BLM

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Final
ENVIRONMENTAL ASSESSMENT

Copper Creek Exploration Project

DOI-BLM-AZ-G010-2023-0003-EA

June 30, 2025

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1.0 INTRODUCTION

This Environmental Assessment (EA) has been prepared to disclose and analyze the environmental consequences of the Copper Creek Exploration Project proposed by Redhawk Copper, Inc. (Redhawk).

1.1. BACKGROUND

The proposed Copper Creek Exploration Project is located approximately 9 miles east of Arizona State Route 77, the Town of Mammoth, and the San Pedro River in unincorporated Pinal County, Arizona. It is located on public lands managed by the Bureau of Land Management (BLM), Gila District Office (GDO) Safford Field Office (SFO) in portions of Sections 03, 04, 10, 11, 14, and 15 of Township 08 South, Range 18 East, Gila and Salt River Meridian and Baseline (**Figure 1**).

The applicant, Redhawk submitted a mining plan of operations application to BLM SFO to conduct mineral exploration activities, the *Copper Creek Exploration Drilling Program Plan of Operations, Pinal County, Arizona* (referred to as the Proposed Action Alternative), dated May 20, 2022. The proposed copper mineral exploration activities, or Project Area, consist of 67 drill pad sites and associated access roads on approximately 18 acres of surface disturbance within unpatented claims on BLM-managed public lands. If approved, these activities would expand upon Redhawk's existing notice-level operations of up to 4.06 acres of surface disturbance, including 9 drill pads and associated access roads. The 67 proposed drill pad sites that are part of Redhawk's proposed copper mineral exploration activities in the mining plan of operations would include 6 of the drill pads that are part of Redhawk's existing notice-level operations. The Project Area is adjacent on all sides to undeveloped lands that include BLM-managed public lands, private parties including Redhawk's patented claims, and the Arizona State Land Department (ASLD).The Project Area is within the historic Copper Creek Mining District (also referred to as the Bunker Hill Mining District), which has a history of mineral exploration and extraction dating back to the 1800s (Dolan and Lindley 2007, Hooper and King 2011).

1.2. PURPOSE AND NEED

The purpose of this action is to respond to Redhawk's request to explore, locate, and delineate copper deposits on public land mining claims. The need is the BLM's responsibility to respond to the proposed plan of operations in accordance with mining law, Section 302 of the Federal Land Policy and Management Act of 1976 (FLPMA), and the BLM Surface Management Regulations at 43 CFR 3809.

1.3. DECISION TO BE MADE

In accordance with the National Environmental Policy Act of 1969 (NEPA), the BLM will decide whether to approve, approve with modification, or deny the proposal for Redhawk's Copper Creek Exploration Project for exploratory drilling on their unpatented lode mining claims on public lands administered by the BLM.

1.4. CONFORMANCE WITH BLM LAND USE PLAN

The BLM manages public lands through Resource Management Plans (RMPs), also called Land Use Plans (LUPs), as required by the FLPMA. The RMP covering SFO outlines management directions, including desired future conditions, suitable uses, monitoring requirements, goals, and objectives, as well as standards and guidelines. The *Copper Creek Exploration Drilling Program Plan of Operations, Pinal County, Arizona* has been reviewed to determine whether it conforms to the RMP terms and conditions as required by 43 CFR 1610.5 and is in conformance with the Safford District Resource Management Plan (BLM 1991b) and Partial Record of Decisions (BLM 1991b, 1994), as amended.

1.5. RELATIONSHIP TO STATUTES, REGULATIONS, OR OTHER PLANS

The Proposed Action Alternative, Preferred Action Alternative, and No Action Alternatives (described in **Section 2.0**) comply with applicable federal laws and regulations, and plans, programs, and policies of federal, state, and local governments, as well as affiliated Tribes, including:

- National Environmental Policy Act of 1969 (NEPA)
- BLM Primitive Road Design Handbook H-9115-1 (BLM 2012a)
- Occupational Safety and Health Administration (OSHA) standards
- Clean Water Act through the Arizona Department of Environmental Quality (ADEQ)
- Multi Sector General Permit (MSGP) for Mining Facilities
- BLM MS 6500: Wildlife and Fisheries Management (BLM 1988)
- Migratory Bird Treaty Act
- Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.)
- Bald and Golden Eagle Protection Act
- Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 et seq.)
- Clean Water Act of 1977
- Clean Air Act of 1963, as amended
- BLM MS 6720: Aquatic Resources Management (BLM 1991a)
- BLM MS 6780: Habitat Management Plans (BLM 1981)
- BLM Manual 6840: Special Status Species Management (BLM 2008)
- Arizona Groundwater Code (Arizona Revised Statute Title 45-Chapter 2, Articles 4 and 5)
- Federal Noxious Weed Control Act (7 U.S.C. 2801 et seq.)

- National Historic Preservation Act (NHPA) of 1966 (Public Law 89-665; 54 U.S.C. 300101 et seq.)
- Mining Law of 1872, as amended
- Redhawk Stormwater Pollution Protection Plan (SWPPP)
- Taylor Grazing Act of 1934
- Toxic Substance Control Act of 1976 as amended (TSCA) (15 U.S.C. 2601, et seq.).

1.6. IDENTIFICATION OF ISSUES

Four issues were identified by the BLM SFO Interdisciplinary (ID) team for detailed analysis in this EA. The ID Team Checklist (**Appendix A**) provides the rationale for issues that were considered but not analyzed further. The first three issues are directly related to wildlife resources and the fourth is directly related to water resources.

1. How would each alternative impact game and nongame species of wildlife (habitat degradation and loss, loss of surface water, noise pollution, light pollution, and introduction of invasive species or spread of existing invasive species)?

2. For each alternative, what is the potential for impacts to occur to BLM sensitive species as well as threatened and endangered species within the Project Area (habitat degradation and loss, loss of surface water, noise pollution, and introduction of invasive species or spread of existing invasive species)?

3. The Project Area is within a wildlife connectivity area identified by the Arizona Game and Fish Department (AZGFD); how would each alternative impact wildlife connectivity and movements?

4. What are the potential impacts to hydrologic and hydrologic-dependent resources associated with Copper Creek due to groundwater withdrawals as stated in each alternative?

2.0 DESCRIPTION OF ALTERNATIVES

2.1. NO ACTION ALTERNATIVE

Under the No Action Alternative, Redhawk would continue exploration activities on BLM-administered public lands as outlined in the active Notice of mineral exploration operations (Notice; AZAZ106362501), but neither the Proposed Action Alternative nor the Preferred Action Alternative would be implemented. The additional exploration drilling activities and associated surface disturbances proposed under the submitted plan of operations for BLM-managed public lands would not occur. Exploration activities may continue on private lands and/or Arizona State Trust lands managed by the ASLD, as authorized by that agency. Activities that will be conducted under Redhawk's active Notice are summarized in **Table 2-1** and depicted on **Figure 2**.

The following activities would continue under the No Action Alternative as part of Redhawk's notice level activities (Notice; AZAZ106362501):

- Redhawk would perform road maintenance and widening on 7,844 ft of existing roads using a dozer, excavator, backhoe, or similar equipment, expanding from 8 feet to 12 feet wide (**Table 2-1**). Road alignment would be cleared of vegetation to the minimum extent necessary using a chainsaw or hand saw.

- Redhawk would re-establish up to 3,242 ft, at 12 ft wide of roads for access to pad locations which includes blading the road for safety and removal or trimming of road-side vegetation if needed (**Table 2-1**).

- A total of nine drill pads will be cleared for drilling: 3 drill pads 60 ft x 60 ft, and 6 drill pads 70 ft x 70 ft, shown in **Table 2-2**.

- Each pad will have 1 sump for drill cutting containment, with dimensions 6 ft x 20 ft x 4 ft and will be sloped for egress. The sumps will be kept open only while a pad is actively being drilled.

- Cores will be drilled using a track-mounted core drill rig (DM100 drill rig or equivalent) with a secondary muffler to reduce noise impacts. One drill rig will be used. The model of muffler to be installed is Harco Manufacturing Company's VRS Series Silencer: 1442vrs 4x5 SI SO SP, DWG#119245. According to the manufacturer's specifications, typical attenuation using this equipment is 18-32 dBA (Harco Manufacturing Company).

- Water for drilling will be pumped from two registered wells on private lands designated for industrial use, the Solar Well and Hendrickson Well.

- Once an exploration drill hole is completed, the drill hole will be abandoned in compliance with the ADWR abandonment requirements before moving to the next drill hole. Only one hole will be open at a given time.

- No fuel will be stored on site. Fuel for equipment at the drill pad site will be transported to the site for each day and stored in the transfer tanks in the drillers' truck beds. A containment tray will be placed under the refueling site to catch any spills.

Table 2-1. Surface Disturbance under Existing Notice

Activity	Count	Disturbance	Reclamation
70' x 70' Pads	6 pads	0.7 acres disturbance	0.7 acres
60' x 60' Pads	3 pads	0.3 acres disturbance	0.3 acres
Re-established, Previously Reclaimed Access Roads	3,242 linear ft, at 12-ft width	0.9 acres disturbance	0.9 acres
Currently Used Access Roads; Maintenance / Improvements, to be Left Open for Public Use	7,844 linear ft; widen existing 8 ft width by 4 ft to 12-ft total width	2.16 acres disturbance	—
Total		**4.06**	**1.90**

Table 2-2. Drill Pads under Existing Notice

Notice Drill Pad ID	Proposed/Preferred Action Drill Pad ID	Dimension (ft)	Easting	Northing
Pad A	BLM 46	70 x 70	549157	3623132
Pad B	BLM 12	70 x 70	549217	3623278
Pad C	BLM 16	60 x 60	549123	3623273
Pad D	BLM 17	70 x 70	549031	3623346
Pad E	BLM 07	60 x 60	549254	3623431
Pad F	—	70 x 70	549112	3623542
Pad G	BLM 15	60 x 60	548951	3623150
Pad H	—	70 x 70	548897	3623673
Pad I	—	70 x 70	549125	3623452

Notice-level operations will be completed by April 2026, including the below-described reclamation activities:

- All re-established access roads to pads, sumps and drill pad locations will be reclaimed.

- The topography of disturbed areas will be restored to similar conditions to those found prior to the Project activities.

- Reclamation will involve regrading areas disturbed during this project to the approximate contours as prior to Project activities or approximate contours of the landscape prior to any disturbance.

- The regraded areas will then be seeded using the reclamation seed mixture approved in coordination with the BLM.

The inclusion of this alternative helps identify existing conditions, including already occurring activity, and provides a contrast for the Proposed Action Alternative and Preferred Action Alternative.

2.2. PROPOSED ACTION ALTERNATIVE

The Proposed Action Alternative includes the proposed copper mineral exploration activities which consists of accessing and expanding 67 pre-existing drill pad sites and associated access roads for the purpose of exploratory drilling within BLM unpatented claims located in the Copper Creek (Bunker Hill) Mining District, Pinal County, Arizona. Under the Proposed Action Alternative, Redhawk would expand upon their existing Notice-level operations, consisting of 9 pads and associated access roads. All but three pads would continue under the Proposed Action Alternative. Pads F, H, and I would be fully reclaimed at the end of the Notice level activity, as shown in **Tables 2-3 and 2-4** (See **Appendix B** for full list of pad IDs and coordinates). No work would continue with these three pads under the Proposed Action Alternative past the expiration of the Notice (AZAZ106362501; expires April 2026).

Table 2-3. Notice AZAZ106362501 Drill Pads Would Continue under the Proposed Action Alternative and Preferred Action Alternative

Drill Pad ID	Proposed Action Pad ID	Easting	Northing
Pad A	BLM 46	549157	3623132
Pad B	BLM 12	549217	3623278
Pad C	BLM 16	549123	3623273
Pad D	BLM 17	549031	3623346
Pad E	BLM 07	549254	3623431
Pad G	BLM 15	548951	3623150

Table 2-4. Notice AZAZ106362501 Drill Pads Would Not Continue under the Proposed Action Alternative and Preferred Action Alternative

Drill Pad ID	Proposed Action Pad ID	Easting	Northing
Pad F	—	549112	3623542
Pad H	—	548897	3623673
Pad I	—	549125	3623452

2.2.1. SURFACE DISTURBANCE

Redhawk proposes to use previously used pads and associated access roads, many of which have evidence of current public use that is not associated with the Proposed Action Alternative. Those roads and pads were identified through review of satellite imagery, previous mineral exploration data, and ground-truthing.

Total ground disturbance on BLM-managed lands is estimated to be 18 ac, which includes 6 ac for 67 drill pads (the previously disturbed and reclaimed portions of all pads plus any expansion to the dimensions specified in **Table 2-5**), 8 ac of re-established access roads (all previously disturbed for exploration activities prior to the current Notice and reclaimed); and 4 ac of road widening on existing access roads with minor maintenance (modifying the existing road prism[1] to allow safe passage of vehicles) and/or improvements (expanding the existing road prism to 12 feet [ft] wide to allow passage of equipment). Drill pad locations, re-established roads and currently used existing access roads that would be disturbed are shown on **Figure 3**.

Approximately 35,254 linear ft of roads are existing access roads with minor maintenance; these roads are currently 8 ft wide and could be expanded up to an additional 4 ft wide, to 12 ft total in width (2 feet on either side). These roads are currently used for public access and may require improvements for safe vehicle passage, so any additional widening would not be reclaimed and would continue to be open for public use.

Approximately 27,713 linear ft (8 ac) of previously used access roads have been naturally reclaimed and would require reestablishment of road widening up to 12 ft in width. Of the estimated total 18 ac proposed for disturbance, the 14 ac of pads and re-established or improved access roads would be reclaimed pursuant to the reclamation plan (**Section 2.2.11**). The remaining 4 ac are attributable to widening disturbance outside the existing driving surface of roads that would remain open at 12 ft wide and would not be reclaimed following completion of work under the Proposed Action Alternative.

Table 2-5. Proposed Action Alternative and Preferred Action Alternative Surface Disturbance

Activity	Count	Disturbance	Reclamation
70’ x 70’ Pads	33 pads	4 ac	4 ac
60’ x 40’ Pads	34 pads	2 ac	2 ac
Re-established, Previously Reclaimed Access Roads	27,713 linear ft (5.2 mi), at 12-ft width	8 ac	8 ac
Currently Used Access Roads; Maintenance / Improvements, to be Left Open for Public Use	35,254 linear ft (6.7 mi), Widen existing 8 ft width by 4 ft, to 12-ft total width	4 ac	—
Total		**18 ac**	**14 ac**

Surface disturbance in riparian areas (**Figure 5**) is included in these totals; Copper Creek is crossed at several locations by currently used roads as described above and in **Table 2-1**. Pads accessed via Copper Creek Road (a named primitive BLM road) would cross at a minimum of

[1] The roadway prism is the area previously disturbed during road construction (ADOT 2018).

one and up to a maximum of four channel crossings each day. Pads accessed via Bunker Hill Road would not cross Copper Creek. The estimated total length of roads within riparian areas is 1,200 ft, and are within existing, currently used access roads. Using the maximum vehicle width of 12 ft, a maximum daily use (i.e., vehicle driving on existing roads) of approximately 0.2 ac from proposed vehicles driving on existing roads through riparian areas is anticipated.

Drill pads and access road alignments would be cleared of vegetation to the minimum extent necessary using a chainsaw or hand saw and levelled using a dozer, excavator, backhoe, or similar equipment. Topsoil is thin to non-existent in the proposed work areas. Where present, topsoil would be salvaged and stockpiled as part of the sidecast to form berms on the edge of the disturbance areas in advance of any construction, for use in reclamation at the conclusion of drilling activities, per BLM guidance H3809-1 Section 5.3.3.2.1 (BLM 2012b). If soil horizons are visible, they would be separated as such (BLM 2012b).

Access roads would need to have a 12-ft (single lane) travel width to accommodate track-mounted drill rigs. Twelve feet is the maximum width to which any roads for the Proposed Action Alternative may need to be expanded. No blasting would occur. Road maintenance (keeping existing roads open and safe for vehicle passage) and improvements (widening) would be conducted with minimum feasible impact and in compliance with the BLM Primitive Road Design Handbook H-9115-1 (BLM 2012a).

There are two categories of access roads (**Table 2-5** and **Figure 3**) that may be expanded to 12 ft wide:

- **Currently Used Access Roads with Maintenance and Road Improvements, to be Left Open for Public Use**: These are actively used roads of adequate width to allow for safe passage of project equipment that connect to portions of the Project Area or are existing roads that are currently in use but may require minor maintenance or improvements to allow adequate access for drill rigs. Minor maintenance includes blading the existing road surface for safety but no new disturbance. Minor improvements, where necessary, include widening to 12 ft. Maintenance and improvements would include installation and maintenance of sediment and runoff control structures during all phases of the proposed project using best management practices (BMPs) such as fabric or excelsior filter fences or filter berms. Since these roads are currently in use, reclamation is not proposed for the currently existing road prism or where these roads are widened to 12 ft.
- **Re-established, Previously Reclaimed Access Roads**: These historically used, reclaimed roads are generally impassable by all but high-clearance, four-wheel drive vehicles and would need maintenance and widening in places to allow for drill rig access. These are minor roads that connect from the larger access roads to the drill pads. Proposed re-establishment activities include blading the road for safety and removal or trimming of road-side vegetation as needed for expansion to 12 ft wide to allow for drill rigs to pass safely.

2.2.2. DRILLING AND SUPPORT ACTIVITIES

The Proposed Action Alternative includes drilling up to 100 boreholes using up to 67 previously reclaimed drill pads accessed by historically used roads, some of which have been reclaimed or partially reclaimed. Boreholes would be up to 4,900 feet in depth. Excluding an estimated three months of down time annually for inclement weather, periods of unsafe conditions such as during the monsoons or lightning, and planned holiday breaks, Redhawk would conduct year-round exploration core drilling and geotechnical testing activities for 2 to 3 years, with one or two drill rigs operating at any one time within the Project Area.

Exploration drill sites that require earthwork would be located and prepared using standard construction practices for temporary mineral exploration to minimize surface disturbance and erosion as well as to facilitate reclamation. As depicted in **Table 2-5**, there are two dimensions for drill pads and drilling activities would differ slightly depending on the dimensions.

- **60 ft x 40 ft pads**: up to 34 pads would have these dimensions. Only a single hole orientation would be drilled from these pads, although it is possible that more than one hole would be drilled at that orientation, with no more than one hole open at a time. Minor maintenance and expansion may be required on these existing pads to allow for a level drilling surface and safe work environment.
- **70 ft x 70 ft pads**: up to 33 pads could have up to two-hole orientations, requiring the larger pad. Only one hole would be open at a time. The need for additional holes on any of these pads would be determined based on results of core analysis after completion of the initial hole.

The 60 ft x 40 ft pads would have one hydrocyclone and lined sump situated within the footprint of each drill site to contain cuttings and manage drilling fluids. The 70 ft x 70 ft drill pads would accommodate drilling in multiple hole orientations, with only one active drill hole on a pad at any time. The same sump would be used for all holes on a pad. Drilling of multiple single orientation holes on single pads may occur consecutively, but determination of need for additional holes would depend on analysis of previous drilling and there could be 1 to 2 years between drilling additional holes.

Earthwork for site preparation would be performed with a backhoe, Cat® D8, or equivalent equipment. This equipment would be staged at a laydown yard on private property bordering public lands. Seven existing monitoring wells on BLM-managed land would support the proposed groundwater monitoring (**Figure 4a**).

Holes would be drilled using a core drill rig, and up to two drill rigs are proposed for concurrent use during the Proposed Action. Drill holes would be vertical or angled as determined appropriate for the data sought at the site. Hole depth is expected to range from 600 ft to 4,900 ft. Only one hole per drill pad would be open simultaneously, for a maximum of two holes (one at each pad) open at any given time.

A geologist would be available throughout drilling activities. The duties of the geologist would include supervising the drill rig, logging each hole according to the geologic features encountered, determining the maximum depth of each hole, recording depth to water if

encountered, and advising the drill operator, as needed. The geologist would typically travel to and from the drill site in a separate pickup truck. Bentonite muds would be used in the drilling process, by drilling contractors licensed and receiving permits from the Arizona Department of Water Resources (ADWR) and following all state regulations. Existing disturbed lands would be utilized to the extent practicable to limit areas of new disturbance.

A drill operator would conduct the drilling. One or two helpers would normally remove and box the recovered core samples, mix drilling fluids in a portable mud tank, operate the water truck, assist with drilling operations, and conduct maintenance, as necessary. The crew would be transported to and from the drill site in up to three diesel and/or gasoline vehicles per drill rig. Only fuels required for approximately one day of drilling would be within the Project Area and would be contained in the service/fuel truck; all other fuels would be stored on private lands. Fuel for equipment at the drill pad site would be stored in the transfer tanks in the drillers' truck beds, then only in the fuel tanks for the rig, when they are fueled up. A containment tray would be placed under the refueling site to catch any spills, and any soil contaminated with fuel would be collected with a shovel and disposed of in compliance with applicable laws and regulations. At the drilling site, fuel would always be in a tank ready for direct use or in a truck-contained transfer tank; small, portable gas cans would not be used. Any geotechnical drill borings would be completed with an auger drill or core drill.

Redhawk would file the appropriate forms with the ADWR for drill holes, including the Notice of Intent (NOI) Form DWR 55-43B.

2.2.3. SCHEDULE

The preliminary Proposed Action Alternative schedule is to initiate the proposed activities as soon as feasible. Upon initiation of the Proposed Action Alternative, exploration activities are expected to be conducted on up to all 67 drill pads within the Project Area 24 hours per day, 365 days per year, as weather permits, for 2 to 3 years. However, drilling would more realistically occur approximately 9 months per year, with breaks primarily during the monsoon season associated with weather conditions and the end-of-year holiday season. There is also a seasonal drilling exclusion on certain pads and access roads as described in **Section 2.2.10**. Up to two drilling rigs would be in operation at any one time. Drilling may commence on completed pads while other pads are under construction.

2.2.4. PROVISIONAL PHASING MANAGEMENT PLAN

All remaining reclamation work, except revegetation and revegetation monitoring, would be completed no later than 6 months after the completion of activities under the Proposed Action Alternative or during the first appropriate reclamation season thereafter if the season is inappropriate for reclamation during the 6 months after exploration activities are completed. Within 6 months of collecting the sample from the pad, Redhawk would have the core sample analyzed and determine whether activities are complete at the pad. Redhawk would conduct reclamation of disturbed areas after it is determined that the disturbed areas would no longer be

required for the Proposed Action activities, i.e., after core sample results are analyzed. This would be based on analysis of core sample data and the determination that further drilling at the pad is not necessary for data collection. No more than two pads would be actively used for drilling at any given time, but multiple pads would remain un-reclaimed for additional exploration activities. These sites would be stabilized for an interim period while not in active use. Stabilization of these drill pads for dust management purposes includes stormwater BMPs to remain in place, as described in **Section 2.2.10**, and revegetation to allow for natural growth, described further in the Reclamation Plan (**Section 2.2.11**).

2.2.5. DRILLING EQUIPMENT AND PERSONNEL

Up to 12 personnel could be within the Project Area at any time during typical project activities. Each drill rig would typically include one Redhawk geologist and a contract drill operator with one or two helpers. Additional personnel within the Project Area at any time may include a drill supervisor, technician, safety coordinator for drilling activities, and a water truck operator. Exploration drilling and maintenance equipment typically could include:

- two 230 (or equivalent) track-mounted core drill rigs (smaller footprint than truck-mounted rigs)
- two portable light plants
- one service truck (fuel) for drill support
- one backhoe or excavator for general earthwork
- one Cat® D8 bulldozer with 12-ft blade for road and pad improvements
- one 3,500-gallon water truck
- up to ten 4WD pickup trucks and one UTV for personnel transport
- one portable auxiliary air compressor
- four generators
- two Solid Removal Units (SRU's)
- up to three booster pumps
- tele-handler (i.e., forklift)

Additional equipment could include rotary drills for geotechnical testing, which would replace one of the core drill rigs while in use.

2.2.6. WATER MANAGEMENT PLAN

Daily water requirements would depend on the type of drill and whether one or two drills are active at any time. All drill rigs would be diamond core drill rigs. If the larger size is not required, then a smaller rig would be used and would require less water. Pumped groundwater would primarily be used for drilling activities, reintroduced to the subsurface through pumping into the drill holes to lubricate and cool the drill bit, and to wash out the loose material created during the drilling process. The drill rigs would run two 12-hour shifts daily except during periods of suspended drilling operations due to weather, planned holiday shutdowns, or other unpredictable

reasons. In addition, as conditions warrant, water would also be required to control dust on the roads with use of a water truck. Therefore, daily requirements would differ. Water would be pumped via PVC hoses placed along the side of roads from an offsite, private well.

Redhawk estimates approximately 70,000 gallons of water would be pumped per month per drill rig, including water use for dust abatement purposes. This water usage is estimated based on previous drilling efforts conducted with comparable equipment[2]. The water is expected to be pumped from registered wells on private lands designated for industrial use (**Figure 4a**). One well is located at 32.73716, -110.46771, WGS 1984 (Solar Well). Two other wells (Hendrickson Wells) are situated approximately 350 ft apart. The original Hendrickson Well was established in 1925 at 32.74505, -110.50898, WGS 1984. The casing in the original Hendrickson Well is in questionable condition due to its age. The second Hendrickson Well was recently drilled and registered to provide a backup option in case the original well fails. The new well is located at 32.74506, -110.51015, WGS 1984. It is on the hillside west of the original well, outside the Copper Creek channel. Only one of the Hendrickson Wells would be used at any time. Similar amounts of water are expected to be pumped from the Solar Well and the combined Hendrickson Wells.

Drill fluids would be managed with a hydrocyclone and a lined sump would be used to contain drill cuttings at each drill site. BMPs (**Section 2.2.10**) for sediment control, as detailed in the Water Quality and Aquatic Resources section of the design features and in the SWPPP for the Proposed Action Alternative, would be used during construction, operation, and reclamation to minimize erosion from disturbed areas. To facilitate drainage and prevent erosion, bladed roads would have water bars constructed, as needed, at BLM-recommended spacing. Wildlife friendly and natural sediment control structures may include, but would not be limited to, fabric or excelsior filter fences, siltation, or filter berms.

Stormwater management is addressed under the Clean Water Act through the ADEQ MSGP for Mining Facilities and the required SWPPP. The SWPPP has been prepared to meet the applicable requirements for coverage.

2.2.7. ELECTRICAL POWER AND LIGHTING

All electrical power would be supplied by generators on the drill rigs or support vehicles. External lighting would be used during nighttime operations and be kept to the minimum required for safety purposes. All fixed lighting would be hooded and shielded. Lights would be directed down toward the interior of the drilling operations to minimize light pollution onto any adjacent lands as viewed from a distance, except for safety in unforeseeable circumstances such as a medical emergency. Vehicles and mobile equipment would use lighting while in motion during night operations.

[2] Based on previous Redhawk drilling efforts, the total water use per rig per month is approximately 70,000 gallons and an average of approximately 1,500 meters (4,921 ft) was drilled monthly. Redhawk does not measure water use by length drilled but this equals 46.6 gallons of water per meter of drilling. The monthly meterage (and thus water use) can vary based on hole orientation and depth and the length of time it takes for drilling.

2.2.8. SURFACE OCCUPANCY

Activities covered under 43 CFR 3710 Subpart 3715.2, may include the use of portable toilet facilities. An appropriate quantity of portable toilets would be made available for Redhawk employees and contractors working in the Project Area. All equipment, materials, and supporting items such as portable toilets and water storage tanks would be removed after it has been determined that they are no longer needed.

2.2.9. TRANSPORTATION PLAN

All project-related traffic would observe a 10-mph speed limit to enhance public safety, protect wildlife and livestock, and reduce fugitive dust emissions. Maintenance of access roads would only be conducted as necessary and in coordination with the BLM, ASLD, and/or Pinal County, as appropriate.

Transport of personnel and equipment within the Project Area would be by unpaved roads. Incoming materials would include fuel, lubricants, drill supplies, and various vehicle and equipment maintenance items. Water trucks would be used for dust abatement, as needed. Water for drill purposes would be piped to pads from offsite.

2.2.10. DESIGN FEATURES AND BEST MANAGEMENT PRACTICES

To mitigate probable effects on the environment, Redhawk would implement several design features and BMPs.

Fire Prevention Plan

All applicable state and federal fire laws and regulations would be complied with, and all reasonable measures would be taken to prevent and suppress fires in the Project Area. In the event the Proposed Action Alternative activities start or cause a wildland fire, Redhawk would be responsible for all costs associated with the suppression. All fires must be reported to the jurisdictional fire agency regardless of size and actions taken.

The following fire precautionary measures would be taken to prevent wildfires:

- Fire watch personnel would be assigned for earthmoving activities during dry or windy periods. All vehicles associated with the drilling program would carry fire extinguishers and a minimum of 5 gallons of water.
- Project vehicles would avoid driving or parking on dry vegetation.
- Fire-fighting equipment (e.g., shovel, Pulaski, extinguishers) would be kept at each drill and construction site.
- Fuel service trucks would contain one 35-pound-capacity fire extinguisher charged with the necessary chemicals to control electrical and fuel fires.
- Welding or other construction activity involving fire is not anticipated during this project. If, however, this becomes necessary, those sites would have personnel dedicated to fire watch

duties during the activities; there would be at least two long-handled round-point shovels and two 5-pound ABC dry chemical fire extinguishers available within the Project Area.
- No smoking would be allowed while operating equipment or while walking or working in areas with vegetation.
- All equipment assigned to the Proposed Action Alternative would be inspected and approved by Redhawk operators. Internal combustion engines (stationary or mobile) would be equipped with spark arresters that meet BLM standards.
- If a fire starts in the Project Area and can be managed, Redhawk would initiate and safely implement fire suppression activities (e.g., using a fire extinguisher or fire water packs with pumps, using a shovel to throw dirt on the fire or remove small patches of vegetation). Fire suppression personnel and equipment, including water trucks, would be dispatched immediately, no longer than 15 minutes from the time a fire is reported.
- If the fire is unmanageable, field crews would first evacuate and then make appropriate notifications.
- If the BLM enters fire restrictions in the Project Area, the applicant must coordinate with BLM to comply with fire restriction conditions.

Notifications would include the following agencies:

- Emergency response at **911**, and
- The BLM SFO at **928-348-4400**

Information reported would include the location (latitude and longitude if possible), fuels involved, time started, who or what is near the fire, and the direction of fire spread. All accommodation would be made to allow immediate safe entry of firefighting apparatus and personnel.

Biological Resources

Wildlife

Design features for protection of wildlife would include:

- Construction of all sumps and other small excavations would have a sloped end for egress and would be backfilled or covered after completion of drilling activities, to preclude access.
- No vegetation clearing, drilling or reclamation would occur within the 0.25 mi buffer of the centerline of Copper Creek riparian areas (**Figure 5**) during the yellow-billed cuckoo (*Coccyzus americanus*) breeding season, from May 25 to September 30.
- A secondary muffler would be installed on drill rigs to reduce noise impacts by between 18 and 32 dBA (Harco Manufacturing Company).
- Surveys for yellow-billed cuckoo were initiated in 2024 and continue to be completed by US Fish & Wildlife (USFWS)-trained, 10(a)(1)(A) permitted, and experienced persons familiar with yellow-billed cuckoo vocalizations. A full season of surveys consists of a minimum of four survey visits within three specified survey periods, between June 15 and August 15, to ensure 95 percent probability of detecting cuckoos in the area during the breeding season (Halterman et al. 2016, USFWS and U.S. Bureau of Reclamation 2019). Prior to the start of

surveys, the BLM and USFWS would be notified of the survey dates and details. Survey results would be shared with BLM in addition to reporting to USFWS. Harassment of livestock or wildlife would be prohibited.

- A Worker Environmental Awareness Program (WEAP) would be developed by a trained biologist. The WEAP would provide information regarding species that may be encountered during project activities, with specific information about the Sonoran desert tortoise (*Gopherus morafkai*), yellow-billed cuckoo, and aquatic species present in Copper Creek. The WEAP would be presented to Redhawk by a trained biologist prior to project initiation and this training would be required for all onsite workers prior to entering the site.
- All vehicle operators would always inspect the work area and beneath all vehicles and equipment prior to starting and moving equipment to ensure there are no wildlife species in harm's way.
- A 10-mph speed limit for the project would aid in avoiding wildlife collisions.
- Effects to wildlife at night would be minimized by directing lights down toward the interior of the drill pads. All proposed lighting would be located to minimize light pollution onto any adjacent lands as viewed from a distance. All lighting fixtures would be hooded and shielded, face downward and directed on to the pertinent site only.
- Drill pads and access roads are already existing; any new disturbance associated with drill pads and access roads would be adjusted to avoid impacts to sensitive biological resources as necessary and in consultation with the BLM resource specialist.
- BLM would provide monarch educational materials and inform applicant to use the Western Monarch Milkweed Mapper or the project portal in the iNaturalist app to report milkweed and monarch observations at every stage of life.
- In collaboration with the BLM, Redhawk would develop a wildlife trail camera monitoring program to monitor wildlife activity in and around the Project Area. All data would be shared with the BLM and USFWS, if appropriate.

Migratory Birds

The following design features would be implemented to minimize impacts to migratory birds:

- Vegetation clearing activities, if necessary, would be performed outside of the February 1 through September 30 breeding/fledgling season for migratory birds. Should vegetation clearing be performed outside of the 0.25 mi buffer of the Copper Creek centerline during the YBC breeding season (May 25 to September 30), prior to clearing, BLM would be consulted, and a qualified biologist would perform a nest survey with a 50-foot radius from the vegetation clearing areas. Pre-disturbance surveys for migratory birds would be conducted no more than 14 days prior to initiation of site disturbance. If the disturbance to the specific location does not occur within 14 days of the survey, another survey would be completed.
- If active nests are located, a protective buffer (the size depending on the habitat requirements of the species) would be delineated after consultation with the BLM and USFWS, if appropriate. The Proposed Action Alternative activity would be delayed within the buffer area until fledging is confirmed.

Vegetation and Soils

The following design features would be implemented to minimize soil disturbance and impacts to vegetation:

- Native vegetation would be left in place wherever possible. If Saguaros or Agaves are found in areas of surface disturbing activities, the applicant would apply for an Arizona Native Plant Tag and transplant it.
- Vegetation removal and soil disturbances, including for temporary road improvements such as filling potholes, trimming shrubs along roadways for safe travel, repairing damaged existing drainage features, and removing large boulders that may pose a travel hazard, would be minimized to not significantly alter the structural components of riparian habitat for YBC because only minimal trimming would occur, as areas to be cleared are previously disturbed.
- Revegetation techniques and reclamation practices (**Section 2.2.11**) would include revegetating disturbed areas as similarly to surrounding, undisturbed areas as possible. Seed beds would be prepared by roughening the soil surface. Seedings and/or plantings would occur as soon as practicable after seedbed preparation. Seeding should take place in late summer or early fall to utilize summer monsoon rains, or in early spring if approved by the BLM. Native seed mix, application rate, seeding methods, and plantings would be specified by the BLM, as described in **Section 2.2.11**. Redhawk would conduct baseline and post-reclamation line-point intercept transects as described in the Reclamation Plan (**Section 2.2.11**) and coordinate with BLM and report reclamation activities and findings annually.
- Pulling up the sidecast during reclamation recontouring is expected to be sufficient to replace the soil profile and support revegetation. Culvert installation is not anticipated, but water bars designed per the BLM Primitive Road Design Handbook (BLM 2012a) may be added where appropriate. Road surfacing materials such as gravel are not anticipated. Redhawk would notify BLM if road surfacing is determined to be necessary.
- Following the completion of earthwork, all disturbed areas would be broadcast seeded. The seed mix may require addition of a carrier to ensure even distribution of light, fluffy, or extremely small seeds. Seeds may be covered with wildlife friendly erosion control blankets to aid in their establishment.

Noxious Weeds

Redhawk would implement noxious weed monitoring and control measures in accordance with BLM Handbook H38091 (BLM 2012b) and H-1740-2 during construction and continuing through operations and reclamation. The spread of noxious weeds would be controlled by managing the following potential sources:

- To avoid the spread of noxious weeds, equipment would be cleaned to ensure that all plant materials and soil is removed before being brought to the site. The main areas on vehicles that would be decontaminated would include, but are not limited to, the equipment tracks, tires, undercarriage, axles, wheel wells, running boards, bumpers, and brush guard assemblies.

- Vehicles would be confined to existing roadways and not permitted to conduct overland travel to reduce the potential for new weed establishment.
- Seed mixes, wattles, and other materials used for erosion control and soil stabilization would be certified weed-free and made of wildlife friendly and natural materials.

Cultural Resources

The Project Area and immediate vicinity has been previously subject to Class III pedestrian survey efforts for cultural resources (Dolan and Lindley 2007, Hooper and King 2011) covering 5,065 acres of BLM, State, and private land (see Appendix A for more information)The previous Class III identification efforts, while over 10 years old, adhere to current Arizona State Historic Preservation Office (SHPO) guidance (SHPO 2004). All three previous projects used currently accepted ASM and BLM survey and site definition methods, and the principal investigators all meet Secretary of the Interior Standards. Of particular importance in considering potential buried archaeological sites and the need for further survey, the nature of the rocky substratum in the Bunker Hill district and the greater Galiuro Mountains is not conducive to widespread deposition and the burial of cultural deposits is not considered likely. Furthermore, the prior survey projects in the current Project Area conducted intensive historical research on the Bunker Hill mining district, including historical map research to identify properties that met the 50-year age threshold for consideration for inclusion on the National Register of Historic Places (NRHP) during the 2007, 2008, and 2011 survey efforts. Additional map research conducted in 2024 for this EA indicated that there are no additional properties in the Project Area dating to the late 1960s or early 1970s that might be considered 50 years old and potentially be historic properties.

The previous identification efforts indicate that five archaeological sites that are eligible for the NRHP—four historical mining and mining-related sites and one prehistoric, limited activity site—are located near the Project Area. The sites include: AZ BB:3:47(ASM) – The Copper Creek Railroad, a historic period narrow gauge railroad; AZ BB:3:34(ASM) – The Copper Prince Mine, a historic period mineral extraction locale; AZ BB:7:22(ASM), a historic period mining camp and mineral extraction locale, AZ BB:7:23(ASM) – Copper Creek Site, a historic period townsite and mineral extraction locale; and AZ BB:2:195(ASM), a multicomponent site consisting of a prehistoric rock shelter with associated artifacts and a historic period mineral extraction locale. The Project would avoid completely four of the historic properties with the fifth (AZ BB:7:23(ASM)) having only one drilling location placed in a highly disturbed area, away from any recognizable cultural elements. Following National Park Service guidance on the significance of historical mining properties (Noble and Spude 1997), the project has been designed to avoid elements of the Historic-period mining sites that contribute to their significance under Criterion D. Indeed, for the four historic-period sites, the expansive nature of hard-rock mining sites resulted in no effects to any significant historical feature. For the prehistoric site eligible for the NRHP, the site is completely avoided by Project activities. In summary, the Proposed Action would have no adverse effect on any historic properties. The Proposed Action Alternative would avoid adverse effects to both unevaluated and evaluated prehistoric or historic sites potentially eligible for listing in the NRHP.

- In the event a site is discovered and not avoidable, the necessity of drilling at the site would be evaluated. If it is determined drilling at the site is necessary, Redhawk would work with BLM in accordance with applicable preservation office agreements (e.g., Arizona State Historic Preservation Office [SHPO]) to undertake mitigation (e.g., data recovery). If a site meets NRHP eligibility criteria, a historic properties treatment plan, data recovery plan, and/or other appropriate mitigation would be completed under applicable agency agreements or memoranda of agreement with BLM. If a site does not meet eligibility criteria as defined by the NRHP Criteria for Evaluation, no further cultural work would be performed.
- Any cultural and/or paleontological resource discovered by Redhawk, or any person working on the behalf of Redhawk, on BLM-managed lands would be immediately reported to BLM authorized representative. Such resources include any historic or prehistoric site, structure, object, artifact, human remains, or vertebrate fossils.
- Redhawk would suspend all operations in the immediate area of any cultural and/or paleontological resource discovered until written authorization to proceed is issued by the authorized representative. BLM would determine the appropriate course of action to prevent the loss of significant cultural or scientific values. In the event of the unanticipated discovery of significant cultural remains, where adverse impacts to the resource cannot be avoided, Redhawk would be financially liable for all resulting costs that may include preparation of a Historic Properties Treatment Plan (HPTP), data recovery excavations and reporting, and cultural material curation. Failure to notify BLM about a discovery may result in civil or criminal penalties in accordance with all available laws, including but not limited to the Archaeological Resources Protection Act of 1979 (as amended).
- Drill pads and access roads are already existing; any new disturbance associated with expansion of drill pads and access roads would be adjusted to avoid impacts to sensitive cultural resource sites, as necessary and in consultation with the BLM resource specialist.
- Redhawk would be responsible for assuring that all project personnel and contractors have been instructed on cultural resource avoidance and protection measures prior to the commencement of any land disturbance activity.

Public Safety and Access

- All equipment and other facilities would be maintained in conformance with Redhawk's project safety plan. When drills are moved, personnel would be in place to ensure the public who are using the roads are aware of activity.
- Drill pads and 8 ac of their associated access roads (**Figure 3**) would be reclaimed after the completion of sampling and logging and upon determination that the disturbance is no longer needed for exploration activities. Sumps would be backfilled when the previously stated criteria are met and there is no standing water present in the excavation.
- Active exploration roads (spur roads off the main roads) would be closed for use by others. After completion of exploration work at a drill pad, 4 ac of publicly used access roads would be left open for public use, and 8 ac of roads would be reclaimed as discussed in **Section 2.2.11**.

- All construction sites and access roads would be clearly marked or flagged at the outer limits prior to the onset of any ground disturbing activity. All personnel would be informed that their activities must be confined within the marked or flagged areas.
- As part of reclamation, Redhawk would be responsible for ensuring that boreholes drilled as part of this Proposed Action Alternative are abandoned in accordance with ADWR regulations and that all excavations or other openings in the ground are backfilled and properly covered, according to the Arizona regulations.
- If any existing roads are degraded because of Redhawk activities, Redhawk would return them to a condition passable by four wheel drive, high clearance, full size vehicles.
- In the case that the water-related ranching infrastructure is damaged by Redhawk or associated contractors, Redhawk would alert the appropriate rancher, and the infrastructure would be repaired by Redhawk as soon as possible.
- All Proposed Action Alternative-related traffic would observe a 10-mph speed limit to enhance public safety.

Water Quality

The following measures would be implemented by Redhawk to prevent water quality and aquatic resource degradation:

- All drill sites would be maintained in accordance with Occupational Safety and Health Administration (OSHA) standards.
- Stormwater BMPs per the Redhawk SWPPP would be used at exploration sites to minimize stormwater erosion.
  - Loose and spillable materials would be covered, kept in appropriate containers or within containment to minimize discharges of stormwater associated with the project.
  - Spills and leaks would be cleaned up quickly with dry materials.
  - Vehicles and equipment would be inspected for leaks and dry absorbent, or drip pans would be used to ensure leaks are contained.
  - Spill kits would be kept in the Project Area, labeled, and in an easy location to access.
- Drill cuttings would be contained within the Project Area, and fluids would be managed using a catch basin when transferring liquids, stored appropriately and spills would be cleaned up. Sediment traps would be used as necessary and filled at the end of the drill program.
- Cut and fill slopes would be constructed at the maximum practicable slope ratio to minimize erosion and surface disturbance area.
- Excelsior wattles or bales, silt fences and other wildlife friendly and natural sediment control features would be installed as necessary on, around, upslope, and/or downslope of drill sites and access roads to control sediment erosion. Sediment controls would be inspected as required by the MSGP SWPPP and following heavy precipitation events.
- The road improvements would adhere to the design standards and BMPs outlined in the H-9115-1 Primitive Road Design Handbook (BLM 2012a).

Air Quality/Dust Control

The following design features would be implemented to control dust and minimize impacts to air quality:

- Redhawk would not proceed with any construction or exploration activities without taking reasonable precautions in compliance with OSHA regulations (e.g., general tidiness, equipment inspection and maintenance) and would keep pads and roads clear of debris to minimize airborne particulate matter.
- All Proposed Action Alternative personnel would be educated on the dust control requirements in the air activity permit.
- All Proposed Action Alternative-related traffic would observe a 10-mph speed limit to reduce fugitive dust emissions.
- As conditions warrant, water may be utilized to control dust on the roads.

Erosion Control

The following design features would be implemented to control erosion:

- Earthwork design and road improvements would adhere to the design standards and BMPs outlined in the H-9115-1 Primitive Road Design Handbook (BLM 2012a).
- When steep cut slopes or embankments are constructed, methods to control erosion would be employed.
- Reclamation would be implemented at the earliest time feasible, as defined in the Reclamation Plan (**Section 2.2.11**), to prevent undue degradation of soils.
- Limiting the length of continuous berms to prevent water channeling on road surface during road widening, using breaches in berms to turn water off the roads, and slightly out-sloping roads to limit runoff concentration.

Hazardous and Solid Waste Management

The following design features would be implemented to manage hazardous and solid waste:

- Redhawk would dispose of waste (e.g., trash produced by the workers such as food wrappers, and scraps) daily. Trash would be stored in Redhawk trucks and removed when the workers leave the Project Area.
- Pursuant to 43 CFR 8365.1-1(b)(3) and 43 CFR 3809.420(b)(5) and (6), no sewage, petroleum products, or refuse would be dumped from any trailer or vehicle.
- Hazardous materials would not be drained onto the ground or into drainage areas.
- All construction waste, including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials, would be removed to a disposal facility authorized to accept such materials.
- Petroleum products, including greases, oils, etc., would be used in the maintenance of equipment and would be stored on drill support vehicles or on the drill rig. Hydrocarbons (outside of daily/short-period quantity) usage would be stored on private land.

- No solid waste would be permitted in sumps.
- If a spill of a petroleum product is considered to meet a reportable quantity per ADEQ guidelines (a spill of any quantity that impacts a waterway within Arizona), measures would be taken to control the spill. The ADEQ Emergency Response Unit would be notified, the BLM would be notified within 24 hours, and the appropriate remedial actions and confirmation sampling would be conducted under the direction of ADEQ.

2.2.11. RECLAMATION PLAN

Redhawk would conduct reclamation of disturbed areas once Redhawk determines through core sample analysis that no further drilling would occur at a pad. Completion of activities at each pad would be determined by analysis of core samples taken from the pad for adequate data. Proposed Action Alternative activities would occur over approximately 2 to 3 years. All reclamation work remaining at that time, except revegetation and revegetation monitoring, would be completed no later than 6 months after the completion of activities under the Proposed Action Alternative. Revegetation would be completed at the earliest feasible time within the first growing season after the completion of activities under the Proposed Action Alternative and revegetation monitoring would continue until considered complete by the BLM. No more than two pads, each with one open exploration hole, would be actively used for drilling at any given time, but pads could remain open to allow for the opportunity of additional exploration. These sites would be stabilized for an interim period while not in active use. Stabilization of the drill pads for sediment control would include BMPs outlined in the SWPPP and revegetation pursuant to the reclamation plan described below.

Reclamation would be completed to the standards described in 43 CFR 3809.420(b)(3). Reclamation would meet the reclamation objectives as outlined in the U.S. Department of Interior Solid Minerals Reclamation Handbook #H-3042-1 (BLM 1992) and Surface Management Handbook H-3809-1 (BLM 2012b). All Redhawk drill sites and sumps would be recontoured and reseeded, with potential supplemental plantings and seedings, as would any drill site access roads that are determined to require reclamation through coordination with BLM.

Redhawk would conduct line-point intercept transects on 10 percent of the 67 proposed pads prior to project disturbance of the pads, to provide a measure of baseline cover. Redhawk would also conduct a line-point intercept transect on a reference pad; a pad previously disturbed that would not be used by Redhawk for the project. Thus, data would be collected on 8 pads throughout the Project Area prior to any project-related disturbance. Details of line-point intercept data collection would be determined in coordination with the BLM. Post-reclamation line-point intercept transects would be conducted annually during reclamation in the same locations at the same time of year as the baseline survey was conducted. Line-point intercept surveys would continue until 70 percent of baseline cover was met. Annual reports outlining reclamation progress would be submitted to the BLM with recontouring, reseeding, and planting dates by area and line-point intercept data. Redhawk would further collect photos of all pads prior to project disturbance, using standard operating procedures for photo collection provided

by the BLM. These photos would be used as a supplement to the line-point intercept data and to further provide a visual aid.

Reclamation is intended to return disturbed land to a level of productivity comparable to the level of productivity of any specific area as it was prior to activities associated with the Proposed Action Alternative. Land uses in the Project Area includes wildlife habitat, livestock grazing, hunting, and dispersed recreation. Land use is not expected to differ following activities associated with the Proposed Action Alternative.

If there were any extended periods of inactivity during the Proposed Action Alternative schedule (**Section 2.2.3**), interim reclamation would occur including filling sumps, cleaning sites, and maintaining the overall safety of the Project Area. Surface disturbance would be reclaimed after completion of sampling and logging and upon determination that the disturbance is no longer needed for Proposed Action Alternative-related activities. Sumps would be backfilled once the previously stated criteria are met and there is no standing water present in the excavation. Petroleum products used for equipment maintenance would be removed with the equipment. The BLM and ADEQ would be notified prior to any periods of inactivity greater than 120 days in the Project Area.

After the Proposed Action Alternative activities are completed, reclamation would involve regrading disturbed areas related to this Proposed Action Alternative to the approximate contours as prior to Proposed Action Alternative activities or approximate contours of the landscape prior to any disturbance. The regraded areas would then be seeded using the approved reclamation seed mixture and application rates furnished by the BLM. A BLM specialist (e.g., botanist, range management specialist, or soil scientist designated by BLM) would provide the list of approved type and quantity of seed mixtures, seeding method, and seeding locations.

Portions of the Project Area have been previously disturbed for mineral exploration purposes similar to those described in the Proposed Action Alternative. Due to this, following Proposed Action Alternative reclamation, the topography of disturbed areas, including roads and pads, would be restored to similar conditions to those found prior to the Proposed Action Alternative activities approximate contours of the landscape prior to any disturbance as previously mentioned.

Drill Hole Plugging

Once an exploration drill hole is completed, the drill hole would be abandoned in compliance with the ADWR abandonment requirements. Geotechnical auger holes would be backfilled with drill cuttings and surface material.

Regrading and Reshaping

Regrading and reshaping of all constructed drill sites, including sumps and pad access roads, would be completed to approximate the contours as prior to Proposed Action Alternative activities or to approximate the surrounding topography. Fill material would be pulled onto the roadbeds as necessary to fill the road cuts and reclaim the slope to conditions as they were prior to activities associated with the Proposed Action Alternative. Roads and drill sites would be

regraded and reshaped with an excavator. Erosion control would be implemented in accordance with the BMPs outlined for the Proposed Action Alternative.

Topsoil Handling

Soils are generally thin to non-existent on the previously disturbed pads of the Proposed Action Alternative and the depth of cut for exploration road improvements would be minimal. During reclamation activities at the Project Area, potential growth media stored in the form of berms and push piles, created during construction activities, would be distributed over surface disturbance areas. Growth medium would be replaced without mixing with subsoil to the extent practicable. Addition of organic material to improve soil condition may be necessary at some sites.

Revegetation

Generally, seedbed preparation and planting would take place in the fall following the regrading of disturbed areas to utilize fall or winter rains, in the early spring to utilize winter rains, or prior to monsoonal rains if approved by the BLM. All reclaimed areas would be broadcast seeded with a cyclone-type bucket spreader or a mechanical blower. Plantings may be added as appropriate if vegetation is removed, in coordination with BLM specialists. Broadcast seed would be covered by harrowing, raking, or other site-specific appropriate methods, as necessary, to provide seed cover and enhance germination. Wildlife friendly and natural erosion control blankets may be used to further aid in seed survival. Reclaimed surfaces would be left in a textured condition (i.e., small humps, pits, etc.) to enhance moisture retention and revegetation success while minimizing erosion potential.

The seed and plant list, to be provided by the BLM, would be based on known soil and vegetative conditions, and selected to establish a plant community similar to the undisturbed, native plant community specific to the Project Area. In addition to the data collected using line-point intercept protocol, the United States Department of Agriculture (USDA) Natural Resources Conservation Service's (NRCS) Ecosystem Dynamics Interpretive Tool (EDIT) would be queried to cross-reference appropriate annual and perennial grasses and forbs within the ecological sites to compile the seed mix for the specific locations where the revegetation would occur. Seed mixes would be tailored to each pad and road revegetation site, although a general seed mix would be provided to the applicant prior to project activities as an example. The final seed list(s) would be comprised of 70-80% perennial (and some annual) grasses, and 20-30% perennial (and some annual) forbs. Each grass species should be 10-20% of the total seed mix, and each forb species should be approximately 5% of the total seed mix, which would be comprised of between 5 and 12 species. The ratio of grasses to forbs is designed to provide for erosion control of species that establish quickly. Broadcast seeding would be at an appropriate per-acre rate to be consistent with the surrounding vicinity. The seed mixture would be certified pure live seed (PLS) and weed-free.

Notably, shrub and tree species are not included in the seed mix, as these seeds generally do not establish via broadcast seeding and instead require scarification to germinate. Any shrubs or trees that the BLM determines are necessary would be planted as seedlings or saplings. Areas where

this is particularly important include sites along the road at creek crossings and creek-side to replace any removed riparian and xeroriparian trees and shrubs.

Revegetation activities (seeding and plantings) may be limited by the time of year during which they could be effectively implemented. Seeding would be completed at the appropriate time in coordination with BLM, which is expected to be in the fall or early spring, unless the BLM approves pre-monsoon seeding. Because post-mining monitoring is required of the operator until reclamation is complete, monitoring would be conducted by Redhawk after the growing season following regrading, reseeding, and plantings, until the site is deemed stable by the BLM. Additional reclamation activities include the removal of all equipment, supplies, and materials brought onto public land at the end of the Proposed Action Alternative.

Timing of revegetation activities is important to the overall success of the program. To the extent practicable, seeding activities would be timed to take advantage of optimal climatic periods and would be coordinated with other reclamation activities. In an ideal situation, earthwork and drainage control would be completed in the summer or early fall. Seedbed preparation would generally be completed in the fall, either concurrently with or immediately prior to seeding.

Off-Highway Vehicle Deterrents

Operation of off-highway vehicles (OHVs) can cause mechanical damage to stabilization structures and soils and mortality of plants. Access by such vehicles would be limited in areas of reclamation. Measures to control OHVs and other unauthorized vehicle use in the Project Area would be determined in consultation with the BLM. Specific areas of potential access by OHVs would be identified and measures to minimize or eliminate access would be developed as appropriate. These measures may include the installation of signs, berms, fences with locking gates, and/or selectively placed boulders. Development of OHV deterrents would be determined on a case-by-case basis based on BLM requirements.

2.3. PREFERRED ACTION ALTERNATIVE

The Preferred Action Alternative is the same as the Proposed Action Alternative with the additional implementation of an Adaptive Management Plan (AMP)[3] related to groundwater pumping. The BLM would require continuous groundwater monitoring and sharing of groundwater withdrawal data from Redhawk, and annual monitoring of parameters including wetted width, thalweg depth, and hydric vegetation composition in the Greenline through Lotic AIM monitoring. Groundwater pumping and climate data, as collected and described in the

[3] "Adaptive Management (AM) is a decision process that promotes flexible decision-making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. AM also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. AM does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals; increases scientific knowledge; and reduces tensions among stakeholders." (Williams et al. 2009).

AMP, would be used by BLM specialists in conjunction with groundwater elevations and AIM data to determine whether the groundwater pumping is causing negative impacts on surface and groundwater, associated vegetation, and aquatic resources of Copper Creek as such effects may trigger reductions in groundwater use for project purposes as described in the AMP. If the Preferred Action Alternative in the EA was selected and the proposed mining exploration activities were to proceed, implementation of the project and implementation of associated design features would be enforced by the BLM per the standards in 43 CFR 3809 and the required design features as described in the EA.

2.3.1. ADAPTIVE MANAGEMENT PLAN

An AMP, in accordance with the Department of Interior Department Manual Part 522, has been developed as a strategy to monitor and mitigate degradation of aquatic and riparian habitats and the biological communities that are supported by the ecosystem of Copper Creek due to water withdrawals for project purposes.

The parameters described in this document are intended to be independent of each other; management actions can be derived from interpretations of the results of data collection and/or periodic observations in relation to any one parameter which are physical indicators that are further discussed below. Because causality is complex in ecosystems such as Copper Creek, management must have the ability to adapt in consideration of the best available information as it becomes available. The parameters are measured independently and compared against themselves and potentially other comparable streams in the region. The parameters, either all together or separately, are used as information to determine if impacts to biological resources may be occurring and are related to groundwater pumping from this proposed project.

An AMP for the Preferred Action Alternative would be suitable to meet SFO RMP objectives; specifically:

- Prescribe management of riparian values based on site-specific characteristics and settings; and
- Give special attention to monitoring and evaluating management activities in riparian areas and revise management practices where site-specific objectives are not being met

Research has shown that rates of groundwater declines, as opposed to climate factors, is the primary driver of declines of riparian species (Patten 1998, Williams et al. 2022). When wells pump groundwater out of an aquifer system, the effects of that pumping are not typically readily apparent. This is because pumped water is first drawn from water stored in the aquifer. However, as pumping continues, a greater percentage of the pumping can come from “depletion,” meaning that the effect of pumping is seen through reduced surface water flow and reduced use of groundwater (evapotranspiration) by plants. At any time, the only sources of pumped water can only be aquifer storage, reduced streamflow, and/or evapotranspiration. Percentages of the water from either aquifer storage, reduced streamflow, and/or evapotranspiration vary through time and

are affected by distance to the surface water and by the properties of the aquifer (Leake et al. 2010).

In a system with predominantly horizontal flow such as Copper Creek, the rate at which a disturbance like pumping would affect the amount of water in an aquifer is determined by the hydrologic diffusivity of the aquifer, as well as the distance of the location of withdrawal (both horizontally and vertically) from a stream, and the rate at which the pumping occurs (Barlow and Leake 2012). Aquifers are typically recharged by natural meteoric precipitation. The amount of water currently recharging many of the aquifers in Arizona, and in the western United States as a whole, is insufficient to meet current and future demands (Hoffmann et al. 2007).

The BLM intends to monitor BLM resources and location specific parameters to inform an adaptive management strategy to prevent loss of aquatic and riparian habitats and the biological communities that are supported by the ecosystem of Copper Creek. Hydrological conditions are inherently variable and are best interpreted though trend establishment and monitoring. The BLM, through the collection of data as described below, would monitor hydrological and biological conditions on an on-going basis. The BLM may recommend management actions directly linked to the information derived from this data.

2.3.1.1. AMP DATA AND BASELINES

Information and data that would be utilized for management decisions in accordance with this AMP would include the following:

Local, Project Driven Data Sources:

- Groundwater levels at the 3 shallow AIM wells. Baseline water levels relative to each location are derived from recent data collection and reflect the site-specific conditions during a specific period of time. Natural variation in baseline groundwater levels is expected during any specific time range, therefore a range of values for each well are expected based upon previously collected data.
- Barometric pressure at one AIM well for level corrections to absolute pressure transducers
- Groundwater levels at 5 other, deeper monitoring wells
- Flow from the 3 surface flow gages
- Pumping records from Redhawk’s private Hendrickson and Solar wells
- Climate data (air temperature, precipitation, relative humidity) from Redhawk's weather station
- Lotic AIM at 3 sites. Baselines for wetted width, thalweg depth, and greenline composition are derived from recent data collection and reflect the site-specific conditions during a specified period of time.

- Proper Functioning Condition (PFC) conducted as necessary may help inform baseline conditions through inclusion of qualitative observations of riparian areas and key species.

National Data Resources:

- Western Regional Climate Center data from the Horse Camp RAWS can provide a long-term record of temperatures and precipitation for comparison with local data from the Redhawk weather station.
- Oregon State University Parameter-elevation Regressions on Independent Slopes Model (PRISM) utilizes data from multiple sources to model climate data. This model may be used in comparison with data from the Redhawk weather station.
- U.S. Drought Monitor hosted by the University of Nebraska may be used to evaluate the current and historical levels of drought in the region.

Groundwater, surface water, pumping records, and weather data would be compiled by Redhawk quarterly and shared with BLM via a Redhawk hosted SharePoint site. The data shared would be included in an Excel document with tabs for each of the raw data sources and additional tabs for data interpretation and for the methods of correction and/or calculations. BLM would have continuous, long-term access to this SharePoint and would back up the data on BLM internal drives for evaluation and QA/QC. The data described in association with the AMP would be publicly available.

The previous monitoring and continuous monitoring data would define the baseline range for all parameters. If the natural variation for DTG, for example, in the month of April is +/- 2 feet from the average DTG, then that would be the expected range.

2.3.1.2. GROUNDWATER MONITORING OF COPPER CREEK

Groundwater monitoring would occur at several locations representing the current depth to groundwater (DTG) within and immediately adjacent to Copper Creek. The evolving record would be informed by data from no less than three shallow wells (no more than 30 ft deep), see Figure 4a. Each well would be equipped with a submersible pressure probe and a data logger. There are currently three groundwater wells at various locations, agreed upon by the BLM, near to the Copper Creek channel (**Figure 4a**). These probes and data loggers would be serviced and downloaded by Redhawk to produce a continuous groundwater monitoring record over the life of the project. Redhawk would provide all data from those identified existing wells and from any proposed new monitoring wells for the duration of the project; the BLM would have continuous access to all gages and data loggers for data QA/QC of collected data for the duration of the exploration project. The groundwater level record would be updated quarterly for the duration of project related activities. The resulting record of groundwater elevations would be shared with the BLM for evaluation quarterly, as updates are made. The comparative baseline DTG that would be used by the BLM in their evaluations would be comprised of monthly averages of DTG elevations collected in the corresponding previous year periods at each specific well (e.g., Average April 2024 DTG at Well 1 would be compared to Average April 2025 DTG at Well 1).

No evaluation would be produced for any well which is missing the previous year's data for a corresponding evaluation period. Each well is independently evaluated. The conditions at any well may trigger adaptive management measures as described in this AMP. DTG would not be used to evaluate the cause of another parameter being outside of a range of natural variation. The parameters would be measured independently and compared against themselves and potentially other comparable streams in the region. The parameters, either all together or separately, would be used as information to determine if impacts to biological resources may be occurring and, if so, if those impacts may be related to groundwater pumping. Our management objective is to protect those resources and that ecosystem.

2.3.1.3. GROUNDWATER WITHDRAWAL RECORDS

Redhawk would provide, concurrently to groundwater elevation record updates, groundwater withdrawal logs for each well to include the location pumped, the pumping time periods, and the quantities of water pumped during each period. This information would be an important component in determining effects of groundwater pumping versus effects of natural climatic variation on the local aquifer.

2.3.1.4. ANNUAL LOTIC ASSESSMENT, INVENTORY, AND MONITORING (AIM) DATA COLLECTION

In compliance with the Department of Interior Permanent Instruction Memorandum PIM 2025-005 and Department Manual Part 522, AIM strategy[4] would be utilized for measuring natural resource condition and trend which would inform and guide management decisions. The BLM has collected AIM data for each of three reaches within Copper Creek beginning in 2023. Baseline data has been collected using AIM National Aquatic Monitoring Framework Field Protocol for Wadeable Lotic Systems (Lotic AIM, Technical Reference 1735-2, Version 2; BLM 2021). Data collection at the selected sites was conducted by crews contracted by the BLM and trained in Lotic AIM protocol. Continued data collection has been accomplished either by contracted crews or SFO staff. If Redhawk is granted authorization for the exploration program, Redhawk would conduct subsequent Lotic AIM data collection annually, between April 21 and May 5, for the life of the project using BLM trained field crews composed of either Redhawk staff or a contracted crew. Any crew collecting Lotic AIM data is required to complete annual BLM Lotic AIM training and comply with the methods used in Technical Reference 1735-2 during data collection. BLM would analyze the lotic data annually and summarize the trends by comparing data collected at each site to data collected previously at the respective site and/or with data collected during appropriate time intervals at similar sites within the Gila District.

The immediate environment directly influences the condition of biotic communities. In arid Arizona, riparian areas are estimated to be less than 0.4 percent of the total area of the state

[4] The Bureau of Land Management (BLM) developed the National Aquatic Monitoring Framework (NAMF) (BLM 2021) to monitor the condition and trend of aquatic systems as part of the Assessment, Inventory, and Monitoring (AIM) Strategy (Toevs et al. 2011). Following the AIM principles, the NAMF standardized field sampling methodologies, electronic data capture, and the use of appropriate sample designs for wadable streams and rivers (i.e., lotic systems) (BLM 2021, Dickard et al. 2015).

(Zaimes et al. 2007). Their value is disproportionate to their size; 80 percent of vertebrates spend some portion of their life in riparian areas in Arizona (Hubbard 1977). Riparian areas are complex systems so any monitoring protocol used to characterize those areas needs to rigorously account for the many variables common to all riparian areas, as well as those variables unique to each individual reach. The BLM Lotic AIM protocol was developed for this use and purpose. Not all core, covariate, or contingent methods ware discussed below, although most methods data would be collected during each AIM data gathering visit. The data collected using three of these methods (channel width, thalweg depth profile, and greenline composition) would be specifically utilized to determine adaptive management criteria.

Each Lotic AIM site (**Figure 4a**) is independently evaluated. Therefore, the conditions at any single site may trigger adaptive management measures as described in this AMP.

AIM Primary Indicators

Fundamental elements that are characterized using the Lotic AIM protocol include: 1) water quality, 2) watershed functions and instream habitat (i.e., physical habitat), and 3) biodiversity and riparian habitat quality.

The Lotic AIM protocol assesses these three fundamental elements. A set of methods that describe each fundamental element has been identified and those methods are further categorized as either a core, contingent, or covariate method depending on ecosystem variables and management objectives. Three methods have been identified by the SFO for use as primary indicators of ecosystem health for the purposes of adaptive management to prevent losses of riparian habitat within the Copper Creek Project Area.

A. Wetted width.

Wetted width is a characteristic of the physical habitat of a stream and a covariate method of Lotic AIM protocol. The wetted width of a channel and is influenced primarily by geology, gradient, discharge patterns, and water depth and velocities. Changes in discharge patterns and water depth and velocities in response to anthropomorphic activities can be detected through changes in wetted width (e.g., less water in a channel would produce a narrower wetted width due to reduced baseflow).

B. Thalweg Depth Profile.

The Thalweg depth profile, or the line joining the deepest points in a channel is a characteristic of the physical habitat of a stream and a contingent method of Lotic AIM protocol. The thalweg is considered a useful summary indicator for representation of the physical diversity of a reach (Bartley and Rutherfurd 2002). Physical diversity is known to correlate strongly with biological diversity (Jungwirth et al. 1993). The Lotic AIM Thalweg Depth Profile method measures the water depth along the thalweg. Decline of the water table may be detected as reduced water depths in the thalweg.

C. Greenline Composition.

The presence of mostly permanent water in the plant rooting zone at the margins of a channel allows growth of robust, hydrophytic plant communities in a continuous area called the Greenline, typically found on each side of a channel (Winward 2000). The plant community composition type is characterized using a protocol developed through the Multiple Indicator Monitoring (MIM) protocol (Technical Reference 1737-23) and is a contingent method of Lotic AIM. Anthropogenic disturbances may impact vegetation through reduced vigor and community changes in response to changes in water availability at the Greenline (Burton et al. 2011).

2.3.1.5. ADAPTIVE MANAGEMENT IS SUPPORTED BY SITE-SPECIFIC DETERMINATIONS OF RESOURCE OBJECTIVES

"Riparian areas are valuable because of their importance to watershed protection, water quality, wildlife, recreation opportunities, and livestock management. Special management attention is needed to ensure these fragile areas are protected and improved while providing for their use."

- *Safford District Resource Management Plan (RMP), 1991*

The Safford District RMP, pages 20 and 32, identifies several Riparian Issues and the selected alternative sets objectives for the direction for management of Riparian Areas. These include:

1. Achieve riparian area improvement and maintenance objectives through the management of existing uses, wherever feasible.
2. Ensure new resource management plans and activity plans, and revisions of existing plans recognized the importance of riparian values and propose management to maintain, restore, or improve them.
3. Prescribe management of riparian values based on site-specific characteristics and settings.
4. Give special attention to monitoring and evaluating management activities in riparian areas and revise management practices where site-specific objectives are not being met.
5. Cooperate with and encourage the involvement of interested federal, state, and local governments, organizations, and private parties to share information, implement management, coordinate activities, and provided education on the value, productivity, and management of riparian areas.
6. Incorporate riparian area objectives into existing and future activity plans.
7. Maintain and monitor representative relict riparian areas to provide a baseline for future management decisions.

The Safford District RMP, pages 33-34, identifies several Wildlife Habitat management concerns and the selected alternative sets objectives and actions for the direction for management of riparian areas. These include:

1. Maintain and enhance priority species and their habitats.

2. Manage priority wildlife species habitat (vegetation communities) or special features for that habitat (water, riparian vegetation, cliffs, etc.) to maintain or enhance population levels.
3. Establish the following as priority species and habitats. Priority species and habitats in the District include federally listed, proposed, and candidate threatened and endangered species and their habitat, important game species and their habitat, and other sensitive species and their habitat.

– Riparian/aquatic habitat and species dependent on riparian/aquatic habitat including Gila topminnow (*Poeciliopsis occidentalis*), loach minnow *(Tiaroga cobitis*), spikedace (*Meda fulgida*), Gila chub (*Gila intermedia*), yellow-billed cuckoo, northern Mexican gartersnake (*Thamnophis eques megalops*), Huachuca water-umbel (*Lilaeopsis schaffneriana* ssp. recurva), southwestern willow flycatcher (*Empidonax traillii extimus*), and lowland leopard frog (*Lithobates yavapaiensis*).
– Desert (*Ovis canadensis mexicana*) and Rocky Mountain (*Ovis canadensis canadensis*) bighorn sheep.
– Mule deer (*Odocoileus hemionus*).
– Sonoran desert tortoise.

Note: for a more complete list of BLM priority species and species of concern that are likely to occur in the Project Area, see the Safford District RMP or recent Information for Planning and Consultation (IPaC) report from the U.S. Fish and Wildlife Service (USFWS).

4. Monitor priority habitat to determine condition and changes in condition. Conduct inventories to determine the impacts of other activities on wildlife populations and habitat. Identify opportunities to mitigate adverse impacts and implement actions needed to correct the problems.

2.3.1.6. RESOURCE OBJECTIVES AND ASSOCIATED ADAPTIVE MANAGEMENT ACTIONS

Groundwater is not static. It is part of a dynamic flow system, moving into and through aquifers from areas of high water-level elevation to areas of low water-level elevation. Groundwater-level fluctuations due to aquifer storage changes involve either the addition or extraction of water from the aquifer, both through natural means and human involvement (Bridges 2020). Seasonal variation of groundwater levels is an expectation in systems such as Copper Creek. Typically, winter storms, spring runoff, and late summer/fall monsoonal events provide surface flow and groundwater recharge. These factors (climate), along with geology, land use, vegetative consumption and evapotranspiration affect water table levels.

In unconfined aquifers such as Copper Creek, the water level in a well is a direct indicator of the amount of groundwater stored at a given time. The depth to groundwater (DTG) is an important metric for habitat condition because dependent root systems of riparian species such as Fremont's Cottonwood (*Populous fremontii*) are relatively shallow. Monthly averages of DTG determined through SFO and Redhawk's agreed upon monitoring plan using data collected prior

to and throughout implementation of this project would define the expected range of variability of the water table in the Project Area of Copper Creek.

This AMP recognizes the importance of establishing meaningful trends in surface and groundwater system changes considering the known effects of groundwater withdrawals and of climate variability. Upon receipt of quarterly DTG record updates, the BLM would evaluate water table levels. The BLM would consider the data, including annual Lotic AIM data, DTG records, pumping withdrawals records and other environmental data, and determine if the measures set forth in the AMP are triggered. A Management Decision Wheel and Data Process Flowcharts that describe the elements of the decision process can be found in **Appendix F**.

- **Adaptive Management Parameter 1**: Determine the extent of DTG change through quarterly evaluation of the groundwater monitoring data. If BLM determines that DTG is increasing and groundwater withdrawal for the project is the causal factor, then it would mitigate impacts by appropriately reducing groundwater withdrawals for the project purposes according to the following guidelines. In application of these guidelines, some flexibility to determine the actual percentage of reductions based on the available data for any given evaluation period is reserved at the discretion of BLM decision makers to facilitate more precise calibrations to balance demands (e.g., If DTG during an evaluation period was found to be 1.5 feet below the expected range and precipitation was found to be only 50% of average for that period, then the SFO manager may choose to not fully apply the max reduction of 25% of groundwater use, rather the SFO manager may choose to apply a reduction of 12.5% in consideration of that climate data which intends to balance the demands of the project and the environment).
    - If the DTG is within expected ranges relative to baseline data (i.e., the previous period average DTG data at a specific site), no reductions of ground water withdrawals for project purposes on BLM lands would be implemented. The expected range of DTG would be determined by BLM through robust evaluation of relevant data and in consideration of seasonal variation and climate effects.
    - If the DTG is between 1 ft and 2 ft lower than expected DTG elevations relative to baseline data (i.e., the previous period average DTG data at a specific site) and considering recent climate conditions, Redhawk would reduce groundwater withdrawals for the project purposes on BLM lands by up to 25 percent of the total water volume extracted during the previous period, from Hendrickson Wells pending the next evaluation period's determination.
    - If the DTG is between 2 ft and 3 ft lower than expected DTG elevations relative to baseline data (i.e., the previous period average DTG data at a specific site) and considering recent climate conditions, Redhawk would reduce groundwater withdrawals for project purposes on BLM lands by 25 to 75 percent of the total water volume extracted during the previous period, from Hendrickson Wells pending the next evaluation period's determination.
    - If the DTG is 3 ft or greater below expected DTG elevations relative to baseline data (i.e., the previous period average DTG data at a specific site) and considering recent

climate conditions, Redhawk would discontinue groundwater withdrawals for project purposes on BLM lands from Hendrickson Wells pending the next evaluation period's determination.

Note: If groundwater withdrawals for project purposes on BLM lands are required to be reduced, concurrent monitoring using Proper Functioning Condition Protocol (PFC) and/or Lotic AIM Protocol by an appropriate Interdisciplinary Team (IDT) would occur during the following evaluation period to determine the degree of resource impacts. Groundwater withdrawals for project purposes on BLM lands may be restored to proposed levels following BLM evaluation of contributing factors.

- **Adaptive Management Parameter 2:** Determine that wetted width is not reduced due to groundwater withdrawals. If the BLM determines that wetted width is reduced and that groundwater withdrawals for project purposes is the causal factor, then it would mitigate impacts by appropriately reducing groundwater withdrawals for project purposes according to the following guidelines. In application of these guidelines, some flexibility to determine the actual percentage of reductions based on the available data for any given evaluation period is reserved at the discretion of BLM decision makers to facilitate more precise calibrations to balance demands.

    1. If the average wetted width is within 25 percent compared to the average wetted width determined through Lotic AIM data collection in the previous year and considering climate variations, no reductions of ground water withdrawals for project purposes on BLM lands would be implemented.
    2. If the average wetted width is reduced by 25 to 50 percent compared to the average wetted width determined through Lotic AIM data collection in the previous year and considering climate variations, Redhawk would reduce groundwater withdrawals for project purposes on BLM lands by 25 to 50 percent of the total water volume extracted during the previous year from Hendrickson Wells pending the next evaluation period's determination.
    3. If the average wetted width is reduced by 50 to 75 percent compared to the average wetted width determined through Lotic AIM data collection in the previous year and considering climate variations, Redhawk would reduce groundwater withdrawals for project purposes on BLM lands by 50 to 75 percent of the total water volume extracted during the previous year from Hendrickson Wells pending the next evaluation period's determination.
    4. If the average wetted width is reduced by 75 percent or greater compared to the average wetted width determined through Lotic AIM data collection in the previous year and considering climate variations, Redhawk would discontinue groundwater withdrawals for project purposes on BLM lands from Hendrickson Wells pending the next evaluation period's determination.

    Note: If groundwater withdrawals for project purposes on BLM lands are required to be reduced, concurrent monitoring using PFC and/or Lotic AIM Protocol by an

appropriate IDT would occur during the following evaluation period to determine the degree of resource impacts. Groundwater withdrawal may be restored to proposed levels following BLM evaluation of contributing factors.

- **Adaptive Management Parameter 3**: Determine that water depth in the thalweg as measured during Lotic AIM data collection is not reduced due to groundwater withdrawals for project purposes on BLM lands. If the BLM determines that thalweg depth is reduced and that groundwater withdrawal for project purposes is the causal factor, then it would mitigate impacts by appropriately reducing groundwater withdrawals for project purposes on BLM lands according to the following guidelines. In application of these guidelines, some flexibility to determine the actual percentage of reductions based on the available data for any given evaluation period is reserved at the discretion of BLM decision makers to facilitate more precise calibrations to balance demands.

    1. If the average water depth in the thalweg is within 25 percent compared to the average thalweg depth determined through Lotic AIM data collection in the previous year and considering climate variations, no reductions of ground water withdrawals for project purposes on BLM lands would be implemented.
    2. If the average water depth in the thalweg is reduced by 25 to 50 percent compared to the average thalweg depth determined through Lotic AIM data collection in the previous year and considering climate variations, Redhawk would reduce groundwater withdrawals for project purposes on BLM lands by 25 to 50 percent of the total water volume extracted during the previous year from Hendrickson Wells pending the next evaluation period's determination.
    3. If the average water depth in the thalweg is reduced by 50 to 75 percent compared to the average thalweg depth determined through Lotic AIM data collection in the previous year and considering climate variations, Redhawk would reduce groundwater withdrawals for project purposes on BLM lands by 50 to 75 percent of the total water volume extracted during the previous year from Hendrickson Wells pending the next evaluation period's determination.
    4. If the average water depth in the thalweg is reduced by 75 percent or greater compared to the average thalweg depth determined through Lotic AIM data collection in the previous year and considering climate variations, Redhawk would discontinue groundwater withdrawals for project purposes on BLM lands from Hendrickson Wells pending the next evaluation period's determination.

        Note: If groundwater withdrawals are required to be reduced, concurrent monitoring using PFC and/or Lotic AIM Protocol by an appropriate IDT would occur during the following evaluation period to determine the degree of resource impacts. Groundwater withdrawals for project purposes on BLM lands may be restored to proposed levels following BLM evaluation of contributing factors.

- **Adaptive Management Parameter 4**. Determine that the percentage of hydric plants present in the Greenline riparian vegetation communities as measured during Lotic AIM data collection are not affected by groundwater withdrawals for project purposes on BLM lands.

If the BLM determines that these communities are impacted and that groundwater withdrawals for project purposes is the causal factor, then it would mitigate impacts by appropriately reducing groundwater withdrawals for project purposes according to the following guidelines. In application of these guidelines, some flexibility to determine the actual percentage of reductions based on the available data for any given evaluation period is reserved at the discretion of BLM decision makers to facilitate more precise calibrations to balance demands.

1. If the total composition of hydric plants on the Greenline is reduced by less than 25 percent compared to the total percent composition of hydric plants on the Greenline determined through Lotic AIM data collection in the previous year and considering climate variations, no reductions of ground water withdrawals for project purposes on BLM lands would be implemented.
2. If the total composition of hydric plants on the Greenline is reduced by 25 to 50 percent compared to the total percent composition of hydric plants on the Greenline determined through Lotic AIM data collection in the previous year and considering climate variations, Redhawk would reduce groundwater withdrawals for project purposes on BLM lands by 25 to 50 percent of the total water volume extracted during the previous year from Hendrickson Wells pending the next evaluation period's determination.
3. If the total relative abundance of hydric plants on the Greenline is reduced by 50 to 75 percent compared to the total percent of relative abundance of hydric plants on the Greenline determined through Lotic AIM data collection in the previous year and considering climate variations, Redhawk would reduce groundwater withdrawals for project purposes on BLM lands by 50 to 75 percent of the total water volume extracted during the previous year from Hendrickson Wells pending the next evaluation period's determination.
4. If the total Greenline relative abundance of hydric plants is reduced by 75 percent or greater compared to the total percent of relative abundance of hydric plants on the Greenline determined through Lotic AIM data collection in the previous year and considering climate variations, Redhawk would discontinue groundwater withdrawals for project purposes on BLM lands from Hendrickson Wells pending the next evaluation period's determination.

   Note: If groundwater withdrawals for project purposes on BLM lands are required to be reduced, concurrent monitoring using PFC and/or Lotic AIM Protocol by an appropriate IDT would occur during the following evaluation period to determine the degree of resource impacts. Groundwater withdrawals for project purposes on BLM lands may be restored to proposed levels following BLM evaluation of contributing factors.

2.3.1.7. SUPPLEMENTAL: PRIORITY NATIVE WOODY RIPARIAN VEGETATION

Native woody riparian vegetation is a contingent method of the Lotic AIM protocol, and it describes several key characteristics of physical habitat which have direct implications for water quality and the quality of habitat critical to various species. Since shallow groundwater along rivers interacts with surface water, anthropogenic alteration of streamflow and pumping of local aquifers are often at odds with the flow needs for various species and can induce water stress to both aquatic and terrestrial species at critical life stages (Rohde et al. 2021). Several phreatophytes, including *Populus* ssp. and *Salix* ssp., provide canopy cover, critical bank stabilization, reduce evaporation and regulate water and soil temperature, provide nutrients and nutrient cycling, and provide physical habitat, among other ecosystem functions in Copper Creek. Decline of the water table may be detected by reduced vigor (leaf senescence), low recruitment, exposed branches (leaf abscission), and increased mortality in riparian woody species (Amlin and Rood 2003).

Lotic AIM detects only the presence and absence of these species. Decline in abundance of Priority Native Woody Riparian Vegetation would likely not be detectable during the timespan of the proposed project due to delayed effects of reduced water availability, were that reduction to occur. However, the health of these communities is appropriately assessed using PFC (Technical Reference 1737-15). IDT observations using this PFC protocol (e.g., diversity, age class, vigor, etc.) would be useful in conjunction with Lotic AIM data to determine the overall health of these critical components, better informing decision-makers in the application of this AMP.

2.4. ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

The following alternatives were considered and briefly analyzed below but were ultimately eliminated from further consideration.

2.4.1. OFFSITE WATER SOURCE ALTERNATIVE

Under this alternative, water would not be obtained for exploratory purposes from the Hendrickson Well or the Solar Well and instead would be hauled in from an offsite source. A standard water truck may carry up to 4,000 gallons of water, while large ones can carry 5,000 to 10,000 gallons. To meet project water requirements, approximately 35 trucks with 4,000-gallon capacity would be needed each month to deliver water to support operation for two drill rigs (140,000 gallons total). This alternative was eliminated from further detailed analysis as it may create more resource conflicts due to increased vehicle traffic, dust, emissions, and increased chances of wildlife impacts due to a standard water truck traversing the site daily. Additionally, this alternative may not eliminate pumping from private wells to fill the water trucks so the impacts would remain the same.

2.4.2. RIPARIAN AREA EXCLUSION ALTERNATIVE

This alternative would eliminate project-related actions within a buffered polygon around the Copper Creek channel. A primary impact from the proposed project is aquatic and riparian habitat degradation within Copper Creek from low water road crossings and from road traffic in the uplands. This alternative would exclude project-related vehicle traffic within the Copper Creek channel and adjacent uplands to avoid impacts to sensitive areas. This alternative was eliminated from further detailed analysis because it would not meet the project purpose. The primary access route for project and public vehicles crosses through the riparian area in several locations. Selecting this alternative would prevent project-related vehicles from accessing the Project Area and so it is not feasible to exclude the riparian area.

2.4.3. LIMITED OPERATING HOURS ALTERNATIVE

This alternative was developed to reduce noise and lighting impacts to wildlife from the proposed action. This alternative would establish operating hours between sunrise and sunset (or dawn and dusk), which would eliminate the need for and use of artificial lighting and subsequent operational noise at night. Emergency lighting may be stationed on site in the event it is needed after hours. Motion-sensing security lights and/or alarms may be used to secure the proposed project site. This alternative was eliminated as lack of artificial lighting would reduce operating hours by approximately 50 percent and may extend or double the estimated project timeline. Additionally, with the drilling technique used, the drill likely cannot be turned off without running the risk of the drill string seizing due the loss of buoyancy and pore pressure in the borehole. Drill advancement speeds range from 2-12 inches per hour depending on the hardness of the rock. For boreholes up to 4,900 feet in depth, this translates to a range of 3.5 - 20.5 days to complete drilling for each borehole. Because of these reasons, this alternative was eliminated from further consideration.

3.0 AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

3.1. INTRODUCTION

Section 3.0 contains the impacts analysis related to the issues presented in **Section 1.6**. This section describes: 1) the affected environment, specifically the existing conditions relevant to each issue identified in **Section 1.6**, followed by 2) a description of the direct, indirect, and cumulative impacts projected to result from each alternative for comparison between the impacts/consequences of alternatives, and the past, present, and foreseeable land uses, and actions with effects in the impact area of analysis.

3.2. RESOURCE ISSUES

The ID Team evaluated potential impacts from the Proposed Action Alternative to determine which resources required detailed analysis. **Appendix A** is a table of the resources one may or may not encounter in the Project Area. Resources that are not impacted (NI) or not present (NP) are not analyzed. Resources that are present with potential for relevant impact (PI) are analyzed in this section.

The resources brought forward for detailed analysis in this section are Wildlife and Water (Streams, Riparian Areas, Wetlands, Floodplains, Surface Water Quality). Four issue statements have been developed and categorized among the resources, as shown in the following text.

Wildlife Resources Issue Statements

1. How would each alternative impact game and nongame species of wildlife (habitat degradation and loss, loss of surface water, noise pollution, light pollution, and introduction of invasive species or spread of existing invasive species)?
2. For each alternative, what is the potential for impacts to occur to BLM sensitive species as well as threatened and endangered species within the Project Area (habitat degradation and loss, loss of surface water, noise pollution, and introduction of invasive species or spread of existing invasive species)?
3. The Project Area is within a wildlife connectivity area identified by the Arizona Game and Fish Department (AZGFD); how would each alternative impact wildlife connectivity and movements?

Water Resources Issue Statement

4. What are the potential impacts to hydrologic and hydrologic-dependent resources associated with Copper Creek due to groundwater withdrawals as stated in each alternative?

3.3. CUMULATIVE EFFECTS STUDY AREA

The description of the Affected Environment is consistent across all three alternatives analyzed in this EA including the No Action Alternative, the Proposed Action Alternative, and the Preferred Action Alternative.

For the purpose of this EA, **cumulative impacts** are defined as the combined effects of past, present, and reasonably foreseeable future actions (RFFAs), primarily from recreation, hunting, livestock grazing, mineral exploration, and mining. The purpose of the cumulative effects analysis is to evaluate the incremental contribution of each alternative to these combined effects within a defined Cumulative Effects Study Area (CESA) for each resource issue carried forward for detailed analysis.

Although CESAs can vary depending on the geographic or ecological scope of a given resource, for this EA, ta single CESA was delineated for all four resource issues based on the following rationale for each resource issue:

- **Issue Statements 1 and 2:** The CESA was delineated to assess cumulative impacts from habitat loss, surface water depletion, noise pollution, and the spread of invasive species.
- **Issue Statement 3:** The CESA focuses on effects to wildlife movement and connectivity, specifically within the Santa Catalina/Rincon–Galiuro Linkage. It includes parts of the San Pedro River watershed and surrounding areas that serve as wildlife corridors linking the San Pedro River, Aravaipa Canyon, and the Galiuro Mountains. These linkages support movement and gene flow for both resident and migratory species across an increasingly fragmented landscape. The CESA also encompasses potential downstream water, and habitat impacts relevant to connectivity.
- **Issue Statement 4:** The CESA evaluates cumulative impacts to hydrologic and hydrologic-dependent resources within the Copper Creek watershed that may be affected by groundwater withdrawals. Key concerns include groundwater-surface water interactions, aquifer drawdown, and impacts to riparian vegetation and aquatic habitat, especially in areas with seasonal or perennial surface flows and potential impacts to the San Pedro River – as Copper Creek is a tributary. A portion of the 7B Ranch falls within this CESA and was included in the analysis.

Table 3-1 defines the boundaries of the CESA. **Figure 6** illustrates the CESA. **Table 3-2** identifies the past, present, and reasonably foreseeable future actions included in the cumulative analysis.

In addition to the actions identified in **Table 3.2**, Redhawk Copper has an active mineral exploration notice within the Project Area for the Proposed Action and alternatives. Activities under the exploration notice consist of:

- Re-opening 0.6 miles of reclaimed roads and widening 1.5 miles of existing roads. The design width of all roads is 12 feet. Constructing six drill pads of 70 x 70 feet and three drill pads of 60 x 60 feet. Excavating nine sumps of 9 x 6 feet by 6 foot depth. Drilling up to 33

boreholes with an average depth of 2,130 feet, 3,600-foot maximum depth, using one track-mounted core drill rig (DM100 or equivalent). Conducting operations 24 hours per day for up to two years. Using water at a rate of 70,000 gallons per month. Abandoning boreholes in compliance with the ADWR Well Abandonment Handbook, 2008 or most recent edition. Reclaiming roads and drill pads to natural contours. Redhawk's activities under the exploration notice are underway or would take place independently of the current Proposed Action or alternatives and are cumulative to the activities under the Proposed Action and alternatives. Activities under the notice are considered part of the affected environment for this analysis.

Additionally, the BLM is expected to acquire the 7B Ranch as part of the Resolution Copper land exchange as part of the San Pedro Riparian National Conservation Area. The 7B Ranch is located within the CESA.

Table 3-1. CESA Boundary Description

Issue Question Numbers	CESA Boundary Description	Acreage
1-4	The portion of the Tucson Wash subwatershed (HUC 1505020308) east of the San Pedro River	92,257

Table 3-2. Disturbance Acreage of Past, Present, and RFFAs in the CESA by Activity Type

CESA	Mineral Activities[1]	Agriculture[1]	Residences, Other Structures and Fields, etc.[1]	Grazing Allotments[2]	Rights-of-Way[3]	Wildfires[4]
Past and Present Actions	111 ac[1, 3]	1,000 ac	250 ac	40,000 ac	13.8 ac	604 ac
Reasonably Foreseeable Future Actions	5 ac[5]				--	
CESA Total	**115 ac**	**1,000 ac**	**250 ac**	**40,000 ac**	**13.8 ac**	**604 ac**

[1] Estimated based on visibility on aerial photograph, includes 5 ac of Copper Fox Sombrero Butte Exploration, 5 ac of Redhawk Notice-level Road improvements in BLM LR 2000, and 4.06 acres of Notice-level exploration by Redhawk on BLM lands, including 1 acre that is not covered by this EA.
[2] Estimated from grazing allotment layer (BLM National Operations Center 2021)
[3] From BLM Mineral & Land Records System (BLM 2024).
[4] From National Interagency Fire Center (2023).
[5] Redhawk pads not on BLM lands.

3.4. ISSUES ANALYZED IN DETAIL

The four Resource Issues identified in **Section 1.6** are addressed in detail in the following sections.

3.4.1. ISSUE STATEMENT 1

1. How would each alternative impact game and nongame species of wildlife (habitat degradation and loss, loss of surface water, noise pollution, light pollution, and introduction of invasive species or spread of existing invasive species)?

3.4.1.1. AFFECTED ENVIRONMENT

Environmental Conditions

The Project Area consists primarily of steep-sloped, rocky bedrock units at elevations ranging from approximately 3,600 to 4,800 ft above mean sea level (amsl). Set within the slopes are numerous ephemeral drainages and areas with perennial surface water and associated aquatic and riparian vegetation, including Copper Creek, Bootlegger Spring, and Number 19 Spring, and vegetation that is influenced by Hendetta Spring, which is located off BLM lands (**Figure 4b**). These upland and riparian areas provide resources for various game and nongame wildlife species.

The Project Area is mapped within a vegetation community transitional area. Generally climbing in elevation and varying by slope aspect, these communities include Arizona Upland subdivision of the Sonoran Desertscrub biotic community, Semidesert Grassland biotic community, Interior Chaparral biotic community, and Madrean Evergreen Woodland biotic community (The Nature Conservancy 2012).

Portions of Copper Creek have perennial surface water or groundwater levels that support streamside obligate riparian vegetation species. Adjacent plant communities are dominated by upland species with some preferential riparian plant species. Ephemeral drainages in the Project Area generally support a discontinuous xeroriparian vegetation community interspersed with bedrock embankments. Vegetation along the ephemeral wash banks include mainly upland species that are sometimes larger and at a higher density than those that occur in adjacent upland areas. Refer to **Figure 5** for a visual of riparian vegetation.

In addition to riparian conditions along portions of Copper Creek, the BLM identified Hendetta Spring, Bootlegger Spring, and Number 19 Spring (**Figure 4b**) as springs of interest for the Proposed Action. WestLand, Redhawk, and BLM staff visited the three springs in October and November 2022. Bootlegger Spring was visited by WestLand on both October 27 and November 22, 2022, observing surface water in a reach of the channel. Bootlegger Spring was visited by BLM Staff on October 17, 2022. During that time, flowing surface water was observed in the mapped location of Bootlegger Spring, and BLM observed several facultative and facultative-wetland species within the reach, including deergrass, *Baccharis* sp., and cottonwood, suggesting that water is at least intermittently available in most years at this site. No lowland leopard frogs, Sonora mud turtles (*Kinosternon sonoriense sonoriense*), Aravaipa sage (*Salvia amissa*), or big sedge (*Carex spissa*) were found in Bootlegger Spring or on BLM land downstream from Hendetta Spring during WestLand's site visit. The Bootlegger Spring area has the potential to provide suitable habitat for the lowland leopard frog and Sonora mud turtle on a temporary basis. BLM and Redhawk staff visited the Number 19 Spring area in November 2023.

Although a spring was not located, pools of water and facultative vegetation were noted in the channel near the mapped location.

The Project Area includes a portion of the Santa Catalina/Rincon – Galiuro Connectivity Assessment corridor (**Appendix C**). This wildlife corridor is discussed in further detail in **Section 3.4.3**.

Abandoned mine workings are common within the Project Area, and many have been closed for safety (WestLand 2012). The mine workings that are still accessible to wildlife (*e.g.*, old adits and shafts) may provide a potential source of shelter. The opportunities for natural cave development are limited by incompatible rock types within the Project Area (WestLand 2012).

The Project Area's vegetation serves as a resource for both game and non-game wildlife species, offering forage, shelter, and nesting sites. The aquatic habitat within Copper Creek is a crucial source of drinking water and supports the aquatic lifecycle of various species, such as lowland leopard frog, Sonora mud turtle, and black-necked gartersnakes (*Thamnophis cyrtopsis*). Additionally, the riparian vegetation associated with these aquatic resources provides forage, shelter, and nesting opportunities, attracting species that might otherwise be absent from the area. Both game and non-game species may traverse the Project Area to access these resources.

Game Species

Predicted range models for ten Species of Economic and Recreation Importance (game species) intersect the project footprint, as provided by the (AZGFD Heritage Data Management System online environmental review tool (ERT; **Appendix C**). These species are also listed in further detail in **Appendix D, Table 4**. Species-specific surveys have not been conducted at Copper Creek for the game species, but the following five of the ten have been confirmed present during field investigations in 2012, 2022, and/or 2023:

- Deer (*Odocoileus* sp.)
- Mountain lion (*Felis concolor*)
- Black bear (*Ursus americanus*)
- Mourning dove (*Zenaida macroura*)
- Gambel's quail (*Callipepla gambelii*).

Nongame Species

AZGFD range models indicate 69[5] nongame wildlife species of greatest conservation need have predicted ranges that intersect the Project Area (**Appendix C**). These species are also listed in **Appendix D, Table 5**. Field investigations have not been conducted within the Project Area with the objective of determining the presence of all nongame wildlife species of greatest conservation need, but the presence of several species has been confirmed through various field visits. Species on the list that were confirmed present during field investigations in July and

[5] BLM-sensitive and threatened and endangered species are not included here as they are discussed in Issue Statement 2.

August 2012 (WestLand 2012) and by WestLand and the BLM during field investigations in support of this EA include:

- Bell's vireo (*Vireo bellii*)
- Gila woodpecker (*Melanerpes uropygialis*)
- Harris' antelope ground squirrel (*Ammospermophilus harrisii*)
- Lowland leopard frog (*Lithobates yavapaiensis*)
- Sonora mud turtle (*Kinosternon sonoriense sonoriense*)
- Black-necked gartersnake (*Thamnophis cyrtopsis*)
- California leaf-nosed bat (*Macrotus californicus*) (possible sign)
- Pale Townsend's big-eared bat (*Macrotis townsendii pallescens*)
- Myotis bats (*Myotis* sp.)

The California leaf-nosed bat, lowland leopard frog, certain *Myotis* bats, and Sonora mud turtle are BLM Sensitive species and are considered with other BLM Sensitive species in **Section 3.4.2**.

3.4.1.2. PROPOSED ACTION ENVIRONMENTAL CONSEQUENCES

The Proposed Action Alternative may directly affect game and nongame wildlife species within the vicinity of active drill pads and road widening activities. There is a potential risk of harassment, injury, and mortality of individual wildlife species. Direct impacts to individual game or nongame species would result from ground disturbance or collisions with vehicles. Indirect effects may result from habitat loss or degradation and disturbance through human presence, introduction of invasive species or spread of existing invasive plant species from vehicles and equipment, noise and vibrations from drilling, nighttime lighting, and fugitive dust resulting from traffic, road improvements, drill site operations, and reclamation activities. The resulting indirect effects could include decreases in foraging success, access to shelter and surface water, avoidance of predators, detection of prey, and breeding and other behaviors of game and nongame species, including life functions of aquatic species. Game and nongame species may temporarily vacate or avoid those portions of the Project Area where surface disturbing and/or drilling activities are occurring.

Drilling under the Proposed Action is expected to be conducted at no more than twos pad locations at any given time during the project period. Drilling operations may be conducted 24 hours per day, 7 days per week, 365 days per year, and likely excluding an estimated 3 months per year when hazardous weather such as monsoons prevents work, and during planned shutdowns. Additional Proposed Action activities including road work, pad preparation, pad recontouring, and restoration/revegetation may occur at any of the identified pads at any time during the project period.

Surface Disturbance

Surface disturbance would consist of clearing the previously used pads and roadways to make them safe for drilling activities. Many of these sites have been naturally revegetated to various degrees, supporting grasses, forbs, shrubs, and subshrubs. Lack of vegetation persists in areas

where continued disturbance, active erosion, or degraded soil quality has prevented seedling establishment and natural revegetation. Ground disturbance may increase the colonization of disturbed areas by noxious and invasive plant species. If unchecked, invasive plant species can displace native species and change habitat, affecting forage suitability of an area for game and nongame species and potentially affect cover opportunities. Some invasive plant species can promote the spread of wildfires. Game and nongame species dependent on the current vegetation in those areas for forage, cover, or other activities would lose that habitat until reclamation has returned the disturbed areas to a level of productivity comparable to levels prior to Proposed Action activities. Approximately 18 ac of surface disturbance are anticipated for the project. Disturbance would consist primarily of vegetation removal that had become established within the previously used pads and roads, expansion of pads where needed to either 40-ft x 60-ft or 70-ft x 70-ft dimensions, and widening of roads where needed to 12 ft, pursuant to the project plan. Design features and BMPs incorporated into the Proposed Action for vegetation and control of invasive plant species (**Section 2.2.10**) would reduce effects of vegetation loss and habitat changes to game and nongame species by minimizing vegetation disturbance and providing for native vegetation recovery at Project completion. Effects from surface disturbance are not expected to cause a change in the population stability of any game or nongame species.

Groundwater Pumping

Groundwater pumping from the private-land wells has the potential to affect the availability of surface water and lower the groundwater table within the Project Area. It could also reduce vegetation leading to less cover and forage for wildlife. The reduction in surface waters can also impact aquatic invertebrates, which are a crucial foods source for many species. In **Section 3.4.4**, a detailed discussion is provided for project groundwater pumping and its potential impacts on hydrologic and hydrologic-dependent resources associated with Copper Creek. Specific to game and nongame species, it's important to note that relatively small changes in water availability can have moderate to major impacts to game and nongame species and their habitats (e.g., a tadpole is restricted to water during a life-phase. If a 1 cubic foot pool that tadpole is living in dries up, it's not a lot of water but that tadpole loses 100% of its habitable range). Design features and BMPs for water resources may lessen these impacts (**Section 2.2.10**). Effects from the loss of surface water or groundwater can lead to habitat degradation, which could eventually impact population stability of game or nongame species.

Noise

Noise and vibrations from drill rigs may interfere with the ability of both game and nongame species to communicate, detect predators and prey, and perceive other environmental cues. The effects of elevated sound levels vary by species, depending on their hearing range and the frequencies they use for communication. For many species, vocalizations are essential for mating, territory defense, and social cohesion. Persistent noise can mask these signals, disrupt communication, and increase stress hormone levels, potentially leading to long-term health impacts.

Noise may also impair predator-prey dynamics. Prey species could become more vulnerable if they are less able to detect approaching predators, while predators that rely on sound to locate prey could be similarly affected. Bats that use echolocation may be impacted if project-generated noise overlaps with the frequencies they use, particularly in the ultrasonic range. Noise at or near roost sites can also disrupt bat behavior, potentially causing awakening from torpor or even roost abandonment. Although some studies suggest hibernating bats are not sensitive to non-tactile stimuli such as noise (Speakman, Webb, and Racey 1991; Summers et al. 2023), anthropogenic disturbance that includes noise has still been linked to roost abandonment.

The extent of noise-related impacts on wildlife depends on multiple factors, including species-specific hearing sensitivity, behavioral context (such as breeding, foraging, or predator avoidance), and proximity to the sound source. Sound attenuation increases with frequency; therefore, higher-frequency sounds degrade more rapidly over distance than lower-frequency sounds. As a result, the affected range of potential impacts varies not only by species but also by the dominant frequency components of the noise source (Lohr et al. 2003; Dooling and Popper 2007; Shannon et al. 2016).

Noise associated with the project includes construction and re-establishment of drill pads and select access roads; drilling activities anticipated to occur for up to 3 years with an estimated 9 months of activity per year with breaks for weather (monsoon season) or other reasons; and during reclamation activities.

Noise emission increases from the Project Area would be localized to the one or two active pads and access road locations, attenuating with distance. Maximum daytime project noise levels would result from drilling, pad clearing, and reclamation activities. Nighttime noise levels would result from drilling operations only, for 24 hours a day while drilling was active at each drill site, a period varying from approximately 1 to 4 weeks.

Noise levels and attenuation are quantifiable, although various environmental factors produce some variability in attenuation rates. Sound pressure levels decrease by 6 decibels (dB) per doubling of distance (FHWA 2006). This only accounts for attenuation due to geometric spreading and does not account for attenuation due to atmospherics, ground attenuation, and intervening topography, and would therefore overpredict the sound level at distances greater than those used within the calculation.

To determine noise levels and attenuation of drill rig noise from drill pads, Redhawk recorded sound level readings at distances of 50 ft, 100 ft, 200 ft, and 300 ft from the front, back, and sides of a drill rig. They also recorded sound level readings at the drill rig while the rig was shut down and while the rig was running and recorded ambient sound levels at two road crossings of Copper Creek. The drill rig used for the noise measurements was on private lands approximately 600 ft from the nearest Proposed Project pad. The drill rig is one that would be used for the project or is of similar construction, with the exception that a secondary muffler would be installed on project drill rigs, dampening the sound level from that recorded during the measurements. Sound level readings were accomplished with a cell phone microphone that had the National Institute for Occupational Safety and Health Sound Level Meter (NIOSH SLM)

application[6] installed. This application has met NIOSH lab testing criteria for accuracy and is promoted for sound measurement by NIOSH, which is part of the National Centers for Disease Control. Data from those readings is presented in **Table 3-3**.

Table 3-3. Drill Sound Attenuation Data[1]

Location	Distance from Drill Rig	dBA
At drill rig, not running	0 ft	29.2
At drill rig, running	0 ft	92.2
Drill rig front	50 ft	74.4
	100 ft	62.9
	200 ft	60.8
	300 ft	42.0
Drill rig back	50 ft	77.2
	100 ft	67.7
	200 ft	65.0
	300 ft	63.6
Drill rig right (control panel) side	50 ft	74.1
	100 ft	61.0
	200 ft	45.7
	300 ft	n/a[2]
Drill rig left (bean pump) side	50 ft	64.4
	100 ft	60.3
	200 ft	48.3
	300 ft	48.1
Western Copper Creek Crossing[3]	0 ft	38.4
Copper Creek Crossing at Settling Ponds[3]	0 ft	32.6

[1] Sound readings are from a drill rig that would be used for the project or is of similar construction, except a secondary muffler would be installed to dampen sound.
[2] Due to a severe slope encountered beyond 200 ft from the drill rig, a reading at 300 ft could not be collected.
[3] Ambient sound levels

Among the readings from the four sides of the drill rig, the average sound pressure level, LAeq,[7] was highest from the back of the drill rig, at 77.2 A-weighted decibels (dBA).[8] The maximum reading at 300 ft from the drill rig was 63.6 dBA, also from the back of the rig. This is consistent

[6] https://blogs.cdc.gov/niosh-science-blog/2017/01/17/slm-app/

[7] LAeq = Equivalent Continuous Sound Pressure Level, the constant noise level that would result in the same total sound energy being produced over a given period.

[8] dBA is an expression of the relative loudness of sounds as perceived by the human ear. Human auditory thresholds in quiet and in noise are approximately 6 dB better than that of the typical bird (Dooling and Popper 2016); i.e., human hearing is more sensitive than that of typical birds.

with predicted attenuation: 77.2 dBA at 50 ft from a source is predicted to attenuate to 61.6 dBA at 300 ft and to further attenuate to 57.2 dBA at 500 ft (WestLand 2024, WKC Group 2024; accessed May 1, 2024). In terms of common noises, 57.2 dBA is greater than the noise level of a refrigerator or light automobile traffic at 100 ft (approximately 50 dBA) but less than the noise level of normal conversation (approximately 60 dBA) (Bureau of Reclamation 2008).

Thresholds for noise that would affect species are expected to vary in numerous ways, including the species considered, the behaviors monitored, the sound frequencies of the noise, the duration of the noise, and the ambient environmental conditions, to name a few. Lacking data for specific species and conditions, it may be useful to look at guidelines that have been established for situations that are similar to the situation under consideration. An example of a US government use of noise level thresholds for wildlife protection is a recommendation by the USFWS for noise reduction measures if operations noise exceeded 69 dBA within 50 meters (164 ft) of a Mexican spotted owl (*Strix occidentalis lucida*) nest site or Protected Activity Center (USFWS 2012). While this guideline was established for a bird, the species is known to be highly reliant on sound for foraging and the guideline was established for a critical life cycle event for the species. It is likely that the guideline noise around MSO nest sites would have some relevance across many groups of wildlife.

Effects of noise may cause game and nongame species to temporarily abandon or avoid the active pads and roads and an area around those locations. The farthest-reaching effect from active pads is expected to be noise from active drill rigs and machinery during site preparation and reclamation, of which site preparation would be completed within a single day at each pad. Based on the sound attenuation described above and project design features and BMPs for noise (**Section 2.2.10**), the area of effect is expected to be approximately 500 ft in all directions of active pads. A 70-ft x 70-ft pad with a 500-ft buffer includes approximately 26 ac. With a maximum of two drill rigs in operation concurrently, the maximum acreage of noise effects including the 500-ft radial buffers per pad would be approximately 52 acres, with a maximum linear disturbance distance of 0.38 miles.

Effects from noise are not expected to cause a change in the population stability of any game or nongame species due to mitigation of noise effects by installation of secondary muffler on drilling rigs. The model of muffler to be installed is Harco Manufacturing Company's VRS Series Silencer: 1442vrs 4x5 SI SO SP, DWG#119245. According to the manufacturer's specifications, typical attenuation using this equipment is 18-32 dBA. The use of a secondary muffler system is anticipated to attenuate peak noise levels generated by drilling operations, resulting in a smaller disturbance radius and mitigating sound-related impacts on wildlife communities.

Project vibrations would emanate from the same sources as noise, primarily including drilling operations, and could primarily affect bats at roost sites. Vibrations in relation to bats is discussed further below.

Lighting

Artificial lighting can significantly alter the behavior, movement, and survival of both game and nongame species. Many species avoid illuminated areas, while others may be attracted to them, leading to altered patterns of habitat use, foraging, and predation. For some species, this can increase vulnerability to predators that hunt more efficiently under artificial light. For others, the presence of light may deter predators, potentially offering temporary refuge. Light can also disrupt access to essential resources, such as food or breeding sites, in areas that are avoided due to illumination.

External lighting at work pads would be limited to the minimum necessary for safety and security. All fixtures would be hooded and shielded, with lights directed downward toward the interior of the project site, except where otherwise required for safety. These measures are intended to minimize light pollution and reduce potential impacts to wildlife. Light attenuation is expected to be high over short distances. Four 1,250-watt metal halide floodlights (137,155 lumens each), mounted on 25-foot poles and aimed directly downward at 90-degree intervals, showed greater than 99% attenuation—dropping below 1 footcandle—within 60 feet of the source (Independent Testing Laboratories 2013).

Although lighting impacts are expected to be spatially limited, artificial lighting can have effects beyond simple habitat avoidance or attraction. Research has shown that artificial light at night can:

- Disrupt circadian rhythms, affecting sleep, hormone production, and metabolic processes in birds, mammals, amphibians, and insects;
- Alter migratory navigation for nocturnal species, particularly birds and some bat species;
- Suppress melatonin production, which plays a role in immune function and reproduction;
- Interfere with insect populations, many of which are drawn to light sources, leading to increased mortality and reduced prey availability for insectivores.

At this time, effects from project lighting are not expected to significantly impact the population stability of any game or nongame species. However, localized behavioral disruptions are likely, especially for species sensitive to artificial lights.

Dust

Fugitive dust may be generated from the project. On roads, while noise and nighttime lighting from passing vehicles is of a very temporary nature, settling dust can persist on the surrounding landscape. Dust can affect the growth processes of vegetation and alter the structure of plant communities in an area (Farmer 1993), thus potentially affecting habitat for game and nongame species. Dust loads produced within an area typically decrease exponentially with distance, such that more than 70 percent of the total dust is deposited within 33 ft of the dust production area, and more than 90 percent within 98 ft (Walker and Everett 1987). However, considering that the project would generate dust mainly during travel to and from the site, during pad construction and road maintenance and improvement activities, and would minimize fugitive dust through dust suppression efforts, the potential effects of dust on wildlife and vegetation are expected to be similar to existing conditions within the Project Area. Dust suppression design features and

BMPs are provided in **Section 2.2.10**. Effects from fugitive dust are not expected to cause a change in the population stability of any game or nongame species.

Game and Nongame Species

Different groups of game and nongame species may be affected by the above factors in different ways. The game and nongame species identified in the AZGFD ERT include large mammals, small mammals (including bats), birds, lizards, amphibians, and fish. Most of the game and nongame species are susceptible to most or all the effects described above, but some effects would impact only certain groups of game and nongame species.

Bats

Although the proposed exploration activities do not include impacts to caves, existing research on the vibration effects related to bat roosting and nesting are summarized below. Adams, Morrow, and Koebel (2018) conducted a study at Mammoth Cave National Park in Kentucky using five sources of vibrations (hammer drill, plate compactor, jackhammer, personnel simulating a bat survey near the hibernaculum, and ambient background levels) in other parts of the same cave system as a hibernation area, more than 300 ft away from the area. Vibration velocities ranged from 0.000062 ips (ambient vibration) to 0.000947 ips (plate compactor) and were at least 100 times less than values reported in the literature as potentially affecting hibernating bats.

Delaney (2002) cites studies suggesting vibration limits for construction vibrations around bat hibernacula, including 0.10 ips as a safe threshold to avoid disturbed hibernating bats and 0.02 ips as not detrimental to hibernating Indiana Bats. Additionally, it has been noted that bats appear to habituate to noise, and vibrations as evidenced by the many bat species that use bridges as roosts during the reproductive season and occasionally during hibernation (Summers et al. 2023).

However, the data cited above were collected under specific conditions and should not be considered for broad application. Like sound, vibrations attenuate with distance. Attenuation rates differ depending on rock or soil type (Amick and Gendreau 2000, Fang et al. 2023) and are frequency-dependent, with higher frequencies attenuating more rapidly with distance (Amick and Gendreau 2000). Therefore, specifics of substrate type, frequencies of vibrations produced at the source, and distance from receptors, and any known sensitivity of receptors to vibrations, need to be considered in vibration effects analysis. In relation to vibrations caused by mineral exploration drilling, research is focused on ways to reduce vibrations, which affect breakage and wear of drill components and drilling efficiency (for examples, see Ghasemloonia, Rideout, and Butt 2015, Pashchenko et al. 2024, Riane et al. 2022).

Therefore, there is no determination of a distance from potential bat roosts that vibrations would be considered to not likely affect roosting bats. However, evidence from Adams, Morrow, and Koebel (2018) suggests that roosts as near as 300 ft from drill sites are well outside the range would be affected by project drilling vibrations. There is potential for California leaf-nosed bat, Pale Townsend's big-eared bat, and Myotis bat roosts within the Project Area, but there are no

known locations. Any effects would be limited to the time that a drill pad was active, estimated to be approximately 1 week to 4 weeks, depending on the pad.

Bat species using echolocation may also have their ability to detect prey compromised by ultrasonic frequencies around active drill pads. With a 500-ft noise effect around active pads, approximately 26 ac would be affected at each pad, or approximately 52 ac if two pads were active. The effects would vary depending on the frequencies used by each species.

Small Mammals and Lizards

Small mammals, tortoises, and lizards, all of which are nongame species, could be affected by ground vibrations near the proposed drilling locations, causing loss of subsurface shelters and abandonment of the vicinity.

Aquatic Species

At least three and possibly four existing low water road crossings of Copper Creek on BLM lands would be used for the project (**Figure 4b**). The crossing upstream from the dam may be avoided entirely. Project traffic at Copper Creek crossings may affect aquatic species, all of which are nongame. Bunker Hill Road would be used to access numerous pads south of Copper Creek and would not require crossing the creek. For pads accessed via Copper Creek Road, project-specific activities would require several project vehicle crossings of Copper Creek per day. Depending on the active pad locations, one, two, or all three Copper Creek crossings would be used in a day as discussed in **Section 2.2.1**. Using the maximum vehicle width of 12 ft, a maximum daily use (i.e., vehicle driving on existing roads) of approximately 0.2 ac from proposed vehicles driving on existing roads through riparian areas is anticipated.

Seven project pads would potentially be accessed using the crossing immediately below the dam, and alternative routes that would use the downstream crossings may be used for some of those pads. Regular crossings at the dam location would be expected to occur only when drill pads requiring the use of this crossing for access are active. This is estimated to include daily crossings for multiple vehicles for periods estimated at less than 1 week to 4 weeks with an average of 2 weeks for each hole at up to nine drill pads. Where access roads pass near the three identified project springs, no new surface disturbance is planned. Hendetta and Bootlegger springs are on the outer perimeter of the Project Area and travel past those springs is expected to be only to the three pads that are accessed from the road that passes the springs. Hendetta Spring is mapped more than 350 ft from the existing road, outside of BLM land, and Bootlegger Spring is mapped more than 50 ft from the road (**Figure 4b**). Neither spring is closer than 500 ft from the nearest pad. Traffic passing Number 19 Spring would be limited to when the one pad accessed by that road is active. Number 19 Spring is more than 400 ft from the nearest access road and more than 600 ft from the nearest pad.

Groundwater pumping for the project could reduce the availability of surface water, crucial for aquatic species and other wildlife as a drinking source. Additionally, it may deplete shallow groundwater levels, adversely affecting riparian vegetation and leading to habitat degradation.

Game Species

A potential impact limited to game species in the Project Area is the availability of the species for hunting. Effects that could lead to reduced hunting success include a decrease in game species numbers and temporary avoidance by game species of project activity areas where hunters previously had success hunting.

Species Impact Summary

Groundwater pumping can reduce surface water availability and lead to loss of available breeding habitat, drinking water, forage, cover, and to mortality or inability to successfully move through the area. area. Drilling activities are expected to be ongoing at up to two pads at a time, 24 hours per day, 7 days per week, approximately 9 months out of the year (depending on periods of inclement weather and planned shutdowns, for up to 3 years). Proposed Action Alternative activities would cause an increase in ambient noise levels and nighttime lighting at up to two locations at a time within the Project Area for the duration of Proposed Action Alternative activities. Continuous construction disrupts wildlife behavior including communications, mating calls, and predator and prey interactions. Nighttime lighting can disorient nocturnal species, disrupt natural behaviors, and increase predation risks. Project design features outlined in **Section 2.2.10** would reduce potential impacts from lighting, fugitive dust, and erosion, and on sedimentation in water resources, but may not eliminate them entirely. Noise would further be reduced by drilling at less than the maximum possible rate. No vegetation clearing, drilling, or reclamation activities would occur within a 0.25-mile (approximately 1,320-foot) buffer from the centerline of Copper Creek riparian area during the yellow-billed cuckoo breeding season, which extends from May 25 through September 30 as depicted in **Figure 5** (enforced by BLM per the standards in 43 CFR 3809 and as a required design feature in the EA). A secondary muffler would be installed on drill rigs to reduce noise impacts by between 18-32 dBA.

Residual Impacts

Residual impacts after implementation of the design features in **Section 2.2.10** and reclamation would be the same as stated in the Species Impact Summary above.

3.4.1.3. CUMULATIVE IMPACTS

Past and Present Actions

The acreages of past and present actions and RFFAs in the 92,257 ac CESA (**Figure 6**) are listed in **Table 3-2**, as tallied from the BLM's Legacy Rehost System (LR2000) and Mineral & Lands Record System (MLRS) (active and expired = past and present actions; pending = RFFAs), the BLM National Operations Center, the National Interagency Fire Center, and estimates from Google Earth aerial photography. Those past and present actions within the CESA total approximately 2,000 ac (2.17 percent of the CESA). This includes current and expired mineral exploration and mining notices of intent and plans of operation, and mineral material disposal sites, totaling 111 ac (0.12 percent of the CESA); agricultural lands covering 1,000 ac (1.1 percent of the CESA); miscellaneous structures and fields totaling 250 ac (0.27 percent of the

CESA); fires since 2003 that have burned approximately 600 ac (0.65 percent) of the CESA, and 5 ac (<0.01 percent of the CESA) for reasonably foreseeable mining activities. Grazing allotments cover approximately 40,000 ac (43.4 percent) of the CESA.

Past and present actions that could have impacted and may be currently impacting game and nongame species habitat in the CESA include several activities. Mineral mining and exploration first started in the area in the early 1900s on private as well as State Trust and BLM lands. Mining and exploration activities included development of existing roads on approximately 5 ac of BLM lands, previous improvements for pads and roads on approximately 12 ac of BLM lands. Redhawk is conducting ongoing mineral exploration activities under a mining notice within the area of the Proposed Action. Activities under the notice impact 4.06 acres and are considered in the affected environment for this analysis. The White Cross Gypsum Mine is an active mine encompassing 80 acres of BLM lands south of Aravaipa Creek. The White Cross Mine operates seasonally during dry periods. Operations include ripping, scraping, screening, and loading gypsum for shipment to the cement kiln at Rialto, AZ via truck. A former in-situ copper mine operated on Copper Creek, west of the proposed exploration area. Past and present mining activity has resulted in degradation of water quality. ADEQ lists Upper Copper Creek as impaired for copper, iron, selenium, cadmium, and zinc (ADEQ 2024). Currently, there are remedial projects including evaporation ponds (depicted in aerial imagery in **Figure 5**) and monitoring wells (**Figure 4a)** near and within the Project Area to address those historical impacts of mining. Historic land uses for agriculture, ranching, and residences (land clearing, planting, fertilizer and pesticide use, water infrastructure, stock tanks, pumping, cisterns, fencing, road infrastructure, maintenance, livestock, feeding and supplements, etc.) have occurred in the area since the 1800s and continue today. A common land use is recreation, including hunting, dispersed camping, OHV use, and travel through the CESA to U.S. Forest Service land, Arizona State Land, or private land. Wildfires have been part of the landscape in the past and would likely have impacts in the future.

These uses are likely having and likely have had effects on wildlife from road-based travel, noise, and dust. Dispersed recreation and exploration may disrupt wildlife and possibly damage vegetation (from cross-country OHV travel or pad clearing). The AZGFD works to manage game species for healthy populations through the hunting tag program and considers nongame wildlife in hunting management. Wildfires damage existing wildlife habitat but enable recolonization by pioneer species and successional ecological communities.

Potential indirect impacts to game and nongame species habitat primarily would have resulted from surface disturbance associated with mineral mining and exploration, agriculture, ranching, and livestock grazing, infrastructure, dispersed recreation, and wildfires. Both game and nongame species may be negatively impacted by noise, nighttime lighting, and human presence, causing them to vacate the area while foraging. Nongame species, including bats, may be indirectly impacted by ultrasonic noise while foraging; reptiles, such as snakes and tortoises, as well as insects may be impacted by drilling vibrations; and there is potential for nighttime artificial lighting to impact species such as moths and bats, causing them to vacate the area. No drilling would occur within 0.25 miles of the riparian areas from May 25 to September 30

(**Figure 5**) and a secondary muffler would be installed on drill rigs to reduce noise impacts. Both game and nongame species may be negatively impacted by reduction in available surface water supply and degraded habitat including loss of available breeding habitat, drinking water, forage, cover, and lead to mortality or inability to successfully move through the area. Disturbance to game and nongame species habitat from past and present actions within the CESA would have been reduced to some degree through reclamation and seeding of disturbed areas and natural recolonization of native species.

RFFAs

Potential impacts to habitat from mineral exploration, agriculture, livestock grazing, associated infrastructure, dispersed recreation, and wildfires are expected to continue. As mentioned in **Section 3.3**, the BLM is expected to acquire the 7B Ranch from Resolution Copper as part of the Resolution Copper land exchange. The 7B Ranch is located within the CESA and would be a RFFA. This acquisition from private ownership to BLM-managed public land would impact game and nongame species beneficially as portions of the 7B parcel overlap with the Lower San Pedro Important Bird Area, an area along the San Pedro River noted for year-round species, breeding, and migration for bird species with mesquite bosque habitat (Arizona Important Bird Areas Program, 2011).

Cumulative Impacts Analysis

Under the Proposed Action Alternative, in combination with other past, present, and RFFAs, game and nongame species may be negatively impacted by road-based travel, dust, day and nighttime noise levels, drilling vibrations, artificial lighting at night, and habitat degradation. Potential impacts due to reduced water resource availability for game species and nongame species may include loss of available drinking water, forage, cover, and game and nongame species of wildlife mortality or abandonment of the Upper Copper Creek area. Accordingly, the Proposed Action Alternative, in combination with other past, present, and RFFAs, may result in changes to population trends for game or non-games species.

3.4.1.4. PREFERRED ACTION ALTERNATIVE ENVIRONMENTAL CONSEQUENCES

The Preferred Action Alternative environmental consequences would be similar to those of the Proposed Action Alternative but would include an AMP. Differences in effects would be limited to riparian and aquatic resources and the habitats and communities dependent on surface and groundwater resources. Only those differences are discussed in this section.

Under the Preferred Action Alternative, there is a risk of riparian and aquatic resource loss that could affect the suitability of the habitat and availability of surface and groundwater resources for game and nongame species. This could lead to loss of available breeding habitat, drinking water, forage, cover, and to game species mortality or abandonment of the area, or inability to successfully move through the area. Additional discussion of the potential effects of groundwater pumping is discussed below in **Section 3.4.4**. The AMP outlined in **Section 2.3.1** would obligate Redhawk and the BLM to enhanced resource monitoring in order to mitigate potential

groundwater drawdown effects from Preferred Action Alternative groundwater pumping. The implementation of the AMP would provide decision-makers with the tools and information needed to determine whether groundwater pumping under the Preferred Action Alternative is causing a specific water resource parameter to fall below a defined threshold. If BLM determines that project pumping is the cause, the AMP would trigger specific reductions in groundwater use for project purposes thereby reducing impacts to riparian and aquatic wildlife habitat.

Residual Impacts

Residual impacts after implementation of the AMP in addition to the design features in **Section 2.2.10** and reclamation would be the same as stated in the Game Species Summary and Nongame Species Impact Summary above.

3.4.1.5. CUMULATIVE IMPACTS

Past and Present Actions

Past and present actions are the same as for the Proposed Action Alternative.

RFFAs

RFFAs for the Preferred Action Alternative are the same as for the Proposed Action Alternative.

Cumulative Impacts Analysis

Under the Preferred Action Alternative, in combination with other past, present, and RFFAs, game and nongame species may be negatively impacted by road-based travel, dust, day and nighttime noise levels, drilling vibrations, artificial lighting at night, and habitat degradation. Potential impacts due to reduced water resource availability for game species and nongame species may include loss of available drinking water, forage, cover, and game and nongame species of wildlife mortality or abandonment of the Upper Copper Creek area.

The AMP outlined in **Section 2.3.1**, however, would obligate Redhawk and the BLM to enhanced resource monitoring to mitigate probable groundwater drawdown effects from Preferred Action Alternative groundwater pumping. The implementation of the AMP would provide decision-makers with methods and information to determine whether Preferred Action Alternative groundwater pumping is the cause of a specific water resource parameter falling below a threshold and triggered measures (specific reductions in groundwater use for project purposes for the Preferred Action Alternative). Because of the expected information associated with future implementation of the AMP under this alternative, it is expected that the cumulative impacts to game and nongame species would be lower than the cumulative impacts to game and nongame species under the Proposed Action Alternative over time.

3.4.1.6. NO ACTION ENVIRONMENTAL CONSEQUENCES

Under the No Action Alternative, impacts to game and nongame species and their habitats would be consistent with current land use, including recreation, camping, motorized all-terrain vehicle use, grazing, as well as the current noise-level associated with mineral exploration, which would be expected to continue at similar levels to current use in the Project Area and surrounding lands. Mineral exploration activities include Redhawk's exploration activities on Arizona State Trust Lands and Private lands as well as the activities on BLM- administered public lands outlined in their active Notice (Notice; AZAZ106362501). Under the No Action Alternative, the current notice-level mineral exploration activities would continue including the 4.06 acres of disturbance as well as the groundwater pumping, noise, light, dust, impacts from one drill rig operating at a time. Impacts from the current notice-level exploration activities are expected to continue through April 2026.

3.4.2. ISSUE STATEMENT 2

2. Across each alternative, what is the potential for impacts to occur to BLM sensitive species as well as threatened and endangered species within the Project Area (habitat degradation and loss, loss of surface water, noise pollution, and introduction of invasive species or spread of existing invasive species)?

3.4.2.1. AFFECTED ENVIRONMENT

The environmental conditions of the affected environment are the same as described in **Section 3.4.1.1**, Issue Statement 1. Special-status Species, including BLM Sensitive species and those with Endangered Species Act (ESA) status, rely on the vegetation in the Project Area for forage, shelter, and nesting. The aquatic habitat also serves as a crucial drinking water source for these species and supports aquatic and semi-aquatic species. Riparian vegetation adjacent to these aquatic resources offers additional forage, shelter, and nesting opportunities, attracting species that might otherwise be absent. These Special-status Species may also traverse the Project Area to access these vital resources.

The USFWS IPaC query (**Appendix E**) returned eleven species recommended for inclusion in an effects analysis for the Analysis Area and one additional species was identified based on AZGFD Environmental Reporting Tool (ERT) that predicted a range that intersects the Project Area. These twelve species are outlined below in **Table 3-4**. There are no AZGFD ERT records of occurrence of these species within 3 miles of the Project Area (**Appendix C**). There is no proposed or designated critical habitat within the Project Area (**Appendix E**). Species identified for further discussion are presented in **Section 3.4.2.2**.; all species are presented in **Appendix D**.

Table 3-4 ESA Species Summary

Species	Scientific Name	Listing Status	Presence in Project Area
Yellow-billed cuckoo (Western DPS)	*Coccyzus americanus*	Threatened	Possible.
Monarch butterfly	*Danaus plexippus*	Proposed Threatened	Possible.
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered	Not present.
Gila chub	*Gila intermedia*	Endangered	Not present.
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	Threatened	Not present.
Ocelot	*Leopardus pardalis*	Endangered	Not present.
Huachuca water-umbel	*Lilaeopsis schaffneriana var. recurva*	Endangered	Not present.
Chiricahua leopard frog	*Lithobates chiricahuensis*	Threatened	Not present.
Spikedace	*Meda fulgida*	Endangered	Not present.
Gila topminnow (including Yaqui)	*Poeciliopsis occidentalis*	Endangered	Not present.
Loach minnow	*Rhinichthys [=Tiaroga] cobitis*	Endangered	Not present.
Mexican spotted owl	*Strix occidentalis lucida*	Threatened	Not present.

The AZGFD ERT (**Appendix C**) indicates that AZGFD models predict the ranges of 20[9] BLM Sensitive fish and wildlife species intersect the Project Area. Of the species considered, the lowland leopard frog is the only one with an AZGFD ERT record indicating its presence within 3 miles of the Project Area (see **Appendix C**). Additionally, AZGFD has also informed the BLM of records for the Sonoran desert tortoise occurring within the same proximity to the Project Area.

The following determinations of potential to occur within the Project Area were made for these species:

Table 3-5 BLM Sensitive Status Species Summary

Species Name	Scientific Name	Presence in Project Area
Pima/Parish's Indian mallow	*Abutilon parishii*	Not present.
Northern goshawk	*Accipiter gentilis atricapillus*	Not present.
Murphey (Hohokam) agave	*Agave murpheyi*	Not present.

[9] This excludes any BLM-sensitive species that have ESA status, which are discussed separately.

Species Name	Scientific Name	Presence in Project Area
Longfin dace	*Agosia chrysogaster*	Not present.
Arizona grasshopper sparrow	*Ammodramus savannarum ammolegus*	Not present.
Kearney's blue star	*Amsonia kearneyana*	Not present.
Arizona toad	*Anaxyrus microscaphus*	Not present.
Sonoran green toad	*Anaxyrus retiformis*	Not present.
Sonoran pronghorn	*Antilocapra americana sonoriensis*	Not present.
Arizona striped whiptail	*Aspidoscelis arizonae*	Not present.
Dalhousie spleenwort	*Asplenium dalhousiae*	Not present.
Huachuca milkvetch	*Astragalus hypoxylus*	Not present.
Western burrowing owl	*Athene cunicularia hypugaea*	Not present.
Ferruginous hawk	*Buteo regalis*	Possible.
Mexican gray wolf	*Canis lupus baileyi*	Not present.
Giant Sedge	*Carex spissa*	Possible.
Desert sucker	*Catostomus clarkii*	Not present.
Bluehead sucker	*Catostomus discobolus*	Not present.
Sonora sucker	*Catostomus insignis*	Not present.
Little Colorado sucker	*Catostomus sp.*	Not present.
Mexican long-tongued bat	*Choeronycteris mexicana*	Possible.
Gilded flicker	*Colaptes chrysoides*	Possible.
Townsend's big-eared bat	*Corynorhinus townsendii*	Present.
Pima pineapple cactus	*Coryphantha scheeri var. robustispina*	Not present.
New Mexico ridge-nosed rattlesnake	*Crotalus willardi obscurus*	Not present.
Gunnison's prairie dog	*Cynomys gunnisoni*	Not present.
Black-tailed prairie dog	*Cynomys ludovicianus*	Not present.
Desert pupfish	*Cyprinodon macularius*	Not present.
Gentry indigo bush	*Dalea tentaculoides*	Not present.
Banner-tailed kangaroo rat	*Dipodomys spectabilis*	Not present.
Nichol's Turk's Head cactus	*Echinocactus horizonthalonius var. nicholii*	Not present.
Arizona hedgehog cactus	*Echinocereus triglochidiatus var. arizonicus*	Not present.
Acuña cactus	*Echinomastus erectocentrus var. acuñensis*	Not present.
Fish Creek fleabane	*Erigeron piscaticus*	Not present.
San Pedro River wild buckwheat	*Eriogonum terrenatum*	Not present.
Round-leaf broom	*Errazurizia rotundata*	Not present.
Arizona eryngo	*Eryngium sparganophyllum*	Not present.
Spotted bat	*Euderma maculatum*	Possible.
Greater western mastiff bat	*Eumops perotis californicus*	Possible.
Northern aplomado falcon	*Falco femoralis septentrionalis*	Not present.
American peregrine falcon	*Falco peregrinus anatum*	Possible.

Species Name	Scientific Name	Presence in Project Area
Great Plains narrow-mouthed toad	*Gastrophryne olivacea*	Not present.
Roundtail chub	*Gila robusta*	Not present.
Sonoran desert tortoise	*Gopherus morafkai*	Possible.
Bartram stonecrop	*Graptopetalum bartramii*	Not present.
California condor	*Gymnogyps californianus*	Not present.
Pinyon jay	*Gymnorhinus cyanocephalus*	Not present.
Rutter's false goldenaster, Huachuca golden aster	*Heterotheca rutteri*	Not present.
Texas purple-spike, Purple-spike Coralroot	*Hexalectris warnockii*	Not present.
Allen's big-eared bat	*Idionycteris phyllotis*	Possible.
Sonora mud turtle	*Kinosternon sonoriense sonoriense*	Present.
California black rail	*Laterallus jamaicensis coturniculus*	Not present.
Little Colorado spinedace	*Lepidomeda vittata*	Not present.
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	Possible.
Plains leopard frog	*Lithobates blairi*	Not present.
Northern leopard frog	*Lithobates pipiens*	Not present.
Lowland leopard frog	*Lithobates yavapaiensis*	Present.
California leaf-nosed bat	*Macrotus californicus*	Possible.
Arizona myotis	*Myotis occultus*	Possible.
Cave myotis	*Myotis velifer*	Possible.
Jaguar	*Panthera onca*	Not present.
Peebles Navajo cactus	*Pediocactus peeblesianus var. peeblesianus*	Not present.
Chihuahua breadroot (scurfpea)	*Pediomelum pentaphyllum*	Not present.
Clifton rockdaisy	*Perityle ambrosiifolia*	Not present.
Arizona Botteri's sparrow	*Peucaea botterii arizonae*	Not present.
Desert purple martin	*Progne subis hesperia*	Possible.
Bylas springsnail	*Pyrgulopsis arizonae*	Not present.
Yuma Ridgway's rail	*Rallus longirostris yumanensis*	Not present.
Speckled dace	*Rhinichthys osculus*	Not present.
Aravaipa sage	*Salvia amissa*	Possible.
Slevin's bunchgrass lizard	*Sceloporus slevini*	Not present.
Desert massasauga	*Sistrurus tergeminus [=catenatus] edwardsii*	Not present.
Sonoran talussnail	*Sonorella magdalenensis*	Not present.
California least tern	*Sternula [=Sterna] antillarum browni*	Not present.
Arizona cave amphipod	*Stygobromus arizonensis*	Not present.
Desert ornate box turtle	*Terrapene ornata*	Not present.
Northern Mexican gartersnake	*Thamnophis eques megalops*	Not present.
Narrow-headed gartersnake	*Thamnophis rufipunctatu*	Not present.
Aravaipa woodfern	*Thelypteris puberula var. sonorensis*	Not present.

Species Name	Scientific Name	Presence in Project Area
LeConte's thrasher	*Toxostoma lecontei*	Not present.
Gila tryonia	*Tryonia gilae*	Not present.
Tumamoc globeberry	*Tumamoca macdougalii*	Not present.
Arizona Sonora rosewood	*Vauquelinia californica ssp. Sonorensis*	Not present.
Razorback sucker	*Xyrauchen texanus*	Not present.

A Candidate Conservation Agreement (CCA)[10] has been implemented for the Sonoran desert tortoise (USFWS and Arizona Interagency Desert Tortoise Team 2015).

WestLand confirmed the presence of lowland leopard frogs in the 0.5-mile wetted reach of Copper Creek immediately downstream from the dam during a site visit on October 27, 2022, but no lowland leopard frogs were found on that date between Saloon Canyon and the constricted portion of the creek (**Figure 4b**). Lowland leopard frogs were also documented in 2005, 2008, 2023, and 2024 by BLM staff.

During field investigations that included the Project Area in July and August 2012, WestLand also confirmed the presence of Sonora mud turtles in Copper Creek and found potential California leaf-nosed bat sign and myotis bats of unknown species (WestLand 2012).

Surveys for two BLM Sensitive plant species, Aravaipa sage and big sedge, conducted on the wetted portions of Copper Creek between the dam and the constricted part of the creek by WestLand under direction from the BLM on October 27, 2022, resulted in no detections of the species. In addition, the Bootlegger Spring area has the potential to provide suitable habitat for the lowland leopard frog and Sonora mud turtle on a temporary basis.

3.4.2.2. PROPOSED ACTION ALTERNATIVE ENVIRONMENTAL CONSEQUENCES

The Proposed Action may directly affect BLM Sensitive and ESA species within the Project Area. There is a potential risk of harassment, injury, and mortality of individual wildlife. Direct impacts to individual BLM Sensitive and ESA species would result from ground disturbance or collisions with vehicles. Potential sources of indirect effects are habitat degradation and disturbance through human presence, approximately 18 ac of ground disturbance and introduction of invasive species or spread of existing invasive plant species, noise and vibrations, nighttime lighting, fugitive dust, resulting from traffic, road improvements, drill site operations, and remediation activities. The resulting indirect effects could include decreases in foraging success, access to shelter and surface water, avoidance of predators, detection of prey, and breeding and other behaviors of BLM Sensitive and ESA species, including life functions of

[10] Species with a CCA do not have ESA protection and are not Candidates for ESA listing but the CCAs include conservation measures that each signatory has committed to following. CCAs factor in the decisions that the species covered under the CCA do not warrant listing under the ESA. The BLM is signatory to the Sonoran desert tortoise CCA.

aquatic species. BLM Sensitive and ESA species would temporarily vacate or avoid those portions of the Project Area where surface disturbing and/or drilling activities are occurring.

Each of the above potential direct and indirect impacts are described in detail in **Section 3.4.1.3**. These direct and indirect impacts would potentially affect ESA and BLM Sensitive species in the same ways as the game and nongame species. Effects on specific species and groups of species are discussed below.

Yellow-billed Cuckoo

Yellow-billed cuckoo could potentially occur in the Project Area.

The largest riparian vegetation patch on Upper Copper Creek between the dam area and the constricted area of Copper Creek (**Figure 4b**) that could potentially support habitat suitable for the yellow-billed cuckoo is 4.5 ac in size. Although the riparian habitat in this area typically lacks a closed canopy, it transitions to upland vegetation, which may offer foraging opportunities. While some patches lie partially or entirely outside of the Project Area, which lies within semidesert grassland, the entire stretch from the dam to the channel constriction has been included in this evaluation for a comprehensive analysis. Yellow-billed cuckoo has been observed nesting outside of areas dominated by typical riparian tree species, such as in Madrean evergreen woodland oak trees often with mesquite trees flanking the riparian strip (USFWS 2021). This suggests that, under certain conditions, the species could use riparian habitat like that found in the Project Area for foraging or transient activity. Madrean evergreen woodland habitat greater than 11 square miles in size lies approximately 0.8 miles north of the 4.5 ac riparian patch mentioned above. This suggests another location within the Cumulative Effects Study Area that could potentially be suitable for yellow-billed cuckoo. However, this habitat is outside of public lands managed by the BLM and the Project Area.

The nearest known nesting habitat for the species occurs on the San Pedro River near its confluence with Copper Creek, approximately 8 miles west of the Analysis Area. The confluence is within designated Critical Habitat Unit AZ-15 for the species and includes 119 miles of the Lower San Pedro River, covering 23,400 acres (USFWS 2021a)Yellow-billed cuckoos were documented foraging up to 0.5 mile from their nest site (USFWS 2021). Telemetry data reports the potential for yellow-billed cuckoo to travel >0.31 miles (500m) per day and >1.86 miles (3000m) within the breeding season (White et al. 2020). These studies suggest that the 8-mile distance to the Project Area is farther than a nesting cuckoo would travel to forage, especially with the vastly larger resources available on the San Pedro River. Non-breeding or migratory birds may utilize the small riparian patches in the Project Area. While the critical habitat on the San Pedro River offers an expansive and highly suitable breeding and foraging environment, the smaller riparian patches in the Analysis Area could still provide occasional habitat resources, making it possible for individuals to occur there, even if primarily on a transient basis while passing through.

The AZGFD ERT screening produced no yellow-billed cuckoo records within 3 miles of the Project Area. Although the habitat patches are small, suitable nesting and foraging habitat may exist. The riparian corridor may also be used by transients during migration or dispersal.

Surveys were initiated by WestLand in 2024 and would continue to be completed by USFWS-trained, 10(a) 1(A) permitted, and experienced persons familiar with yellow-billed cuckoo vocalizations. A full season of surveys consists of a minimum of four survey visits within three specified survey periods, between June 15 and August 15, to ensure 95 percent probability of detecting cuckoos in the area during the breeding season (Halterman et al. 2016, USFWS and Reclamation 2021). Prior to the start of surveys, the BLM and USFWS would be notified of the survey dates and details. Survey results would be shared with BLM in addition to reporting to USFWS.

A lowered groundwater table would likely affect riparian vegetation and suitability for yellow-billed cuckoo if they use the proposed Project Area for nesting, foraging, and dispersal. However, the AMP for water resources would be implemented to reduce degradation of water resources, including riparian habitat. Effects from the Proposed Action Alternative on riparian habitat includes the following:

- **Vegetation Removal**: **Figure 5** depicts riparian vegetation as well as a 0.25 mi buffer along Upper Copper Creek in the Project Area. There is no surface disturbance related to the drill pads and roads within the riparian vegetation area; no riparian vegetation would be removed as part of exploration activities. No additional surface riparian vegetation would be removed as part of the Proposed and Preferred Alternatives. The Proposed Alternative includes a design feature wherein no vegetation clearing, drilling, or reclamation would occur within the 0.25 mi buffer of the centerline of Copper Creek riparian areas during the yellow-billed cuckoo breeding season, from May 25 through September 30. However, groundwater pumping could potentially result in the loss of riparian vegetation along Copper Creek.

- **Noise Effects**: The noise effects from the nearest drill pad to riparian vegetation (located 500 ft away) are expected to attenuate to no more than 57.2 dBA at the edge of the vegetation (WestLand 2024, WKC Group 2024; accessed May 1, 2024). This is below the 69 dBA threshold recommended by the USFWS for noise reduction measures to protect other federally listed birds that is expected to be similar for the yellow-billed cuckoo (USFWS 2012). Further, a study by Dillon and Moore (2020) found no significant difference in flushing rates from nests for four species of riparian obligate birds exposed to construction noise compared to control birds of the same species not subjected to such noise. The construction noise in that study was broadcast at 85 dBA, which is lower than the assumed maximum noise from the Proposed Action pads (86.3 dBA) at distances ranging from 164 to 1,312 ft from the nests. A secondary muffler would also be installed on drill rigs to reduce noise impacts by between 18-32 dBA.

- **Lighting Effects:** Artificial lighting from the Project has the potential to impact migratory birds including the yellow-billed cuckoo. Beyond habitat avoidance or attraction, artificial lighting can:
    - Disrupt circadian rhythms, affecting sleep, hormone production, and metabolic processes in birds, mammals, amphibians, and insects.
    - Alter migratory navigation for nocturnal species, particularly birds and some bat species.
    - Suppress melatonin production, which plays a role in immune function and reproduction.
    - Interfere with insect populations, many of which are drawn to light sources, leading to increased mortality and reduced prey availability for insectivores.
    - While yellow-billed cuckoo forage during the daytime, design features for nighttime lighting at the drilling locations would attenuate lighting effects by more than 99 percent within a distance of less than 90 ft from the lighting sources. This attenuation ensures that the riparian habitat remains minimally affected by artificial lighting. Localized behavioral disruptions may still occur for species sensitive to artificial lights.

Monarch Butterfly

Species-specific surveys for monarch butterflies or milkweed were not conducted within the Project Area. However, suitable milkweed and foraging habitat are likely present. Monarch butterflies have been recorded approximately 7 miles southwest of the Project Area, and milkweed has been documented approximately 0.5 mile to the north (The Xerces Society for Invertebrate Conservation 2023), indicating the species has potential to occur within the Project Area.

Although ground disturbance is limited and primarily confined to previously disturbed areas, it may result in injury or mortality of individual monarch butterflies and damage or loss of individual milkweed and other foraging plants. However, given the small footprint of disturbance and its concentration in already disturbed areas, such impacts are not expected to jeopardize the continued existence of the species.

Raptors

Special-status species raptors could potentially be present in the Project Area for foraging. As noted in **Section 3.4.2.1** and **Appendix D**, there are no suitable nesting sites within the Project Area for the peregrine falcon, it is unlikely that there are any suitable nesting sites for the golden eagle and the Project Area is outside the known breeding range of the ferruginous hawk. Foraging resources (prey) would be affected at active pad sites and within the 18 ac of disturbance areas until the areas had recovered from the disturbance. Design features and BMPs for disturbance and vegetation described in **Section 2.2.10** were included to reduce these impacts.

Other Birds

Other special-status species of birds could avoid nesting in the areas surrounding active drill pads and lose nesting and roosting opportunities within the 18 acres of direct disturbance until vegetation recovers. Birds may also avoid nesting and foraging near drill pads due to noise disturbance, and noise may interfere with vocal communication around active sites. A 500-foot noise effect radius around each active drill pad would encompass approximately 26 acres per pad, or up to 52 acres if two pads are active simultaneously. This temporary displacement may increase competition for resources in adjacent habitats.

To reduce these impacts, design features and best management practices (BMPs) for disturbance, vegetation, and noise described in **Section 2.2.10** have been incorporated. Noise impacts would be mitigated using secondary mufflers on drilling rigs—specifically, the Harco Manufacturing Company's VRS Series Silencer (model 1442vrs 4x5 SI SO SP, DWG#119245), which are expected to attenuate noise levels by 18–32 dBA. This noise reduction is anticipated to shrink the disturbance radius and lessen the likelihood of behavioral impacts such as nest abandonment, communication disruption, and foraging avoidance in nearby special-status bird species.

Bats

Special-status species of bats could be affected by nighttime lighting, noise, and vibrations generated by drilling operations, which may interfere with affecting their foraging success, navigation, and communication in the surrounding area. In response, bats species may temporarily disperse from the affected area to forage or roost elsewhere. Changes in vegetation and increased dust could reduce the availability of insects and other small prey, indirectly impacting bat foraging on. Lighting may either attract or repel bat prey, furthering altering prey availability.

A 500-ft noise effect radius around active drill pads would encompass approximately 26 ac at an active pad, or up to 52 ac if two pads are active simultaneously. However, noise effects on bats are expected to be minimal due to mitigation provided by installation of secondary mufflers on drilling rigs. The model of muffler to be installed is Harco Manufacturing Company's VRS Series Silencer (1442vrs 4x5 SI SO SP, DWG#119245), which provides sound attenuation of approximately 18–32 dBA. The use of a secondary muffler system is anticipated to reduce peak noise levels generated by drilling operations, resulting in a smaller disturbance radius and minimizing the likelihood of noise-related disruption to bats. Most bat species are more sensitive to high-frequency sounds, and the lower-frequency mechanical noise associated with drilling.

However, the muffler system does not mitigate ground vibrations generated by drilling activities. Vibrations generated by drilling can travel through the ground and may affect sensitive bat species, particularly if roosting sites are nearby. The potential for impact depends on factors such as soil composition, distance from the source, and species-specific sensitivity. Vibrations from drilling could disturb roosting bats attenuation rate of higher frequencies. Vibrations from drilling could potentially affect bat roosts. Design features and BMPs for disturbance, vegetation, and noise described in **Section 2.2.10** have been incorporated to reduce the potential impacts from these combined stressors were included to reduce these impacts.

Riparian-Dependent Species

Special-status riparian-dependent wildlife species in the area include the lowland leopard frog and the Sonora (or desert) mud turtle. Lowland leopard frogs primarily breed from January to May, with a secondary breeding period following summer monsoons in some populations (AZGFD 2023). The Sonora mud turtle is generally active year-round but becomes less active from December through February, particularly at higher elevations where it may become inactive during winter months (Rorabaugh 2019).

Project-related groundwater pumping has the potential to reduce or eliminate surface water flows that are critical to the survival of species such as the Sonora mud turtle and lowland leopard frog. The loss of surface water can disrupt breeding, foraging, and thermoregulation behaviors, potentially leading to local extirpation if alternative habitats are unavailable or inaccessible. In addition, sedimentation from roads and low water road crossings poses a significant threat to lowland leopard frogs by degrading the quality and availability of their aquatic habitats. Increased sediment loads can fill in or alter the structure of breeding pools and streams, thereby reducing suitable habitat for egg laying, larval development, and foraging. Fine sediments can smother eggs, limit oxygen exchange and increase mortality rates. Tadpoles are particularly vulnerable, as sediment can clog their gills and cover grazing surfaces, impairing their ability to feed. Sedimentation also impacts water quality by increasing turbidity, which can limit light penetration and disrupt aquatic vegetation growth. This affects habitat complexity and reduces shelter and food availability for both tadpoles and adult frogs. Additionally, sedimentation can negatively affect aquatic invertebrate populations, which are a primary food source for lowland leopard frogs throughout their life stages.

Vehicles crossing Copper Creek when water is present could crush individuals or eggs. Although adults of both species use upland areas, it is unlikely that either species would be found on Proposed Action drill pads even absent project implementation. Design features and BMPs described in **Section 2.2.10** were included to reduce impacts to aquatic species

Noise, vibrations, nighttime lighting, and fugitive dust, resulting from traffic, road improvements, drill site operations, and reclamation activities could cause the lowland leopard frog and Sonora mud turtle to temporarily avoid those portions of the Project Area where surface disturbing and/or drilling activities are occurring; however, the potential for those impacts is low. Approximately 0.8 acres of existing roadbed through riparian areas would be directly impacted by project activities. These species have a low potential both spatially and temporally for occurring in the upland areas where surface disturbing activities would occur.

If changes in surface water were to occur, there would be impacts to their shelter, foraging and reproduction. Changes in habitat may increase their exposure to predations.

Sonoran Desert Tortoise

The Sonoran desert tortoise has the potential to occur within the Project Area. WestLand has observed Sonoran desert tortoises on the lower slopes of the Galiuro Mountains, approximately 5 to 6 miles southwest of the Project Area. Additionally, AZGFD has reported records of Sonoran

desert tortoises within 3 miles of the Project Area. The AZGFD considers the Project Area to be occupied by Sonoran desert tortoises with the uppermost reaches of the project site having marginal habitat for the species.

As the Sonoran desert tortoise is covered under a CCA (described in **Section 3.4.2.1**), the BLM, AZGFD, and WestLand conducted a site visit on April 18, 2024 to conduct a survey for Sonoran desert tortoise. While tortoises were not identified during the survey, AZGFD and BLM determined suitable tortoise habitat is present in the Project Area (**Appendix D**).

Sonoran desert tortoises in the Project Area could be directly impacted by vehicle collisions, shelters could be destroyed during pad preparations, and potential forage within the disturbance areas would be lost until vegetation had recovered from the disturbance. Additionally, the use of water trucks for dust control on roads may prompt tortoises to leave their shelters due to the scent of water and damp soil, which could be perceived by them as a drinking opportunity (AZGFD pers. comm. to BLM and WestLand, April 18, 2024).

Design features and BMPs for disturbance, vegetation, and vehicle or equipment collisions described in **Section 2.2.10** are included to reduce these impacts. These measures include a WEAP that would have specific information for the species. The WEAP would be presented to Redhawk staff by a Westland biologist and all onsite workers would be required to complete the WEAP training prior to onsite work. A 10-mph speed limit would be enforced on site and if a Sonoran desert tortoise is observed in the Project Area, the Sonoran desert tortoise would be moved by a person with a permit issued by the AZGFD per their guidance (AZGFD 2014). Other design features and BMPs developed that are relevant to reduce potential impacts to Sonoran desert tortoises include construction of all sumps and other small excavations with a sloped end for egress to preclude access and backfilling or covering after completion of drilling activities; prohibiting harassment of wildlife; requiring all vehicle operators to inspect the work area and beneath all vehicles and equipment for wildlife prior to starting and moving equipment; and adjusting any new disturbance to avoid impacts to sensitive biological resources.

No impacts likely to lead to a loss of viability or result in a trend toward federal listing are anticipated for any BLM Sensitive species. The information is summarized for all these species in further detail in **Appendix D**.

Species Impact Summary

Groundwater pumping can reduce surface water availability and lead to loss of available breeding habitat, drinking water, forage, cover, and to mortality or inability to successfully move through the area. Drilling activities are expected to be ongoing at up to two pads at a time, 24 hours per day, 7 days per week, approximately 9 months out of the year (depending on periods of inclement weather and planned shutdowns, for up to 3 years). Proposed Action Alternative activities would cause an increase in ambient noise levels and nighttime lighting at up to two locations at a time within the Project Area for the duration of Proposed Action Alternative activities. Continuous construction disrupts wildlife behavior including communications, mating calls, and predator and prey interactions. Nighttime lighting can disorient nocturnal species,

disrupt natural behaviors, and increase predation risks. Project design features outlined in **Section 2.2.10** would reduce potential impacts from lighting, fugitive dust, and erosion, and on sedimentation in water resources, but may not eliminate them entirely. Noise would further be reduced by drilling at less than the maximum possible rate, to keep drill holes straight. No vegetation clearing, drilling, or reclamation activities would occur within a 0.25-mile (approximately 1,320-foot) buffer from the centerline of Copper Creek riparian area during the yellow-billed cuckoo breeding season, which extends from May 25 through September 30 as dep (enforced by BLM per the standards in 43 CFR 3809 and as a required design feature in the EA, see also **Figure 5**). A secondary muffler would be installed on drill rigs to reduce noise impacts by between 18-32 dBA. Impacts to ESA and BLM Sensitive species may cause loss of ability to forage, reproduce, or find shelter that would lead to decreased population stability in some species. Design features outlined in **Section 2.2.10** can reduce impacts from surface disturbance, lighting, noise and vibrations, fugitive dust, erosion, and sedimentation to water resources in the Project Area, but may not eliminate them entirely.

Residual Impacts

Residual noise impacts following implementation of the design features outlined in **Section 2.2.10**, including installation of a secondary muffler on drilling equipment would be reduced compared to unmitigated conditions. The Harco Manufacturing Company's VRS Series Silencer (Model 1442vrs 4x5 SI SO SP, DWG#119245), which provides 18–32 dBA of attenuation, is anticipated to decrease the extent and intensity of noise disturbance around active drill pads. However, species sensitive to noise may still avoid areas with active disturbance. Residual effects post-implementation and reclamation would remain consistent with those described in the Species Impact Summary.

3.4.2.3. CUMULATIVE IMPACTS

Past and Present Actions

The acreages of past and present actions and RFFAs in the 92,257-acre CESA (**Figure 6**) are listed in **Table 3-2**, as tallied from the BLM's MLRS (active and expired = past and present actions; pending = RFFAs), the BLM National Operations Center, the National Interagency Fire Center, and estimates from Google Earth aerial photography. Those past and present actions within the CESA total approximately 2,000 ac (2.17 percent of the CESA). This includes current and expired mineral exploration and mining notices and plans of operation, and mineral material disposal sites, totaling 111 ac (0.12 percent of the CESA); agricultural lands covering 1,000 ac (1.08 percent of the CESA); miscellaneous structures and fields totaling 250 ac (0.27 percent of the CESA); fires since 2003 that have burned approximately 600 ac (0.65 percent) of the CESA; and 5 ac (<0.01 percent of the CESA) for reasonably foreseeable mining activities. Grazing allotments cover approximately 40,000 ac (43.36 percent) of the CESA.

Past and present actions that could have impacted and may be currently impacting BLM Sensitive species and ESA species and their habitat in the CESA include several activities. Mineral mining and exploration first started in the area in the early 1900s on private as well as

State Trust and BLM lands, which depending on the species could include physical, noise, and light impacts to individuals and their habitat. Those activities include existing road improvements on approximately 5 ac of BLM lands, previous improvements for pads and roads on approximately 12 ac of BLM lands. Redhawk is conducting ongoing mineral exploration activities under a mining notice within the area of the Proposed Action. Activities under the notice impact 4.06 acres and are considered in the affected environment for this analysis. The White Cross Gypsum Mine is an active mine encompassing 80 acres of BLM lands south of Aravaipa Creek. The White Cross Mine operates seasonally during dry periods. Operations include ripping, scraping, screening, and loading gypsum for shipment to the cement kiln at Rialto, AZ via truck. A former in-situ copper mine operated on Copper Creek, west of the proposed exploration area. Mining activity has also resulted in degradation of water quality. ADEQ lists Upper Copper Creek as impaired for copper, iron, selenium, cadmium, and zinc (ADEQ 2024). Currently, there are remedial projects including evaporation ponds and monitoring wells near and within the Project Area to address those historical impacts of mining. Historic land uses for agriculture, ranching, and residences (land clearing, planting, fertilizer and pesticide use, water infrastructure, stock tanks, pumping, cisterns, fencing, road infrastructure, maintenance, livestock, feeding and supplements, etc.) have occurred in the area since the 1800s and continue today. A common land use is recreation including hunting, dispersed camping, OHV use, and travel through the CESA to U.S. Forest Service land, Arizona State Land, and private land. Wildfires have been part of the landscape in the past and would likely have impacts in the future.

Potential indirect impacts to BLM Sensitive species habitat in the CESA primarily would have resulted from surface disturbance and degraded water quality associated with mineral mining and exploration, agriculture, ranching, and livestock grazing, infrastructure, dispersed recreation, and wildfires. Disturbance to BLM Sensitive species habitat from past and present actions within the CESA would have been reduced to some extent through reclamation and seeding of disturbed areas and natural recolonization of native species.

RFFAs

Potential impacts to BLM Sensitive and threatened and endangered species from mineral exploration, agriculture, livestock grazing, associated infrastructure, dispersed recreation, and wildfires are expected to continue. As mentioned in **Section 3.3**, the BLM is expected to acquire the 7B Ranch as part of the Resolution Copper land exchange. The 7B Ranch is located within the CESA and would be a RFFA. This acquisition from private ownership to BLM-managed public land would impact BLM sensitive species as well as threatened and endangered species within the Project Area beneficially as portions of the 7B parcel overlap with the Lower San Pedro Important Bird Area, an area along the San Pedro River noted for year-round species, breeding, and migration for bird species with mesquite bosque habitat (Arizona Important Bird Areas Program, 2011). The regional Lower San Pedro Important Bird Area supports populations of southwestern willow flycatcher and western yellow-billed cuckoo, which depend on intact riparian habitat for survival. Due to the relatively low pumping rate and relatively low annual

volume proposed for pumping, no project attributable discernible cumulative impacts to inflows, either surface or groundwater, to the San Pedro River are anticipated.

Cumulative Impacts Analysis

The Proposed Action Alternative, in combination with other past, present, and RFFAs, may cause BLM sensitive species and ESA species to be negatively impacted by road-based travel, dust, day and nighttime noise levels, drilling vibrations, artificial lighting at night, and habitat degradation. Potential impacts due to reduced water resource availability may reduce aquatic resource availability for species that rely on water resources associated with Upper Copper Creek, leading to loss of breeding habitat, drinking water, forage, cover, and mortality or abandonment of the Upper Copper Creek area. Accordingly, the Proposed Action Alternative, in combination with other past, present, and RFFAs, is expected to result in changes to population trends for BLM-sensitive or threatened and endangered species.

3.4.2.4. PREFERRED ACTION ALTERNATIVE ENVIRONMENTAL CONSEQUENCES

The Preferred Action Alternative environmental consequences would be similar to those of the Proposed Action Alternative but would include an AMP and associated monitoring. Differences in effects would be limited to aquatic resources and the plants and wildlife dependent on those resources. Only those differences are discussed in this section.

Species Impact Summary

Under the Preferred Action Alternative, there is a risk of riparian and aquatic resource loss that could affect the suitability of the habitat for the federally threatened yellow-billed cuckoo and BLM Sensitive species reliant on these resources, specifically the lowland leopard frog and Sonora mud turtle. This could lead to degradation and loss of available breeding habitat, drinking water, forage, cover, and mortality or abandonment of the area for these species. The AMP outlined in **Section 2.3.1** would obligate Redhawk and the BLM to enhanced resource monitoring to mitigate potential groundwater drawdown effects from Preferred Action Alternative groundwater pumping. The implementation of the AMP would provide decision-makers with the tools and information needed to determine whether groundwater pumping under the Preferred Action Alternative is causing a specific water resource parameter to fall below a defined threshold. If BLM determines that project pumping is the cause, the AMP would trigger specific reductions in groundwater use for project purposes thereby reducing impacts to riparian and aquatic habitat for BLM sensitive and listed species.

Residual Impacts

Residual impacts after implementation of the design features in **Section 2.2.10** and reclamation would be the same as stated in the Species Impact Summary above.

3.4.2.5. CUMULATIVE IMPACTS

Past and Present Actions:

Past and present actions are the same as for the Proposed Action Alternative.

RFFAs

RFFAs for the Preferred Action Alternative are the same as for the Proposed Action Alternative.

Cumulative Impacts Analysis

The Preferred Action Alternative, in combination with other past, present, and RFFAs, may reduce aquatic resource availability for BLM Sensitive species that rely on water resources associated with Upper Copper Creek, leading to loss of breeding habitat, drinking water, forage, cover, and mortality or abandonment of the Upper Copper Creek area. The AMP outlined in **Section 2.3.1**, however, would obligate Redhawk and the BLM to enhanced resource monitoring to mitigate probable groundwater drawdown effects from Preferred Action Alternative groundwater pumping. The implementation of the AMP would provide decision-makers with methods and information to determine whether Preferred Action Alternative groundwater pumping is the cause of a specific water resource parameter falling below a threshold and triggered measures (specific reductions in groundwater use for project purposes for the Preferred Action Alternative) when the BLM determines that project groundwater pumping is the cause of a specific water resource parameter falling below the threshold. Because of the expected information associated with future implementation of the AMP under this alternative, it is expected that the cumulative impacts to BLM Sensitive species, including threatened and endangered species, would be lower than the cumulative impacts to these species under the Proposed Action Alternative over time.

3.4.2.6. NO ACTION ENVIRONMENTAL CONSEQUENCES

Under the No Action Alternative, impacts to BLM Sensitive species and ESA species would be consistent with current land use, including recreation, camping, driving motorized all-terrain vehicles, grazing, as well as mineral exploration, which would be expected to continue at similar levels to current use in the Project Area. Mineral exploration activities include Redhawk's exploration activities on Arizona State Trust Lands and Private lands as well as the activities on BLM- administered public lands outlined in their active Notice (Notice; AZAZ106362501). Under the No Action Alternative, the current notice-level mineral exploration activities would continue including the 4.06 acres of disturbance as well as the groundwater pumping, noise, light, dust, impacts from one drill rig operating at a time. Impacts from the current notice-level exploration activities are expected to continue through April 2026.

3.4.3. ISSUE STATEMENT 3

3. The Project Area is within a wildlife connectivity area identified by the Arizona Game and Fish Department; how would each alternative impact wildlife connectivity and movements?

3.4.3.1. AFFECTED ENVIRONMENT

The AZGFD ERT report (**Appendix C**) cites the Santa Catalina/Rincon – Galiuro Connectivity Assessment as including portions of the Project Area. The Santa Catalina/Rincon – Galiuro Linkage Design was the result of modeling the biologically best corridors connecting the Santa Catalina and Rincon Mountains to the Galiuro Mountains (the three Wildland Blocks) for 18 focal species. The Connectivity Assessment identifies numerous potential corridors connecting the Wildland Blocks, or areas with a long-term prospect of serving as wildlife habitat (AZGFD 2012). The northernmost of the corridors follows Copper Creek from the San Pedro River over the Galiuro Mountain divide to the east slope of the mountains (**Figure 6**); herein referred to as the Copper Creek Corridor [CCC]). The corridor ends at Fourmile Canyon on the east, which connects to the Aravaipa Canyon Wilderness. The CCC is approximately 1 mile wide and centered on Copper Creek as it passes through the Project Area, extending down to the San Pedro River on the west. The environmental conditions of the affected environment are essentially the same as described in **Section 3.4.1**, Issue Statement 1, except that the Project Area includes some lands outside the CCC. The CCC is centered on Upper Copper Creek, a known water resource, as discussed in **Section 3.4.1**. Numerous springs are located within the CCC (Springs Stewardship Institute 2023; BLM pers. comm. to WestLand), including the three springs of BLM interest in relation to the project: Hendetta Spring, Bootlegger Spring, and Number 19 Spring (**Figure 4b; Section 3.4.1**).

Out of the 18 focal species identified in the report, 3 species include the CCC within their modeled biologically best corridor: the giant spotted whiptail (*Aspidoscelis burti stictogrammus*), Sonoran desert toad (*Incilius alvarius*), and Sonoran desert tortoise (AZGFD 2012). Three other species, badger (*Taxidea taxus*), kit fox (*Vulpes macrotis*), and lowland leopard frog, did not have modeled biologically best corridors mapped, the first two species due to their corridor lengths and presence of suitable habitat elsewhere throughout the linkage design, and the lowland leopard frog due to it mostly occurring in the lands between the Wildland Blocks and not in the Wildland Blocks themselves (AZGFD 2012). Though at a species level the CCC may not be the biologically best corridor for all 18 focal species in the Santa Catalina/Ricon – Galiuro linkage design, it may provide optimal, suboptimal, or occasionally used habitat for those species.

Wildlife may use vegetation in the Project Area and CCC for forage, shelter, and nesting. The aquatic habitat is additionally a source of drinking water for wildlife and provides resources for the aquatic lifecycle of species for which the aquatic regime of Copper Creek is appropriate. Riparian vegetation associated with the aquatic resources provides forage, shelter, and nesting opportunities for species that may otherwise be absent from the area. Wildlife may traverse through the Project Area and CCC to access resources.

3.4.3.2. PROPOSED ACTION ENVIRONMENTAL CONSEQUENCES

The Proposed Action Alternative may affect habitat connectivity and movement of species, including the giant spotted whiptail, Sonoran desert toad, and Sonoran desert tortoise, for which the AZGFD model identifies the CCC as the biologically best corridor connecting the Santa

Catalina and Rincon mountains to the Galiuro Mountains. The effects would be within the localized area of daily activities and the traffic associated with the Proposed Action. The three species all have modeled predicted ranges that intersect with the Project Area and have potential to use the area as a habitat connectivity corridor, although the AZGFD ERT has no records of occurrence of the species within 3 miles of the Project Area (**Appendix C**). WestLand has observed Sonoran desert tortoise on the lower slopes of the Galiuro Mountains an estimated 5 to 6 miles southwest of the Project Area and AZGFD has reported to the BLM that they are aware of records of Sonoran desert tortoise within 3-miles of the Project Area.

Proposed Action direct disturbance would be limited to approximately 18 acres of roads and pads, previously disturbed except where expansion of pads and roads would occur. The pads and most roads directly leading to the pads, where not currently in use by recreational vehicles, would be cleared of recolonized vegetation, mainly grasses and forbs, and may have minor[11] expansion onto previously undisturbed lands to accommodate transporting vehicles, personnel and equipment including drill rigs that require roads with 12-ft width.

Human presence, noise, vibrations, ground disturbances, nighttime lighting, and fugitive dust resulting from traffic, road improvements, drill site operations, and remediation activities would cause wildlife to vacate from or temporarily avoid the CCC in the vicinity of the Project Area during Proposed Action Alternative activities. These effects are expected to extend no further than 500 ft from active pads and 50 ft from roads when project vehicles drive through (see **Section 3.4.1.2**). There would be no more than two active drill pads at any time, so wildlife avoidance would be expected to be no more than an area of approximately 1,070 ft by 1,070 ft (approximately 26 ac) at each active pad (pad plus 500-ft buffer) for a maximum approximate area of 52 ac during project activities. In the case that the 500-ft buffers of two active pads overlap, the corridor could be constricted by as much as 2,140 ft. Corridor constriction could change wildlife movement patterns and interactions. There may be an increased exposure to predators using the corridor and resources within the avoided areas would not be available.

Groundwater pumping for the Proposed Action Alternative has the potential to affect the availability of surface water for wildlife using the CCC for connectivity and movements, and on shallow groundwater availability for riparian vegetation that provides necessary habitat for those species.

Impacts to wildlife connectivity and movements within the CCC would be up to 24 hours per day for a maximum of 3 years and would likely exclude an estimated 3 months per year during inclement weather (summer/monsoon months). Additionally, for areas within 0.25 mi of the centerline of Copper Creek riparian areas, no vegetation clearing, drilling or reclamation would occur during May 25 to September 30, allowing for reduced proposed Project-related impacts to wildlife connectivity, movements during those times. The design features and BMPs in **Section**

[11] Minor maintenance or improvement to allow adequate access for drill rigs. Minor maintenance includes blading the road for safety and improvement, where necessary, includes widening to 12 feet. Maintenance and improvement would include installation and maintenance of sediment control structures during all phases of the Preferred Action Alternative.

2.2.10 would help to minimize impacts to wildlife connectivity and movements and resource availability within the CCC.

Wildlife Connectivity Impact Summary

Impacts to wildlife connectivity and movements within the CCC may cause changed use of the CCC that would lead to decreased population stability. In the case of two overlapping pads being drilled at the same time, there would be a constriction of the corridor which may temporarily impede wildlife movement in this area, this may cause changes in movement and wildlife interactions. Changes in wildlife movement thus means changes in corridor use. Design features and BMPs outlined in **Section 2.2.10** would help to minimize impacts to wildlife connectivity and movements and to resource availability within the CCC. Measures to minimize impacts include avoiding any riparian vegetation clearing; avoiding vegetation clearing, drilling or reclamation within 500 ft of the centerline of Copper Creek riparian areas yellow-billed cuckoo breeding season; installing a secondary muffler on drill rigs to reduce noise impacts; and minimizing light pollution at night by hooding and shielding lights, directing lights down toward the interior of the drill pads at night, and locating lights to reduce their visibility as viewed from a distance.

The Proposed Action would have a negligible effect on the 7B Ranch as it is located 8 miles away. Wildlife, however, that are using the 7B Ranch as part of a larger wildlife connectivity corridor or landscape, may have movement patterns that are temporarily disrupted by the presence of mineral exploration activities that are part of the Proposed Action.

Residual Impacts

Residual impacts after implementation of the design features in **Section 2.2.10** and reclamation would be the same as stated in the Wildlife Connectivity Impact Summary above.

3.4.3.3. CUMULATIVE IMPACTS

Past and Present Actions

The acreages of past and present actions and RFFAs in the 92,257-acre CESA (**Figure 6**) are listed in **Table 3-2**, as tallied from the BLM's MLRS (active and expired = past and present actions; pending = RFFAs), the BLM National Operations Center, the National Interagency Fire Center, and estimates from Google Earth aerial photography. Those past and present actions within the CESA total approximately 2,000 ac (2.17 percent of the CESA). This includes current and expired mineral exploration and mining notices of intent and plans of operation, and mineral material disposal sites, totaling 115 ac (0.12 percent of the CESA); agricultural lands covering 1,000 ac (1.1 percent of the CESA); miscellaneous structures and fields totaling 250 ac (0.27 percent of the CESA); fires since 2003 that have burned approximately 600 ac (0.65 percent) of the CESA, and 5 ac (<0.01 percent of the CESA) for reasonably foreseeable mining activities. Grazing allotments cover approximately 40,000 ac (43.4 percent) of the CESA.

Past and present actions that could have impacted and may be currently impacting wildlife connectivity and movements within the CCC in the CESA include mineral mining and

exploration that first started in the area in the early 1900s on private as well as State Trust and BLM lands. Those activities include existing roads on approximately 5 ac of BLM lands, previous improvements for pads and roads on approximately 12 ac of BLM lands. Redhawk is conducting ongoing mineral exploration activities under a mining notice within the area of the Proposed Action. Activities under the notice impact 4.06 acres and are considered in the affected environment for this analysis. The White Cross Gypsum Mine is an active mine encompassing 80 acres of BLM lands south of Aravaipa Creek. The White Cross Mine operates seasonally during dry periods. Operations include ripping, scraping, screening, and loading gypsum for shipment to the cement kiln at Rialto, AZ via truck. A former in-situ copper mine operated on Copper Creek, west of the proposed exploration area. Mining activity has also resulted in degradation of water quality. ADEQ lists Upper Copper Creek as impaired for copper, iron, selenium, cadmium, and zinc (ADEQ 2024). Currently, there are remedial projects including evaporation ponds and monitoring wells near and within the Project Area to address those historical impacts of mining. Historic land uses for agriculture, ranching, and residences (land clearing, planting, fertilizer and pesticide use, water infrastructure, stock tanks, pumping, cisterns, fencing, road infrastructure, maintenance, livestock, feeding and supplements, etc.) have occurred in the area since the 1800s and continue today. A common land use is recreation including hunting, dispersed camping, OHV use, and travel through the CESA to U.S. Forest Service lands, Arizona State lands, and private lands. Wildfires have been part of the landscape in the past and would likely have impacts in the future.

These uses are likely having and have had effects on wildlife connectivity and movements within the CCC from road-based travel, noise, and dust while dispersed recreation and exploration may disrupt wildlife and damage vegetation (from cross-country OHV travel or pad clearing). The AZGFD works to manage game species for healthy populations through the hunting tag program and considers nongame wildlife in hunting management. Wildfires damage existing wildlife habitat but enable recolonization by pioneer species and successional ecological communities.

Potential indirect impacts to wildlife connectivity and movements within the CCC in the CESA primarily would have resulted from surface disturbance associated with mineral mining and exploration, agriculture, ranching, and livestock grazing, infrastructure, dispersed recreation, and wildfires. Disturbance to wildlife connectivity and movements within the CCC from past and present actions within the CESA would have been reduced to some extent through reclamation and seeding of disturbed areas and natural recolonization of native species.

RFFAs

Potential impacts to wildlife connectivity and movements within the CCC from mineral exploration, agriculture, livestock grazing, associated infrastructure, dispersed recreation, and wildfires are expected to continue. The SFO plans to designate a comprehensive network of motorized routes and trails for managing travel within this project vicinity that could affect impacts to the CESA. As mentioned in **Section 3.3**, the BLM also is expected to acquire the 7B Ranch as part of the Resolution Copper land exchange. The 7B Ranch is located within the CESA and would be a RFFA. This acquisition from private ownership to BLM-managed public land would impact wildlife connectivity and movements within the CCC beneficially as portions

of the 7B parcel overlap with the Lower San Pedro Important Bird Area, an area along the San Pedro River noted for year-round species, breeding, and migration for bird species with mesquite bosque habitat (Arizona Important Bird Areas Program, 2011).

Cumulative Impacts Analysis

The Proposed Action Alternative, in combination with other past, present, and RFFAs, may reduce upland, riparian, and aquatic resource availability for species using the CCC for connectivity and movement that are reliant on these resources. These species are most notably the giant spotted whiptail, Sonoran desert toad, and Sonoran desert tortoise, for which the AZGFD model identified the CCC as the biologically best corridor for connectivity and movements. Loss of breeding habitat, drinking water, forage, cover, and mortality or inability to successfully move through the area could result from implementation of the Proposed Action Alternative.

As discussed in **Section 3.4.3.2**, a maximum of 52 acres of the corridor could be directly impacted at a given time as a result of implementation of the Proposed and Preferred Action Alternative activities. Cumulatively, a maximum of up to approximately 406 ac of the corridor (500 ft around each pad and 50 ft of proposed roads resulting from passing vehicles) could be impacted over the life of the total proposed activities across each alternative.

3.4.3.4. PREFERRED ACTION ALTERNATIVE ENVIRONMENTAL CONSEQUENCES

The Preferred Action Alternative environmental consequences would be similar to those of the Proposed Action Alternative but would include an AMP for water resources. Differences in effects would be limited to aquatic resources and the plants and wildlife dependent on those resources. Only those differences are discussed in this section.

Wildlife Connectivity Impact Summary

Under the Preferred Action Alternative, there is a risk of riparian and aquatic resource loss that could affect the suitability of the CCC for species including the giant spotted whiptail, Sonoran desert toad, and Sonoran desert tortoise, for which an AZGFD model identifies the CCC as the biologically best corridor for connectivity and movement. Losses of breeding habitat, drinking water, forage, cover, and mortality or inability to successfully move through the area are potential effects from pumping-induced changes that may occur due to the Preferred Action. The AMP outlined in **Section 2.3.1** would obligate Redhawk and the BLM to enhanced resource monitoring to mitigate probable groundwater drawdown effects from the Preferred Action groundwater pumping. Other potential indirect impacts on wildlife using the CCC for connectivity and movements would result from noise and vibrations, nighttime lighting, vibration from heavy machinery operation, or fugitive dust from activities. Mitigation measures outlined in **Section 2.2.10** may reduce potential impacts from these sources. Measures to minimize impacts include avoiding any riparian vegetation clearing; avoiding vegetation clearing, drilling or reclamation within 0.25 miles of the centerline of Copper Creek riparian areas during yellow-billed cuckoo breeding season; not having more than two drill rigs operating

a time; implementing the AMP; installing a secondary muffler on drill rigs to reduce noise impacts; and minimizing light pollution at night by hooding and shielding lights, directing lights down toward the interior of the drill pads at night, and locating lights to reduce their visibility as viewed from a distance.

The Preferred Action Alternative would have a negligible effect on the 7B Ranch as it is located 8 miles away. Wildlife, however, that are using the 7B Ranch as part of a larger wildlife connectivity corridor or landscape, may have movement patterns that are disrupted by the presence of mineral exploration activities that are part of the Preferred Action Alternative.

Residual Impacts

Residual impacts after implementation of the design features in **Section 2.2.10** and reclamation would be the same as stated in the Wildlife Connectivity Impact Summary above.

3.4.3.5. CUMULATIVE IMPACTS

Past and Present Actions

Past and present actions are the same as for the Proposed Action Alternative.

RFFAs

RFFAs for the Preferred Action Alternative are the same as for the Proposed Action Alternative.

Cumulative Impacts Analysis

The Preferred Action Alternative, in combination with other past, present, and RFFAs, may reduce riparian and aquatic resource availability for species using the CCC for connectivity and movement that are reliant on these resources. These species most notably include the giant spotted whiptail, Sonoran desert toad, and Sonoran desert tortoise, for which the AZGFD model identified the CCC as the biologically best corridor for connectivity and movements. Loss of breeding habitat, drinking water, forage, cover, and mortality or inability to successfully move through the area could result from implementation of the Preferred Action Alternative.

As discussed in **Section 3.4.3.2**, a maximum of 52 ac of the corridor could be directly impacted at a given time as a result of implementation of the Proposed and Preferred Action Alternative activities. Cumulatively, up to approximately 406 ac of the corridor (500 ft around each pad and 50 ft of proposed roads resulting from passing vehicles) could be impacted over the life of the total proposed activities across each alternative.

The AMP outlined in **Section 2.3.1**, however, would obligate Redhawk and the BLM to enhanced resource monitoring to mitigate probable groundwater drawdown effects from Preferred Action Alternative groundwater pumping. The implementation of the AMP would provide decision-makers with methods and information to determine whether Preferred Action Alternative groundwater pumping is the cause of a specific water resource parameter falling

below a threshold and triggered measures (specific reductions in groundwater use for project purposes for the Preferred Action Alternative) when the BLM determines that project groundwater pumping is the cause of a specific water resource parameter falling below the threshold.

The BLM expects this additional information associated with future implementation of the AMP under this alternative would be a beneficial tool to consider when evaluating general wildlife movement and connectivity across the Project Area. Because of the additional monitoring information under the adoption of the AMP in the Preferred Action Alternative, the combined cumulative effects to wildlife movement and connectivity are expected to be lower than cumulative effects associated with the Proposed Action Alternative over time.

3.4.3.6. NO ACTION ENVIRONMENTAL CONSEQUENCES

Under the No Action Alternative, impacts to the Santa Catalina/Rincon – Galiuro Linkage would be consistent with current land usage in the Project Area and within the CESA (mineral exploration, agriculture, ranching, recreation, driving, road improvements, grazing, commercial and residential private land activities, highway commercial and public traffic). Mineral exploration activities include Redhawk's exploration activities on Arizona State Trust Lands and Private lands as well as the activities on BLM- administered public lands outlined in their active Notice (Notice; AZAZ106362501).The current notice-level mineral exploration activities would continue including the 4.06 acres of disturbance as well as the groundwater pumping, noise, light, dust, impacts from one drill rig operating at a time. Impacts from the current notice-level exploration activities are expected to continue through April 2026.

3.4.4. ISSUE STATEMENT 4

4. What are the potential impacts to hydrologic and hydrologic-dependent resources associated with Copper Creek due to groundwater withdrawals as stated in each alternative?

3.4.4.1. AFFECTED ENVIRONMENT

Hydrologic and hydrologic-dependent resources within the Project Area include Copper Creek, Bootlegger Spring, Number 19 Spring, vegetation influenced by Hendetta Spring, which is not within the Project Area, and species dependent on resources at Copper Creek and the springs.

The flow regime of Copper Creek is complex and not fully understood, with surface water presence varying both spatially and temporally within reaches. The applicant prepared a hydrologic report, and BLM evaluated it (Burtell, 2023). According to ADEQ, Upper Copper Creek (**Figure 4b**) is classified as intermittent (ADEQ 2023, accessed 6/29/2023), while the ADWR describes it as perennial in the Arizona Water Atlas Volume 3 (ADWR 2012). This variability highlights the importance of seasonal water derived from winter rain and snowmelt, which helps sustain the creek's flow along with multiple springs. During summer, these flows often diminish, leaving isolated pools and short stretches of water until late summer or fall when

monsoon systems return. Lower Copper Creek is not in the Project Area and therefore is excluded from further discussion.

Preferred Action Alternative vehicle traffic intersecting the creek would be limited to four road crossings to access project drill pads throughout the Project Area. A sediment-filled dam in the upper extent of the creek within the Project Area has a low-level outlet which was seeping water when WestLand visited the dam site in December 2022 and water was overtopping the dam, feeding Copper Creek below the dam. From the dam downstream to Prospect Canyon, Copper Creek had several reaches with surface water present during WestLand's biological field investigations in April, October, and December 2022, and during BLM field visits during October and November 2022, and April, July, and August 2023, as described in **Section 3.4.1.1**. Copper Creek supports perennial hydrophytic vegetation associated with the perennial surface flows and pools from the dam to approximately 2 miles downstream.

Sensitive resources associated with Copper Creek include various riparian plant species that are dependent or facilitated by the presence of perennial surface water or shallow groundwater, and aquatic invertebrates and vertebrates, including the threatened, yellow-billed cuckoo and BLM Sensitive lowland leopard frog and Sonora mud turtle. Aquatic-dependent species are discussed in detail in **Section 3.4.1.1** and **Section 3.4.2.1**. Although not an ESA or BLM Sensitive species, the black-necked garter snake is also present in Copper Creek likely due to its strong association with riparian areas.

Conditions at Hendetta, Bootlegger, and Number 19 springs during site visits in 2022 and 2023 are discussed in **Section 3.4.1.1**. Surface water observed during visits was associated only with Bootlegger Spring, where the patchwork of upland, facultative, and facultative wetland vegetation species surrounding the area with surface flow suggests intermittent flow from the spring source. Hendetta Spring primarily occurs on State Land, supplying water for livestock use and supporting riparian vegetation on BLM land. No further evaluation of Hendetta Spring is warranted. During a brief site visit in November 2023, BLM and Redhawk staff were unable to locate Number 19 Spring; however, pools of water and facultative vegetation were noted in the channel near the mapped location.

Aravaipa Creek, within the Aravaipa Wilderness Area, is located approximately 10 miles north of the Project Area, in a separate watershed from the Project Area. Aravaipa Creek has long stretches of perennial surface flows and is also tributary to the San Pedro River. Due to the distance of the Project Area to Aravaipa Creek, no effects would be anticipated, and no further evaluation is warranted.

Two private wells (Hendrickson Well and Solar Well; **Figure 4b**), are currently used by Redhawk to obtain water for exploratory drilling on private lands and for ranching operations. These wells would also be used by Redhawk for Proposed Action drill water supply. As noted in **Section 2.2.6**, a third well approximately 350 ft from the Hendrickson Well was recently installed as a backup for the Hendrickson Well because of the questionable condition of the casing in the original Hendrickson Well. Water is pumped from approximately 55 ft (original Hendrickson Well) and 200 ft (Solar Well) below ground surface. The original Hendrickson

Well is within the Copper Creek channel west of, and approximately 300 ft downstream from BLM-managed land. The new Hendrickson Well is approximately 350 ft west of the original well, on a hillside outside the Copper Creek channel. Solar Well is more than 1 mile south of and 600 ft higher in elevation than Copper Creek at the dam and is in a different watershed (Mulberry Wash) than Copper Creek and all except three proposed drill pads.

Daily Proposed Action Alternative water requirements would depend on the type of drill and the number of drills (up to two) active at any time. Water would be pumped via PVC hoses placed along the side of roads from the two offsite, private wells. Based on previous drilling operations that Redhawk has completed with comparable equipment and the rated pumping capacity of the source wells (maximum capacity of not more than 35 gallons per minute), Redhawk estimates approximately 70,000 gallons of water would be pumped per month per drill rig (see **Section 2.2.6**), most of which would be pumped into the drill holes to lubricate and cool the drill bit and to remove loose material from the drilling operations. Water use for dust abatement purposes is included in that usage estimate and is expected to be negligible compared to the amount used for drilling operations due to a combination of the 10-mph speed limit and some roads traversing bedrock.

The two existing wells have been and are currently in use for ranching and for mineral exploration on non-federal lands. Any pumping for the Proposed Action Alternative would be replacing current pumping for other Redhawk drilling operations on non-federal lands.

3.4.4.2. PROPOSED ACTION ENVIRONMENTAL CONSEQUENCES

The Proposed Action Alternative may affect aquatic resources, riparian vegetation, and wildlife species dependent on those resources on BLM lands. Groundwater pumping for project purposes and the potential for reductions of surface and shallow groundwater availability may have scaling effects specific to the affected resource. Reductions in surface flow may disrupt the water/sediment balance, lowering the transport capability of the stream, affecting aquatic habitat and surface water expression. Reductions in surface water would reduce available habitat for aquatic wildlife and aquatic vegetation. Reductions in surface water would reduce water availability for terrestrial wildlife. Reductions in surface water would result in increases of water temperature and decreases in water quality. Reductions of groundwater levels would have negative effects for riparian vegetation, relatively shallow-rooted hydrophytes dependent on surface water availability.

Effects to aquatic resources, riparian vegetation, and dependent wildlife due to groundwater use may occur during periods when runoff from precipitation is not available for the resources, most typically during May through July, prior to initiation of summer monsoon storms. During the driest times of year, surface water is expected to be found only in pools and possibly isolated areas of low flows in Upper Copper Creek. WestLand has noted pools in Upper Copper Creek up to approximately 2 to 4 ft deep when there was no connecting surface flow between pools. The Proposed Action has the potential to lower groundwater during these dry times, resulting in reduction or cessation of flows and declines or elimination of pools in Upper Copper Creek, which may affect riparian species and the habitat and ecosystem services that those riparian species

provide. Riparian-dependent species would be most vulnerable, as discussed in previous sections, but other species that use riparian resources on occasion would need to find alternate resources.

The maximum anticipated Proposed Action groundwater pumping would be approximately 5.2 acre-feet-annually (AFA) for 3 years, although this total does not account for times of no drilling activity, expected to be up to 3 month per year, or when only one drill rig is working on the project instead of two drill rigs. Reliable hydrologic data for the local Copper Creek watershed is lacking. The ADWR does not have and is not aware of the existence of estimates of groundwater pumping data for the Lower San Pedro River basin, in which the Proposed Action is located (K. Nelson, ADWR pers. comm. to S. Hart, February 6, 2023).

5.2 acre-feet is the total annual anticipated water used for the proposed Project. According to weather-station data at the nearest Remote Automatic Weather Stations (RAWS) site, Horse Camp, the average annual precipitation during the period of 2021 through 2024 is 16.07 inches. According to Oregon State University (OSU) Parameter-elevation Regressions on Independent Slopes Model (PRISM), the average modeled precipitation in the Project Area during the past 10 years is 15.2 inches. According to United States Geological Survey (USGS) StreamStats modeling, the mean annual precipitation calculated for the Copper Creek watershed is 18.9 inches. Using the lowest modeled volumes from either the USGS model or the OSU PRISM model (6.83 to 13.9 inches annually, much lower than the median or averages recorded or modeled), and the total Copper Creek contributing watershed area calculated at the outflow point at Hendrickson Well as 12.9 square miles, and anticipating losses to evapotranspiration of 90%, the lowest modeled range of precipitation available as streamflow and/or aquifer recharge is 469 to 956 acre-feet annually. The total annual use proposed for Project purposes is 1.1% or less than the precipitation available in the driest recent years of record.

According the ADWR, the Groundwater Site Inventory (GWSI) wells relative to the proposed Project Area and the San Pedro River near Mammoth show and overall increase of the groundwater elevation over the past 20 years. Well ID 324208110393301, located west of the San Pedro River near Mammoth shows an increase of 18.6 feet. Well ID 324418110350001, located east of the San Pedro River near Mammoth shows an increase of 4.9 feet. The nearest well to the Project Area, other than those wells used for either exploration or monitoring purposes, is used for stock watering and is approximately 1.4 miles away from the Hendrickson Well and 3.1 miles from the Solar Well.

Due to the relatively low pumping rate and relatively low annual volume proposed for pumping, there would be no discernible impacts nearby water production wells or to inflows, either surface or groundwater to the San Pedro River.

The Proposed Action would have a negligible effect on the 7B Ranch as the Proposed Action is 5.2-acre feet per year of water use which is unlikely to affect land that is located 8 miles away.

Groundwater Pumping Impact Summary

Under the Proposed Action impacts to surface water and groundwater levels resulting from groundwater pumping are unknown. Those water levels, and the habitats and vegetation

communities dependent upon them, may be affected by actions under the Proposed Action. There is a risk of reduction or cessation of flows, declines or elimination of pools, and lowering of the groundwater table in Upper Copper Creek. If this occurs, riparian species and their habitat and ecosystem services that those riparian species, and the surface water itself provide would be negatively impacted. For terrestrial species this could lead to loss of available breeding habitat, drinking water, forage, cover, and mortality or inability to successfully move through the area. For aquatic animal species this could lead to changes in habitat quality or loss of habitat entirely, habitat fragmentation, loss of breeding habitat, loss of forage, and mortality. For riparian vegetation this would lead to reduced vigor and mortality, loss of germination capability or survivorship of seedlings, contraction of riparian area, and conversion to a more xeric vegetation community. These impacts could be delayed and have effects after the pumping-induced change occurs and after the Proposed Action is completed.

Residual Impacts

Residual impacts would be the same as stated in the Groundwater Pumping Impact Summary above.

3.4.4.3. CUMULATIVE IMPACTS

The acreages of past and present actions and RFFAs in the 92,257-acre CESA (**Figure 6**) are listed in **Table 3-2**, as tallied from the BLM's MLRA (active and expired = past and present actions; pending = RFFAs), the BLM National Operations Center, the National Interagency Fire Center, and estimates from Google Earth aerial photography. Those past and present actions within the CESA total approximately 2,000 ac (2.17 percent of the CESA). This includes current and expired mineral exploration and mining notices of intent and plans of operation, and mineral material disposal sites, totaling 115 ac (0.12 percent of the CESA); agricultural lands covering 1,000 ac (1.1 percent of the CESA); miscellaneous structures and fields totaling 250 ac (0.27 percent of the CESA); fires since 2003 that have burned approximately 600 ac (0.65 percent) of the CESA; and 5 ac (<0.01 percent of the CESA) for reasonably foreseeable mining activities. Grazing allotments cover approximately 40,000 ac (43.4 percent) of the CESA.

Past and present actions that could have impacted and may be currently impacting riparian and aquatic resources related to groundwater in the CESA include several activities. Mineral mining and exploration first started in the area in the early 1900s on private as well as State Trust and BLM lands. Mining activity has resulted in degradation of water quality. ADEQ lists Upper Copper Creek as impaired for copper, iron, selenium, cadmium, and zinc (ADEQ 2024). Currently, there are remedial projects including evaporation ponds and monitoring wells within the Project Area to address those historical impacts of mining. Historic land uses for agriculture, ranching, and residences (land clearing, planting, fertilizer and pesticide use, water infrastructure, stock tanks, pumping, cisterns, fencing, road infrastructure, maintenance, livestock, feeding and supplements, etc.) have occurred in the area since the 1800s and continue today. A common land use is recreation including hunting, dispersed camping, OHV use, and travel through the CESA to U.S. Forest Service lands, Arizona State lands, and private lands. Surface disturbances include existing roads on approximately 5 ac of BLM lands, previous improvements for drill pads and roads on

approximately 12 ac of BLM lands. Redhawk is conducting ongoing mineral exploration activities under a mining notice within the area of the Proposed Action. Activities under the notice impact 4.06 acres and are considered in the affected environment for this analysis. The White Cross Gypsum Mine is an active mine encompassing 80 acres of BLM lands south of Aravaipa Creek. The White Cross Mine operates seasonally during dry periods. Operations include ripping, scraping, screening, and loading gypsum for shipment to the cement kiln at Rialto, AZ via truck. A former in-situ copper mine operated on Copper Creek, west of the proposed exploration area. Wildfires have been part of the landscape in the past and would likely have impacts in the future.

Direct impacts to aquatic resources from the above activities could include detrimental changes in habitat quality or loss of habitat entirely, habitat fragmentation, loss of breeding habitat, loss of forage, and mortality for aquatic wildlife. Direct impacts to riparian vegetation could include reduced vigor and mortality, loss of germination capability or survivorship of seedlings, contraction of riparian areas, and conversion to a more xeric vegetation community.

Potential indirect impacts to riparian and aquatic resources in the CESA primarily would have resulted from groundwater pumping associated with mineral mining and exploration, agriculture, ranching, and livestock grazing, infrastructure, dispersed recreation, and wildfires. Reductions in surface water reduce water availability for terrestrial and aquatic wildlife, decrease water quality and have negative effects for riparian vegetation and hydrophytes dependent on surface water availability. Disturbance to aquatic resources from past and present actions within the CESA would have been reduced some through the cessation of these activities and the associated groundwater pumping, including the retirement of multiple wells previously used for agriculture along the San Pedro River within the CESA (Haney 2005). These retired wells are within the CESA but are located along the San Pedro River and not likely relevant to the Project Area.

Effects from the Proposed Action, in coordination with the past and present actions in the CESA, groundwater pumping on surface water accessibility for wildlife and subsurface water accessibility for riparian vegetation may have a detectable difference for these biological resources; changes in species health and behavior and vegetation abundance, vigor, and community composition may occur.

RFFAs

Potential impacts to water resources within the CESA from mineral exploration, agriculture, livestock grazing, associated infrastructure, dispersed recreation, and wildfires are expected to continue.

Cumulative Impacts Analysis

The Proposed Action Alternative, in combination with other past and present impacts, may reduce surface and groundwater resource availability, including flows and pools and lower the groundwater table in Upper Copper Creek. For species that are reliant on water resources, this could lead to loss of habitat, decreased survivorship of riparian seedlings, lost breeding habitat

for aquatic and terrestrial species, habitat fragmentation, reductions of water quality, changes in geomorphic processes, loss of available drinking water, loss of forage and potential vegetation community shifts, loss of cover and impediment of migration through the wildlife corridor, changes in predation, and mortality of aquatic, terrestrial, or vegetative species.

3.4.4.4. PREFERRED ACTION ALTERNATIVE ENVIRONMENTAL CONSEQUENCES

The Preferred Action Alternative environmental consequences would be similar to those of the Proposed Action Alternative but would include an AMP as a mitigation measure and obligate Redhawk and the BLM to enhanced monitoring for effects of pumping groundwater resources. Groundwater pumping for project purposes and the potential for reductions of surface and shallow groundwater availability may have scaling effects specific to the affected resource. Reductions in surface flow may disrupt the sediment balance, lowering the transport capability of the stream, affecting aquatic habitat and surface water expression. Reductions in surface water would reduce available habitat for aquatic wildlife and aquatic vegetation. Reductions in surface water would reduce water availability for terrestrial wildlife. Reductions in surface water would result in increases of water temperature and decreases in water quality. Reductions of groundwater levels would have negative effects for riparian vegetation, relatively shallow-rooted hydrophytes dependent on surface water availability.

Under the Preferred Action Alternative, the thresholds and triggers in the AMP are designed to moderate potential effects on project groundwater pumping on Upper Copper Creek so that RMP water, riparian, and wildlife resources objectives are met.

In addition, the AMP for monitoring groundwater levels along Copper Creek would provide baseline data that could be used as data input for hydrologic modeling of the system, following multiple years of data collection.

Impacts to Bootlegger Spring would be monitored. Hendetta Spring is not on BLM land and Number 19 Spring could not be located. No effects to those springs would be anticipated due to the volume of proposed water withdrawals, though the AMP should still help to gather general riparian habitat trends in the project vicinity.

The Preferred Action Alternative would have a negligible effect on the 7B Ranch as the Proposed Action is 5.2-acre feet per year of water use which is unlikely to affect land that is located 8 miles away.

Groundwater Pumping Impact Summary

Under the Preferred Action Alternative, the AMP ensures enhanced monitoring, however, there remains a risk of reduction or cessation of flows, declines or elimination of pools, and lowering of the groundwater table in Upper Copper Creek, particularly between monitoring reporting periods. If this occurs, it is likely to affect riparian species and the habitat and ecosystem services that those riparian species, and the surface water itself provide. For terrestrial species, this would likely lead to loss of available breeding habitat, drinking water, forage, cover, and mortality or inability to successfully move through the area. For aquatic animal species this would likely lead

to detrimental changes in habitat quality or loss of habitat entirely, habitat fragmentation, loss of breeding habitat, loss of forage, and mortality. For riparian vegetation this would likely lead to reduced vigor and mortality, loss of germination capability or survivorship of seedlings, contraction of riparian area, and conversion to a more xeric vegetation community. These effects could be delayed and have long-lasting effects after the pumping-induced change occurs and after the Preferred Action Alternative is completed. In the Desert Southwest the vegetative communities and the species they serve (all but 1) have adapted to the arid ecosystems. Such that they are, most species can endure short-term deficiencies in resources. However, long-term deficiencies lead to losses. Because the AMP would invoke continuous and enhanced monitoring, a shortfall in any resource parameter and/or changes in the health and composition of dependent communities would be captured in quantitative and qualitative observations far sooner than long-term impacts might occur thus mitigating any impacts and preventing losses.

Residual Impacts

Residual impacts after implementation of the enhanced monitoring as detailed in the AMP would be the same as stated in the Groundwater Pumping Impact Summary above.

3.4.4.5. CUMULATIVE IMPACTS

Past and Present Actions

Past and present actions are the same as for the Proposed Action Alternative.

RFFAs

RFFAs for the Preferred Action Alternative are the same as for the Proposed Action Alternative.

Cumulative Impacts Analysis

The Preferred Action Alternative, in combination with other past and present impacts and the use of the AMP, is not expected to reduce surface and groundwater resource availability, including reductions in flows and pools or in the groundwater table in Upper Copper Creek.

The AMP outlined in **Section 2.3.1** would obligate Redhawk and the BLM to enhanced resource monitoring to mitigate probable groundwater drawdown effects from Preferred Action Alternative groundwater pumping. The implementation of the AMP would provide decision-makers with methods and information to determine whether Preferred Action Alternative groundwater pumping is the cause of a specific water resource parameter falling below a threshold and triggered measures (specific reductions in groundwater use for project purposes for the Preferred Action Alternative) when the BLM determines that project groundwater pumping is the cause of a specific water resource parameter falling below the threshold.

Because of the expected information associated with future implementation of the AMP under this alternative, it is expected that the cumulative impacts to hydrologic and hydrologic-dependent resources associated with Copper Creek due to groundwater withdrawals would be

lower than those cumulative impacts to hydrologic and hydrologic-dependent resources under the Proposed Action Alternative over time.

3.4.4.6. NO ACTION ENVIRONMENTAL CONSEQUENCES

Under the No Action Alternative, the Proposed Action Alternative would not occur. Impacts to aquatic resources, riparian vegetation, and dependent wildlife that could result from the No Action Alternative would be consistent with current land usage, including recreation, camping, driving motorized all-terrain vehicles, grazing, minimal mineral exploration, and development, and road maintenance, which would be expected to continue at similar levels to current use in the Project Area. Mineral exploration activities include Redhawk's exploration activities on Arizona State Trust Lands and Private lands as well as the activities on BLM- administered public lands outlined in their active Notice (Notice; AZAZ106362501). The Notice level operation includes up to 4.06 acres of ground disturbance for nine drill pads and associated access roads and would utilize one drill rig and up to 70,000 gallons of water per month.

4.0 CONSULTATION AND COORDINATION

4.1. INTRODUCTION

The issue identification section of **Section 1.0** identifies those issues which were analyzed in detail in **Section 3.0**. The issues were identified through the public and agency involvement process described in this section.

4.2. PERSONS, GROUPS, AND AGENCIES CONSULTED

This section lists the persons, groups, and agencies that were coordinated with or consulted during the preparation of this project. **Arizona Game and Fish Department**

Arizona Game and Fish Department has been a cooperating agency with this proposed project. On March 21, 2023, the SFO received a letter from the Tucson Regional Supervisor of the Arizona Game and Fish Department (AZGFD) requesting the opportunity to review and provide comments on the Draft EA and to participate in the NEPA process as a cooperating agency due to its expertise and jurisdictional authority for wildlife and wildlife resources. On March 31, 2023, the BLM sent a letter back to AZGFD recognizing them as a cooperating agency under the Master Memorandum of Understanding (MOU) between BLM Arizona and the State of Arizona Game and Fish Commission through the AZGFD. The BLM provided AZGFD with an opportunity to review the administrative draft EA and early draft biological evaluations in October 2023, prior to the EA's public release. The BLM held meetings with AZGFD on October 25 and November 2, 2023, with subsequent phone and email correspondence, to discuss potential impacts to wildlife species due to the Copper Creek Exploration Project. In December 2024, the AZGFD provided comments on an early version of the draft EA. The AZGFD provided input regarding the Santa Catalina Wildlife Connectivity Corridor, BLM Sensitive

species, including Lowland Leopard Frog, and a site visit for Sonoran Desert Tortoise habitat suitability determination. BLM responded to this letter in January 2025. AZGFD's concerns have been adequately incorporated in the final biological evaluation to the US Fish and Wildlife Service and are reflected in the administrative EA.

U.S. Fish and Wildlife Service

The BLM has consulted with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act on this project and received a concurrence on our effects determinations on June 27, 2025.

USFWS has provided technical assistance throughout the duration of this project. The BLM and USFWS met virtually in 2023, May 29, 2025, June 3, 2025, and June 10, 2025, to discuss the project's Biological Evaluation (BE). Informal consultation begun on May 30, 2025, with the BLM's submission of the Draft BE. The Final BE was submitted on June 13, 2025 and consultation concluded on June 27, 2025 when the BLM received USFWS concurrence letter (**Appendix H**).

Tribes

Pursuant to the American Indian Religious Freedom Act of 1978 (42 USC 1531) and National Historic Preservation Act (NHPA) (16 USC 131), the SFO sent letters to initiate consultation on February 17, 2023 to the Ak Chin Indian Community, the Gila River Indian Community, the Hopi Tribe, the Mescalero Apache Tribe, the Pascua Yaqui Tribe, the Pueblo of Zuni, the Salt River Pima- Maricopa Indian Community, the San Carlos Apache Tribe, the Tohono O'odham Nation, the Tonto Apache Tribe, the White Mountain Apache Tribe, and the Yavapai Apache Nation. Of the 12 tribes invited to consult, the BLM received responses from the Ak-Chin Indian Community, Pascua Yaqui Tribe, and White Mountain Apache Tribe with no concerns about the proposed project, but with requests to stay notified of project progress.

In the summer of 2024, the San Carlos Apache Tribe submitted letters to the BLM Arizona State Director and Secretary of Interior Haaland stating concerns about the mining Notice level activities in the Copper Creek area at that time (July 2, 2024, and September 17, 2024, respectively). The BLM responded via letter to the Tribal Chairman on August 1, 2024, and November 22, 2024. Throughout that correspondence, the SFO became aware that the Tribe had raised project concerns with the project applicant directly in a letter dated May 13, 2024. Concerns communicated included the potential Traditional Cultural Property encompassing the San Pedro Valley, water quality, water quantity, access, and impacts to the 7B property to be acquired by BLM through the Resolution Copper project. Those concerns have been addressed in this EA. Subsequently, several phone calls as well as an email were placed from SFO to the Tribe throughout the end of September to October 2024 to discuss these issues in detail. No response was received by the SFO from the Tribe. On October 10, 2024, a letter was sent to the San Carlos Apache Tribe inviting them (and twelve other interested Tribes) to a Tribal and public meeting for the project on November 14, 2024. That public meeting was eventually postponed to March 2025. A letter was sent from SFO on February 14, 2025, inviting the twelve

interested Tribes to a Tribal and public meeting on March 6, 2025. While one member of the San Carlos Apache Tribe attended the public meeting on March 6, 2025, no concerns were raised during the Tribal or Public meeting. The San Carlos Apache Tribe did submit a letter with substantive comments on the Draft EA on April 14, 2025. Additionally, San Carlos Apache Tribe sent a letter to the Safford Field Office and Arizona State Office requesting consultation received by the BLM on June 25, 2025, which was reviewed and considered by BLM. In response to the Tribes concerns, the BLM revised and expanded upon Native American Religious Concerns and Archaeological resources in Appendix A. BLM's responses to the Tribes comments on the Draft EA can be found in **Appendix G**.

Arizona State Historic Preservation Office

Pursuant to the National Historic Preservation Act Section 106, a concurrence of no adverse effects was requested from SHPO on October 25, 2024, via certified letter and a response was received on November 14, 2024.eeeeSummary of Public Participation

Issues were identified by the BLM Interdisciplinary Team as documented in the Interdisciplinary Team Checklist, which is attached to this document as **Appendix A**. Issues to be analyzed in detail are summarized in **Section 1.0** and carried forward for detailed description and analysis in **Section 3.0**.

The BLM SFO made the preliminary EA available for public comment on February 27, 2025, for 45 days. The BLM SFO held a public meeting on March 6, 2025. In addition, on March 6, 2025, SFO held a separate meeting with tribes in order to give tribes a specific venue to voice their concerns. The BLM received approximately 2,300 comment letters on the preliminary EA. Those 2,300 comment letters were parsed into approximately 7,500 comments which were summarized into approximately 300 unique comments. For a summary of key concerns raised by the public, as well as unique comments received and BLM responses, refer to **Appendix G** in the EA.

4.3. LIST OF PREPARERS

The specialists listed in the following table(s) assisted in the preparation of this EA.

Table 4-1. EA Preparers

BLM Preparers:

Name	Title	Responsible for the Following Section(s) of this Document
Sharisse Flatt	Field Manager	Project Management
Scott Cooke	Field Manager	Project Management
Roberta Lopez	Non-Renewable Assistant Field Manager	Project Management
Amelia Taylor	Renewable Assistant Field Manager	Project Management
Shelby Leachet	Planning and Environmental Specialist, Renewable Assistant Field Manager	Project Management, Quality Assurance
Amy McGowan	Planning and Environmental Coordinator	Quality Assurance
Alexia Williams	Planning and Environmental Specialist, NonRenewable Assistant Field Manager (Acting)	Project Management, Quality Assurance
Carlos Herdocia	Geologist, Project Lead	Project Co-Lead
Daniel Moore	Geologist, Primary Project Lead	Project Co-Lead
George Maloof	Archeologist	Cultural Resources
Matthew Stewart	Hydrologist	Water Resources
Heidi Blasius	Fisheries Biologist	Biological Resources, Wildlife, Vegetation
Peggy Monkemeier	Natural Resource Specialist, Biologist Support	Biological Resources, Wildlife, Vegetation
Gabby Buttermore	Wildlife Biologist	Wildlife
Ryan Peterson	Range Management Specialist, Renewable Assistant Field Manager (Acting)	Quality Assurance
Thomas Schnell	Range Management Specialist	Range Management
Lamoni Mora	Outdoor Recreation Planner	Recreation, Travel and Transportation
Kayli Farmer	Wildlife Biologist (Detailed)	Wildlife
Dusty Carpenter	Planning and Environmental Specialist (Acting)	Project Management, Quality Assurance

WestLand Preparers:

Name	Title	Responsible for the Following Section(s) of this Document
Brian Lindenlaub	Discipline Service Lead	Quality Assurance
Scott Hart	Senior Environmental Consultant	Project Lead
Catherine Lee	Senior NEPA Specialist	Quality Assurance
Samantha Blonder	Environmental Specialist	Environmental Assessment
Joel Diamond	Senior Biologist	Biological Resources
Avi Buckles	Cultural Resources Director	Cultural Resources
Robert Archer	Noise Specialist	Noise Analysis

5.0 REFERENCES, GLOSSARY AND ACRONYMS

5.1. INTRODUCTION

The following sections list the references cited within this document, the terms used and their definitions, and the acronyms used and their meanings.

5.2. REFERENCES CITED

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5.3. GLOSSARY OF TERMS

ACRE-FEET PER ANNUM OF WATER: Enough water to cover one acre of land 1 foot deep for a year.

ADAPTIVE MANAGEMENT (AM): AM is a decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. AM also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. AM does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals; increases scientific knowledge; and reduces tensions among stakeholders.

ALLOTMENT: An area of land where one or more individuals graze their livestock.

ANIMAL UNIT MONTH: The amount of dry forage required by one animal unit for one month based on a forage allowance of 26 pounds per day.

AUTHORIZED OFFICER: The decision maker who has the delegated authority to for that decision.

BEST MANAGEMENT PRACTICES: A suite of techniques that guide, or may be applied to, management actions to aid in achieving desired outcomes.

CONDITIONS OF APPROVAL: Conditions or requirements under which a decision is made.

ENVIRONMENTAL ASSESSMENT: A concise public document that analyzes the environmental impacts of a proposed action and provides enough evidence to determine the level of significance of the impacts.

ENVIRONMENTAL IMPACT STATEMENT: A detailed written statement of environmental effects of a major federal action significantly affecting the quality of the human environment.

EXCELSIOR: An erosion control material made from wood shavings that may be used in several configurations of erosion control products.

FORAGE: Vegetation eaten by animals, especially grazing and browsing animals.

FRAGMENTATION (HABITAT): The break-up of a large land area (such as a forest) into smaller patches isolated by areas converted to a different land type.

IMPACT: A modification of the existing environment caused by an action (such as construction or operation of facilities).

INTERDISCIPLINARY TEAM: Representatives of various disciplines designated as members of a team which was created to prepare an environmental document.

INVASIVE PLANTS: Plants that are not part of (if exotic) or are a minor component of (if native), the original plant community or communities that have the potential to become a dominant or co-dominant species on the site if their future establishment and growth is not actively controlled by management interventions.

MINIMIZE: To reduce the adverse impact of an operation to the lowest practical level.

MITIGATION: Steps taken to 1) avoid an impact; 2) minimize an impact; 3) rectify an impact; 4) reduce or eliminate an impact over time; or, 5) compensate for an impact.

MONITORING: The process of collecting and assessing data/information necessary to evaluate the effectiveness of a decision or its conditions of approval.

MULTIPLE USE: The management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people.

NO ACTION ALTERNATIVE: The most likely condition to exist in the future if current management direction were to continue unchanged.

NOXIOUS WEEDS: A plant species designated by Federal of State law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or nonnative, new, or not common to the United States.

OFF-HIGHWAY VEHICLE: Any motorized vehicle capable of or designed for travel on or immediately over land.

PERIOD OF USE: The time of livestock grazing on a range area based on type of vegetation or stage of vegetative growth.

PERMIT: A revocable authorization to use public land for a specified purpose for a specified period of time.

PLAN OF DEVELOPMENT: A plan developed by a project applicant that specifies the techniques and measures to be used during construction and operation of the project.

PROJECT AREA: The area of land potentially affected by a proposed project.

PROPERLY FUNCTIONING CONDITION: The ability of an area to maintain the ecological processes and values associated with the potential of that specific area, such as habitat quality and clean water.

RANGELAND HEALTH: The degree to which the integrity of the soil, the vegetation, the water, and air as well as the ecological processes of the rangeland ecosystem is balanced and sustained.

REVEGETATION: Re-establishing desirable plants in areas where desirable plants are absent or of inadequate density, by management alone (natural revegetation) or by seeding or transplanting (artificial revegetation).

SCOPING: The process of identifying the issues, management concerns, preliminary alternatives, and other components of an environmental document.

SIGNIFICANCE: A determination of the degree or magnitude of importance of an effect, whether beneficial or adverse.

TIMING LIMITATION: A constraint that prohibits specified activities during specified time periods to protect identified resource values.

UTILIZATION: The proportion or degree of current year's forage production that is consumed or destroyed by animals (including insects).

VALID EXISTING RIGHTS: Rights that existed before a change in law, policy, or plan that would not be altered by that change.

5.4. LIST OF ACRONYMS

The following is a list of acronyms and their meanings that are frequently used by the BLM and which may have been used in the writing of this document.

Acronym	**Definition**
ACEC	Area of Critical Environmental Concern
ACEPM	Applicant-Committed Environmental Protection Measure
ADWR	Arizona Division of Water Resources
AEMP	Aravaipa Ecosystem Management Plan
AFA	Acre-foot/feet per Annum
AMP	Adaptive Management Plan

Acronym	Definition
AWA	Aravaipa Wilderness Area
AZGFD	Arizona Game and Fish Department
AO	Authorized Officer
APD	Application for Permit to Drill
APE	Area of Potential Effect
AUM	Animal Unit Month
BCC	Birds of Conservation Concern
BLM	Bureau of Land Management
BMP	Best Management Practice
CEQ	Council of Environmental Quality
CFR	Code of Federal Regulations
IAA	Impact Area of Analysis
COA	Condition of Approval
CWA	Clean Water Act
DAQ	Division of Air Quality
DR	Decision Record
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FLPMA	Federal Land Policy and Management Act
FO	Field Office
FONSI	Finding of No Significant Impact
GB	Gila Box
GBMP	Gila Box Management Plan
GBRNCA	Gila Box Riparian National Conservation Area
GHG	Green House Gas
GIS	Geographic Information System
HAP	Hazardous Air Pollutants
IAA	Impact Area of Analysis
IDT	Interdisciplinary Team
MBTA	Migratory Bird Treaty Act
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NI	Not Impacted
NP	Not Present
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NSO	No Surface Occupancy
OHV	Off-highway Vehicle
OSHA	Occupational Safety and Health Act
PAC	Protected Activity Center
PIF	Partners in Flight

Acronym	Definition
PRISM	Parameter-elevation Regressions on Independent Slopes Model
PUP	Pesticide Use Proposal
RCRA	Resource Conservation and Recovery Act of 1976
RFD	Reasonably Foreseeable Development
RFFA	Reasonably Foreseeable Future Actions
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right-of-way
SARA	Superfund Amendments and Reauthorization Act
SDR	State Director Review
SHPO	State Historic Preservation Office
SMA	Surface Management Agency
SPCC	Spill Prevention, Control and Countermeasure
SRMA	Special Recreation Management Area
SUPO	Surface Use Plan of Operations
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
USACE	United States Army Corps of Engineers
USDI	U.S. Department of the Interior
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VRM	Visual Resource Management
WA	Wilderness Area
WRCC	Western Regional Climate Center
WSA	Wilderness Study Area
WUI	Wildland Urban Interface

FIGURES

APPENDIX A

Interdisciplinary Team Checklist

APPENDIX B

Drill Pad Coordinates

APPENDIX C

Arizona Game and Fish Department Heritage Data Management System Online ERT Report

APPENDIX D

Federally Listed, BLM Sensitive, and General Wildlife Species

APPENDIX E

U.S. Fish and Wildlife Service Information for Planning and Consultation Report

APPENDIX F

SFO Manager's Decision Wheel and Data Process Flowcharts

APPENDIX G

Summary of Public Comments and BLM Responses

APPENDIX H

U.S. Fish and Wildlife Service Final Concurrence Letter