MOODY FLATS QUARRY PROJECT

GEOLOGY AND SOILS

DECEMBER | 2009

REVISED FEBRUARY 2011

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

Applicant/Operator
Moody Flats Quarry, LLC

BENCHMARK RESOURCES

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GEOLOGY AND SOILS

Ground shaking from earthquakes, liquefaction, landslides, land subsidence, and erosion are the main geologic constraints that affect Shasta County (County). The purpose of this section is to evaluate the suitability of the Moody Flats Quarry (Project) site for the proposed development and to mitigate potential impacts to people, property, and natural resources associated with existing geologic conditions and Project-related changes to the environment.

1.0 METHODOLOGY AND TERMINOLOGY

Preparation of this section was based on a review of various geologic reports, publications, and maps of the County and Project site. Additionally, the Applicant has prepared the following reports:

- CH2M Hill. *Preliminary Geotechnical Exploration: 3M Plantsite Development, Mountain Gate, California*. March 1981.
- Petra. *Slope Stability Evaluation, 3M Moody Flats Quarry, Shasta County, California*. December 2009.

These reports were used to determine geological and soil impacts for the development of the Project site. Copies of these reports are provided in Appendices E and J.

2.0 EXISTING CONDITIONS

2.1 Regional 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.

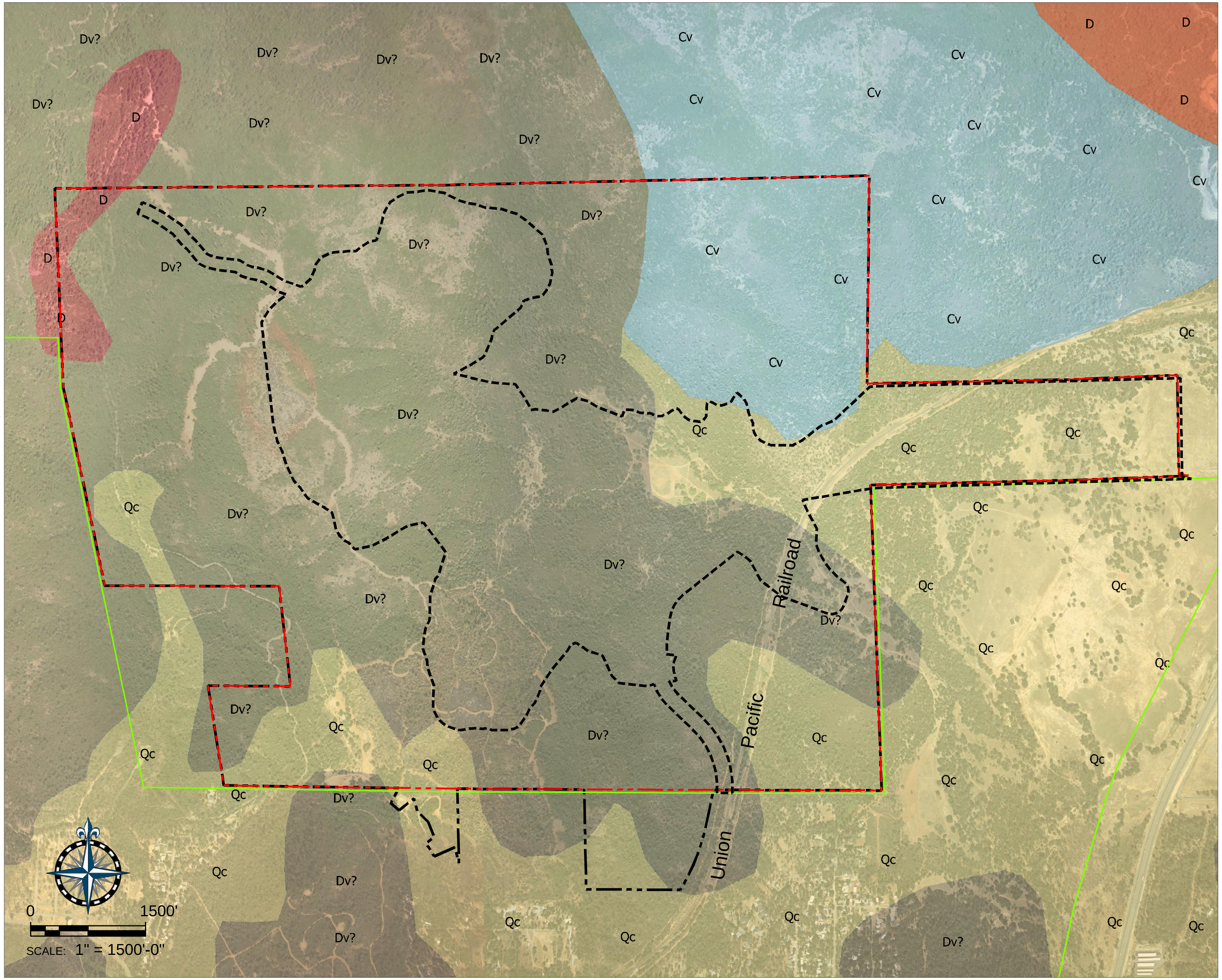
Bordering the Project site to the southeast is the Great Valley geologic province. The Great Valley is a northwest-trending geosyncline. It has a complex geologic history involving four episodes of tectonism, and marine and non-marine sedimentation from the late Jurassic to Recent time. Marine siltstone 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.

Site geology is shown on GEO-Figure 1, Geology.

2.2 Project Site 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.



Cv Carboniferous metavolcanic rocks

Qc Pleistocene nonmarine

Dv? Devonian and pre-Devonian? metavolcanic rocks

D Devonian marine

Property Ownership

Site Boundary

Limits of Surface Disturbance

SOURCE: California Department of Conservation, Division of Mines and Geology

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Geology

MOODY FLATS QUARRY

GEO - Figure 1

- 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.

2.3 Seismic and Other Hazards

2.3.1 Seismicity

The California Geological Survey (CGS) designates faults as active, potentially active, and inactive depending on the frequency of the movement that can be substantiated for a fault. CGS evaluates the activity rating of a fault in fault evaluation reports that compile available geologic and seismologic data and evaluate if a fault should be zoned as active, potentially active, or inactive. Fault activity is rated as follows:

- Active (A) - Holocene Within last 11,000 years;
- Potentially Active (PA) - Quaternary 11,000-1.6 Million Years; and
- Inactive (I) - Pre-Quaternary Greater than 1.6 Million.

One unnamed fault is known to traverse the project site (Jennings & Bryant, 2010) as shown on GEO-Figure 2, Fault Activity. As explained by the CGS, the unnamed fault is a “pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement. Some faults are shown in this category because the source of mapping used was of reconnaissance nature, or was not done with the object of dating fault displacements. Faults in this category are not necessarily inactive.” There are also several regional and local faults traverse the surrounding region the most significant of these being the potentially active Battle Creek fault. The Battle Creek fault is located about 25 miles south of the Project site.

2.3.2 Liquefaction

Liquefaction is a phenomenon in which saturated soils lose strength and cohesion when subjected to dynamic forces, such as shaking during an earthquake. Liquefaction can

SOURCE: Department of Conservation, Division of Mines and Geology (2010)

Late Quaternary: Faults showing evidence of displacement during the late Quaternary time.

Early Quaternary: Undivided Quaternary Faults

Pre-Quaternary: Faults without recognized Quaternary displacement or showing ecidence of no displacement during Quaternary time. Not necessarily inactive.

N

0 4 miles

SCALE: 1" = 4 miles

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Fault Activity

MOODY FLATS QUARRY

GEO - Figure 2

also occur in unsaturated soils with low cohesion, such as sand. Ground failure resulting from liquefaction can include sand boils, ground settlement, ground cracking, lateral spreading, slope toe failure, and ground warping.

The soils at the Project site are thin, especially toward the ridges to the north and west where mining of the North and South Pit would primarily occur. The material underlining these soils is of granitic nature and not generally subject to saturation or loss of cohesive strength during seismic events. Therefore, the potential risk of liquefaction impacts at the Project site is considered insignificant.

2.3.3 Subsidence

Soil subsidence can result from both natural and man-made phenomena. Natural phenomena that may induce subsidence include seismically induced settlement (liquefaction); soil consolidation; oxidation or dewatering of organic-rich soils; and collapse of subsurface cavities. Man-made activities such as withdrawing subsurface fluids through groundwater pumping may help induce subsidence by decreasing pore pressure.

Subsidence is particularly common in soils having high silt or clay contents. However, the Project site is located within a large granitic structure. Consequently, subsidence as a result of natural or man-made phenomena at the Project site is not considered significant.

2.3.4 Landslides

Landslides, rock falls, and debris flows are all forms of mass wasting, the movement of soils and rock under the influence of gravity. A landslide may occur if source material on a slope is triggered by some mechanism. Source materials include fractured and weathered bedrock and loose soils. Triggering mechanisms include earthquakes, saturation from rainfall, and erosion.

Landslide risk categories can generally be categorized into four categories. Areas of "no risk" are identified as flatlands, valley bottoms, and areas of minimal topographic relief. Areas of "low risk" are generally identified as those along hillside and mountains terrain of competent igneous and metamorphic rocks and sedimentary rocks with favorable bedding and composition. The "moderate risk" category includes dip slopes, complexly folded metamorphic rocks, and zones of fractured rock. The "high risk" locations are those that consist of weak, landslide-prone rocks and existing or historical landslide locations. Therefore, in general, landslide hazards are locations along foothills and mountainous terrain, steep banks along rivers, and passes through valley floors.

The Project site has locations with relatively steep slopes. The elevation change along the western slope near the Project site is approximately 1,000 feet vertical to about 4,000 feet horizontal. This equates to an average slope of 14-degree angle. However, this represent an overall average; some locations have slopes steeper than 14 degrees. If the granitic rocks in the steeper areas are fractured, the area would be more susceptible to landslides. Using the general criteria established above the Project site represents a low to moderate risk for a landslides event.

2.3.5 Erosion

Erosion is the wearing away and removal of soils and/or rocks by natural forces. The main natural erosion forces are rainfall, wind, percolation of water that slowly dissolves rock (water is known as the universal solvent; because given time, it will eventually dissolve or wear any rock or other surface materials), or landslides.

Erosion of the surface caused by rainwater is known as sheet-wash. Sheet-wash is described as water flowing across land and picking up particles of soil or organic materials and carrying them away. Additionally, rainwater flows can cause rilling, which is when runoff water forms shallow broad channels across an area. Both sheet-wash and rilling leave patches of deposited soil material as a result of decreasing water velocity that result from diminishing land gradient or from slackening rainwater.

Wind erosion picks up small soil particles or bounces or rolls large particles along the land surface. Wind erosion is most serious when the soil is bare and exposed to strong wind.

Although all of these erosion processes are natural, human activity can often multiply the frequency and size of the erosion event. Human activities that can increase erosion include:

- Reducing the rate by which water can enter the soil (e.g., covering the land with impervious surfaces such as houses, roads, and shopping centers), and thereby, promote rapid runoff and greater erosive power of the water;
- Making drainage systems which concentrate runoff without controlling flow;

- Using poor agricultural practices such as overgrazing and cutting furrows down slope rather than with the natural contour of the land; and/or
- Excavating an area, which remove the vegetation and leaves the soil exposed to erosive factors.

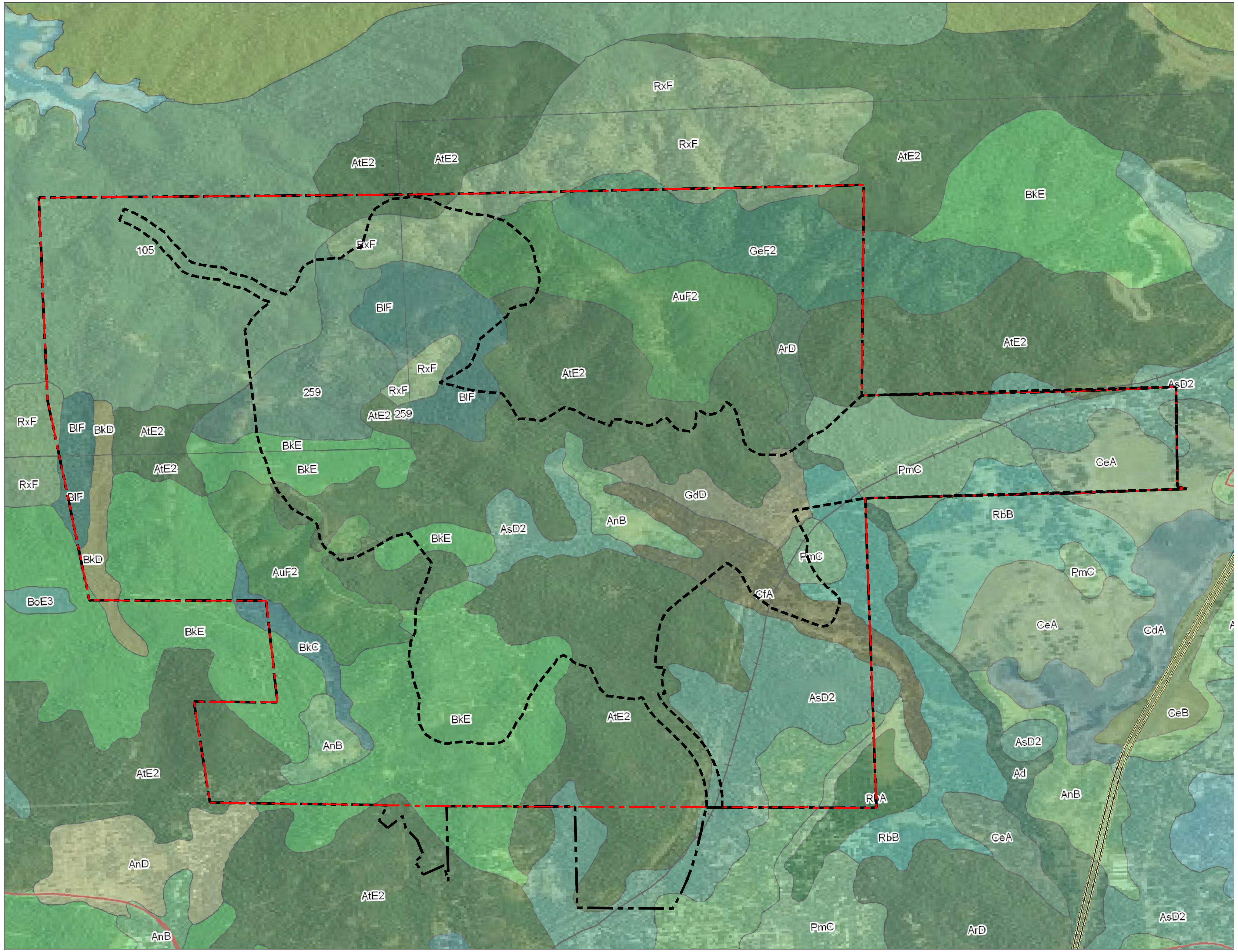
The Project site has been historically used, and is currently being used, as undeveloped open space. Some surface soils have been exposed due to development of internal roads and historic surface water flows. In some higher elevation areas, vegetative cover has been reduced as a result of over-steep slopes and a fire that burned a portion of the Project site.

2.4 Soils

Soils types vary greatly across the property, as shown in GEO-Figure 3, Soils. Soil boundaries shown on GEO-Figure 3 are approximate, based on the location and soils observed in the soil profiles as mapped by the Natural Resource Conservation Service.

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.



SOURCE: U.S.D.A., National Resource Conservation Service WSS

Symbol	Soil
ArD	Anderson gravelly sandy loam
AnB	Auburn loam, 0% to 8% slopes
AsD2	Auburn clay loam, 0% to 30% slopes, eroded
AtE2	Auburn very stony clay loam, 30% to 50% slopes, eroded
AuF2	Auburn very rocky clay loam, 50% to 70% slopes, eroded
BkC	Boomer gravelly loam, 0% to 15% slopes
BkD	Boomer gravelly loam, 15% to 30% slopes
BkE	Boomer gravelly loam, 30% to 50% slopes
BlF	Boomer very sandy loam, 50% to 70% slopes
CeA	Churn gravelly loam, 0% to 3% slopes
CfA	Churn gravelly loam, deep, 0% to 3% slopes
GdD	Goulding very stony loam, 10% to 30% slopes
GeF2	Goulding very rocky loam, 50% to 70% slopes
PmC	Perkins gravelly loam, 8% to 15% slopes
RbA	Red Bluff loam, 0% to 3% slopes
RbB	Red Bluff loam, 3% to 8% slopes
105	Holland family, deep complex, 40 to 60 percent slopes
259	Rock outcrop-Goulding family complex, 40% to 80% slopes
RxF	Rockland

Property Ownership

Site Boundary

Limits of Surface Disturbance

N

0 1000'

SCALE: 1" = 1000'

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Soils

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GEO - Figure 3

- **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 REGULATORY SETTING

3.1 State

The State of California has established a variety of regulations and requirements related to seismic safety and structural integrity, including the California Building Code, the Alquist-Priolo Earthquake Fault Zoning Act and the Seismic Hazards Mapping Act.

3.1.1 California Building Code

The California Building Standards Code (CBSC) is included in Title 24 of the California Code of Regulations (CCR) and is a portion of the California Building Standards Code. Under state law, all building standards must be centralized in Title 24 or they are not enforceable. The CBC incorporates the Uniform Building Code, a widely adopted model building code in the United States. Through the CBSC, the state provides a minimum standard for building design and construction. The CBSC contains specific requirements for seismic safety, excavation, foundations, retaining walls and site demolition. It also regulates grading activities, including drainage and erosion control.

3.1.2 Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. The main purpose of the Act is to prevent the construction of buildings used for human occupancy on active faults.

3.1.3 Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act, passed in 1990, addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically-induced landslides. Under the Act, seismic hazard zones are to be mapped by the State Geologist to assist local governments in land use planning. As of September 2009, the Shasta County area had not been mapped under the Seismic Hazards Mapping Act, because the state targeted higher risk areas, such as the San Francisco Bay area.

3.2 Local

3.2.1 Shasta County General Plan

The Health and Safety Element of the Shasta County General Plan includes several objectives and policies to reduce the risks from seismic and other geologic hazards. The following provides those objectives and policies regarding seismic and other geologic hazards applicable to this Project:

Objectives:

SG-1 Protection of all development from seismic hazards by developing standards for the location of development relative to these hazards; and protection of essential or critical structures, such as schools, public meeting facilities, emergency services, and high-rise and high-density structures, by developing standards appropriate for such protection.

SG-2 Protection of development on unstable slopes by developing standards for the location of development relative to these hazards.

SG-3 Protection of development from other geologic hazards, such as volcanoes, erosion, and expansive soils.

SG-4 Protection of waterways from adverse water quality impacts caused by development on highly erodible soils.

Policies:

SG-b In order to minimize development that would be endangered by landslides, geological investigations by a registered geologist or a geological engineer will be required on all subdivision and/or developments where the preliminary staff report indicates the possibility of landslides on or adjacent to the development. A landslide map shall be developed and maintained as these reports are accumulated for reference by the development sponsors.

SG-d Shasta County shall develop and maintain standards for erosion and sediment control plans for new land use development. Special attention shall be given to erosion prone hillside areas, including those with extremely erodible soils types such as those evolved from decomposed granite.

3.2.2 Shasta County Grading Ordinance

The Shasta County Grading Ordinance (Grading Ordinance) sets forth regulations concerning grading, excavating, and filling. The Grading Ordinance prohibits any grading of more than 250 cubic yards or 10,000 square feet of disturbance area without a grading permit from the County. The grading permit must include an approved grading plan provided by the project applicant, and it must set forth terms and conditions of grading operations that conform to the County’s grading standards. The permit also requires the project applicant to provide a permanent erosion control plan that must be implemented upon completion of the project.

As outlined in Section 12.12.050(A)(3) of the Grading Ordinance, mining and ground disturbing activities are exempt from preparation of a grading plan when a use permit and reclamation plan are granted by the County.

4.0 THRESHOLDS OF SIGNIFICANCE

Appendix G of the CEQA Guidelines provides guidance for assessing the significance of potential environmental impacts. Relative to geology, soils, and seismic consideration, a Project may have a significant effect on the environment if it will:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;.
  - Strong seismic ground shaking;
  - Seismic-related ground failure, including liquefaction;
  - Landslides;
- Result in substantial soil erosion or the loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;
- Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water; or
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, creating substantial risks to life or property.

5.0 ENVIRONMENTAL IMPACTS, MITIGATION MEASURES, AND SIGNIFICANCE DETERMINATIONS

Impact 3.6-1: Ground Rupture and Shaking from a Known Earthquake Fault or Liquefaction

Review of the Fault Activity Map of California and Adjacent Areas and the Peak Acceleration from Maximum Credible Earthquakes in California indicates that there are no known active or potentially active faults in the immediate vicinity of the Project. The nearest mapped active fault to the Project site is the Battle Creek fault located approximately 25 miles to the south. Therefore, the Project would not expose people or structures to substantial adverse affects due to ground rupture.

The potential for liquefaction within the Project site is low, due to the lack of unconsolidated sediments and lack of near-surface groundwater. Additionally, during the early phases of the Project, most of the unconsolidated deposits that could potentially increase liquefaction potential would be removed and processing facilities would then be constructed on exposed bedrock. No impacts to Project facilities or reclamation features would be anticipated.

Level of Significance Before Mitigation: Less than Significant

Mitigation Measures: None Required

Impact 3.6-2: Erosion and Loss of Topsoil

Erosion and associated impacts are discussed in detail in the Hydrology and Water Quality Environmental Assessment include in Part II of the Application Package. In addition, Appendix D contains a detailed Stormwater, Erosion Control, and Drainage plan that outlines onsite measure to prevent erosion of disturbed soils. The Project may also require the following additional permits: General Industrial Storm Water Permit (GISWP), Section 404 Permit, and Streambed Alteration Agreement.

With implementation of the Stormwater, Erosion Control, and Drainage plan and state and federal permitting requirements, erosion would be minimized and sediment would be contained on site in engineered storm water detention basins.

Level of Significance Before Mitigation: Less than Significant

Mitigation Measures: None Required

Impact 3.6-3: Slope Stability

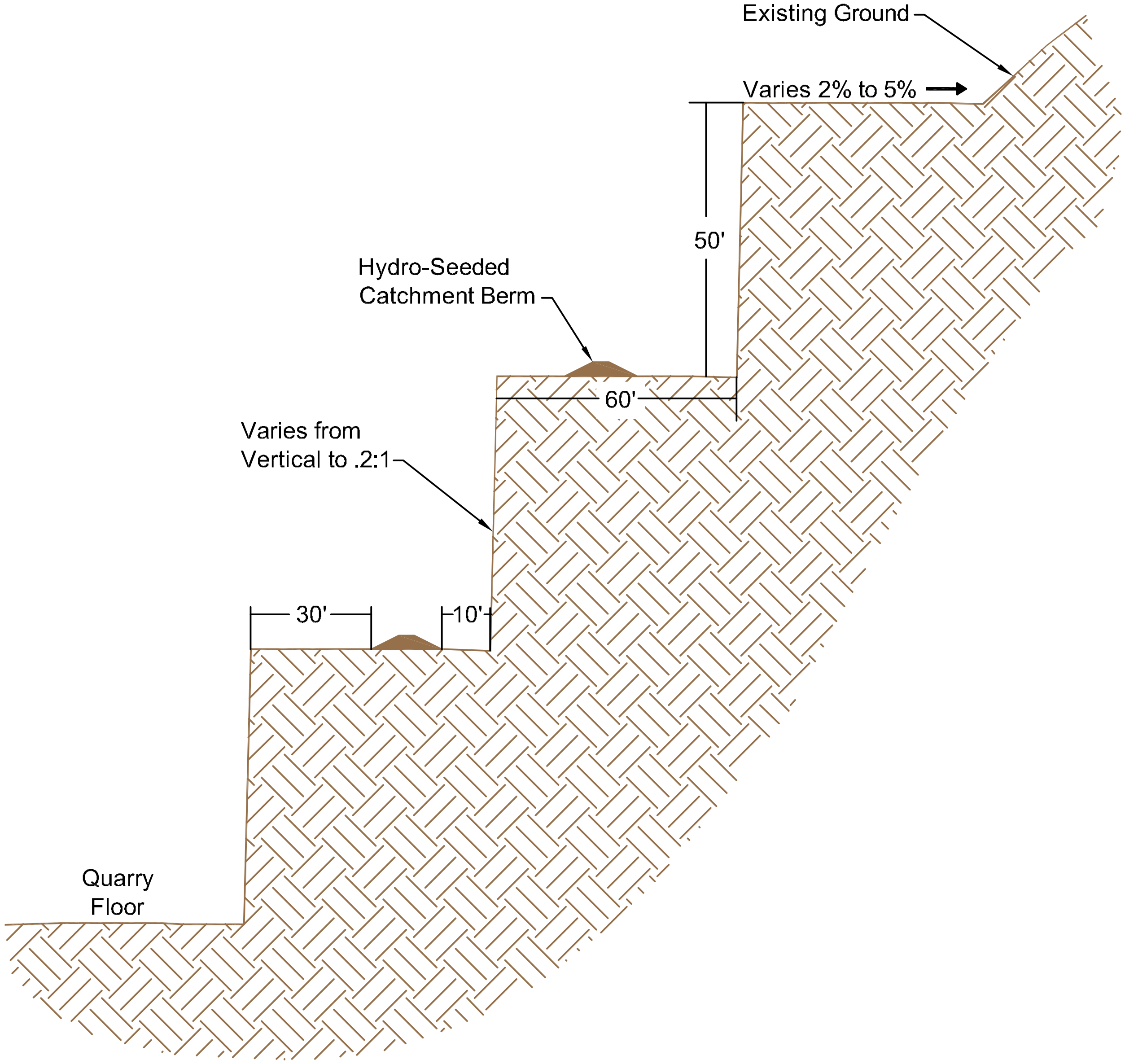
Operations at the site will use conventional mining practices common in the industry. Quarrying is initiated by establishing a working bench at the upper quarry limit. As the initial bench is extended laterally along the quarry face, a new bench is established at the next lower level. Bench areas are extended until the planned quarry backwall is reached; successive benches are developed as the quarry progresses downward. Mineral reserves will be removed through a combination of drilling, blasting, and excavation equipment. The quarry would be excavated with an overall (stepped) slope of 1:1 (1 horizontal to 1 vertical) (see GEO-Figure 4, Conceptual Quarry Excavation Cut Slope). Loaders or similar excavating equipment will remove the 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.

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.

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.



Conceptual Quarry Excavation Cut Slope

MOODY FLATS QUARRY

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).

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.

Overburden Fill Area

The overburden 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.

Level of Significance Before Mitigation: Potentially Significant

Mitigation Measures:

Mitigation Measure GEO-1a: South Pit

The uppermost portions of the northwest-, west-, and southwest-facing quarry slopes, where highly weathered bedrock is encountered, should be laid back to 1.5:1 (h:v). The vertical extent of the layback is anticipated to be on the order of 60 vertical feet, but is subject to field evaluation by the California-certified Engineering Geologist during construction.

Mitigation Measure GEO-1b: Overburden Fill Area

- *Topsoil shall be stripped and stockpiled separately from overburden and other materials prior to placement of overburden fill material within the* *stockpile area. Topsoil shall be stripped no more then 30 days prior to placement overburden fill material.*

- *Overburden fill area slopes shall be constructed at a 2:1 slope in an engineered fashion or slope faces shall be constructed at 2.5:1 and are not required to be constructed in an engineered fashion.*

Impact 3.6-3: Expansive Soil

Expansive soils are characterized by their ability to undergo significant volume change (shrink and swell) due to variation in soil moisture content. Potential impacts associated with shrink/swell cycles include unacceptable settlement or heave of structures, concrete slabs supported-on-grade, and pavements. Thirteen soil types are located within the Project's limits of surface disturbance and some of these soils have a moderate to high shrink/ swell potential. Though expansive soils are not considered to pose a significant hazard, the effects of potentially expansive soils on structures can be reduced through proper engineering design and standard corrective measures. Construction in conformance with California Building Standards Code and Uniform Building Code Standards adopted by the County will ensure that the potential for impacts related to soil expansivity are reduced to a level of less-than-significant.

Level of Significance Before Mitigation: Less than Significant

Mitigation Measures: None Required

Impact 3.6-5: Lack of Public Sanitary Sewer Infrastructure and Waste Water Disposal

The Project is located within the unincorporated portion of the County without public sanitary sewer. The Project will include sanitary systems using portable chemical toilets until such time sufficient the site has sufficient infrastructure and associated workforce to sustain and warrant an engineered wastewater treatment and disposal system. Because such a system may not be necessary for a decade or more, at which time technology may have changed or public waste management services may be available onsite, the Operator will obtain any necessary permits for such a system at that time. If an engineered wastewater treatment and disposal system is the preferred option it will comply with state and county requirements.

Level of Significance Before Mitigation: Less than Significant

Mitigation Measures: None Required