

# **MINING AND RECLAMATION PLAN OF OPERATIONS KIRKLAND HIGH QUALITY POZZOLAN MINE**

Kirkland Mining Company

Prepared for:

Kirkland Mining Company  
9694 E. Chuckwagon Lane  
Scottsdale, Arizona 85262

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## LIST OF ACRONYMS AND ABBREVIATIONS

1		
2	AADT	Average Annual Daily Traffic
3	ACOE	Army Corps of Engineers
4	ADA	Arizona Department of Agriculture
5	ADEQ	Arizona Department of Environmental Quality
6	ADOT	Arizona Department of Transportation
7	ADWR	Arizona Department of Water Resources
8	AMA	Active Management Area
9	amsl	Above mean sea level
10	APP	Aquifer Protection Permit
11	AMSI	Arizona State Mine Inspector
12	ASR	Alkali-Silica Reactions
13	ASTM	American Society for Testing and Materials
14	ASU	Arizona State University
15	AZPDES	Arizona Pollutant Discharge Elimination System
16	BADCT	Best Available Demonstrated Control Technology
17	BGEPA	Bald and Golden Eagle Protection Act
18	BLM	Department of Interior, Bureau of Land Management
19	bls	Beneath land surface
20	BMPs	Best Management Practices
21	BNSF	Burlington Northern and Santa Fe Railway
22	CAA	Clean Air Act
23	CFR	Code of Federal Regulations
24	CO	Carbon Monoxide
25	CO <sub>2</sub>	Carbon Dioxide
26	C-S-H	calcium silicate hydrate
27	CWA	Clean Water Act
28	EPA	United States Environmental Protection Agency
29	EPG	Environmental Planning Group, LLC
30	ESA	Endangered Species Act
31	gpd	Gallons per day
32	gpm	Gallons per minute
33	H:V	Horizontal:Vertical
34	HPTP	Historic Properties Treatment Plan
35	HQP	High Quality Natural Pozzolan
36	HUC	Hydrological Unit Code
37	INA	Irrigation Non-expansion Area
38	KMC	Kirkland Mining Company

1	MSHA	U.S. Mine Safety and Health Administration
2	MSGP	Multi-Sector General Permit
3	NAAQS	National ambient air quality standards
4	NFPA	National Fire Protection Association
5	NHPA	National Historic Preservation Act
6	NO <sub>2</sub>	Nitrogen Dioxide
7	NOAA	National Oceanic and Atmospheric Administration
8	NRHP	National Register of Historic Places
9	NWP	Nationwide Permit
10	O <sub>3</sub>	Ozone
11	OHWM	ordinary high water mark
12	OPC	ordinary Portland cement
13	OSHA	Occupational Safety and Health Administration
14	Pb	Lead
15	Plan	Mine Plan of Operations
16	PM <sub>2.5</sub>	Particulate Matter less than 2.5 microns diameter
17	PM <sub>10</sub>	Particulate Matter less than 10 microns diameter
18	SCM	Supplementary Cementitious Material
19	Site	Kirkland Mine Plan of Operations Area
20	SO <sub>2</sub>	Sulfur Dioxide
21	SPCC	Spill Prevention, Control, and Countermeasures
22	SWPPP	Stormwater Pollution Prevention Plan
23	USFWS	United States Fish and Wildlife Service
24	USGS	United States Geological Survey

## I. OPERATOR INFORMATION

The Kirkland Mine is owned and operated by:

Kirkland Mine Company (KMC)

Areta Zouvas, President

9694 E. Chuckwagon Lane

Scottsdale, Arizona 85262

619-846-4671

Mine Property Address:

7825/7855 S. Iron Springs Road

Skull Valley, Arizona 86338

Taxpayer ID: Provided under separate cover

The activities described in this Plan of Operations (Plan) occur on land administered by the Bureau of Land Management (BLM) within a portion of Section 28 of Township 13 North, Range 4 West, Gila and Salt River Baseline and Meridian (**Figures 1 through 3**) within the unpatented lode claims and the Capital Association Placer mining claim listed in **Table 1** and shown in **Figure 2**. The Kirkland Mine Plan of Operations Area (the Site) is in Yavapai County near the town of Kirkland, Arizona within the BLM's Bradshaw-Harquahala Planning Area.

**Table 1. Claims Covered by This Plan**

<b>Claim Name</b>	<b>BLM Serial Number</b>
Capital Association Placer	AMC 367119
Capital One Lode	AMC 428988
Capital Two Lode	AMC 428989
Capital Three Lode	AMC 428990
Capital Four Lode	AMC 428991
Capital Five Lode	AMC 428992
Capital Six Lode	AMC 428993
Capital Seven Lode	AMC 428994
Capital Eight Lode	AMC 428995

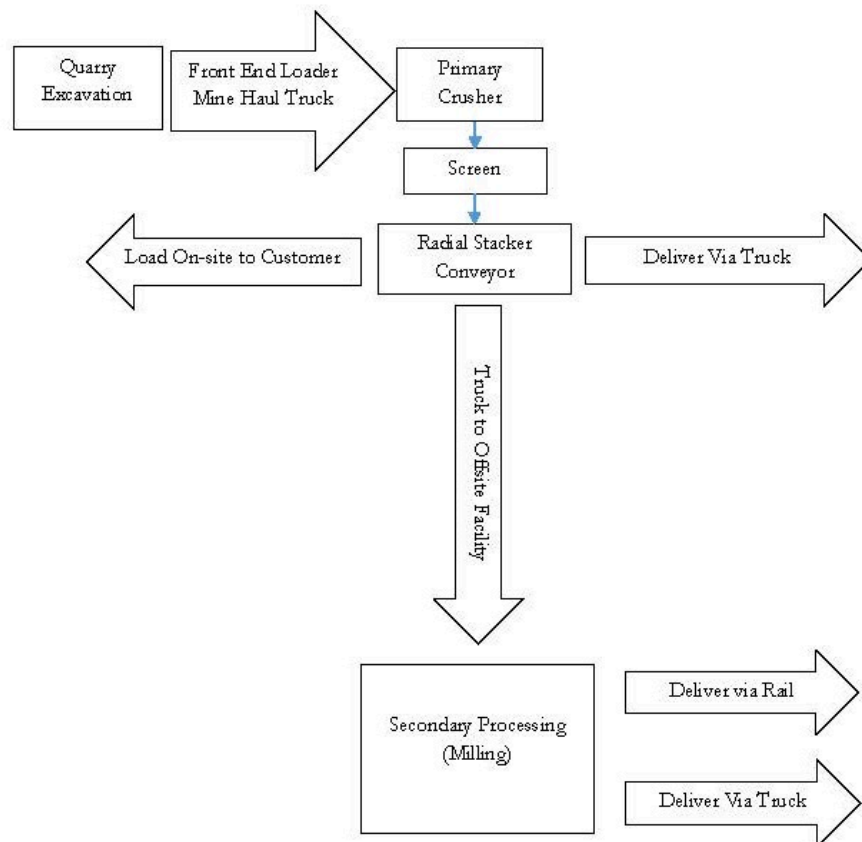


## 2. DESCRIPTION OF OPERATIONS

KMC is proposing to mine a high quality natural pozzolan (HQP) and remove a stockpile of screened HQP fines from a previous mining operation within the Site (**Figures 2 and 3**). Operations will be conducted in accordance with BLM regulations published in the Code of Federal Regulations (CFR) at 43 CFR part 3809 (BLM 2016) and 43 CFR 3715 (BLM 1998), and would be consistent with the BLM's Bradshaw-Harquahala Planning Area Resource Management Plan (BLM 2010).

The federal lands proposed for utilization have been the subject of years of prior mining activity. KMC owns land adjacent to BLM land and the mining claims. The west side of the Site can be accessed via an existing maintained road across the KMC privately-owned lands and BLM lands. As part of the mining activities KMC proposes ancillary activities and facilities associated with access; a well for project water needs; fueling, servicing, and temporary storage of equipment; and weighing of the HQP for sale to customers. Milling and potential future loading operations for transport of the HQP via the Burlington Northern and Santa Fe (BNSF) Railway would occur on KMC private lands at a location to be determined. **Exhibit 1** provides a process flow chart illustrating the operations proposed under this Plan.

**Exhibit 1. Process Flow Chart**



HQP would be loaded onto trucks in the mine area, trucked to the scales located on KMC's adjacent privately owned lands where they would be weighed and sent to market. Truck transport would be used for delivery to customers within an approximately 350-mile radius of the Site and rail transport would be used for customers outside of that area.

The HQP from the Site will be used in specialized industrial mineral applications, most importantly as a very effective natural pozzolanic Supplementary Cementitious Material (SCM) used in cement, mortars, and concrete to enhance concrete density, strength, durability, and chemical resistance. Most transportation departments across the country now require up to 25 percent pozzolan in their infrastructure mix designs to strengthen and protect the concrete from Alkali Silica Reactions (ASR) and sulfate attack. Other uses for the HQP continue to be the subject of research and development and include a wide range of applications such as an absorbent, filtration medium, and waste remediation material and highly specialized uses in ceramics, bioplastics, and geopolymers (materials with amorphous networks that may be used for fire- and heat-resistant coatings and adhesives, medicinal applications, high-temperature ceramics, new binders for fire-resistant fiber composites, toxic and radioactive waste encapsulation, and as cementing components to make concrete).

KMC analyzed available base line data and information and utilized the available information to design this proposed mining and reclamation plan. Every effort was made to incorporate best management practices and environmental protection measures to prevent unnecessary or undue degradation as required by 43 CFR 3809.415.

## 2.1. SITE OVERVIEW

### 2.1.1. Previous Activities Conducted on the Site

Portions of the Site have been heavily disturbed by historical mining activities. Mining has been conducted at this location since the early 1900s. Per the Arizona Department of Mines and Mineral Resources website, the area has been known variously throughout its history as the Arizona Tufa (“Magic Mountain”) Property, Rynearson Quarry, Kitty Litter Mine, and Capital Quarry. In 1958, the Rynearson family leased the quarry to Capital Quarries to provide dimensioned stone for construction of the Arizona State Capital Building; it is estimated that the builders may have used up to 1,000 tons during this operation. In 1979, Kitty Litter Mine began shipping oil absorbent material from the mine that was producing approximately 1,200 tons of tuff per month. The mine was closed in 1985 and the equipment was removed. A stockpile that remains covers approximately 2.6 acres of the Capital Seven lode claim (**Figures 2 and 3**), and contains approximately 48,000 tons of HQP. The HQP deposit that will be developed in the area covered by this Plan is the subject of an uncommon variety determination under the Common Varieties Act (30 U.S.C §§ 611-615). The mineral report for the determination is currently under review by the BLM.

In 2014, Arizona State University (ASU) analyzed the potential use of the HQP as an alternative, natural, pozzolanic SCM to replace a percentage of ordinary Portland cement (OPC) for use in concrete, mortar, shotcrete, and Type IP cement applications. ASU found that KMC HQP material reacts chemically with calcium hydroxide, a by-product of the hydraulic reaction between OPC and water, at ordinary temperatures, to form additional calcium silicate hydrate (C-S-H) compounds. The additional C-S-H increases the concrete density, which in turn provides increased strength and durability to the concrete. Additional testing conducted at industry certified labs indicated the HQP will also mitigate destructive ASR, a very valuable pozzolanic tool in the battle to fortify concrete against chemical attack. HQP can be used to provide unique solutions for “green” concrete applications in buildings and structures as it is a natural material that lacks the undesirable contaminants found in some artificial pozzolans. ASU also determined that the HQP has properties that offer the potential to be environmentally effective in reducing global CO<sub>2</sub> emissions by replacing targeted percentages of OPC and other cementitious materials with HQP.

Ninyo & Moore (2015) conducted a geologic site reconnaissance, mapping the geologic conditions of the lode mining claims on the KMC Homestead and Capital Association placer claims. An exploratory drilling program was developed to test HQP samples for consistency in the high quality of the HQP deposits through the Site. A drilling program consisting of ten drill holes was authorized by the BLM in December 2015 and conducted in February and March of 2016 to determine the extent of the entire HQP deposit within the lode mining claims (AZA 36808). The holes varied in depth from 40 to 100

feet. All drilling was done by a Teric Sonic Drill, operated by the Yellow Jacket Drilling Company. The drilling program was summarized in the Sandwell-Weiss (2016) geological report.

### **2.1.2. Physical Setting**

#### **2.1.2.1. Topography and Geology**

The Site elevation ranges from approximately 4,020 feet above mean sea level (amsl) to 4,240 feet amsl, with the highest elevation occurring near the northeast corner of the Site. The Site is located within the Central Highlands transition zone, located between the Basin and Range Lowlands and Colorado Plateau Uplands Provinces. This transition zone is characterized by rugged mountains of igneous, metamorphic, and sedimentary rocks. The Site is located in the Skull Valley area near the confluence with Kirkland Creek, west of the Bradshaw Mountains and north east of the Weaver Mountains (**Figure 1**).

The regional landscape surrounding the Site is moderately rugged terrain, with some cliffs, ridges, and peaks mostly composed of older, metamorphosed Precambrian basalt, tonalite, and granite overlain with sedimentary and volcanic rocks (DeWitt, et al. 2008). The bedrock within the Site consists of stratified Miocene volcanic tuff and basalt. The tuff is a tan to white, thick-bedded to massive crystal-lithic to lithic tuff in excess of 250 feet thick that dips gently to the northeast. The tuff is exposed at the surface over most of the Site. In the northern and northeastern portion of the Site, the tuff is overlain by a dark gray basalt that can vary in thickness up to 30 feet (Ninyo and Moore 2015; **Figure 4**).

Recovered core from recent drilling operations showed that the tuff typically consists of a pumice matrix and lithic clasts of pumice, quartz, granite, metamorphic rocks, and other volcanic rocks that range in size from microscopic to two inches across (Sandwell-Weiss 2016). The overall composition of the tuff is classified as a rhyolite to rhyodacite. The tuff contains significant silica-rich amorphous (noncrystalline) material in the form of pumice and pumice fragments and is consistent throughout the mining claim Site (Sandwell-Weiss 2016). The pumiceous volcanic tuff is the HQP proposed for development in this Plan.

#### **2.1.2.2. Surface and Groundwater Hydrology**

The Site is located in the Lower Skull Valley Wash (U.S. Geological Survey [USGS] Hydrological Unit Code [HUC] 12) within the Bill Williams River watershed (HUC 6) and near the confluence of a few major drainage contributors to the watershed, including the Copper Basin Wash, Kirkland Creek, and Skull Valley Wash (**Figure 5**). The Site is just north of the confluence of Copper Basin Wash, a southwest trending, ephemeral drainage originating in the Bradshaw Mountains to the northeast, with Skull Valley Wash. There are portions of perennial stretches within the Copper Basin Wash upstream



of the Site within the foothills of the Bradshaw Mountains, likely originating as spring discharges from crystalline rocks (ADWR 2009).

Ephemeral and perennial springs issue primarily from the volcanic and crystalline rocks, respectively, and are subject to seasonal variations in precipitation. The discharges of the ephemeral springs measured by the USGS in 1979 ranged from less than 1 to 27 gallons per minute and most of the perennial springs ranged from 1 to 36 gallons per minute (ADWR 2009). Stream gauge data has not been collected within Copper Basin Wash. Stream gauge data collected from 1973 through 1983 in Kirkland Creek near Kirkland (Station 9424470) recorded mean annual flows per year as 7,961 acre-feet. Two unnamed ephemeral tributaries to Copper Basin Wash, trending southwest, traverse the northwest and southeast corners of the Site (**Figure 6**). These ephemeral drainages display “ordinary high water mark” (OHWM) characteristics, but the jurisdictional status of these potential “waters of the United States” has not yet been determined by the U.S. Army Corps of Engineers (ACOE).

The site is located in the eastern portion of the Bill Williams River basin, within the Skull Valley sub-basin. Groundwater in the eastern part of the basin infiltrates primarily in basin fill valleys bounded by mountain ranges with fractured and porous volcanic rocks. An important water-bearing unit in the Copper Basin area east of Skull Valley is a 1,000-foot thick layer of volcanic rocks separated from the overlying basin-fill deposits by a 35-foot thick confining bed of well-cemented sand and clay. This water-bearing unit has reportedly high well yields in the upper 350 to 400 feet. The upper 350 to 400 feet of these volcanics may produce more than 2,000 gallons per minute (ADWR 2009). Pathways of groundwater occur via faults in granite and metamorphic rocks.

Groundwater in the Skull Valley sub-basin, north of Kirkland, flows to the southwest, and south of Kirkland flows to the northwest. Groundwater recharge is from streamflow and mountain front precipitation. Water level measurements for wells located in the Skull Valley sub-basin show relatively shallow groundwater levels (less than 100 feet beneath land surface [bls]) in most measured wells (ADWR 2009).

#### **2.1.2.3. Climate**

Within the Kirkland area, the coldest month of the year is December, averaging temperatures of 25°F, while the warmest month of the year is in July, with temperatures averaging 96°F. The month of August on average receives the largest precipitation events, averaging 2.45 inches of rainfall (Intellicast no date). The annual precipitation averages approximately 15.8 inches per year<sup>1</sup>. Annual snowfall averages approximately 2.5 inches per year<sup>2</sup>.

<sup>1</sup> Annual averages for precipitation were aggregated from historical, monthly averages (Intellicast no date).

<sup>2</sup> Annual averages for snowfall were aggregated from historical, monthly averages (Intellicast no date).

Historically, the Skull Valley area received an average of approximately 19.0 inches in precipitation and approximately 9.6 inches in snowfall between 1972 through 1980 (WRCC no date). July is the warmest month of the year and winter is the coldest month of the year with average annual maximum temperatures of 73.9°F and average annual minimum temperatures of 40.7°F (WRCC no date).

### 2.1.3. Vegetation and Wildlife

Broad-scale vegetation mapping in the vicinity of the Site identified the biotic community as Interior Chaparral (Brown 1982; **Figure 8**); however, site specific investigation by Environmental Planning Group, LLC (EPG) found that 160 acres of BLM land within the Site is characterized by Interior Chaparral with patches of Semidesert Grassland and riparian vegetative communities (EPG 2017a). The northern portion of the Site is dominated by Interior Chaparral species on slopes, ridges, and along xeric washes, and includes Sonoran scrub oak (*Quercus turbinella*), hollyleaf redberry (*Rhamnus ilicifolia*), alderleaf mountain mahogany (*Cercocarpus montanus*), Stansbury cliffrose (*Purshia stansburiana*), and broom snakeweed (*Gutierrezia sarothrae*). On the flat portions of the northern section of the Site, characteristics of Semidesert Grassland vegetation is present including curly-mesquite (*Hilaria belangeri*), broom snakeweed, velvet mesquite (*Prosopis velutina*), juniper (*Juniperus* spp.), and catclaw acacia (*Senegalia greggii*). A monoculture of Stansbury cliffrose (with few other herbaceous plants) occurs on the existing stockpile that would be removed as part of this Plan.

The ephemeral washes that traverse the Site contain some riparian plant species including Fremont's cottonwood (*Populus fremontii*), willow (*Salix* sp.), and Stansbury cliffrose.

EPG performed a biological evaluation of the Site analyzing Special-status species protected by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA) and species identified by BLM as sensitive<sup>3</sup>. EPG determined that there was no potential for any species protected under the ESA to occur within the Site. There is no proposed or designated critical habitat within the Site.

EPG determined that 12 BLM sensitive species (four species of bats, five species of raptors, one amphibian, one invertebrate, and one plant) could occasionally occur within the Site. However, preferred habitat is not present for any of these species except the amphibian. There is some potential for the Arizona toad to occur in canyons and washes near the Site (EPG 2017a). These results are summarized in **Table 2**. Activities proposed by KMC would not substantially impact habitat for these species. Those activities may impact individuals of these species, but they are not likely going to result in a trend toward listing or loss of viability of these species.

<sup>3</sup> EPG evaluated species identified as potentially occurring in the Phoenix District Office from the BLM's 2017 sensitive species list for their potential presence in Yavapai County and in the general vicinity to the Site.

1 **Table 2. Special-status Species with Some Potential to Occur in the Site**

Species	Status	Final Determination
<b>MAMMALS</b>		
Cave Myotis ( <i>Myotis velifer</i> )	BLM Sensitive	Could occasionally occur in the Site; however, preferred habitat is not present.
Greater Western Mastiff Bat ( <i>Eumops perotis californicus</i> )	BLM Sensitive	Could occasionally occur in the Site; however, preferred habitat is not present.
Spotted Bat ( <i>Euderma maculatum</i> )	BLM Sensitive	Could occasionally occur in the Site; however, preferred habitat is not present.
Pale Townsend's Big-eared Bat ( <i>Corynorhinus townsendii pallescens</i> )	BLM Sensitive	Could occasionally occur in the Site; however, preferred habitat is not present.
<b>BIRDS</b>		
American Peregrine Falcon ( <i>Falco peregrinus anatum</i> )	BLM Sensitive	Could occasionally occur in the Site; however, preferred habitat is not present.
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	BLM Sensitive; BGEPA <sup>4</sup>	Could occasionally occur in the Site; however, preferred habitat is not present.
Ferruginous Hawk ( <i>Buteo regalis</i> )	BLM Sensitive	Could occasionally occur in the Site; however, preferred habitat is not present.
Golden Eagle ( <i>Aquila chrysoides</i> )	BLM Sensitive; BGEPA <sup>4</sup>	Could occasionally occur in the Site; however, preferred habitat is not present.
Western Burrowing Owl ( <i>Athene cunicularia hypugaea</i> )	BLM Sensitive	Could occasionally occur in the Site; however, preferred habitat is not present.
<b>AMPHIBIANS</b>		
Arizona Toad ( <i>Anaxyrus microscaphus</i> )	BLM Sensitive	Could be present in canyons and washes near the Site
<b>INVERTEBRATES</b>		
Monarch Butterfly ( <i>Danaus plexippus</i> )	BLM Sensitive	Could occasionally occur in the Site; however, preferred habitat is not present.
<b>PLANTS</b>		
California Flannelbush ( <i>Fremontodendron californica</i> )	BLM Sensitive	Could occasionally occur in the Site; however, preferred habitat is not present.

2  
3 **2.1.4. Cultural and Paleontological Resources**

4 (b) (3) (B)

[Redacted content]

<sup>4</sup> BGEPA = Bald and Golden Eagle Protection Act

(b) (3) (B)

(b) (3) (B)

(b) (3) (B)

## 2.2. MINING ACTIVITIES

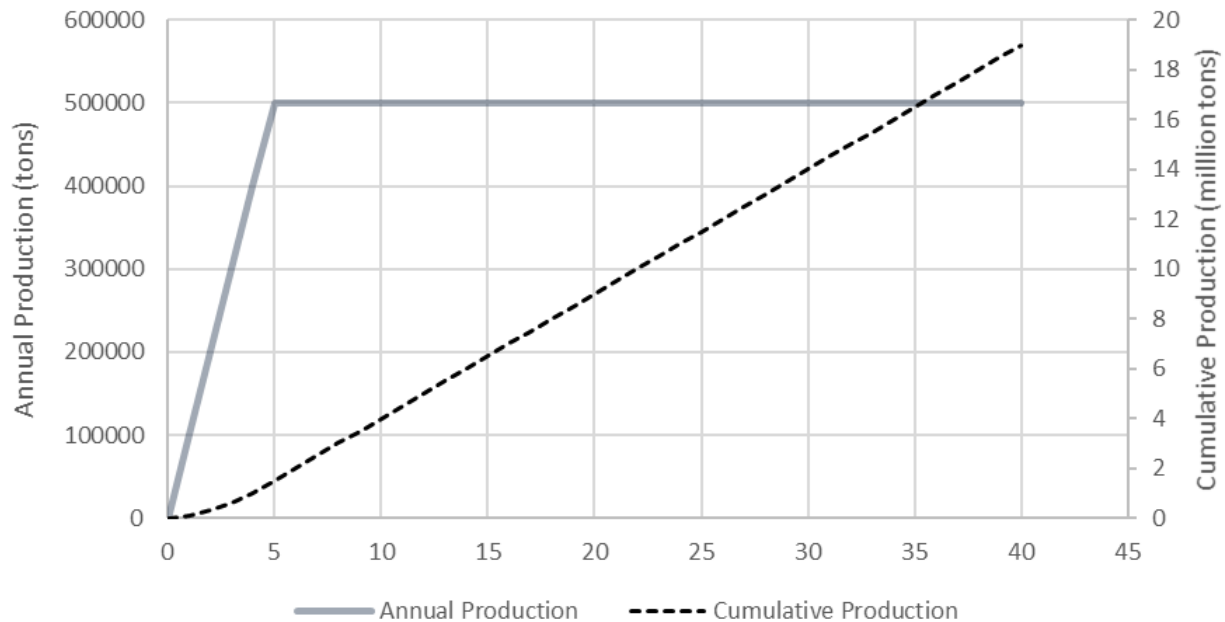
The total mine and reclamation area is approximately 76 acres (**Figure 10a**). This constitutes the current area of known and inferred reserves (Brost 2016). The total expected output of the mine would be 20.9 million tons in a 40-year period.

### 2.2.1. Mine Production

The mine production would grow to approximately 500,000 tons per year over the next several years (based on full production; **Figure 10a**). This ramp-up is shown in the **Exhibit 2**, below. Greater detail of expected mining activities within these phases is described in **Sections 2.2.1.1.** and **2.2.1.2.**



**Exhibit 2. Mine Production**



### 2.2.1.1. Initial Mining Operations

Initial mine activities would begin with removal of the existing stockpile and excavation of HQP in the west central portions of the Site within Capital Lode Claims 6 and 7 (**Figure 10b**). KMC would employ a local contractor to excavate and load the HQP at the active mining area, which would then be transported to the customer either by the contractor or direct pick up from customer. This truck loading would begin within Capital Lode Claim 7 (**Figure 10b**). The truck loading area would change as excavation advances. The removal operation would consist of the following activities:

1. Removal, wood-chipping and piling of vegetation;
2. Stripping and placement of growth medium adjacent to the stockpile; and,
3. Loading HQP into trucks for weighing and transport to the customer.

HQP would be crushed and screened on-site with a portable crusher-screen-stacker to generally two-inch minus products for sale to customers as described for the stockpiled resource. This ridge is anticipated to be taken down in 15-foot increments as shown in **Figure 11**.

After removal of the stockpile, the mine excavation is anticipated to extend south and eastward, excavating down in 15-foot increments. The overburden from this area would be placed as convenient in the initial stockpile locations shown on **Figure 10b**, or another suitable location within the mine disturbance area.

Within this initial mining operation stage, KMC would construct an off-site processing facility in a location to be determined, and begin processing HQP to a finer size at this location as economic conditions demand. Approximately 1.5 million tons of HQP are projected to be produced in this initial phase.

The layout of major initial mine features and facilities are shown in **Figure 10b**.

#### **2.2.1.2. Full Production Activities**

At full production expected by year five (5) of operations, the expected output from the Kirkland Mine is approximately 500,000 tons per year with a range of between 1,000 to 1,500 tons per day based upon economic demand. HQP would be mined within the boundaries shown in **Figure 10a**. KMC anticipates mining the HQP in 15-foot lifts in an open pit configuration, reflecting local geological conditions or rock orientation and stability. Based upon the local conditions and customer preference, different portions of the developing pit would be opened through time. As portions of the pit are exhausted, mining would continue in other areas of the pit. Higher areas may be lowered in a 15-foot “pancake” method until these areas match the surrounding areas. Ultimately, the resource would be excavated to an elevation of approximately 3,870 feet amsl.

KMC would maintain wall, bank, and, and slope stability on all active faces and those where persons work or travel. Loose or unconsolidated material would be sloped to the angle of repose or stripped back for at least ten (10) feet from the top of the pit wall.

As mining activities expand into undisturbed areas, the following activities would occur:

1. Removal of the vegetation according to Arizona Department of Agriculture (ADA) regulations;
2. Stripping and salvage of the topsoil;
3. Stripping and placement of overburden into staging areas or final reclamation areas in or around the pit (**Figure 10a**);
4. Removal of the HQP using rippers, loaders, and scrapers;
5. Loading and hauling to the portable crusher-screen-stacker located in the pit;
6. Primary crushing and screening; and,
7. Transport crushed raw HQP offsite via haul trucks.

The majority of pit excavation is anticipated to be suitable for excavation using a single-shank ripper, although harder areas would require the use of a hydraulic excavator. Blasting is not anticipated for any excavation activities. The HQP deposits are anticipated to break down into appropriate sizing on their own while being handled, however one or more power screens and crusher-screen-stackers

would also be used to process the HQP down to a 2-inch minus size. Harder deposits would be broken down using a hydraulic excavator if they are too large to initially fit in the crusher-screen-stacker.

After HQP has been quarried and crushed to two-inch minus onsite using portable crusher-screen-stackers, it would be placed into an on-site stockpile and either sold directly to customers or hauled offsite for additional processing depending on demand. In either case, the crushed HQP would be loaded using a front-end loader into trucks that are suitable for use on public streets. HQP loading and primary crushing operations would normally occur 40 to 80 hours per week during daylight hours.

An offsite facility would further process and mill the HQP to a size of approximately 10 microns, following the ASTM C618 standard for natural pozzolan. The facility may include a drying circuit should any moisture need to be removed from the HQP. The offsite milling operation would be located near rail access at a location to be determined. After the HQP is processed into its final saleable product, it would be loaded onto the trucks or trains and shipped to buyers.

Reclamation operations would be initiated as areas are mined out to the extent feasible. KMC will attempt to limit the disturbed, non-reclaimed land to 20 acres or less at any given point in time.

No chemicals would be used in the mining process. Water would be routinely sprayed from a water tanker onto mine roadways and active stockpiles and water spray bars would be installed on crushing equipment.

## **2.2.2. Water Management Facilities**

### **2.2.2.1. Surface Water Design Criteria and Regulations**

The proposed mining activities are designed using the guidelines set in the 2015 Drainage Design Manual (Drainage Manual) for Yavapai County (Yavapai County Flood Control District 2015). The Drainage Manual recommends a modified “Rational Method” to determine the volume of rainfall that the project must retain. The general equation for this method is:

$$Q = CiA$$

Where:

Q = The volume of rain to be retained

C = The runoff coefficient.

i = Inches of rainfall for the design storm

A = Area of contributing watershed in acres.

Arizona Department of Environmental Quality (ADEQ) Best Available Demonstrated Control Technology (BADCT) recommends use of the 100-year, 24-hour design storm to determine the required retention volumes. The National Oceanic and Atmospheric Administration (NOAA) 14 atlas

predicts the 100-year 24-hour precipitation for this project location to be 4.59 inches with a confidence interval of 90 percent (NOAA 2017). All water that is retained would be infiltrated or evaporated. Retained water would not be discharged offsite.

The runoff coefficients in **Table 3** were chosen for this project based on guidance from the Drainage Manual and the land descriptions contained there.

**Table 3. Runoff Coefficients**

Land Description	Runoff Coefficient
Undisturbed Rock outcrops	0.90
Undisturbed Desert/hillside with slope <20%	0.70
Undisturbed Desert/hillside with slope >20%	0.85
Active Mine Area	0.95
Reclaimed Mine Area (assumed similar to desert hillside)	0.85

#### 2.2.2.2. Watersheds

At buildout, there are five watersheds outside of the project's disturbance limits that contribute flows to the interior of the disturbance limits. These watersheds are mapped in **Figure 11**. Rain that falls within the disturbance limits must also be retained. The report assumes that no more than 20 acres of the mine would be actively mined at one time, as such the remainder of the project's buildout disturbance limit is considered to be reclaimed mine area. The areas, land descriptions, runoff coefficients, and anticipated runoff volumes contributing to this project's retention requirements are shown below in **Table 4**.

**Table 4. Runoff Volumes**

Watershed	Land Description	Runoff Coefficient	Area (Acres)	Runoff Volume (CF)
Area A	Undisturbed Desert/hillside with slope >20%	0.85	0.55	7,843
Area B	Undisturbed Desert/hillside with slope <20%	0.70	0.49	5,685
Area C	Undisturbed Rock outcrops	0.90	0.09	1,335
Area D	Undisturbed Rock outcrops	0.90	1.07	15,992
Area E	Undisturbed Desert/hillside with slope >20%	0.85	1.43	20,276
Active Mine Area	Active Mine Area	0.95	20.00	316,573
Reclaimed Mine Area	Reclaimed Mine Area	0.85	56.08	794,277
<b>TOTAL</b>			<b>79.71</b>	<b>1,161,981</b>



### 2.2.2.3. Retention

Runoff volumes from the 100-year, 24-hour rainfall event plus freeboard volume would be retained onsite in one or more retention basins (see example of retention basin locations at initial mine operation phase in **Figure 10b**). These retention basins are anticipated to have up to ten feet of working depth, 3:1 side slopes, and a total area of 3.16 acres at the outer edge of the basins. Using this design, these basins provide storage for 1,172,700 cubic feet of water. The mine intends to use rock mulch, drainage swales, and berms as necessary to limit erosion and transport of fine materials while allowing natural flow of stormwater into these retention basins.

All stormwater (or water used for dust suppression) within footprint of the mine (contact water) will be contained within the mine area. It is anticipated that stormwater collected within the retention basin would percolate naturally into the ground through existing fissures in the HQP deposit (pers. comm. Al Burch, KMC Project Manager, with Jeff Whidden, Ed Dvorak, and Joe Griego from the CR Minerals, Rocky Mountain Mine in Rio Arriba, New Mexico). Stormwater retention areas will vary in location and size. The Drainage Manual requires storm water to be dissipated within a 36-hour period. Infiltration rates within the basin would be tested using either the Double Ring Infiltrometer test (ASTM D 3385-03) or the Environmental Protection Agency (EPA) Falling Head Percolation Test Procedure (EPA 1980). Both procedures are described in the Drainage Manual.

### 2.2.2.4. Diversion Channels

All stormwater that flows outside the footprint of the mine (non-contact water) would be diverted away from the mine to the extent possible. Drainage control would be achieved through a combination of contouring slopes to promote sheet flow and constructing stormwater diversion channels. Diversion channels would be designed to convey the 100-year, 24-hour storm event. It is important to note that the mine boundaries have been adjusted to maintain a minimum 50-foot separation between disturbed area and the major washes.

### 2.2.3. Roads

The main access road (Entrance Road, **Figure 10a**) lies within an existing access easement (Book 2058, Page 494 Y.C.R) and would be paved from Iron Springs Road to the planned gate on BLM lands west of the pit. The existing access road is between 22 and 25 feet in width and the Kirkland Mine requires a 25-ft wide access road for access to the mine and transport of the HQP; therefore, minor improvement and widening may be required in a few areas. An at grade crossing of a tributary to Copper Basin Wash will be improved and reinforced with concrete to allow for safe crossing during rain events and prevent erosion of the drainage.

Temporary roads would be constructed and maintained within the overall mine disturbance area as needed to perform mining activities. These roads would be designed and constructed to meet the BLM road standards described in Chapter 3 of BLM Manual 9113-Roads (BLM 1985) but would not be open to the public. These roads are anticipated to be classified as “Resource” or “Local” roads, with a maximum grade of 14 percent. With the exception of the main haul road which would be 50 feet in width (**Figure 10a**), temporary road widths would vary by classification and the expected average daily traffic, but would generally be between 14 and 25 feet in width, not including berms.

Geometric design and construction will follow the guidelines set by U.S. Bureau of Mines Information Circular 8758 “The Design of Surface Mine Haulage Roads – A Manual” (Kaufman and Ault 1977). Roads would be bermed as necessary to meet U.S. Mine Safety and Health Administration (MSHA) specifications.

#### **2.2.4. Utilities**

The BLM administered areas of the Site would not require any utility connections. The adjacent private parcel would require standard residential power for lights and other office uses. Sewer service would be provided by a portable toilet, and potable water needs would be met using bottled water. Water needs for dust suppression would be trucked to the Site. The crusher-screen-stacker unit is self-contained with its own power-generation motor. This and other mine equipment used for the operation would require diesel fuel only and no electrical power sources are required.

#### **2.2.5. Support Facilities**

KMC plans to operate the quarry on BLM lands utilizing temporary structures and facilities, which would be removed when mining operations are completed. These include one or more portable crusher-screen-stacker located in the quarry, a staging area within the quarry for stockpiles and other material handling, and a quarry facilities area on privately owned land adjacent to the Site.

Other facilities on BLM land would include the following:

- One (1) portable toilet; and
- A concrete pad approximately 20 -by 40 feet to fuel equipment;
- One double-walled diesel fuel tank (approximately 10,000 gallons);
- Miscellaneous equipment and materials including waste receptacles.

Facilities located on privately owned lands adjacent to the quarry would include:

- A designated parking area for up to six (6) vehicles;
- A small portable (modular) office-lunch building on blocks (Maximum 14 by 60 feet);

- One (1) portable toilet;
- Up to three (3) portable storage buildings (Maximum 24 by 24 feet), one of which would be used to service equipment as needed and would include a 24- by 24-foot concrete pad;
- A water storage tank (Maximum 12,000 gallons);
- A waste oil storage container (Maximum 2,500 gallons); and
- Miscellaneous equipment and materials including waste receptacles, and other facilities.

Fueling and equipment servicing would be performed on the concrete service pad. The pad would be an un-reinforced (for removal at closure), 12-14-inch thick pad.

The fuel tank would be an aboveground, fire-resistant (meeting requirements of the Uniform Fire Code), double-walled storage tank with built-in secondary containment and interstitial monitoring. Double wall design can be monitored for leak detection. The tank would be secured and locked during times when KMC personnel are not on Site. It would be placarded to identify the nature of fuel, emergency procedures, and emergency phone numbers. Fuel would be off-road diesel. The tank would be placed immediately adjacent to the concrete pad.

#### **2.2.6. Equipment**

The major pieces of mining equipment required to fulfill the production schedule are summarized in **Table 5**. The final equipment selection and fleet sizes may vary slightly with vendor selection and future mine optimization.

**Table 5. Anticipated Mining Equipment**

<b>Equipment</b>	<b>Phase</b>	<b>Fleet Size</b>
<b>Bulldozers</b>		
Caterpillar D8, with GP blade and single-shank ripper	Initial	1
Caterpillar D7-D10 with rippers	Full Production	4
<b>Grader</b>		
Caterpillar 120 to 160 with scarifiers	Both	1
<b>Excavator</b>		
John Deere 850 or Caterpillar 320 to 5110 with hydraulic hammer	Both	1
<b>Haul Truck</b>		
Caterpillar 740 Articulated Dump Truck	Initial	1
Caterpillar 725 to 740 Articulated Dump Truck	Full Production	2
<b>Front-End Loader</b>		
Caterpillar 960 (4.0 cubic yard bucket)	Initial	2
Caterpillar 950 to 960	Full Production	4
<b>Water Truck</b>		
Caterpillar 613 Water Wagon (5,000 gallon)	Both	1
<b>Service Truck</b>		
Ford F350 with compressor, tool cribs, and welding machine	Both	1
<b>Crusher</b>		
XH320 Trackpactor	Initial	1
XH320 Trackpactor	Full Production	2
<b>Power Screen</b>		
Chieftain 1700 Tracked Screening Plant	Initial	1
Chieftain 1700 Tracked Screening Plant	Full Production	2
<b>Stacker</b>		
Powerscreen M95 Radial Stacking Conveyor	Initial	1
Powerscreen M95 Radial Stacking Conveyor	Full Production	2

### 2.3. OPERATING PLANS

Operating plans for proposed activities would include a Water Management Plan, Overburden Management Plan, Hazardous and Solid Waste Management Plan, Spill Contingency Plan, Transportation Plan, and a Fire Prevention Plan.

### 2.3.1. Water Management Plan

Except for dust control, the proposed operation is a dry process and does not consume water. Water for dust control would be obtained from an existing well on KMC's private parcel approximately 800 feet from the planned mining operations (**Figure 10a**, Arizona Department of Water Resources [ADWR] Well #55-505179) with no water use from sources on BLM land. As a contingency, an existing well located approximately 3 miles southwest of the Site (ADWR Well #55-625487) could be used as a water source for dust suppression. There is no chemical or other processing of fines on BLM lands or adjacent KMC land. Because KMC would use clean groundwater and processes inert HQP in its operations, it would not release pollutants into the aquifer or vadose zone.

KMC would require a Multi-Sector General Permit (MSGP) for mining sector J for the Arizona Pollutant Discharge Elimination System (AZPDES) program with an attendant stormwater pollution prevention plan (SWPPP) required by ADEQ. A SWPPP would be developed and implemented for the Site, as described in **Section 4.2**. Proposed activities are not located within active drainage channels or floodplains. All mining activities are a minimum of 50 feet from any potential water of the U.S. (**Figure 10a**). Stormwater controls would include rock mulching and construction of drainage swales and berms to limit erosion and transport of fine materials while allowing natural flow of stormwater.

Groundwater quality in Arizona is regulated under ADEQ's Aquifer Protection Permit (APP) program while groundwater quantity is regulated through the ADWR. ADEQ specifies 24 types of facilities under A.R.S. § 49-250 as exempt from requiring an APP. The facilities proposed by KMC, overburden stockpiles and stormwater retention basins, are exempted from permitting under the ADEQ's APP program. The excavated mining overburden will remain onsite within the footprint of the mine and will not be subject to any chemical or leaching agent, and the overburden will be used in the reclamation process. KMC surface impoundments within the mine area will be used solely to contain stormwater runoff.

The KMC Site is not within an ADWR designated Active Management Area (AMA) or Irrigation Non-expansion Area (INA). KMC plans to use the existing ADWR Well #55-505179 to meet its process water needs. These needs are principally dust control on the access roads and crusher-screen-stacker, but may periodically include water for washing equipment. This existing well is 80ft deep, with a static water level of 25 feet bls and is capable of producing up to 30 gallons per minute (gpm). Although the anticipated mine process water needs would likely be met by this existing well, KMC has access to a secondary offsite well capable of producing 500 gpm as a redundant water source. This well would fill the KMC water truck to transport water to the Site. Because KMC would use clean groundwater and processes inert HQP in its operations, it will not release pollutants into the aquifer or vadose zone.

### 2.3.2. Overburden Management Plan

The lithology of the entire claim area appears to be the same material. The basalt cap is as thick as 30 feet in the northern part of the claim (Ninyo & Moore 2015) and would not be removed during mining. Other areas have a basalt cap of a few inches to six (6) feet (Sandwell-Weiss 2016), which would be removed as overburden with a ripper and a loader. Overburden would be stockpiled no more than 50 feet high in various locations along the pit boundary as replacement for site grading and re-contouring during reclamation efforts.

Management of overburden includes estimating the amount to be excavated, evaluating the potential reclamation uses for the material, and designing storage areas for the material.

The removal of overburden would be performed periodically throughout the life of the mine and used for reclamation purposes, perhaps every one (1) to three (3) years.

The overburden would be handled by a rubber tire front-end loader and transported by truck to stockpiles or reclamation areas within the footprint along the outer edge of the proposed quarry.

### 2.3.3. Hazardous and Solid Waste Management Plan

No hazardous waste would be produced at KMC. Overburden and HQP are biologically and chemically inert. Chemical analysis to show that the material is inert could be provided upon the request of BLM. Any materials such as contaminated grease, unused chemicals, paint related materials, spent batteries, and reagents that may be classified as hazardous waste would be shipped offsite for disposal as necessary. If disposal of the aforementioned items is required, KMC plans to dispose of these materials using the most permanent, legal, and practicable disposal method available.

In general, waste would be managed in dumpsters or other appropriate containers. All containers would be covered or weighted to prevent blowing trash. Trash from the office area would be bagged. A waste disposal company would be contracted as necessary to manage wastes other than debris or construction wastes.

Grease associated with the mining, milling, and other operational equipment would be placed into drums or other bulk containers suitable for recycling. If the grease is not suitable for recycling, the contained waste would be sent offsite for disposal. While on site, the containers would be managed in an area that would provide secondary containment.

Onsite fueling of the off-road equipment (drill, loader, grader, and water truck) and portable crushing plant would be done from a portable diesel tank. All other vehicles would be fueled offsite. In the event that hazardous or regulated material, such as diesel, is spilled, measures would be taken to

control the spill and the appropriate agencies, including BLM, would be notified. Mine Employees and Contractors would maintain spill kits onsite for use in case of a spill.

Used oil from maintenance activities would be managed in bulk containers with secondary containment to ensure there is no release to the environment. Only oil acceptable for recycling would be placed in the bulk containers. Used oil not acceptable for recycling would be placed in a contained used oil tank for proper disposal.

Waste tires would be relocated to an active waste tire facility per A.R.S. 44-1304(D), and on-site waste tire storage would include fewer than 100 tires at all times.

Portable restroom facilities would be maintained by outside contractors and accumulated human waste would periodically be collected and transported to an approved disposal site. No waste would be buried onsite.

#### **2.3.4. Spill Contingency Plan**

KMC would develop a Spill Prevention, Control and Countermeasure (SPCC) Plan that describes regulated oil-based products and spill protection measures for the Site. KMC would have a fuel tank onsite that would hold 10,000 gallons of diesel fuel. This SPCC Plan would be prepared in accordance with the 40 CFR Part 112, Oil Pollution Prevention and is required because the KMC facility would store greater than 1,320 gallons of oil and petroleum products above ground. The SPCC would describe the procedures followed by KMC to prevent, control, and mitigate releases of oil and petroleum products to the environment at the Site.

The following outline includes proposed spill prevention, control and countermeasures elements that would be included in a formal SPCC plan for the Site. KMC would finalize this plan once facilities are completed and equipment is procured, to ensure that plans are specific to the final Plan, equipment specifications, operations personnel and responsibilities, and operational conditions.

A **Facility Layout** section would identify the following:

- Fueling and servicing activity locations.
- Storage container locations, contents, and capacities.
- Transfer station, fire prevention, and clean-up supplies locations.



A **Fueling and Equipment Servicing** section would identify the following:

- Fueling would be performed on a 20 x 40 concrete fuel pad located within the Site just inside the main entrance/access gate. The concrete pad would be sloped gently to one corner with a small sump to contain any accidental releases of fuel.
- Equipment servicing would be performed on a 24 x 24 concrete fuel pad on privately owned lands adjacent to the Site. The concrete pad would be sloped gently to one corner with a small sump to contain any accidental releases of oil.
- These pads would be 12-14-inches thick. The pads would be constructed without rebar to allow for demolition and removal upon completion of use or completion of mining.
- The area adjacent to the pads would be graded to prevent surface water run-on from adjacent areas.
- Handling of products (loading, unloading, and facility transfers, etc.) would be conducted from the pads. Specific procedures would be updated at completion of construction.
- As standard procedure fueling and servicing would be performed at the designated fueling and servicing stations; however, equipment may need to be serviced in the mine area at times and spill protection measures would be implemented.

A **Transportation and Delivery of Diesel Fuel** section would include the following:

- Diesel fuel is a major consumable for the mine equipment. Diesel fuel is available from local suppliers and would be received in tank trucks with a capacity of about 6,000 gallons. The project would receive and unload diesel to the on-site storage tank.
- Diesel fuel would be offloaded using drip-less connections in a contained area to eliminate spillage contamination. The off-loading sites would be designed to drain into the main storage site containment and have a spill response kit containing booms, and clean-up materials to ensure that any off-containment spillage is immediately contained and cleaned.
- A spill response trailer would be maintained on site and would contain sufficient materials such as booms and other materials to contain a spill within a 50-foot radius of an overturned diesel tanker. The kit would contain materials to absorb small leaks and plug small holes in the event of a turn-over.
- A small spill response trailer would be maintained in the mine to clean-up any spills. Procedures outlined in the SPCC Plan would be followed by KMC in response to any spills on the Site.

A **Specific Procedures** section would include the following:

- Discovery, response, and cleanup (both the facility's capability and those that might be required of a contractor) procedures would be developed;
- A list of threshold quantities and specific clean-up and reporting procedures for each;
- Clean-up equipment and supplies to be maintained on site, including storage vessels for liquids and solids removed from the sump, absorbents kept onsite for minor spills and other equipment;
- Description of the reasonable potential for equipment failure (such as loading or unloading equipment, tank overflow, rupture, or leakage, or any other equipment known to be a source of a discharge), including prediction of the direction, rate of flow, and total quantity of oil which could be discharged from the facility as a result of each type of major equipment failure; and,
- A list of site personnel and contractors to be used for emergency response. Contact information for each would be included in the plan as follows:
  - KMC manager,
  - Specific contractors with whom KMC has agreement(s) for removal, response and clean-up that would be utilized in the event of a spill, including names and phone numbers;
  - Emergency response contractors would be provided up-to-date phone numbers, maps for access to the site and keys for gates or other secured equipment necessary to perform an emergency spill response;
  - Appropriate federal, state, and local emergency response personnel, including phone numbers for:
    - Local Fire Department;
    - BLM Authorized Officer;
    - National Response Center; and
    - ADEQ.

An **Inspection, Tests, and Records** section would include the following:

- Inspections of fuel valves and other inlets and outlets as well as secondary containment would be made weekly;
- Testing of any equipment used to transfer fuel would be made at least annually or in accordance with manufacturers specifications;
- All SPCC facilities would be inspected regularly by a qualified professional engineer;

- A record of the inspections and tests would be maintained at the site and signed by the quarry manager or his designated representative, or inspector, with the SPCC Plan for a period of three years.

A **Personnel, Training, and Discharge Prevention Procedures** section would include the following:

- All site personnel that would be involved in oil-handling would be trained in the operation and maintenance of equipment to prevent discharges;
- Training would include, at least once per year, or upon hiring for new personnel:
- Discharge procedures, protocols, applicable pollution control laws, rules, and regulations facility operations;
- Familiarization of the contents of the facility SPCC Plan;
- Known discharges or failures, malfunctioning components, and any recently developed precautionary measures.

A **Security** section would include the following:

- The 10,000-gallon fuel tank would be secured and locked during times when KMC personnel are not on site;
- The fuel tank would have one valve permitting direct outward flow of the container's contents to the surface and that would be adequately secured to ensure that it remain in the closed position when in non-operating or non-standby status;
- The gate to the site would be locked during non-operating hours to prevent discharges occurring through acts of vandalism; and,
- Berms and protective barriers would be placed around the fuel tank to prevent accidental or malicious damage by vehicles or equipment.

### **2.3.5. Transportation Plan**

Temporary access routes within the ultimate disturbance area would be planned for minimum width needed (14 to 25 feet in width) for safe operations and would follow natural contours where practicable to minimize cut and fill. Where a notice or a plan of operations is required, it shall specify the location of access routes for operations and other conditions necessary to prevent unnecessary or undue degradation (43 CFR 3809.420(b)(1)). A grader would perform maintenance on the access roads to the Site as needed. Roads would be maintained for safe passage. Maintenance would include smoothing ruts, bumps, and washouts created by seasonal storms. No new access routes into the Site are anticipated.

Public access to the Site would be controlled by a gate. The gate would be locked after working hours. Traffic and no trespassing signs would also be affixed to the gate consistent with requirements of the Arizona State Mine Inspector. Vehicle speed would be restricted to 5 mph for safety and dust control. Speed limits and maximum vehicle weight would be posted at the entrance/exit.

In the early phases of the project, unprocessed HQP would be sold on-site and loaded directly into customer's trucks. The mine would only serve customer that are equipped and licensed for use on public roads. Loaders would be used onsite to load the trucks from the existing stockpiles.

Once the offsite grinding and storage facilities have been constructed adjacent to the railroad, tandem dump trucks (or similar) would be used to haul screened HQP offsite to the processing plant. KMC and KMC contractors would comply with all legal load limits for the State of Arizona.

According to the Arizona Department of Transportation (ADOT), per the 2013 Average Annual Daily Traffic (AADT) traffic counts, State Route 89 (SR 89) has an AADT count of approximately 1,100 vehicles per day. KMC plans to remove 1200 to 1500 tons of HQP per day. At this rate, KMC anticipates that Kirkland Mine operations would add 30 to 50 truck round trips per day, depending on the size of the truck, to Iron Springs Road, Kirkland Road, and SR 89. It would also add a small number of miscellaneous round trips for fuel, supplies and personnel.

It is anticipated that the mining operation would use about 20,000-35,000 gallons per day (gpd) during time of peak production. Depending on the size of the truck that is in use (between 2,000 and 8,000 gallons), this would entail between 3 and 18 trips per day.

#### **2.3.6. Fire Prevention Plan**

The KMC Site is located within the Phoenix District Fire Management Zone, administered by the BLM's Hassayampa and Lower Sonoran Field Offices. The fire program within this zone is responsible for the protections of nearly 2.4 million acres of BLM public lands (BLM no date). BLM has identified a variety of fuel types within this region, including the Sonoran Desert ecosystem, grass lands, desert oak/chaparral with intermixed manzanita, desert shrub and ponderosa pine. Fire season usually begins in mid-March and ends in early September. The Phoenix District Fire Management Zone is a full participant in the Central West Arizona Interagency Fire Management Zone. In this cooperative effort, a variety of agencies have joined forces to fight wildland fires (BLM no date).

KMC would comply with all applicable state and federal fire laws and regulations and would maintain all reasonable measures to prevent and suppress fires at the Site. KMC would identify and maintain policies that apply best management practices for fire prevention, including prohibiting parking of vehicles on top of vegetation, prohibiting smoking on site, proper removal of vegetation cleared from the Site, and proper storage and containment of fuels and other ignitable materials.

Handheld and large equipment (e.g. saws, tractors) used for vegetation clearing would be equipped with spark arresters and maintained in proper working condition. Planning and prevention of fires is also managed through the appropriate handling and storage of fuels, inspections and recordkeeping, spill prevention and response procedures, proper use of safety equipment, resource management training, and fire prevention training.

To protect individuals from initial developing fires, KMC would have available water that would be available to assist in firefighting operations. KMC would ensure that all mobile equipment be equipped with fire extinguishers, hand tools, and first aid kits. During extended periods of time of non-operation or seasonal closure, all equipment and supplies would be removed from the Site.

The National Fire Protection Association (NFPA) established NFPA 10, which is the Standard for Portable Fire Extinguishers. NFPA 10 mandates the type, size, placement, and minimum number of extinguishers required for each building and vehicle. Fire extinguishers would be installed in accordance with this standard during operation.

In the event of an initial, small fire that that does not create enough smoke, flame and heat to prevent fighting the fire using a hand-held fire extinguisher or a small water hose, and providing workers would not be endangered, KMC personnel would use hand-held fire extinguishers and water hoses to make a reasonable effort to extinguish the fire. If two or more people are present, one would fight the fire while one reports the size, type, and location in the event the fire grows out of control to the Prescott Dispatch Center. Personnel would not directly engage any fire which is beyond the incipient stage, i.e., a fire which has progressed to the point it has substantially involved any structure/equipment.

The Prescott Dispatch Center is the interagency focal point for the mobilization of resources. The Volunteer Skull Valley Fire Department is the nearest local fire department, located approximately five miles north of the Site on Iron Springs Road.

#### **2.4. SCHEDULE OF OPERATIONS**

For the foreseeable future, mining operations would occur year-round 40 to 80 hours a week during daylight hours. However, if economic conditions are suitable, mine operations may extend periodically to operate 24-hours a day. The overall life of the mine is anticipated to be 40 years.

### 3. RECLAMATION PLAN

This chapter describes a proposed approach for reclaiming land disturbed on the Site.

#### 3.1. PURPOSE, APPROACH, AND SCHEDULE

This Reclamation Plan discusses the proposed reclamation approach, general reclamation schedule, potential cover material (borrow) sources, revegetation plan, and conceptual plan for reclaiming the Site.

The purpose of the reclamation program is to return the Site to pre-mining land uses, including potential commercial/industrial or recreational uses, livestock grazing, mineral exploration, or wildlife habitat. To the extent practicable and in accordance with the applicable regulations and guidelines, the Site would be reclaimed to a condition similar to the surrounding area. Naturally steep slopes would be left intact.

Generally, the proposed reclamation and closure activities are intended to promote the establishment of a self-sustaining ecosystem consistent with the biotic communities of the surrounding area, with consideration of the specific conditions that exist at the Site. Post-closure monitoring and maintenance would follow reclamation to ensure the success of the program and compliance with performance criteria. Concurrent reclamation is planned throughout the life of the operation.

Consistent with the H-3809-1 Surface Management Handbook (BLM 2012), this Reclamation Plan would be updated or appended to reflect other agency permits or authorizations, final designs, or certain stipulations, as more specific and detailed engineering designs or information become available.

According to 43 CFR part 3809, reclamation means taking measures (following disturbance of public lands caused by mining operations) to meet applicable performance standards and achieve closure conditions required by BLM. Components of reclamation include, where applicable:

- Regrading and reshaping the land where needed to a 3H:1V slope;
- Placing growth medium and establishing self-sustaining vegetation;
- Removing or stabilizing buildings, structures, or other support facilities;
- Providing for post-mining monitoring, maintenance, or treatment.

Reclamation and closure of the quarry area would include:

- Recontouring the slope angles to a minimum of 3H:1V to ensure stable slopes that would reduce erosion,
- Regrading and revegetating the reclaimed surfaces, and

- Maintaining and constructing drains and retention ponds as practicable for stormwater management.

To facilitate long-term stability, revegetation, and erosion protection, steep slopes would be regraded where possible to achieve the desired slope that would provide for a structurally and erosionally stable surface. Recontouring would enhance natural drainage in selected areas, as needed. Supplemental erosion protection may be applied where necessary. The footprints of the regraded facilities are depicted in **Figures 10a and 12**. Existing slopes subject to excessive erosion or with insufficient vegetative cover would be regraded to a minimum 3H:1V, covered with overburden material, and planted with a BLM-approved seed mix. Where side slopes have been confirmed to be stable and no cover is required, no regrading or recontouring is planned.

A reclamation cost estimate will be provided to BLM upon request in accordance with 43 CFR 3809.401(d).

### **3.2. REVEGETATION**

Reclaimed areas on the Site would be revegetated with a BLM-approved seed mix. These areas would be revegetated after cover placement and at the appropriate time of the year for optimum seed germination and plant growth.

#### **3.2.1. Growth Media**

Generally, initial seedbed preparation on flatter surfaces would include ripping or discing the surface along contours. Conventional seeding techniques (including drill and broadcast) would be used as appropriate depending on soil/cover characteristics and landform. Hydroseed, hydromulch, and tackifier may be used on slopes that are not suitable for conventional seeding. Mulch may be applied to minimize erosion and promote moisture retention where appropriate.

If needed, soil on the Site would be tested to determine if amendments need to be applied to adjust the soil balance to optimize the potential for successful revegetation.

#### **3.2.2. Seed Mix**

Revegetation would require site-appropriate, BLM-approved native seed mixtures. A diverse native plant community would be targeted through the definition of seed mixtures and application rates. The seed mix list would be reviewed before revegetation activities are initiated to confirm the availability of the seeds, and the list would be adjusted as needed. The seed mix and mulch materials would be certified by the revegetation contractor to be weed free.



The seed mix would be designed to meet the following criteria:

- Native non-invasive species that have a high compatibility with existing surroundings;
- Species and plant type diversity to promote a sustainable vegetative cover throughout the dramatic seasonal changes and other climate related variances; and
- Species and plant type diversity to promote a variety of germination periods and seasonal growth.

### **3.3. REMOVAL OF EQUIPMENT AND FACILITIES**

Generally, the strategy for reclamation and closure of equipment and facilities would include:

- Removing temporary instrumentation and equipment, utilities, and unneeded access roads; and
- Reclaiming disturbed surfaces by ripping and/or covering and reseeding.

### **3.4. ROAD CLOSURE**

The main entrance road would remain in use during the post-closure period to provide access for post closure land uses.

Closure of roads that are not needed for post-closure access would involve demolishing fill while maintaining satisfactory drainage. The abandoned road surfaces would be scarified by ripping, if necessary. Where needed, rock or earthen berms would be placed to prevent vehicular access. The road corridors would be reclaimed by treatment with a mulch/seed mix to promote revegetation.

## **4. ENVIRONMENTAL PROTECTION MEASURES**

### **4.1. PREVENTION OF UNNECESSARY OR UNDUE DEGRADATION**

KMC would prevent unnecessary or undue degradation of public lands by complying with the performance standards found in 43 CFR § 3809.415 and 3809.420, as applicable. KMC would comply with BLM's terms and conditions related to the specific mining and reclamation activities and with other federal and state laws related to environmental protection and protection of cultural resources.

KMC would commit to the following environmental protection measures to prevent unnecessary or undue degradation during project activities. The measures are derived from the general requirements established in 43 CFR § 3809.420, as applicable, as well as other federal and state water and air quality regulations.

## 4.2. SURFACE WATER AND GROUNDWATER

Surface water within the Site consists of stormwater runoff within natural ephemeral drainages. Two unnamed ephemeral tributaries to Copper Basin Wash traverse the northwest and southeast corners of the Site (**Figure 6**). These ephemeral drainages display OHWM characteristics, and would likely be determined by the ACOE to be “waters of the United States”. One of those drainages crosses the Entrance Road, where an at-grade crossing would be reinforced with concrete to allow for safe crossing during rain events and prevent erosion of the drainage. This crossing would likely require a Clean Water Act (CWA) Section 404 permit and qualifies for a Nationwide Permit (NWP) 14 (Linear Transportation Projects). No activities within the mine itself would occur in potentially jurisdictional wetlands or waters of the United States under the CWA.

A Stormwater Pollution Prevention Plan (SWPPP) would be developed in accordance with the Arizona MSGP for Mineral Mining and Dressing, Sector J, and implemented to control sedimentation from disturbance associated with mine activities. BMPs would be installed to manage stockpile areas and other disturbed surfaces. Sediment control structures could include, but not be limited to fabric and/or hay bale filter fences, siltation or filter berms, and downgradient drainage channels in order to prevent unnecessary or undue degradation.

Direct runoff of water used for dust control shall be limited to the extent practicable and shall not cause downstream erosion or flooding nor cause an exceedance of applicable water quality standards.

KMC would use water from an existing well source for dust control and other mining operations relating to the inert HQP processed in the mine. If any additional wells are needed, they would be drilled in accordance with Arizona Department of Water Resources (ADWR) well construction and abandonment requirements. KMC operations would not release pollutants to groundwater.

## 4.3. SPILL CONTAINMENT

As discussed in **Section 2.3.4**, KMC would develop and implement an SPCC Plan to manage storage and usage of oil-based products during operations. Only minor servicing of mobile equipment would be conducted at the Kirkland Mine, limiting the potential for diesel fuel spills. Spill response kits shall be maintained at to ensure that pollutants are prevented from entering into washes. Any pollutants generated by mining or transportation activities shall be properly disposed of in accordance with applicable regulations.

#### 4.4. EROSION AND SEDIMENT CONTROL

KMC would implement BMPs for erosion and sediment control measures identified in the SWPPP. The Entrance Road may require minor regrading following storm events. The effectiveness of erosion control measures would be monitored during the mining operation.

KMC would follow all erosion and sediment control measures identified in the Reclamation Plan.

#### 4.5. AIR QUALITY

Air quality impacts associated with Kirkland Mine would be primarily from fugitive dust generation by vehicles and equipment during operations and from vehicle emissions. Mining activities that have the potential to release regulated pollutants include the following:

- Road dust emissions and tailpipe emissions at the mine site and from haulage and occasional support vehicle travel along the access roads,
- Additional wind-blown dust erosion emissions from the disturbed stockpile or disturbed mine area.

The greatest contributors to these pollutants are mining equipment exhaust, haulage equipment exhaust, exhaust from worker commuting and material delivery, and fugitive dust emissions from mining and earthmoving.

In accordance with the Clean Air Act (CAA), the EPA shall review air quality conditions reported by states to determine whether states are meeting the national ambient air quality standards (NAAQS). The EPA designates Yavapai County, which includes the proposed Kirkland Mine, as being in attainment/unclassifiable with respect to the NAAQS for ozone (O<sub>3</sub>), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), particulate matter (dust; PM<sub>10</sub> less than 10 microns diameter and PM<sub>2.5</sub> less than 2.5 microns diameter), and lead (Pb).

At the planned production rate, KMC's operation is anticipated to be below the permit threshold. If required, KMC would obtain the appropriate air quality permitting and all permit terms and conditions would be followed. Operations would comply with all emission limits and ambient air quality standards and monitoring would be conducted to ensure NAAQS are being met.

Emissions of fugitive dust from disturbed surfaces would be minimized by utilizing appropriate control measures including surface application of water to roadways and process areas, speed limits controls for operating equipment, and using covered trucks. Concurrent reclamation would be completed where possible.

All equipment will be fitted with standard emission controls to reduce emission to below the approved threshold levels.

Fiberquant Analytical Services (“Fiberquant”), specialists in detecting fibrous minerals, tested 18 samples of HQP from the stockpile and other locations on the KMC adjacent claims in 2015. Fiberquant did not find any fibers indicating the presence of asbestos, erionite or other fibrous minerals that could be an airborne hazard (Mining & Environmental Consultants, Inc. 2015).

#### **4.6. SOLID AND HAZARDOUS WASTES**

KMC would properly dispose of waste oil, other related fluids, filters, oily rags, etc. in appropriate disposal locations. Operational litter would be collected in appropriate containers and removed as required from the Site. Project-related refuse would be hauled to the authorized landfill for disposal. No refuse would be disposed on-site. If a hazardous or regulated material, such as diesel fuel is spilled, the area would be cleaned and ADEQ would be notified as per ADEQ regulations.

Portable toilet facilities would be maintained by outside contractors and accumulated human waste would periodically be collected and transported to an approved disposal site. No waste would be buried on site.

#### **4.7. FISHERIES, WILDLIFE, AND PLANT HABITAT**

KMC mine activities would occur on some previously disturbed land. To minimize impacts to wildlife and plant resources within the Site, KMC would implement the following measures:

- Utilize existing roads to the maximum extent possible.
- Keep surface impacts to the minimum that is required to provide safe equipment access and crew working areas.
- Maintain prudent speed limits to protect wildlife that may pass through the Site.
- File and submit a notice of intent to clear land to the ADA thirty (30) days prior to any clearing of native vegetation.
- Require that vehicles entering the site are cleaned prior to entering the mine area to prevent accidental introduction of noxious weeds.
- Limit mine operations to occur between dawn and dusk to avoid the illumination of adjacent habitat areas that may affect light-sensitive species.
- Implement concurrent reclamation, which would include recontouring, scarification, and reseeding with a BLM-approved seed mix of native species.

As described in **Section 2.1.3**, EPG determined that 12 BLM sensitive species (four species of bats, five species of raptors, one amphibian, one invertebrate, and one plant) could occasionally occur

within the Site, and one, Arizona toad, has greater potential to occur in canyons and washes near the Site (EPG 2017a). Activities proposed by KMC would not substantially impact habitat for this species. Those activities may impact individuals of this species, but they are not likely going to result in a trend toward listing or loss of viability of these species.

#### 4.8. CULTURAL RESOURCES

If KMC discovers any cultural resource that might be altered or destroyed by operations, the discovery would be left intact and reported to the authorized BLM officer in accordance with 43 CFR 3809.420(8). One site that has been recommended eligible by EPG (AZ: N:10:49 [ASM] shown in **Figure 9**) may be impacted by proposed activities. The BLM review process and recommendations will determine options for this site under the Arizona Antiquities Act (A.R.S. §15-1631, §41-841 and §41-861 et. seq) and Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (54 U.S.C. § 306102). If necessary, an additional cultural survey would be conducted on KMC's privately owned lands to ensure that potential impacts to cultural resources resulting from this Plan (if any) are identified.

Pursuant to 43 CFR 10.4(g), KMC would notify the BLM authorized officer, by telephone, and with written confirmation, immediately if there is the discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony (as defined in 43 CFR 10.2). Further pursuant to 43 CFR 10.4 (c) and (d), the operator would immediately stop all activities in the vicinity of the discovery and not commence again for 30 days or when notified to proceed by the BLM authorized officer.

KMC would not knowingly disturb, alter, injure, or destroy any scientifically important paleontological resources. If KMC discovers any scientifically important paleontological resource that might be altered or destroyed by operations, the discovery would be left intact and reported to the authorized BLM officer in accordance with 43 CFR 3809.420(8).

No paleontological survey has been conducted, but extensive biological, cultural, and geological survey work has been conducted within the Site to support the Kirkland Mine (Ninyo & Moore 2015, Sandwell-Weiss 2016, EPG 2017a, EPG 2017b), and no paleontological findings have been identified.

Any survey monuments, witness corners, or reference monuments would be protected to the extent economically and technically feasible. In the event of monument obliteration, KMC would immediately report the incident, in writing, to the authorized officer and respective installing authority.

#### **4.9. FIRE SAFETY AND GENERAL SAFETY**

KMC would implement the Fire Prevention Plan described in **Section 2.3.6**. Approved fire extinguishers would be located on all pieces of mobile equipment and heavy equipment and stored water would be available onsite to assist in firefighting.

Cellular telephone service is available at the KMC site for emergency and other communications. KMC employees would be trained in proper emergency response, incident reporting, and general health and safety issues as part of their initial and annual refresher MSHA-required training.

#### **4.10. MAINTENANCE AND PUBLIC SAFETY**

KMC would maintain public safety throughout the life of the mine. All equipment and other facilities would be maintained in a safe and orderly manner. The KMC mine would be inspected periodically and would operate under applicable U.S. Mine Safety and Health Administration (MSHA) and Arizona State Mine Inspector (ASMI) permits. All employees would receive MSHA-required initial and annual refresher safety training. KMC operations would be conducted in accordance with all applicable MSHA and ASMI safety regulations. In addition to complying with MSHA regulations, KMC operations would be conducted in accordance with any applicable Occupational Safety and Health Administration (OSHA) regulations.

### **5. MONITORING PLAN**

The closed facilities would be monitored and maintained to ensure that vegetation is established, review the integrity of surface water control structures, and evaluate cover erosion and geotechnical stability. Upon the implementation of the final reclamation, annual monitoring and reporting of the reestablishment of vegetation would be conducted for a period of 10 years.

KMC mining operations consist of excavating and transporting geologically inert materials. The mined HQP and overburden are not chemically-treated; therefore, mining operations do not require storage and maintenance of chemical treatment processes. The scale of mining to occur at the KMC Site is expected to be small, impacting approximately 76 acres of disturbed and naturally vegetated BLM lands. The mine is not expected to require individual permits for impacts to any air quality resources, surface water resources, or groundwater resources. The KMC mine poses relatively low risks of environmental impacts and therefore would not require extensive monitoring at closure.

### **6. INTERIM MANAGEMENT PLAN**

An interim management plan, required under 43 CFR 3809.424, outlines and establishes actions required during periods of temporary or seasonal closure to avoid causing unnecessary or undue degradation. KMC does not anticipate any planned periods of non-operation; however, in the event

of a temporary closure exceeding one (1) year, KMC would commit to the following actions outlined within the Interim Management Plan.

KMC would notify the BLM in the event of any unplanned, temporary closure lasting for more than one year.

#### **6.1. MEASURES TO STABILIZE EXCAVATIONS AND WORKINGS**

Following the excavation of HQP, the exposed soil would be recontoured, scarified and reseeded or stabilized until revegetation is appropriate. If necessary, filter fabric, straw or mulch would be used to stabilize exposed soils. KMC would only complete final reclamation on an area when no further disturbance is planned in that area, but temporary stabilization measures would be applied during periods of non-operation to prevent erosion. A SWPPP would be prepared for the Site that would detail temporary and permanent BMPs that would be followed throughout the life of the mine.

#### **6.2. PROVISIONS FOR THE STORAGE OR REMOVAL OF EQUIPMENT, SUPPLIES, AND STRUCTURES**

Equipment and supplies would be removed from the Site or secured on adjacent privately owned lands, both for liability reasons and to ensure environmental protection.

#### **6.3. MEASURES TO MAINTAIN SAFE AND CLEAN CONDITIONS**

During unanticipated periods of non-operation, KMC would conduct regular periodic inspections of the mine area. During periods of non-operation greater than one year, KMC would remove trash and unneeded mobile equipment from the Site.

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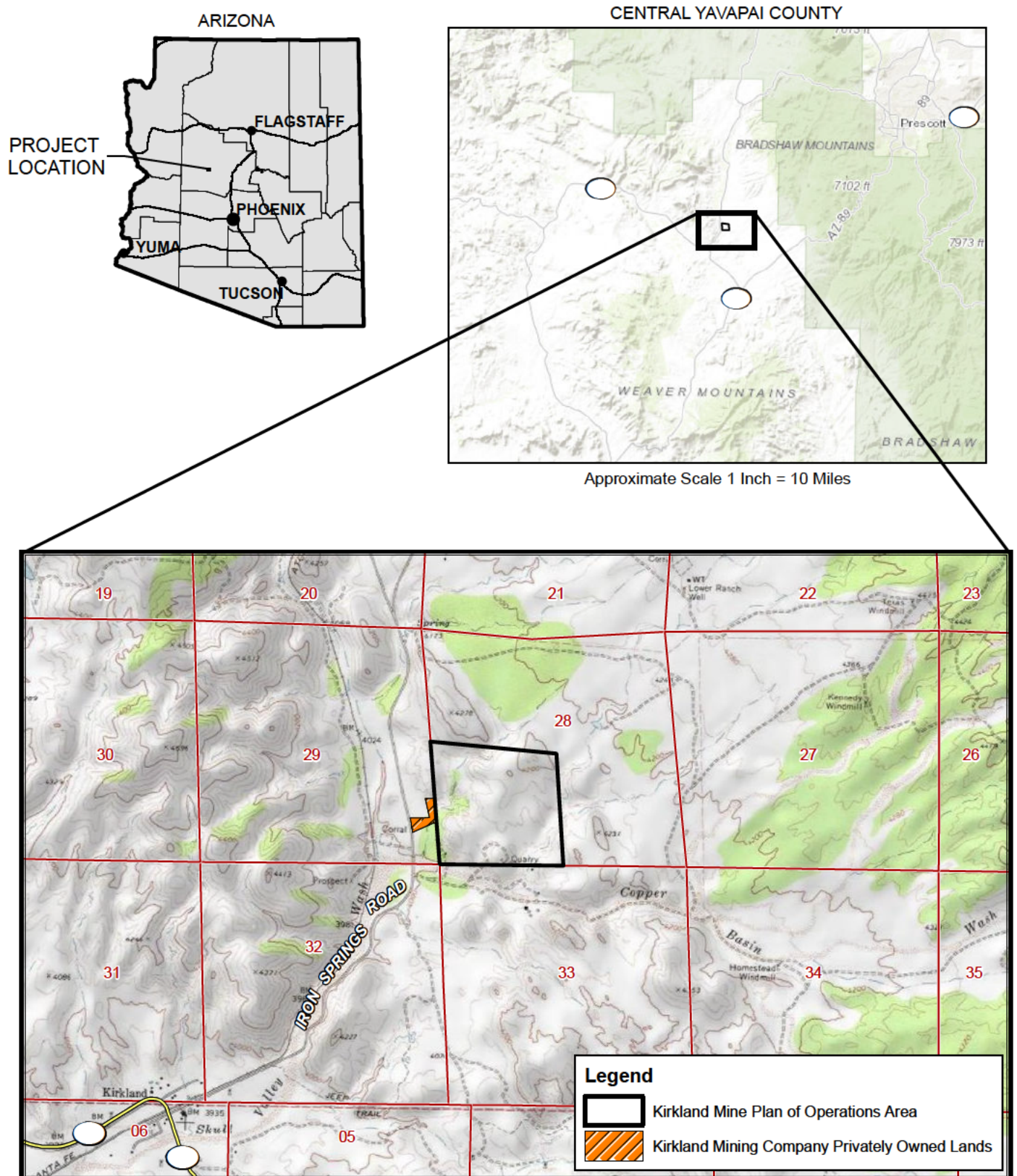


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## FIGURES



T13N, R4W, Portions of Sections 28 & 29  
 Yavapai County, Arizona  
 Kirkland USGS 7.5' Quadrangle  
 Image Source: ArcGIS Online World Topo Map

# KIRKLAND MINING COMPANY Mining and Reclamation Plan of Operations Kirkland HQP Mine

VICINITY MAP

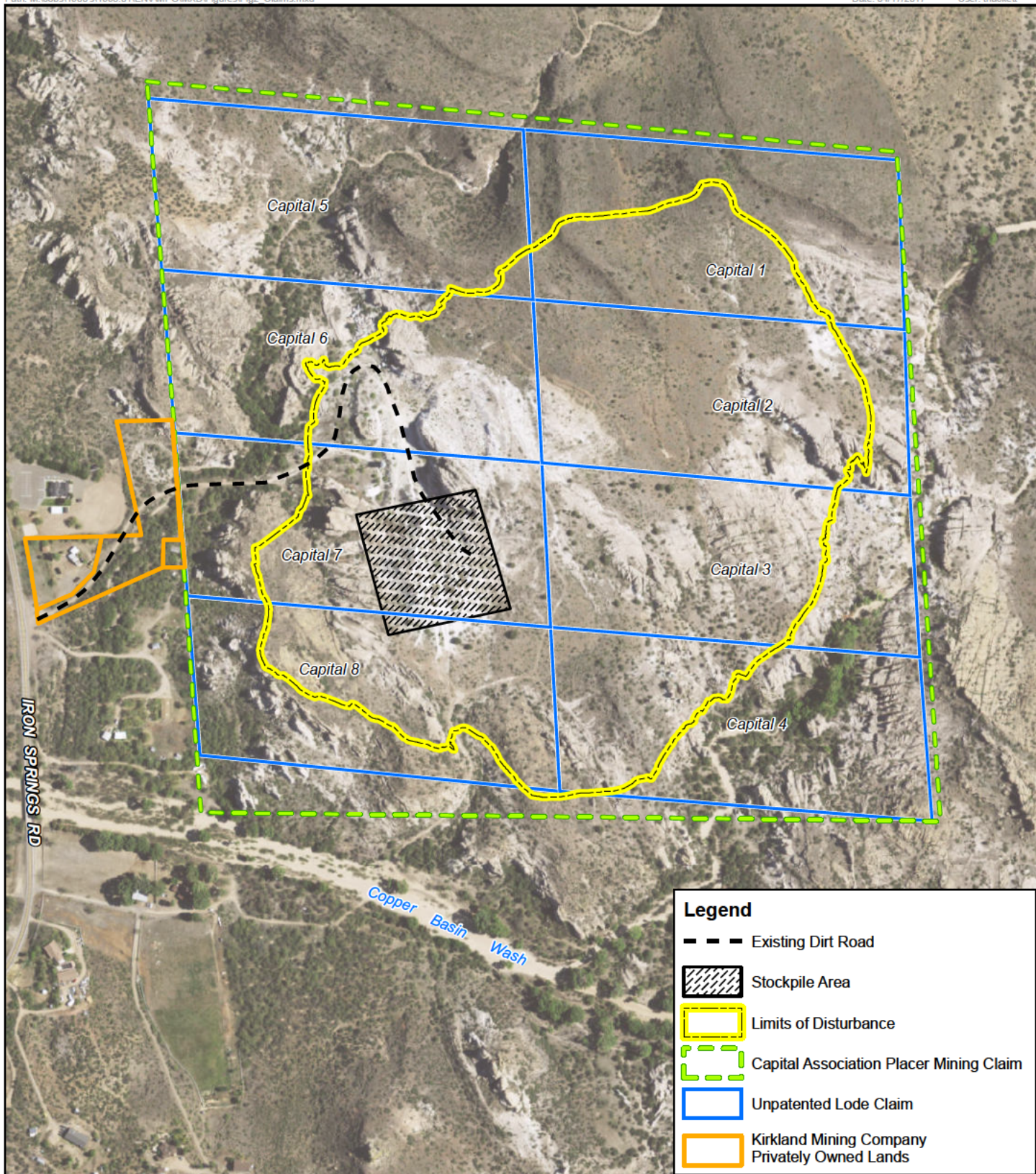
Figure 1



0 1,500 3,000 Feet

0 750 1,500 Meters





T13N, R4W, Portions of Sections 28 & 29  
 Yavapai County, Arizona,  
 Data Source: Kirkland Mining Company and BLM.  
 Image Source: NAIP, 2015

# KIRKLAND MINING COMPANY Mining and Reclamation Plan of Operations Kirkland HQP Mine

CLAIMS COVERED BY THIS PLAN  
 Figure 2

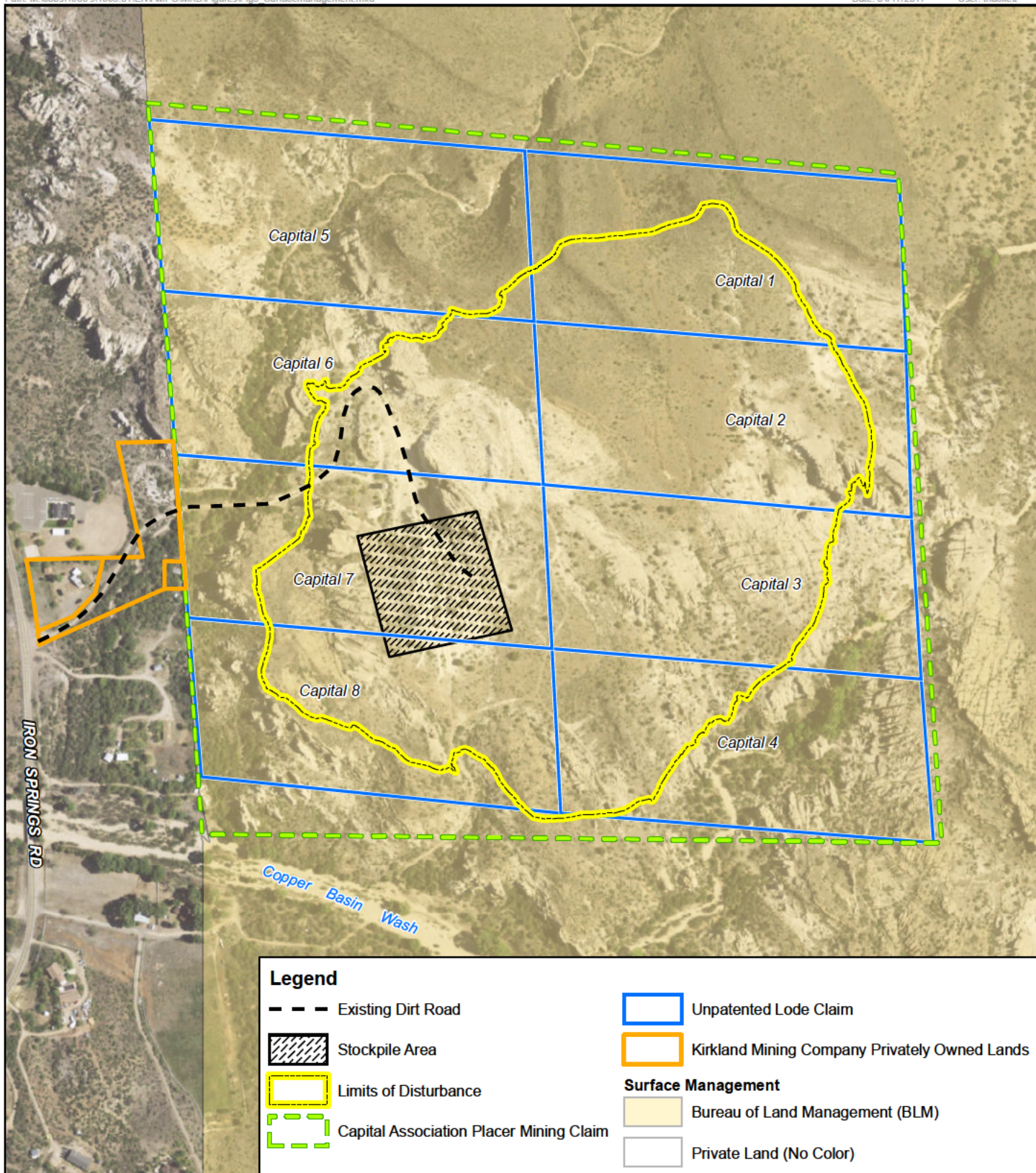
WestLand Resources



0 250 500  
 Feet

0 125 250  
 Meters



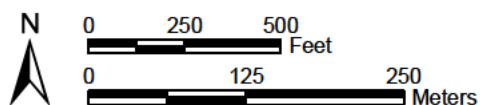


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 Yavapai County, Arizona,  
 Data Source: Kirkland Mining Company and BLM 201 (WRI Modified).  
 Image Source: NAIP, 2015

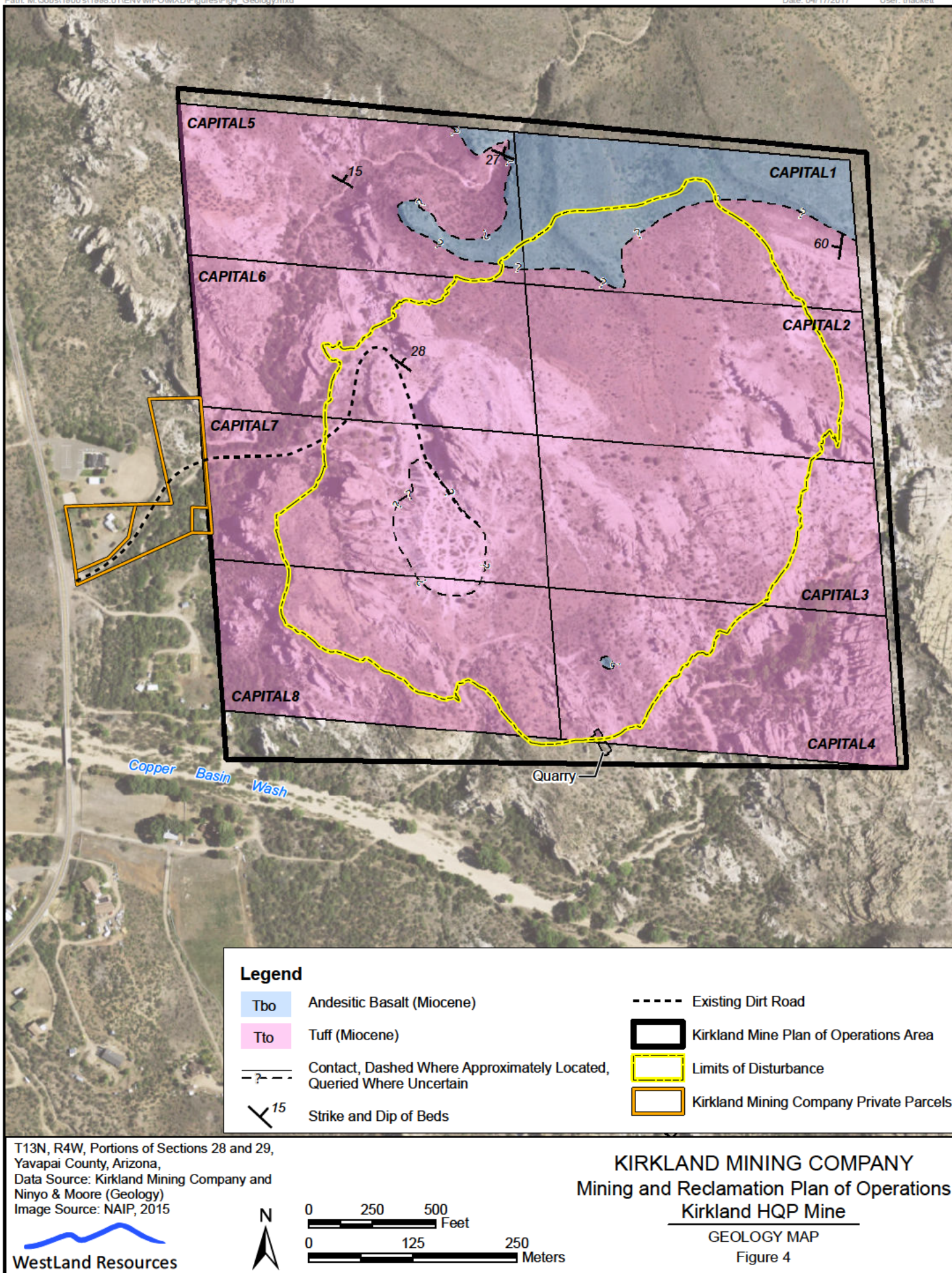
# KIRKLAND MINING COMPANY Mining and Reclamation Plan of Operations Kirkland HQP Mine

SURFACE MANAGEMENT

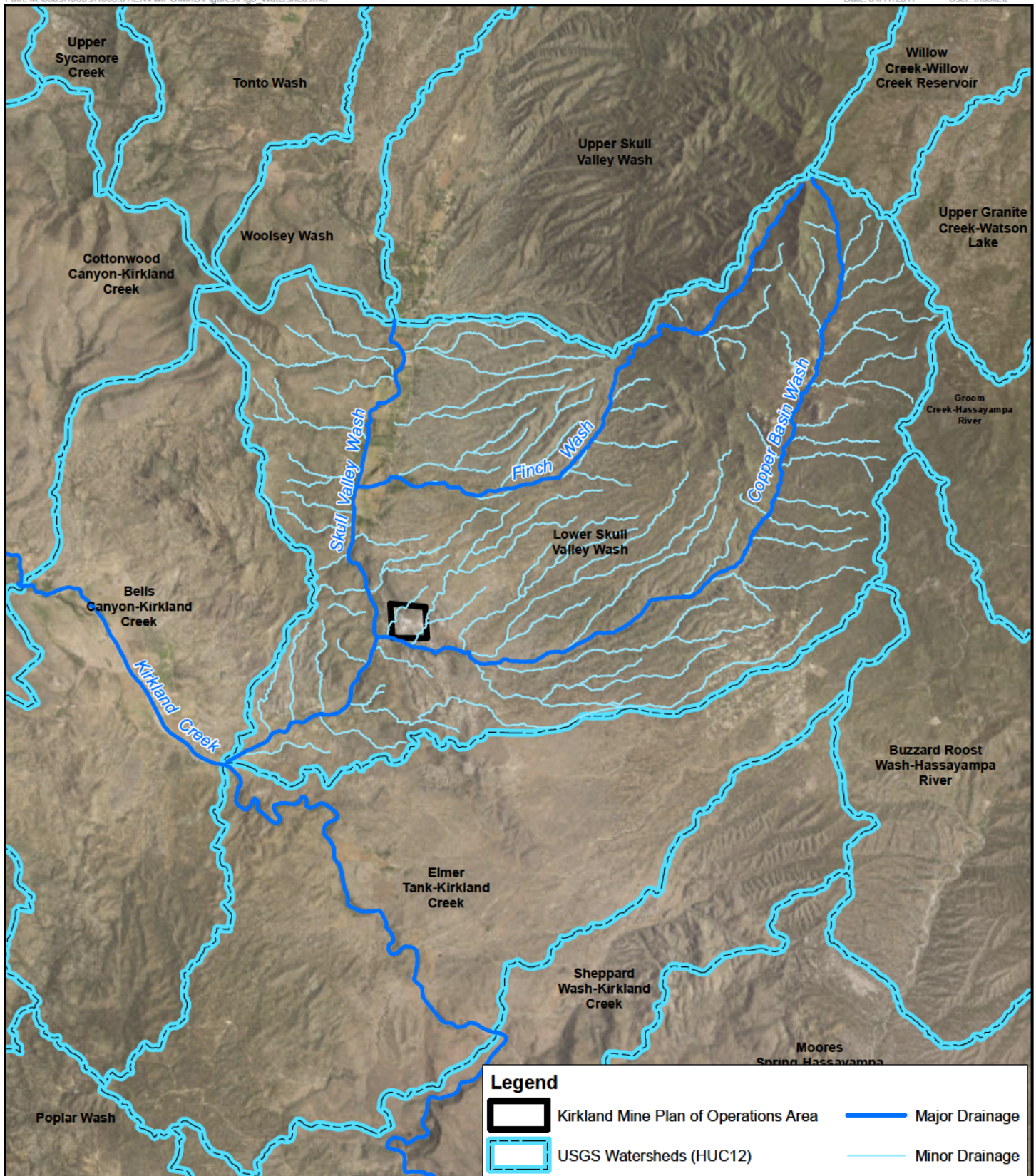
Figure 3











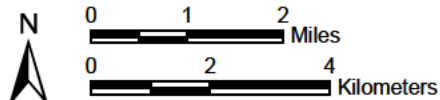
T13N, R4W, Portion of Section 28  
 Yavapai County, Arizona,  
 Data Source: Kirkland Mining Company & USGS  
 Image Source: NAIP, 2015

# KIRKLAND MINING COMPANY Mining and Reclamation Plan of Operations Kirkland HQP Mine

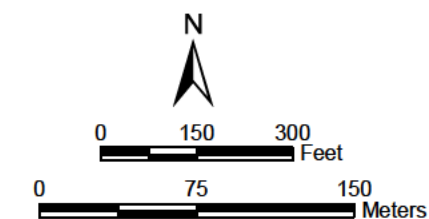
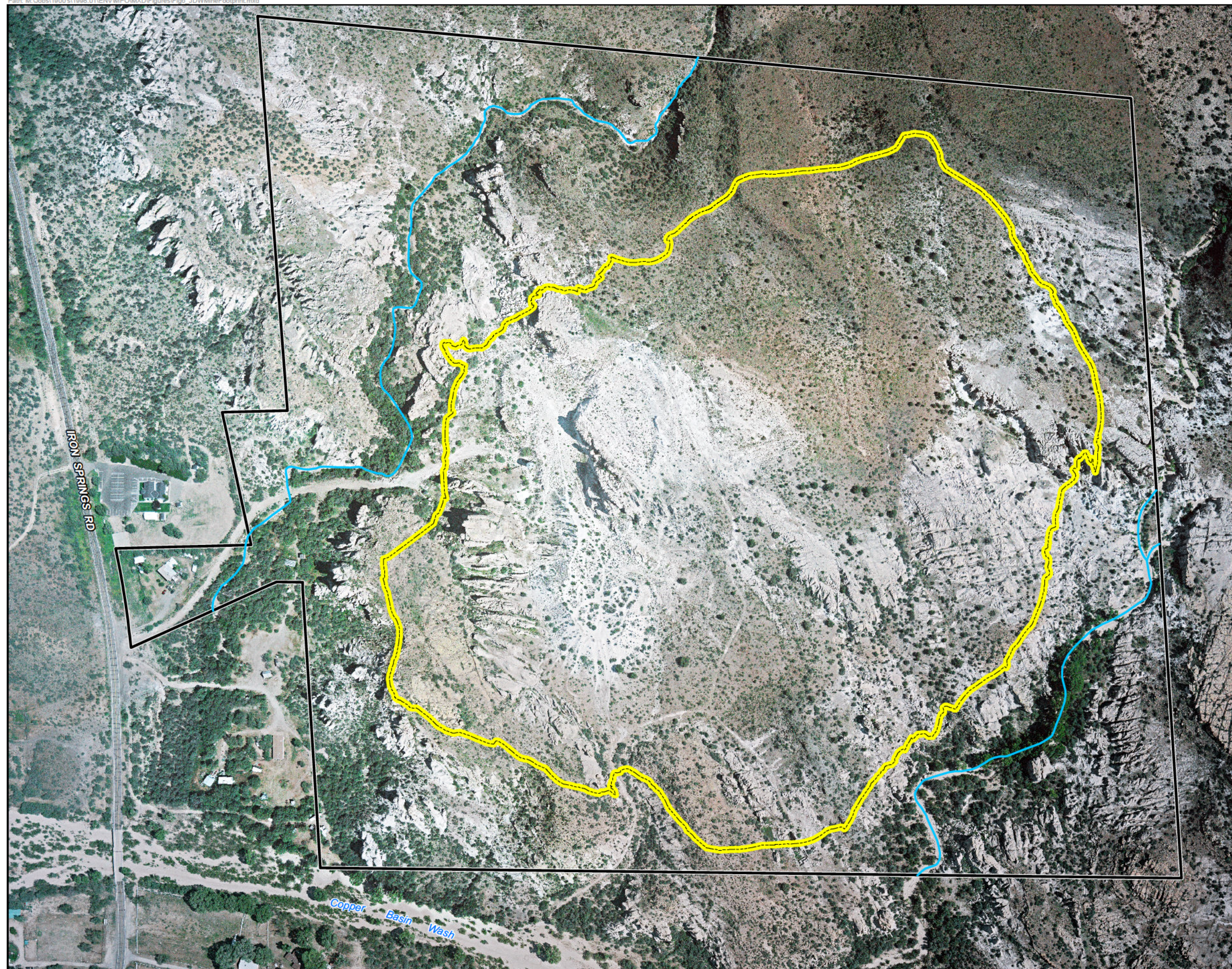
WATERSHED MAP

Figure 5

  
 WestLand Resources







T13N, R4W, Portions of Sections 28 and 29,  
Yavapai County, Arizona,  
Data Source: Kirkland Mining Company, AeroTech  
Mapping-2 Foot Contour Map-2013.  
Image Source: AeroTech Mapping, Flight Date  
August 16, 2013

# Legend

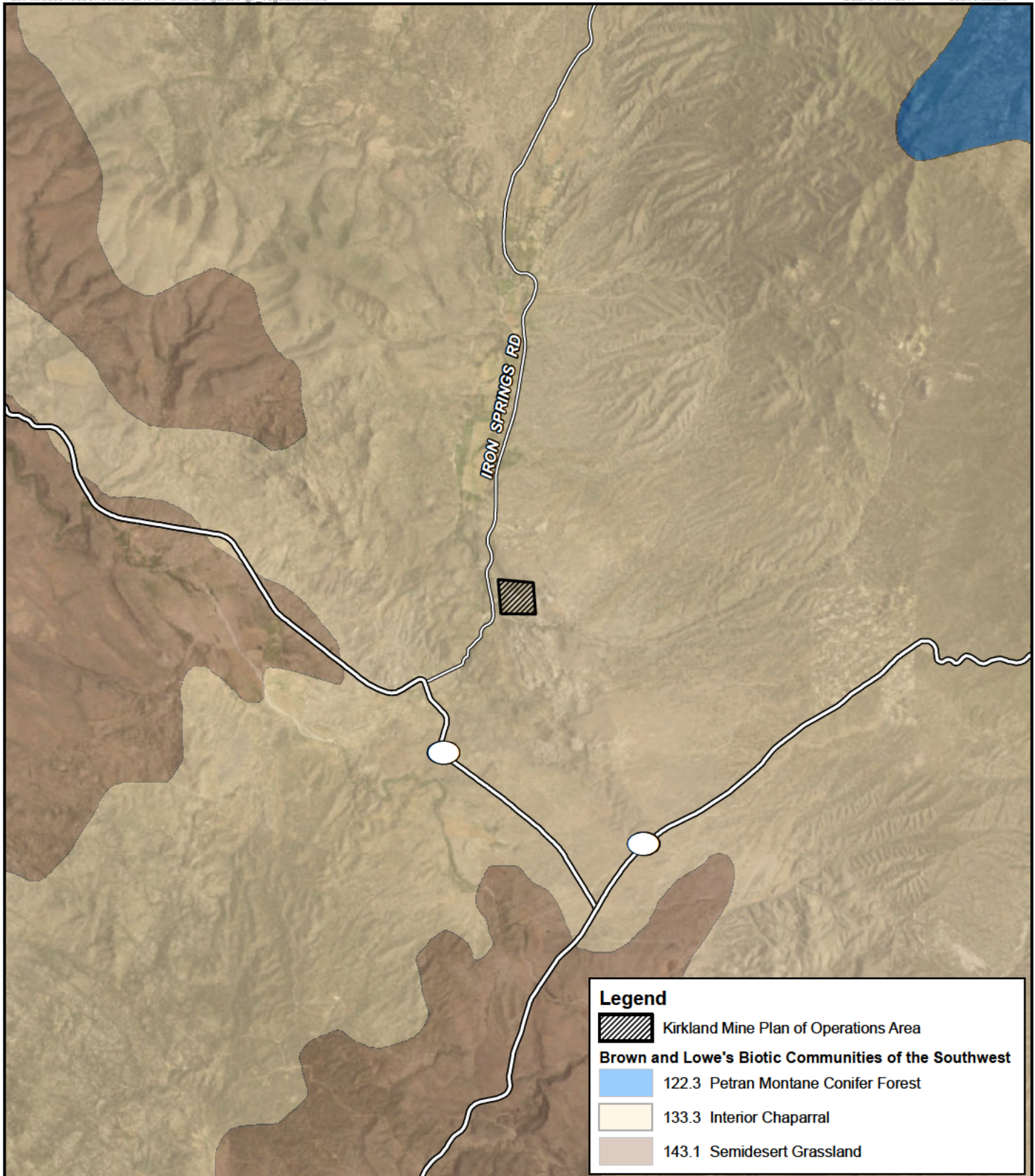
- Kirkland Mine Plan of Operations Area  
with Kirkland Mining Company Privately  
Owned Land
- Limits of Disturbance
- Centerline of Potential  
Waters of the U.S.



KIRKLAND MINING COMPANY  
Mining and Reclamation Plan of Operations  
Kirkland HQP Mine

POTENTIAL WATERS OF THE U.S.  
Figure 6





T13N, R4W, Portions of Sections 28 & 29  
 Yavapai County, Arizona,  
 Data Source: "Brown and Lowe's Biotic Communities  
 of the Southwest" map from 1981. (<http://azconservation.org>),  
 Kirkland Mining Company.  
 Image Source: NAIP, 2015

# KIRKLAND MINING COMPANY Mining and Reclamation Plan of Operations Kirkland HQP Mine

VEGETATION MAP  
 (BIOTIC COMMUNITIES)

Figure 7

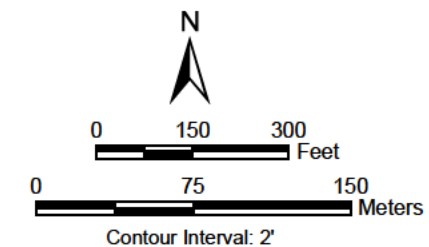
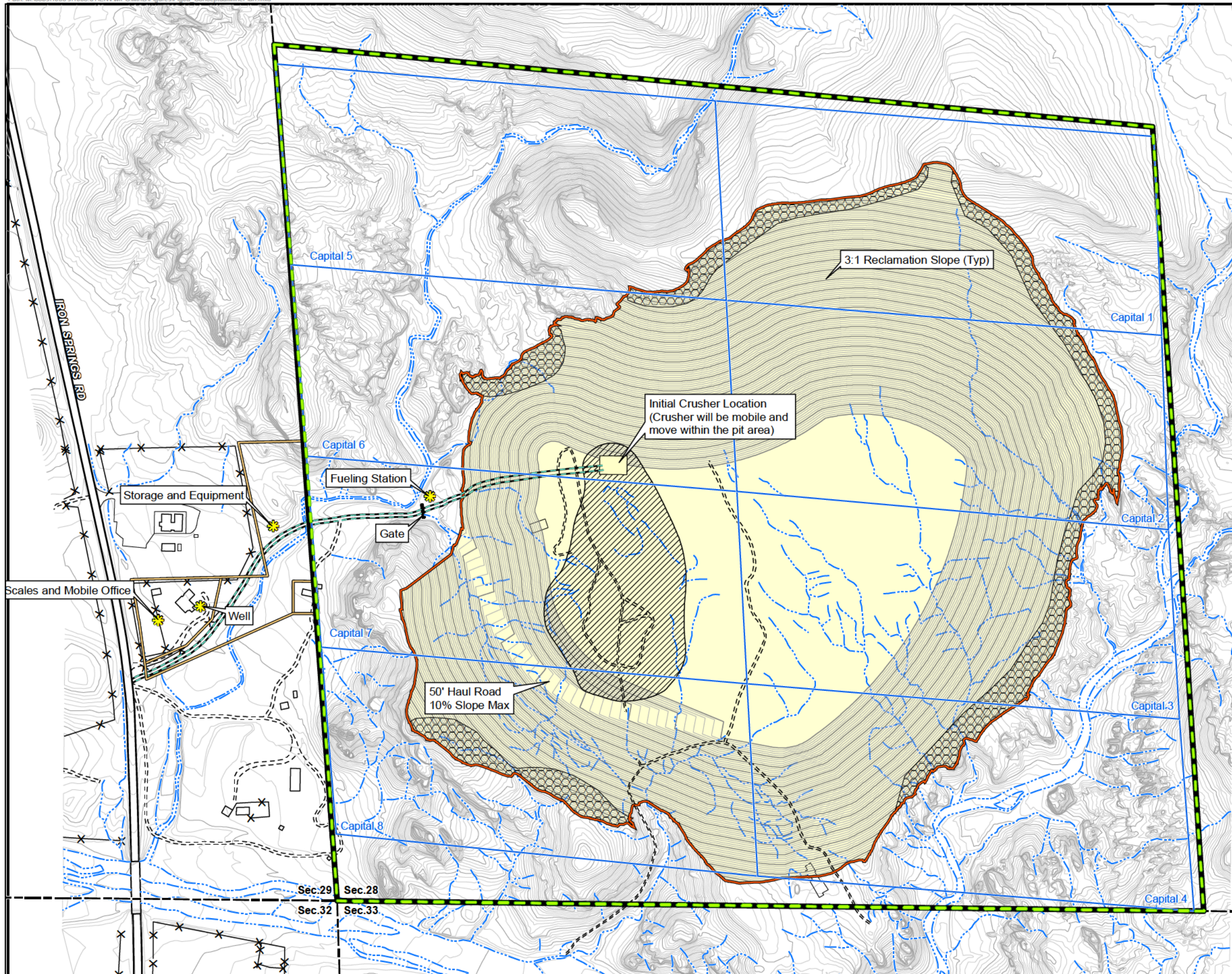
WestLand Resources



0 1 2 Miles  
 0 2 4 Kilometers

(b) (3) (B)





T13N, R4W, Portions of Sections 28 & 29,  
Yavapai County, Arizona,  
Data Source: Kirkland Mining Company, Burch, and BLM.

### Legend

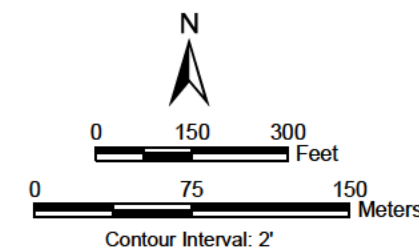
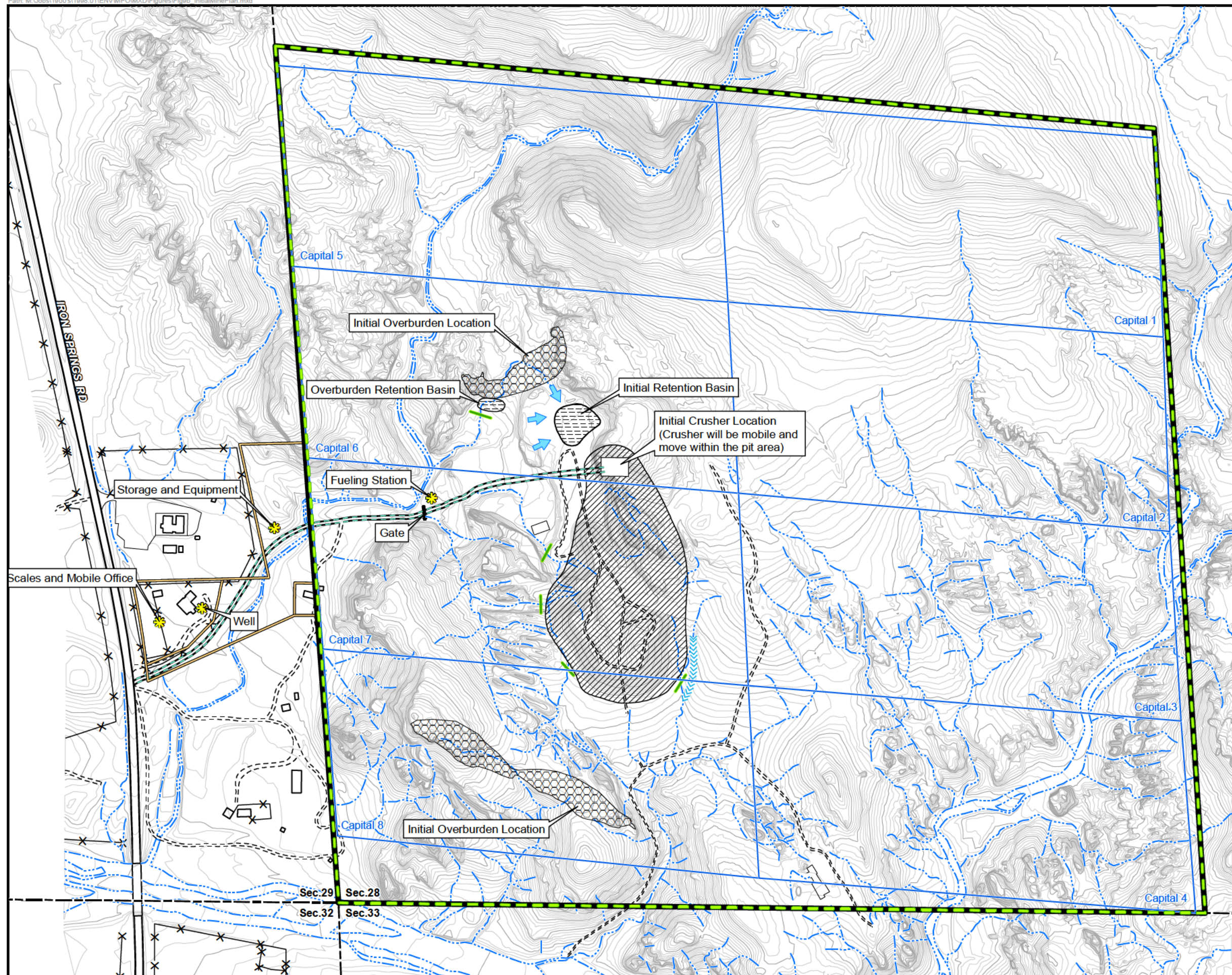
- Kirkland Mine Plan of Operations Area
- Capital Association Placer Mining Claim
- Unpatented Lode Claim
- Kirkland Mining Company Private Parcels
- Limits of Disturbance
- Overburden Stockpile Area
- Initial Impact Area
- Wash (Minimum Setback 50')
- Fence
- Entrance Road
- Dirt Road

WestLand Resources

KIRKLAND MINING COMPANY  
Mining and Reclamation Plan of Operations  
Kirkland HQP Mine

CONCEPTUAL MINE PLAN  
Figure 9a





T13N, R4W, Portions of Sections 28 & 29,  
Yavapai County, Arizona,  
Data Source: Kirkland Mining Company, Burch, and BLM.

### Legend

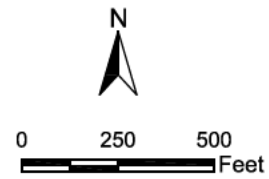
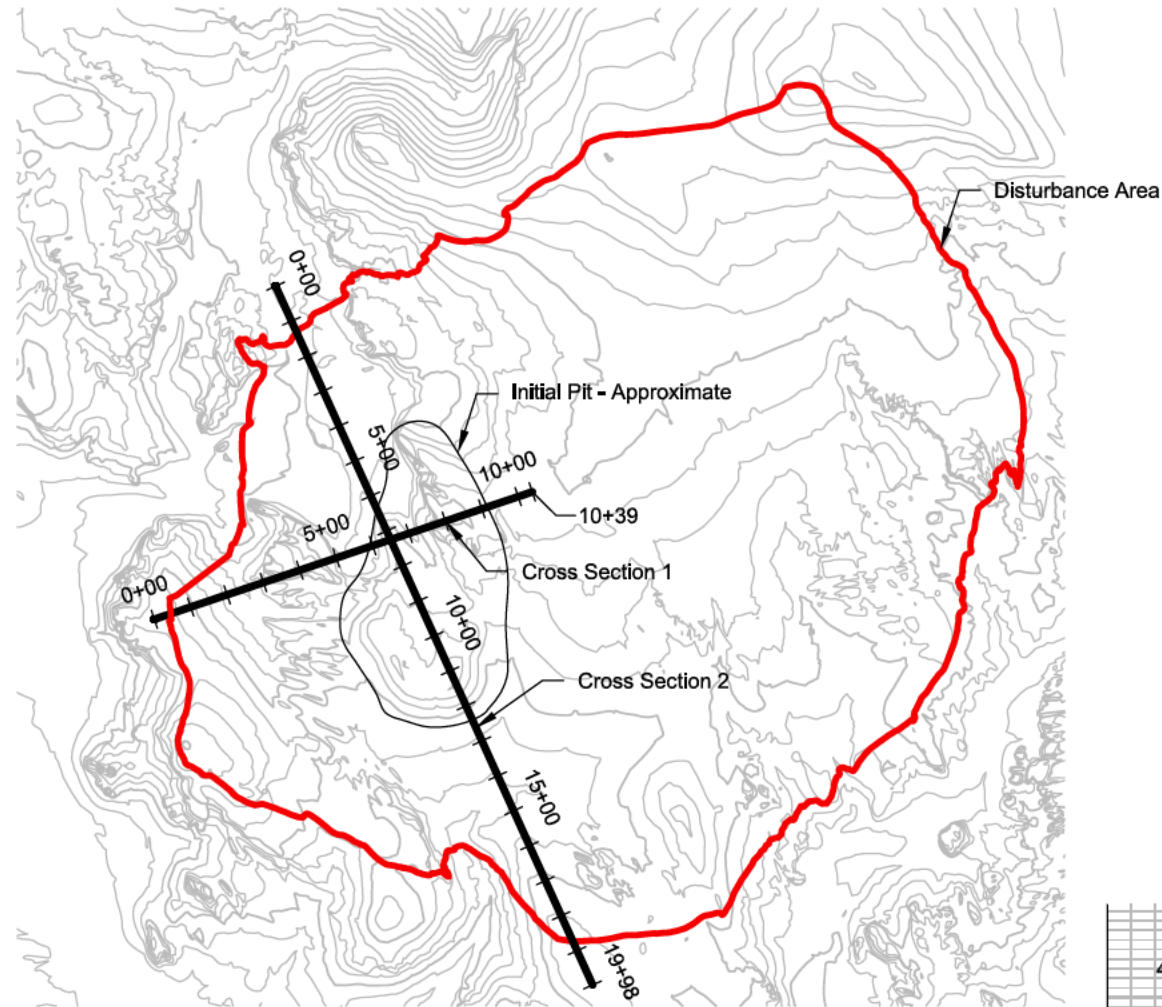
- Kirkland Mine Plan of Operations Area
- Capital Association Placer Mining Claim
- Unpatented Lode Claim
- Kirkland Mining Company Private Parcels
- Overburden Stockpile Area
- Initial Impact Area
- Retention Basin
- Berm
- Diversion Channel
- Wash (Minimum Setback 50')
- Fence
- Entrance Road
- Dirt Road

WestLand Resources

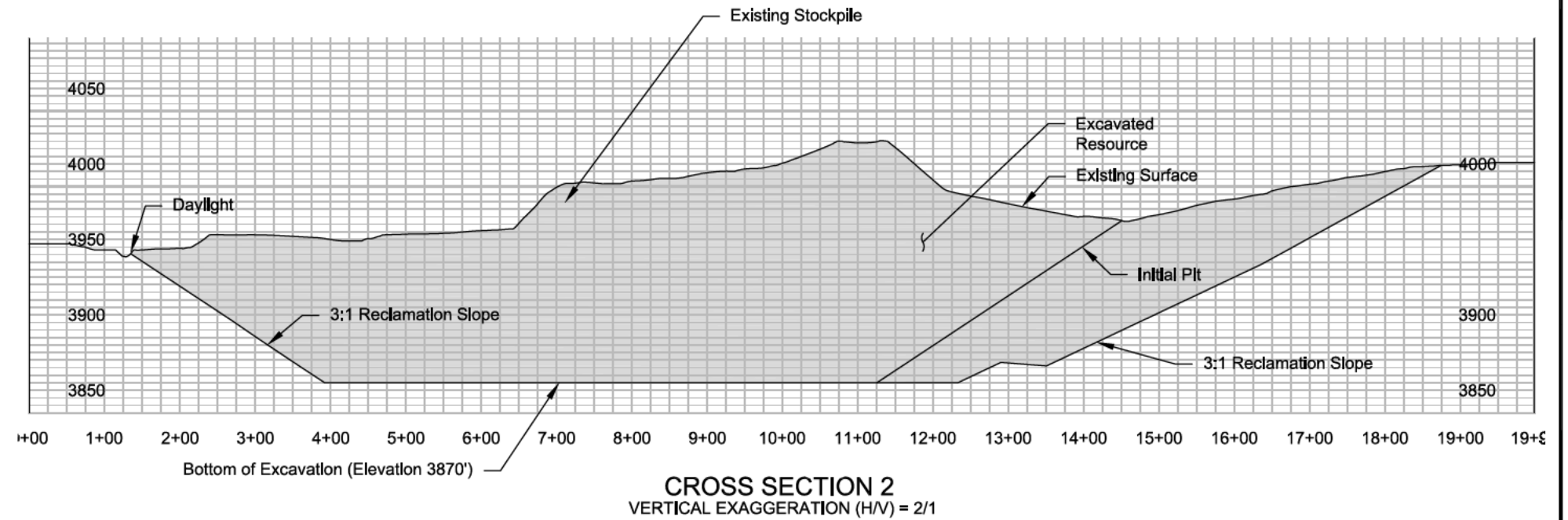
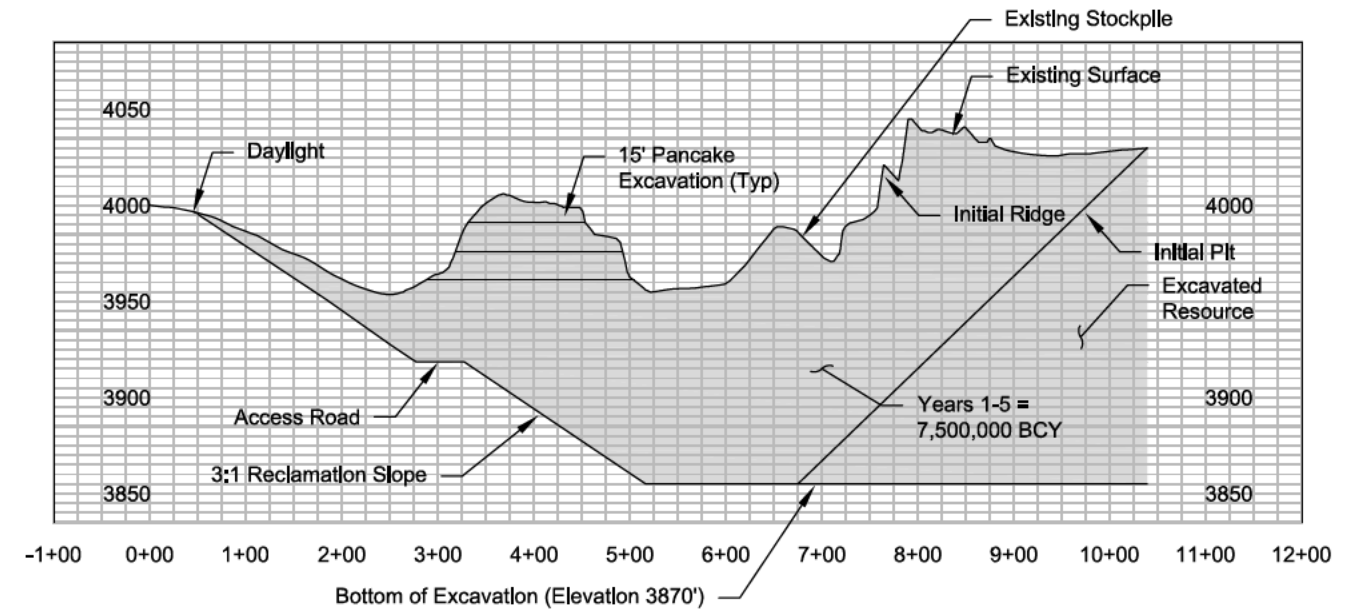
KIRKLAND MINING COMPANY  
Mining and Reclamation Plan of Operations  
Kirkland HQ Mine

INITIAL MINE OPERATIONS  
Figure 9b

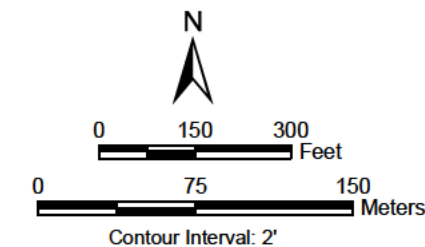
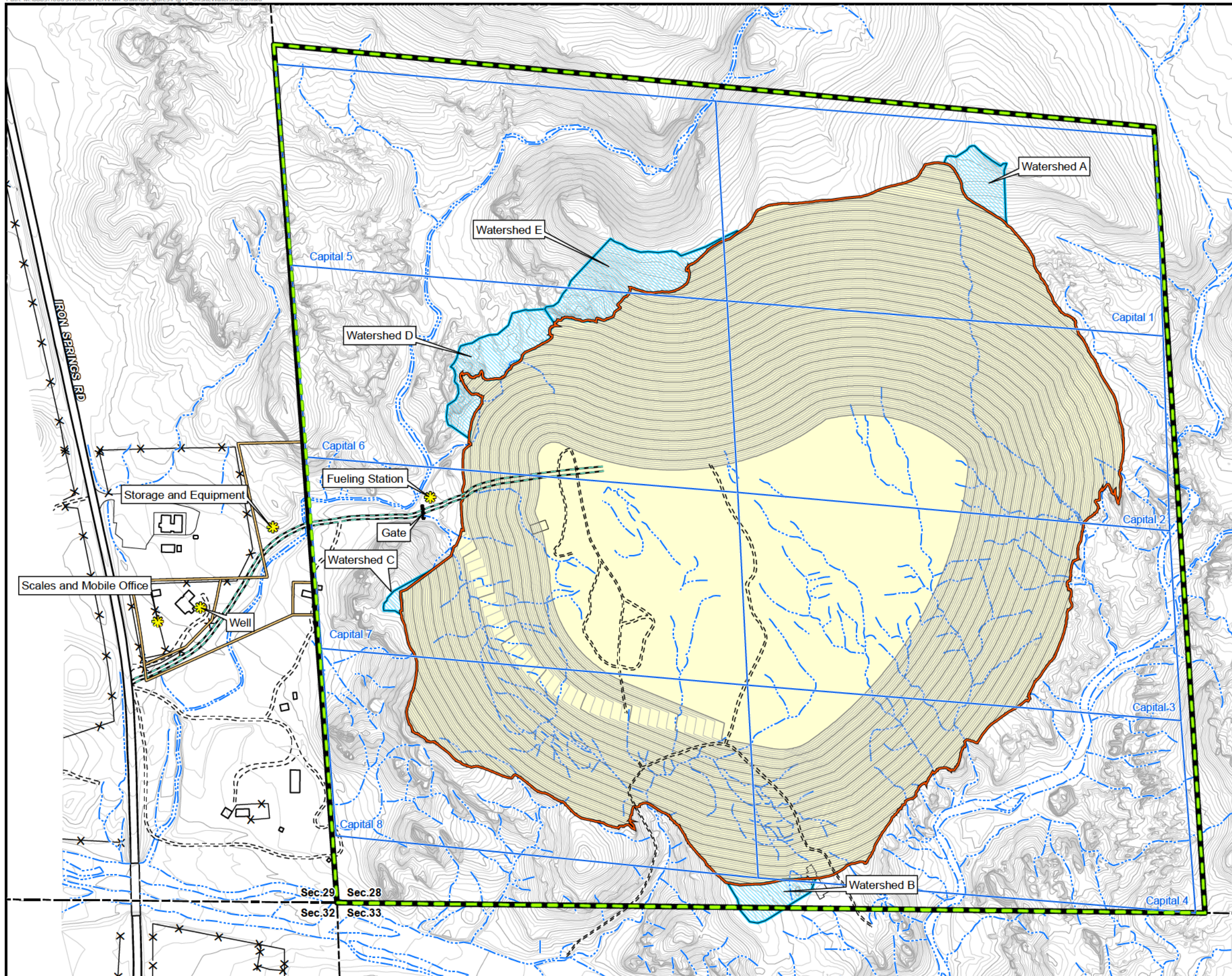




BCY = BANK (IN PLACE) CUBIC YARDS







T13N, R4W, Portions of Sections 28 & 29,  
Yavapai County, Arizona,  
Data Source: Kirkland Mining Company, Burch, and BLM.

### Legend

- Kirkland Mine Plan of Operations Area
- Capital Association Placer Mining Claim
- Unpatented Lode Claims
- Kirkland Mining Company Private Parcels
- Limits of Disturbance
- Offsite Watershed
- Wash (Minimum Setback 50')
- Fence
- Entrance Road
- Dirt Road



## KIRKLAND MINING COMPANY Mining and Reclamation Plan of Operations Kirkland HQP Mine

OFFSITE WATERSHEDS REQUIRING  
STORMWATER CONTROLS AT FULL BUILD OUT  
Figure 11