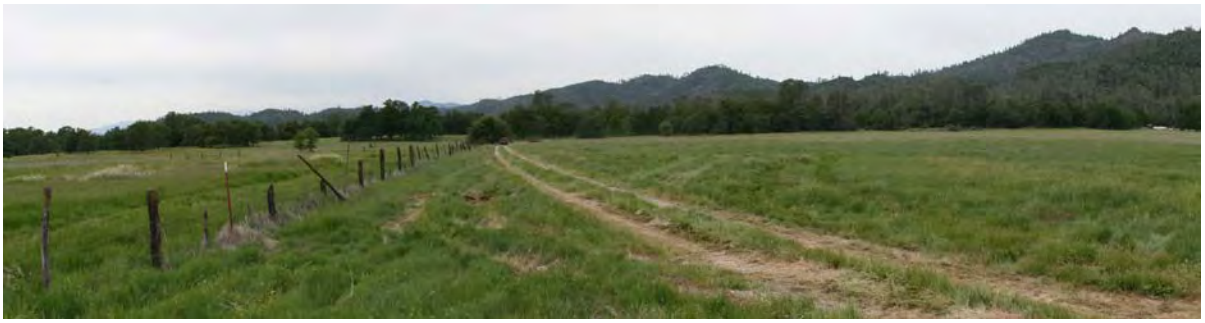
MOODY FLATS QUARRY PROJECT
RECLAMATION PLAN



DECEMBER | 2009
REVISED FEBRUARY 2011

Lead Agency
Shasta County, Department of Resource Management – Planning Division

Applicant/Operator
Moody Flats Quarry, LLC

BENCHMARK RESOURCES

MOODY FLATS QUARRY PROJECT
RECLAMATION PLAN

DECEMBER | 2009
REVISED FEBRUARY 2011

Lead Agency
Shasta County, Department of Resource Management – Planning Division
19005 Placer Street, Suite 103, Redding, California 96001

Applicant/Operator
Moody Flats Quarry, LLC
3M Center, Building 224-5N-60
St. Paul, Minnesota 55144

Preparer
Benchmark Resources
4990 Hillsdale Circle, Suite 400, El Dorado Hills, California 95762

Name and Address of Owner/Operator
(PRC §2772(c)(1)):

Moody Flats Quarry, LLC
Industrial Mineral Products Division
Building 220-3E-11
St. Paul, MN 55144-1000

Contact:	John Lowrey
Telephone (direct):	(651) 575-8199
Telephone (main):	(800) 447-2914
Facsimile:	(651) 736-8474

Name and Address of Agent
(PRC §2772(c)(1)):

Benchmark Resources
4990 Hillsdale Circle, Suite 400
El Dorado Hills, CA 95762

Contact:	Andrew White
Telephone:	(916) 983-9193
Facsimile:	(916) 983-9194

STATEMENT OF RECLAMATION RESPONSIBILITY *(PRC §2772(c)(10))*

I certify that the information in this Reclamation Plan is correct, to the best of my knowledge, and that all of the owners of possessory interest in the property in question have been notified of the planned operation and potential uses of the land after reclamation. I also certify that I am authorized on behalf of Moody Flats Quarry, LLC to accept responsibility for reclaiming the mined lands described and submitted herein, with any modification required by the County of Shasta and agreed to as Conditions of Approval.

Signed this _____ day of February, 2011.

_____

John Lowrey
for Moody Flats Quarry, LLC

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PLAN SUMMARY

Operation Name:	Moody Flats Quarry
California Mine Identification Number:	Not Yet Assigned
Mine Operator Name and Address (§2772(c)(1)):	Moody Flats Quarry, LLC Building 220-3E-11 St. Paul, MN 55144-1000 (651) 575-8199
Contact Person:	John Lowrey
Owner of Property Mineral Rights Name and Address:	3M, Industrial Mineral Products Division
Owner of Mineral Rights:	Same as above Building 224-5N-60 St. Paul, MN 55144-1000 (651) 737-3563 (800) 447-2914
Location:	Western Shasta County about 1 mile west of Interstate 5, north of the City of Shasta Lake, and 9 miles north of the City of Redding.
Section, Township, and Range:	Sections 13, 24, and 25 of Township 33N, Range 5W; and Sections 18, 19, 20, and 30 of Township 33N, Range 4W of the Shasta Dam and Project City, California 7.5 U.S. Geological Service (USGS) topographic map

Latitude and Longitude (at Center of Project):	Latitude: N 40° 42′ 46″ Longitude: W 122° 22′ 00″
Directions to the Site:	Take Interstate 5 North from Redding, approximately 9 miles to the Wonderland Blvd. off-ramp. Turn left over the freeway to a private unpaved access road to the property.
Total Parcel Size(s):	1,900± acres
Assessor's Parcel Numbers:	006-770-002 through 005; 065-500-002 and 004; 307-200-002, 006, 007, 010, 018, and 019; 307-230-014, 016, and 017
Total Area to be Mined: **Total Area to be Reclaimed:**	Approximately 285± acres (435 acres of total project facilities) Approximately 435± acres
Maximum Anticipated Depth (§2772(c)(4)):	800 feet below existing ground surface (measured from the highest elevation where mining will occur).
Quantity and Type of Materials to be Mined (§2772(c)(2)):	Approximately 175 million tons of aggregates.
Proposed Start-Up Date and Termination Date: (§2772(c)(3))	Reserves are available on-site to support a 100-year operation. Assuming a start-up date of August 2012, the proposed completion date is December 2112. These dates would be dependent on completion of all environmental review, attainment of all necessary County, state and federal permits, and economic factors.
Potential Land Use After Reclamation:	The North Pit, South Pit, overburden fill area, and primary processing plant area would be reclaimed to an open space condition suitable for uses under the applicable County Zoning Code. The South Pit may be reclaimed to a condition suitable for water storage. The secondary and ancillary processing and loadout area, rail siding/spur facility, and access roads would remain post-reclamation.

1.0 PURPOSE AND OBJECTIVES *(CCR §3502(a))*

The Surface Mining and Reclamation Act of 1975 (SMARA) was enacted by the California Legislature to address identification and conservation of mineral resources and provide for the protection and subsequent second land use of mined lands. In enacting SMARA, the Legislature identified extraction of mineral resources as essential to the economic well-being of the State and that reclamation of mined lands is necessary to prevent or minimize effects on the environment and to protect public health and safety. To that end, SMARA and its implementing regulations were adopted and have been routinely updated to establish state policy that meets these objectives.

SMARA and its implementing regulations specify information that should be included in a reclamation plan, as applicable, to site conditions. These reclamation plan requirements are found in the statute (primarily PRC §2772) and the standards that must be met in reclamation implementation, as specified in CCR §3503 and CCR §3700 through CCR §3713.

This reclamation plan for Moody Flats Quarry (Project) has been prepared in accordance with the requirements of the SMARA. Applicable PRC and CCR references are provided throughout this document. The statute and regulations, as they exist at the time of preparation of this plan, are dated January 2007.

Objectives of this reclamation plan are designed to meet PRC §2712 by:

- Implementation of site-specific stormwater, erosion control and drainage plan;
- Preventing erosion of disturbed soils through a variety of control mechanisms;

- Maintaining and controlling equipment and associated fuels and oils to prevent contamination of soils and surface waters;
- A site-specific revegetation plan using native species common in the local area;
- Maintaining major infrastructure improvements post-reclamation to provide for consistent land use development;
- Permitting a long-term known high-quality aggregate resource in an area already designated in Shasta County land-use documents as a "mineral resource";
- Incorporating a variety of safety measures, including fences, signage, and berms to reduce public access; and
- Long-term stability of reclaimed slopes based on recommendations of a site-specific geotechnical investigation.

2.0 SITE DESCRIPTION AND ENVIRONMENTAL SETTING

(PRC §2772(c)(5); CCR §3502(b)(1))

2.1 SITE LOCATION AND SIZE

The Project site is located in western Shasta County, California, about 1 mile west of Interstate 5, north of the City of Shasta Lake, and 9 miles north of the City of Redding (see Rec-Figure 1, Regional Location, and Rec-Figure 2, Site Location). The site lies in Sections 13, 24, and 25 of Township 33N, Range 5W; and Sections 18, 19, 20, and 30 of Township 33N, Range 4W of the Shasta Dam and Project City, California 7.5 U.S. Geological Service (USGS) topographic map. The Project would be located entirely within the boundaries of the 3M-owned Assessor's Parcel Numbers (APN) 006-770-002 through 005, 065-500-002 and 004; 307-200-002, 006, 007, 010, 018, and 019; and 307-230-014, 016, and 017. The total property is approximately 1,900 acres.

2.2 EXISTING LAND USE

The Project site is located on land historically utilized as undeveloped open space, as shown in Rec-Figure 3, Existing Conditions Aerial Photograph and Exhibit 1. A Union Pacific Railroad line cuts through the western portion of the property. Existing site conditions are shown in Rec-Figures 4a through 4c, Existing Conditions Photographs.

The Project site is currently designated by the Shasta County General Plan as Mining Resource (MR), Industrial (I), Rural Residential (RA), and Suburban Residential (SR) (see Rec-Figure 5, Existing General Plan Designation). The Shasta County Zoning Code

Figure 1, Regional Location

Figure 2, Site Location

Figure 3, Existing Conditions Aerial Photograph

Figure 4a, Existing Conditions Photographs

Figure 4b, Existing Conditions Photographs

Figure 4c, Existing Conditions Photographs

Figure 5, Existing General Plan Designation

designates the property Mineral Resource, Community Commercial and Design Review (C-2-DR), General Industrial, and Interim Rural Residential (see Rec-Figure 6, Existing Zoning Designation).

A gas station located at the corner of Old Oregon Trail and Wonderland Blvd. is the closest public facility, approximately ¾ miles east of the Project site. Interstate 5 is the closest primary roadway approximately 1 mile east of the site.

2.3 ACCESS AND INFRASTRUCTURE

The site lies approximately 1 mile west of Interstate 5. Access is provided via Wonderland Blvd., off the Interstate 5 Mountain Gate/Wonderland Blvd. off-ramp. The site entrance is a gated private, unpaved access road.

The only on-site infrastructure improvement is the Union Pacific rail line traversing the eastern portion of the property. No other utility improvements or utility easements are located on the property in a manner that could be potentially affected by mining or reclamation.

2.4 GEOLOGY

2.4.1 Regional Geology

Site geology is shown in Rec-Figure 7, Geology. The Project site is located in the eastern Paleozoic belt of the Klamath Mountains geologic province. It is also located near to the extreme northern end of the Great Valley province. The eastern Paleozoic belt contains a diverse assemblage of sedimentary, metamorphic, and plutonic rocks ranging in age from Ordovician to Jurassic. In general, these rocks are an eastward-dipping homoclinal sequence. Formations that underlie various portions of the project include the Copley Greenstone, Kennett, Bragdon, and Baird Formations.

Bordering the Project site to the southeast is the Great Valley geologic province. The Great Valley is a northwest-trending geosyncline. It has a complex geologic history involving four episodes of tectonism, and marine and non-marine sedimentation from the late Jurassic to Recent time. Marine siltstone and sandstone of the Cretaceous Chico Formation are the oldest rocks in the northern Great Valley sequence. Overlying the Chico in the north valley are the Plio-Pleistocene Tehama and Pleistocene Red Bluff Formations.

Figure 6, Existing Zoning Designation

Figure 7, Geology

2.4.2 Local Geology

The following provides a description of site geology based on drilling records and geologic mapping:

Copley Greenstone: probable middle Devonian age, is the oldest unit underlying the Project site. This formation consists of metamorphosed interlayered volcanic flows, pillow lavas, and pyroclastic flows and tuffs, all generally of intermediate composition. Most of the Copley is keratophyre with a characteristic greenish color and aphanitic, foliated, or schistose texture.

Devonian to Mississippian Sedimentary Rocks: the Copley Greenstone is overlain by the Kennett, Bragdon, and Baird Formations; the Kennett Formation is characterized as dark, thin-bedded siliceous mudstone and shale, tuffaceous shale, and limestone. Bragdon Formation is a dark greenish-gray to black shale (weathers to buff or brown color). Baird Formation is a pyroclastic rocks, mudstone, and keratophyre flows.

Alluvial and Colluvial Deposits: Pleistocene to Recent deposits of alluvial and colluvials origin are present over much of the site. Colluvium is present on the sides and near the base of the nearby hills. Alluvial and colluvials deposits generally consist of mixed coarse- and fine-grained soils and are characterized by the presence of angular and subangular gravel.

Fluvial Deposits: recent deposits of fluvial origin are present within the minor drainage courses crossing the site. These deposits are generally well-graded unconsolidated mixtures of sand and gravel with various amounts of cobbles.

2.5 HYDROLOGY

2.5.1 Climate and Rainfall

The average high temperature ranges from 53°F in January and December to 95°F in July. The average low temperature ranges from 39°F in January to 68°F in July. The seasonal temperature variations, however, can be much larger. For example, the record high temperature is 115°F (in 1981), whereas the record low temperature is 7°F (in 1985). The average annual precipitation in the project vicinity is approximately 64 inches per year (www.weather.com, WRCC 2007), which includes approximately 4.5 inches of snowfall equivalent water depth. The 24-hour 100-year storm has a magnitude of approximately 11.4 inches (City of Redding 2006).

2.5.2 Jurisdictional Waters

The property is within 3 watersheds including Shasta Lake, Moody Creek, and Salt Creek with over 90 percent of proposed surface disturbance within the Moody Creek watershed. The remaining 10 percent is within the Salt Creek watershed. No surface disturbance will occur within the Shasta Lake watershed.

Three intermittent streams are located within the Property including Moody Creek, Rancheria Creek, and Salt Creek. There are no perennial streams within the Project boundary.

A Delineation of Waters of the U.S. was conducted for the property. A total of 13.65 acres of waters of the U.S. were delineated. An acreage summary of the features delineated is included in Table 1, Acreage Summary of Waters of the U.S., below.

TABLE 1
ACREAGE SUMMARY OF WATERS OF THE U.S.

Waters of the United States	Total Acreage	Acreage Within the Limits of Surface Disturbance
WETLANDS		
Fresh Emergent Wetland	0.09	0.049
Fresh Emergent-Riparian Wetland	0.22	0.000
Intermittent Pool	0.001	0.0007
Intermittent Swale	0.57	0.497
Riparian Wetland	2.40	0.089
Seep-Spring Wetland	0.24	0.053
Vegetated Ditch	0.01	0.00
OTHER WATERS		
Ephemeral Stream	0.55 (19,568 linear feet)	0.227 (10,298 linear feet)
Intermittent Stream	9.57 (114,118 linear feet)	4.323 (64,809 linear feet)
Seep-Spring/Other Waters	0.003 (73 linear feet)	0.00
Total Waters of the United States	**13.65**	**5.24**

2.5.3 Groundwater

Groundwater occurs almost exclusively within fractures in the bedrock. As such, the bedrock formations generally do not contain appreciable quantities of groundwater, except within shear or fracture zones. Water production from boreholes drilled at the

site in areas outside of major shear zones averages no more than 1 to 2 gallons per minute. In general, the groundwater tends to mimic the topography, indicating that the fractures are recharged locally due to percolation of rainfall.

The limits of both the South Pit and the North Pit encompass small topographic peaks that sit along a north-south trending ridge that separates the Salt Creek and Moody Creek watersheds. These topographic peaks are the highest points within the Project area, and there are no other contiguous areas at a higher elevation. There are no upslope watershed areas adjacent to the pit locations. Therefore, the limited groundwater (less than 1 to 2 gpm capacity) in the area of the North Pit and South Pit is sourced from local recharge within the limits of the pits.

Several areas of shearing or enhanced fracturing have been identified on the Project site. These areas, however, do not occur within the proposed North Pit or South Pit mining areas. The Mountaingate Community Services District has two groundwater supply wells located approximately 2 miles north of the Project site. The Mountaingate wells are completed within the Kennett Formation and produce at least 350 acre-feet of water per year (equivalent to a constant pumping rate of 220 gpm), even during extended drought periods. The hydrogeologic conditions in the Kennett Formation shear zone on the Moody Flats site are comparable to those present at the location of the Mountaingate wells. In addition, field observations made in November 2009 (before the peak rainy season) identified springs and groundwater seeps in drainages crossing the shear zone in the Kennett Formation. Outside of the area of the shear zones, water was not flowing within any of the surface drainages. The field observations demonstrate the presence of open fractures that transmit groundwater within the Kennett Formation shear zone on the Project site.

2.6 VEGETATION AND WILDLIFE

2.6.1 Vegetation

Eleven CWHR habitats were mapped during reconnaissance-level surveys within the Property boundary including annual grassland, barren, blue oak woodland, blue oak-gray pine, fresh emergent wetland, mixed chaparral, montane hardwood-conifer, montane hardwood, ponderosa pine, valley oak woodland, and valley-foothill riparian. Table 2, Summary of CWHR Vegetative Habitats, provides the vegetation habitats and approximate acreage of those habitats within the property boundary and limits of surface disturbance. Vegetation habitat boundaries are shown in Rec-Figure 8.

Figure 8, CWHR Vegetation Habitat Boundaries

TABLE 2
SUMMARY OF CWHR VEGETATION HABITATS

Vegetation Habitats	Acreage	
	Project Boundary	*Limits of Surface Disturbance*
Annual grassland	48	47
Barren	21	12
Blue oak-gray pine	196	124
Blue oak woodland	3	3
Fresh emergent wetland	0.05	0
Mixed chaparral	148	61
Montane hardwood-conifer	905	304
Montane hardwood	504	213
Ponderosa pine	87	7
Valley foothill riparian	4	1
Valley foothill riparian/Fresh emergent woodland	1	0
Valley oak woodland	16	15
Total	**1,933**	**787**

2.6.2 Special Status Species

Special Status Plant Species

A botanical survey of the property was conducted during early and late season blooming periods in 2010, in accordance with CDFG Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities (2000). One special status plant specie, northern clarkia (*Clarkia borealis sp. borealis*), was observed in the northwest corner of the property. The northern clarkia is not federally- or state-listed, but is a CNPS List 1B.3. The location where the northern clarkia was observed is outside of the Project's limits of surface disturbance and therefore will not be impacted by the Project. No state of federally listed plant species under CEQA or ESA were found on the property.

A complete list of plant species identified on-site during botanical surveys is included in Appendix A, Botanical Survey Report.

Special Status Wildlife Species

Special status wildlife species include those proposed for listing, candidates for listing, or those currently listed as threatened or endangered by either the Federal or State

resource agencies, as well as those identified as State species of special concern. Table 3, Special Status Wildlife Species with a High Potential of Occurrence On-Site, lists special status wildlife species that have a high potential of occurring within the Project site. A complete list of wildlife species with a potential to occur with the Project site and/or identified during an April 2010 site visit is included in Appendix B, Biological Resources Assessment.

TABLE 3
SPECIAL-STATUS WILDLIFE SPECIES WITH A HIGH POTENTIAL OF OCCURRENCE ON-SITE

Common Name *Scientific Name*	Status[1] (Fed/State)	General Habitat Description and Potential Occurrence On-Site
FEDERAL AND STATE LISTED SPECIES		
Pacific Fisher *Martes pennanti pacifica*	C/CT	Intermediate to large dense stages of coniferous forests and deciduous riparian habitats with greater than 50 percent canopy closure. High potential occurring in ponderosa pine, montane hardwood-conifer, and montane hardwood habitats in the study area. Known to occur 0.5 mile northwest of the study area.
OTHER SPECIAL-STATUS SPECIES		
Yellow Warbler *Dendroica petechia*	—/SC	Breeds in riparian woodlands, particularly those dominated by willows and cottonwoods. Present. Observed in valley foothills riparian in the study area.
Yellow-Breasted Chat *Icteria virens*	—/SC	Breeds in riparian habitats having dense understory vegetation, such as willow and blackberry. Present. Observed in valley riparian in the study area.
Ring-Tailed Cat *Bassariscus astutus*	—/FP	Riparian habitats and in brush stands of most forest and shrub habitats. Nests in rock recesses, hollow trees, logs, snags, abandoned burrows or woodrat nests. High potential occurring in valley foothill riparian and along stream corridors in the study area.

[1]Status Codes:
Federal and State Codes: E = Endangered; T = Threatened; C = Candidate; CT = Candidate for Threatened (State); SC = Species of Concern (Federal) and Species of Special Concern (State); PD = Proposed for Delisting; D = Delisted; FP = California Fully Protected species

Oak Woodland Habitat

In anticipation that oak woodland removal would occur as a result of Project operations, the Applicant has designed a revegetation plan that incorporates use of oak tree planting. As shown in Table 4, Oak Tree Cover, Density, and Removal Percentages, oak trees were identified on-site through vegetative transect data (see Appendix C, Revegetation Plan).

TABLE 4
OAK TREE COVER, DENSITY, AND REMOVAL PERCENTAGES

Vegetative Habitat	Specie	Canopy Cover (%)	Density Per Plot (%)
Blue Oak-Gray Pine	Blue Oak	19	10
	Interior Live Oak	13	15
Blue Oak Woodland	Blue Oak	50	36
Mixed Chaparral	Interior Live Oak	8	11
Montane Hardwood-Conifer	Interior Live Oak	14	20
	Blue Oak	<1	1
Valley Foothill Riparian	Valley Oak	15	8
	Blue Oak	15	6
	Interior Live Oak	8	6
Valley Oak Woodland	Valley Oak	39	8
	Canyon Live Oak	6	5

As discussed in Section 5.4, the Reclamation Plan anticipates revegetation of approximately 132 acres suitable for oak tree revegetation. Anticipated revegetation oak species include Blue Oak and Interior Live Oak (see Table 6, Topsoil and Overburden Use, below). Table 7, Potential Revegetation Species, below, provides success criteria performance values to ensure successful revegetation of oak tree plantings.

2.7 SOILS

Soils types vary greatly across the property, as shown in Rec-Figure 9, Soils. Soil boundaries shown on Rec-Figure 9 are approximate, based on the location and soils observed in the soil profiles as mapped by the Natural Resource Conservation Service.

Figure 9, Soils

The following soil types have been identified and mapped within the limits of surface disturbance:

- **Auburn loam, 0 to 8 percent slopes (AnB):** Well-drained clay loams underlain by basic metavolcanic rock. The surface layer is loam 5 to 10 inches thick, with moderate permeability. Runoff is slow to medium, with a slight to moderate hazard of erosion. This soil is used mainly as dryland pasture, and small areas are used as irrigated pasture and vineyards.
- **Auburn clay loam, 8 to 30 percent slopes, eroded (AsD2):** Well-drained clay loams underlain by basic metavolcanic rock. This soil has moderate permeability, with medium to rapid runoff. The hazard of further erosion is moderate to high. This soil is used mainly as dryland pasture, and small areas are used as irrigated pasture.
- **Auburn very stony clay loam, 30 to 50 percent slopes, eroded (AtE2):** Well-drained clay loams underlain by basic metavolcanic rock. This soil has moderate permeability and rapid runoff. The hazard of further erosion is high. This Auburn soil is used mainly as range and wildlife habitat and for watershed.
- **Auburn very rocky clay loam, 50 to 70 percent slopes, eroded (AuF2):** Well-drained clay loams underlain by basic metavolcanic rock. This soil has moderate permeability and very rapid runoff. The hazard of further erosion is very high. This Auburn soil is used as range and wildlife habitat and for watershed.
- **Boomer gravelly loam, 30 to 50 percent slopes (BkE):** A well-drained, light-brown, medium acid gravelly loam that is underlain by weathered metabasic rock. This soil has moderately slow permeability and rapid runoff. The hazard of erosion is high. This Boomer soil is used as woodland and wildlife habitat and for watershed.
- **Boomer very stony loam, 50 to 70 percent slopes (BIF):** A well-drained, light-brown, medium acid gravelly loam that is underlain by weathered metabasic rock. However, its entire original surface layer has been lost through erosion. This soil has rapid runoff, with a high hazard of further erosion. This Boomer soil is used as woodland and wildlife habitat and for watershed.
- **Churn gravelly loam, 0 to 3 percent slopes (CeA):** A light yellowish-brown, medium acid gravelly loam that forms in alluvium from mixed sources. This soil is well-drained and has moderately slow permeability with slow runoff. The hazard of erosion is none to slight. This Churn soil is used for irrigated hay and both irrigated and dryland pasture. Small areas are used for irrigated row crops and orchards.

- **Churn gravelly loam, deep, 0 to 3 percent slopes (CfA):** A light yellowish-brown, medium acid gravelly loam in narrow channeled valley bottoms. This soil is moderately well drained, with slow permeability and runoff. The hazard of erosion is none to slight. This Churn soil is used as irrigated and dryland pasture, and is not suited to deep-rooted crops.
- **Goulding very stony loam, 10 to 30 percent slopes (GdD):** A brown, slightly acid, and well-drained soil that is underlain by greenstone. Its permeability is moderate, with medium to rapid runoff. The hazard of erosion is moderate to high. This Goulding soil is used mainly as range.
- **Perkins gravelly loam, 8 to 15 percent slopes (PmC):** A well-drained soil that formed in mixed alluvium, with a brown, slightly acid gravelly loam surface layer. It has slow permeability and medium runoff. The hazard of erosion is moderate. This Perkins soil is used for dryland pasture and for urban uses near Redding.
- **Map Unit – 105:** Holland deep complex, 40 to 60 percent slopes
- **Map Unit – 259:** Goulding complex, 40 to 80 percent slopes
- **Rock Land (RxF):** This is nearly level to very steep. Rock outcrops cover 25 to 90 percent of the surface. Rock land is used as watershed and for recreation.

3.0 PLANNED MINING OPERATIONS

(PRC §2772(c)(2), (3), and (6))

3.1 QUANTITY AND TYPE OF MATERIALS

There are sufficient reserves (approximately 175± million tons) within the site plan for Moody Flats Quarry to support marketing up to 2 million tons of aggregate material annually for 100 years. Actual production rates will vary, largely dependent upon aggregate consumption demands in the regional markets. A 100-year project averaging 2 million tons/year is planned.

The type of material to be mined is hard, crystalline bedrock (primarily a Copley Greenstone) of suitable grade for use in a variety of aggregate products including base, sized aggregate, asphalt, and ready-mix.

3.2 INITIATION AND TERMINATION DATES

Reasonably foreseeable operations are presently planned until approximately August 2112, but are dependent upon completion of the environmental review process and attainment of necessary subsequent permits.

3.3 DESCRIPTION OF PLANNED MINING

The 100-year life of the Project will include the development of two quarry areas (the South Pit and North Pit) (see Rec-Figure 10, Site Plan; Rec-Figure 11, Quarry Plan; Rec-Figure 12, Site Plan Cross-Sections; and Exhibits 2 and 3). Planned quarry

Figure 10, Site Plan

Figure 11, Quarry Plan

Figure 12, Quarry Plan Cross-Sections

development would begin in the South Pit with reserves sufficient to last approximately 20 to 30 years, and include establishment of the adjacent primary processing facility. While the Applicant plans to begin operations in the South Pit, geology, environmental constraints, and/or economic factors may result in quarry activities within the North Pit first, or operations within each pit concurrently. Both the North and South Pits would be developed in a typical hardrock quarry bench/highwall configuration created through successively deeper cuts (benches) in the rock until design depth is reached. As such, there is no further phasing as each pit is continuously operated until the design depth is reached.

3.3.1 Vegetation, Topsoil, and Overburden Removal

Prior to aggregate removal, vegetation will be removed in the immediate working areas and managed on-site (e.g. mulched for erosion control, burned, etc.) or transported off-site (e.g. landfill/greenwaste facility, sold as product, cogeneration) depending on the type of vegetation removed and available uses. Topsoil salvaged from the site, as available, would be handled and stored differently depending on current site needs. If areas for concurrent or final reclamation were available then topsoil would be used for those immediate purposes. Otherwise topsoil would be stockpiled separately from overburden within the active mining area for future distribution on completed benches or the quarry floor. Topsoil used in concurrent and final reclamation may be amended with silts and fines from silts ponds and stormwater facilities if necessary and available.

After the topsoil is stripped and stockpiled, if any, overburden (i.e. soil and other weathered aggregate material not suitable for sale or blending) will be removed. The Applicant estimates that about 8 million cubic yards of overburden material may be excavated over the 100-year life of the Project. Overburden materials would consist of material not suitable for use in aggregate production, silt material from the aggregate washing system, and silts excavated during maintenance of stormwater control systems. Depending on market conditions, it is possible that some overburden could ultimately be sold as product.

Some overburden materials would be used for construction of pads for permanent on-site facilities and use in concurrent and final reclamation. It is anticipated that approximately 4 million cubic yards of overburden would be necessary for construction of catchment berms on quarry benches and fill for equipment and processing facility pads. The remaining overburden would be permanently stockpiled in the overburden fill area. Once clearing of vegetation, topsoil, and overburden is complete for the active operations area, aggregate removal will commence (see Table 5, Non-Aggregate Material by Facility)

TABLE 5
NON-AGGREGATE MATERIAL BY FACILITY

Facility	Total Amount Topsoil/Cut/ Overburden/Waste (cu. yds)
North Pit	5,200,000
South Pit	3,200,000
Primary Processing Plant	0
Secondary and Ancillary Processing and Loadout Area	7,000
Rail Siding/Spur	1,000,000
Totals: Topsoil[1] Overburden/Waste	 1,500,000 7,900,000

Notes:

[1] Topsoil calculations were generated by taking the average A and B soil horizon depths estimated by NRCS for the types of soils disturbed by Project build-out.

3.3.2 Excavation and Blasting

Operations at the site will use conventional mining practices common in the industry. Quarrying is initiated by establishing a working bench at the upper quarry limit. As the initial bench is extended laterally along the quarry face, a new bench is established at the next lower level. Bench areas are extended until the planned quarry backwall is reached; successive benches are developed as the quarry progresses downward. The quarry would be excavated with an overall (stepped) slope of 1:1 (1 horizontal to 1 vertical) (see Rec-Figure 13, Conceptual Quarry Cut Slope). The maximum depth of excavation would occur in the South Pit at approximately 950 feet amsl.

Mineral reserves will be removed through a combination of drilling and blasting and excavating equipment. All blasts will occur during daylight hours only on regular business days (not on weekends or federal holidays). The transportation, storage, and handling of explosives will be performed or supervised by a licensed explosives expert contracted or employed by the Operator. Explosive materials, typically ammonium nitrate and fuel oil (ANFO), may be stored on-site. The Applicant will comply with all federal (i.e. Bureau of Alcohol, Tobacco, Firearms, and Explosives) and local law enforcement (i.e. Shasta County Sheriffs Department) regulations regarding transportation, use, and detonation of blasting materials.

Loaders or similar excavating equipment will remove aggregate for processing after blasting. Blasted rock will be loaded onto haul trucks and transported to or within the primary processing plant adjacent to the active pit. Once through the primary crusher/feeder, the material will then be transported via conveyor to the secondary and tertiary processing plant.

Figure 13, Conceptual Quarry Excavation Cute Slope

4.0 SECOND LAND USE PLAN *(PRC §2772(c)(6), (7) and (9))*

4.1 POTENTIAL SECOND LAND USE

The anticipated second land use following reclamation varies based on its use during active mining. The North and South Pits, overburden fill area, and primary processing plant would be returned to an open space condition through revegetation measures consistent with surrounding vegetation. The South Pit may be partially backfilled with overburden to an elevation of approximately 1,050 amsl and revegetated. If not backfilled, the pit may be used for water storage. The secondary and ancillary processing and loadout area, rail siding/spur, and access road would remain as a post-reclamation land use.

The reclamation plan, shown in Rec-Figure 14 (Reclamation Plan), Exhibit 4 (Reclamation Plan), Rec-Figures 15a and 15b (Reclamation Plan Cross-Section), and Exhibit 5 (Reclamation Plan Cross-Sections), shows the planned reclaimed topography. Slope design is shown in Rec-Figure 13. Reclamation will allow future unencumbered access to mineral resources in this MR-designated area.

4.2 AREAS AVAILABLE FOR CONCURRENT RECLAMATION

Mining is generally planned as a continuous activity consistent with hardrock mining practices associated with developing a quarry at incrementally increasing depths. The final area of mining and reclamation will be when the quarry floor elevation is reached at the foot of the highwalls. The resource at this site is dictated by the geology actually

Figure 14, Reclamation Plan

Figure 15a, Reclamation Plan Cross-Sections

Figure 15b, Reclamation Plan Cross-Sections

encountered, economics, and available working space within the Quarry. The open pit development scenario distinctly limits the type of reclamation activities and the degree to which they can be employed during active mining. As explained by the National Research Council[1]:

> *"Active open pits, as compared with surface coal mines, provide little opportunity (if any) for simultaneous mining and reclamation because the pit continues to expand and deepen as long as the mine is producing. Also, the ultimate depth and shape of the pit, although roughly predictable, are dictated by the economics of mining and the geometry of the ore deposit rather than by particular reclamation goals…"*

Development of Moody Flats Quarry is largely dictated by these principles, but in an effort to adhere to the tenets of SMARA, the following concurrent reclamation measures would be implemented when applicable.

4.2.1 Quarry Benches

Each approximately 60-foot quarry bench, as described in Section 3.3, will have an approximately 20-foot (at its widest point) catchment berm upon completion of mining. Placement of the catchment berms will be dictated by safety principles as mining of lower benches progresses and will involve use of stockpiled overburden and topsoil (as available). Initially, these berms would be hydroseeded for erosion control. Once mining-associated activities on lower benches are sufficiently completed, plantings of trees and other vegetation consistent with Section 5.4 will begin.

4.2.2 Construction Pads and Facilities

Initially, site development will include the construction of various facilities including the access road, secondary and ancillary processing and loadout area, and rail siding/ spur. These facilities may require construction equipment storage and staging areas within the limits of surface disturbance but would not otherwise be disturbed in the future or not for an extended period of time except for these activities. In these situations, once construction of these facilities is complete and these staging areas are no longer needed, equipment and associated construction materials would be removed. The area would be inspected for any spilled fuels or petroleum products and appropriate action taken. If the soils in the area are compacted, the soils would be scarified prior to revegetation. Revegetation of these areas would be dependent on their location within the site and dictated by Section 5.4.

4.3 EFFECT OF RECLAMATION ON FUTURE MINING

Additional resources may be available in the walls surrounding the quarry and in the floor as it is currently designed. These resources are planned to be left accessible and no reclamation activities would marginalize future production.

5.0 RECLAMATION PRACTICES AND ACTIONS

(PRC §2772(c)(8))

5.1 DRAINAGE, STORMWATER, AND EROSION CONTROL

(PRC §2773(a); CCR §§ 3502(b)(6); 3503(a), (b), (d), and (e); 3706; 3710(a)

A site-specific stormwater, erosion control, and drainage plan (included as Appendix D) provides designs to control stormwater and prevent erosion. These measures will be effective in protecting downstream beneficial uses of surface water in accordance with the Porter-Cologne Water Quality Control Act, Water Code §13000, *et seq.*, and the Federal Clean Water Act, 33 U.S.C. §1251, *et seq.*

5.1.1 Stormwater Runoff Control and Management

As shown on Rec-Figure 10, stormwater control facilities have been developed and included in the site design to ensure adequate control of runoff to meet State and County water quality standards. Rec-Figure 16, Stormwater Control and Facilities Flowchart, presents a process-flow diagram for stormwater management for the Project. The flowchart identifies the watersheds and various stormwater control mechanisms, including storage sumps, surge basins, rate control basins, water quality (settling) ponds, and a vegetated sheet drain, that may be implemented to control stormwater runoff. In addition, Appendix D provides a detailed description (including modeling data) outlining the projected stormwater flows and capacity of stormwater control measures to contain these flows.

Figure 16, Stormwater Control and Facilities Flowchart

Stormwater runoff in the North and South Pit watersheds will be retained within water storage sumps within their respective active mining areas. As appropriate and necessary to facilitate mining, retained water within the storage sumps may be pumped out between storms or after the wet season to water trucks for use in dust control or to the overburden surge basin. Runoff from the overburden fill area will be collected in the overburden surge basin. The overburden surge basin size, as shown on Rec-Figures 10 and 16, is designed to reduce peak flows and provide initial settling of sediment particles. Please see Appendix D for basin dimensions and anticipated flows. Stormwater flows from the overburden surge basin discharge to a rate control basin, along with the runoff from the northeast loadout and secondary and ancillary processing and loadout area. Runoff from the southeast loadout area and access ramp flow to a second rate control basin.

The two rate-control basins discharge to a water quality control pond, which would then discharge to a second water quality control pond or vegetated sheet drain[1]. The water quality control pond would discharge to a vegetated sheet drain to provide an additional margin of safety in removing sediment and improving stormwater quality. Flows through the vegetated sheet drain eventually enter Moody Creek near the eastern edge of the Project site.

5.1.2 Drainage and Diversions

Existing site drainage is shown on Rec-Figure 17, Existing Site Drainage. Mining operations and related grading necessary for development of the processing facilities and rail siding/spur will alter existing site drainage within the limits of surface disturbance. As described in detail above, stormwater control measures including surge ponds, diversion channels, and siltation ponds have been included in the site design to ensure control and containment of stormwater so that outfall off-site meets applicable County and State water quality standards. In addition to these measures, grading and erosion control measures will be implemented on-site to further control and channel runoff. As site facilities are developed, grading of the active mining areas, overburden fill area, and primary and secondary processing facilities will direct stormwater to the closest control facility as shown on Rec-Figure 10. A stormwater diversion channel will be constructed on the north side of the secondary and ancillary processing and loadout area to prevent sheet flow from undisturbed lands accessing this portion of the site. As a result of permanent alteration to existing topography, site

[1] SWRCB NPDES Sediment Basin Sizing criteria indicate that only one water quality control pond is necessary, but a second pond has been included in the design if necessary to improve stormwater quality prior to discharge

Figure 17, Existing Site Drainage

grading to direct and contain stormwater and containment facilities to ensure similar or higher water quality final site drainage will change existing conditions (see Rec-Figure 18, Reclaimed Site Drainage).

As shown on Rec-Figure 10, Upper Moody Creek will be diverted from its existing channel slightly north around the secondary and ancillary processing and loadout area until it joins lower Moody Creek. Operations will be set back 100 feet from both upper and lower Moody Creek. Diversion of upper Moody Creek would not begin until any necessary permits are obtained from State and Federal agencies.

5.1.3 Erosion Control

Erosion control measures would be used in, but not limited to, areas of surface disturbance, including:

- Active mining areas;
- Unvegetated portions of the overburden fill area;
- Material and soil stockpiles;
- Unpaved internal haul roads;
- Construction pads; and
- Equipment storage area(s).

Disturbance and removal of vegetation or overburden will be limited to the minimum necessary for construction and mining operations. Surface runoff and drainage from disturbed surfaces will be controlled through a variety of erosion control measures depending on the scale of surface disturbance, terrain, and location of waterways and stormwater control facilities. Potential erosion control measures may include, but would not be limited to, berms, silt fences, sediment ponds, revegetation, or hay bales. Any disturbed areas not actively planned as part of future mining or use in processing or ancillary activities would be revegetated. Erosion and sedimentation will be controlled consistent with a site-specific Stormwater Pollution and Prevention Plan and applicable RWQCB and SWRCB regulations.

Fuels, oils, and various other petroleum products necessary for mining and processing operations would be stored on-site. Those materials stored in containers larger than 55-gallon drums would be contained within adequately sized secondary containment facilities as required by applicable State and County law. The remaining products in

Figure 18, Reclaimed Site Drainage

55-gallon drums or smaller would be stored within a designated maintenance facility area or vehicle. A County-approved Hazardous Materials Business Plan and a Spill Prevention Control and Countermeasure Plan will dictate measures to be taken in the event of accidental spillage.

5.2 PROTECTION OF FISH AND WILDLIFE *(CCR §§ 3503(c) and 3703)*

5.2.1 Wildlife

As discussed in Section 2.6 above, the Property has the potential to support or provide habitat for several rare, threatened, and/or endangered plant and wildlife species. Wildlife habitat is not a proposed second land use but as discussed in Section 5.4 below, proposed revegetation will return the North Pit, South Pit, and primary processing area to an open space condition. The revegetation plan, through the use of vegetation species common in the local area, similar planting density, and monitoring to ensure revegetation success should produce an open space environment with some habitat values. Those areas with substantial infrastructure improvements, including the secondary and ancillary processing and loadout area, rail siding/spur, and access road would remain post reclamation thereby precluding its use as wildlife habitat.

Reasonable measures to protect rare, threatened, and/or endangered plant and wildlife habitat include ensuring that equipment operators confine equipment usage to the defined on-site working areas, removal of vegetation during non-breeding and nesting seasons, and pre-disturbance surveys. Where working areas are expanded, removal of vegetation will not exceed the minimum necessary to complete operations. If avoidance of these habitats is infeasible, mitigation for potential loss of species or specie habitat will be dictated by mitigation measures imposed during the environmental review process and/or Use Permit conditions of approval.

5.2.2 Wetlands

As shown in Table 1, the Project will result in the removal of approximately 0.7 acres of wetlands. The Project will create wetlands within the Moody Creek diversion channel and vegetate sheet drain at a minimum ratio of 1:1 (approximately 0.7 acres). A description of the species, performance standards/success criteria, and monitoring is provided in Section 5.4.

5.3 SITE FACILITY, WASTE, AND OVERBURDEN REMOVAL/DISPOSAL

(PRC 2772(c) and CCR §§3502(b); 3503(d); 3704(c), 3709, and 3712))

5.3.1 Disposal of Waste Rock and Overburden

As discussed in Section 3.3 above, a substantial amount of overburden material would be available as a result of waste from mining operations, silts removed from wash ponds and maintenance of stormwater facilities, and creation of pads for various facilities where cut exceeds fill requirements. Some of this overburden material may be sold for off-site use but a majority would be placed on-site in the overburden fill area (see Rec-Figure 10).

Prior to placement of overburden material, topsoil would be stripped from the immediate area of placement. Over the 100-year life of the Project, approximately 8 million cubic yards of overburden and waste material would be generated by the Project (see Table 5, above). Approximately 4 million cubic yards would be used in the creation of catchment berms on benches, fill material for creation of site facility pads, and grading. The remaining approximately 4 million cubic yards of material would be placed within the overburden fill area. Slopes of the overburden fill area would not exceed 2:1, if constructed in an engineered fashion, otherwise slopes would be 2.5:1 or flatter. As the overburden fill area is constructed, stormwater facilities and erosion control measures, as explained in Section 5.1, would be implemented to prevent erosion and contamination of nearby upper Moody Creek diversion.

Waste rock material (i.e. overburden, non-spec material) generated by the Project would be defined as a Group C mining waste because they are mining wastes from which any discharge would be in compliance with the applicable water quality control plan, including water quality objectives other than turbidity.

In mid-December 2009, a pulverized composite sample of Moody Flats was analyzed by SVL Analytical in Kellogg, Idaho for total metals and Acid-Base Accounting (ABA) (see results for sample 3MMF-1 Composite). The data from the whole rock analysis indicate that the sample does not contain heavy metals at concentrations that exceed hazardous levels. The metals concentrations, in fact, are relatively low and suggest that there are no soluble chemicals present in the rock that could result in an exceedance of water-quality objectives due to runoff from waste rock piles or product stockpiles.

The ABA results indicate very low quantities of pyritic sulfur (the main constituent contributing to acid generation potential [AGP]), with an acid neutralization potential (ANP) of 28.6 and an AGP of 4.0. Thus, the ratio of ANP to AGP is more than 7.

Overall, there are no specific State or County standards related to AGP. There is, however, a substantial amount of information and discussion related to this issue developed by the Central Valley Regional Water Quality Control Board (RWQCB) (especially the Redding office), the U.S. EPA, and the USGS. In general, it is reported that rocks with an ANP greater than 20, and a ratio of ANP to AGP of greater than 3 are not acid-producing (U.S. EPA 1994). According to Mr. Phil Woodward of the RWQCB Redding office, the RWQCB uses these same guidelines in assessing the potential for acid mine drainage. Since the analysis from the Moody Flats sample had an ANP of 28.6 (i.e. >20) and an ANP to AGP ratio of over 7 (i.e. >3), the data indicate that the proposed mining project does not have the potential for acid mine drainage conditions.

5.3.2 Building, Structure, and Equipment Removal

Construction and development of the secondary and ancillary processing and loadout area, rail siding/spur, and access road are expensive and valuable improvements; future use of the property would likely incorporate these facilities. As such, these components are scheduled to remain. No post-reclamation storage of equipment, supplies, or other materials related to mining of the North and South Pits is expected. The equipment and associated structures necessary for operation of facilities that would remain post-reclamation (i.e. secondary and ancillary processing and loadout area, rail siding/spur) would be transported and stored within these areas for future use. All other facilities and equipment would be removed from the Project site.

5.4 REVEGETATION *(PRC 2773(a) and CCR §§3503(f & g); 3705; and 3711)*

Pursuant to PRC §2773(a), a site-specific Revegetation Plan has been prepared for this Project and is included as Appendix C, the primary provisions and requirements of which are summarized below.

5.4.1 Topsoil Salvage, Maintenance, and Redistribution

Salvage

Topsoil will be stripped in phases based upon development of the mining, processing, overburden fill area and rail siding/spur areas. Stripping of topsoil from the primary processing plant, secondary and ancillary processing and loadout area, rail siding/spur, and access road would be removed within the first 10 years of operation as permanent facilities are constructed. Topsoil salvage from the North and South Pits, internal haul roads, and overburden fill area would be limited to the minimum necessary for active mining operations, distribution of overburden and waste material, and equipment

movement. Topsoil salvage shall not precede operations by more than 1 year and will not occur during the rainy season or when soil is saturated.

The total amount of topsoil that would be salvaged in the 100-year life of the Project is approximately 1.5 million cubic yards. Table 6 provides the amount of overburden/ waste and topsoil redistributed in that area upon final reclamation.

TABLE 6
TOPSOIL AND OVERBURDEN USE

Facility	Overburden/Waste Used in Development or Reclamation of Site Facility (cu. yds)	Topsoil Used in Reclamation of Site Facility (cu. yds)[1]
North Pit	Catchment Berms: 88,000 Floor[1]: 75,000	Catchment Berms: 4,500 Floor: 75,000
South Pit	Catchment Berms: 27,000 Floor[1]: 25,000	Catchment Berms: 1,500 Floor: 25,000
Primary Processing Plant	1,600,000	16,000
Secondary and Ancillary Processing and Loadout Area	2,100,000	N/A
Rail Spur/Siding	165,000	N/A
Overburden Fill Area	4,300,000	50,000

Notes:

[1] Assumes minimum overburden and topsoil resoiling of 6 inches. The amount of overburden and topsoil used in resoiling may be modified based on results of test plots as described in section 5.4.2 below.

Stockpiling

Topsoil salvaged during construction of the primary processing plant, secondary and ancillary processing and loadout area, rail siding/spur, and access road would be stockpiled in a location outside the active mining area and separate from the overburden fill area and other waste material stockpiles. Topsoil removed from new active mining areas would be stockpiled within the floor of the active mining area. To protect from inadvertent destruction, topsoil stockpiles would be surrounded by flagged staking and signage. Topsoil stockpiles that will not be disturbed within 6 months shall be revegetated to protect against erosion. In order to maintain topsoil micro-organism oxygen availability, stockpiles will not be compacted.

Due to the large amount of topsoil that would be salvaged and stockpiled during the initial 10 years of the Project and the lack of concurrent reclamation areas in the near future, topsoil stockpiles could remain undisturbed for years. In these situations, prior to use of this topsoil in reclamation activities, the stockpiled topsoil would be analyzed by an approved soils and plant laboratory. If necessary, based upon laboratory results, the Operator would amend the topsoil to a structure and nutrient level consistent with the surrounding area.

Use and Redistribution

Use of topsoil in reclamation is limited to cover of the overburden fill area, catchment berms on the North and South Pit benches, primary processing plant, and internal haul roads. As discussed in Section 4.0, the primary processing plant, secondary and ancillary processing and loadout area, rail siding/spur, and access road will remain post reclamation and will not be subject to revegetation treatment. Concurrent reclamation and associated topsoil use will be limited to catchment berms on completed benches, construction pads, and internal haul roads. Redistribution of topsoil will be structured so that harder mine overburden and waste is placed below finer materials including overburden or waste mixed with silts and fines. Topsoil used in concurrent and final reclamation may be amended with silts and fines from silts ponds and stormwater facilities if necessary and available. Topsoil, as available, would be spread over the overburden at a depth determined appropriate to meet revegetation success criteria as shown in test plots described in Section 5.4.2 below.

5.4.2 Test Plots

A test plot program will be established concurrent with mining until a determination is made as to the most appropriate planting procedure to be followed for each plant community to ensure successful implementation of the revegetation plan. Three distinct test plot areas will be established to test revegetation success: 1) catchment berms on quarry benches, 2) overburden fill area, and 3) quarry floors and primary processing plant. Test plots for these three areas will be located in soils and locations representative of future revegetation areas. A total of three plots will be tested within each of the three areas. Each plot will have varied rip, topsoil, and overburden depths, and representative mixes of native seeds and plants of each plant community type to be restored.

The test plot program will be initiated when sufficient areas are available for concurrent reclamation. For the catchment berms, this will not begin until completion of the first quarry bench and safety standards allow such activities. Test plots for the quarry

floors, primary processing plant, and overburden fill area would occur 5 years prior to concurrent or final reclamation of these areas.

5.4.3 Site Preparation

Prior to distribution of overburden/waste and topsoil, any compacted soils subject to reclamation treatment would be ripped or disked a minimum of 12 inches. Internal access roads no longer necessary for active mining or part of permanent facilities to remain post reclamation would be inspected for roadbase materials and petroleum or lubricant spill residue. If present, this material would be removed prior to decompaction.

5.4.4 Revegetation Species, Actions, and Success Criteria

Species

A list of tree, shrub, and herbaceous plant species to be planted in the revegetation areas are presented in Table 7. Other native plant species suited to each community may be added to the list at the time of installation, depending on availability, genetic compatibility, and results of the test plots.

TABLE 7
POTENTIAL REVEGETATION SPECIES[1]

Common Name	Scientific Name	Percent Composition	Recommended Propagule Size	Installation Rate (Plants Per Acre)
SUCCESSIONAL FOOTHILL PINE WOODLAND				
Trees				
Foothill Pine	*Pinus sabiniana*	60%	Plug, leach tube or bare root	120
Interior Live Oak	*Quercus wizlizenii*	20%	Seed, 1 gallon and/or tree pot	40
Black Oak	*Quercus kelloggii*	20%	Seed, 1 gallon and/or tree pot	40
Total Trees		**100%**	**-**	**200**
Shrubs				
White leaf Manzanita	*Arctostaphylos visida*	20%	4" or 1 gallon	35
Buckbrush	*Ceanothus spp.*	10%	Seed, 4" or 1 gallon	18
Holly-leaved Redberry	*Rhamnus illicifolia*	5%	4" or 1 gallon	9
California Sagebrush	*Artemisia californica*	30%	Seed, 4" or 1 gallon	52
Coyote Brush	*Baccharis pilularis*	30%	Seed, 4" or 1 gallon	52

Common Name	Scientific Name	Percent Composition	Recommended Propagule Size	Installation Rate (Plants Per Acre)
Foothill Penstemon	*Penstemon heterophyllus*	5%	Seed or 4"	9
Total Shrubs		**100%**	**-**	**175**
Herbs				
Common Yarrow	*Achillea millefolium*	10%	Seed	-
Deerweed	*Lotus scoparius*	30%	Seed	-
Blue Wild Rye	*Elymus glaucus*	60%	Seed	-
Total Herbs		**100%**	**-**	**-**
Biosol Mix 7-2-3 , or equiv.		-	Fertilizer	-
Turbo Start, or equiv.		-	Microbial inoculants	-
Mulch and/or Tackier.		-	-	-
SUCCESSIONAL OAK WOODLAND – HYDROSEED				
Trees				
Blue Oak	*Quercus douglasii*	30%	Seed, 1 gallon and/or tree pot	78
Black Oak	*Quercus kellogii*	30%	Seed, 1 gallon and/or tree pot	78
Interior Live Oak	*Quercus wizlizenii*	30%	Seed, 1 gallon and/or tree pot	78
California Buckeye	*Aesculus californica*	10%	Seed, 4" and/or 1 gallon	26
Total Trees		**100%**	**-**	**260**
Shrubs				
Toyon	*Heteromeles arbutifolia*	20%	Seed, 4" and/or 1 gallon	27
Buckbrush	*Ceanothus spp.*	10%	Seed, 4" and/or 1 gallon	13
Holly-leaved Redberry	*Rhamnus illicifolia*	10%	Seed, 4" and/or 1 gallon	14
Coyote Brush	*Baccharis pilularis*	60%	Seed, 4" and/or 1 gallon	81
Total Shrubs		**100%**	**-**	**135**
Herbs				
Common Yarrow	*Achillea millefolium*	10%	Seed	-
Purple Needlegrass	*Nassella pulchra*	40%	Seed	-
Blue Wild Rye	*Elymus glaucus*	40%	Seed	-
Woolly Sunflower	*Eriophyllum lanatum*	10%	Seed	-
Total Herbs		**100%**	**-**	**-**
Biosol Mix 7-2-3 , or equiv.		-	Fertilizer	-
Turbo Start, or equiv.		-	Microbial inoculants	-
Mulch and/or Tackier.		-	-	-

Common Name	Scientific Name	Percent Composition	Recommended Propagule Size	Installation Rate (Plants Per Acre)
SUCCESSIONAL FOOTHILL PINE WOODLAND - HYDROSEED (Access road to north pit and perimeter of south pit, if pit is used for water storage)				
Shrubs				
California Sagebrush	*Artemisia californica*	40%	Seed	38
Coyote Brush	*Baccharis pilularis*	30%	Seed	28
Buck Brush	*Ceanothus spp.*	20%	Seed	19
Foothill Penstemon	*Penstemon heterophyllus*	10%	Seed	9
Total Shrubs		**100%**	**-**	**94[2]**
Herbs				
Common Yarrow	*Achillea millefolium*	10%	Seed	-
Deerweed	*Lotus scoparius*	30%	Seed	-
Blue Wild Rye	*Elymus glaucus*	60%	Seed	-
Total Herbs		100%	-	94[2]
Biosol Mix 7-2-3 , or equiv.		-	Fertilizer	-
Turbo Start, or equiv.		-	Microbial inoculants	-
Mulch and/or Tackier.		-	-	-
FRESHWATER WETLANDS				
Meadow Barley	*Hordeum brachyantherum*	30%	Seed	-
Pale Spikerush	*Eleocharis macrostachya*	20%	Plug	-
Seep Monkey Flower	*Mimulus guttatus*	20%	Seed	-
Black Willow	*Salix goodingii*	20%	Dormant cutting	-
Iris-leaved Rush	*Juncus xiphioides*	10%	Plug	-
Total		**100%**	**-**	**-**

[1] Species list and propagule size may be revised based on results of test plots and additional information gathered prior to completion of mining.

[2] Seed application rate shall be calculated to achieve stated shrub density.

With the exception of the grasses and forb species identified above, seeds, plugs and cuttings to propagate woody plants for revegetation will come from on-site or vegetative areas similar to those found on-site.

Irrigation

No fixed schedule of irrigation will meet the needs of different plants during all times of year and in varying weather and soil conditions. Therefore, irrigation will be scheduled by analysis of drought stress and soil moisture conditions. Revegetation areas will be irrigated when soil in the root zone is dry enough to warrant irrigation. Supplemental irrigation will be required for the container stock plants immediately after installation

and for a minimum of 3 years after planting. To encourage deep rooting, deep watering will be implemented for all container stock. Woody plantings will be watered in such a way that the soil profile is wetted continuously to a depth of at least 3 inches. Irrigation will be discontinued at the end of 3 years after planting, but will be resumed any time during Years 4 and 5 if plants show significant drought stress during monitoring. The goal is to have the plants off irrigation for 2 years before the end of the 5-year establishment period.

Revegetation Schedule

Revegetation actions will begin approximately 1 to 2 years prior to actual planting/ hydroseeding and after the completion of test plots demonstrating successful revegetation parameters. Table 8, Typical Revegetation Schedule, provides an approximate schedule for revegetation actions once an area is available for concurrent or final reclamation.

TABLE 8
TYPICAL REVEGETATION SCHEDULE

	Year 0				Year 1				Year 2				Years 3-5			
	W	*S*	*S*	*F*	*W*	*S*	*S*	*F*	*W*	*S*	*S*	*F*	*W*	*S*	*S*	*F*
Propagation of Propagules[1]																
Final Site Preparation																
Hydroseed Revegetation Areas																
Install Container Stock Plants																
Conduct Site Maintenance																
Supplemental Planting (if necessary)																
Conduct Yearly Monitoring																

Notes:

[1] Collection of propagules and contract-growing of plant materials should be initiated at least 1 year prior to out planting.

Revegetation Goals and Success Criteria

Long-Term Revegetation Goals

1. Implement revegetation in a manner that stabilizes soil and minimizes soil erosion.
2. Establish successional foothill pine woodland on the benches of the North Pit and South Pit, overburden fill area, primary processing plant, and floor of South Pit (if South Pit is not used for water storage). Achieve this goal by implementing the following objectives:
    - Install successional foothill pine woodland vegetation that can persist in winter-wet and summer-dry site conditions
    - Achieve plant cover in 5 years that represents 60 percent of the pine woodland reference site data.
    - Utilize native pine woodland plant species that can grow within overburden materials on excavated benches and within stockpiled overburden areas.
    - Utilize both hydroseed and container stock planting techniques to establish grass, forb and woody plant species.
    - For woody plant species, utilize site-specific plant propagules or those collected from the Moody Creek watershed and/or Shasta County in the revegetation efforts.
    - Maintain 60 percent survival of installed container stock plants each year for a minimum period of 5 years. Install replacement plants if needed to meet survival rates and to achieve plant cover requirements.
    - Control cover of target invasive weeds (e.g., thistles and others) to less than 10 percent each year.
3. Establish successional oak woodland within the floor of the North Pit to provide compensatory mitigation for the removal of oak trees from the quarry project. Achieve this goal by implementing the following objectives:
    - Install successional oak woodland vegetation that can persist in winter-wet and summer-dry site conditions.
    - Achieve plant cover that represents 60 percent of the oak woodland reference site data in 5 years.

- Utilize both hydroseed and container stock planting techniques to establish grass, forb and woody plant species.
- For woody plant species, utilize site-specific plant propagules or those collected from the Moody Creek watershed and/or Shasta County in the revegetation efforts.
- Maintain 60 percent survival of installed trees each year for a minimum period of 5 years. Install replacement plants if needed to meet survival rates or to achieve plant cover requirements.
- Control cover of target invasive weeds (e.g., thistles and others) to less than 10 percent each year.

4. Hydroseed internal access roads and perimeter of South Pit (if pit is used for water storage) at completion of quarry operations.
    - Install native grasses and forbs along decommissioned roadbed to stabilize the area(s) and to facilitate natural colonization of native species from the adjacent pine woodland.
    - Achieve plant cover that represents 60 percent of the pine woodland reference site data in 5 years.
5. Establish freshwater wetlands within the Moody Creek diversion channel and vegetation sheet drain area to provide compensatory mitigation for the removal of wetlands by the quarry project. Achieve this goal by implementing the following objectives:
    - Install freshwater wetlands vegetation that represents fresh-emergent wetlands, riparian wetland, and seep-spring habitat types that can persist in intermittent flow conditions.
    - Create approximately 0.3 acres of wetlands within the Moody Creek diversion channel on minimum 3-foot-wide low elevation benches adjacent to a low-flow channel.
    - Create approximately 0.4 acres of wetlands within the vegetated sheet drain area, creating low elevation benches adjacent to meandering low-flow channels.
    - Install native grasses, forbs, and subshrubs within designated revegetation areas using hydroseed and container stock materials.
    - For woody plant species, utilize site-specific plant propagules or those collected from the Moody Creek watershed and/or Shasta County in the revegetation efforts.

- Achieve 50 percent plant cover by wetland indicator plant species in 5 years.
- Control cover of target invasive weeds to less than 10 percent each year.

Success Criteria

Performance standards have been established for the successional foothill pine woodland and successional oak woodland based on data collected from reference transects and the project goals for creating a mosaic of mature, self-sustaining native plant communities on the quarried lands. The revegetation area will meet species diversity (i.e., number of plant species) and relative plant cover values as a percentage of the reference transects data (using data from mature habitats). Reference transects were established in oak woodland and pine woodlands within the Project site in July 2010 (North State Resources, Inc., 2010). Data on plant cover and species diversity collected at five sites was used to develop the performance standards; data from these transects is presented in Table 9, Summary of Reference Transect Data. A delineation of wetlands was conducted in 2010 (north State Resources, Inc., 2010). Plant cover data from wetland sample point and wetland criteria in the *Corps of Engineers Wetlands Delineation Manual* was used to develop the performance standards for the created freshwater wetlands.

Areas receiving only hydroseed application (i.e., access road to the north pit and rim of south pit [if pit is used for water storage]) and the high wall benches also have performance standards. Reference data for these areas was obtained from transect in annual grassland and a transect within the oak-pine woodland.

Performance standards will be measured during Years 1-5. The standards (as listed in Table 10, Performance Standards Revegetation Areas, Years 1-4 and Final Success Criteria for Year 5) for the successional foothill pine and oak woodlands are based on achieving a percentage of the reference transect data each monitoring year. The standard for the freshwater wetlands is to achieve 50 percent cover by dominant species that have a wetland indicator status of OBL, FACW, or FAC in 5 years. As depicted on Table 10, survival of container stock plantings, plant cover, and site maintenance will be monitored. Remedial measures will be implemented by the project applicant if these standards are not achieved in any of the monitoring years. Examples of remedial actions include

re-planting failed plants, re-seeded bare areas, increasing weeding sessions, and/or modifying the irrigation system.

TABLE 9
SUMMARY OF REFERENCE TRANSECT DATA

Plant Community Type	Plant Cover (%)	Plant Cover (%)	Average Cover Value (%)	Average Density per 600 m² Plot	Approximate Density per Acre
FOOTHILL PINE AND PINE/OAK-DOMINATED WOODLANDS					
	Plot #2	***Plot #4***	-	-	-
Total Plant Cover	**45%**	**49%**	**47%**	**-**	**-**
Tree Cover					
Foothill Pine	<1%	6%	3%	5	38
Blue Oak	19%	<1%	10%	6	41
Interior Live Oak	13%	14%	14%	18	122
Black Oak	0%	1%	<1%	1	1
Tree Cover Total	**32%**	**21%**	**27%**	**30**	**202**
Shrub/Vine Cover (all species)					
White Leaf Manzanita	6%	28%	17%	21	142
Toyon	0%	1%	<1%	1	7
Buck Brush	1%	0%	<1%	1	7
Holly-leaved Redberry	<1%	0%	<1%	1	7
Poison Oak	2%	<1%	1%	1	7
Shrub/Vine Cover Total	**7%**	**28%**	**18%**	**25**	**169**
Herb Cover (all species)	**5%**	**0%**	**3%**	**-**	**-**
Native Species Diversity	14 species	7 species	11 species	-	-
OAK-DOMINATED WOODLANDS					
	Plot #1	***Plot #6***	-	-	-
Total Plant Cover	**92%**	**84%**	**88%**	**-**	**-**
Tree Cover					
Blue Oak	50%	0%	25%	18	122
Black Oak	0%	46%	23%	14	95
Canyon Live Oak	0%	10%	5%	4	27
Foothill Pine	0%	<1%	<1%	1	7
Interior Live Oak	0%	<1%	<1%	1	7
Tree Cover Total	**50%**	**56%**	**53%**	**38**	**257**
Shrubs/Vines					
White Leaf Manzanita	2%	4%	3%	2	14
Toyon	0%	15%	8%	1	7
Buck Brush	0%	4%	2%	1	7
Holly-leaved Redberry	0%	4%	2%	1	7
Poison Oak	0%	<1%	<1%	1	7
Shrub/Vine Cover Total	**2%**	**27%**	**15%**	**6**	**41**

Plant Community Type	Plant Cover (%)	Plant Cover (%)	Average Cover Value (%)	Average Density per 600 m² Plot	Approximate Density per Acre
Herb Cover (all species)	**40%**	**0%**	**20%**	**-**	**-**
Native Species Diversity	4 species	9 species	7 species	-	-
SUCCESSIONAL COMMUNITIES (MIXED CHAPARRAL AND ANNUAL GRASSLAND)					
	Plot #8	*Plot #9*	-	-	-
Total Plant Cover (all species)	**81%**	**81%**	**81%**	**-**	**-**
Tree Cover					
Interior Live Oak	8%	0%	4%	7	47
Foothill Pine	<1%	0%	<1%	1	7
Tree Cover Total	**8%**	**0%**	**4%**	**8**	**54**
Shrub/Vine Cover					
White Leaf Manzanita	71%	0%	36%	11[1]	74
Toyon	<1%	0%	<1%	3[1]	20
Shrub/Vine Cover Total	**71%**	**0%**	**36%**	**-**	**-**
Herb Cover (all species)	**<1%**	**81%**	**41%**	**-**	**-**
Native Species Diversity	4 species	1 species	3 species	-	-
FRESHWATER WETLANDS (INTERMITTENT SWALE AND RIPARIAN WETLAND)					
		Wetland Delineation Data		*Average Value*	
Total Plant Cover		35-100%		65%	
% of Dominant Species OBL, FACW, FAC		75-100%		96%	
Black willow		Obligate		>20%	
Narrow-leaved Willow		Obligate		>20%	
California Button Willow		Obligate		>20%	
Pale Spikerush		Obligate		>20%	
Willow Dock		Obligate		>20%	
Perennial Ryegrass		Facultative		>20%	
Seep Monkey Flower		Obligate		>20%	

[1] Data for these species from Plots #2 and #4.

TABLE 10
PERFORMANCE STANDARDS REVEGETATION AREAS
YEARS 1-4 AND FINAL SUCCESS CRITERIA FOR YEAR 5

	Year 1	Year 2	Year 3	Year 4	Year 5
	Success Criteria Performance Value (percent of reference transect data)				
SUCCESSIONAL FOOTHILL PINE WOODLAND					
Species Diversity, Native Species	>8 species	>8 species	>8 species	>8 species	>8 species
Total Plant Cover	>5%	>12%	>16%	>21%	>28%

	Year 1	Year 2	Year 3	Year 4	Year 5
	Success Criteria Performance Value (percent of reference transect data)				
Tree Cover					
Foothill Pine	1%	2%	3%	6%	7%
Interior Live Oak	2%	2%	4%	6%	6%
Black Oak	1%	1%	2%	2%	3%
Tree Cover Total	**4%**	**4%**	**9%**	**14%**	**16%**
Tree Density (# trees per acre)					
Foothill Pine	85	85	85	85	85
Interior Live Oak	24	24	24	24	24
Black Oak	12	12	12	12	12
Tree Density Total	**121**	**121**	**121**	**121**	**121**
Tree Survival (%)	60%	60%	60%	60%	60%
Approximate Tree Spacing (feet)	20′	20′	20′	20′	20′
Shrub/Vine Cover					
White Leaf Manzanita	1%	1%	1%	1%	1%
Buck Brush	1%	1%	1%	1%	1%
Holly-Leaved Redberry	1%	1%	1%	1%	1%
CA Sagebrush	1%	2%	3%	3%	4%
Coyote Brush	1%	1%	2%	3%	4%
Shrub/Vine Cover Total	**5%**	**6%**	**8%**	**9%**	**11%**
Shrub Density (# shrubs per acre)					
White Leaf Manzanita	20	20	20	20	20
Buck Brush	10	10	10	10	10
Holly-Leaved Redberry	10	10	10	10	10
CA Sagebrush	30	30	30	30	30
Coyote Brush	30	30	30	30	30
Shrub Density Total	**100**	**100**	**100**	**100**	**100**
Approximate Shrub Spacing (feet)	20′	20′	20′	20′	20′
Herb Cover (all species)	**40%**	**40%**	**30%**	**30%**	**30%**
Cover by Invasive, Non-Native Plant Species	<10%	<10%	<10%	<10%	<10%
OAK WOODLAND					
Species Diversity, Native Species	>8 species	>8 species	>8 species	>8 species	>8 species
Total Plant Cover	>8	22	31	40	53
Tree Cover					
Blue Oak	2%	4%	7%	9%	10%
Black Oak	1%	2%	6%	8%	9%
Interior Live Oak	1%	2%	3%	5%	8%
California Buckeye	1%	2%	2%	3%	5%
Tree Cover Total	**5%**	**10%**	**18%**	**24%**	**32%**
Tree Density (# trees per acre)					
Blue Oak	46	46	46	46	46
Black Oak	46	46	46	46	46
Interior Live Oak	46	46	46	46	46

	Year 1	Year 2	Year 3	Year 4	Year 5
	Success Criteria Performance Value (percent of reference transect data)				
California Buckeye	15	15	15	15	15
Tree Density Total	**154**	**154**	**154**	**154**	**154**
Tree Survival (%)	60%	60%	60%	60%	60%
Approximate Tree Spacing (feet)	20′	20′	20′	20′	20′
Shrub/Vine Cover					
Toyon	1%	2%	2%	2%	2%
Buck Brush	1%	1%	2%	2%	2%
Holly-Leaved Redberry	1%	1%	2%	2%	2%
Coyote Brush	1%	2%	2%	3%	4%
Shrub/Vine Cover Total	**4%**	**6%**	**8%**	**9%**	**10%**
Shrub Density (# shrubs per acre)					
Toyon	8	8	8	8	8
Buck Brush	8	8	8	8	8
Holly-Leaved Redberry	16	16	16	16	16
Coyote Brush	48	48	48	48	48
Shrub Density Total	**80**	**80**	**80**	**80**	**80**
Approximate Shrub Spacing (feet)	20′	20′	20′	20′	20′
Herb Cover (all species)	**40%**	**40%**	**30%**	**30%**	**30%**
Cover by Invasive, Non-Native Plant Species (%)	<10%	<10%	<10%	<10%	<10%
Container Stock Plant Survival (%)	60%	60%	60%	60%	60%
SUCCESSIONAL FOOTHILL PINE WOODLAND - HYDROSEED (Access road to north pit, and perimeter of south pit, if pit is used for water storage)					
Species Diversity, Native Species	5 species	5 species	5 species	5 species	5 species
Total Plant Cover	20	25	30	40	50
Shrub/Vine Cover					
California Sagebrush	<1%	1%	1%	2%	4%
Coyote Brush	<1%	1%	1%	2%	4%
Buck Brush	<1%	<1%	1%	2%	2%
Blue Wild Rye	<1%	1%	1%	2%	5%
Deerweed	<1%	1%	1%	2%	5%
Foothill Penstemon	<1%	<1%	<1%	<1%	<1%
Shrub/Vine Cover Total	**<1%**	**4%**	**5%**	**10%**	**20%**
Shrub Density (# shrubs per acre)					
California Sagebrush	16	16	16	16	16
Coyote Brush	6	6	6	6	6
Buck Brush	11	11	11	11	11
Blue Wild Rye	6	6	6	6	6
Deerweed	6	6	6	6	6
Foothill Penstemon	6	6	6	6	6
Shrub Density Total	**51**	**51**	**51**	**51**	**51**
Approximate Shrub Spacing (feet)	30′	30′	30′	30′	30′
Herb Cover (all species)	**20**	**21**	**25**	**30**	**30**

	Year 1	Year 2	Year 3	Year 4	Year 5
	Success Criteria Performance Value (percent of reference transect data)				
Cover by Invasive, Non-Native Plant Species (%)	<10%	<10%	<10%	<10%	<10%
FRESHWATER WETLANDS (Moody Creek Diversion Channel and Vegetated Sheet Drain)					
Species Diversity, Native Species	5 species	5 species	5 species	5 species	5 species
Cover by Dominant Species that are OBL, FACW, or FAC	30%	40%	50%	60%	60%
Black Willow	1%	5%	10%	20%	20%
Meadow Barley	20%	20%	20%	20%	20%
Pale Spikerush	5%	10%	10%	10%	10%
Iris-Leaved Rush	2%	5%	5%	5%	5%
Seep Monkey Flower	2%	5%	5%	5%	5%

5.4.5 Monitoring and Maintenance

Reconnaissance Surveys

A qualified botanist, ecologist, or revegetation specialist will periodically survey the revegetation area during the first year after planting. Reconnaissance surveys will be conducted four times during Year 1 and twice a year during Years 2-5. During these surveys, revegetation areas will be examined for plant damage and changes or adjustments to revegetation plan activities will be made as necessary (i.e., altering the maintenance schedule, adding extra weed control visits, increasing or reducing the frequency or amount of irrigation water, etc.).

Detailed Monitoring of Shrubs and Trees for Plant Survival and Growth

In addition to the reconnaissance surveys, monitoring visits will be made to the revegetation area between July and September of Years 1-5. These visits can be concurrent with reconnaissance surveys above, and will be used to collect quantitative data on the revegetation plantings. The monitoring survey will evaluate plant survival and health/vigor during or, for some species, just after, peak growth.

The container stock plantings will be monitored as to dead/alive, height, and health/vigor. During Years 1-5, yearly plant survival within each created habitat type should be at least 60 percent. If plant survival falls below 60 percent in any year, supplemental container stock planting will be undertaken the following fall. If a plant

species does poorly at the site, the revegetation specialist will assess suitability of the revegetation site for that plant species and recommend further remedial action, including species substitutions.

If plant cover is less than the required amounts, the revegetation specialist will assess whether remedial actions are necessary (i.e., additional plantings to increase cover values) to achieve yearly performance standards.

Maintenance

The revegetation specialist will monitor the need for maintenance and document maintenance task items performed. Documentation will include the date, maintenance tasks performed, who performed maintenance, notes on other tasks requiring action, and observations of problems or potential problems. Maintenance tasks documented will include, but not be limited to: irrigation, irrigation system maintenance, weed control, supplemental planting, mulching, plant protection measures and debris removal. Table 11, Maintenance Schedule, outlines an approximate maintenance schedule that should be followed once revegetation begins.

TABLE 11
MAINTENANCE SCHEDULE

Task	Winter	Spring	Summer	Fall
Yearly, conduct field inspections to monitor plant growth and progress of flowering stalks on invasive weed species. Monitor project area for changes in distribution of existing invasive weeds.				
Yearly, prior to the spring flowering season conduct first-season removal of invasive weeds.				
Monthly, check planting basins and remove weeds, repair browse protection cages, if needed.				
Yearly, in early spring check irrigation system and program system for spring and summer irrigation (Years 1-3)				
In spring and summer, every two weeks check irrigation system to ensure each plant is receiving adequate water; repair leaks or other problems with irrigation system.				

Weed Control

The botanical survey conducted for the Project site identified six non-native invasive plants with a Cal-IPC rating of High, including: red brome (*Bromus madritensis ssp. rubens*), cheatgrass (*Bromus tectorum*), yellow starthistle, medusahead, Himalay blackberry, and french broom (*Genista monspessulana*). Infestations of non-native plants will be reduced and controlled throughout the revegetation area and in adjacent existing vegetation if these areas are providing a significant source of weed seeds. The safest way to control weeds is to patrol frequently, and remove weeds manually. It is improbable that pre-emergent herbicides will be appropriate for use on the revegetation site as they do not discriminate between desirable native seeds and undesirable weeds, but prevent all seed germination. If herbicides are considered necessary, they will be used only on the recommendation of a California Licensed Qualified Applicator in conjunction with a qualified revegetation specialist, and only on sites narrowly specified.

5.5 GEOTECHNICAL REQUIREMENTS *(CCR §§3502(b) and 3704)*

As discussed in Section 3.3 above, North and South pit slopes would have an overall (stepped) slope of approximately 1:1 (horizontal:vertical [h:v]) with individual 50-foot highwalls separated by 60-foot-wide horizontal benches (see Rec-Figure 13). The overburden fill area would have fill slopes of 50 feet in height separated by 30-foot-wide horizontal benches. The overall slope of the overburden fill area is 2:1 (h:v). The following provides a discussion based on facility outlining the conclusions of the slope stability evaluation included as Appendix E, Slope Stability Evaluation.

5.5.1 North Pit

The slope stability evaluation identified a minimum factor of safety in the North Pit between 1.44 and 1.51 for static conditions and 1.10 and 1.16 for pseudo-static (seismic) at the conclusion of operations. The proposed slope design outlined above has a satisfactory limited of equilibrium for gross stability with individual slopes anticipated to be stable at a gradient of 0.25: 1 (h:v). Common to hardrock quarries small scale localized planar, toppling and wedge failures may exist due to fracturing of bedrock. As a result, localized layback of individual slopes or portions thereof may be needed to accommodate unfavorable fracture planes encountered during quarry activities.

5.5.2 South Pit

In the South Pit, the factor of safety ranged between 1.40 and 1.94 for static conditions and 1.03 and 1.26 for seismic, assuming a groundwater elevation of 1,070 ft msl. Assuming no groundwater is present, the factor of safety ranged between 1.56 and 1.79 for static conditions and 1.19 and 1.37 for seismic. Gross stability of the overall slopes is satisfactory per limit equilibrium stability analyses.

Areas of the South Pit are capped with a variable thickness of weathered bedrock with depths of up to approximately 60 feet below the ground surface. Individual slopes cut in both unweathered and weathered bedrock are anticipated to be stable at 0.25: 1 (h:v) as proposed. Individual slopes cut in the shallow highly weathered bedrock are not expected to be stable at 0.25:1 (h:v). The weathered bedrock appears to be more prominent in the eastern portion of the South Pit and would be exposed in the northwest-, west-, and southwest-facing quarry slopes. The uppermost portions of the northwest-, west-, and southwest-facing slopes, where weathered bedrock is encountered may be laid back to 1.5:1 (h:v). The final slope design and extent of the layback in the highly weathered bedrock will be dependent on its depth and would be subject to field evaluation by the California-certified Engineering Geologist during mining. Based on these evaluations, recommendations as to final slope design and layback in the highly weathered bedrock will be followed.

Similar to the North Pit, small scale localized planar, toppling and wedge failures may exist due to fracturing of bedrock. As a result, localized layback of individual slopes or portions thereof may be needed to accommodate unfavorable fracture planes encountered during quarry activities.

5.5.3 Overburden Fill Area

The stockpile fill slope produced a factor of safety of 1.06 for static and 0.73 for seismic where the fill was placed over the topsoil mantle and 1.62 and 1.10 for static and seismic, respectively, where the topsoil was stripped to expose the underlying bedrock prior to placement of the fill. To maintain a satisfactory factor of safety topsoil would be stripped prior to placement of overburden fill. Consistent with SMARA, overburden fill slopes would be 2:1. In addition, as fill slopes are constructed they would be subject to field evaluation by a California-certified Engineering Geologist. Based on recommendations of these evaluations, slopes may be modified based on actual field verified slope stability including engineering of slopes or increasing the slope angle to 2.5:1 or greater.

5.6 PUBLIC SAFETY/CLOSURE *(CCR §§3502(b) and 3713)*

5.6.1 Closure of Surface Openings

If drill holes or monitoring wells are developed during the course of mining, they will be closed in accordance with CCR §3713 requirements.

5.6.2 Public Safety

The Project is located on private property; the second land use of open space may increase the level of public exposure to the site. Final slopes are designed at factors of safety appropriate for the end use. Primary access to the operating site is through a single roadway, which has a gated entrance. The property access is fenced and gated.

The Quarry highwalls will be fenced and bermed to limit public access. Advertent trespass will be addressed by signage.

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REFERENCES AND RESOURCES

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