MEMORANDUM

TO: CALIFORNIA DEPARTMENT OF PARKS AND RECREATION

FROM: ELLEN BERRYMAN, BERRYMAN ECOLOGICAL

SUBJECT: EMPIRE MINE VEGETATION AND HABITAT

DATE: 8/20/2009

This memorandum describes the methodology and results of a vegetation community and habitat type evaluation of the Empire State Mine State Park (Park) in Nevada County, California (Figure 1). This memorandum collates information from precious vegetation and habitat evaluations at the Park, and fills in data gaps. The purpose of this memorandum is to provide information necessary for assessing potential impacts to sensitive vegetation communities and habitat for special status species that could result from activities identified in the Empire Mine Site Characterization Draft Program Environmental Impact Report (Empire Mine Draft PEIR).

I. Background

Prior to preparation of this memorandum, URS Associates (URS 2004) and Vestra Resources, Inc. (Vestra 2009) had mapped vegetation at the Park. URS mapped a majority of the Park, while Vestra only mapped the central portion of the Park (Figure 2). A small proportion of the Park had not been mapped by either Vestra or URS prior to preparation of this memorandum.

The central portion of the Park that was mapped by Vestra, referred to herein as the "core area," is the area where specific proposed remediation activities may be identified in the future outside the core area, and such activities will be addressed at a programmatic level under the Empire Mine Draft PEIR.

Vestra and URS did not use the same nomenclature for their mapping, and neither Vestra nor URS applied to nomenclature that CDFG currently uses to identify sensitive natural vegetation communities in California. Furthermore, neither Vestra nor URS differentiated between vegetation communities and habitat types.

Subsequent to URS and Vestra mapping efforts, DPR requested that the entire Park be mapped, and that vegetation communities be identified independent of habitat types. DPR also requested that CDFG's current vegetation nomenclature be used. In response, Berryman Ecological has prepared this vegetation and habitat evaluation for the Park.

II. Methods

URS mapped vegetation types and aquatic features at the Park in June, 2004 (URS 2004). The boundaries of their study area are shown on Figure 2. URS used the Holland (1986) classification system for vegetated areas, and also mapped aquatic habitats (perennial streams and perennial ponds).

Vestra conducted vegetation and habitat mapping at the Park in 2008 (Vestra 2009a). The boundaries of their study area are shown on Figure 2. Vestra based their vegetation mapping on a California Wildlife Habitat Relationship (CWHR) map, which is statewide (Vestra 2009b). Vestra then ground-truthed the CWHR mapping and added several vegetation and/or habitat types that were not included on the CWHR maps, such as riparian and small wetland patches (Vestra 2009a, Vestra 2009b). Vestra revised the CWHR habitat types to vegetation series based on the 1995 vegetation manual (Sawyer and Keeler-Wolf 1995). Vestra also identified aquatic habitat types and identified several upland habitat features that do not fall into a vegetation classification system (barren/mine tailings, developed, mine shafts, and unoccupied nests) (Vestra 2009a).

In January, 2009, DPR requested that the Empire Mine DEIR use the vegetation community nomenclature provided in CDFG's *List of California Terrestrial Natural Communities Recognized by the California Natural Diversity Data Base* (CDFG 2003). CDFG's list of vegetation communities incorporates the National Vegetation Classification System, which is expressed in this state by the *Manual of California Vegetation* (Sawyer and Keeler-Wolf 1995). However, CDFG's 2003 list is not identical to the 1995 (first) edition of Sawyer and Keeler-Wolf's manual: it has been adapted from the 1995 manual to serve as an interim reference until the second edition of the manual is published.

Additions and modifications to the 1995 classification system have been ongoing for over 20 years, and the second edition of Sawyer and Keeler-Wolf's manual is expected to be published in early 2009 (CDFG 2003). The interim list that CDFG (2003) has posted on its website does not include new vegetation alliances or associations that CDFG expects to see in the updated manual, but it does include vegetation types from *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986), and integrates the Holland (1986)

classification system in a manner that did not occur in the 1995 manual (CDFG 2003).

The CDFG interim list incorporates the Holland (1986) numerical coding system, but the coding system in the 2003 interim list provides a greater level of detail than the system provided in Holland (1986). The 2003 interim list identifies special communities that are either known or believed to be of high priority for inventory in the California Natural Diversity Data Base.

For the purpose of providing a complete characterization of the Park using standard nomenclature for vegetation and habitat types, Berryman Ecological prepared a vegetation crosswalk. Berryman Ecological then combined the Vestra and URS maps using Vestra GIS data and digitizing URS 2004 maps. Berryman Ecological assigned vegetation classifications to each type using the cross-walk, and based on the CDFG 2003 list of vegetation types. Where possible, Berryman Ecological identified vegetation types to the association level. However, in some cases there was only a sufficient level of detail available for Berryman Ecological to identify vegetation classes to the alliance level.

Because Vestra's mapping is the most recent and conducted at a more detailed level than the URS mapping, Vestra's vegetation and habitat boundaries were used where Vestra and URS mapping overlapped. With the combined Vestra dn URS maps, a data gap remained in the northernmost portion of the Park: Berryman Ecological conducted vegetation mapping in this area through use of aerial photograph interpretation and visual ground truthing, with use of a Global Positioning System (Tremble GeoExplorer) to confirm locations.

III. Vegetation Mapping Results

Figure 2 is a vegetation map Berryman Ecological prepared for the Park using the methodology described above. Table 1 is a crosswalk comparing the vegetation nomenclature used by Berryman Ecological, Vestra, and URS. Included below is a description of each vegetation community identified at the Park. The numbers provided in these descriptions, in association with the vegetation communities, are in reference to the numerical coding system for vegetation communities adopted by CDFG (2003).

TABLE 1 VEGETATION CROSSWALK		
URS MAP	**VESTRA 2009 VEGETATION MAP**	**BERRYMAN ECOLOGICAL (THIS MEMORANDUM)**
WESTERN PONDEROSA PINE FOREST, EARLY SUCCESSIONAL WESTERN PONDEROSA PINE FOREST	PONDEROSA PINE SERIES/MIXED CONIFER SERIES	PONDEROSA PINE FORESTS AND WOODLANDS ALLIANCE (WESTSIDE PONDEROSA PINE ASSOCIATION)
N/A	BLACK OAK SERIES	BLACK OAK FORESTS AND WOODLANDS ALLIANCE (BLACK OAK ASSOCIATION
MONTANE RIPARIAN SCRUB	ARROYO WILLOW/WHITE ALDER SERIES	WHITELEAF MANZANITA ASSOCIATION
	ARROYO WILLOW (EMERGENT WETLAND)	ARROYO WILLOW RIPARIAN FORESTS AND WOODLANDS ALLIANCE
N/A	N/A	CALIFORNIA ANNUAL GRASSLAND ALLIANCE
N/A	CALIFORNIA ANNUAL GRASS SERIES	OTHER: NATIVE RE-VEGETATION AREA
DISTURBED	BARREN	OTHER: DISTURBED
POND	N/A	OTHER: AQUATIC
N/A	DEVELOPED	OTHER: BUILDINGS AND LANDSCAPING

Westside Ponderosa Pine Association (87.010.33): URS identified this vegetation type at the Park as Western Ponderosa Pine Forest, and Vestra identified it as Ponderosa Pine/Mixed Conifer Series. URS (2004) describes this vegetation community at the Park as consisting of an open, park-like forest dominated by ponderosa pine (*Pinus ponderosa*). URS describes the understory as consisting of large patches of whiteleaf manzanita (*Arctostaphylos viscid*) and saplings of ponderosa pine, Douglas fir (*Pseudotsuga menziesii*), black oak (*Quercus kelloggii*), and incense cedar (*Calocedrus decurrens*). URS describes the herbaceous layer as being dominated by Sierran mountain misery (*Chamaebatia foliosa*) and sky lupine (*upinus nanus*). The vegetation community description in Vestra's Biological Characterization report describes Ponderosa Pine/Mixed Conifer Series together with Black Oak Series, but maps these two vegetation communities separately. URS includes patches of black oadk within polygons mapped as Western Ponderosa Pine Forest, and does not map black oak dominated patches separately. Berryman Ecological mapped vegetation outside the core area at a similar scale as URS, and therefore included black-oak dominated patches in the areas mapped as Westside Ponderosa Pine Association.

The CDFG List of California Terrestrial Vegetation Communities (CDFG 2003) lists Westside Ponderosa Pine Association as a sub-category under Ponderosa Pine Forests and Woodlands Alliance, and indicates that this community corresponds to Holland vegetation type #84210 (Westside Ponderosa Pine Forest). The 2003 CDFG list designates Westside Ponderosa Pine Association as a vegetation community of high inventory priority.

Black Oak Forest Association (71.010.19): Vestra identified this vegetation community as Black Oak Series. URS did not separately map vegetation patches dominated by black oak, but included this vegetation within Western Ponderosa Pine Forest.

The Black Oak Forest Association is characterized by black oak as the only dominant tree species. Although Vestra (2009) mapped this vegetation type at the Park, they did not describe it apart from their vegetation description that also included Ponderosa Pine Series and Mixed Conifer Series. Vestra mapped this vegetation community only in the "Sand Dam" area (Figure 3), but Black Oak Forest Association may also be present outside the core area identified by Vestra, and not differentiated from Westside Ponderosa Pine Forest by URS. Because patches of black oak are common in Westside Ponderosa Pine Association and the Black Oak Forest Association is not a special status vegetation community, patches of black oak throughout the Park do not need to be mapped separately for the purpose of the Empire Mine CEQA analysis.

The CDFG List of California Terrestrial Vegetation Communities (CDFG 2003) lists Black Oak Forest Association as a sub-category under Black Oak Forest and Woodland Alliance, and indicates that this type corresponds to Holland Type #71120 (Black Oak Woodland). This vegetation community is not designated by CDFG as a natural community of high inventory priority.

Whiteleaf Manzanita Association (37.305.00): Vestra identified this vegetation type as Whiteleaf Manzanita Series and URS identified it as Montane Manzanita Chaparral. Whiteleaf Manzanita is the dominant species in the chaparral areas throughout the Park. Associated species include toyon (*Heteromeles arbutifolia*) and occasionally Indian Manzanita (*Arctostaphylos mewukka* var. *mewukka*). DPR also documented True's Manzanita (*Arctostaphylos mewukka* var. *mewukka*: a CNPS List 4 species) within this association in the Osborne Hill area of the Park.

The CDFG List of California Terrestrial Vegetation Communities (CDFG 2003) lists Black Oak Forest Association as a sub-category under Whiteleaf Manzanita Chaparral Alliance, and does not indicate any corresponding vegetation type under Holland (1996). CDFG does not identify Whiteleaf Manzanita Association as a natural vegetation community of high inventory priority.

California Annual Grassland Alliance: This vegetation community is present in the northernmost portion of the Park, just south of Bennett Street on either side of Wolf Creek. Annual grasses and forbs dominate the grasslands, but perennial grass species are also scattered through this grassland area. The mapping effort for this grassland area was conducted in February, 2009, outside the blooming period for grasses, and Berryman Ecological was unable to identify most of the grasses at that time. However a Department of Parks and Recreation (DPR) biologist indicated that nonnative annuals such as soft chess (*Bromus hordaceous*), annual bluegrass (*Poa annua*), and Mediterranean barley (*Hordeum marinum* spp. *Gussoneanum*) are common in the grasslands. The perennial bunchgrasses scattered through the grassland include non-natives such as orchardgrass (*Dactylis glomerata*) and tall fescue (*Festuca arundinacea*) as well as native perennials such as slender wheatgrass (*Elymus trachycaulus* ssp. *trachycaulus*), Idaho fescue (*Festuca idahoensis*), and red fescue (*Festucarubra*) (pers. comm., Laurie Archanbault, DPR March 2009).

The annual grasslands include a series of narrow irrigation ditches that appear to have been used in the past for irrigating pastureland. There are also small scattered patches in the annual grassland that are dominated by a low-growing rush (*Juncus* sp.) and may constitute wetlands, but were not mapped separately because the scale of the mapping effort did not allow for this. Non-native annual grasslands are extensively naturalized in the valleys and foothills of California (Sawyer and Keeler-Wolf 1995), and CDFG (2003) does not identify California Annual Grassland Alliance as a vegetation community of high inventory priority. Vestra (2009) identified a patch of California Annual Grassland Series in the "Red Dirt Pile" area of the Park. However, DPR indicated that this area is actually the location of an ongoing native revegetation project. Berryman Ecological mapped California Annual Grassland Alliance on either side of Wolf Creek in the northernmost portion of the Park. Since this is not a natural occurring vegetation community, Berryman Ecological did not map this under any particular vegetation community but shows it on the vegetation map as "Other, Native Re-vegetation Area."

IV. Habitat Mapping Results

Figure 3 is a habitat map Berryman Ecological prepared for the Park using the methodology described under Section II, above. Table 2 is a crosswalk comparing the vegetation/habitat nomenclature used by Berryman Ecological (based on CWHR nomenclature), Vestra, and URS. Included below is a description of each habitat type identified at the Park.

TABLE 2: HABITAT CROSSWALK		
URS Map	**Vestra 2009 Vegetation and Hydrologic/Aquatic Feature Maps**	**Berryman Ecological**
Western Ponderosa Pine Forest, Early Successional Western Ponderosa Pine Forest	Ponderosa Pine Series/Mixed Conifer Series	Ponderosa Pine/Sierran Mixed Conifer
N/A	Black Oak Series	Montane Hardwood
Montane Manzanita Chaparral	Whiteleaf Manzanita Series	Montane Chaparral
Montane Riparian Scrub	Arroyo Willow/White Alder Series	Montane Riparian
	Arroyo Willow Series (emergent wetland) or Emergent Wetland	Montane Riparian/Freshwater Emergent Wetland
N/A	N/A	Annual Grassland
N/A	California Annual Grass Series	Other: Native Re-vegetation Area
Shown as blue lines on URS maps but not including in legend	Perennial stream	Riverine (perennial)
Pond	Seasonal Pond	Lacustrine (seasonal)
N/A	Developed	Other: Buildings, Landscaping, and Concrete Pools
N/A	Magenta Drain	Other: Manmade Drain
N/A	Subterranean Portion of Magenta Drain	Other: Subterranean Manmade Drain
Disturbed	Barren	Other: Disturbed

Ponderosa Pine/Sierran Mixed Conifer:

Ponderosa Pine and Sierran Mixed Conifer habitat corresponds to the vegetation community at the Park that Vestra (2009) described as Ponderosa Pine

Series/Mixed Conifer Series, and URS (2004) described as Western Ponderosa Pine Forest.

Ponderosa Pine Habitat is found on suitable mountain and foothill sites throughout California except in the San Francisco Bay area, the north coast area, south of Kern County in the Sierra Nevada and east of the Sierra Nevada crest. Ponderosa Pine Habitat sometimes provides important transitional or migratory habitat for deer (Mayer and Laudenslayer 1988). Sierran Mixed Conifer Habitat dominates the western middle elevation slopes of the Sierra Nevada, and occupies between 4.5 and 7.8 million acres in southern Oregon and California (Mayer and Laudenslayer 1988). Black oak acorns, berries from a variety of shrubs, and a great number of grasses and forbs common to this habitat type provide the forage resource essential for wildlife.

Montane Hardwood:

Montane Hardwood Habitat corresponds to the vegetation community that Vestra (2009) described as Black Oak Series. URS did not separately map vegetation patches dominated by black oak, but included this vegetation within Western Ponderosa Pine Forest. Therefore, Montane Hardwood habitat may be present in patches outside the core area, in areas mapped as Ponderosa Pine/Sierran Mixed Conifer.

This habitat type ranges throughout California mostly west of the Cascade-Sierra Nevada crest (Mayer and Laudenslayer 1988). Wildlife species characteristic of Montane Hardwood Habitat include disseminators of acorns (e.g., scrub jay, Stellar's jay (*Cyanocitta stelleri*), acorn woodpecker (*Melanerpes formicivorus*), and those that use acorns as a major food source such as wild turkey, bandtailed pigeon (*Patagioenas fasciata*), California ground squirrel (*Spermophilus beecheyi*), dusky-footed woodrat (*Neotoma fuscipes),* black bear (*Ursus americanus*), and mule deer (*Odocoileus hemionus*). Many reptiles and amphibians are found on the forest floor in Montane Hardwood Habitat, such as relictual slender salamander (*Batrachoseps relictus*), rubber boa (*C. bottae*), western rattlesnake (*C. oreganus*), and California mountain kingsnake (*Lampropeltis zonata*).

Montane Chaparral:

Chaparral habitat is composed of shrubby plants adapted to dry summers and moist winters. The chaparral habitat at the Park is categorized under the CWHR habitat classification system as Montane Chaparral, and corresponds with the vegetation community Vestra (2009) described as Whiteleaf Manzanita Series.

Montane Chaparral is associated with mountainous terrain from mid to high elevations (3,000-10,000 ft. amsl: Mayer and Laudenslayer 1988). Montane Chaparral is often indicative of disturbed areas, and over time will often succeed into Ponderosa Pine and Sierran Mixed Conifer Habitat types (CDFG 2008b). Deer and other herbivores often make extensive use of chaparral habitat. Montane Chaparral provides summer range foraging areas, escape cover and fawning habitat for deer. Shrubs are important to many mammals as shade during hot weather, and moderate temperature and wind velocity in the winter. Montane Chaparral provides seeds, fruits, insects, protection from predators and climate, and singing, roosting and nesting sites for many bird species (Mayer and Laudenslayer 1988).

Montane Riparian:

Riparian habitat is typically found in the general vicinity of water bodies, occurring on or near the banks of water courses (brooks, streams, rivers, etc.) and adjacent to lakes or ponds. CWHR (Mayer and Laudenslayer

1988) categorizes the type of riparian vegetation found at the Park as Montane Riparian Habitat, which corresponds with the vegetation communities that Vestra described as Arroyo Willow Series/White Alder Series.

Montane Riparian Habitat occurs in the Klamath, Coast and Cascade ranges and in the Sierra Nevada south to about Kern and northern Santa Barbara Counties below 8,000 feet asml (Mayer and Laudenslayer 1988). Riparian habitats of all types in California support a high diversity of wildlife species, including special status species such as the state listed willow flycatcher *(Empidonax traillii)*. Riparian areas provide important sanctuary and travel corridors for wildlife because of their high structural complexity, water availability, and dense biomass/food availability. Many mammal species such as deer mice, deer, raccoons, and opossums *(Didelphis virginiana)* use riparian areas for the diverse food and water availability, and dense cover. Bats also use riparian areas for foraging. Many songbird species are associated with riparian areas for nesting and foraging including winter wrens *(Troglodytes troglodytes)*, orange-crowned warblers *(Vermivora celata)*, yellow warblers *(Dendroica petechia)*, and song sparrows *(Melospiza melodia)*. Reptilian and amphibian species can be found in these areas as well, including common garter snakes and California newts *(Taricha torosa)*.

Montane Riparian/Freshwater Emergent Wetland:

These two habitat types co-occur in the Sand Dam area, where arroyo willow is the dominant overstory species and the understory is dominated by common

rush. This corresponds with the area Vestra (2009) mapped as Arroyo Willow Series and emergent wetland.

Montane Riparian habitat is described in the preceding section. CWHR (Mayer and Laudenslayer 1988) characterizes Freshwater Emergent Wetland as consisting of erect, rooted herbaceous hydrophytes (water loving plants). Freshwater Emergent Wetland Habitat is found throughout California at virtually all elevations, but primarily below 7,700 ft. above mean sea level (Mayer and Laudenslayer 1988). This is one of the most productive habitats in California, providing food, cover, and water for more than 160 species of birds and numerous mammals, reptiles, and amphibians (CDFG 2008b).

Annual Grassland:

Grassland habitat is composed of various species of grasses and forbs. Because irrigated lawns have limited value as habitat for native plants and wildlife, they are not included under Annual Grassland but are mapped as "other" on Figure 3. Berryman Ecological mapped Annual Grassland Habitat in the northernmost portion of the Park, north and south of Wolf Creek.

Annual Grassland Habitat occurs in patches of various sizes throughout the state (CDFG 2008b). Annual Grassland can provide habitats for many wildlife species. Rodents, such as deer mice and ground squirrels, and some bird species, such as savannah sparrows (*Passerculus sandwichensis*), western meadowlarks (*Sturnella neglecta*), and white-crowned sparrows (*Zonotrichia leucophrys*), are especially associated with grasslands. In addition, the presence of these species attracts predatory species to grasslands for foraging, including coyotes (*Canis latrans*), raptors, and snakes.

Riverine:

Vestra (2009a and 2009c) mapped two perennial streams within the Park: South Fork Wolf Creek and Little Wolf Creek. CWHR classifies perennial streams as Riverine Habitat (Mayer and Laudenslayer 1988) Wildlife species typically found in Riverine Habitat include fish, aquatic invertebrates, muskrat and beaver. Many species of insectivorous birds (swallows, swifts, flycatchers) forage over the open water of Riverine Habitat.

Both of the perennial streams at the Park flow into Wolf Creek, a significant tributary of the Bear River, which ultimately flows into the Sacramento River (see Figure 3). Little Wolf Creek enters the Park on the east side and flows west to its confluence with the Sand Dam area, and then continues west out of the Park to its confluence with Wolf Creek. A diverse stratum of silt, woody debris, cobble,

and fragmented granitic bedrock comprise the littoral substrate of Little Wolf Creek (see Figure 3).

South Fork Wolf Creek enters the Park from the east and flows west where it eventually joins the main stem of Wolf Creek. This creek supports deep pools, riffles, and gradual runs. Woody debris, silt, and cobble comprise the littoral substrate. Both the South Fork Wolf Creek and Little Wolf Creek are approximately equal in size, averaging one foot deep and four feet wide.

Lacustrine:

Stacy Lane Pond is a seasonal pond, which holds water for only a few months during the wet season (approximately October 15 through April 15). CWHR categorizes seasonal ponds as Lacustrine Habitat (Mayer and Laudenslayer 1988). Stacey Lane Pond was dry during Vestra's first site visit in May 2008, but has potential to hold water up to a depth of eight feet. The wetland area is approximately 0.39 acres. Water sources include precipitation and outflow from nearby mine shafts. The surrounding vegetation consists of ponderosa pine, Himalayan blackberry and numerous grass species. Within the pond, there are willow and cottonwood trees, although Vestra did not map this area as a distinct vegetation type because of its small size. The substrate and bank soils are sandy, allowing for rapid infiltration of water. The littoral substrate consists of sand and woody debris.

Other:

Other habitat types found at the Park include buildings, irrigatedlandscaping, concrete pools, a man-made drain, a subterranean drain, and disturbed areas. These features have limited habitat value. However, buildings providing roosting habitat for bats and nesting habitat for some migratory bird species, such as swallows. The concrete pools provide limited value for aquatic and amphibious species such as California tree frog.

IV. Habitat Mapping:

Potential for Special Status Species Vestra (2009a) provided an analysis of special status species potentially occurring at the Park based on several factors including habitat suitability. For the most part, Berryman Ecological found similar habitat types and therefore concurs with Vestra regarding potential for special status species. Berryman Ecological believes only one species, short-eared owl (*Asio flammeus*), has higher likelihood of occurrence on-site than Vestra indicated. Since Vestra did not include the northern portion of the Park in their mapping effort, they did not include these grasslands in their analysis. Berryman

Ecological believes there is a moderate likelihood of occurrence of this species in the grasslands at the Park.

IV. Recommendations for Use of This Mapping:

As described above, under the Methodology section, the vegetation and habitat mapping conducted within the core area is more detailed than the mapping conducted over the remainder of the Park. The mapping throughout the Park has been completed to a sufficient level to allow for identification of sensitive resource issues in the Empire Mine Draft PEIR. However, more detailed, area-specific investigations should be conducted prior to any remediation activities outside the core area, to ensure that impacts to any small patches of sensitive vegetation or habitat not specifically identified in the PEIR are sufficiently addressed. Berryman Ecological also recommends that formal wetland delineations be performed for remediation activities outside the core area. In particular, a wetlands delineation should be performed for any activities in the vicinity of Wolf Creek and the surrounding riparian and grassland habitats.

V. References

CDFG 2003. *List of California Terrestrial Natural Communities Recognized by the California Natural Diversity Data Base*. .www.dfg.ca.gov/biogeodata/vegcamp/pdfs/natcomlist.pdf.

Holland, R.F., 1986. Preliminary descriptions of the terrestrial natural communities of California. State of California, The Resources Agency, Nongame Heritage Program, Dept. Fish & Game, Sacramento, Calif. 156 pp.Sawyer and Keeler-Wolf 1995

Mayer, K.E. and W.F. Laudenslayer, Jr. 1988. A Guide to Wildlife Habitats of California. State of California, Resources Agency, Department of Fish and Game. Sacramento, CA. 166 pp.

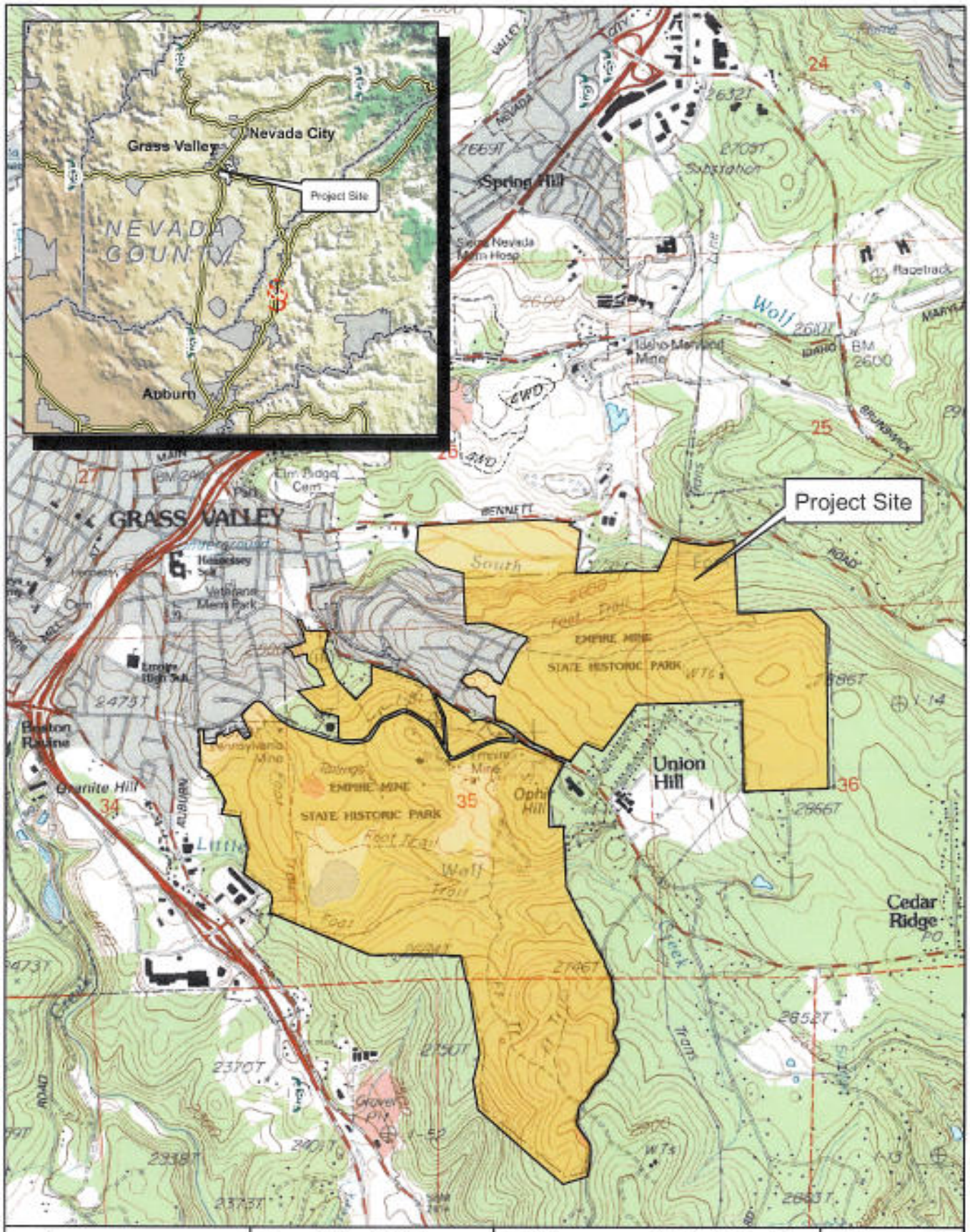
Sawyer, J.O., and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society, Sacramento, California.

URS. 2004. Final Biological Assessment for Empire Mine State Historic Park.

URS Corporation, Sacramento,California.

Vestra 2009a. Biological Characterization Report, Empire Mine State Historic Park Remediation Project, Nevada County, CA. Prepared for Golder Associates.

Vestra 2009b. Electronic mail message from Talitha Penland, Vestra Inc. biologist, dated January 23, 2009, and describing Vestra's vegetation and habitat mapping methodology.biologist, dated January 23, 2009, and describing Vestra's vegetation and habitat mapping methodology.



BERRYMAN Ecological

0 1000 2000 Feet

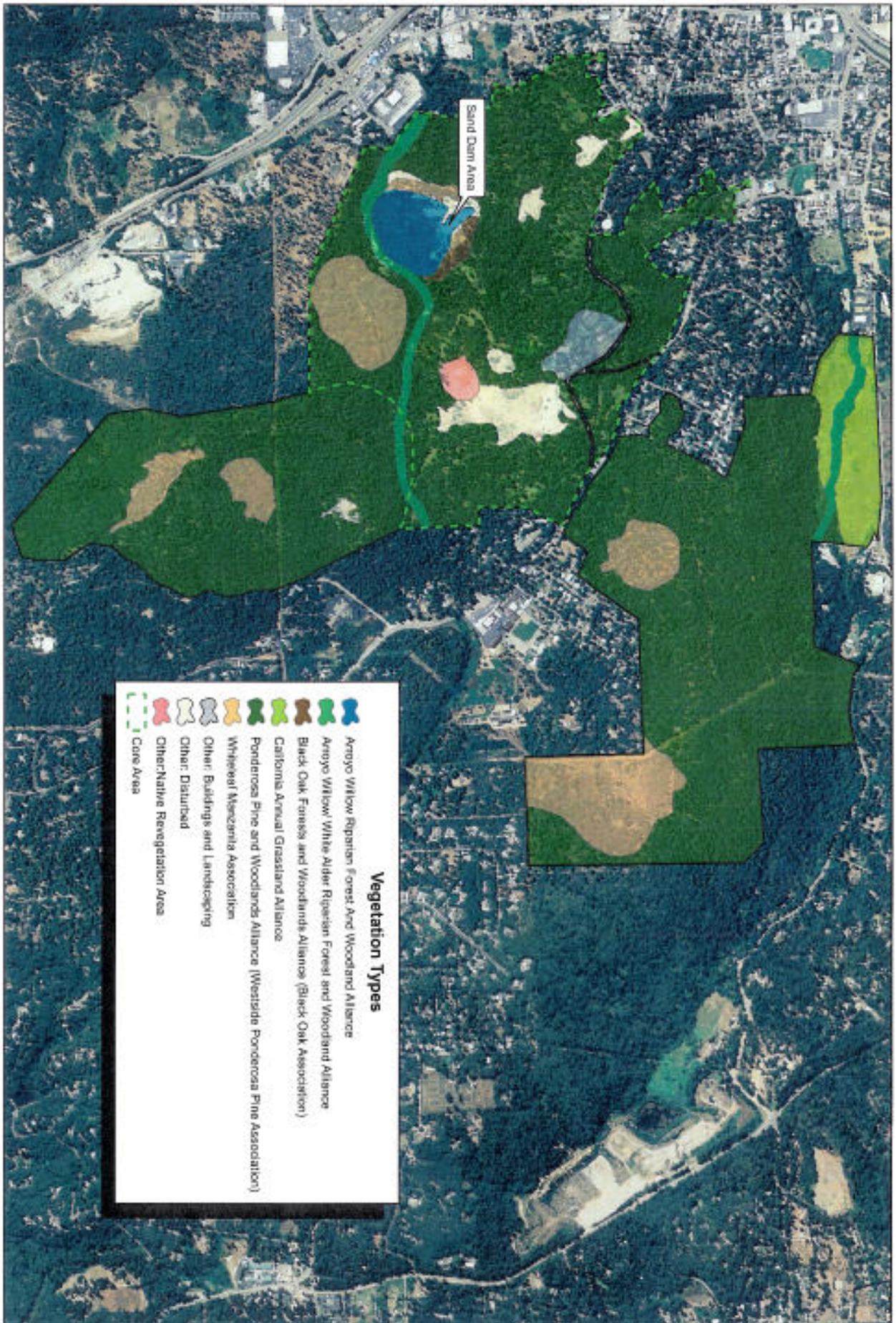
Site and Vicinity

Empire Mine

Figure 1

Date: 02/16/09
Tech: ARMB
Rev: 1

Source: Grass Valley USGS DRG provided by Maptech. Boundary data provided by Vestra. Property lies within T16N, R8E, Sections 25, 26, 34, 35, 36, and T15N, R8E, Section 1, Mt.Diablo Meridian. Boundaries are approximate.



BERRYMAN Ecological

0 500 1000
Feet

B

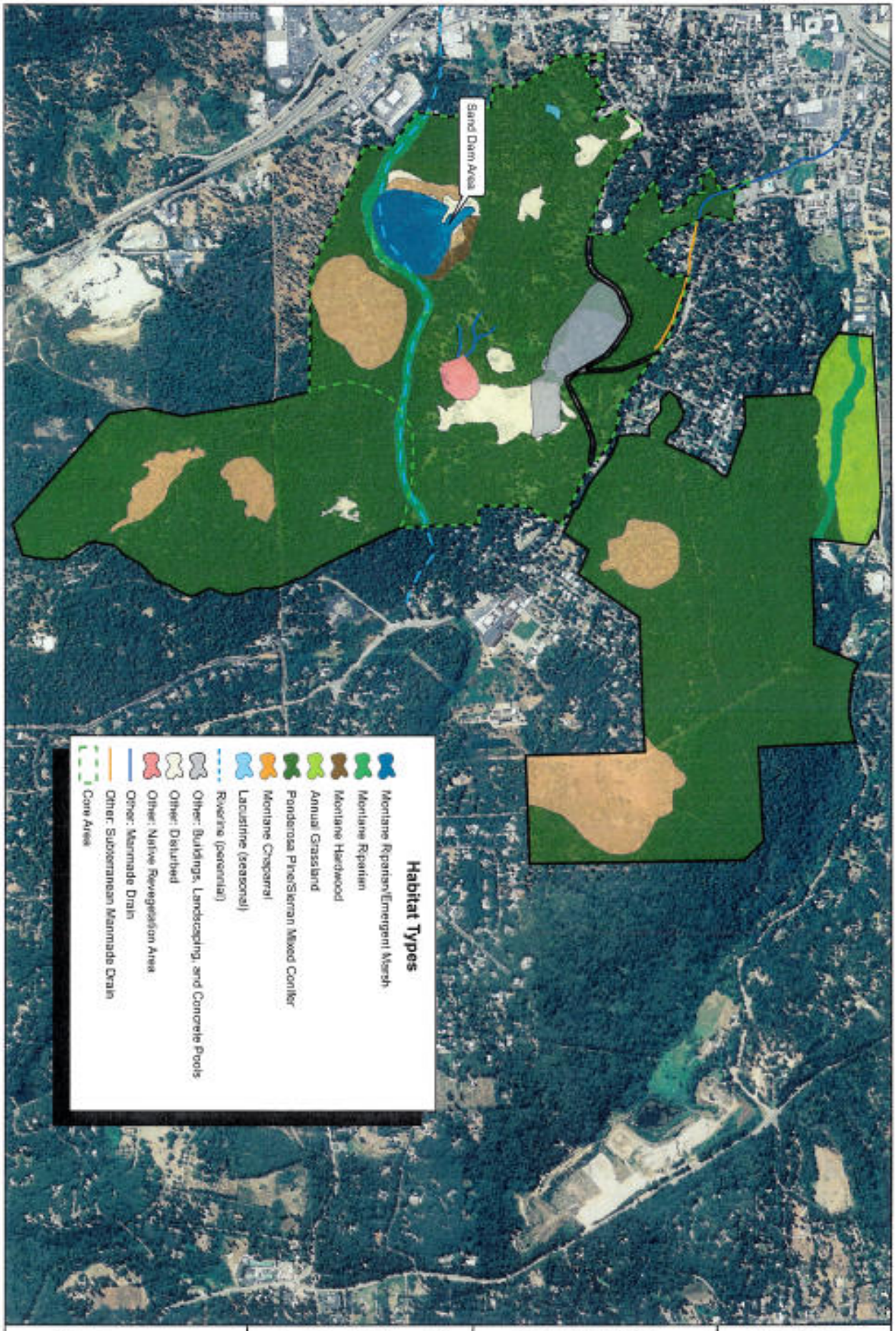
Vegetation Map

Empire Mine

Figure 2

Date: 03/12/09
Tech: ARMB
Rev. 1

Source: Aerial photo provided by USDA NAIP 2005. Project boundary and vegetation data provided by URS and Neatra. Boundaries are approximate.



BERRYMAN Ecological

0 500 1000
Feet

B

Habitat Map

Empire Mine

Figure 3

Date: 03/12/09
Tech: ARMB
Rev: 1

Source: Aerial photo provided by USDA NAIP 2005. Project boundary and habitat/wetland data provided by URS and Vestra. Boundaries are approximate.