Supplement to the Biological Assessment Proposed Rosemont Copper Mine Santa Rita Mountains, Arizona Coronado National Forest

Prepared for

U.S. Department of Agriculture
Forest Service
Coronado National Forest

For Submittal to

U.S. Department of the Interior
Fish and Wildlife Service

Prepared by

SWCA Environmental Consultants

October 2012
SUPPLEMENT TO THE BIOLOGICAL ASSESSMENT
PROPOSED ROSEMONT COPPER MINE SANTA RITA
MOUNTAINS, ARIZONA CORONADO NATIONAL FOREST

Prepared for

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INTRODUCTION AND BACKGROUND

This document was prepared to address new information obtained after the Biological Assessment (BA) for the proposed Rosemont Copper Project was submitted to the U.S. Fish and Wildlife Service (USFWS) on 8 June 2012 to initiate Section 7 Consultation under the Endangered Species Act (ESA). The USFWS requested an extension on the completion of the Draft Biological Opinion (BO) on 29 August 2012; the extension was granted by the Coronado National Forest (the Coronado) on 12 September 2012. The draft BO is now expected on 5 November 2012, with a final BO expected on 20 December 2012, in accordance with the 12 September 2012 letter.

The purpose of this document is to provide an addendum to the June 2012 BA that provides information to the USFWS concerning differences between the proposed project as assessed in the June 2012 BA and the proposed project as currently being assessed through the National Environmental Policy Act (NEPA) process. During a meeting between the Coronado, USFWS, SWCA Environmental Consultants (U.S. Forest Service [Forest Service] contractors), Rosemont Copper Company (Rosemont Copper), and WestLand Resources, Inc. (WestLand) (Rosemont Copper contractors), on 6 September 2012, the need for a supplement to the BA was discussed for a few reasons. First, the BA submitted in June 2012 assessed impacts specific to the Barrel Alternative, the preferred alternative identified by the Forest Supervisor in the October 2011 Draft Environmental Impact Statement (DEIS). Since submittal of the June 2012 BA, the Coronado and Rosemont Copper have continued to refine and improve on the Barrel/preferred alternative, and it is this refined Barrel/preferred alternative that is being analyzed as the Coronado continues analysis to comply with NEPA. Furthermore, the USFWS recently proposed to designate critical habitat for Jaguar (Panthera onca) and has recently revised proposed critical habitat for Southwestern Willow Flycatcher (Empidonax traillii extima).

The revisions to the preferred alternative and proposed critical habitat for the Jaguar and Southwestern Willow Flycatcher are addressed in the addendum. The Coronado wants the BO that will be produced by the USFWS to be consistent with the most current analysis under the NEPA process. Further, the Coronado would like to initiate formal conference with USFWS on the proposed Rosemont Copper Project with regard to proposed critical habitat for Jaguar and Southwestern Willow Flycatcher. Discussions at the 6 September 2012 meeting indicated that a timely supplemental BA would likely help streamline the ESA consultation process by integrating the results of the formal conference into the BO.

ACTION AREA

See the BA for a definition of “action area.” The current description of the Barrel Alternative as it appears in the Administrative Draft Final EIS (ADFEIS) (3 September 2012) has been included as an appendix to this document (Appendix 1). Specific differences are described below.

The primary differences addressed in this document include the following:

- Removal of underdrains and redesign of stormwater management features
- Removal of the heap leach pad/process
- Clarification of mine life
- Reduction in the amount of mine-associated traffic
- Arizona Corporation Commission approval of electrical and water supply line alignment
- Rerouted Arizona National Historic Trail location
- Decommissioned and new forest road segments
• Reduction in water use
• Refined calculation of acreage of disturbance
• Refinement of reclamation and closure plans, and phasing of concurrent reclamation
• Recategorization and refinement of mitigation measures

Figure 1 in the BA (page 6) should be replaced with figure 15 in Appendix 1. Figure 2 has been revised and is shown below (page 7).

Project Description

Project Description

The changes to the project description since the time of the October 2011 EIS and the June 2012 BA are as follows.

Removal of Underdrains and Redesign of Stormwater Management Features

The proposed mine will isolate a portion of the Barrel Canyon watershed in perpetuity. The associated loss of surface water flow is a major concern of the Coronado, other cooperating agencies, and the public. Since publication of the DEIS in October 2011, the Coronado has continued to work with Rosemont Copper to redesign the stormwater management features of the preferred alternative in order to allow as much water to flow downstream as possible. As disclosed in the October 2011 DEIS, the original design of the preferred alternative resulted in a postclosure reduction in runoff of 34%. In contrast, the redesigned preferred alternative has a postclosure reduction in runoff of 17%. This reduced impact was accomplished primarily by preventing water from being retained on the top or benches of the waste rock and tailings facilities, and by directing it into stormwater drainage facilities where it can move downstream.

In addition, as part of the stormwater redesign, Rosemont Copper decided to remove any underdrains from the facility. The underdrains were originally designed to allow stormwater upstream of the waste rock/tailings facilities to infiltrate and pass under the facilities, rather than remaining impounded upstream. However, concerns remained about the potential for mingling of seepage from the tailings facility with upstream stormwater and about long-term maintenance of the underdrains. Removal of the underdrains, in conjunction with the stormwater redesign, avoids these potential problems while allowing an estimated 17% more water to flow downstream.

Removal of the Heap Leach Pad/Process

The stormwater redesign of the preferred alternative did not change the overall footprint of the waste rock/tailings facilities, but it did result in changes to the overall design, including changes in slopes and the number and width of benches. These changes in turn necessitated that Rosemont Copper revise the stacking plan for the preferred alternative.

Previously, the preferred alternative incorporated a heap leach pad and associated solvent extraction/electrowinning plant in order to process oxide ore, which accounted for about 10% of the available ore. The heap leach pad was expected to remain open for approximately 6 to 7 years, at which time it would begin to be covered by waste rock. In revising the stacking plan, Rosemont Copper determined that the heap leach pad could not remain open and uncovered long enough to recover enough copper for it to be economically viable. In addition, there have been other public concerns raised about the heap leach, particularly long-term maintenance and monitoring concerns, and concerns about potential seepage. In light of the revised stacking plan and public concerns, Rosemont Copper decided to remove
Figure 2. Action area for biological resources.
the heap leach pad from the preferred alternative. The oxide ore will either become waste rock or will be processed as part of the sulfide ore.

- The removal of the heap leach pad does not result in any changes to the overall footprint of the mine facilities.
- Several components of the plant site, such as sulfuric acid storage and the solvent extraction/electrowinning facilities, will no longer be constructed, and those areas will become equipment storage/laydown areas instead.
- Sulfuric acid and kerosene will no longer be transported to the site, and copper cathodes will no longer be transported off the site. The reduction in traffic is described below.

**Clarification of Mine Life**

In general, there have been inconsistencies in how mine life has been presented in both the October 2011 DEIS and the June 2012 BA. These inconsistencies are being clarified as the NEPA process continues. Overall, the expected mine life has not significantly changed. Rather, the length of the different phases of the mine are being clarified and more clearly presented. As described in the June 2012 BA, preproduction/construction of mine facilities would take approximately 18 months, and production and processing of ore would occur for approximately 20 years, followed by an indeterminate period of reclamation and closure activities.

The following represents the description of mine life that will be used consistently as the NEPA process proceeds:

- Premining phase: 18 to 24 months. (Includes clearing vegetation, soil stockpiling, construction of facilities and roads, construction of electric and water lines, fence construction, decommissioning of forest roads, initial construction of pit, initial construction of the perimeter waste rock buttress, and constructing test wells).
- Active mining phase: 20 to 25 years. (Includes continued pit development, continued construction of the perimeter waste rock buttress, placement of tailings, concurrent reclamation activities).
- Final reclamation and closure phase: 3 years. (Includes removal of plant site facilities, completion of reclamation, staining of pit walls, removal of perimeter fence, and removal of water and electrical lines).
- Postclosure phase. Indeterminate amount of time. (Includes monitoring and maintenance).

**Reduction in Traffic**

The June 2012 BA did not detail all truck traffic that will occur as a result of the proposed mine. In addition, the truck traffic has been reduced owing to the removal of the heap leach pad. A full summary of traffic counts before and after removal of the heap leach pad is shown in Table 1.

**Utility Lines (Electrical and Water Supply)**

On 12 June 2012, the Arizona Corporation Commission approved the Certificate of Environmental Compatibility authorizing the construction of a 138-kilovolt electrical transmission line and associated facilities from the proposed Toro Switchyard to the Rosemont Substation (figure 2). Because the water supply and secondary access road were intended to be colocated in all action alternatives in order to reduce impacts, the decision made by the Arizona Corporation Commission drove the final alignment of all three components.
Table 1. Summary of Mine Related Truck Traffic

<table>
<thead>
<tr>
<th>Material</th>
<th>Barrel/Preferred Alternative (October 2011 DEIS)</th>
<th>Refined Barrel/Preferred Alternative (September 2012 ADFEIS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantity per Year (tons)</td>
<td>Trips per Week</td>
</tr>
<tr>
<td>Copper concentrate</td>
<td>484,700</td>
<td>388</td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>73,190</td>
<td>64</td>
</tr>
<tr>
<td>Pebble lime</td>
<td>37,200</td>
<td>33</td>
</tr>
<tr>
<td>SAG &amp; ball mill balls</td>
<td>19,000</td>
<td>17</td>
</tr>
<tr>
<td>Diesel fuel (gallons)</td>
<td>9,000,000</td>
<td>29</td>
</tr>
<tr>
<td>Copper cathode</td>
<td>19,000</td>
<td>17</td>
</tr>
<tr>
<td>Ammonium nitrate</td>
<td>20,075</td>
<td>18</td>
</tr>
<tr>
<td>Miscellaneous reagents</td>
<td>3,750</td>
<td>6</td>
</tr>
<tr>
<td>Wear parts &amp; explosives</td>
<td>3,250</td>
<td>5</td>
</tr>
<tr>
<td>Molybdenum concentrates</td>
<td>4,670</td>
<td>4</td>
</tr>
<tr>
<td>Fuel &amp; oils (gallons)</td>
<td>105,000</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total Trips</strong></td>
<td><strong>–</strong></td>
<td><strong>582</strong></td>
</tr>
</tbody>
</table>

**Arizona National Scenic Trail Location**

The June 2012 BA did not explicitly recognize that approximately 10 miles of the Arizona National Scenic Trail would need to be rerouted, resulting in some additional surface disturbance, including several trailheads. The additional acreage of disturbance from the rerouting of the Arizona National Scenic Trail is summarized below under “Refinement in Calculation of Acres of Disturbance.” The location of the rerouted trail is shown in Appendix 1, Figure 15.

**Decommissioned and New Forest Road Segments**

The perimeter fence excludes public access during the active mine life and, along with the waste rock and tailings piles, will result in the decommissioning of a number of existing forest roads. The June 2012 BA did not explicitly recognize that changes would occur to the National Forest System roads that intersect the perimeter fence. Some roads would be decommissioned, and in some cases, small segments of new road construction would occur to restore connectivity. The additional acreage of disturbance from the decommissioning/construction of National Forest System roads is summarized below under “Refinement in Calculation of Acres of Disturbance.” The location of the roads to be decommissioned and segments to be constructed is shown in Appendix 1, Figure 18.

**Reduction in Water Use**

The removal of the heap leach pad will result in some reduction in water use during the first 6 to 7 years of the proposed mine. However, at the same time, more water may be required for dust control or other aspects of the sulfide ore processing. Overall, there will be no change in the amount of water use analyzed in the NEPA process.
Refinement in Calculation of Acres of Disturbance

Overall, there has been no change to the physical footprint of the plant site, pit, waste rock facilities, or tailings facilities as a result of the refinement of the preferred alternative; however, the calculations of the area undergoing surface disturbance have been refined. The proposed mine will be surrounded by a perimeter fence within which public access will not be allowed. The October 2011 DEIS and June 2012 BA both assumed that any lands within the perimeter fence would be disturbed; however, in reality, not all of those lands will undergo surface disturbance. Within the perimeter fence, there is a separate security fence/road that would be located roughly 750 feet from the toe of the waste rock/tailings facilities. Except where specific features such as the primary or secondary access roads are located, the land between the perimeter fence and the security fence will not be disturbed. This more focused and refined calculation has resulted in a reduced acreage of disturbance. The June 2012 BA indicated that 7,016 acres of land would be directly disturbed. Owing to the changes described above, this acreage has been reduced to 5,367 acres, which includes areas within the security fence (4,228 acres), the primary access road (226 acres), the utility line corridor (867 acres), decommissioned or new forest roads (28 acres), and the rerouted Arizona National Scenic Trail (19 acres).

Reclamation and Closure/Concurrent Reclamation

The June 2012 BA does not include details of reclamation and closure activities specific to the Barrel/preferred alternative. These details are now available based on the Preliminary Reclamation and Closure Plan for the Preferred Alternative, prepared by Rosemont Copper in July 2012. The ADFEIS (3 September 2012) includes detailed descriptions of the reclamation activities, including locations and handling of stockpiled salvaged soils, detailed phasing of concurrent reclamation, and revegetation/reclamation procedures and techniques.

An excerpt from the “Soils and Revegetation” section of Chapter 3 of the ADIEIS (3 September 2012) has been included as an appendix (Appendix 2) to provide a full description of these items. Table 2 shows a summary of concurrent reclamation phasing.

Table 2. Phasing of Concurrent Reclamation

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Total Acres Undergoing Reclamation</th>
<th>Total Acres Reclaimed</th>
</tr>
</thead>
<tbody>
<tr>
<td>End of year 1 of active mining phase</td>
<td>114</td>
<td>0</td>
</tr>
<tr>
<td>End of year 2 of active mining phase</td>
<td>169</td>
<td>114</td>
</tr>
<tr>
<td>End of year 3 of active mining phase</td>
<td>259</td>
<td>283</td>
</tr>
<tr>
<td>End of year 4 of active mining phase</td>
<td>75</td>
<td>542</td>
</tr>
<tr>
<td>End of year 5 of active mining phase</td>
<td>93</td>
<td>617</td>
</tr>
<tr>
<td>End of year 10 of active mining phase</td>
<td>390</td>
<td>710</td>
</tr>
<tr>
<td>End of year 15 of active mining phase</td>
<td>383</td>
<td>1,100</td>
</tr>
<tr>
<td>End of year 22 of active mining phase</td>
<td>1,764</td>
<td>1,483</td>
</tr>
<tr>
<td>Postclosure</td>
<td>0</td>
<td>3,589</td>
</tr>
</tbody>
</table>

Recategorization and Refinement of Mitigation Measures

Some readers found the description of mitigation measures in the October 2011 DEIS confusing, primarily because many design elements meet the criteria for mitigation, even though they are an integral part of the overall project and cannot be separated. To avoid this, mitigation components have been
recategorized in the ADFEIS (dated 3 September 2012) specifically as either design elements, permit requirements, additional mitigation, or possible future mitigation. The June 2012 BA used a slightly different organizational scheme. For consistency with the NEPA process, the latest summary of mitigation measures is included as Appendix 3.

ENVIRONMENTAL BASELINE

Biophysical Features

The analysis of impacts to both riparian areas and seeps/springs has been refined during the ADFEIS. Specifically, the following changes were undertaken:

• The springs inventory was updated to incorporate recent field surveys conducted by WestLand as well as monitoring data collected since approximately 2006;
• The riparian mapping was updated to make use of Pima County’s riparian mapping, which tends to focus more on habitat corridors and less on specific vegetation types. The Pima County mapping was reconciled with field observations, and some refinements to the mapping were made.
• A more robust riparian analysis was undertaken in order to determine physical effects that might occur to riparian vegetation and aquatic habitat in response to changes in surface water or groundwater conditions. The riparian analysis also incorporated the most recent understanding of the accuracy of the groundwater models, as well as the uncertainty associated with them.

At this time, the conclusions reached concerning impacts to springs, riparian areas, and aquatic habitats are under review by the Coronado. These will be provided when appropriate review has been completed.

Figures 3 (springs and seeps) (page 33 of the BA), 4 (mine adits and shafts) (page 34), and 5 (soil types) (page 35) have been revised to reflect the new project and action areas.

Vegetation Communities

Uplands

The use of Pima County’s riparian mapping resulted in changes in acreages of upland and riparian within the action area. Below are the revised acreages for upland vegetation in the action area (pages 36 and 38 of the BA):

• Semidesert grassland = 94,752 acres
• Madrean evergreen woodland = 27,279 acres
• Chihuahuan desertsrub = 1,980 acres
• Sonoran desertsrub = 1 acre

Figure 6 (page 37 of the BA) has been revised to reflect the new project and action area and changes in vegetation mapping methodology.
Figure 3. Springs, seeps, ponds, and stock tanks within the action area (Pima Association of Governments 2003, 2010; Tetra Tech 2010; WestLand 2011b, 2011g, 2012).
Figure 4. Mine adits and shafts within the action area (WestLand 2009f).
Figure 5. Soil types within the action area (Natural Resources Conservation Service 2010).
Figure 6. Vegetation types within the action area (Brown 1994; Pima County 2012).
Riparian

Below is new text describing riparian vegetation (replacing the riparian vegetation text on pages 38 and 39 of the BA).

The word “riparian” is used to describe plant communities associated with natural washes, rivers, ponds, and springs. Riparian plant associations occur along a continuum of available soil moisture, and regulatory agencies and researchers have consequently developed numerous and varied definitions of riparian (WestLand 2010c). Some definitions relate directly to the nature of the water supply (e.g., perennial streams only); others relate to the condition and nature of the habitats associated with the watercourse (e.g., vegetation location, density, and composition), and still others use definitions that incorporate varied combinations of these factors (WestLand 2010c).

There is a total of approximately 22,114 acres of riparian vegetation in the action area (see figure 6). These vegetation communities are present in drainages within the action area and along downstream portions of Box, McCleary, Sycamore, Scholefield, Wasp, Barrel, Davidson, and Gardner Canyons; Empire Gulch; and Cienega Creek. In addition to the riparian vegetation listed below as occurring in riparian areas in the action area, Emory oak, Mexican blue oak, and Arizona white oak are common in Box, McCleary, Sycamore, Scholefield, Wasp, and Barrel Canyons. Further, while many springs support some individuals of species considered to indicate hydoriparian habitat, only two springs had large mappable areas of hydoriparian vegetation: Scholefield No. 1 spring supports about 0.3 acre of wetland, and Fig Tree spring supports about 0.5 acre of riparian habitat, with a very limited wetland area. These water sources provide habitat for aquatic species within the action area. Pima County’s riparian mapping source is used for this project, and the following riparian habitat types are mapped within the action area (Pima County 2012).

HYDORIPARIAN

Hydoriparian habitats are generally associated with perennial watercourses and/or springs. Plant communities are dominated by obligate or preferential wetland plant species such as Goodding’s willow (Salix gooddingii) and Fremont cottonwood (Populus fremontii) and also include velvet ash (Fraxinus velutina), seep willow (Baccharis salicifolia), Arizona walnut (Juglans major), salt cedar (Tamarisk spp.), and mesquite. The cottonwood/willow forest is a typical example of this habitat type. The following drainages and associated riparian habitat contain stretches that are mapped as hydoriparian: Cienega Creek, Gardner Canyon, Empire Gulch, Davidson Canyon, and Barrel Canyon. Approximately 7,332 acres of hydoriparian habitat are located within the action area. Note that field analysis indicates that Barrel Canyon likely does not represent hydoriparian habitat despite being mapped as such; no perennial water sources are present, nor are any individuals of the types of species (cottonwood/willow) that indicate hydoriparian habitat present, based on field observations. Rather, the riparian areas of Barrel Canyon are better classified as xeroriparian habitat.

Aquatic vegetation that is unique to the springs and seeps is present within the action area. Vegetation at these springs and seeps includes obligate wetland plants (i.e., almost always occur under natural conditions in wetlands) such as seep monkey flower (Mimulus guttatus) and water speedwell (Veronica anagallis-aquatica), along with facultative wetland plants (i.e., usually occur in wetlands, but occasionally found in nonwetlands) such as smooth horsetail (Equisetum laevigatum) and Arizona giant sedge (Carex spissa var. ultra) (which is likely a facultative wetland plant). Other riparian plant species documented at springs and seeps in the action area include sycamore (Plantanus wrightii), willow (Salix spp.), netleaf hackberry (Celtis reticulata), and deergrass (Muhlenbergia rigens). Within the action area, moist soil or surface water (both lentic and lotic systems) and associated aquatic vegetation are known to occur at the several springs (e.g., Deering, Upper Empire Gulch, Fig Tree, Mudhole, Oak, Ojo Blanco, 

12 October 2012
Rosemont, Scholefield No. 1, Sycamore, and Water Develop) (WestLand 2011g, 2012). Areas of aquatic habitats are too small to map; therefore, they do not appear in figure 6.

**XERORIPARIAN**

Xeroriparian habitats are generally associated with an ephemeral water supply. These communities typically contain plant species also found in upland habitats; however, these plants are typically larger and/or occur at higher densities than adjacent uplands. Approximately 14,782 acres of xeroriparian habitat are located within the action area. Xeroriparian habitat is further divided into four subclasses to reflect the amount of vegetation present. Pima County Regional Flood Control District’s Regulated Riparian Habitat Mitigation Standards and Implementation Guidelines (Pima County 2010) define the xeroriparian subcategories as follows:

- **Xeroriparian A**: The most dense xeroriparian subcategory with a Total Vegetative Volume Greater than 0.856 cubic meters per square meter (m³/m²). Xeroriparian A habitat is present in stretches of Cienega Creek, Empire Gulch, and Davidson Canyon where vegetation consists of mesquite and netleaf hackberry. Approximately 145 acres of xeroriparian A habitat are located within the action area.

- **Xeroriparian B**: Moderately dense xeroriparian subcategory with a Total Vegetative Volume less than or equal to 0.856 m³/m² and greater than 0.675 m³/m². Xeroriparian B habitat is present in stretches of Cienega Creek, Gardner Canyon, Empire Gulch, Davidson Canyon, and Barrel Canyon where vegetation consists of mesquite, scattered cottonwood, netleaf hackberry, burrobrush (*Hymenoclea monogrya*), juniper (*Juniperus* sp.), and acacia (*Acacia* sp.). Approximately 7,122 acres of xeroriparian B habitat are located within the action area.

- **Xeroriparian C**: Less dense xeroriparian subcategory with a Total Vegetative Volume less than or equal to 0.675 m³/m² and greater than 0.500 m³/m². Xeroriparian C habitat is present in stretches of Cienega Creek, Gardner Canyon, Empire Gulch, and Davidson Canyon where vegetation consists of mesquite, desert broom (*Baccharis sarothroides*), burrobrush, desert willow (*Chilopsis linearis*), hackberry (*Celtis* sp.), and juniper. Approximately 7,341 acres of xeroriparian C habitat are located within the action area.

- **Xeroriparian D**: Less to sparse plant density xeroriparian subcategory that provides hydrologic connectivity to other riparian habitat areas with a Total Vegetative Volume less than or equal to 0.500 m³/m². Xeroriparian D habitat is present in stretches of Cienega Creek and Davidson Canyon where vegetation consists of acacia and desert broom. Approximately 174 acres of xeroriparian D habitat are located within the action area.

**IMPORTANT RIPARIAN AREAS**

Important Riparian Areas, as defined by Pima County, are those Regulated Riparian Habitats having the highest value and can include any of the various classifications of regulated habitat type listed above. They provide critical watershed and water resource management function and landscape linkages and are valued for their higher water availability, vegetation density, connectivity factors, and biological productivity, compared with adjacent uplands (Pima County Regional Flood Control District 2010). An Important Riparian Area is a regulatory distinction but does not factor into the functional assessment of riparian impacts. Approximately 14,539 acres of Important Riparian Areas are located within the action area, including much of Barrel Canyon and its tributaries.
Past and Existing Disturbances

Below is revised text describing past and existing disturbances, which now include fire activity and groundwater use (page 39 of the BA).

Past and present actions are reflected in the existing condition of the action area. Previous mineral exploration and production activities scattered throughout the action area have resulted in numerous landscape disturbances, such as mine prospects and adits, mine related access roads, and geotechnical drilling sites, that potentially increase light in the night sky and fugitive dust. Additional anthropogenic disturbances have resulted from livestock grazing and all-terrain vehicle use. Past wildfires have also affected biological resources in the action area: since 1989 there have been eight fires larger than 10 acres, totaling 34,082 acres. Fires kill vegetation and wildlife to a varying degree, depending on the severity and intensity of the fire, and the recovery can take up to decades, depending on the pre-fire vegetation community and the severity and intensity of the fire. Further, within and adjacent to the action area, there are numerous wells in the Sonoita area that support residential and ranching uses and contribute to groundwater drawdown in the action area.

FEDERALLY LISTED SPECIES AND DESIGNATED OR PROPOSED CRITICAL HABITAT

Chiricahua Leopard Frog

Figure 7 (page 42 of the BA) has been revised to reflect the new project and action areas.

Status and Distribution in the Action Area

RECENT SURVEYS

The second bullet of this section should be replaced with the following (page 47 of the BA):

- Chiricahua Leopard Frogs were documented in one location (Lower Stock Tank) within the proposed security fence of the preferred alternative in 2008 but have not been detected there since, despite annual surveys.

Gila Chub and Gila Topminnow

Figure 8 (page 50 of the BA) has been revised to reflect the new project and action areas.

Huachuca Water Umbel

Figure 9 (page 59 of the BA) has been revised to reflect the new project and action areas.
Figure 7. Chiricahua Leopard Frog designated critical habitat and documented occurrences (USFWS 2011d; WestLand 2009c, 2009d, 2011d).
Figure 8. Gila Chub and Gila Topminnow survey locations (Bodner et al. 2007; Kesner and Marsh 2009, 2010; Marsh and Kesner 2008, 2011; USFWS 2005b).
Figure 9. Huachuca water umbel locations (Bureau of Land Management 2011; Pima County 2001).
Jaguar

The following section should be added after the “Listing Status” section (page 60 of the BA).

Proposed Critical Habitat

Much of the Santa Rita Mountain Range is included as proposed critical habitat for a number of reasons. Essentially, this area is within the recent range of the Jaguar, as defined by the Jaguar Recovery Team (Jaguar Recovery Team and USFWS 2012) for the Northwestern Recovery Unit (NRU) Secondary Area, and because it possesses the Primary Constituent Elements (PCEs) required for recovery of the species in the Northwestern NRU (USFWS 2012). The project and action areas (defined in the June 2012 BA) are partially within the NRU.

RANGE AND RECENT DISTRIBUTION OF JAGUARS IN THE NORTHWESTERN RECOVERY UNIT

The species’ recovery outline (Jaguar Recovery Team and USFWS 2012) divides the Jaguar’s range into two recovery units, the NRU and the Pan American Recovery Unit. The NRU is in northwestern Mexico and contiguous with extreme southeastern Arizona and adjacent New Mexico—the only American states in which Jaguar has been known to occur in recent years—and the historic epicenter of Jaguar distribution in the United States.1 The NRU of northern Sonora and the United States is further subdivided into four subunits. The northernmost is the Northwestern Management Unit (NMU), which spans the borderlands of northern Sonora, Mexico, and the United States (Arizona and New Mexico) (Jaguar Recovery Team and USFWS 2012). The proposed critical habitat is within the United States portion of the NMU (USFWS 2012). Most of the proposed critical habitat is in the “Sky Islands” of the Coronado, from the Mexican border to Interstate 10, to the Baboquivari Mountains to the west, and to the Peloncillo Mountains to the east (some Sky Islands in this perimeter are not included as proposed critical habitat because they were not considered to meet the criteria of critical habitat PCEs).

There are two proposed critical habitat units in the vicinity of the proposed project area: Patagonia (Unit 3) and Whetstone (Unit 4) units (Figure 10)2. The Whetstone Unit has three subunits: unit 4a is a “habitat” unit, while subunits 4b and 4c are “connector” subunits. Habitat units and subunits are those that provide for Jaguar recovery by having all PCEs, while connector subunits provide general habitat connectivity between units, subunits, and Mexico (where source populations exist). The summary of acreages of proposed critical habitat units within the project and action areas is shown in Table 3.

Table 3. Area of Overlap between the Project and Action Areas with Proposed Critical Habitat, in Acres

<table>
<thead>
<tr>
<th></th>
<th>Unit 3</th>
<th>Subunit 4b</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Area</td>
<td>3,576</td>
<td>50</td>
<td>3,626</td>
</tr>
<tr>
<td>Action Area</td>
<td>34,076</td>
<td>19,640</td>
<td>53,716</td>
</tr>
</tbody>
</table>

The “connector subunits” function as travel corridors, rather than typical core habitat, so they may not meet the requirements of meeting all PCEs, which are required for critical life history needs (such as foraging), rather than being sufficient for travel (i.e., forays, dispersal, and other long-range movements). Long-range movements may be important for some life history needs, such as accessing other core areas within the home range or seeking mates, but Jaguars do not tend to spend extended periods in these sorts

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1 The eastern coastal populations of Mexico formerly ranged into southern Texas (Brown and López González 2001). The Texas population is believed to be extinct and connectivity to northeastern Mexico lost due to habitat degradation, urbanization, and hunting.

2 Figure 10 (page 62 of the BA) has been revised to also reflect the new project area and proposed critical habitat.
Figure 10. The spatial relationships among Jaguar proposed critical habitat (orange area), the project area (i.e., security fence [purple dashed line]), and the action area (i.e., black dashed line). Localities are approximate for the 2011 records (general area of stars) and the 2012 record (within critical habitat and the action area) (AGFD 2011a; Jaguar Recovery Team and USFWS 2012; personal communication, Eric Gardner, AGFD Non-game Species Coordinator, 2011; USFWS 2012).
of habitats. As an example, “Macho B,” the only Jaguar whose movements are fairly well documented in the United States, was recorded numerous times in two mountain ranges (McCain and Childs 2008) and would have had to cross the Altar Valley to access these montane areas. This pattern of movement between, or outside, core areas is common for mammalian carnivores.

The two recent Jaguar records from 2011 that were discussed in the BA are both within proposed critical habitat. The Whetstone locality is a confirmed (based on indisputable physical evidence) sighting in Unit 4a. The “Mansfield Canyon” locality, an unconfirmed sighting in the Santa Rita Mountains, is in Unit 3. Unit 3 and 4a are habitat units, which are joined by the 4b connector subunit (USFWS 2012). Recently, in 2012, another confirmed sighting was made in the Santa Rita Mountains. This record was from an image on a hunter’s trail camera. All of the general localities of these records are shown in Figure 10; locations are approximate to ensure species conservation. The 2012 record is within proposed critical habitat and within the action area (i.e., north of Box Canyon and south of Interstate 10). This record provides the first unequivocal evidence of Jaguar occurrence in recent years in the action area (and Santa Rita Mountains).

**PRIMARY CONSTITUENT ELEMENTS**

The PCEs are habitat features within areas of open space (at least 32 miles² [84 km²]) in southeastern Arizona and adjacent New Mexico that include the following (USFWS 2012):

1. Connectivity to Mexico
2. Adequate levels of prey species
3. Surface water sources within 12.4 miles (20 km) of each other
4. Madrean evergreen woodland or semidesert grassland
5. Moderate to highly rugged terrain
6. Minimal human influence or disturbance

Each of these PCEs is discussed below, as it relates to the project and action areas.

1. **Connectivity to Mexico.** The Patagonia Unit extends from the border with Mexico in the Patagonia Mountains, northward to the north end of the Santa Rita Mountains, just north of the project area (but within the action area). There is a more or less contiguous chain of rugged mountains in Unit 3 composed of the Patagonia Mountains and Santa Rita Mountains. The Patagonia Mountains extend into Mexico. Also south of the international border are the Mexican Sky Islands of Sierra San Antonio, Sierra Chivato, and Sierra Pinito, with the Tumacacori Mountain complex (Unit 2, Atascosa Unit) and Sierra Cibuta complex to the west (see figure 4.1 in Appendix 4). The issue of connectivity between the United States and Mexico has been highlighted as a conservation concern for many species because of human traffic barriers (e.g., Lasky et al. 2011), but the Patagonia Mountains have permeable fences (e.g., vehicle barriers). Indeed, one of the reasons for this PCE is the linkage between Mexico and the United States along corridors identified by the Wildlands Project in 2007 (identified and reported by Johnson et al. 2009). The two major corridors are at the Patagonia and Pajarito Mountains to the west and Peloncillo Mountains to the east. Although design of these corridors was based on knowledge of Jaguar populations, habitats, and land use, recent records confirm Jaguar presence

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3 A large star is used for each 2011 locality because precise information is under the authority of Arizona Game and Fish Department. Sensitive data such as Jaguar locations are “fuzzed” to ensure species conservation. The 2012 sighting referenced in the text also was within the proposed critical habitat, but the locality is not noted with a star.

4 “Open space” is considered an overarching requirement for Jaguar critical habitat (USFWS 2012) so is itself a PCE (personal communication, Marit Alanen, USFWS, 6 September 2012).
in these corridors (reported during the Madrean Archipelago Symposium in Tucson, Arizona, May 2012).

2. **Adequate levels of prey species.** Deer, Collared Peccary, and medium-sized prey species, such as White-nosed Coati, Skunks, Raccoon, or Jackrabbits, are important prey species (USFWS 2012). The project and action areas are within the known range of all of these species, including two species of deer (White-tailed and Mule), four species of skunk (Hog-nosed, Striped, Western Spotted, and Hooded), and four species of lagomorphs (Desert Cottontail, Eastern Cottontail, Black-tailed Jackrabbit, and Antelope Jackrabbit) (Hoffmeister 1986; Reid 2006). Habitat is present for all of these species.

3. **Surface water sources within 12.4 miles (20 km) of each other.** It is somewhat unclear what constitutes surface water in such an arid environment, but it seems that stock ponds, drinkers, streams, and seeps (except seeps without standing water) are considered surface waters; however, surface water can be perennial or ephemeral. In the action area, perennial streams are known to exist at Box Canyon, Empire Gulch, and Cienega Creek; all of these are intermittent during dry periods (early summer low flow and drought) but tend to have some pools remaining. There are several named ephemeral streams (e.g., Barrel, Mc Cleary, Scholefield, Wasp, and Davidson Canyons), numerous constructed waters (primarily stock tanks and drinkers), and some seeps with surface water in the project and action areas. These features have been characterized and mapped by WestLand (2011g, 2012) and Pima County (2012). The presence of numerous more or less perennial waters in the project and action areas is substantiated by the presence of numerous Chiricahua Leopard Frog (a perennially aquatic species) localities in the Rosemont vicinity (e.g., WestLand 2009c, 2009d, 2011d).

4. **Madrean evergreen woodland or semidesert grassland vegetation community.** Another PCE is a 3% to 40% canopy cover within these two biotic communities (defined by Brown 1994) (USFWS 2012). It is often stated that the Sky Island region of the United States and/or Mexico constitutes fringe, suboptimal, or atypical habitat for Jaguars. The source of this concept can be found in the literature, and Rabinowitz (1999:97) is often cited (i.e., “The more open, dry habitat of the southwest, although apparently suitable for the puma, is marginal for the jaguar in terms of water, cover, and prey densities”). However, this generalization is misleading. Jaguars actually occupy a wide variety of habitats throughout their range, including tropical deciduous forests, rainforests, swamps, thornscrub, and pampas grassland (IUCN website, access date 20 September 2012). Vegetation communities used by Jaguars correspond to biogeographic areas that provide for life history needs. In the NMU and much of northern Mexico, these needs are met by the Madrean evergreen woodland and semidesert grassland vegetation communities. Hence, these habitats are actually typical and necessary for Jaguars in the NMU (along with other suitable vegetation communities, such as thornscrub), an area where Jaguars have bred and persisted since records were kept by European settlers (and where an extensive fossil record is present) (see Brown and López González 2000, 2001; Grigione et al. 2009; Gutiérrez-González et al. in press; Hatten et al. 2003, 2005; Hoffmeister 1986; Johnson et al. 2009; McCain and Childs 2008; Rabinowitz 1999; Rosas-Rosas and Bender 2012). The three recent records in 2011 and 2012 (Figure 10) were all in these habitat types.

In the project area and most of the action area, the vegetation community is composed of semidesert grassland and Madrean evergreen woodland, but it is noted in the June 2012 BA that the lower end of Madrean evergreen woodland is dominated by oaks and junipers while the upper end has more pines and higher-elevation oaks. In the project area and northern Santa Rita Mountains, there is no pine/oak woodland (McLaughlin and Van Asdall 1977). The only part of the project area not in this vegetation type is along the spine of the mountains, where some rock outcrops and talus slopes may have less than 3% cover. In the action area, there are some desertscrub habitats that are not of this PCE type, but these are outside proposed critical habitat.
5. **Moderate to highly rugged terrain.** This PCE is based on most of the same publications listed in the vegetation PCE (in part). Most of the Jaguar records in Arizona are from camera surveys, sightings, and hunting; the vast majority of these were in moderate to highly rugged terrain. As mentioned in the section on vegetation the PCE above, Jaguars are known to occur in a variety of topographic types, including flat swamps and grasslands, but in this NMU, rugged mountains below the conifer zones appear to be the typical habitat for Jaguars. Figure 10 shows that part of the eastern edge of the project area is not within proposed critical habitat for Jaguar. This is presumably because this portion of the project area lacks the moderate to highly rugged terrain PCE.

6. **Little human influence or disturbance.** This PCE includes minimal to no human population density, no major roads, or no stable nighttime lighting over any 0.4-square-mile (1-km²) area (USFWS 2012). This reflects the fact that Jaguars avoid areas of human activity. This is more subjective than the other PCEs for an effects analysis because there is undoubtedly a human disturbance threshold where Jaguars will or will not establish a home range, but this threshold cannot be measured accurately. However, qualitatively reviewing the project and action areas should help paint the picture of the level of human disturbance that exists as a baseline and what could be expected after initiation of the project. There is more information on noise, light pollution, traffic, and other anthropogenic disturbances in the June 2012 BA, 2012 ADFEIS, and references cited in those documents.

   • **Population density.** The project and action areas could subjectively be classified as relatively remote. Northwest of the Santa Rita Mountains is a major population center—the Tucson metropolitan area. Tucson and environs are separated from the project area by the spine of the northern Santa Rita Mountains. Northeast of the project area is a small community, and Sonoita is to the south. There are some inholdings of a few ranch homes on the Coronado National Forest. Overall, the action area has a low human density and contains no large communities.

   • **Major roads.** The major road in the vicinity is State Route 83 to the east of the project area, a paved two-lane highway between Sonoita and the Tucson metropolitan area. At the south end of the action area is a maintained dirt road, Box Canyon Road. These roads are probably not a significant deterrent to movement by Jaguar currently. Interstate 10, however, is north of the Santa Rita Mountains and is a significant barrier to movement (i.e., there are no recent records north of Interstate 10), but that area is outside proposed critical habitat.

   • **No stable nighttime lighting.** Although a baseline lighting report was provided by contractors (STEM 2011), it is not easy to interpret the data, as there are no summaries or commonly interpreted reference conditions understandable by laypersons. At a gross, qualitative level, it appears to the human eye that the skies in the area are relatively dark in most of the project and action area on moonless nights; the lights of Tucson are blocked by the ridgeline west of the project area (consistent with STEM 2011 graphics). Currently, there is some mine exploration activity in the project area and some light from adjacent private lands, but there is little other information on the current baseline light levels at night. There has been some effort to quantify the amount of light in the night skies studies. The area in and adjacent to the project area currently is dark at night because there are few artificial light sources and no developed areas to affect night sky views or the natural light conditions and cycles that are important to native plants and animals. Background sources of lighting in the action area include headlights from vehicles traveling at night along SR 83 and along forest roads; however, there are no pole-mounted fixtures along those roadways, nor is there lighting in visitor use areas to illuminate their roads, signs, access paths and trails, or

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5 “Night skies” refers to the amount of light projected vertically into the sky, due in part to astronomical viewing concerns, rather than the amount and attenuation of light horizontally, which is also of concern for plant and animal conservation.
parking areas. Sky glow is visible in the project area, caused primarily by lighting in the Tucson metropolitan area to the north, with distant sky glow caused by lighting in Nogales and Sierra Vista to the south. The presence of a Jaguar in the action area in 2012 suggests that the amount of ambient light present was not great enough to repel the Jaguar. This suggests the area is currently “dark enough” for Jaguars, so substantiates this PCE in this area.

- **Other.** Figure 10 shows a section of proposed critical habitat missing from the area to the north of Helvetia, northeast of the project area and within the action area. It appears to have the topographic and other requirements of PCEs; however, it represents a quarry that has been disturbed enough to render it unsuitable for proposed critical habitat. This section is physically close to the project area (about 1.5 miles) and at the juncture of Units 3 and 4b.

To summarize this section, all of the PCEs within the boundaries of the proposed critical habitat for Jaguar are considered to be present in the project area, except the eastern portion, which lacks only the topographic PCE. The USFWS has already decided that the mapped area has the potential for PCEs, and the Coronado’s knowledge on the ground confirms the presence of PCEs.

**Lesser Long-nosed Bat**

Figure 11 (page 71 of the BA) has been revised to reflect the new project and action areas.

**Mexican Spotted Owl**

Figure 12 (page 71 of the BA) has been revised to reflect the new project and action areas.

**Status and Distribution in the Action Area**

**RECENT SURVEYS**

**Bat Surveys.** The second to the last sentence of the second paragraph of this section should be replaced with the following (page 70 of the BA).

Site R-2 is located outside and approximately 0.5 mile to the southwest of the proposed security fence of the preferred alternative.

**Pima Pineapple Cactus**

Figure 13 (page 84 of the BA) has been revised to reflect the new project and action areas.

**Status and Distribution in the Action Area**

**RECENT SURVEYS**

The second sentence of the last paragraph of this section should be replaced with the following (page 83 of the BA).

Forty-seven living Pima pineapple cactus (Appendix E) have been found within the utility corridor (see Figure 13).
Figure 11. Lesser Long-nosed Bat known roost locations (Buecher et al. 2010, 2011; WestLand 2009f, 2011f).
Figure 12. Nearby Mexican Spotted Owl PACs and designated critical habitat (USFWS 2004a).
Figure 13. Pima pineapple cactus locations (WestLand 2009a, 2009b, 2010b).
Southwestern Willow Flycatcher

Critical Habitat Designation

The following text should be added after the last paragraph in this section (page 86 of the BA).

On July 12, 2012, the USFWS proposed to designate additional areas that occur in the Santa Cruz Management Unit, Pima County, Arizona, within the Gila Recovery Unit (USFWS 2012). This change would lengthen, both upstream and downstream, the segment of Cienega Creek that had been proposed for designation as critical habitat in August 2011 and would add two short segments of Empire Gulch, a tributary to the headwaters of Cienega Creek. The new segments of Cienega Creek and Empire Gulch would add 6.8 miles to the areas in the proposed Santa Cruz Management Unit. All of the newly proposed segments are within the Las Cienegas National Conservation Area. Although these areas were not known to be occupied at the time of listing in 1995, they contain both PCEs of the physical and biological features essential to the conservation of the Southwestern Willow Flycatcher: riparian vegetation and insect prey populations.

Figure 14 (page 87 of the BA) has been revised to reflect the new project and action areas and revisions to proposed critical habitat.

EFFECTS ANALYSIS

Vegetation Considerations

The second sentence of this paragraph should read as follows (page 96 of the BA).

Direct, long-term or permanent impacts to vegetation communities from the preferred alternative, including the construction of connected actions, would result from the removal of approximately 5,367 acres of vegetation: 4,780 acres of upland vegetation (2,273 acres of semidesert grassland, 2,506 acres of Madrean evergreen woodland, 0 (no) acres of Chihuahuan desertscrub, and 1 acre of Sonoran desertscrub), and 587 acres of riparian vegetation (113 acres of hydoriparian, 420 acres of xeroriparian B, and 55 acres of xeroriparian C habitat).

Species

Chiricahua Leopard Frog

DIRECT AND INDIRECT EFFECTS

The second, third, and fourth sentences of the first paragraph of this section should be changed to read as follows (page 105 of the BA).

One aquatic site within the footprint of the proposed mine, Lower Stock Tank, was known to have been occupied by Chiricahua Leopard Frogs in 2008 (WestLand 2009c) and will be removed as a result of mine operations. Although frogs have not been documented in this location since 2008 … (the remainder of this sentence is unchanged).
Figure 14. Southwestern Willow Flycatcher proposed critical habitat and Empire Gulch MAPS station (USFWS 2011f, 2012).
Jaguar

DIRECT AND INDIRECT EFFECTS

In the June BA, there is already a determination of may affect, likely to adversely affect for the species. This does not change with the 2012 confirmed sighting of Jaguar within the action area, but it does help justify the effects determination. The effects analysis below targets Jaguar proposed critical habitat.

Effects on Primary Constituent Elements

1. **Connectivity to Mexico.** Connectivity to Mexico will not be altered. This project is at the north end of proposed critical habitat, over 30 miles north of the international border. Connectivity, however, would likely be affected for areas beyond (north and northeast) of the project area in Units 3 and 4b because of activity and disturbance by the proposed project.

2. **Adequate levels of prey species.** It is anticipated that during most of the mine operation and during postclosure, prey species density and diversity are expected to decrease, both in the project area and, to a lesser degree, the action area. The habitat will be topographically altered and vegetation structure and composition may be altered (see below). During and after operations, the open pit will not provide suitable habitat for prey species. There will be steep walls, exposed rock, and poor plant growth. The pit will also retain a pit lake, which because of the steep sides could function as a pitfall trap for prey species. During operations, the facilities will not provide habitat for any prey species. It is difficult to project what the postclosure facilities footprint will look like and how it will function biologically, but it is likely that such a highly disturbed area will not become restored for a long time. During operations, there will be heavy machinery use and active transport of waste rock and topsoil into the waste rock piles. There will also be active hydoseeding for reclamation.

Because of the amount of human activity during the life of the mine from direct ground disturbance, noise, dust, light pollution, and traffic, it seems logical to assume most Jaguar prey species will avoid the area. Postclosure is more difficult to predict, but at least the area of the open pit and the canyons and rocky habitats within the project area will be permanently altered or lost as wildlife habitat. Because of this, prey species are expected to decline in abundance and diversity during and after postclosure in these heavily affected areas. The area of the waste rock piles will be permanently transformed. Canyons will be filled in and replaced with waste rock piles approximately 700 feet high. After closure, the piles will likely become revegetated with grasses and shrubs, so it is likely that most prey species will resume foraging in the waste rock and dirt road areas to some extent.

In the action area outside the project area, there will likely be effects from mine related activity. Traffic and nighttime lighting will likely affect prey species negatively. Traffic on State Route 83 is expected to increase and speeds are expected to slow during mine operations, so it is likely that behavior and movement of prey species will be negatively affected. It is anticipated that road mortality will increase. Deer and Collared Peccary, probably the two most important prey species in our area, are often casualties of increased traffic.

The net result is that there will not be adequate levels of prey species during the life of the mine, and at postclosure, the levels of prey species will be reduced, at least in the area of the pit lake.

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6 For our purposes, project area effects in this section relate to that portion of the project area within proposed critical habitat. Similarly, effects on the action area, outside the project area, would refer to that portion of Unit 4b that overlaps the proposed critical habitat.

7 See footnote 6.
3. **Surface water sources within 12.4 miles (20 km) of each other.** The effects of the project on surface water and groundwater (especially), have been a topic of debate among hydrologists, biologists, and geomorphologists from the action agencies and cooperating agencies, as well as the public. For the project, the interdisciplinary team has relied on several models and input from those listed above. There is much uncertainty about the effects of the preferred alternative on surface water, but here are some concepts that seem generally accepted:

- The pit will form a lake that will draw in groundwater from the surrounding area
- Surface water flow patterns will be altered
- Some surface water, seeps, and springs will be lost owing to direct surface disturbance or falling groundwater levels
- Several naturally occurring drainages will be lost owing to direct surface disturbance or altered as a result of reduced surface water flows
- Effects of the project will likely exacerbate the effects of climate change, resulting in a synergism that will result in decreased surface water, at least during the spring and early summer

Thus, a loss of surface water is anticipated from the project—the only disagreement is how much, where, and by when; however, short- and long-term effects are still effects on the species and their habitats, regardless of when they occur. As with light pollution, effects will diminish with increased distance from the project area. At the time of this writing, there are no specific mitigations or conservation measures that will offset the effects of the general loss of surface water for proposed critical habitat. Replacing waters outside the proposed critical habitat would not mitigate effects on water inside proposed critical habitat. If waters were replaced within the proposed critical habitat, the arrangement would be altered from the existing condition. Effects of disturbance from altered water flow regimes are synergistic with other effects on PCEs. For example, if the area inside the footprint section of the proposed critical habitat is well-lit and has an active mining operation, a Jaguar would not venture into the footprint to access surface water.

4. **Madrean evergreen woodland or semidesert grassland.** Early in the process, the project area will be cleared of most vegetation in order to make mining operations efficient. The reclamation plan (CDM Smith 2012) does not specify exactly which areas will be cleared and when. This will obviously have a short-term effect on the vegetation community. The PCE calls for 3% to 40% cover in semidesert grasslands and Madrean evergreen woodland. Thus, the clearing of vegetation will cause the vegetation to drop below the threshold of the required PCE coverage. It is likely that the vast majority of mature oaks and junipers (the dominant canopy species in Madrean evergreen woodlands [Brown 1994] and dominant trees in the project area [McLaughlin and Van Asdall 1977]) will be removed. Parts of the grasslands will be scraped to bare ground in areas (e.g., facilities, roads, pit area) or covered by waste rock prior to reclamation.

Over the life of the mine, topography and vegetation composition and structure is expected to change. After initial clearing, materials will be removed from the pit and relocated to waste rock piles (except that being retained for the removal of copper and other valuable metals). As the piles grow, reclamation will begin. There will be phased reclamation beginning at Year 1, but about 50% of the reclamation will be during Years 16 to 22 and at closure (CDM Smith 2012). The reclamation and closure plan calls for using prospective seed mixes of “native species” (it is not known where the ultimate source of these seeds will be, but probably not from local [Rosemont area] seed sources). The “native” seed mixes are composed of grasses, herbs, and small shrubs, but no mention of trees (CDM Smith 2012). There is an invasive species management plan to address invasion of nonnative species (Rosemont Copper 2012), but ground-disturbing activities are conducive to weed invasion, and control will not likely equate to eradication.
There will be some other disturbed areas within the action area in proposed critical habitat, including roads and the relocated Arizona National Scenic Trail.

In the long term, the topography will be permanently changed, and the recovery of native vegetation species is largely unknown. It is unlikely the pit area will recover because of exposed rock and filling with water. Other areas left in a topographically disturbed state will undoubtedly have some coverage of grasses, forbs, and perhaps shrubs and trees, but it seems unlikely that it will completely blend with the native vegetation. While there are requirements for reclamation, there are no requirements for restoration, and there are currently no mitigation measures to restore the landscape within proposed critical habitat with the full, or nearly full, complement of local plant species. However, in the DEIS section on revegetation success, it was predicted that life-form structure of the plant communities should be fairly close to the historic condition.

The Anamax surveys (McLaughlin and Van Asdall 1977) reported 416 plant species in 256 genera and 75 families as occurring in the area, yet the seed mixes are composed of 11 species, mostly common grasses (one family). Undoubtedly there will be recruitment of native species, but no one can predict the final outcome of native species recolonization.

5. **Moderate to highly rugged terrain.** The proposed project may actually create a net increase in the amount of moderate to highly rugged terrain (see 22-year map in CDM Smith 2012). At the end of the operation, and during closure, there will be an open pit that is 6,000 to 6,500 feet wide and 1,800 to 2,900 feet deep (June 2012 BA). Some of the rugged spine of the ridge will be etched out for the pit or other structures. The area of the tailings will morph into a different topography. Some canyons will be filled, but the net result will be an increase in topography at the waste rock piles. There will essentially be two new large hills about 700 feet high in areas that are either within the rugged terrain boundaries of the proposed critical habitat, or just outside to the east. The gradient of the slope of the piles will vary, but will generally have 3:1 to 4:1 (25% to 33%) slopes. Two areas of reduced topography include the benches and tops of the waste rock piles and the area of the facilities, which will be flattened.

6. **Minimal human influence or disturbance.** One of the most obvious changes caused by the proposed copper mine in the proposed Jaguar critical habitat will be the transformation from a relatively undisturbed landscape to one that shows extensive evidence of human activity. At first, there will be activity from the mining operation; later, there will be an altered landscape.

   - **Population density.** During the life of the mine, the project area and proposed critical habitat will have a functionally increased population density. Although people will not live in the footprint, mine operations are continuous, 24 hours per day, for about 20 years, so there will be ongoing human activity. There may be some nearby increase in population, but this will probably be slight, or not due to the mine *per se*.

   - **Major roads.** No major (paved) roads are expected to be built to accommodate the mine, but the single, nearby major road (State Route 83) will experience an increase in traffic, and problems associated with traffic, such as more cars, more lights, more trucks, closer distance between vehicles, and so on. Access roads will be directly related to mine operations, and there will be large trucks driving on these roads for about 20 years. Although not addressed anywhere in the analysis, it seems possible that Box Canyon Road may experience increased traffic from people wanting to avoid the State Route 83 bottleneck. This could be important because Box Canyon road currently gets little use and is not likely a major barrier to Jaguar movements. The canyon itself may also be a potential draw to Jaguars because it is a perennial source of surface water and deciduous riparian vegetation (good habitat and dispersal corridor). After closure, the access roads will be decommissioned and traffic will resume to a normal (*sans* mining) level.
Nighttime lighting. Nighttime lighting has always been one of the most significant concerns for astronomical and biological issues. These concerns were addressed when the Rosemont Lighting Plan was updated, and the amount of light output was significantly reduced (Monrad et al. 2012) and a monitoring plan developed (STEM 2012). During analysis of the initial monitoring plan, it was stated that the night sky would resemble that of Nogales at night (see DEIS). To laypersons, this was an easily recognizable reference. Unfortunately, no analogous effect has been disclosed in the current plan. While the effects of the mitigation will no doubt be an improvement to the initial lighting plan, the night will not be “relatively dark” in the project area because logic suggests that it will have to be fairly bright in order to meet Mine Safety Health Administration (MSHA) standards for human safety. As mentioned earlier, light intensity attenuates (especially at certain wavelengths) away from the source, and at some point there is a threshold where Jaguar behavior would be affected. Light from artificial illumination associated with the proposed project would increase light levels at night within the action area, and sky brightness resulting from the proposed project would vary, depending on the angle of view to the project area. It is expected the lighting close to the operations (at least) will render proposed critical habitat uninhabitable by Jaguars.

Effects on Proposed Critical Habitat Continuity, Connectivity, and Open Space

The overarching concept of Jaguar habitat (USFWS 2012) is that it contains large areas of relatively undisturbed open space that have PCEs meeting the natural history needs of Jaguar. The fact that the mining operation northwest of Helvetia was excluded from proposed critical habitat suggests that a large, active (and possibly closed) mine area does not meet the requirements of PCEs.

The proposed critical habitat for Jaguar is composed of six units that are somewhat linear along isolated “Sky Island” mountain ranges, from the Mexican border northward, with somewhat linear connectors between. The proposed copper mine effects are not limited to the mine site itself because the location fragments Units 3 and 4b. Connectivity of habitat is effectively lost because the linear habitat would become discontinuous with the operation of a large-scale mine. The effects of fragmentation are twofold. First, a Jaguar would not likely establish a home range that includes part of the proposed critical habitat where the project area is (and some distance beyond owing to light pollution and other factors). Also, this break in connectivity may also hinder dispersal and other long-term movements that might be necessary for Jaguar recovery, at least in Unit 3 and possibly in Unit 4. Existing wildlife linkages (see June 2012 BA) do not take into account a landscape inclusive of an open-pit mine in the area, and travel corridors are designed around a concept of the Rosemont area being a source or refuge for Jaguars establishing home ranges. The linkage areas are connections for animals to access the Rosemont area as a block of contiguous habitat for a variety of life history needs (i.e., a site for home range establishment for large animals, not just a corridor).

Open space would be reduced. Open space is not only a key concept for Jaguar recovery, but it is also an important mitigation to maintain biodiversity affected by climate change (e.g., a larger buffer around a refugium minimizes edge-effect xerification), and many studies have addressed the role of open space/protected landscapes at maintaining biological diversity (e.g., Cantú-Salazar and Gaston 2010; Ervin 2003; Wiens et al. 2003). The Forest Service has recognized this value and has an Open Space Conservation Strategy (Forest Service 2007).

As discussed above, all PCEs of proposed Jaguar critical habitat will be negatively affected by the project, except (1) connectivity to Mexico (proposed critical habitat beyond the project area notwithstanding) and possibly (5) moderate to highly rugged terrain. There would be direct impacts within proposed critical habitat within the footprint (project area); however, this only accounts for 0.4% of the proposed critical
habitat. The action area overlaps 10% of the proposed critical habitat for Unit 3 and 19% for Unit 4 (74% for Subunit 4b). However, in the action area, the effects are less precisely known but are expected to reach beyond the project area and attenuate to less disturbance the greater the distance from the mine. For example, levels of light pollution are not precisely known and probably will not be until the mining operation is underway (e.g., MSHA establishes lighting safety regulations). Certainly, there will be attrition of light away from the project area, but no one can predict mine operation light levels (especially “horizontal light”) the threshold at which Jaguars will turn away from the project area. The effects on topography and vegetation during mine operations will be profound, and the topographic changes will endure indefinitely. Effects on the water table will be most pronounced within the proposed critical habitat /project area and attenuate away from the mine. Not only will these impacts affect Jaguar habitat, but also Jaguar prey, which uses the same habitat, especially for the next 20 years. In summary, the proposed project is a large-scale land altering project that will negatively affect most PCEs in the short term, and some PCEs will be affected indefinitely. The proposed project does not mesh with the concept of open space (in a natural sense) and is a stressor to effects from climate change.

CUMULATIVE EFFECTS

The following text should be added to the “Cumulative Effects” section (page 114 of the BA):

With regard to proposed critical habitat within Unit 3, there are also several mining operations in the Patagonia Mountains, and these are mostly along the mountainous spine. Patented mines are private lands, even if within Forest Service Ecosystem Management Area boundaries. Most of these mining operations are small and/or exploratory, but the Hardshell Mine is currently being reviewed as a relatively large exploratory operation in the Patagonia Mountains.

Determination of Effect

The following text should be added to this section (page 114 of the BA).

The proposed project may affect, and is likely to adversely affect, Jaguar proposed critical habitat.

Pima Pineapple Cactus

DIRECT AND INDIRECT EFFECTS

The second sentence of this section should be changed to read as follows (page 120 of the BA).

Approximately 47 live Pima pineapple cacti and 24.4 acres of Pima pineapple cactus habitat would be impacted.

Southwestern Willow Flycatcher

DIRECT AND INDIRECT EFFECTS

The last paragraph in this section should be replaced with the following text (page 121 of the BA).

The proposed project could indirectly impact both PCEs of proposed critical habitat for this species: riparian vegetation and insect prey populations. Southwestern Willow Flycatchers are known to occur at two locations in proposed critical habitat that is supported by groundwater: Cienega Creek and Empire Gulch. Groundwater drawdown in Cienega Creek and Empire Gulch is modeled to be measurable beginning 50 years after mine closure, although the levels of drawdown predicted are much less than the accuracy of the groundwater models, and a very high level of uncertainty exists with these predictions. If occurring, any impacts to surface flow could be critical during periods of low flow (May and June) and
drought because even small flow reductions could cause some portions of Cienega Creek and Empire Gulch to stop flowing. Predicted drawdown in Empire Gulch is of greater magnitude than Cienega Creek, and though still highly uncertain, is reasonable to predict that it could occur. Predicted drawdown along Cienega Creek is possible but of high uncertainty. These modeled decreases in groundwater (less than 1 foot) would occur over a long period of time but could cause changes in riparian vegetation extent or health, and the reduction in stream flow could impact designated critical habitat for this bird species, which preys on insects that are found within or adjacent to riparian floodplains or moist environments. Indirect effects of groundwater drawdown on proposed critical habitat could result in reduced substrate for nest locations and escape cover, and prey species.

**Determination of Effect**

The second sentence in this paragraph should be replaced with the following (page 122 of the BA).

The proposed project *may affect, and is likely to adversely affect*, Southwestern Willow Flycatcher proposed critical habitat.
LITERATURE CITED

References cited in this addendum that were not previously cited in the June 2012 BA are listed below.


APPENDIX 1

Excerpt from Chapter 2 of ADFEIS (September 2012)
Description of Barrel Alternative
Alternative 4 – Barrel Alternative in Detail (Preferred Alternative)

The forest supervisor has chosen the Barrel Alternative as the preferred alternative. Factors influencing the decision include preservation of resource values in McCleary Canyon, including recreation, riparian areas, and wildlife species habitat and movement corridors, as well as avoidance of waters of the United States and cultural sites in McCleary Canyon and other areas.

There have been refinements to this alternative in response to public comments and agency efforts toward geomorphic reclamation. Geomorphic reclamation is the desire to have postclosure landforms that replicate the natural drainage both functionally and visually. Through the refinement process for this alternative, Rosemont Copper committed to work within the project footprint developed by the Coronado team. After further construction planning by Rosemont Copper, it became clear that this could not be constructed according to the necessary phasing and still keep the heap leach facility exposed with enough surface area to make the oxide ore processing economically desirable. Because the commitment and designs had already been made and numerous public comments had been made and outside agency concern expressed over the heap leach facility, Rosemont Copper chose to eliminate the oxide ore processing from this alternative. These refinements include the following:

- Elimination of the oxide ore processes, including the heap leach facility
- Reclamation on east slope to include rock cover to promote long-term stability
- Stormwater redesign, including the removal of the underdrains, elimination of storage on top of the facility, and inclusion of more stormwater routing downstream
- The Arizona National Scenic Trail was relocated to the east side of State Route 83

SPECIFIC ELEMENTS OF THE BARREL ALTERNATIVE

The Barrel Alternative (figure 15) was developed to respond to the significant issues regarding potential impacts on biological resources, cultural resources, recreation, and the surface water component of water resources.

PRODUCTION SCHEDULE

A feasibility study update was completed in July 2012, and although the entire study was not released for proprietary reasons, the news release describes a preproduction period of “22 months followed by 21 years of mining production.” It also states that “although the oxide minerals contained in the mineral resource estimate are potentially economic, it has been removed from the mineral reserves and is included in waste in this update” (cite Augusta News Release 7/24/12).

The table below (table X), provided by Rosemont Copper after the July 2012 updated feasibility study, gives the production schedule that applies to the Barrel Alternative only and considers the elimination of the oxide ore processing:
Figure 15. Barrel Alternative footprint
Table X. Production schedule

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Sulfide Ore (1,000 tons)</th>
<th>Waste Rock (1,000 tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preproduction: 22 months</td>
<td>6,259</td>
<td>108,417</td>
</tr>
<tr>
<td>Year 1*</td>
<td>27,920</td>
<td>88,169</td>
</tr>
<tr>
<td>Year 2</td>
<td>35,577</td>
<td>69,944</td>
</tr>
<tr>
<td>Year 3</td>
<td>42,628</td>
<td>82,165</td>
</tr>
<tr>
<td>Year 4</td>
<td>27,375</td>
<td>95,980</td>
</tr>
<tr>
<td>Year 5</td>
<td>32,015</td>
<td>74,569</td>
</tr>
<tr>
<td>Year 6</td>
<td>34,349</td>
<td>63,412</td>
</tr>
<tr>
<td>Year 7</td>
<td>37,373</td>
<td>62,094</td>
</tr>
<tr>
<td>Years 8 through 10</td>
<td>50,316</td>
<td>269,243</td>
</tr>
<tr>
<td>Years 11 through 15</td>
<td>163,520</td>
<td>260,736</td>
</tr>
<tr>
<td>Years 16 through 20</td>
<td>164,250</td>
<td>79,346</td>
</tr>
<tr>
<td>Years 21 and 22*</td>
<td>39,847</td>
<td>4,644</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>661,428</strong></td>
<td><strong>1,258,718</strong></td>
</tr>
</tbody>
</table>

Source: (citation needed).
* Years 1 and 22 are partial years for production purposes.

WASTE ROCK STORAGE AREA AND TAILINGS FACILITY

The Barrel Alternative places all of the tailings and waste rock in upper Barrel Canyon and the lower portion of Wasp Canyon. Prohibiting mine tailings or waste in McCleary Canyon permanently maintains its contribution of surface water flow to the Barrel Canyon drainage system, albeit in a somewhat decreased capacity during operations by requiring runoff from the plant site to be retained, and increases the drainage area that may be diverted through the McCleary Canyon channel, in contrast to that of the proposed action and the Phased Tailings Alternative.

As in other alternatives, the Barrel Alternative incorporates a waste rock perimeter buttress that would completely surround the dry-stack tailings. In order to maintain concurrent reclamation of final outer slopes, waste rock is initially placed in berms along the outside edge of the waste rock area, followed by waste rock and tailings placement behind the berms. A large portion of the waste rock buttresses that surround the tailings facility and the waste rock facility itself are concurrently reclaimed by year 10; these areas will begin to discharge water downstream as reclamation is completed. The upper benches and tops of the waste rock and tailings facility will be reclaimed beginning in year 16 but will not be completed until the mine is fully closed.

PRIMARY ACCESS ROAD

The primary access road from State Route 83 would be the same as the Phased Tailings Alternative.

PLANT SITE

The plant site is similar to the Phased Tailings Alternative, except that it does not include the oxide ore processing buildings and instead uses that land for outdoor laydown yards (outdoor storage areas), as shown in figure 16.
Figure 16. Barrel Alternative plant site
STORMWATER CONTROLS

During operations, several areas will not discharge downstream. Runoff in the vicinity of the pit itself is retained in the pit or, before development of the pit, in stormwater ponds. Runoff from the plant site is retained in stormwater or process ponds and recycled as process water. Runoff from tailings facilities, prior to concurrent reclamation, is also retained in various ways and not allowed to discharge. Tailings runoff is at times necessarily stored on top of the tailings facility during operations; when necessary, this water can be actively pumped off and recycled as process water.

Unlike the Phased Tailings Alternative, postclosure, all storage of stormwater on the top or benches of the waste rock/tailings landform has been eliminated. Instead, the waste rock and tailings facilities shed runoff. The tops of the facilities are graded to discharge stormwater to the lower benches, which in turn are designed to move stormwater laterally along the benches until reaching several concrete drop structures, at which point the runoff is either discharged into the natural washes (Barrel Canyon or a tributary) or discharged into a diversion channel that carries runoff along the toe of the waste rock and tailings facilities and then discharges that runoff into the natural washes (figure 17). In this manner, as much water as possible is allowed to flow downstream once reclamation is complete.

The flow-through drains beneath the tailings and waste rock facilities have been removed from the Barrel Alternative owing to concerns over intermingling of stormwater with tailings seepage and long-term maintenance. Postclosure, stormwater from the former plant site will instead be diverted via a surface channel to flow into McCleary Canyon.

Because the heap leach facility has been eliminated for this alternative, there is no discussion or need for the waste rock cover that is described in other alternatives.

ARIZONA NATIONAL SCENIC TRAIL AND AREA ROADS

The Arizona National Scenic Trail alignment that is analyzed as part of this alternative is different from the proposed action and Phased Tailings Alternative and is located east of State Route 83, as shown in figure 15.

Area roads that are outside the perimeter fence would either be reconnected or decommissioned and are shown in figure 18.

Specific information pertaining to the effects of “Alternative 4 – Barrel Alternative” is summarized at the end of this chapter.
Figure 17. Barrel Alternative stormwater concept (This one will be revised)
Figure 18. Barrel and Barrel Trail area road changes
APPENDIX 2

Excerpt from “Soils and Revegetation” Section of Chapter 3 of ADFEIS (September 2012)

Description of Concurrent Reclamation Phasing, Soil Salvage Handling, and Revegetation Techniques
Soil Salvage Plans

Detailed plans for soil salvage have been proposed for the preferred alternative (Cite CDM Smith 2012 Soil Salvage Management Plan). Stockpile locations are specific only to the preferred alternative, but the following procedures would be used to manage salvaged soil for all action alternatives.

- At soil salvage locations, pits will be dug to verify removal depth of salvage soils.
- Erosion and sediment controls will be installed, both upslope and downslope of soil removal areas. Placement of these controls is required under the stormwater pollution prevention plan that will be required under the mine’s Arizona Pollutant Discharge Elimination System Multi-sector General Permit for stormwater. Dust controls will also be implemented.
- Soil will be transported using haul trucks or other equipment to a stockpile location or directly to the waste rock/tailings landform. If possible, transportation will be direct rather than incorporating long-term stockpiles. Stockpiles will be located in four different areas over the life of the mine.
- Stockpile 1 is located immediately east of the phase 2 dry-stack tailings facility, with a footprint of approximately 18 acres and a capacity of 501,000 cubic yards. This stockpile will be used generally through the first 8 years of operation.
- Stockpile 2 is located south of stockpile 1 and will be used for years 8 through 14 of operations. Stockpile 2 has a footprint of approximately 39 acres and a capacity of 502,000 cubic yards.
- Stockpile 3 is located on the top of the waste rock storage area and will be used for years 14 through 22 of operations. Stockpile 3 has a footprint of 22 acres and a capacity of 335,000 cubic yards.
- Stockpile 4 is also located on the top of the waste rock storage area and will be used for years 14 through 22 of operations and during closure. Stockpile 4 has a footprint of 18 acres and a capacity of 283,000 cubic yards.
- Soil stockpiles will be managed to reduce potential erosion, designed to reduce potential for compaction to maintain air circulation and drainage, and if anticipated to be in existence for at least 1 year, will have vegetative cover using a broadcast seed mix and possibly stabilizers like straw mulch with tackifier.

Revegetation and Expected Revegetation Success

Concurrent reclamation will take place over the life of the project, with initial reclamation beginning on the lowest levels of the waste rock buttresses by the end of the first year. The proposed acreage of reclamation activities over time is shown in Table X, and the locations of these activities are shown in Figure X.

Table X. Reclamation Phasing over Project Life for Preferred Alternative

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Total Acres Undergoing Reclamation – Federal</th>
<th>Total Acres Undergoing Reclamation – State</th>
<th>Total Acres Undergoing Reclamation – Private</th>
<th>Total Acres Reclaimed – Federal</th>
<th>Total Acres Reclaimed – State</th>
<th>Total Acres Reclaimed – Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>End of Year 1</td>
<td>104</td>
<td>0</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>End of Year 2</td>
<td>125</td>
<td>10</td>
<td>34</td>
<td>104</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>End of Year 3</td>
<td>224</td>
<td>10</td>
<td>25</td>
<td>229</td>
<td>10</td>
<td>44</td>
</tr>
</tbody>
</table>
Revegetation will be the responsibility of the mine operator. The description of revegetation procedures provided below has been developed by Rosemont Copper. However, the Coronado will dictate the criteria that must be met for the revegetation to be considered successful and complete. Therefore, some changes could be expected over time as actual revegetation progress is monitored for success and methods are modified to achieve the desired results.

Revegetation procedures will differ, depending on whether upland or riparian areas are being revegetated. Most of the landform, which consists of the waste rock and tailings facilities, will be revegetated with upland vegetation, as will the upper pit benches and the plant site. However, there may be limited areas along drainages where riparian revegetation would be appropriate. Upland revegetation will generally follow these steps: regrading, placement of salvage soils, ripping, transplantation of trees or shrubs, seed application, and maintenance/monitoring activities.

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Areas will be regraded to obtain stable, permanent slope condition as designated in the final stormwater management plans. Where possible, such as at the plant site, grading is intended to restore more natural slopes and minimize erosion. The potential for restoring natural slopes is limited with respect to the waste rock and tailings facility, but such shaping has been incorporated to the extent practicable, primarily on top of the facilities.

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Total Acres Undergoing Reclamation – Federal</th>
<th>Total Acres Undergoing Reclamation – State</th>
<th>Total Acres Undergoing Reclamation – Private</th>
<th>Total Acres Reclaimed – Federal</th>
<th>Total Acres Reclaimed – State</th>
<th>Total Acres Reclaimed – Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>End of Year 4</td>
<td>51</td>
<td>7</td>
<td>17</td>
<td>453</td>
<td>20</td>
<td>69</td>
</tr>
<tr>
<td>End of Year 5</td>
<td>77</td>
<td>5</td>
<td>11</td>
<td>504</td>
<td>27</td>
<td>86</td>
</tr>
<tr>
<td>End of Year 10</td>
<td>374</td>
<td>5</td>
<td>11</td>
<td>581</td>
<td>32</td>
<td>97</td>
</tr>
<tr>
<td>End of Year 15</td>
<td>374</td>
<td>2</td>
<td>7</td>
<td>955</td>
<td>37</td>
<td>108</td>
</tr>
<tr>
<td>End of Year 22</td>
<td>1575</td>
<td>5</td>
<td>184</td>
<td>1329</td>
<td>39</td>
<td>115</td>
</tr>
<tr>
<td>Postclosure</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3196</td>
<td>44</td>
<td>349</td>
</tr>
</tbody>
</table>

Source: (CITE NEW RECLAMATION AND CLOSURE PLAN 2012).

Assumes 1 year for completion of active reclamation activities.

Acreage through end of year 22 is for waste rock and tailings facilities; postclosure acreage includes an additional 292 acres for the plant site (Federal) and an additional 50 acres for the upper benches of the pit (private).
Figure X. Phasing of concurrent reclamation activities
Soils will be salvaged onsite as described previously in this section and will be used as surface cover for revegetation. Almost all slopes will receive either a cover of soil or a mixture of soil and rock cover. Several steep slopes on the side of the landform adjacent to the pit will remain solely rock with no soil cover. Specific surface treatment locations are shown in Figure Y. For shorter slope runs between benches (less than 300 feet), the surface treatment is likely to be primarily soil cover. For longer slope runs between benches (over 300 feet), the soil cover could be limited to the upper 300 feet of the slope to prevent erosion. The lower 300 feet may consist of rock or a combination of soil/rock. Other configurations may also be considered, such as the use of soil islands; these are areas in which small areas of soil of greater depth are created to improve species’ diversity and benefit planted trees and shrubs. Where present, the total depth of soil cover will vary but is estimated to be approximately 12 inches (CITE SOIL SALVAGE PLAN 2012).

After placement of salvage soil, the soil surface will be ripped or otherwise mechanically manipulated in order to create an optimal seedbed. Ripping and furrowing generally will follow contours to minimize erosion.

Trees and shrubs may be transplanted, particularly along drainages, but most revegetation will take place through seeding. A native seed mix will be broadcast at an overall rate of approximately 75 pure live seeds per square foot. The native seed mix will be agreed upon and approved by the Coronado and will be informed by the greenhouse studies and test-plot studies conducted by Rosemont Copper that are intended to determine the optimal seed mix. Seed will be broadcast at an appropriate time of the year considered to be optimal for seed establishment; in southeast Arizona, the best time of year for seeding is mid- to late June (CITE Lawson 2011 Thesis, page 20).

After seed has been broadcast, the area will be dragged lightly to ensure good contact between the seeds and soil. This will be followed by application of certified weed-free straw mulch with a tackifier at a rate of 1 ton per acre.
Figure Y. Surface treatments for revegetation
APPENDIX 3

Excerpt from Chapter 2 of ADFEIS (September 2012)
Mitigation Measures
Mitigation Measures Incorporated into the Project Design

Mitigation measures are often incorporated as integral components in the design of a project (Council on Environmental Quality 2011). The proposed action and other action alternatives contain numerous measures that are designed to avoid, reduce, rectify, eliminate, or compensate for environmental impacts. These mitigation measures and associated monitoring are summarized in table xx.

Table XX. Mitigation measures incorporated into the project design

<table>
<thead>
<tr>
<th>Mitigation Measure</th>
<th>Impacts Mitigated</th>
<th>Mitigation Timing and Duration</th>
<th>Monitoring Item, Schedule, and Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry-stack tailings</td>
<td>Smaller footprint avoids impacts to cultural sites; wildlife habitat; waters of the United States; and surface water. Reduces water use; reduced seepage avoids or reduces potential groundwater contamination; reduced evaporation reduces water use. Reclamation can begin earlier, improving vegetative recovery.</td>
<td>Continuous throughout mine operation</td>
<td>Throughout construction to ensure facilities and structures are constructed according to final mine operations plan (MPO) and in compliance with the NEPA decision. Monitoring will occur primarily during construction phase and when modifications are proposed.</td>
</tr>
<tr>
<td>Process water control</td>
<td>Reduction in potential for groundwater and surface water contamination and reduced process water use.</td>
<td>Continuous throughout mine operation</td>
<td>Same as above</td>
</tr>
<tr>
<td>Perimeter buttress</td>
<td>Reclamation and vegetation recovery begins earlier; eventually blocks view of most of plant site and structures; reduces erosion potential.</td>
<td>Continuous throughout mine operation</td>
<td>Throughout construction, closure, and reclamation phases. Monitoring to ensure adherence to final MPO and compliance with NEPA decision.</td>
</tr>
<tr>
<td>Stormwater diversion from undisturbed areas around mining activities</td>
<td>Reduces risk of flooding damage to mine facilities; allows noncontact stormwater to flow into natural drainages.</td>
<td>Continuous throughout mine operation</td>
<td>Throughout construction, closure, and reclamation phases. Monitoring to ensure adherence to final MPO and compliance with NEPA decision and applicable permits.</td>
</tr>
<tr>
<td>Plant site location</td>
<td>Reduced footprint avoids impacts to cultural, plants, and wildlife habitat. Design uses gravity for supply of process water where possible, reducing energy needs. Avoids biological core areas identified in Sonoran Desert Conservation Plan.</td>
<td>Continuous throughout mine operation</td>
<td>Primarily during construction phase to ensure adherence to final MPO and compliance with NEPA decision; periodically during operations if modifications are proposed.</td>
</tr>
<tr>
<td>Coarse ore stockpile dome and pebble crusher/ball loading facility</td>
<td>Smaller footprint and angled arrangement of building and conveyers avoids sensitive orchid populations; reduces dust generation; dome is less visually evident than conventional structure.</td>
<td>Continuous throughout mine operation</td>
<td>Same as above</td>
</tr>
<tr>
<td>Mitigation Measure</td>
<td>Impacts Mitigated</td>
<td>Mitigation Timing and Duration</td>
<td>Monitoring Item, Schedule, and Reporting</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------------------</td>
<td>-------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>Revegetate disturbed areas, including use of growth media</td>
<td>Improves timing and success of revegetation efforts; reduces potential erosion and improves surface water quality.</td>
<td>From year 1 when concurrent mitigation begins, through operations, closure, and reclamation and beyond until reclamation objectives are met.</td>
<td>Monitor for vegetation success. Monitor disturbed and revegetated areas for noxious and invasive weeds and take action to prevent, eliminate, or control weeds should they occur. Monitoring will begin when concurrent reclamation begins and will continue until revegetation objectives are met.</td>
</tr>
<tr>
<td>Enclose process water ponds or take measures to exclude wildlife</td>
<td>Avoids or reduces potential impacts to wildlife.</td>
<td>During operation periods when process ponds contain water.</td>
<td>Primarily during operations to ensure that measures are effective; monitoring at closure to ensure that process water is no longer ponded.</td>
</tr>
<tr>
<td>Primary access road – location and design</td>
<td>Location avoids impacts to cultural sites. Shorter length results in less ground disturbance and fewer drainage crossings.</td>
<td>Indefinite, as road is proposed to be used for public or administrative access postclosure.</td>
<td>Primarily during the construction phase to ensure adherence to final MPO and compliance with NEPA decision.</td>
</tr>
<tr>
<td>Dust control measures, including use of dust control agents, collectors, water sprays, physical covers, and wind barriers</td>
<td>Variety of measures across the mine site and access roads designed to reduce fugitive dust emissions.</td>
<td>Continuous throughout mine operation</td>
<td>Continuously throughout mine operation to ensure compliance with applicable laws, regulations, permits, and the NEPA decision.</td>
</tr>
<tr>
<td>Segregation and encapsulation of potentially acid-producing waste rock</td>
<td>Avoidance or reduction in potential to produce acid rock drainage, which could contaminate surface water and groundwater.</td>
<td>Indefinite, beginning when waste rock is segregated and placed.</td>
<td>Periodic testing of waste rock for acid rock drainage potential during active mining operations.</td>
</tr>
<tr>
<td>Use of lined ponds and retention of all contact stormwater for reuse as process water</td>
<td>Avoidance or reduction in surface water and groundwater contamination.</td>
<td>During the operation period</td>
<td>Monitoring during construction to ensure compliance with final MPO and NEPA decision; during operations to ensure effectiveness and permit compliance; and during reclamation to ensure that facilities are adequately reclaimed.</td>
</tr>
<tr>
<td>Detention of stormwater from waste rock areas for water quality testing prior to discharge</td>
<td>Decreases risk of discharging contaminated water; controls sediment load of water released into downstream drainages.</td>
<td>Primarily during the operation period</td>
<td>Same as above</td>
</tr>
<tr>
<td>Stormwater diversion design and operation</td>
<td>Diversions designed and operated to route stormwater through or around project facilities will reduce loss of surface water and groundwater flows in drainage downstream of mine facility.</td>
<td>Indefinite, beginning with the construction phase</td>
<td>Monitoring ensures that construction adheres to final MPO and complies with NEPA decision; that operation and maintenance during operations is effective and complies with permit and NEPA decision requirements. Monitoring postclosure ensures that facilities will operate with no or minimal maintenance.</td>
</tr>
<tr>
<td>Mitigation Measure</td>
<td>Impacts Mitigated</td>
<td>Mitigation Timing and Duration</td>
<td>Monitoring Item, Schedule, and Reporting</td>
</tr>
<tr>
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</tr>
<tr>
<td>Stormwater diversion design for Barrel Alternative</td>
<td>Design sheds water off and around facility without ponding on the landform, which would decrease impacts to surface and groundwater flows in drainages downstream by allowing more stormwater delivery.</td>
<td>Construction through postclosure, but mostly postclosure</td>
<td>Same as above</td>
</tr>
<tr>
<td>Reuse or recycling of all process water</td>
<td>Reduces amount of supply water needed.</td>
<td>During operations phase.</td>
<td>Monitoring during operations phase ensures that process water is being recycled and not being discharged, in accordance with permit and NEPA decision requirements.</td>
</tr>
<tr>
<td>Noxious and invasive weed control</td>
<td>Avoids or reduces establishment and spread of noxious and invasive weed species.</td>
<td>Indefinite</td>
<td>Disturbed and revegetated areas will be monitored for noxious and invasive weeds beginning in year 1 and continuing until revegetation objectives have been met.</td>
</tr>
<tr>
<td>Light pollution mitigation measures</td>
<td>Reduces night light pollution to levels below those specified in the Pima County Outdoor Lighting Code.</td>
<td>Construction through closure phases</td>
<td>Monitoring will occur during construction phase to ensure compliance with NEPA decision; periodic monitoring during operations phase to determine whether predictions of lumens is accurate; includes direct measurement of sky brightness using overflights and land-based measurements.</td>
</tr>
<tr>
<td>Emergency response and contingency plans, including a fire plan</td>
<td>Pre-emergency planning and coordination with Emergency Medical Services providers will reduce response time and improve services of Emergency Medical Services, reducing impacts of fires and potential human injuries from accidents.</td>
<td>From construction through closure phases</td>
<td>Monitoring will consist of ensuring that the plan is prepared in a timely manner (compliance with NEPA decision) and periodic review to ensure that it is effective.</td>
</tr>
<tr>
<td>Hazardous materials containment and management</td>
<td>Reduces potential human health and environmental risks</td>
<td>Construction through closure phases</td>
<td>Monitoring ensures that construction adheres to final MPO and complies with NEPA decision; and that operation and maintenance during operations is effective and complies with permit and NEPA decision requirements; monitoring postclosure ensures that facilities will operate with no or minimal maintenance.</td>
</tr>
<tr>
<td>Backup alarms on vehicles attuned to reduce noise</td>
<td>Reduces noise pollution</td>
<td>Construction through closure phases</td>
<td>Periodic monitoring from construction through closure phases to ensure that equipment is operating effectively and in accordance with final MPO and NEPA decision.</td>
</tr>
<tr>
<td>Blasting limited to once per day</td>
<td>Reduces noise pollution</td>
<td>Construction through closure phases</td>
<td>Periodic monitoring from construction through closure phases to ensure that operations are consistent with final MPO and NEPA decision.</td>
</tr>
<tr>
<td>Mitigation Measure</td>
<td>Impacts Mitigated</td>
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<td>Monitoring Item, Schedule, and Reporting</td>
</tr>
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</tr>
<tr>
<td>Use of low-sulfur diesel for all stationary equipment</td>
<td>Reduces air emissions</td>
<td>Construction through closure phases</td>
<td>Periodic monitoring from construction through closure phases to ensure that appropriate fuel is being used, in accordance with final MPO and NEPA decision.</td>
</tr>
<tr>
<td>Delivery schedule that minimizes truck traffic on State Route 83 during peak traffic hours</td>
<td>Reduces traffic on State Route 83 during peak traffic hours</td>
<td>Construction through closure phases</td>
<td>Same as above</td>
</tr>
<tr>
<td>Salvage, propagation, and planting of agave plants</td>
<td>Reduces impacts to agave plants and related impacts to lesser long-nose bat foraging habitat</td>
<td>Indefinite</td>
<td>Same as above, with the possible addition of compliance with the requirements of the BO issues by the USFWS</td>
</tr>
<tr>
<td>Relocate section of the Arizona National Scenic Trail away from mine facilities. Loading ramps and service areas will be relocated.</td>
<td>Reduces impacts to recreational users of the Arizona National Scenic Trail</td>
<td>Indefinite</td>
<td>Monitoring to ensure that trail relocation is completed prior to obliteration of current location (compliance with NEPA decision); monitoring during construction to ensure that trail is constructed to desired standards.</td>
</tr>
<tr>
<td>Power line and water line locations</td>
<td>Final location is shortest route and eliminates one pump station, thereby reducing acres impacted, cultural resources impacted, and plant and animal habitat impacted.</td>
<td>Construction through closure phases</td>
<td>Monitoring during construction to ensure compliance with final MPO and NEPA decision.</td>
</tr>
<tr>
<td>Removal of water line and booster pump stations after closure</td>
<td>Reduces visual impacts and maintenance needs</td>
<td>Postclosure</td>
<td>Monitoring during closure to ensure compliance with final MPO and NEPA decision.</td>
</tr>
<tr>
<td>Perimeter and security fence locations</td>
<td>Avoids or reduces public air impacts; ensures that public will not come into contact with operations and therefore reduces risk of public accident or injury.</td>
<td>Construction through closure phases</td>
<td>Monitoring during construction to ensure compliance with final MPO and NEPA decision; periodic maintenance during operations to ensure effectiveness; monitoring at closure to ensure that removal complies with NEPA decision.</td>
</tr>
<tr>
<td>Use of newer engine designs in mobile sources, which are subject to stricter Federal regulation and result in lower emissions</td>
<td>Use of Tier 4 emission standards on selected nonroad engines (all except haul trucks and the 2,000 horsepower front-end loaders); use of Tier 2 diesel engines for haul trucks; and use of Tier 4 engines for large haulage trucks and support equipment purchased after 2014 will reduce emissions.</td>
<td>Construction through closure phases</td>
<td>Monitor periodically throughout all phases to ensure compliance with final MPO and NEPA decision and applicable permits.</td>
</tr>
</tbody>
</table>

**Mitigation Measures Required by Permits or Authorizations**

The intent of this category is to present mitigation measures and associated monitoring that are required by various permits and authorizations that must be obtained by Rosemont Copper before the project can
be implemented. Refer to table 3 earlier in this chapter for a description of major permits or authorizations applicable to the proposed Rosemont Copper Mine. Note that this is simply a summary of the mitigation and monitoring that are incorporated into required permits and authorizations. Additional details can be found within the permits and authorizations themselves in appendix B of this ADFEIS and in some cases in chapter 3. Additional required mitigation and monitoring will be added as final permits are issued following approval of the record of decision for this project.

Table XX. Mitigation measures required by permits or authorizations

<table>
<thead>
<tr>
<th>Mitigation Measure</th>
<th>Impacts Mitigated</th>
<th>Mitigation Timing and Duration</th>
<th>Monitoring Item, Schedule, and Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquifer protection permit (APP) groundwater quality control requirements</td>
<td>Reduced potential for groundwater contamination</td>
<td>Indefinite</td>
<td>Monitoring will occur during all phases, including postclosure, to ensure compliance with the APP, NEPA decision, and applicable laws and regulations. The APP requires monitoring at point of compliance locations at the perimeter of the project site; monitoring wells will be established to monitor groundwater quality and water levels. Includes monitoring of potential acid rock drainage. APP requires monitoring following mine closure.</td>
</tr>
<tr>
<td>Multisector general permit/stormwater pollution prevention plan stormwater quality control requirements</td>
<td>Reduced impacts to quality of downstream surface water and groundwater</td>
<td>Indefinite</td>
<td>Monitoring will occur throughout all phases and postclosure to ensure compliance with these permits and applicable laws and regulations.</td>
</tr>
<tr>
<td>Arizona Pollutant Discharge Elimination System permit requirements to use best management practices, stabilization measures, and sediment control measures</td>
<td>Reduces risk of water quality degradation and loss of soil through erosion</td>
<td>Indefinite</td>
<td>Monitoring will occur periodically with storm events; and quarterly without storm events for all phases through postclosure</td>
</tr>
<tr>
<td>APP required waste rock segregation plan</td>
<td>Avoids or reduces risk of acid rock drainage contamination to surface water and groundwater</td>
<td>Indefinite</td>
<td>Periodic testing of waste rock for acid rock drainage potential during active mining operations.</td>
</tr>
<tr>
<td>Arizona Department of Transportation encroachment permit requirements to improve intersection of primary access road and State Route 83</td>
<td>Reduction of potential traffic safety hazards</td>
<td>Indefinite</td>
<td>Monitoring during construction phase to ensure adherence to permit requirements.</td>
</tr>
<tr>
<td>Follow specified procedures contained in material safety data sheets</td>
<td>Reduces risk of release of hazardous materials into the environment and reduced risk to worker and public safety.</td>
<td>Construction through closure phases</td>
<td>Periodic monitoring to ensure compliance.</td>
</tr>
<tr>
<td>APP requirements for liner systems and leak detection/ collection</td>
<td>Reduces risk of groundwater and surface water contamination.</td>
<td>Indefinite</td>
<td>Monitoring during all phases to ensure compliance and determine effectiveness.</td>
</tr>
</tbody>
</table>
Additional Mitigation Measures

This category includes required mitigation measures and associated monitoring that are not listed in the previous two categories. While many of these mitigation measures were brought forward voluntarily by Rosemont Copper, they will be required if they are carried forward in the final decision made and disclosed in the record of decision.

Table XX. Additional mitigation measures

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Locate west side pit operations power loop within the disturbance perimeter of the pit and diversion structures</td>
<td>Reduces disturbance to talus slopes and potential impacts to talus snail</td>
<td>Primarily during construction, operation, and closure phases</td>
<td>Monitoring during construction through closure phases to ensure that the talus area is not disturbed by mining activities and compliance with NEPA decision</td>
</tr>
<tr>
<td>Suspend operations upon discovery of a cave, sinkhole, or karst feature, pending Forest Service review</td>
<td>Allows investigation and documentation of significant cave and karst features, should they be found during operations. Would not necessarily mitigate for damage to those resources.</td>
<td>During construction and operation phases</td>
<td>Rosemont Copper would suspend work at that site and contact the designated Forest Service representative to investigate the discovery before work is reinitiated.</td>
</tr>
<tr>
<td>Suspend operations upon discovery of paleontological resources, pending Forest Service review</td>
<td>Reduces potential impacts to significant paleontological resources.</td>
<td>Primarily during construction and operation phases</td>
<td>Monitoring by a Forest Service approved paleontologist would occur ahead of ground disturbance in formations with a moderate potential for significant paleontological resources. Upon discovery of such resources, Rosemont Copper would suspend work at that site and the site would be investigated before work resumes.</td>
</tr>
<tr>
<td>Implement well owner agreements</td>
<td>Compensates for potential impacts to domestic wells for homeowners who sign up for the plan in the Sahuarita Heights neighborhood and in the vicinity immediately surrounding the mine site</td>
<td>Indefinite</td>
<td>No Forest Service or agency monitoring would occur. These plans are in place and were discretionary on Rosemont Copper’s part. Involvement of homeowners is voluntary, and the agreement is between the homeowner and Rosemont Copper.</td>
</tr>
<tr>
<td>Regional groundwater mitigation within the Tucson Active Management Area, including using Central Arizona Project water to recharge within the Tucson Active Management Area</td>
<td>Compensates for some or all of the water removed from the aquifer to supply the mine.</td>
<td>Indefinite</td>
<td>Monitoring will occur during construction and operation phases to ensure compliance with NEPA decision. Annual reporting required to Arizona Department of Water Resources.</td>
</tr>
<tr>
<td>Annually fund U.S. Geological Survey to operate and maintain existing flow gage at Barrel Canyon</td>
<td>Allows for continued data collection of flows in Barrel Canyon</td>
<td>Construction through operation phases</td>
<td>This is an agreement between U.S. Geological Survey and Rosemont Copper. No Forest Service or other agency monitoring will occur.</td>
</tr>
<tr>
<td>Mitigation Measure</td>
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<tr>
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</tr>
<tr>
<td>Paint or stain mine related buildings to produce a flat-toned nonreflective surface</td>
<td>Reduces contrast and related visual impact associated with plant buildings</td>
<td>Construction through closure phases</td>
<td>Monitoring will focus on ensuring that buildings are painted or stained in compliance with NEPA decision.</td>
</tr>
<tr>
<td>Allow Arizona State Land Department to access a water line booster station for firefighting purposes</td>
<td>Potentially reduces impacts from wildfire, particularly on and near the Santa Rita Experimental Range, by providing a new water source to firefighting agencies.</td>
<td>Construction through closure phases</td>
<td>This is an agreement between Arizona State Land Department and Rosemont Copper. No Forest Service or other agency monitoring will occur.</td>
</tr>
<tr>
<td>Purchase mineral survey fractions from the Coronado</td>
<td>Eliminates the need for the Coronado to manage slivers of land that are covered by waste rock and tailings as public lands.</td>
<td>Indefinite</td>
<td>Forest Service will process sale, to be finalized prior to mine closure.</td>
</tr>
<tr>
<td>Bureau of Land Management administered land resurvey and control network</td>
<td>Loss of survey monuments and land ownership boundaries.</td>
<td>Indefinite</td>
<td>The resurvey has been completed. No further monitoring is needed.</td>
</tr>
<tr>
<td>Expedite construction of electric lines to reduce the need for onsite electrical generation</td>
<td>Reduces emissions that would otherwise result from onsite power generation during the construction phase</td>
<td>Construction phase</td>
<td>Construction of the electric line on State and private land is under the jurisdiction of the Arizona Corporation Commission. Monitoring will consist of air quality monitoring during the construction phase to ensure compliance with applicable permit requirements and laws and regulations.</td>
</tr>
<tr>
<td>Use alternative methods of power generation such as solar and wind to power the mine administration building</td>
<td>Reduction in electric power use from Tucson Electric Power.</td>
<td>Construction, operation, and closure phases when the alternative power sources are operational.</td>
<td>Monitoring will focus on ensuring that facilities include alternative energy sources in compliance with the NEPA decision.</td>
</tr>
<tr>
<td>Remove unneeded facilities during closure, including plant site, some roads, the perimeter and security fence; recontour plant site and revegetate with native vegetation</td>
<td>Reduces visual impacts; restores ability to allow public access.</td>
<td>Indefinite</td>
<td>Monitoring during closure and postclosure phases to ensure compliance with NEPA decision and postclosure to ensure revegetation success.</td>
</tr>
<tr>
<td>Light colored rock in the upper pit area will be treated as needed to reduce visual contrast</td>
<td>Reduced contrast will reduce visual impacts</td>
<td>Closure and postclosure phases</td>
<td>Monitor during closure phase to ensure compliance and during postclosure phase to evaluate effectiveness.</td>
</tr>
<tr>
<td>Eliminate future development of private lands located on top of waste rock and tailings facilities</td>
<td>Avoid future activities that could compromise reclamation of waste rock and tailings areas over the long term.</td>
<td>Postclosure</td>
<td>Forest Service will work with Rosemont Copper to implement mechanisms such as conservation easements to accomplish goals.</td>
</tr>
<tr>
<td>Reestablish east-west road over the Santa Rita Mountains through Lopez Pass after mining</td>
<td>Reduces loss of public access postmining</td>
<td>Postclosure</td>
<td>Monitoring during closure phase to ensure compliance and that work meets appropriate standards.</td>
</tr>
<tr>
<td>Mitigation Measure</td>
<td>Impacts Mitigated</td>
<td>Mitigation Timing and Duration</td>
<td>Monitoring Item, Schedule, and Reporting</td>
</tr>
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</tr>
<tr>
<td>Provide funding to Arizona Department of Transportation (ADOT) to improve rest areas and four school bus pullouts on State Route 83</td>
<td>Reduces traffic impacts on State Route 83</td>
<td>Construction through postclosure phases</td>
<td>ADOT will ensure that funding is provided. All work will be completed by ADOT contractors under ADOT oversight. Monitoring will be provided to the Forest Service to determine NEPA compliance.</td>
</tr>
<tr>
<td>Provide public access to Rosemont Copper private lands not affected by mine operations through the AGF Cooperative Landowner incentive program</td>
<td>Reduction of loss of public access</td>
<td>Construction through operation phases</td>
<td>AGF will work with Rosemont Copper to put this into place and will report to the Forest Service in order to monitor NEPA compliance.</td>
</tr>
<tr>
<td>Fund a 7-mile extension of Central Arizona Project (CAP) to deliver Community Water Company of Green Valley’s CAP allotment; and use the extra capacity of that pipeline to recharge in the general vicinity of the supply wells</td>
<td>Provides access to CAP water to Community Water Company, allows recharge by Rosemont Copper in vicinity of pumping, and recharge will compensate for some or all of the mine supply water pumped out of the aquifer.</td>
<td>Indefinite</td>
<td>Monitoring of construction and of recharge credits to ensure compliance with NEPA decision.</td>
</tr>
<tr>
<td>Follow University of Arizona College of Architecture and Landscape Architecture design guidance for pump stations to ensure that they maintain the tenor of the Experimental Range</td>
<td>Reduces visual contrast and associated visual impacts of water line pump stations located on the Santa Rita Experimental Range</td>
<td>Construction and operation phases</td>
<td>Monitor during construction and operation to ensure compliance with NEPA decision.</td>
</tr>
<tr>
<td>Purchase the following lands (totaling 4,365 acres) and protect resource values in perpetuity: Fullerton Ranch; Helvetia North; Sonoita Creek Ranch; and Rosemont parcels east of the project site.</td>
<td>Compensates for impacts to waters of the United States; impacts to wildlife species, including habitat for species listed under the ESA; and impacts to cultural sites.</td>
<td>Indefinite</td>
<td>Monitoring would ensure that lands are purchased by Rosemont Copper and that appropriate action is taken to protect resource values in perpetuity.</td>
</tr>
</tbody>
</table>
APPENDIX 4

Jaguar Proposed Critical Habitat
Connectivity to Mexico
Figure 4.1. The Sky Islands that form part of the habitat and corridor for Jaguars in northern Sonora adjacent to the Patagonia Unit. Image courtesy of the Sky Island Alliance.