of the pre-feasibility survey area or along several Forest Service roads. Westland re-surveyed these areas from 2015 to 2017, relocating these cacti (see below).

From 2010 to 2014, WestLand, conducted several Arizona hedgehog cactus surveys to comply with biannual monitoring requirements for the Resolution Copper Pre-feasibility Activities Plan of Operations (WestLand Resources 2014). The surveys covered 738 acres and included portions of the East Plant Site, subsidence area, the colocated 115-kV transmission line and tailings pipeline corridor. In 2010, WestLand surveyed the pre-feasibility activity area and documented a total of 346 Arizona hedgehog cacti (WestLand Resources 2010). Their second survey of the area in 2012 identified 98 Arizona hedgehog cacti, in addition to the 346 individuals documented during 2010 survey (WestLand Resources 2012). Their third survey in 2014, WestLand documented an additional 44 Arizona hedgehog cacti (WestLand Resources 2014). WestLand did not find any Arizona hedgehog cacti growing west and south of Apache Leap (WestLand 2010, 2014).

From 2015 to 2017, WestLand conducted multiple surveys for the Arizona hedgehog cactus within the footprint of the proposed copper mine and associated mine facilities. In 2015, WestLand surveyed potential Arizona hedgehog cactus habitat within the project footprint that biologists had not surveyed since 2004, and revisited known occurrences at the Oak Flat Federal parcel with observed recruitment occurring around established Arizona hedgehog cacti. The surveyed area was approximately 300 acres within portions of the East Plant Site, West Plant Site, and the subsidence area. WestLand found one individual Arizona hedgehog cactus in previously unsurveyed potential habitat. They relocated 11 known cacti and found an additional five individual plants within a previously surveyed area (WestLand 2016). One relocated cactus found in 2012 was dead in 2015. In 2017, WestLand surveyed 360 acres of the East Plant Site. They detected 17 new individual Arizona hedgehog cacti in addition to the 11 individuals previously identified in this area (WestLand 2017a). Another survey of the East Plant Site in May 2020 relocated 31 Arizona hedgehog cacti and detected 9 new individual plants. Of the nine, only two were within the East Plant Site boundary. For the remaining 7 individual plants, 3 cacti were 25 feet or less outside of the East Plant Site boundary, and 4 newly detected cacti were approximately 250 feet outside the East Plant Site boundary. In total, WestLand detected 8 Arizona hedgehog cacti within the East Plant Site with another 5 individual plants outside, but within 25 feet of the East Plant Site (WestLand 2020a).

Surveys for the Arizona hedgehog cactus conducted in 2019 included surveys of portions of the 230-kV transmission line corridor, the Skunk Camp tailings 115-kV transmission line corridor, and the Skunk Camp tailings pipeline corridor (WestLand 2019). Overall, WestLand (2019) found about 870 cacti; approximately 280 Arizona hedgehog cacti occurred within the 230-kV transmission line corridor, 500 within Skunk Camp tailings 115- kV transmission line corridor, and 90 within the Skunk Camp pipeline corridor. The surveyed areas for both transmission line corridors were 1,000 feet wide. WestLand resurveyed these areas again in June 2020 and included the revised Skunk Camp corridor and subsidence area (WestLand 2020b). Some of these Arizona hedgehog cacti found were within the action area at the perimeter of these corridors, but outside of the corridor footprint and anticipated area of disturbance.

In summary, surveyors documented a total of 165 Arizona hedgehog cacti from project-related surveys within the proposed project footprint area. An additional 1,962 individuals were located outside the project footprint but within the action area. Specifically, surveyors identified 24 individual Arizona hedgehog cacti in the subsidence area, 13 in the East Plant site, 87 in the Skunk Camp tailings pipeline corridor, 2 in the 115-kV transmission line, and 39 in the colocated 230-kV/115-kV transmission lines. Surveys for Arizona hedgehog cactus were conducted in 2019 on approximately 203.1 acres (68.9 percent) of the 115-kV transmission line that is colocated with the

Skunk Camp pipeline corridor and no Arizona hedgehog cacti were identified within that portion of the project (Table 5, Appendix C).

SWCA (2020) concluded that the number of individual Arizona hedgehog cactus documented in the proposed project footprint area covers 80.8 percent of the total project footprint area. They also assumed that the Arizona hedgehog cactus is likely present on the remaining 19.2 percent of the Skunk Camp tailings pipeline corridor that overlaps with its range. Based upon the density of Arizona hedgehog cactus in the surveyed area, SWCA (2020) estimated that an additional 23 cacti occur in that area, bringing the estimated total to 186 individual Arizona hedgehog cacti in the project footprint area. We expect that because these Arizona hedgehog cacti are located within the core of its range, these plants are correctly identified and not confused with other similar looking cactus (*e.g.*, red-flowered hedgehog cactus, [*Echinocereus coccineus* var. *coccineus*]) occurring on the periphery of its range.

There are approximately 800 Arizona hedgehog cacti within the 100-acre JI Ranch conservation easement area. Resolution Copper planted approximately 300 cacti within the JI Ranch boundaries (SWCA 2020a).

## **EFFECTS OF THE ACTION**

In accordance with 50 CFR § 402.02, effects of the action are all consequences to listed species or critical habitat caused by the proposed action, including the consequences of all other activities that are caused by the proposed action. “A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see §402.17).”

We have concluded that “but for” the TNF’s permits for Resolution Copper Mine roads and pipelines and SRP’s transmission lines on Forest Service land, the entire Resolution Copper Mine project would not occur and its consequences are reasonably certain to occur. The effects of the action may occur later in time and may include consequences occurring outside of the immediate area involved in the action.

### **Effects Overview**

The proposed project will result in loss and degradation of approximately 822 acres of Arizona hedgehog cactus habitat and will lead to the removal and potential loss of up to 246 cacti. The conservation measures (*e.g.*, transplant) may minimize the loss of cactus and the JI Ranch conservation easement will conserve approximately 800 Arizona hedgehog cacti by protecting 100 acres of cactus habitat from threats on private land during the life of the project.

### **Consequences from Mine Components**

#### Mine Facilities Outside the Range of Arizona Hedgehog Cactus

The western portions of the action area that includes the MARRCO corridor, Filter Plant and Loadout Facility, Skunk Camp tailings storage facility, and the West Plant Site, are outside the cactus’ known range and do not contain suitable Arizona hedgehog cactus habitat or Arizona hedgehog cactus. As a result, we anticipate no effects to Arizona hedgehog cactus or its habitat

from construction, mining activities, reclamation at these facilities, or USACE CWA permitting of effects to the waters of the U.S. at the Skunk Camp tailings storage facility.

### Access Roads

The development of the access roads outside the transmission and pipeline corridors will lead to ground disturbance of about 1.6 acres within the known range of Arizona hedgehog cactus. Because surveyors did not identify individual cactus in the footprint of the access roads during surveys, it is unlikely that the species or the associated seed bank will be present and affected in these areas during construction. The potential effects on these 1.6 acres will include ground disturbance that could make these areas unsuitable for species re-establishment in the future after the project life span due to the changes to soils and geological formations from grading during construction.

### Underground Mining and Subsidence

Surveys conducted in the subsidence area identified 10 individual Arizona hedgehog cacti. Because this parcel will be transferred to private property, Resolution Copper has proposed to transplant the cacti onto the TNF where Federal biologists continue to have access to the plants and the plants can remain federally protected under the Act (i.e., unless a federal nexus occurs on private lands, Endangered Species Act regulations for listed plants do not apply).

Approximately 387.1 acres of the underground mining area occur within the range of Arizona hedgehog cactus and will be degraded and likely permanently lost due to subsidence. The TNF and SWCA expect the ground surface dropping 800 to 1,115 feet will disrupt or overturn, to the point of death, most of the interior chaparral vegetation within the “crater limit.” Some interior chaparral vegetation may survive in the “fracture limit” but the ground surface is expected to subside enough that stormwater runoff will change direction and flow towards the subsidence crater resulting in excess water. Therefore, while there may be a possibility for a small number of cacti to establish on the perimeter of the subsidence crater, we estimate that it is a low likelihood and more likely that Arizona hedgehog cactus habitat in the subsidence crater will be lost and unable, following the closure of the mine, to support Arizona hedgehog cactus.

We do not anticipate groundwater drawdowns to adversely affect Arizona hedgehog habitat or plants beyond the subsidence crater. We do not expect groundwater drawdowns caused by the dewatering of the Apache Leap Tuff aquifer to cause declines in the interior chaparral vegetation community beyond the subsidence crater. The interior chaparral vegetation, which provides Arizona hedgehog cactus habitat, relies on precipitation for obtaining water rather than groundwater. Therefore, we do not expect effects to this vegetation community and the cactus beyond the subsidence crater from groundwater drawdowns.

### East Plant Site

We expect construction of surface support buildings, access shafts, and ventilation at the East Plant Site to affect 13 Arizona hedgehog cacti. We also anticipate effects to three additional cacti growing within or near the proposed re-alignment of Magma Mine Road. Loose soil or rocks rolling or sliding downslope from new road cuts and fill may adversely affect these plants. To prevent damage or direct losses to these plants, all 13 will be removed and planted in suitable habitat within the action area following the salvage and transplant protocol (USFS 2020). For any

cacti downslope of the new road alignment that Resolution Copper can protect in place, they will implement conservation measures, such as fencing or barriers or other forms of protection to prevent damage to cacti from rolling or sliding debris during construction.

Ground disturbance associated with construction activities will alter about 22.1 acres of Arizona hedgehog cactus habitat. We expect that these areas will no longer be suitable for re-establishment of Arizona hedgehog cactus after the project is completed. Loss of suitable habitat will also result in a loss of any existing seeds stored in a soil seed bank that would otherwise enable future Arizona hedgehog cacti germination and establishment.

### Tailings Pipeline Corridor

To assess project effects to the cactus, SWCA (2020) analyzed a 500-foot tailings pipeline corridor width and assumed all 56.7 acres could be disturbed. Our analysis is based upon this assumption. Upon final approval of the design, the TNF anticipates the final right-of-way will likely be 150 feet wide with the acreage of ground disturbance substantially less.

Ground disturbance associated with the tailings pipeline corridor includes the construction and installation of the 22-inch PAG pipeline, 34-inch NPAG pipeline, and 16-inch reclaimed water pipeline, and the 20-foot wide access road, grading, vegetation removal, and trenching. These construction activities will affect up to 89 individual Arizona hedgehog cacti and alter up to 56.7 acres of suitable cactus habitat. Prior to any ground disturbance, a qualified biologist will survey the corridor to identify any Arizona hedgehog cacti that may have been missed during previous surveys or new plants that have become established since the most recent 2019 survey. We anticipate that biologists will remove all 89 Arizona hedgehog cacti and any newly discovered individuals prior to ground disturbance and replant them into new areas outside the pipeline corridor, but within the action area.

Following the removal of plants, we do not anticipate that habitat within the pipeline corridor will become suitable for Arizona hedgehog cactus re-establishment in the future given routine maintenance of the pipeline during the life of the project and ground disturbance at mine closure to remove all of the pipelines within the corridor. We anticipate there will be no effects to the Arizona hedgehog cactus habitat from staging areas because these will be located within the newly constructed corridors during the project's construction and closure phases.

Loss of Arizona hedgehog cactus suitable habitat will result in a loss of any seeds established in a soil seed bank across 56.7 acres. Loss of suitable habitat would likely reduce or eliminate the suitability of the cactus to re-establish after the project due to the removal of top soils, any seeds stored in a potential soil seed bank, and changes in geological formations from grading and trenching. Degradation of suitable habitat will increase habitat fragmentation between plants growing outside of the project footprint and inhibit future establishment of Arizona hedgehog cacti seedlings in the project footprint.

Resolution Copper development of the access road within the corridor (where existing access roads are not sufficient) could lead to road cuts and fill creating loose soil/rocks that could shift downslope and bury or crush individual Arizona hedgehog cacti outside the area to be disturbed. There are an estimated 11 Arizona hedgehog cacti within 100 feet of the project footprint that are downslope from project activities. To prevent damage and/or plant deaths, biologists will remove and transplant these cacti to new locations within the action area, following the TNF's salvage and

transplant protocols. If Resolution Copper can protect these plants in place, they will implement measures to protect those individuals.

#### Tailings Pipeline Corridor Colocated with the 115-kV Transmission Line

To assess effects to the cactus, SWCA (2020) analyzed a 500-foot corridor width for the 14.2-mile long tailings pipeline/115-kV transmission line. The 500-foot corridor includes 833.1 acres from the start of the colocated tailings pipeline/115-kV transmission line to the Skunk Camp tailings storage facility fence line. Upon final approval of the design, the TNF anticipates the final right-of-way will likely be from 225 to 280-foot wide for the tailings pipeline and the parallel transmission line. The acreage of ground disturbance could be substantially less.

No Arizona hedgehog cacti occur within the 500-foot wide colocated corridor. Some Arizona hedgehog cacti occur outside of the colocated corridor and outside of the action area. Therefore, we do not expect any construction-related effects to the cactus from this portion of the project. Prior to any ground disturbance, qualified biologists will survey this corridor again to ensure no individuals are present. Qualified biologists will transplant or protect in place any Arizona hedgehog cactus if construction activities will result in damage or death.

SWCA (2020) determined that the project will alter 294.9 acres of Arizona hedgehog cactus habitat within this 833.1-acre corridor (Table 5, Appendix C). Approximately 214 acres of habitat will be permanently altered (vegetation removal, grading, trenching) by the construction and installation of the 22-inch PAG, 34-inch NPAG, and 16-inch reclaimed water pipelines, the 50-foot by 50-foot transmission tower foundations, and staging areas. Another 4.2 acres of ground disturbance is associated with the construction of a 20-foot wide access road for SRP to gain access to the transmission towers. We anticipate that areas within the corridor will not become suitable Arizona hedgehog cactus habitat in the future due to construction habitat alteration; routine and hazardous vegetation management of the pipeline corridor and transmission line operation; and closure operations to remove the pipelines and potentially the transmission line.

#### Colocated 230-kV/115-kV Transmission Lines

To assess effects to the cactus, SWCA (2020) analyzed a 160-foot corridor width, consisting of 61 acres, for the new alignment of the colocated 230-kV/115-kV transmission lines. Upon final approval of the design, the TNF anticipates the final right-of-way will likely be from 110 to 160-foot wide for the colocated transmission lines and actual ground disturbance may be less.

SWCA (2020) estimated that 57.3 acres within the colocated 230-kV and 115-kV transmission lines is occupied and/or suitable Arizona hedgehog cactus habitat. Ground disturbance associated with construction of the corridor, 50-foot by 50-foot tower foundations, and staging areas will cause removal of 39 Arizona hedgehog cacti and loss of 57.3 acres of habitat. The acreage includes 1.2 acres of habitat loss to construct a 20-foot wide road for SRP to access to the transmission towers within the corridor.

Prior to any ground disturbance, a qualified biologist will survey the corridor to identify any Arizona hedgehog cacti and any plants established since the most recent survey. A qualified biologist will salvage any individual cacti that are suitable for transplant and plant it outside the

area of disturbance prior to construction activities, following TNF's salvage and transplant protocols (USFS 2020).

The development of an access road within the corridor could lead to road cuts and fill creating loose soil/rocks that could shift and bury or crush individual Arizona hedgehog cactus growing downslope of construction. For those plants that qualified biologists cannot salvage but are downslope of a construction area, they will implement measures, such as fencing or barriers or other forms of protection to protect cacti from rolling or sliding debris.

### 115 kV Transmission Line

To assess effects to the cactus, SWCA (2020) analyzed a 160-foot corridor width for the new alignment of the 115-kV transmission line. Upon final approval of the design, the TNF anticipates the final right-of-way will likely be from 75 to 130-foot wide for the transmission line.

SWCA estimated that the new 115-kV transmission line alignment will occur within about 3.0 acres of occupied and/or suitable Arizona hedgehog cactus habitat. Ground disturbance associated with construction of the transmission line includes the construction of 50-foot by 50-foot tower foundations, SRP vegetation management, and staging areas.

Potential construction-related effects on the species from the 115-kV transmission lines, associated access roads, and staging areas will include the removal of two individual Arizona hedgehog cacti and any additional individuals established since surveys occurred in 2019. Prior to any ground disturbance, a qualified biologist will survey the corridor to identify any Arizona hedgehog cacti that may have been missed during previous surveys or new plants that have become established since the most recent survey. A qualified biologist will salvage any individuals of the species that are suitable for transplant and plant them into areas outside the area of disturbance prior to construction activities, following the TNF's salvage and transplant protocols (USFS 2020).

Ground disturbing activities will lead to a reduction or loss of the Arizona hedgehog cactus seed bank on up to 3.0 acres from construction of the 115-kV transmission line. These areas will no longer have Arizona hedgehog cactus contributing to the seed bank and ground disturbance can change conditions to make it less suitable for seed germination. Where disturbance occurs, this project corridor will reduce habitat suitability and the likelihood for the Arizona hedgehog cactus to re-establish after the life of the project.

### **Consequences from Mining Operations and Maintenance**

We do not anticipate effects to the Arizona hedgehog cactus from continuous mine operations and subsidence on the Oak Flat parcel over the 40-year mining period due to the salvage and transplant of cactus from the Oak Flat parcel from conservation measure and BMP application prior to the development and implementation of mining facilities and activities.

Resolution Copper's implementation of BMPs will minimize and cause any effects to the Arizona hedgehog cactus growing downslope of the project footprint and its habitat to be insignificant. Specifically, Resolution Copper's *Noxious Weed and Invasive Species Management Plan on National Forest Systems Lands* provides strategies to treat and reduce the spread of weeds and invasive plants, stabilize embankment slopes, and implement various dust control and suppression measures to prevent fugitive dust from covering an Arizona hedgehog cactus.

### **Consequences from SRP Line Maintenance and Vegetation Management under Transmission Lines**

We do not anticipate SRP transmission line maintenance/repairs/inspections and vegetation maintenance underneath lines will affect the Arizona hedgehog cactus because qualified biologists will transplant cactus prior to maintenance, repairs, and inspections or marked in a way that they will not be harmed. A qualified biologist will remove all 41 at-risk cacti that construction of the colocated 230kV-115kV and 115-kV may damage or kill. Helicopter flights are high above the ground and move quickly past this low growing cactus, preventing any effects associated with wind or dust. The likelihood of a helicopter landing where cacti occur, because of its rugged and rocky growing locations, is discountable. Line maintenance will be specific to a tower or a section on the circuit for purposes of minor or emergency hardware repair or replacement. In the rare event a structure needs replacing later in time, but during mine operations, we anticipate no effect to the Arizona hedgehog cacti because we do not expect any Arizona hedgehog cacti to remain in the corridor following the initial salvage and transplant prior to construction of the corridor. Similarly, because of cactus absence, we do not expect vegetation maintenance and hazard treatments within the transmission corridor and maintaining clearings around transmission towers to affect the Arizona hedgehog cactus. Because the transmission line occurs with low growing desert vegetation and the project will alter vegetation in the colocated corridors, we expect the need for extensive vegetation management will likely be minimal. Any necessary vegetation maintenance where qualified biologists have not removed Arizona hedgehog cactus will result in pre-project surveys to identify and protect cactus from any necessary vehicle access or vegetation removal.

### **Consequences from Closure and Reclamation Activities**

During closure and reclamation activities in mine years 50 to 56, ground disturbing activities may affect any Arizona hedgehog cactus that germinates and grows during the 40-years of mine operations. Demolition of facilities, trenching to remove underground pipelines and pipeline bridges; contouring, and grading will result in the additional losses or degradation of soil. Resolution Copper will seed disturbed areas with native seed mixes and replace growth media to vegetate and stabilize embankments to reclaim disturbed areas. Demolition activities may damage or kill any new Arizona hedgehog cacti seedlings or plants originally protected in place in the project footprint, such as the East Plant site and tailing pipeline corridor. Qualified biologists will resurvey these areas for the cactus prior to demolition activities. While we do not anticipate any Arizona hedgehog cacti growing in these areas after the initial salvage and transplanting, it is possible that seedlings that either became established or individuals originally protected in place may now be at risk during this stage. Qualified biologists will remove any at-risk plants and replant them in the action area, following the TNF's salvage and transplant protocols. Grading and trenching activities will likely remove any potential seed remaining in the soil seed bank, eliminating the potential for future germination of Arizona hedgehog cactus in the area.

### **Consequences from CWA 404 and Recreation Mitigation Parcels**

We do not anticipate any adverse effects to Arizona hedgehog cactus from ground disturbance associated with developing recreation mitigation activities for the Arnett Creek trailhead, motorized and non-motorized trails, Inconceivables Climbing Area road extension, and Queen Creek Castleberry Campground (and associated facilities) because these recreational improvement areas occur at lower elevations outside the known Arizona hedgehog cactus range. The total ground disturbance associated with these recreational areas is 92 acres.

The USACE CWA Section 404 compensatory mitigation parcels at Queen Creek, Gila River, and San Pedro River sites are outside of the cactus' known range and do not contain suitable Arizona hedgehog cactus habitat or Arizona hedgehog cactus. As a result, we anticipate no effects to Arizona hedgehog cactus or its habitat from CWA mitigation areas.

### **Summary of Consequences to the Arizona Hedgehog Cactus**

Construction activities occurring over a nine-year period to build new facilities, create the transmission and pipeline corridors, access routes to transmission towers, and the subsidence crater will result in the loss of an estimated 165 individual Arizona hedgehog cacti. Closure activities to remove most of the mine components may result in additional adverse effects to cacti established during mine operations. The TNF estimates that an additional 21 individuals may occur across the entire project footprint for a total of 186 Arizona hedgehog cacti affected. Surveys before construction or any type of ground disturbance begins will help identify plants that monitors can protect in place. The TNF anticipates that monitors will relocate all 186 Arizona hedgehog cacti to a new location outside of the project footprint but within the action area.

Removal or transplant of at least 165 Arizona hedgehog cacti detected during project surveys will occur with a possibility that additional cacti may be found and transplanted. The TNF estimates that an additional 21 individuals may occur across the entire project footprint for a total of 186 Arizona hedgehog cacti affected. They estimated this number using densities of individuals in specific project features and extrapolating that density to areas not surveyed within the known species' range. However, surveyors can miss plants during pre-construction surveys, but discover them during the vegetation clearing activities. In this case, we estimate that an additional 60 individual Arizona hedgehog cacti could occur based on the large size of the project footprint that overlaps occupied habitat. We therefore estimate that project activities may adversely affect up to 246 individual Arizona hedgehog cacti. Because the corridor widths analyzed were conservative and broader than the likely footprint, the number of affected Arizona hedgehog cactus could be less, as could the loss of habitat.

Conservation measures proposed to salvage Arizona hedgehog cactus from areas of disturbance and replant them to new locations within the action area may minimize the loss of plants and effects to genetic variation. However, transplanting is not a guarantee for plant survival. A high mortality rate can occur if monitors do not plan carefully and persons approved to carry out the work are not experienced moving rare plants, particularly *Echinocereus* species. Timing of the removal, techniques used for removal (i.e., keeping much of the roots intact, preventing damage to stems, strategies for stem or plant removal within boulder crevices), suitability of new locations, an understanding of the species, and experience in transplanting native cactus species and other qualifications can improve survival.

The TNF and Resolution Copper proposed several conservation measures to reduce the number of Arizona hedgehog cacti adversely affected by this project. In particular, they will attempt to conduct transplanting activities between October and May, when the weather is cooler and winter rainfall may occur, to reduce heat stress on transplanted Arizona hedgehog cacti and improve their ability to re-establish. If transplanting activities must occur between May and October, the TNF or Resolution Copper will provide additional water to transplanted cactus to offset heat related stress to uprooted plants. They committed to conducting long-term monitoring of transplanted Arizona hedgehog cacti which will not only add insight to the status of transplanted individuals but will

allow us to measure the effectiveness of the TNF's transplant techniques toward recovery. However, we are uncertain of who will conduct the transplanting, where qualified and appropriately permitted biologists will plant cactus in the action area, and other details. In the event that all estimated 246 Arizona hedgehog cacti do not survive transplantation; we expect the population to number around an estimated 5,760-6,450 plants. We expect these estimated 5,760-6,450 cacti to continue to contribute to Arizona hedgehog cactus survival and recovery because with the potential loss of 246 individuals, the population is likely to still maintain high levels of genetic diversity (Fehlberg et al. 2013) and be distributed across its range. The approximate 5,760-6,450 individual cactus remaining can provide seeds for propagation, as well as stems that qualified biologists can collect from genetically different individuals to grow in a greenhouse nursery and replanted back in its natural habitat for recovery purposes.

Resolution Copper has committed to developing an Arizona Hedgehog Cactus Relocation, Salvage, and Monitoring Plan with the TNF and our office that provides criteria for determining which cacti are suitable for immediate relocation as well as measures to collect seed or to salvage healthy stems from individuals when biologists cannot salvage the whole plant. This effort, in coordination with the FWS, is important to making decisions that can improve the chances of survivorship of translocated plants. However, Resolution Copper has not submitted this plan prior to consultation. Without specific information about this plan, who will implement the plan, and details, such as adaptive measures to prove its effectiveness over time, its conservation value toward minimizing adverse effects considered in the biological opinion is limited.

Construction, closure, and reclamation activities will result in the degradation and/or loss of up to approximately 822.8 acres of occupied and suitable Arizona hedgehog cactus habitat. We anticipate the project to cause permanent negative effects to about 375.3 acres from access roads, East Plant site construction/development, and the entire tailings pipeline, likely precluding future cactus re-establishment. We expect habitat degradation or loss at the subsidence area and, transmission lines will adversely affect about 447.5 acres, causing these areas to not likely be suitable for future cactus establishment. Additional transmission line habitat degradation may occur during closure activities if SRP does not use the powerlines for another purpose. Loss of occupied habitat will increase habitat fragmentation and reduce the taxon's ability to increase its population distribution between individual Arizona hedgehog cacti growing to the north and south of the project footprint.

We anticipate the conservation measures associated with transplanting Arizona hedgehog cacti and the conservation easement will help to reduce and minimize the effects of the action but will not completely offset the effects. Physically moving 186 to 246 cacti will alter the Arizona hedgehog cacti spatial distribution, create an artificial cluster of plants, and not all transplants will likely survive. Resolution Copper's new JI Ranch conservation easement of 100-acres for the life of the project will help conserve Arizona hedgehog cactus and its habitat for approximately 60 years. However, the conservation easement's duration for the life of the project and acreage does not fully offset the project's overall adverse effects to 822.8 acres of occupied and suitable Arizona hedgehog cactus habitat. When the JI Ranch conservation easement ends in about 60 years, it may return to private ownership. While we do not know the future circumstances surrounding the cactus' listing status, the environment, or plans for the ranch after the end of the project, Arizona hedgehog cactus were able to persist with previous ranching activities (see *Environmental Baseline*). Therefore, should the ranch return to current use following the end of the mine project, Arizona hedgehog cactus may still persist. Even without these conservation measures, the estimated abundance of remaining plants (5,760-6,450), distribution across its range, genetic

diversity (Fehlberg et al. 2013), and amount of overall acreage within its range (approximately 54,000 acres), recovery of the plant is not precluded.

The proposed development of the Resolution Copper Mine is not likely to cause the endangered Arizona hedgehog cactus to reach a tipping point that precludes recovery, for the following reasons:

- 1) If all affected cacti from the project do not survive implementation of proposed conservation measures associated with transplantation, the estimated rangewide Arizona hedgehog cactus population of 5,760-6,450 plants will remain large enough, be well distributed, and maintain a high level of genetic diversity (Fehlberg et al. 2013).
- 2) Conservation measures can minimize the effects to 186 and potentially up to 246 cacti through transplant techniques within the action area. While transplanting does not guarantee plant survival, we anticipate that some transplanted cacti will survive to reproduce.
- 3) The JI Ranch Arizona hedgehog cactus conservation easement minimizes some effects of the action by conserving about 100 acres of private land and approximately 800 Arizona hedgehog cacti from development, human access, and cattle grazing for the approximate 60-year life of the mine. Arizona hedgehog cactus may still persist at JI Ranch following termination of the easement if activities return to those currently occurring, based upon those actions persisting since the ranch's establishment in the 1930s/40s.
- 4) The degradation and/or loss of up to 822.8 acres of Arizona hedgehog cactus habitat caused by mining construction, closure and reclamation activities, represents only about 1.5% of the estimated 54,700 acres within its range. More than 90 percent of the Arizona hedgehog cactus' range occurs on the TNF, where it has greater long-term protection from the ESA, compared to non-Federal land.

## **CUMULATIVE EFFECTS**

Cumulative effects are those “effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area” considered in this Opinion (50 CFR § 402.02).

We are not aware of any specific future state, tribal, local, or private actions that are reasonably certain to occur within the action area at this time; therefore, we are not able to currently anticipate any cumulative effects. Those actions that may be ongoing in the future include private land development and ranching. Because more than 90 percent of occupied Arizona hedgehog cactus is on the TNF's Globe Ranger District, and the remaining occupied habitat occurs on BLM, ASLD, or private lands, we anticipate that future activities within the action area that could have a substantial affect to the Arizona hedgehog cactus are likely to be subject to Section 7 consultation under the ESA.

## **JEOPARDY AND ADVERSE MODIFICATION ANALYSIS**

Section 7(a)(2) of the ESA requires that federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat.

## Jeopardy Analysis Framework

Our jeopardy analysis relies on the following:

“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). The following analysis relies on four components:

- 1) Status of the Species, which evaluates the range-wide condition of the listed species, the factors responsible for that condition, and the species’ survival and recovery needs;
- 2) 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) Effects of the Action (including those from conservation measures), 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.

The jeopardy analysis in this biological opinion emphasizes the range-wide survival and recovery needs of the listed species and the role of the action area in providing for those needs. We evaluate the significance of the proposed Federal action within this context, taken together with cumulative effects, for making the jeopardy determination.

## CONCLUSION

After reviewing the current status of the Arizona hedgehog cactus, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Arizona hedgehog cactus. We have not designated critical habitat for this taxon; therefore, none will be affected.

We base this conclusion on the following:

1. Regardless of the success of any conservation measures, the Arizona hedgehog cactus, following implementation of the project, will remain well distributed, large enough, and with a high level of genetic diversity throughout its range.
2. The proposed project may result in the loss of 186 and up to 246 Arizona hedgehog cacti. An entire loss of all 246 cacti would represent a small proportion of the current known population abundance (estimated at 6,010 to 6,700 plants and taking into account all effects from projects we previously analyzed pursuant to section 7 of ESA) and is not expected to hinder implementation of recovery actions for the taxon, such as, controlled propagation, seed collection, and continued translocations into suitable habitat within its range.
3. Resolution Copper, with input from TNF and FWS, will transplant any Arizona hedgehog cacti at risk of injury or death to new locations outside of the project footprint and within the action area to conserve the cactus. Transplants will possibly occur in cooler months to reduce additional stress on plants and improve survival. If transplantation occurs in warmer months, a biologist will provide supplemental water.

4. The loss and/or degradation or alteration of 822.8 acres of habitat represents only 1.5% of the estimated 54,700 acres within the Arizona hedgehog cactus' range. These effects are not likely to jeopardize the cactus because it occurs to the north, east, and south of the proposed project within the TNF in sites unaffected by the proposed action and maintains a high level of genetic diversity.
5. Resolution Copper will record a new conservation easement on 100-acres of private land that supports approximately 800 Arizona hedgehog cacti. This easement will conserve occupied Arizona hedgehog cactus habitat during the estimated 60-year life of the project. Because Arizona hedgehog cactus likely persisted with ongoing ranching activities since the 1930s/40s, they may also persist following completion of the easement should the ranch return to similar activities prior to the easement.
6. Groundwater drawdowns caused by the dewatering of the Apache Leap Tuff aquifer and changes in surface stormwater runoff will not cause a decline in the interior chaparral and related vegetation communities beyond the subsidence crater. The degradation or loss of 387.1 acres from subsidence is not likely to jeopardize the Arizona hedgehog cactus habitat because it represents only a 2% loss of the interior chaparral vegetation community within the action area. Interior chaparral and related vegetation communities and the Arizona hedgehog cactus rely on precipitation for obtaining water and therefore changes to groundwater and surface water will not affect the cactus or its habitat beyond the Oak Flat Federal parcel.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any conservation measures that were incorporated into the project design.

### **INCIDENTAL TAKE STATEMENT**

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act 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" (section 3(19)). "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 or omissions that create the likelihood of injury to listed species by annoying it 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 Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of federally listed endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any regulation of any State or in the course of any violation of a State criminal trespass law.

## CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. We recommend the TNF establish long-term Arizona hedgehog cactus demographic monitoring plots to record essential life history traits such as: germination rates, percent of population fruiting, seedling survival, and potential causes of mortality.
2. We recommend the TNF conduct a species distribution model with a climate vulnerability assessment that identifies areas of highly suitable habitat to inform the Arizona hedgehog cactus' status under changing climatic conditions, and potentially used for future translocations during federal projects.
3. We recommend Arizona hedgehog cactus surveys, especially in areas where Arizona hedgehog cactus have not been located in the past, to improve our understanding of its distribution and abundance.

For us to be informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

## REINITIATION NOTICE

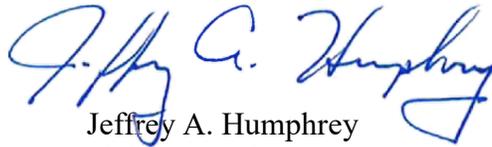
This concludes formal consultation on the Resolution Copper Mine project. As provided in 50 CFR § 402.16, reinitiation of consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion or written concurrence; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Because there is no incidental take or numerical exceedance criteria for listed plants, consultation reinitiation for the Arizona hedgehog cactus for the Resolution Copper Mine project would rely on items such as changes in project location and/or acres of plants affected not considered in this biological opinion, where discretion is retained.

In keeping with our trust responsibilities to American Indian Tribes, we encourage you to continue to coordinate with the Bureau of Indian Affairs in the implementation of this consultation and, by copy of this biological opinion, are notifying the San Carlos, White Mountain, Mescalero, Tonto and Yavapai Apache Tribes; Gila River Indian Community; and the Hopi and Hualapai Tribes of its completion. We also encourage you to coordinate the review of this project with the Arizona Game and Fish Department.

We appreciate the TNF, USACE, SRP, SWCA, and Resolution Copper's collaborative efforts to identify and minimize effects to listed species from this project. Please refer to the consultation number, 02EAAZ00-2020-F-0822 in future correspondence concerning this project. Should you require further assistance or if you have any questions please contact Kathy Robertson, (602) 899-5957, or Greg Beatty, (602) 242-0210.

Sincerely,



Jeffrey A. Humphrey  
Field Supervisor

cc (electronic):

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## Appendix A: Concurrences

This appendix contains our concurrences with your “may affect, not likely to adversely affect” determinations for the endangered Gila chub (*Gila intermedia*) and southwestern willow flycatcher (*Empidonax traillii extimus*) and their designated critical habitat; the threatened northern Mexican gartersnake (*Thamnophis eques megalops*); and the threatened yellow-billed cuckoo (*Coccyzus americanus*) and its proposed critical habitat.

### Gila Chub

We consider Mineral Creek occupied by a small, remnant population of Gila chub. Mill Creek at the confluence of upper Mineral Creek is intermittent/ephemeral and supports the Gila chub only during high flows. Both Mill Creek and upper Mineral Creek are designated critical habitat (Figure 12, Appendix C). The Arizona Game and Fish Department surveyed and found Gila chub in Mineral Creek in 2000; however, they found no Gila chub during surveys in 2002, 2006, 2007, 2008, 2009, and 2013 (Crowder et al. 2014). WestLand surveyed Mineral Creek in 2017, and Mineral and Mill Creek in 2020 and did not find any Gila chub (SWCA 2020). Although biologists did not detect Gila chub during these survey efforts, they would need to conduct additional thorough and expansive surveys with negative results within Mineral Creek to determine extirpation. If and when that is determined, we plan to repatriate Mineral Creek from another Gila chub population within the same recovery management unit (USFWS 2015). Gila chub, its habitat, and designated critical habitat do not occur in other streams within the proposed action area.

### Determination of Effects

We concur with your determination that the proposed action may affect, but will not likely adversely affect the Gila chub and designated critical habitat. We based our concurrence on the following:

- Resolution Copper will install tailings pipelines (10-in. PAG, 22-in. PAG/NPAG, 34-in. NPAG, and 16-in. reclaimed water) underneath Mill Creek where the colocated corridor crosses the stream channel (also described as underground boring or trenchless crossing). Entry and exit points of the pipelines will occur outside of Mill Creek’s ordinary high-water mark which is outside of stream channel and designated critical habitat. The tailings pipelines will be drilled at a minimum depth of 30-feet to avoid effects to the stream channel and riparian vegetation and occur where streamflow is ephemeral/intermittent (i.e., dry and lacks pool habitat). Therefore, construction of the tailings pipelines will have no effects to the Gila chub, its habitat or critical habitat primary constituent elements (PCEs), which are perennial pools, the necessary vegetation that provides cover, and adequate water quality. Because the pipeline’s removal and reclamation will be similar to its installation by avoiding any riparian vegetation and also occurring outside the Mill Creek high water mark, stream channel, high water mark, and designated critical habitat boundary, we do not anticipate additional effects to Gila chub, its habitat or its critical habitat during the mine’s closure activities.
- Construction and closure activities of the tailings pipelines will cause ground disturbance within the Mineral Creek watershed, and potentially result in sedimentation moving into Mineral and Mill Creeks during storm runoff events. Resolution Copper will minimize sedimentation and erosion by seeding disturbed areas with native vegetation, erosion

control, other prevention measures, and implementing best management practices.

Therefore, due to implementation of these conservation measures, we anticipate any effects to Gila chub critical habitat PCE 1 (stream habitat), 2 (temperature) and 3 (water quality) will be insignificant.

- The colocated 115-kV transmission line will pass overhead within upper Mineral Creek near its headwaters with Mill Creek. Construction and placement of the new power poles will be located outside of Mineral Creek's ordinary high-water mark which occurs outside of the stream channel and designated critical habitat boundary. Therefore, construction of the new transmission line will have no effect to the Gila chub or its critical habitat.
- Operators will use the existing Dripping Springs Road that crosses upper Mineral Creek during all phases of the proposed project. No road improvements or alterations to the road will occur. No new roads to access the power poles will be built (access would be by foot). Dripping Springs Road crosses Mineral Creek in a section that is primarily dry most of the year with only seasonal flows. During construction of the colocated 115-kV and tailings pipelines corridor, increased traffic crossing the creek is expected. When water is present, traffic may cause sedimentation to enter Mineral Creek. We anticipate the effect from sediment during seasonal flows will be local and short in duration, and as a result, likely result in an insignificant effect to Gila chub and its critical habitat downstream. We do not anticipate excess sedimentation to fill pools (PCE 1), increase turbidity that reduces water quality (PCEs 2 and 3), or effect primary productivity (PCE 4) because the streambed is dry surrounding the road crossing. Because Gila chub have not been found within Mineral Creek since 2000 and are considered nearly absent (see introduction summary above), and vehicles crossing the creek is anticipated to occur primarily during low flows in areas where fish are not likely to occur, and any sedimentation will be local, minimized, and of short duration, we anticipate any effects to the species and critical habitat by the use of Dripping Springs Road will be insignificant and discountable.
- We do not anticipate dewatering the deep groundwater system and partial dewatering of the Apache Leap Tuff aquifer due to block-caving will change Mineral Creek baseflow or adjacent spring or stream flow based upon surface water and spring monitoring and groundwater modeling studies and results (see *Environmental Baseline*). Resolution Copper will minimize any unanticipated effects to Mineral Creek through continued monitoring and conservation measures (see *Conservation Measures*). Therefore, based upon the studies and modeling results, continued monitoring, and conservation measure implementation (if necessary), we anticipate effects to Gila chub, its habitat, and its designated critical habitat PCEs (water quantity, stream pool habitat, stream flow, water temperature and quality, food, cover, water quality, or non-native fish abundance) will be insignificant.

Early in the NEPA process the Forest Service recognized the difficulties associated with modeling the complex hydrology and geology at the mine site, especially considering the extremely long time frames involved in the recovery of groundwater (hundreds or thousands of years), and the fact that the panel caving would fundamentally alter the hydrogeologic framework (USFS 2019, SWCA 2020). The TNF implemented five specific strategies to manage modeling uncertainties:

1. The Forest Service convened a Groundwater Modeling Workgroup, composed of experts from the Forest Service, the NEPA team, Resolution Copper and their subcontractors, and cooperating agencies and other stakeholders. The purpose of the workgroup was to review Resolution Copper's groundwater modeling, using a collaborative and iterative process. The workgroup met 11 times from September 2017 to September 2018; collaboration with the Geology and Subsidence workgroup also ensured that the geologic framework underlying the groundwater model was appropriate. The Draft EIS (USFS 2019) included a memorandum capturing the workgroup conclusions. Overall, the workgroup concluded: "...that the results of the predictive groundwater model appear reasonable and are based on best available science and understanding of the hydrogeology and project at the time the groundwater model was created."
2. As part of the analysis, the workgroup requested that Resolution Copper run a number of sensitivity analyses to evaluate how different assumptions for input parameters would change the modeling results. In total, Resolution Copper conducted 88 separate model runs. In order to deal with uncertainty, the Forest Service used all the sensitivity runs—not just the base case run—to assess impacts to GDEs.
3. The Forest Service recognized that the presentation of the modeling results would affect the public's perception of how certain they were. For instance, a result of "1.2 feet of drawdown" suggests that we can trust any model to accurately predict inches of change, which is not the case. Based on input from the modeling workgroup, the Forest Service decided to use 10 feet as a threshold for quantitatively using modeling results. The TNF did not consider results less than 10 feet reasonable to rely upon for quantitative impact analysis.
4. Similarly, the Forest Service recognized that presenting modeling predictions many hundreds of years in the future could lead the public to perceive that these were reliable results. Based on input from the modeling workgroup, the Forest Service decided to use 200 years as the limit of quantitative modeling results. However, the Forest Service still analyzed qualitative longer-term trends, as many of the peak impacts will not have occurred by 200 years.
5. Recognizing the inherent uncertainty in modeling, Resolution Copper proposed a monitoring plan to evaluate the real-world hydrologic changes, regardless of whether modeling predicted a GDE would be affected or not. Resolution Copper monitoring is tied to mitigation measures to replace lost water.

Resolution Copper, TNF, and SWCA conducted and analyzed studies evaluating Mineral Creek surface water and springs at six separate sampling points (USFS 2019, SWCA 2020). Because groundwater associated with the Apache Leap Tuff aquifer at least partially supports Mineral Creek, the TNF included it as part of the groundwater modeling process. SWCA and the TNF concluded there were, based upon the best-calibrated model run, as well as 87 sensitivity runs, no effects from mining to the Mineral Creek baseflow or to any of its discreet springs.

Regardless of anticipated effects, Resolution Copper intends to monitor the stream, and should any real-world loss begin to occur, replace any lost water. Resolution Copper has developed and submitted to the Forest Service a Monitoring and Mitigation Plan for Groundwater Dependent Ecosystems and Water Wells (Montgomery and Associates Inc. 2020). This document outlines a monitoring plan to assess potential effects on each GDE, identifies triggers and associated actions to be taken by Resolution Copper to ensure that

GDEs are preserved, and suggests mitigation measures for each GDE if it is shown to be affected by future mine dewatering. The stated goal of the plan is “to ensure that groundwater supported flow that is lost due to mining activity is replaced and continues to be available to the ecosystem.” The plan does not contain a specified duration over which monitoring and mitigation will take place, however, the TNF intends to specify the timeline in the FEIS and Draft ROD to include all of the operations and closure phases, with GDEs then being dropped from monitoring only upon approval of TNF, based upon accumulated monitoring results (C. Garrett, SWCA, pers. comm. 2020).

The plan identifies 16 springs that would be monitored, as well as surface water flows in 10 locations, including Mineral Creek. A variety of potential actions are identified that could be used to replace water sources if monitoring reaches a specified trigger. These include drilling new wells to supply water, installing spring boxes, installing guzzlers, or installing surface water capture systems such as check dams, alluvial capture, recharge wells, or surface water diversions. Resolution Copper can use all of these to supplement diminished groundwater flow at GDEs by retaining precipitation in the form of runoff or snowmelt, making it available for ecosystem requirements. One further method for replacing flow would be to provide alternative water supplies from a nearby source (such as groundwater from the Desert Wellfield or Arizona Water Company that deliver water to the town of Superior, both located in the same Active Management Area, as regulated by Arizona Department of Water Resources).

The Draft EIS (USFS 2019) notes that for GDEs, the effectiveness of these mitigation measures would depend on the specific approach. Engineered replacements like pipelines, guzzlers, or spring boxes would be effective at maintaining a water source and maintaining a riparian ecosystem, but the exact type, location, and extent of riparian vegetation could change to adapt to the new discharge location and frequency of the new water source. Changes in water quality are unlikely to be an issue, since new water sources would likely derive from the same source as natural spring flow (i.e., the Apache Leap Tuff aquifer, or stored precipitation).

- We anticipate any precipitation that the subsidence area at Oak Flat captures will have no effect to Gila chub, its habitat, or its designated critical habitat on Mineral Creek (Garrett 2018). The subsidence area is not immediately connected through washes or drainages to Mineral Creek. Devil’s Canyon, which is adjacent to the subsidence area (and will have a 5-10 percent reduction in precipitation runoff from subsidence), flows into Mineral Creek downstream of Gila chub designated critical habitat and where Gila chub would most likely occur (Figures 11&12, Appendix C). As a result, any precipitation captured by the subsidence area will not influence any Mineral Creek surface water where Gila chub, its habitat, or designated critical habitat occur. Therefore, we expect any stormwater precipitation captured by subsidence at the Oak Flat parcel due to mining will not affect Gila chub, its habitat, or designated critical habitat in Mineral Creek.
- Gila chub, its habitat or critical habitat do not occur and are not expected to occur in Devil’s Canyon, Queen Creek, Arnett Creek or other springs that mining may affect from groundwater drawdowns. Therefore, we do not expect any groundwater effects that may occur in Devil’s Canyon, Queen Creek, Arnett Creek or other springs will affect Gila chub, its habitat, or critical habitat.

- We do not anticipate effects to Gila chub as a result of construction at the following project components: Underground Mining and Subsidence, East Plant Site, Ore Conveyor/Infrastructure Corridor, West Plant Site, Skunk Camp Tailings Storage Facility, MARRCO Corridor, Filter Plant and Loadout Facility, and Electricity Supply and Transmission Lines (with the exception of the new 115-kV line colocated with the Tailings Pipeline Corridor, discussed above), because there is no Gila chub, Gila chub habitat, or designated critical habitat within these areas.
- Gila chub, its habitat or designated critical habitat do not occur within any of the Section 404, CWA compensatory mitigation parcels or recreation mitigation sites, and therefore, no effects to either will occur as a result of Resolution Copper's proposed mitigation activities for recreation and the CWA.
- We anticipate there will be no adverse effects to Gila chub or its designated critical habitat from effects to waters of the U.S. and USACE CWA 404 permitting at the Skunk Camp tailings facility. We have reached this conclusion because Gila chub, its habitat or designated critical habitat do not occur within the Skunk Camp tailings storage facility, or any of ephemeral drainages, including Dripping Spring Wash, Skunk Camp Wash, Stone Cabin Wash and a number of unnamed drainages that are located within the tailings storage facility footprint associated with potentially jurisdictional waters of the U.S. affected and permitted by the USACE.
- We anticipate any effects to Gila chub or its designated critical habitat from effects to ephemeral waters of the U.S., permitted by the USACE under section 404 of the CWA at the Skunk Camp tailings facility that may flow into Mineral Creek will be insignificant and discountable. We expect any sedimentation or change to stormwater flow to be temporary and minor due to the distance from Mineral Creek (approximately 5 miles), irregular flow, and implementation of a SWPPP. Therefore, we anticipate effects to Gila chub will be discountable due to unlikelihood of sedimentation effects reaching Mineral Creek and if it any increased sedimentation did occur, the insignificant effect it would have to any remnant small fish population or its habitat because it would be temporary, minor, a long distance to Gila chubs and its habitat, and minimized by implementing SWPP measures (SWCA 2020). We anticipate any effects to Gila chub critical habitat and its primary constituent elements associated with water quality, sedimentation, and quantity will be insignificant due to implementation of SWPPP and the small, temporary, and minor change to overall water flow that may reach Mineral Creek.
- We anticipate any effects to Gila chub or its designated critical habitat from effects to waters of the U.S. at Mineral Creek permitted by the USACE under section 404 of the CWA for the 115 kV colocated pipeline/power line construction, including use of the Mineral Creek crossing by vehicles during construction, will be insignificant and discountable. We reached this conclusion because we anticipate the implementation of BMPs and SWPPP will reduce, minimize, and possibly eliminate effects from sedimentation from construction within this localized portion of Mineral Creek. During construction of the colocated 115-kV and tailings pipelines corridor, increased traffic crossing the creek is expected. No road improvements or alterations to the road will occur. Dripping Springs Road crosses Mineral Creek in a section that is primarily dry most of year with only seasonal flows. When water is present, traffic may cause minor sedimentation to enter Mineral Creek. Increased sedimentation from vehicle crossing during construction

will likely have a minor, localized, temporary, and insignificant impact on Gila chub critical habitat PCEs including water quality or availability of prey. Resolution Copper will use trenchless crossing (underground boring) to insert pipelines beneath Mineral Creek outside of the ordinary high-water mark and critical habitat and will not involve disturbance of the stream or nearby riparian vegetation. Power poles will be located outside of Mineral Creek and critical habitat, though the lines themselves will pass overhead. We do not anticipate construction of the colocated 115 kV line will fill pools (PCE 1), increase turbidity that reduces water quality (PCEs 2 and 3), or effect primary productivity (PCE 4) because the streambed is typically dry surrounding the road crossing. Because any vehicle caused sedimentation will be temporary, site-specific, and limited; trenchless crossing will avoid affecting stream habitat; power pole construction will occur outside of areas that may influence Mineral Creek stream habitat; and Gila chub have not been detected since 2000 in Mineral Creek; we anticipate any effects to Gila chub and critical habitat from USACE permitting for 115 kv colocated pipeline/power line construction will be insignificant and discountable.

### **Western Yellow-billed Cuckoo**

As we described in the recent proposed critical habitat notice (USFWS 2020a), the western yellow-billed cuckoo (yellow-billed cuckoo or cuckoo) is a neotropical migratory species that travels between North, Central, and South America each spring and fall. As such, it needs movement corridors of linking habitats and stop-over sites along migration routes and between breeding areas. During movements between nesting attempts, biologists have found western yellow-billed cuckoos at riparian sites with small groves or strips of trees, sometimes less than 10 acres in extent. The habitat features at stop-over and foraging sites are typically similar to the features at breeding sites, but may be smaller in size, may be narrower in width, and may lack understory vegetation. We know much less about migration, stop-over, or dispersal habitat within the breeding range; however, western yellow-billed cuckoos do use a variety of habitats that may or may not be used for breeding. As a result, we do not think that migration, stop-over, or dispersal habitat is limiting.

Surveyors detected yellow-billed cuckoos in the project footprint and associated action area along Queen Creek upstream of the Whitlow Ranch Dam (Prager and Wise 2017), Arnett Creek (Prager and Wise 2017), Devil's Canyon, and Mineral Creek (SWCA 2020). With the exception of Mineral Creek, multiple surveys of these areas did not include breeding pairs and resulted in detections presumed to be migrants or transient individuals (Halterman et al. 2016). Cuckoos detected infrequently upstream of Queen Creek near Whitlow Ranch Dam were likely migratory individuals (Prager and Wise 2017). Riparian habitat at Whitlow Ranch Dam is no longer considered suitable for the cuckoo because of an ongoing drought and a 2012 wildfire creating a mix of live and dead tree species (WestLand 2016). Surveyors did not detect yellow-billed cuckoos in Devil's Canyon during five survey efforts between 2011 and 2019 (WestLand 2016, SWCA 2020). Surveyors detected a migratory cuckoo along Arnett Creek during two seasons of surveys (Prager and Wise 2015, 2017). Small patches of riparian habitat at Whitlow Ranch Dam, Rancho Rio Creek, and Devil's Canyon may provide suitable stopover or foraging habitat for migratory yellow-billed cuckoos.

The cuckoo uses Mineral Creek during the breeding season (WestLand 2011, USFWS 2020a). Surveys in 2011 suggested that there were as many as six breeding pairs along the upper and middle portions of Mineral Creek (WestLand 2011). Mineral Creek also provides a movement corridor and migratory habitat for cuckoos. Proposed critical habitat occurs in Mineral Creek as

Unit AZ-28 and in the Lower San Pedro and Gila Rivers as Unit AZ-15 (USFWS 2020a) (Figure 12, Appendix C).

### Determination of Effects

We concur with your determination that the proposed action may affect, but will not likely adversely affect, the yellow-billed cuckoo and proposed critical habitat. We based our concurrence on the following:

Early in the NEPA process the Forest Service recognized the difficulties associated with modeling the complex hydrology and geology at the mine site, especially considering the extremely long time frames involved in the recovery of groundwater (hundreds or thousands of years), and the fact that the panel caving would fundamentally alter the hydrogeologic framework (USFS 2019, SWCA 2020). The TNF implemented five specific strategies to manage modeling uncertainties:

1. The Forest Service convened a Groundwater Modeling Workgroup, composed of experts from the Forest Service, the NEPA team, Resolution Copper and their subcontractors, and cooperating agencies and other stakeholders. The purpose of the workgroup was to review Resolution Copper's groundwater modeling, using a collaborative and iterative process. The workgroup met 11 times from September 2017 to September 2018; collaboration with the Geology and Subsidence workgroup also ensured that the geologic framework underlying the groundwater model was appropriate. The Draft EIS (USFS 2019) included a memorandum capturing the workgroup conclusions. Overall the workgroup concluded: "...that the results of the predictive groundwater model appear reasonable and are based on best available science and understanding of the hydrogeology and project at the time the groundwater model was created.
2. As part of the analysis, the workgroup requested that Resolution Copper run a number of sensitivity analyses to evaluate how different assumptions for input parameters would change the modeling results. In total, Resolution Copper conducted 88 separate model runs. In order to deal with uncertainty, the Forest Service used all the sensitivity runs—not just the base case run—to assess impacts to GDEs.
3. The Forest Service recognized that the presentation of the modeling results would affect the public's perception of how certain they were. For instance, a result of "1.2 feet of drawdown" suggests that we can trust any model to accurately predict inches of change, which is not the case. Based on input from the modeling workgroup, the Forest Service decided to use 10 feet as a threshold for quantitatively using modeling results. The TNF did not consider results less than 10 feet reasonable to rely upon for quantitative impact analysis.
4. Similarly, the Forest Service recognized that presenting modeling predictions many hundreds of years in the future could lead the public to perceive that these were reliable results. Based on input from the modeling workgroup, the Forest Service decided to use 200 years as the limit of quantitative modeling results. However, the Forest Service still analyzed longer-term trends, as many of the peak impacts have not occurred by that time.
5. Recognizing the inherent uncertainty in modeling, Resolution Copper has proposed a monitoring plan to evaluate the real-world hydrologic changes, regardless of whether modeling predicted a GDE would be impacted or not. Resolution Copper monitoring is tied to mitigation measures to replace lost water.

Regardless of the anticipated effects, Resolution Copper intends to monitor streams, and should any real-world loss begin to occur, replace any lost water. Resolution Copper has developed and

submitted to the Forest Service a Monitoring and Mitigation Plan for Groundwater Dependent Ecosystems and Water Wells (Montgomery and Associates Inc. 2020). This document outlines a monitoring plan to assess potential effects on each GDE, identifies triggers and associated actions to be taken by Resolution Copper to ensure that GDEs are preserved, and suggests mitigation measures for each GDE if it is shown to be affected by future mine dewatering. The stated goal of the plan is “to ensure that groundwater supported flow that is lost due to mining activity is replaced and continues to be available to the ecosystem.” The plan does not contain a specified duration over which monitoring and mitigation will take place, however, the TNF intends to specify the timeline in the FEIS and Draft ROD to include all of the operations and closure phases, with GDEs then being dropped from monitoring only upon approval of TNF, based upon accumulated monitoring results (C. Garrett, SWCA, pers. comm. 2020).

The plan identifies 16 springs that would be monitored, as well as surface water flows in 10 locations along Queen Creek, Arnett Creek, Telegraph Canyon, Devil’s Canyon, and Mineral Creek. A variety of potential actions are identified that could be used to replace water sources if monitoring reaches a specified trigger. These include drilling new wells to supply water, installing spring boxes, installing guzzlers, or installing surface water capture systems such as check dams, alluvial capture, recharge wells, or surface water diversions. Resolution Copper can use all of these to supplement diminished groundwater flow at GDEs by retaining precipitation in the form of runoff or snowmelt, making it available for ecosystem requirements. One further method for replacing flow would be to provide alternative water supplies from a nearby source (such as groundwater from the Desert Wellfield or Arizona Water Company that deliver water to the town of Superior, both located in the same Active Management Area, as regulated by Arizona Department of Water Resources).

The Draft EIS (USFS 2019) notes that for GDEs, the effectiveness of these mitigation measures would depend on the specific approach. Engineered replacements like pipelines, guzzlers, or spring boxes would be effective at maintaining a water source and maintaining a riparian ecosystem, but the exact type, location, and extent of riparian vegetation could change to adapt to the new discharge location and frequency of the new water source. Changes in water quality are unlikely to be an issue, since new water sources would likely derive from the same source as natural spring flow (i.e., the Apache Leap Tuff aquifer, or stored precipitation).

- We anticipate there will be insignificant effects to yellow-billed cuckoos from changes to water and vegetation quality within Devil’s Canyon from the Resolution Copper Mine. Groundwater studies and modeling (USFS 2019, SWCA 2020) indicated that block-caving from underground mining was unlikely to lead to reductions in the main channel groundwater inflow in Middle Devil’s Canyon and no changes to Lower Devil’s Canyon. However, subsidence will result in reducing stormwater runoff, causing a reduction in the total volume of storm flows in the Devil’s Canyon drainage (5.6 percent in middle Devil’s Canyon to 3.5 percent at the mouth of Devil’s Canyon) and dewatering will cause the permanent loss of a spring (DC6.6W). The Forest Service (2019) estimates a reduction in the lower Devil’s Canyon mainstem flow by 5 to 10 percent, assuming no replacement of water occurs for spring DC6.6W. No yellow-billed cuckoo nesting habitat or proposed critical habitat occurs in Devil’s Canyon, but the riparian habitat may provide migratory/stopover or foraging habitat. Up to 90 acres of dense riparian habitat within middle and lower Devil’s Canyon will likely decline in quality from reduced surface flows and groundwater, but the Forest Service does not anticipate widespread vegetation loss as explained in the BA (SWCA 2020) and DEIS (USFS 2019). Because surveyors have not

recorded breeding cuckoos in this area of Devil's Canyon and we expect migrant cuckoos (which can use a broader quality of habitat and for a temporary period of time) can still take advantage of the habitat's shelter and cover (USFWS 2020a), the effects to migrant cuckoos at Devil's Canyon from underground mining and subsidence to water within Devil's Canyon will be insignificant.

- We anticipate there will be insignificant effects to yellow-billed cuckoos from changes to water and vegetation quality within Queen Creek caused by mining. The TNF (USFS 2019) and SWCA (2020) anticipates, based upon studies and modeling, that Queen Creek groundwater drawdowns were possible but unlikely. More likely however, was that the subsidence area at Oak Flat would decrease the annual Queen Creek surface watershed volume, ranging from 19 percent (in Superior) to 3.5 percent (at Whitlow Ranch Dam). The Forest Service expects reduced groundwater and surface flows at Whitlow Dam and habitat disturbance from subsidence in Rancho Rio Creek to cause declines or modify the riparian vegetation at both areas. Biologists have not recorded breeding cuckoos along Queen Creek or near Whitlow Dam. Potential habitat changes include a reduction in the quality and extent of riparian habitat or conversion to a drier, xeroriparian habitat, altering cuckoo migratory/stopover or foraging habitat. We anticipate these potential effects will be insignificant because migrant cuckoo detections along Queen Creek near Whitlow Dam are infrequent or uncommon, and because migrant cuckoos can use wider varieties of habitat and locations temporarily (USFWS 2020a). Additionally, past fires at Whitlow Dam have burned riparian vegetation and it is unknown if the current baseline condition will allow previous habitat quality to recover.

Similarly, there are no anticipated groundwater effects from drawdown to occur along Queen Creek at Boyce Thompson Arboretum based upon studies and modeling results (USFS 2019, SWCA 2020). We anticipate any reduction in flow due to the loss of watershed area from the subsidence crater to be minor, insignificantly affecting the current ephemeral stream supporting xeroriparian vegetation along Queen Creek at Boyce Thompson Arboretum. Similar to near Whitlow Dam, no breeding cuckoos or breeding cuckoo habitat (or proposed critical habitat) occurs along Queen Creek near Boyce Thompson Arboretum. We expect any migrant cuckoos that may occur along Queen Creek near Boyce Thompson Arboretum to be uncommon and can use wider varieties of habitat and locations temporarily (USFWS 2020a). Therefore, because we expect any minor loss of watershed area will not alter the existing ephemeral stream/xeroriparian habitat environmental baseline at Queen Creek near Boyce Thompson Arboretum and due to the migratory cuckoo's ability to still use the area, wider varieties of habitat, or move to other nearby locations, we anticipate the effect will be insignificant.

- We anticipate there will be no effects to yellow-billed cuckoos along Arnett Creek from groundwater effects because no breeding cuckoos are known to occur along Arnett Creek, no proposed cuckoo critical habitat occurs along the creek, and the TNF's groundwater studies and modeling (USFS 2019, SWCA 2020) indicate that no groundwater drawdowns will occur along Arnett Creek as a result of mine construction and operation activities.
- We anticipate there will be insignificant effects to yellow-billed cuckoos from mine caused groundwater drawdowns to springs within the action area. Bored Spring is the lone spring that supports any substantial riparian vegetation. Bored Spring has infrastructure improvements and consists of an approximately 65 × 25-foot depression with a cattle

trough downstream (SWCA 2020). A cottonwood occurs at the site, and a string on scattered riparian vegetation occurs downstream for approximately 500 feet in the vicinity of Bored Spring, including Goodding's willow, velvet mesquite, tamarisk, and African sumac (SWCA 2020). TNF biologist Mark Taylor noted from past site visits that water is not always present at the site and the riparian vegetation in the spring vicinity is sparse and does not contain riparian vegetation density, or a multi-canopy structure that would indicate suitable breeding cuckoo habitat (SWCA 2020). In addition, Bored Spring is located directly adjacent to, and part of, a minerals material ADOT storage facility that is currently in use (SWCA 2020). Groundwater drawdown could lead to the death of a large Fremont cottonwood tree at the spring and other trees scattered over a 500-foot reach downstream of the spring. Because riparian habitat supported by the spring is small in extent and contains scattered, sparse riparian trees uncharacteristic of breeding cuckoo habitat, with existing human activity and infrastructure, we do not expect spring supported habitat this small in size to support breeding cuckoo habitat (USFWS 2020a). Therefore, we anticipate any effects to cuckoos associated with springs will be insignificant, because only one spring possesses substantial riparian vegetation, is a relatively small area, existing habitat quality is reduced, ongoing infrastructure/human activity occurs, and the ability for migrant cuckoos to use wide varieties of habitat and locations during migration (USFWS 2020a).

- We do not anticipate dewatering the deep groundwater system and partial dewatering of the Apache Leap Tuff aquifer due to block caving will change Mineral Creek baseflow or adjacent springs or stream flow, based upon surface water and spring monitoring and groundwater modeling results (see *Environmental Baseline*). Resolution Copper will minimize any unanticipated effects to Mineral Creek through continued monitoring and conservation measures (see *Conservation Measures*). Resolution Copper, TNF, and SWCA conducted and analyzed studies evaluating Mineral Creek surface water and springs at six separate sampling points (USFS 2019, SWCA 2020). Because Mineral Creek is at least partially supported by groundwater associated with the Apache Leap Tuff aquifer, it was included as part of the groundwater modeling process. SWCA and the TNF concluded, based upon the best-calibrated model run, as well as 87 sensitivity runs, that no effects from mining will occur to the Mineral Creek baseflow or to any of its discrete springs. Therefore, based upon the studies and modeling results, continued monitoring, and conservation measures, effects to yellow-billed cuckoo, its habitat, and its proposed critical habitat Physical or Biological Features (woodland floodplain habitat or immediate upland vegetation, prey base, and hydrologic processes) along Mineral Creek are expected to be insignificant.
- We anticipate any precipitation that the subsidence area at Oak Flat captures will have an insignificant effect to the yellow-billed cuckoo, its habitat, or proposed critical habitat at Mineral Creek, near the Mineral Creek/Devils Canyon confluence, and Big Box Dam reservoir. The Oak Flat subsidence area is not immediately connected through washes or drainages to Mineral Creek. Devil's Canyon, which is adjacent to the subsidence area (and will have minor 5-10 percent reduction in precipitation runoff from subsidence), flows downstream into Mineral Creek where Big Box Dam reservoir captures flow from both Mineral Creek and Devil's Canyon. Mineral Creek and yellow-billed cuckoo proposed critical habitat ends at Big Box Dam and reservoir immediately below the Devil's Canyon/Mineral Creek confluence (Figures 11&12, Appendix C) (USFWS 2020a). Any reduction in Devil's Canyon precipitation runoff will affect any Mineral Creek flow, because they are different drainages. We expect Big Box Dam water storage on Mineral

Creek will nearly eliminate any reduction in Devil's Canyon precipitation runoff below the Devils' Canyon/Mineral Creek confluence. A small reduction in precipitation stormwater flow will not affect any existing individual cuckoos, because cuckoos perch, forage, and seek cover in trees. We expect any existing cuckoo habitat will not be affected, because a small reduction in Devil's Canyon stormwater flow will not noticeably alter water storage and any existing vegetation at or surrounding the reservoir due to the amount of stormwater flow entering Big Box Dam reservoir from both the Devil's Canyon and Mineral Creek watersheds. SWCA determined that of the presence and extent of water behind Big Box Dam has remained consistent since the mid-1990s (C. Garrett, SWCA, pers. comm., 2020). We anticipate that existing water storage at Big Box Dam will prevent any reduction in stormwater flow from affecting proposed critical habitat physical and biological features such as riparian woodlands, insect prey, and hydrologic processes. Big Box Dam water storage will dominate stream function at the confluence and likely maintain and not noticeably alter existing baseline conditions for yellow-billed cuckoo proposed critical habitat physical and biological features (vegetation persistence, insect availability, and hydrologic processes). Therefore, because of the existing Big Box Dam and water storage, inflow from both Devil's Canyon and Mineral Creek watersheds, and its location at the Devil's Canyon/Mineral Creek confluence, we anticipate any effects to cuckoos, cuckoo habitat, or the physical or biological features of proposed cuckoo critical habitat (riparian woodlands, prey resources, or hydrologic processes) from a reduction in Devil's Canyon precipitation stormwater runoff at the Mineral Creek/Devil's Canyon confluence will be insignificant.

- We anticipate the construction of tailings pipelines will not affect yellow-billed cuckoos, its habitat, or its proposed critical habitat along Mineral Creek. Resolution Copper will install the tailings pipelines (10-inch PAG, 22-inch PAG/NPAG, 34-inch NPAG, and 16-inch reclaimed water) underneath Mill Creek where the colocated corridor crosses the stream channel. Entry and exit points of the pipelines will occur outside of proposed critical habitat and will be drilled at a minimum depth of 30-feet to avoid effects to the stream and riparian vegetation (trenchless crossing or underground boring). In order to prevent effects to cuckoos (injuries or fatalities to adults, eggs, or young) in areas where biologists may detect yellow-billed cuckoos during pre-project surveys, vegetation clearing and ground disturbing activities associated with pipeline construction within 500 feet of the ordinary high water mark of Mineral Creek will not be completed from May 15 through September 30 to remain outside the breeding season. Therefore, construction of the tailings pipelines will have no effects to the yellow-billed cuckoo or its proposed critical habitat.
- In order to reduce any likelihood for bird collisions with transmission lines, the lines and structures will be designed in accordance with "Reducing Avian Collision with Power Lines" (APLIC 2012), and line marking devices, (i.e., flight diverters) will be placed at the crossings of Devil's Canyon and Mineral Creek. The 115-kV transmission line will cross Devil's Canyon and upper Mineral Creek near its confluence with Mill Creek then parallel Mineral Creek for 0.5 mile. New power poles will be located outside of the ordinary high-water mark of upper Mineral Creek and proposed critical habitat. Construction crews will deliver materials by helicopter, crane, or by hand and use the existing Dripping Springs Road and access power poles by foot for any required maintenance. No new roads will occur. We described records of cuckoo collisions with towers, solar facilities, and wind turbines as a threat our listing rule (USFWS 2014c), but not collisions with power lines.

The transmission line locations occur in areas not known to be cuckoo migratory corridors. Therefore, we anticipate that effects from the construction and persistence of the transmission lines in upper Mineral Creek and Devil's Canyon will be insignificant and discountable to the yellow-billed cuckoo and proposed critical habitat.

- In areas where pre-project surveys show presence of possible, probable, or confirmed breeding yellow-billed cuckoos, large-scale, major noise-producing activities within 500 feet of the ordinary high water mark of Mineral Creek will be avoided to the extent possible (e.g., maintenance activities associated with pipeline replacement and cleaning) during the cuckoo breeding season (May 15 to September 30 annually). We therefore, do not anticipate effects to breeding cuckoos during maintenance activities.
- No ground disturbance within yellow-billed cuckoo habitat or proposed critical habitat along Mill and Mineral Creeks will occur during the removal of the colocated 115-kV transmission and tailings pipelines corridor. In areas where surveys have detected the presence of the yellow-billed cuckoo, closure and reclamation activities within 500 feet of the ordinary high-water mark of Mill and Mineral Creeks will occur from October 1 to May 14, which is outside of the cuckoo breeding season to avoid disturbance to nesting yellow-billed cuckoos.
- We anticipate there will be insignificant effects to yellow billed cuckoos from the specific construction, daily operational activity, and closure activities of mine facilities at the underground Oak Flat mining parcel, East and West Plant sites, Skunk Camp tailings facility, MAARCO corridor, and Filter Plant and Loadout facility (consequences associated with water drawdowns and transmission/pipeline line corridors are described separately within this concurrence). None of these locations contain yellow-billed cuckoo habitat or proposed critical habitat. However, because cuckoos are a migratory bird covering large areas, and some of these areas occur near locations where migratory cuckoos might visit, there is the possibility a cuckoo will occur at these facilities while in development, operation, or during closure. Because these facilities do not contain the riparian habitat cuckoos rely upon for cover, food, and shelter, we expect they will only occur briefly and continue to move to other areas. Should any cuckoo behavior alteration occur from mine-related activities (noise, human activity, vehicles, etc.), we anticipate these will be rare and short in duration, having an insignificant effect.
- We anticipate any effects to yellow-billed cuckoo from developing, maintaining, managing, and closing PAG tailings, non-contact and contact stormwater catchment basins, and process water ponds will be insignificant and discountable due to their location, lack of vegetated habitat, and management techniques. Resolution Copper will not place these ponds in locations (e.g., streams or proposed critical habitat) where we expect cuckoos will nest or rely upon. Resolution Copper will remove vegetation at these ponds to prevent these locations from attracting cuckoos and providing areas for perching, foraging, cover, and nesting. We expect additional hazing devices will deter and disperse any migrating cuckoos that might occur in these areas, but due to the ponds location and lack of habitat should be rare. We expect any effects to cuckoos or its habitat (or proposed critical habitat) will be insignificant and discountable because these ponds are located away from cuckoo habitat (and proposed critical habitat), will be managed to prevent vegetated habitat from developing, and any behavior alteration will be rare and temporary.

- The H&E Farm, included as part of Section 404, CWA compensatory mitigation parcels, encompasses 265 acres of yellow-billed cuckoo proposed critical habitat along the San Pedro River. Proposed mitigation efforts include drainage reconstruction to reconnect abandoned agricultural land on floodplain terraces to the active river channel. These abandoned agricultural lands are outside the proposed cuckoo critical habitat boundary. Mitigation efforts within proposed critical habitat includes planting and seeding of native species for habitat improvement along the eastern boundary of the property (Area B), and preservation efforts along the San Pedro River (Area C). No ground disturbing activities will occur within proposed critical habitat and therefore no effects to the physical or biological features are expected. The establishment of a conservation easement on the entire H&E Farm may benefit the species by protecting habitat in perpetuity.
- The Queen Creek and Mar5/Olberg Road Restoration CWA mitigation sites along the Gila River may currently provide migratory or stopover habitat for the yellow-billed cuckoos. Surveyors have not detected breeding or migratory cuckoos at these parcels. The proposed mitigation for both these sites is to remove tamarisk and plant native trees and shrubs. We anticipate that tamarisk removal will be insignificant to cuckoos and their habitat because of the small size of the sites, the lack of breeding cuckoos at these locations, and the ability for migrating cuckoos to take advantage of nearby habitat upstream and downstream of these mitigation sites. No proposed critical habitat occurs at either site and therefore, none is affected. There may be long term benefits to cuckoos from improved habitat quality at this site.
- We anticipate there will not be any adverse effects to yellow-billed cuckoo or its proposed critical habitat from USACE CWA 404 permitting at the Skunk Camp tailings facility. Yellow-billed cuckoo, its habitat or proposed critical habitat do not occur within the Skunk Camp tailings storage facility, or any of the ephemeral drainages, including Dripping Spring Wash, Skunk Camp Wash, Stone Cabin Wash and a number of unnamed drainages that are located within the tailings storage facility footprint and are associated with potentially jurisdictional waters of the U.S. affected and permitted by the USACE.
- We anticipate there will be no effects to yellow-billed cuckoos or its proposed critical habitat by USACE permitting effects to waters of the U.S. from construction of the 115 kV transmission line or installation of the tailings pipeline at Mineral and Mill Creek. The tailings pipeline will be bored 30 feet beneath the creek, and construction activity and pipeline entrance and exit points will occur outside of proposed critical habitat boundaries. Crews will place all power poles outside proposed critical habitat, and not create new access roads within proposed critical habitat. Implementation of BMP and SWPPP will minimize, reduce, or eliminate any potential sedimentation. Construction activities will avoid any breeding yellow-billed cuckoos, by conducting work outside of the May 15 to September 30 breeding season.
- The recreation mitigation sites at Queen Creek, Arnett Creek trailhead, Inconceivables Climbing area, and roads/trails do not contain or expect to have breeding yellow-billed cuckoo habitat because they are outside of suitable riparian woodlands. Migrant cuckoos can occur in a variety of habitats. Because these recreation sites are small and cuckoos can take advantage of nearby habitats, we expect any alteration to migrant cuckoo habitat is insignificant. Also, should migrant cuckoos occur at any of these recreation mitigation work sites, we expect birds will be able to move to nearby undisturbed habitat and any behavior alteration will be of short duration, temporary, and be an insignificant effect.

## Northern Mexican Gartersnake

We listed the northern Mexican gartersnake as threatened under the Act on July 8, 2014 (USFWS 2014a) and revised proposed critical habitat on April 28, 2020 (USFWS 2020b). No detections of northern Mexican gartersnakes occur in the footprint of the project components and/or the associated action area. The only portion of the proposed action area where northern Mexican gartersnake has potential to occur is Area A at the H&E Farm, along the San Pedro River where CWA 404 mitigation activities are proposed. We believe the northern Mexican gartersnake could occur in low-density populations along the San Pedro River where populations of gartersnake prey, such as lowland leopard frogs (*Lithobates yavapaiensis*) and longfin dace (*Agosia chrysogaster*), exist (USFWS 2014b, 2020c). Although no recent occurrences have been detected along the lower San Pedro River (north of Interstate 10), this stretch of the San Pedro River has had limited search effort in extent since 1996. There is no proposed critical habitat within the action area.

### Determination of Effects

We concur with your determination that the proposed action may affect, but will not likely adversely affect, northern Mexican gartersnake. We based our concurrence on the following:

- The northern Mexican gartersnake could occur on the San Pedro River, but in substantially low densities because many river sections have intermittent stream flow, reduced prey availability, and locally abundant occurrence of exotic aquatic predators. Gartersnakes and its habitat at H&E Farm likely do not occur due to the lack of a perennial stream and stable aquatic prey resources. As a result of the lack of suitable gartersnake foraging habitat and stable prey resources at H&E Farm, and therefore, the gartersnake's unlikely occurrence, we anticipate effects to gartersnakes at the H&E Farm are discountable.
- Areas proposed for active habitat improvement at the H&E Farm (Area A) do not contain suitable gartersnake habitat and will occur outside of the active San Pedro River channel (SWCA 2020). Area A is highly disturbed (e.g., soil compaction, fissures, and sink holes) and does not contain a perennial water source or stable food supply. Therefore, it is unlikely that a northern Mexican gartersnakes will be present and any effects to the gartersnake or its habitat from the proposed earthwork are insignificant and discountable.
- H&E Farm areas B and C will not have any substantial ground disturbing activities. Planting and seeding to improve native vegetation along the San Pedro River may benefit the northern Mexican gartersnake in the future. The establishment of a conservation easement on the entire H&E Farm may benefit the species by protecting habitat in perpetuity. Therefore, any effects to the northern Mexican gartersnake or its habitat will be insignificant and discountable from the proposed mitigation efforts.
- No proposed gartersnake critical habitat occurs on H&E Farm, and therefore, none is affected.
- Northern Mexican gartersnakes, its habitat, or proposed critical habitat do not occur within the mining or transmission/pipeline corridor project footprint, any of remaining Section 404, CWA compensatory mitigation parcels (Gila River or Queen Creek), USACE CWA permitted activities at Skunk Camp or 115 kV colocated pipeline corridor, or recreation mitigation sites. Therefore, we anticipate no effects to northern Mexican gartersnake, its

habitat, or proposed critical habitat will occur from the remaining Resolution Copper mine activities and USACE CWA 404 permitted actions and compensatory mitigation actions.

### **Southwestern Willow Flycatcher**

Southwestern willow flycatchers and the other willow flycatcher subspecies are neotropical migrants breeding in North America and wintering in Central and northern South America (Finch et al. 2000, USFWS 2002). Willow flycatchers use a greater variety and distribution of habitats, including non-riparian vegetation during migration, such as agricultural fields and desert grasslands (Finch et al. 2000, USFWS 2013). Flycatcher migration habitat can lack the key components necessary for breeding flycatchers, such as the presence of standing water or moist soils and suitable vegetation size and structure (Finch et al. 2000).

The collection of streams and habitat surrounding the Resolution Copper Mine Project primarily provide short-term opportunities for migratory southwestern willow flycatchers for cover, shelter, and food. The intermittent and ephemeral creeks, canyons, and springs surrounding Resolution Copper Mine (Arnett, Queen, and Mineral Creeks and Devil's Canyon) have riparian vegetation or drier xeroriparian vegetation, but do not have the broad, wide floodplains similar to the lower Colorado River, Verde River, Salt River/Tonto Creek confluence at Roosevelt Lake, or Rio Grande that contain the water and elevated groundwater to establish the abundant vegetation and conditions flycatchers typically rely on for successful nesting (USFWS 2002, 2013).

WestLand surveyors in 2017 and 2018 recorded a total of three migrant willow flycatchers of undetermined subspecies in the proposed project footprint (WestLand 2017, 2018). WestLand searched the Whitlow Ranch Dam area, Boyce Thompson Arboretum along Arnett Creek, Queen Creek upstream of Superior, and Mineral Creek on State Trust Lands. Two willow flycatchers occurred along Queen Creek near Boyce Thompson Arboretum, one in 2017 and one in 2018. Another willow flycatcher occurred near Whitlow Ranch Dam in 2018. WestLand concluded that these three flycatchers, detected early in the survey season, were migrant birds and did not persist into the breeding season (WestLand 2017, 2018). Based on the available survey data, the southwestern willow flycatcher is currently an occasional migrant in the action area (SWCA 2020). Flycatcher designated critical habitat only occurs in the action area along the San Pedro River where USACE CWA mitigation activities will occur (Figure 12, Appendix C) (USFWS 2013).

In 2005, a southwestern willow flycatcher territory occurred near Whitlow Ranch Dam, but no evidence of breeding was detected (English et al. 2006). Surveyors searched the Whitlow Dam site in 1994, 1996, 1998, and 2006, and did not detect flycatchers (Ellis et al. 2008). Subsequent fires at Whitlow Dam have affected habitat and there is uncertainty whether habitat quality can recover.

WestLand also conducted raptor and general avian surveys within the action area in 2008, 2009, 2012, and 2013 and did not detect any southwestern willow flycatchers (SWCA 2020).

### **Determination of Effects**

We concur with your determination that the proposed action may affect, but will not likely adversely affect, the southwestern willow flycatcher and designated critical habitat. We based our concurrence on the following:

- No dense cottonwood-willow or tamarisk vegetation that is southwestern willow flycatcher nesting habitat occurs in the project footprint and CWA mitigation sites (Devil's Canyon, Queen Creek, Arnett Creek, Mineral Creek, Gila River, San Pedro River, or springs) and no breeding territories occur. Therefore, the proposed project will have no effect on breeding southwestern willow flycatchers.
- During mine operations, the estimated loss of annual volume of surface water in upper Queen Creek (Whitlow Ranch Dam) and Bored Spring will likely cause minor reductions in the quality and quantity of small patches or stringers of riparian vegetation that may provide migratory or stopover habitat for willow flycatchers. We anticipate the effect to migrant flycatchers from any reductions in riparian habitat along Queen Creek and Bored Spring will be insignificant because of the few migratory flycatchers found using these habitats, and the flycatcher's ability to move freely and take advantage of a wide diversity and quality of habitat (USFWS 2013).

Similarly, there are no anticipated groundwater effects from drawdown to occur along Queen Creek at Boyce Thompson Arboretum based upon studies and modeling results (USFS 2019, SWCA 2020). We anticipate any reduction in flow due to the loss of watershed area from the subsidence crater will be minor, insignificantly affecting the current ephemeral stream supporting xeroriparian vegetation along Queen Creek at Boyce Thompson Arboretum. No breeding flycatchers or breeding flycatcher habitat (or critical habitat) occurs along Queen Creek near Boyce Thompson Arboretum because this stream does not have the water and wide, broad, and flat floodplains that are likely to develop habitat for breeding flycatchers (USFWS 2002) or essential for its conservation and recovery (USFWS 2002, 2013). Migrant flycatchers can move freely, taking advantage of wide varieties of habitat and locations for short periods (USFWS 2013). Therefore, because any minor loss of watershed area is not expected to alter the existing ephemeral stream/xeroriparian habitat environmental baseline at Queen Creek near Boyce Thompson Arboretum, and due to the few migratory flycatchers found using these habitats and their ability to still use the area, wide varieties of habitat, and move to other nearby locations, we anticipate the effect will be insignificant.

- We anticipate any groundwater drawdown related mine effects along Devil's Canyon, Mineral Creek, Arnett Creek, Queen Creek, and ephemeral drainages or springs or effects from reductions in precipitation runoff associated with subsidence will have an insignificant effect to migratory southwestern willow flycatchers and its habitat, and no effect to designated critical habitat. None of these streams possess the broad, flat, densely vegetated riparian areas we expect breeding flycatchers to rely upon for nesting. We did not designate these areas as flycatcher critical habitat (USFWS 2013), because these areas are not locations where the stream has the water and wide, broad, and flat floodplains that are likely to develop habitat for breeding flycatchers (USFWS 2002) or essential for its conservation and recovery (USFWS 2002, 2013). Additionally, the TNF does not expect mining to affect the groundwater at some of these streams, such as Mineral Creek and Arnett Creek, will occur based upon groundwater studies and modeling results (USFS 2019, SWCA 2020). We expect any anticipated reductions in precipitation runoff will result in minor changes to riparian habitat quality along Devil's Canyon and Queen Creek. We anticipate the effect to migrant flycatchers from any reductions in riparian habitat due to alteration of groundwater or surface water will be insignificant because of the few

migratory flycatchers found using these habitats and the migratory flycatcher's ability to move freely and take advantage of a wider diversity and quality of habitat (USFWS 2013).

- In order to reduce any likelihood for flycatcher collisions with transmission lines, the lines and structures will be designed in accordance with "Reducing Avian Collision with Power Lines" (APLIC 2012), and line marking devices, (i.e., flight diverters) will be placed at the crossings of Devil's Canyon and Mineral Creek. The 115-kV transmission line will cross Devil's Canyon and upper Mineral Creek near its confluence with Mill Creek then parallel Mineral Creek for 0.5 mile. The areas surrounding these streams and transmission lines, unlike locations along the lower Colorado River or Rio Grande (Finch et al. 2000), are not known to be concentrated flycatcher migration corridors. Flycatcher collision with transmission lines was not identified as a threat in either the flycatcher listing rule (USFWS 1993) Recovery Plan (USFWS 2002), or most recent five-year review (USFWS 2017). Therefore, we anticipate that effects from the construction and persistence of the transmission line in upper Mineral Creek and Devil's Canyon will be insignificant and discountable to the flycatcher.
- We anticipate any effects to southwestern willow flycatchers from developing, maintaining, managing, and closing PAG tailings, non-contact and contact stormwater catchment basins, and process water ponds will be insignificant and discountable due to their location, lack of vegetated habitat, and management techniques. Resolution Copper will not place these ponds in locations (e.g., streams or designated critical habitat) where we expect flycatchers will nest or rely upon. Resolution Copper will remove vegetation at these ponds to prevent these locations from attracting flycatchers and providing areas for perching, foraging, cover, and nesting. We expect additional hazing devices will deter and disperse any migrating flycatchers that might occur in these areas, but due to the ponds location and lack of habitat should be rare. We expect any effects to flycatchers or its habitat (or designated critical habitat) will be insignificant and discountable because Resolution Copper will locate these ponds away from flycatcher habitat and designated critical habitat, and will manage them to prevent vegetated habitat from developing, and any bird behavior alteration will be rare and temporary.
- We anticipate there will be insignificant effects to southwestern willow flycatcher from the specific construction, daily operational activity, and closure activities of mine facilities at the underground Oak Flat mining parcel, East and West Plant sites, Skunk Camp tailings facility, MAARCO corridor, Filter Plant and Loadout facility, and transmission/pipeline line corridors (consequences associated with water drawdowns are described separately within this concurrence). None of these locations contain flycatcher breeding habitat or designated critical habitat. However, because flycatchers are a migratory bird covering large areas, and some of these areas occur near locations that migratory flycatchers might visit, there is the possibility a flycatcher will occur at these facilities while in development, operation, or during closure. Because these facilities do not contain the riparian habitat flycatchers rely upon for cover, food, and shelter, we expect they will only occur briefly and continue to move to other areas. Should any migratory flycatcher behavior alteration occur from mine-related activities (noise, human activity, vehicles, etc.), we anticipate these instances will be rare and short in duration, having an insignificant effect.
- We anticipate any USACE CWA 404 permitted activity for waters of the U.S. at the Skunk Camp tailings facility or from pipeline/power line corridors will have an insignificant effect

to the southwestern willow flycatcher. The Skunk Camp tailings facility and associated ephemeral washes, and Queen and Mineral Creek corridors are not breeding flycatcher habitat or designated flycatcher critical habitat. However, because flycatchers are a migratory bird covering large areas, and some of these areas occur near locations where migratory flycatchers might visit, there is the possibility that migratory flycatchers have visited these areas or may visit them in the future. We anticipate the effect to migrant flycatchers from any reduction or change in riparian habitat or disturbance from construction activities will be insignificant because of the disturbance effect being short duration, and migratory flycatcher's ability to move freely and take advantage of a wide diversity and quality of habitat (USFWS 2013).

- The H&E Farm CWA mitigation site along the San Pedro River overlaps with southwestern willow flycatcher critical habitat (USFWS 2013) and encompasses approximately 16 acres of riparian habitat. No breeding flycatcher habitat occurs at this site and as a result, we do not anticipate any effects to breeding flycatchers. Proposed mitigation efforts to reconnect abandoned agricultural land on floodplain terraces to the active river channel will occur outside critical habitat boundaries. Resolution Copper proposed no other groundwork within critical habitat. Drainage reconstruction and subsequent planting of native species will reestablish natural runoff patterns and promote the establishment and maintenance of native riparian vegetation. The establishment of a conservation easement on the entire H&E Farm may benefit the species by protecting habitat in perpetuity. Because migratory flycatchers could occur during project implementation, we expect any alteration of their behavior that may occur will be of short duration and therefore, insignificant. Migratory flycatchers will be able to move a short distance away from activities to take advantage of similar habitat upstream or downstream of the project site. We expect any effects to southwestern willow flycatcher critical habitat from the proposed mitigation will be insignificant because the project will not remove or alter any substantial riparian habitat (PCE 1) or affect insect prey populations (PCE 2).
- The Gila River Mar5/Olberg Road and Queen Creek CWA habitat improvement mitigation sites may currently provide southwestern willow flycatcher migratory or stopover habitat. Surveyors have not detected flycatchers at these parcels. The proposed mitigation for both these sites is to remove tamarisk and plant native trees and shrubs. We anticipate that tamarisk removal will be insignificant to southwestern willow flycatchers because of the small size of the sites, the lack of breeding flycatchers at these locations, and the ability for migrating flycatchers to take advantage of a wider diversity and quality of habitat (USFWS 2013). No designated critical habitat occurs at either site; and therefore, none is affected.
- The recreation mitigation sites at Queen Creek, Arnett Creek trailhead, Inconceivables Climbing area, and roads/trails do not contain or expect to have breeding flycatcher habitat because they do not possess the broad wet floodplains with abundant riparian vegetation where nesting flycatchers occur. Because migrant flycatchers can occur in and take advantage of a variety of habitats and the relatively small size of each of these recreation sites, we expect any alteration of migrant flycatcher habitat will be insignificant. Also, should migrant flycatchers occur at any of these recreation mitigation work sites, we expect birds will be able to move to nearby undisturbed habitat and any behavior alteration will be of short duration, temporary, and an insignificant effect. No flycatcher critical habitat occurs at these recreation sites, and therefore it is not affected.

## Appendix B: Technical Assistance

### Sonoran Desert Tortoise

In 2020, the FWS reached a settlement agreement with WildEarth Guardians and Western Watersheds Project to review the status of the Sonoran desert tortoise (*Gopherus morafkai*). We agreed to publish a decision in 18 months and during this time, restore the tortoise as a candidate species while we complete our species status review.

Given the information provided in the BA and the nature of the project, we provide technical assistance for the Sonoran desert tortoise below. If plans for this project change, or if new information becomes available on the status, distribution, or abundance of the Sonoran desert tortoise in the action area, this technical assistance, and the need for section 7 consultation, may need to be reconsidered.

The Sonoran desert tortoise occurs in portions of the action area on Federal, State Trust, and private lands. The Cave Creek and Mesa Districts of the TNF joined and signed on to the “Sonoran Desert Tortoise Candidate Conservation Agreement (CCA)” that was finalized on May 27, 2015 (AIDTT 2015). For portions of the action area that fall under the TNF’s administration, they will ensure that this project follows applicable measures in the CAA that are specific to the TNF.

Resolution Copper commits to implementing environmental protection measures to reduce impacts on wildlife for proposed actions occurring on private land. Several measures outlined in the CCA may help reduce effects to the Sonoran desert tortoise and we summarize them below:

1. Conduct pre-construction surveys for Sonoran desert tortoise before surface ground-disturbing activities start in its habitat. A biological monitor would monitor for Sonoran desert tortoise during construction activities. The monitor would flag Sonoran desert tortoise shelter sites/burrows. Monitors will inspect these flagged areas, and relocate any tortoises discovered outside project activity areas.
2. Inform project crews of the potential to encounter Sonoran desert tortoise within the action area and project footprint. Work crews will check below vehicles or equipment prior to moving, and cover and/or backfill holes or trenches that could potentially entrap the species. If crews observe a tortoise they will stop work until the biological monitor relocates it out of harm’s way.
3. Project personnel would follow the AZGFD’s *Guidelines for Handling Sonoran Desert Tortoises Encountered on Development Projects*, when handling a tortoise is necessary.
4. Establish tortoise crossings, as needed and applicable, for concentrate and tailings pipeline corridors, as well as the railroad tracks within the MARCCO corridor within areas containing suitable habitat.
5. We recommend Resolution Copper seek input from AZGFD and FWS for measures to conserve Sonoran desert tortoise and its habitat, including minimizing noxious weed establishment in all tortoise habitat and implementing tasks associated with detecting, relocating, handling, crossing designs, or any other applicable conservation measures.

**Appendix C: Tables and Figures**

Table 1: Characteristics and acreages of subsidence subareas.

<b>Subsidence Subarea</b>	<b>Characteristics</b>	<b>Predicted Acreage of Each Area</b>
Crater limit	Large, visible crater with cave angles of 70 to 78 degrees and with a depth between approximately 800 and 1,115 feet at the end of mine life	1,341.7
Fracture limit	Visible deformation in a conical form between the surface and cave zone; characterized by rotational failures, tension and dislocation cracks, benching, fractured surfaces, and toppling	256.4
Subsidence limit	Extremely small rock deformations that can only be detected by high-resolution monitoring equipment (would not be visible in the soil or on the ground)	159.0
<b>Total Area of Subsidence</b>		<b>1,757</b>

Table 2: Summary of Skunk Camp tailings storage facility.

<b>Tailings Storage Facility</b>	<b>Description</b>
Location	In Dripping Spring Wash approximately 13 miles north of confluence with the Gila River
Land ownership	ASLD, private
Distance from West Plant Site	15 miles
Tailings type and disposal	Thickened slurry tailings placed subaqueously for PAG tailings in one of two cells, NPAG placed hydraulically from perimeter. At disposal—PAG tailings would be 50% solids content; thickened cyclone overflow (NPAG) would be 60% solids content; and thickened NPAG stream sent directly from the mill would be 60% solids content.
Tailings embankment	Earthen starter dams raised with compacted cyclone sand. The NPAG facility would be a centerline construction approach with a 3H:1V slope and the PAG cells would be a downstream construction approach with a 2.5H:1V slope.
Lining and other seepage controls	Engineered, low-permeability layers will be installed on PAG cell foundation and the upstream slope of the embankment.
Approximate size at fence line of tailings storage facility	8,136 acres within fence line; 4,002 acres within footprint of disturbance
Approximate embankment height	490 feet
Pipelines/conveyance	Thickened slurry pumped in two streams (PAG and NPAG) to the tailings storage facility and recycled water pipeline to return water to processing loop at West Plant Site North Option: 22.20 miles of corridor from West Plant Site to tailings storage facility
Auxiliary facilities	Surface water diversions would be large due to the steep surrounding terrain and need to surround the tailings facility on northern, eastern, and western sides with extensive stormwater diversion structures.
Closure and reclamation	Reclamation of the NPAG tailings embankment face would begin as soon as the slope reaches its final extent starting at approximately mine year 10–15. The top of the tailings storage facility will not be reclaimed until after mining is complete. Closure of the tailings recycled water pond is estimated to take up to 5 years after closure. Until that time, excess seepage in seepage ponds will be pumped back to the recycled water pond, and reclamation would take place on the embankment and tailings beaches. After the recycled water pond is closed, seepage ponds will be used to evaporate seepage, and the remaining reclamation of the tailings surface would occur.

Table 3. Transmission line widths and activities occurring within the corridor.

Transmission Line	Description of Corridor	Analysis Width (feet)	Likely Final Approved Width (feet)
115-kV (Mineral Creek crossing)	Contains 50 feet by 50 feet tower foundations; vegetation management as required	130	75-130
115-kV and 230-kV colocated	Contains 50 feet by 50 feet tower foundations, 20 feet wide spur roads as needed to access towers; vegetation management as required	160	110-160
115-kV colocated with tailings pipelines	Pipelines for tailings conveyance and reclaim water for mine use; 20 feet wide access road; 50 feet by 50 feet tower foundations, 20 feet wide spur roads as needed to access towers; vegetation management as required	500	225-280

Table 4. Proposed new and upgraded transmission line summary.

Facility	Transmission Line Route	New Alignment or Upgrade	Approximate Length
East Plant Site	115-kV line colocated with the 230-kV line from Silver King substation to Oak Flat substation	New	3.2 miles
West Plant Site	115-kV line from West Plant Site substation to East Plant Site	New	3.3 miles
Skunk Camp tailings storage facility	115-kV line from the 115-kV /230-kV colocated line to the Skunk Camp tailings storage facility. It is colocated with the tailings pipeline corridor for a majority of this alignment.	New	14.2 miles

Table 5. Arizona hedgehog cactus survey summary

Proposed Action Component	Project Component (acreage)	Project Component Disturbance within Known Species' Range (acreage)	Percent of Project Component Surveyed within Known Species' Range	Individuals Observed during Surveys	Individuals Estimated for Project Component
Access Roads	4.2	1.6	75.3%	0	0
East Plant Site and Magma Road realignment	188.8	22.1	100%	13	13
Filter plant/Loadout Facility disturbance	552.5	-	-	-	-
MARRCO corridor	685.2	-	-	-	-
Silver King Road realignment	13.0	-	-	-	-
Subsidence area (excluding East Plant Site disturbance)	1,672.4	387.1	98.1%	24	24
Skunk Camp tailings storage facility fence line	4,644.5	-	-	-	-
Skunk Camp tailings pipeline	56.7	56.7	98.3%	87	89
Skunk Camp tailings storage facility disturbance	4,002.1	-	-	-	-
Transmission line 115-kV corridor	42.5	3.0	100%	2	2
Transmission line 115-kV/ Tailings pipeline colocated corridor	833.1	294.9	68.9%	0	0
Transmission lines colocated	61.0	57.3	100%	39	39
West Plant Site	940.1	-	-	-	-
<b>Total Project Footprint</b>	<b>14,739.5</b>	<b>822.8</b>	<b>88.7%</b>	<b>165</b>	<b>186</b>

Table 6. SRP Transmission and Distribution Line Maintenance Schedule Summary

Activity	Line Voltage	Frequency	Duration	Amount of Each Circuit	Equipment	Comments
<b>Transmission and Distribution Line Maintenance</b>						
Line Maintenance Aerial Inspection	Transmission	2 per year	Hours/Days	Entire Circuit	Helicopter	
Line Maintenance Ground Inspection	All Overhead	Every 5 years	Days/Weeks	Entire Circuit	Helicopter, Pickup truck UTV	Helicopter only used if area is inaccessible
Line Maintenance	All	Minor repairs every 1-10 years Structure replacement every 10-60 years  (approximately)	Days/Weeks	Single or select locations on a circuit	Backhoe, Boom truck, Bucket truck, Cable puller truck, Caterpillar D4/D5 Crane, Helicopter, Hole digger truck, other repair trucks, Pickup truck UTV Trailer attachments	Line maintenance repairs are limited to a single structure or small numbers of structures and occurs infrequently.  Minor repairs include replacing insulators, bolts, and other hardware.  Helicopter used if area is inaccessible and/or in emergency situations.
Unscheduled Emergency Inspection	All	Infrequent – about 10 hazards per year	Hours/Days	1 span to entire circuit (entire circuit infrequent)	Helicopter, Pickup truck, UTV	Identified by helicopter, pickup truck or UTV first, then other vehicles used for repair work.
Emergency Line Maintenance	All	5-10 per year	Hours/Days	Single location or select locations along circuit	Backhoe, Boom truck Bucket truck, Cable puller truck, Caterpillar D4/D5 Crane, Helicopter, Hole digger truck, Other repair trucks, Pickup truck, UTV Trailer attachments	Repair vehicles and helicopter only used if hazard warrants use of these vehicles

Table 7. SRP Vegetation Management Schedule Summary

Activity	Line Voltage	Frequency	Duration	Amount of Each Circuit	Equipment	Comments
<b>Vegetation Management</b>						
Vegetation Aerial Inspection	Transmission	Annually	Hours/Days	Entire Circuit	Helicopter	
Vegetation Ground Inspection	All Overhead	Every 1-5 years	Hours/Weeks	Entire Circuit	Pickup truck, UTV, walk	
Routine Vegetation Maintenance	All Overhead	Every 1-5 years	Weeks/1-2 Months	Entire Circuit	Bucket truck (infrequent), Chipper trailer (infrequent), Pickup truck, UTV Mechanical mower (some lines)	Portions of power lines where line is high above vegetation or where incompatible vegetation does not occur or has not regrown will not be treated.
Hazard Vegetation Treatment	All Overhead	Infrequent - Less than 1 per year	Hours/Days	1 span to entire circuit (entire circuit infrequent)	Pickup truck, UTV, walk	

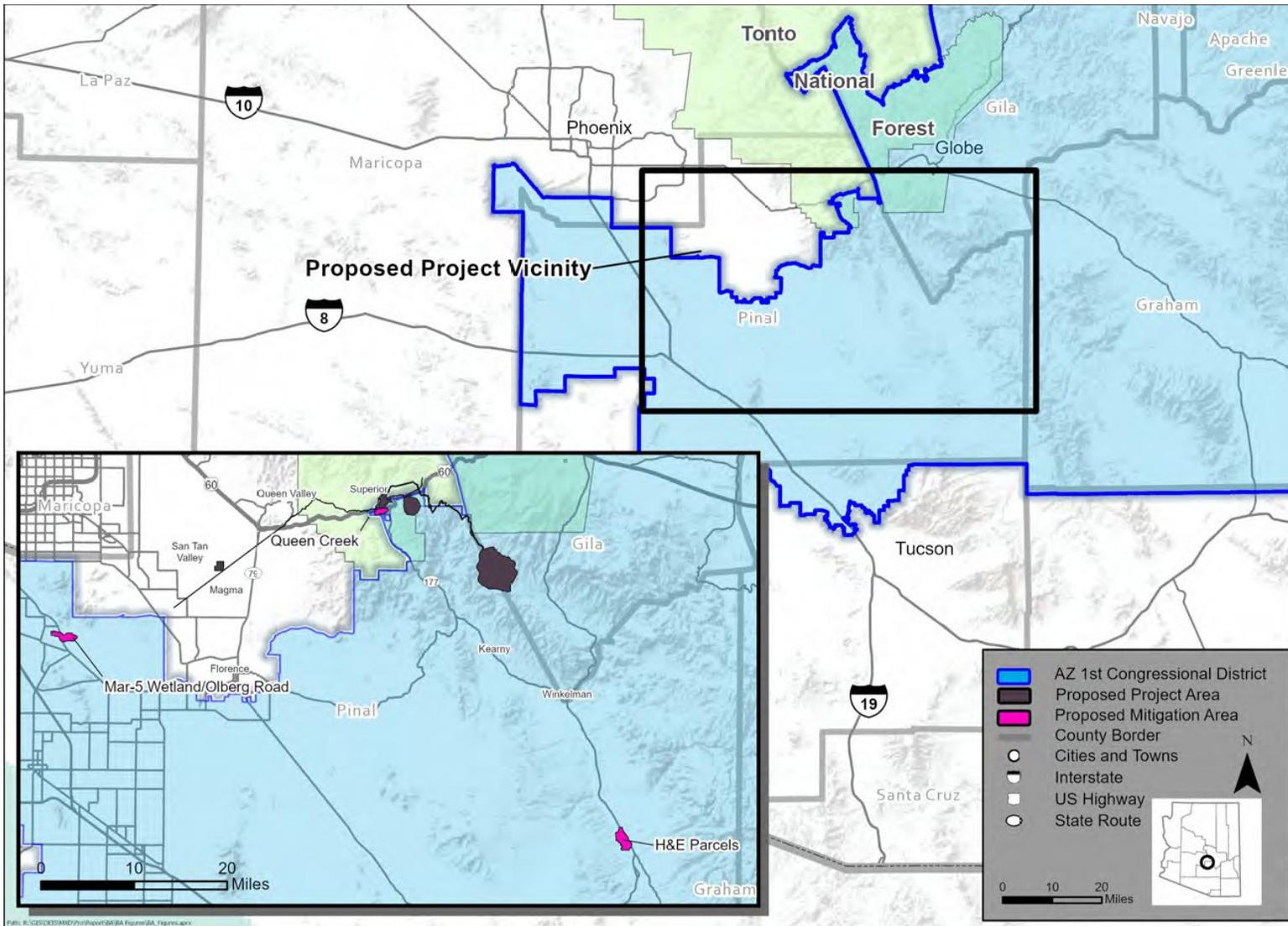


Figure 1. Resolution Copper Project vicinity map, Gila and Pinal counties, Arizona.

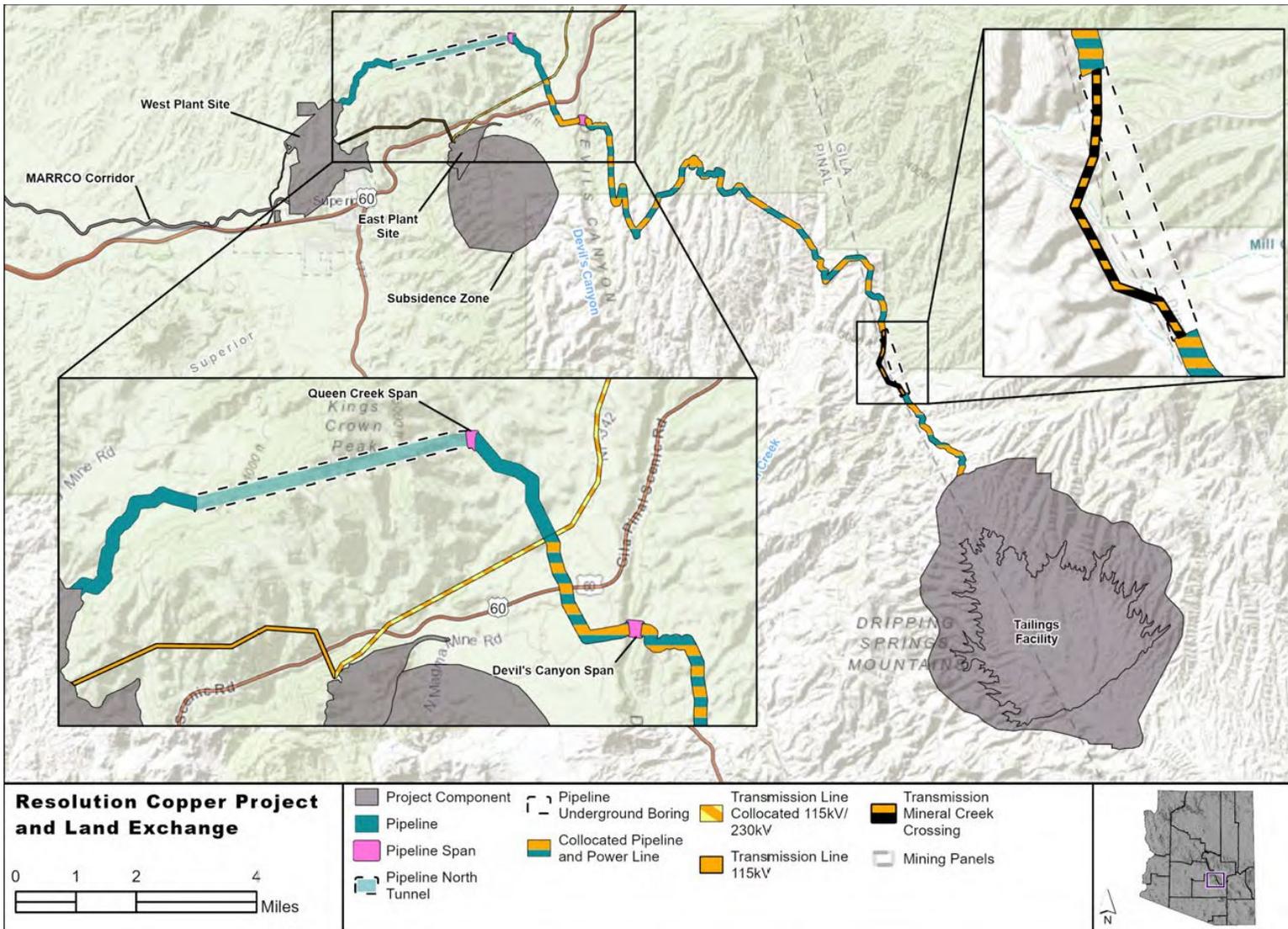


Figure 2. Resolution Copper Mine - proposed action components, Arizona.

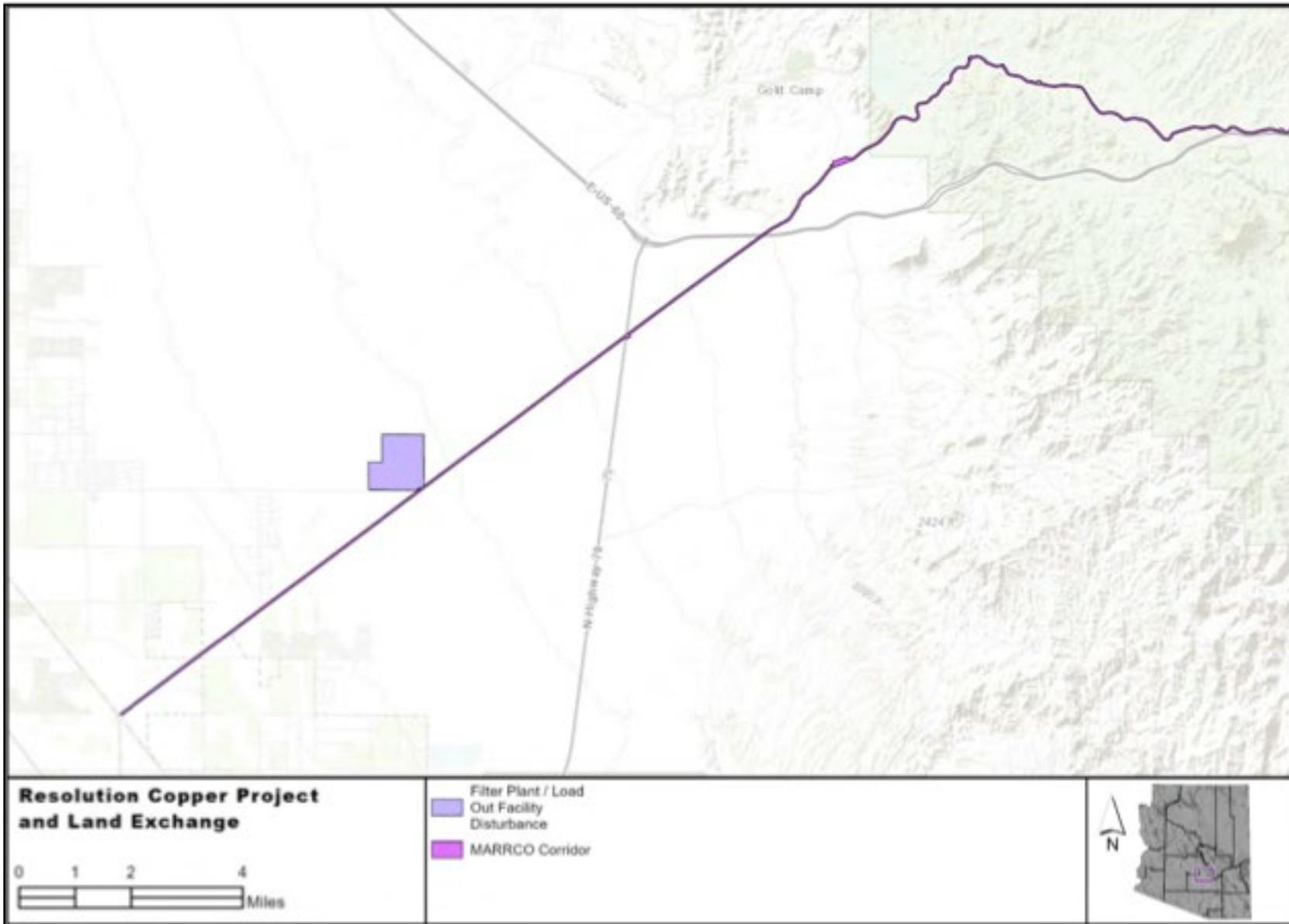


Figure 3. Resolution Copper Mine - proposed action components, Arizona.

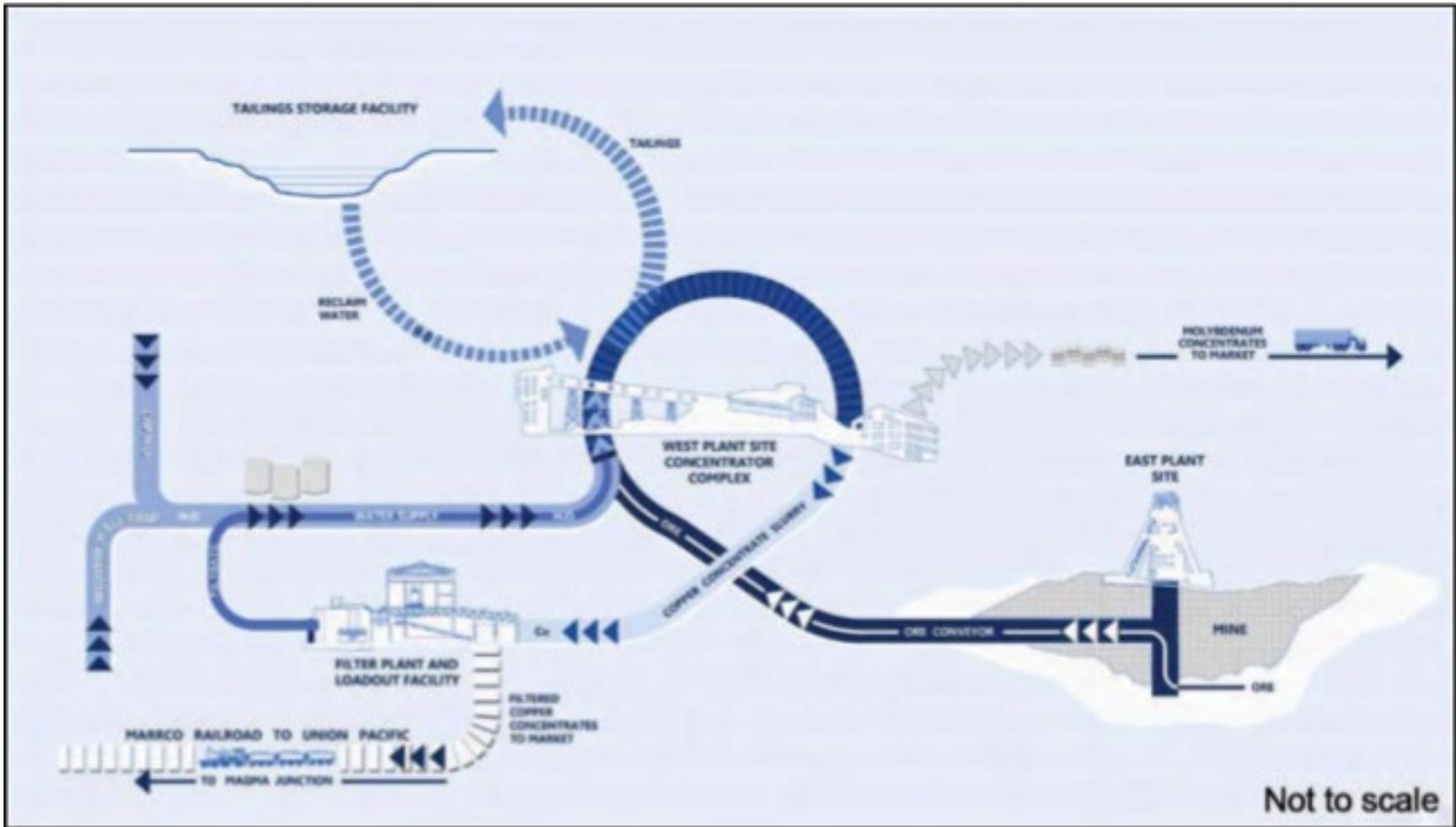


Figure 4. Resolution Copper Mine - overview of the mining process at full operation, Arizona.

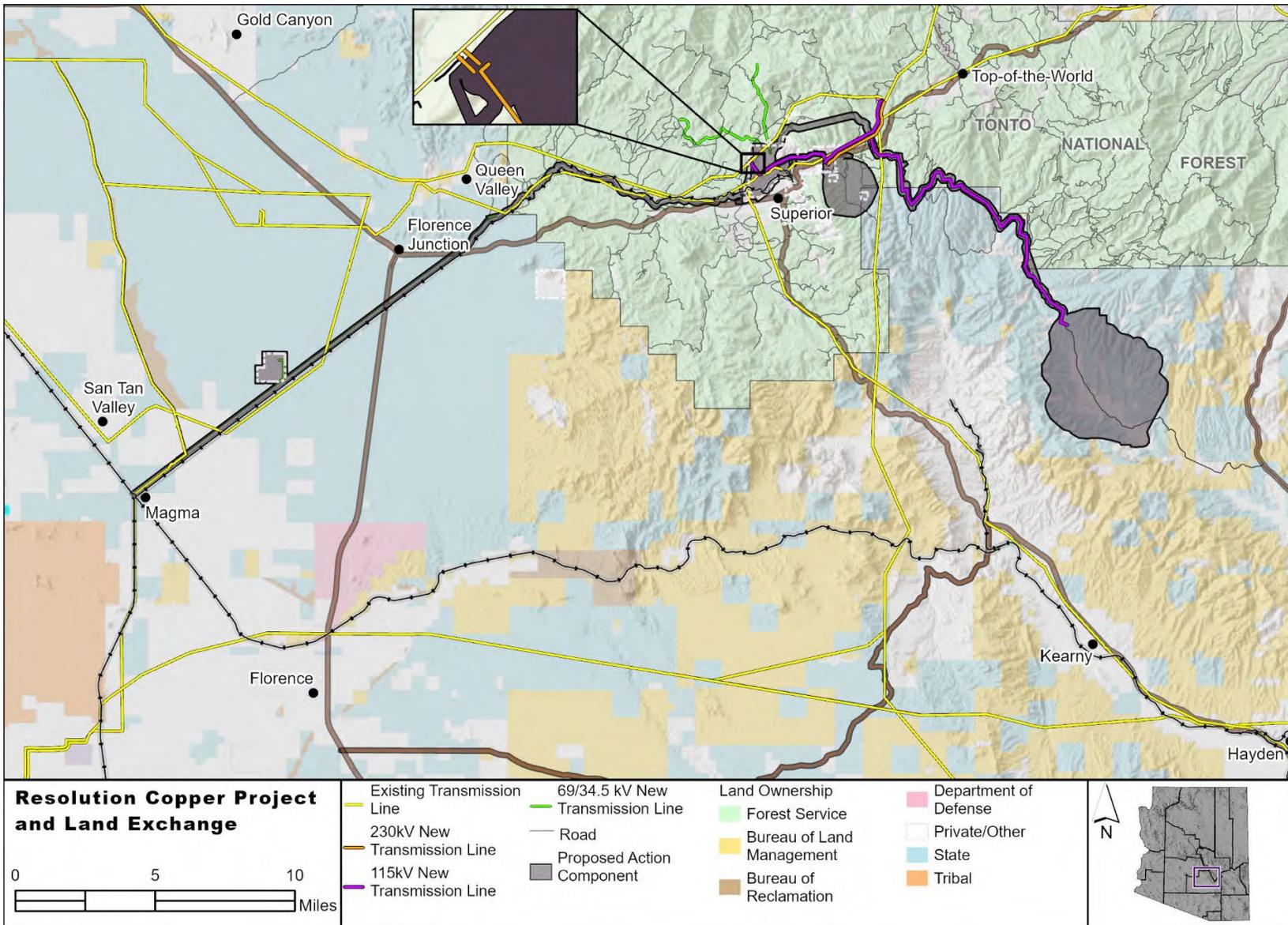


Figure 5. Resolution Copper Mine - proposed upgraded and new SRP transmission lines, Arizona.

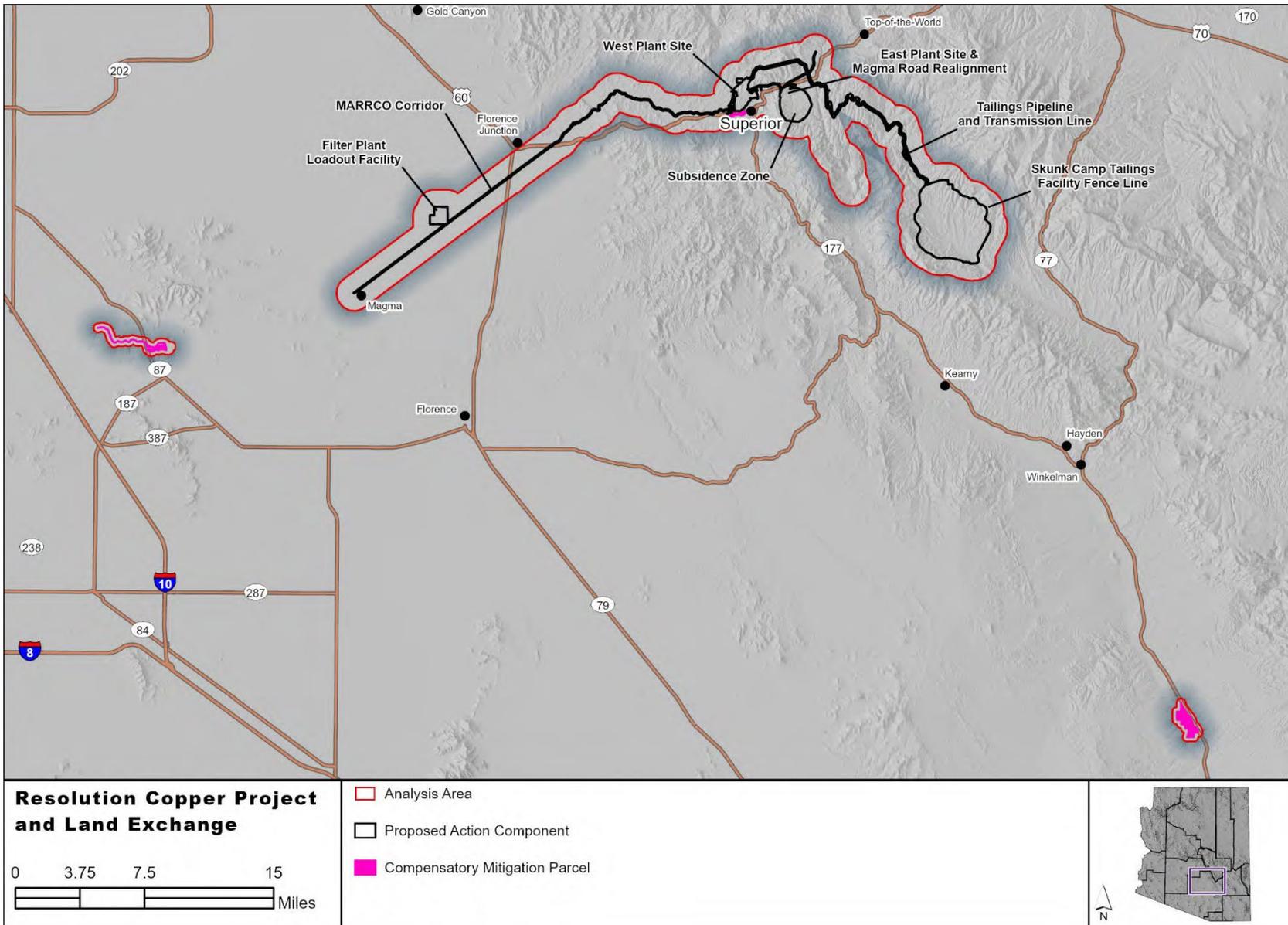


Figure 6. Resolution Copper Mine action area, including USACE Clean Water Act mitigation sites, Arizona.

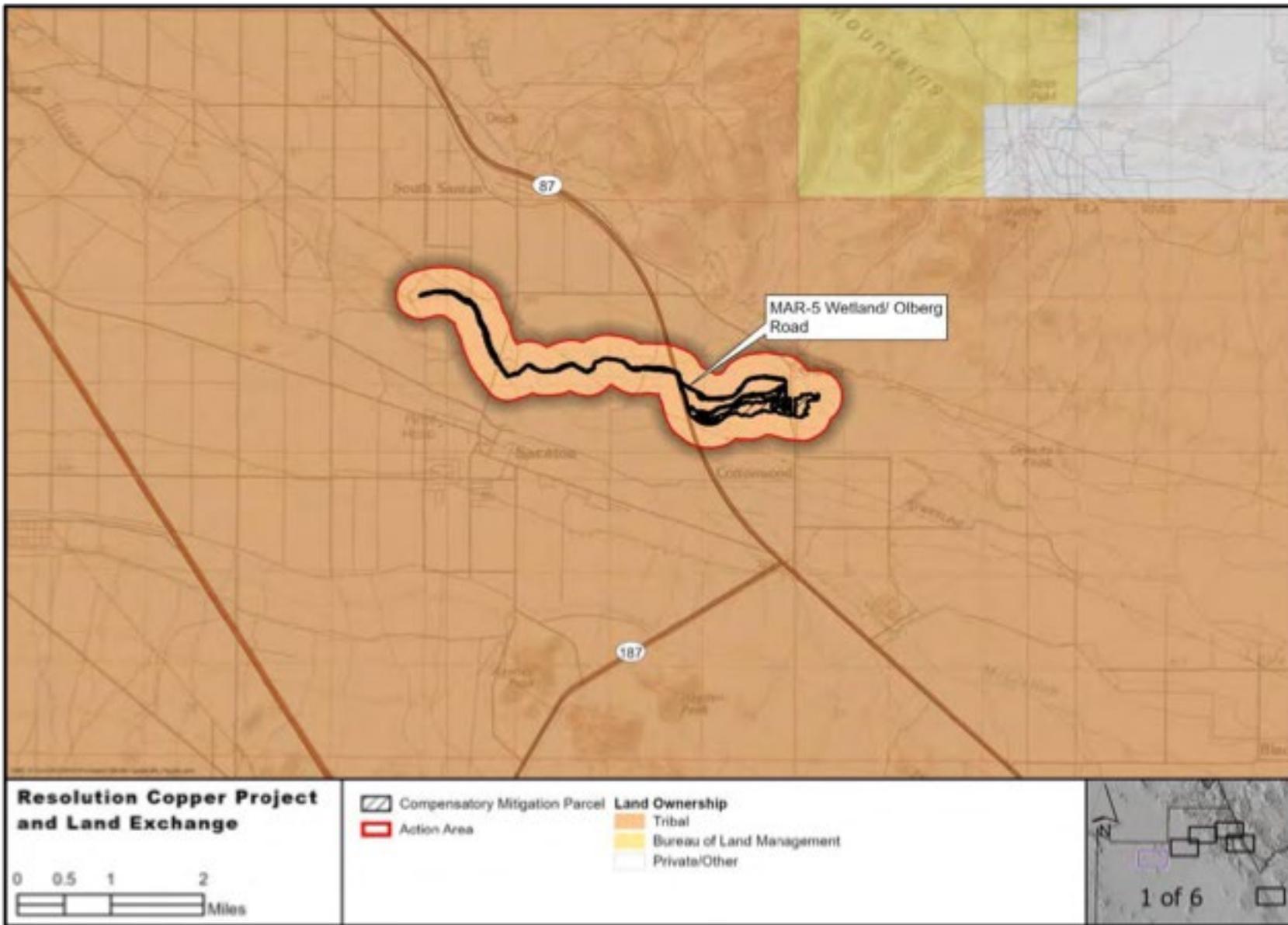


Figure 7. MAR-5/Olberg Road Restoration Site, USACE CWA mitigation site, Gila River, Arizona.

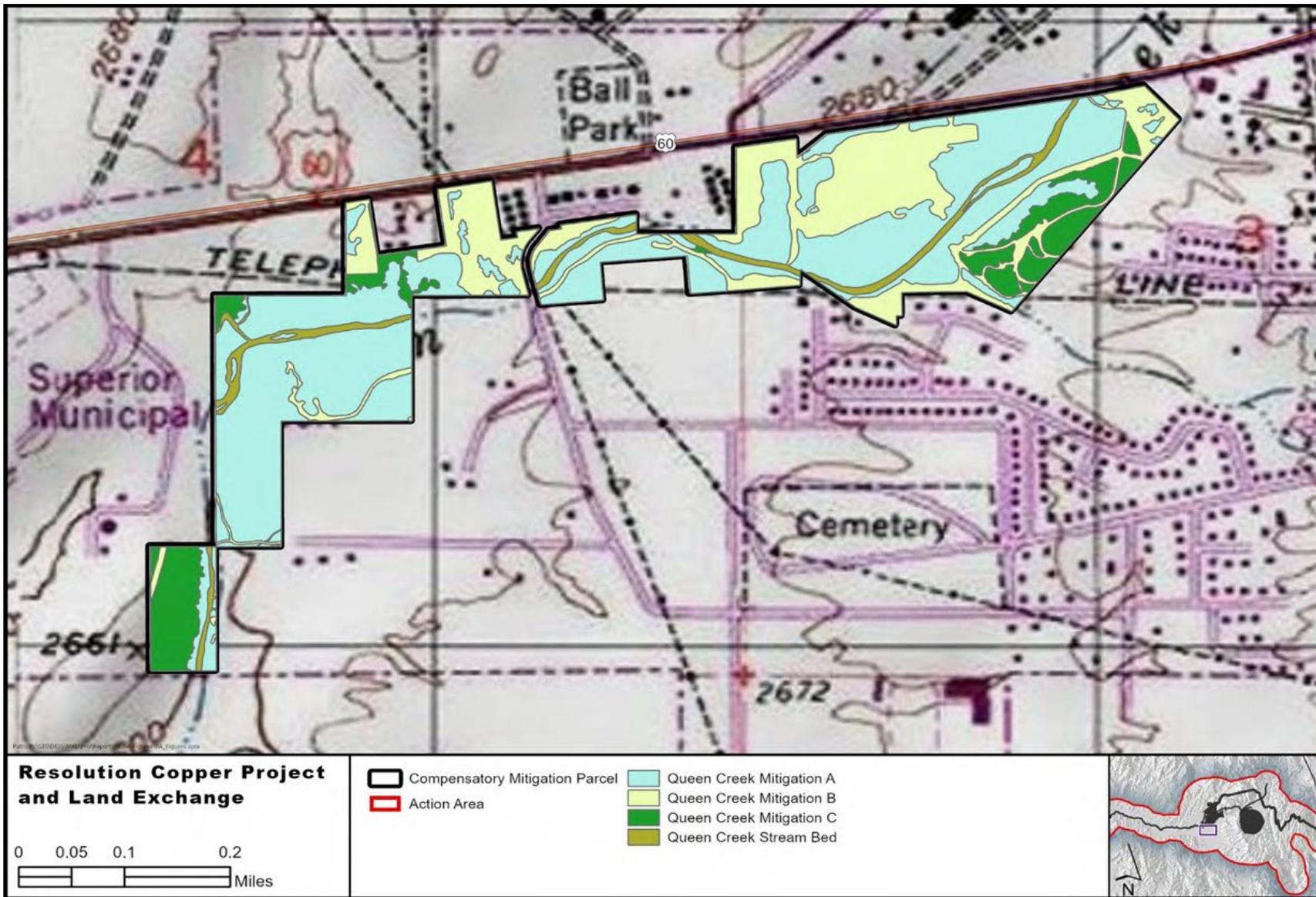


Figure 8. Queen Creek, USACE CWA mitigation site, Queen Creek, Arizona.



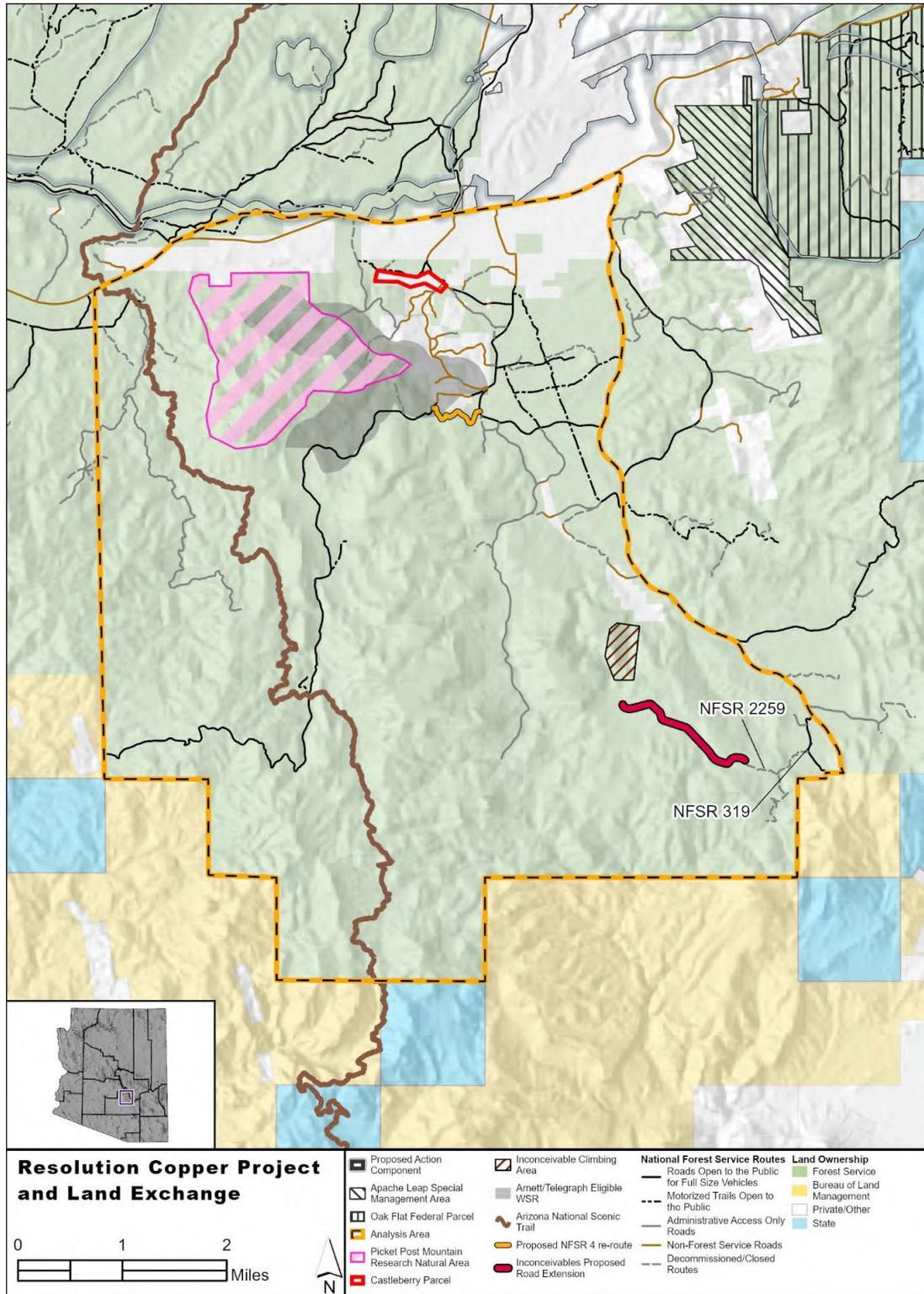


Figure 10. Recreation mitigation sites, Superior, Arizona.

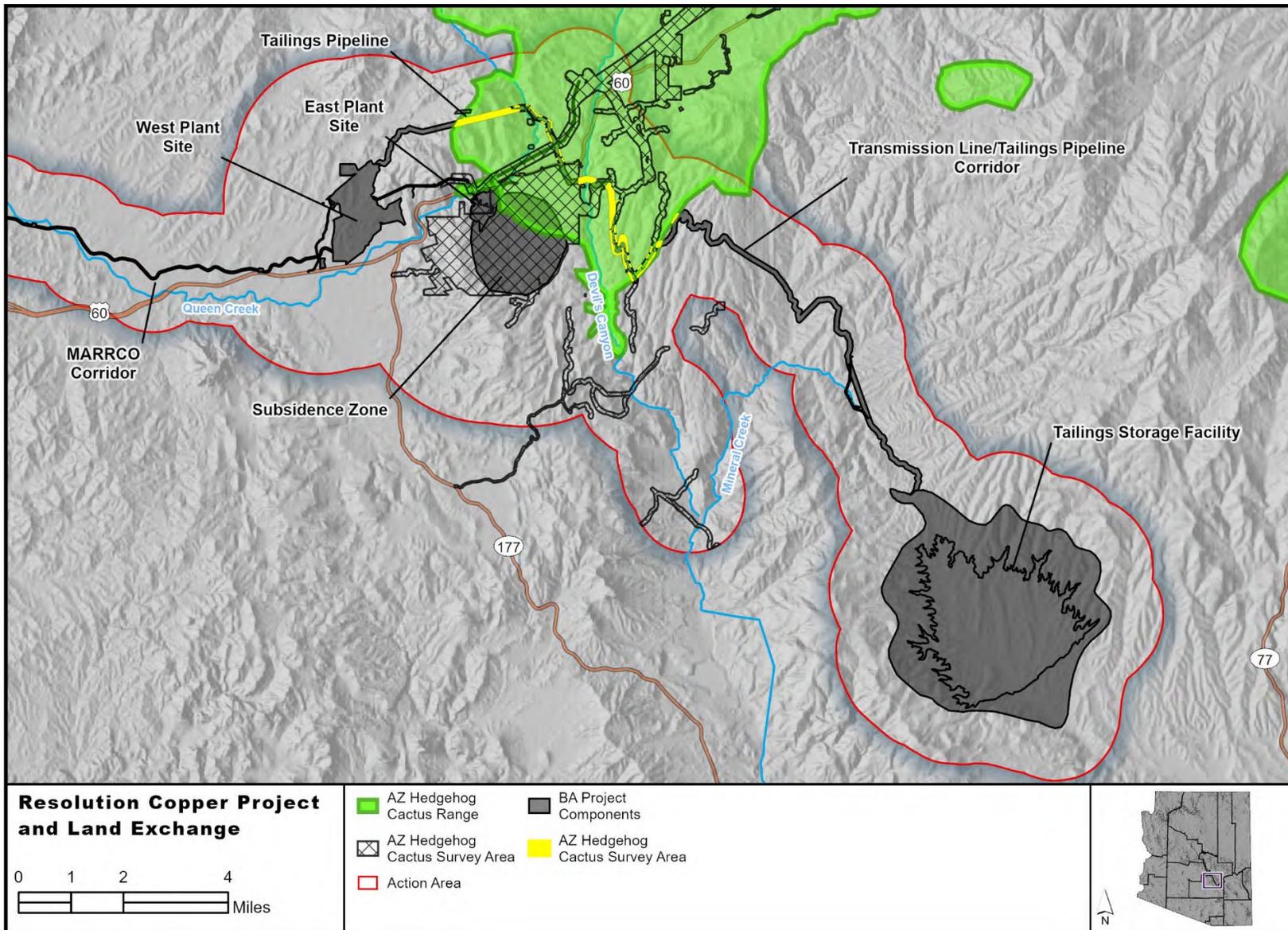


Figure 11. Arizona hedgehog cactus range overlapping proposed action area.

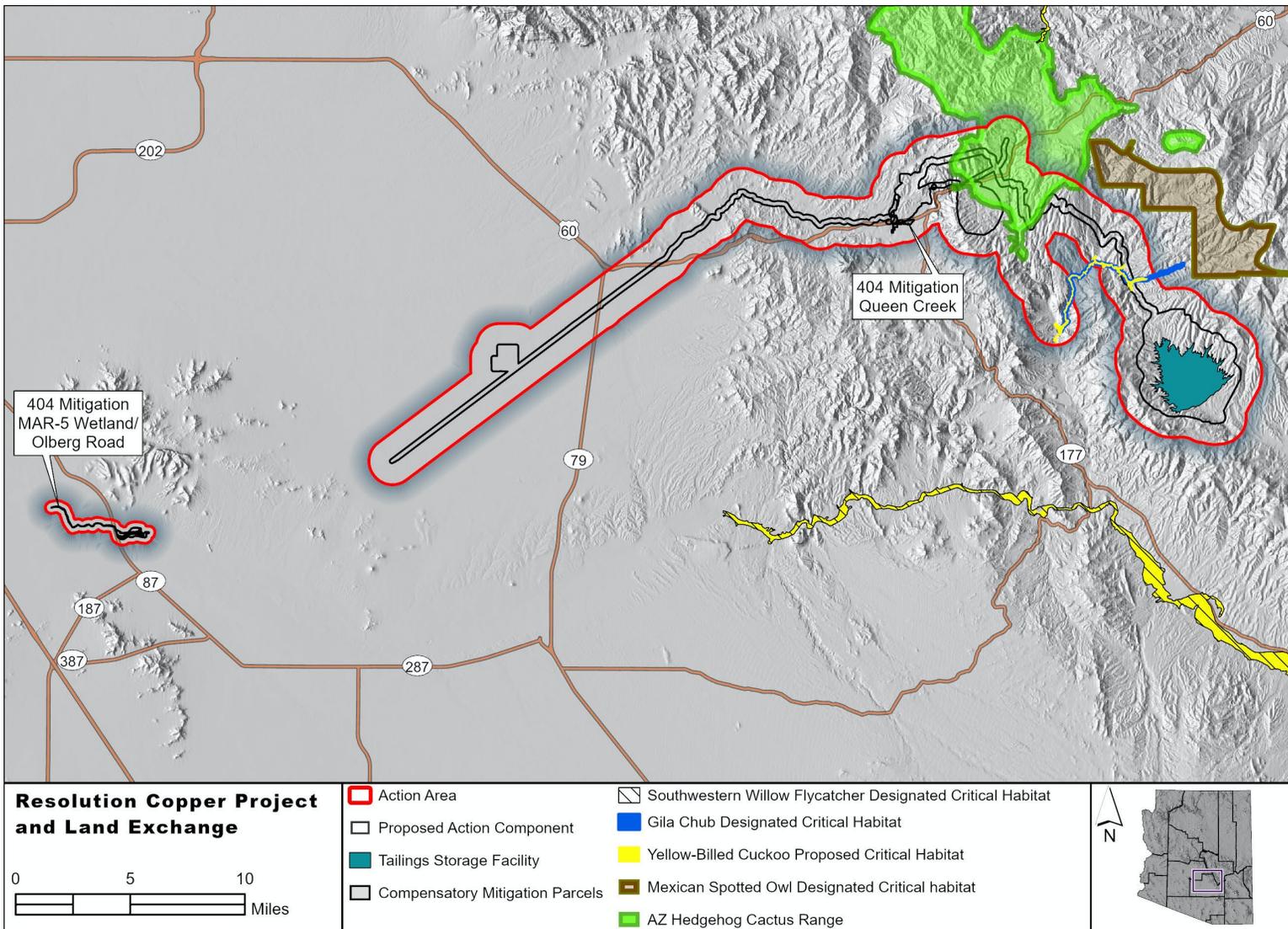


Figure 12. Designated critical habitat in Resolution Copper Mine project vicinity.

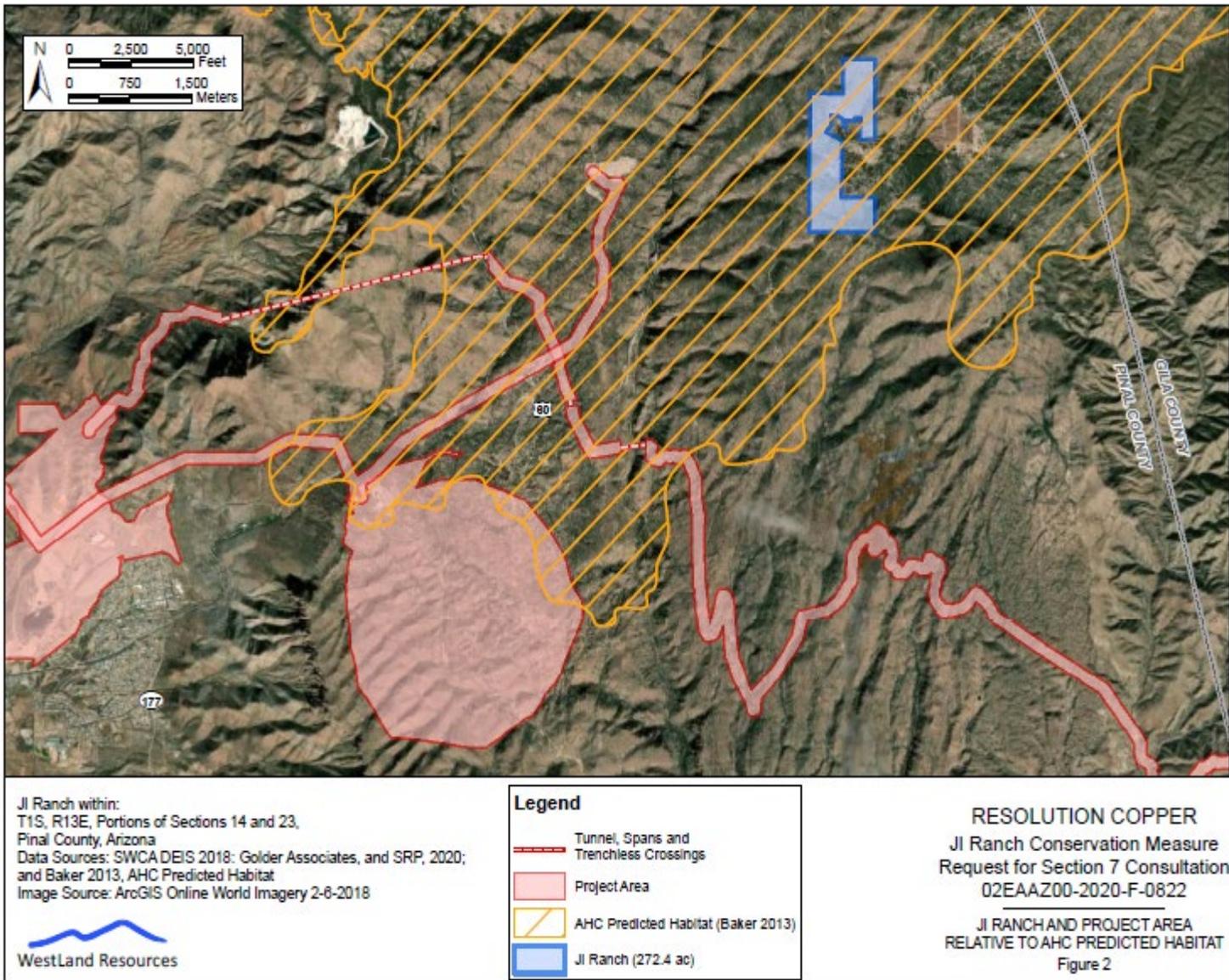


Figure 13. JI Ranch Conservation Easement and Resolution Copper Mine Project.

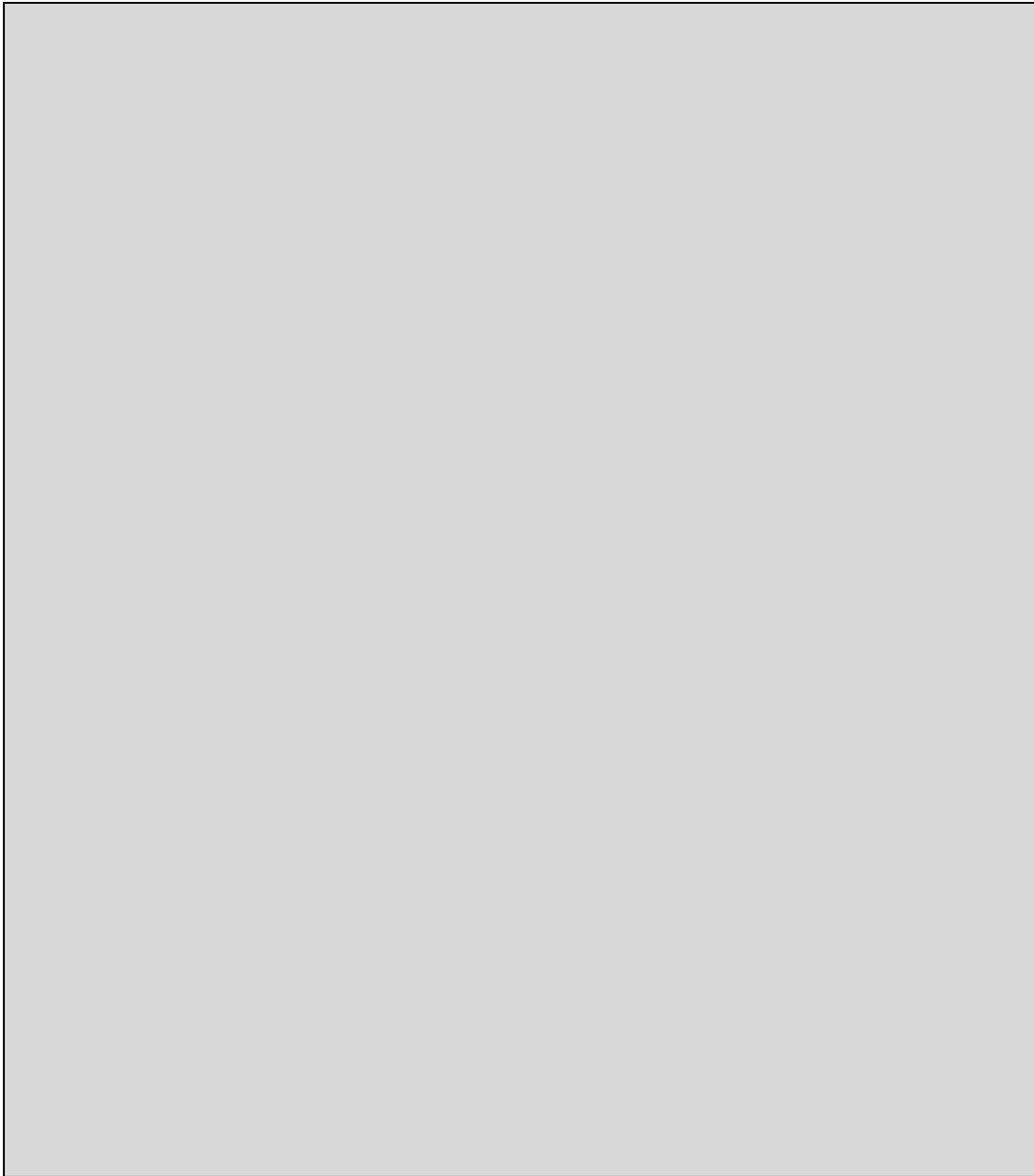


Figure 14. JI Ranch Conservation Easement, Pinal County, Arizona.