SANTA CLARA COUNTY, CALIFORNIA

STEVENS CREEK QUARRY

RECLAMATION PLAN AMENDMENT

CA MINE ID 91-43-0007

DECEMBER | 2020

Lead Agency:
Santa Clara County Department of Planning and Development

Prepared for:
Stevens Creek Quarry, Inc.

Preparer:
Benchmark Resources

BENCHMARK RESOURCES

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Lead Agency:
Santa Clara County Department of Planning and Development
70 West Hedding Street, East Wing, 7th Floor, San Jose, CA 95110

Prepared for:
Stevens Creek Quarry, Inc.
12100 Stevens Canyon Road, Cupertino, CA 95014

Preparer:
Benchmark Resources
2515 East Bidwell Street, Folsom, CA 95630

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1. SUMMARY

The following subsections provide an overview of the site and reclamation plan. Appendix A, "Index to Required Content," provides the location in this document for specific requirements, practices, and standards for reclamation plans.

1.1 Purpose and Objectives

The reclamation plan for the Stevens Creek Quarry (SCQ; site) has been prepared in accordance with the requirements of the Surface Mine and Reclamation Act, found in California Public Resources Code (PRC) Section 2710 et seq., Title 14 of California Code of Regulations (CCR) Section 3500 et seq., and Santa Clara County's (County; the lead agency) implementing ordinance (Santa Clara County Surface Mining Ordinance Sections 2.10.040 and 4.10.370). The purpose of this amendment is to update the reclamation responsibilities based on the expansion of the quarry and end use requiring the importation of fill.

The reclamation plan includes actions designed to meet the objectives for implementing physical reclamation of surfaces disturbed by mining and other associated activities. These physical reclamation treatments are intended to:

- Provide for long-term stability of slopes.
- Prevent wind and water erosion by stabilizing the soil surface through proper grading and drainage.
- Implement a revegetation program designed to establish self-sustaining vegetation cover.
- Reclaim the parcels to an open space condition suitable for future development as allowed under the County Zoning Ordinance at reclamation.

1.2 Site Background and Existing Use

Mining activity has been continuous at the site since the 1940s. The existing site is comprised of 5 assessor parcels, but for convenience has historically been referred to as Parcel A (comprised of 2 assessor parcels), and Parcel B (comprised of three assessor parcels). The County granted SCQ a use permit for Parcel A (Use Permit) in January 1984 (modified September 10, 1996) and granted SCQ continued use of Parcel A for 20 years in 1996. Mining of Parcel B is subject to vested rights. A reclamation plan was approved for Parcels A and B in 1983. In 2009, a reclamation plan amendment modifying the reclamation boundary, allowing partial backfill of Parcel B, and amending the revegetation palette was approved by the County. Since 2009, interim phase mining slopes have exhibited signs of instability that could fail before final buttressing when backfill occurs.

The existing quarry site boundary occupies an area of approximately 170 acres. Operations at SCQ currently consist of excavation/extraction of aggregate resources (i.e., rock and gravel), processing (crushing and screening) of aggregate resources, materials recycling, material loading and weighing, and material hauling.

1.3 Reclamation

The site will be reclaimed to an open space condition suitable for future development as allowed under the County Zoning Ordinance at reclamation. After mining is completed, all temporary structures and mining and processing equipment will be removed, finished slopes graded and engineered where necessary, and revegetation of the entire quarry site performed.

2. SITE DESCRIPTION

The following sections provide general site details such as contact information for the mine owner and operator; evidence of landowner notification of reclamation; reclamation responsibility; and site location, size, site features, and land uses.

2.1 Contact Information

Owner of Property Name: Stevens Creek Quarry, Inc.

Owner of Mineral Rights: Stevens Creek Quarry, Inc.

Address: 12100 Stevens Canyon Road, Cupertino, California 95014

Telephone: (408) 253-2512

Parcels: 351-18-048 (66.3 acres [ac]), 351-10-044 (41.9 ac), 351-10-040 (4.4 ac), 351-10-019 (40 ac)

Owner of Leased Property Name: Hanson Permanente Cement, Incorporated

Owner of Leased Property Mineral Rights: Hanson Permanente Cement, Incorporated

Street Address or PO Box: 24001 Stevens Creek Boulevard

City, State, Zip Code: Cupertino, California 95014

Telephone Number: (408) 253-2512

Parcels: small portions of 351-10-017 (40 ac) and 351-10-039 (35.6 ac)

2.2 Operator

Mine Operator: Stevens Creek Quarry, Inc.

Address: 12100 Stevens Canyon Road, Cupertino, California 95014

Telephone: (408) 253-2512

Contact: Jason Voss

E-mail: jvoss@scqinc.com

2.3 Reclamation Responsibility

A statement for responsibility to complete reclamation in accordance with this plan is provided by the current operator in Appendix B, "Statement of Responsibility."

2.4 Notification of Landowner

Signed landowner notification forms are included in Appendix C, "Notification of Landowners & License Agreement," providing evidence that all landowners have been notified of the proposed use.

2.5 Location, Size, and Legal Description

Stevens Creek Quarry is located approximately 15 miles south of San Jose, California (see Figure 1, "Regional Location," and Figure 2, "Site Location") at the southwestern limits of Santa Clara County. The parcels and their acreages that would be subject to mining related surface disturbance and reclamation are provided below.

The location is also identified as follows:

- **U.S. Geological Survey Township and Range:** Sections 21 and 28, Township 7 South, Range 2 West, Mount Diablo Base and Meridian
- **Latitude and Longitude:** 37.296181° and -122.082135°, at site entrance.

Table 1, "Parcel Acreage and Ownership," provides each parcel within the project boundary, its local jurisdiction, acreage, and ownership.

TABLE 1
PARCEL ACREAGE AND OWNERSHIP

		Approximate Acreage		
Parcel Number	Jurisdiction	*Parcel*	*Within Reclamation Plan Boundary*	Ownership
351-10-017	City of Cupertino	40	4	Heidelberg Cement, Inc.
351-10-019	Santa Clara County	40	40	Stevens Creek Quarry, Inc.
351-10-039	City of Cupertino	35.5	7	Heidelberg Cement, Inc.
351-10-040	City of Cupertino	4.4	3	Stevens Creek Quarry, Inc.
351-10-044	Santa Clara County	41.9	42	Stevens Creek Quarry, Inc.
351-11-001	Santa Clara County	503.8	3	Heidelberg Cement, Inc.
351-18-048	Santa Clara County	66.3	48	Stevens Creek Quarry, Inc.

The legal description of the property under Stevens Creek Quarry ownership and County parcel maps for the entire site are provided in Appendix D, "Grant Deeds, Parcel Map, and Topography."

2.6 Existing and Allowed Land Uses

2.6.1 Land Use Designations

As shown in Table 1 above, the majority of the site is located within the unincorporated portion of the County. A small portion on the eastern side of the site is located within the City of Cupertino (City). Because quarry operations have been under the County's oversight since operations began and because the City lacks a surface mining ordinance necessary to regulate mining operations, the two jurisdictions have agreed that the operation is subject to County approval and regulation.

The *City of Cupertino General Plan* land use map (City of Cupertino 2019) does not assign a land use to the areas of the site within the City. The City land use map notes, "Land use densities for lands located outside the urban service area shall be consistent with residential densities established by the *Santa Clara County General Plan*." As shown on Figure 3, "Zoning," the City zoning district assigned to the site and neighboring properties is Residential Hillside (RHS). Although a quarry is not a permitted or conditionally permitted use in the RHS district, the City previously waived SMARA jurisdiction over the portion of the site (an area on the east side of Parcel B owned by Hanson Permanente Cement via a Memorandum of Understanding with the County [August 2008]). Thus, this small area of the site is not considered a zoning conflict.

The *Santa Clara County General Plan, 1995-2010* (General Plan) (Santa Clara County 1994), classifies the site as Hillsides (see Figure 4, "Land Use Designations"). The General Plan describes this designation as follows:

R-LU 17: These lands also contain such important resources as grazing lands, mineral deposits, forests, wildlife habitat, rare or locally unique plant and animal communities, historic and archeological sites, and recreational and scenic areas of regional importance, which serve to define the setting for the urbanized portions of Santa Clara County. Given the importance of these lands to the county's overall quality of life, allowable uses shall be consistent with the conservation and wise use of these resources and levels of development shall be limited to avoid increased demand for public services and facilities.

R-LU 18: All allowable uses must be consistent with the basic intent of the 'Hillside' designation. The range of allowable uses shall be limited to:

- *a. agriculture and grazing;*
- *b. mineral extraction;*
- *c. parks and low-density recreational uses and facilities;*
- *d. land in its natural state;*
- *e. wildlife refuges;*
- *f. very low density residential development; and*
- *g. commercial, industrial, or institutional uses, which by their nature*
  - *i. require remote, rural settings; or*
  - *ii. which support the recreational or productive use, study or appreciation of the natural environment.*

As shown on Figure 3, those areas of the site within the County have a zoning designation of HS-d1-sr. The Santa Clara County Zoning Ordinance provides, "Permitted uses include agriculture and grazing, very low-density residential use, low density, low intensity recreation, mineral and other resource extraction, and land in its natural state. Low-intensity commercial, industrial, and institutional uses may also be allowed if they require a remote, rural setting and are sized to primarily serve the rural residents or community, or if they support the recreational or productive use, study, appreciation, or enhancement of the natural environment."

2.6.2 Existing Entitlements

The original reclamation plan for Stevens Creek Quarry was approved by the County on December 6, 1983. It covered both parcels: Parcel A (subject to a use permit) and Parcel B (subject to vested rights). The Parcel A use permit was approved by the County Board of Supervisors on September 10, 1996. A January 2009 reclamation plan amendment corrected minor discrepancies between actual and planned activities (i.e., minor boundary adjustment, updated mine and reclamation maps, and update revegetation planting palette).

2.7 Exiting Site Conditions and Features

2.7.1 Existing Site Operations

As shown on Figure 5, "Existing Conditions Aerial Photograph," and Sheet 1, "Existing Conditions Aerial Photograph," the site consists of an active quarry; materials stockpiles; a plant for processing aggregate and recycle; a scale; equipment, fuel storage, maintenance, and storage building, constructed drainage ditches and stormwater containment, and access roads. In addition, a gated (locked) entrance at the northeast corner of Parcel A is used by the City of Cupertino for access to compost facilities that are part of a City program. A description of mining activities is provided in Section 3, "Mining," below. Surrounding active mining and processing operations is open space.

2.7.2 Surrounding Land Uses

The project site is surrounded by undeveloped open space, low-density residential development, mining, and Stevens Creek Reservoir. Table 2, "Surrounding Land Uses," provides a summary of the surrounding land uses closest to the project site. Figure 5 and Sheet 1 shows surrounding land uses.

TABLE 2
SURROUNDING LAND USES

Direction	Land Uses
North	Open space, mining, and cement plant
West	Open space
South	Stevens Creek Reservoir, low-density residential
East	Open space, Sunnyvale Rod & Gun Club

2.7.3 Utilities and Access

Locations of utility features, roads, and other necessary site infrastructure within the vicinity of the site are shown in Figure 5 and Sheet 1. The following utilities are necessary for operation and are available at the site:

- **Power:** Line power and diesel generators
- **Water:** Supplied from stormwater stored in ponds and settling basins
- **Sewage:** Residences on septic, portable facilities are provided throughout the site for personnel.

Three driveways (as shown in Figure 5 and Sheet 1) currently provide vehicular access to Parcel A from Stevens Canyon Road. The driveways are described in the list below:

- the main entrance near the southeast corner of Parcel A, used for ingress only;
- an exit-only driveway located about 180 feet northeast of the entrance; and
- a third driveway at roughly the midpoint of the site's frontage on Stevens Canyon Road, used infrequently by trucks that have already been weighed.

A gated (locked) entrance at the northeast corner of Parcel A is used by the City of Cupertino for access to compost facilities that are part of a City program.

2.7.4 Soils

Soils units identified on the site are shown on Figure 6, "Soils." The soils boundaries are approximate and based on the National Resources Conservation Service (NRCS) Web Soil Survey. The following soil types are included within the site boundary:

- Pits, mine
- Merbeth-Literr complex, 30-65 percent slopes
- Mouser-Maymen complex, 30-75 percent slopes
- Katykat-Sanikara complex, 8-30 percent slopes
- Footpath-Mouser complex, 50-75 percent slopes
- Sanikara-Footpath complex, 30-75 percent slopes

2.7.5 Geology

Site Geology

Franciscan-aged greenstone (metabasalt) is the primary rock type mined in the pit. A small volume of Franciscan-aged limestone and graywacke (Calera Limestone—Sliter and McGann, 1992; Walker, 1950) have been mined in the northeast corner of the pit (See Figure 7, “Geology”). Field observations indicate that the majority of the rocks in the pit are sheared metamorphosed mafic volcanics, with occasional metamorphosed pillow basalts found along the upper part of the west side of the pit. The north and west sides of the pit are separated by a NW-SE trending shear zone that is 50 to 100 feet wide (Rogers and Armstrong, 1973, and Sorg and McLaughlin, 1975).

All rocks in the pit are fractured/jointed/sheared to varying levels. The rocks underwent multiple stages of deformation/shearing during subduction and later tectonic events. Localized shearing also occurred during development of the Berrocal fault. Field observations indicate that rocks within the pit can be separated into three zones. These zones consist of two linear greenstone cores and a limestone (sedimentary Franciscan) unit. They are separated from each other by high dip shear zones. Both the shear zones and the rock cores appear to trend southeast-northwest at an oblique angle to the northerly trending Berrocal fault. These units are part of the Franciscan mélange (Raymond, 1984). Even though they appear to be separate units at quarry scale, the rock cores and shear zones are not regional in scale.

Fracturing within the greenstone cores is relatively widely spaced, and the unfractured greenstone is quite hard. When the cores are mined, the larger greenstone blocks are broken up with a concrete breaker (these rocks were blasted in the past). Fracture spacing, block size, and global rock competence all decrease away from the core to the degree that the rock can be ripped. The shear between the two greenstone zones appears to be combination of serpentine, clay, and highly sheared greenstone.

The upper 2 to 20 feet consists of a reddish-brown residual soil. This overlies moderately to highly weathered bedrock (a 50 to 90 percent rock/soil mixture) that can extend another 5 to 20 feet. Below this is slightly weathered bedrock. This has weathered brown but contains no observable soil. It is more fractured than the underlying unweathered bedrock. Overall weathering and fracturing (with respect to gross rock competence) decreases with depth. Based on color changes and failure mechanisms, the weathered zone extends 80 to 100 feet below the ground surface.

A small area of Franciscan limestones and sedimentary units is located at the northeast corner of the pit (Photo 9). This unit appears to be the southern continuation of a limestone trend on the Kaiser-Permanente quarry. A shear zone separates greenstone from limestone units. The shear zone is 50 to 80 feet wide. Shear indicators were not visible. The Berrocal fault marks the eastern boundary of this area. Like the greenstones, the limestones and sedimentary units are strongly fractured, and it appears that fracturing increases adjacent to the Berrocal fault. Sandstone units at the northeast corner of the quarry (adjacent to the Berrocal fault) showed indications of mineralization while adjacent clays (not the shear zone clays) were moist. No free groundwater was encountered. The moist zone was about 100 feet in diameter and confined to the clays along the eastern border of the pit.

Parcel B Western Slope Failure

The northern portion of the east-facing western slope on Parcel B abuts the active mining area along its western side, whereas the central and southern parts of the western slope are situated along the west side of the main staging/processing and jaw crusher areas, respectively. The northern portion of the western slope opposite the active mining area has experienced surficial slumping and failure of the Franciscan Complex greenstone bedrock nearly along the entire height of the mined slope. The central and southern sections of the western slope have been covered with fill stockpiles that obscured the greenstone bedrock and appear to have experienced surficial slumping and slope movement. A comprehensive discussion of the slope failure is provided in Appendix E, "Slope Stability Analyses."

2.7.6 Biological Resources

Appendix F, "Biological Constraints Report," includes a memo from WRA, Inc. providing a constraints assessment of special-status species and habitat communities with the potential to occur within or near the project site. Appendix G, "Approved Jurisdictional Determination," includes an analysis of potentially regulated waters of the United States identified within the site, per a survey by LSA in 2017.

Habitat Communities

The project site is mostly disturbed by mining. The outer edges of the site support five natural vegetation communities including annual grassland, California bay forest, oak woodland, chaparral, cattail marsh, and open water. The following provides a description of each vegetation community.

- **Annual Grasslands—**dominated by foxtail chess (Bromus madritensis) with wild oats (*Avena fatua*), grassy tarweed (*Madia gracilis*), yellow starthistle (*Centaurea solstitialis*) and many other grasses and herbs present in smaller numbers. Small areas of ruderal vegetation and barren or disturbed areas are included in this category. This community is located in highly disturbed or managed areas within the site.
- **California Bay forest—**dominated by California bay (*Umbellularia californica*) intermixed with big-leaf maple (*Acer macrophyllum*), coast live oak (*Quercus agrifolia*), and western sycamore *(Platanus racemosa*). Understory is typically composed of California wood fern (*Dryopteris arguta*), California blackberry (Rubus ursinus), and poison oak (*Toxicodendron diversilobum*). This community is primarily located on north and east facing slopes in the southern half of the site, typically around ponds and creeks.
- **Oak Woodlands—**dominated by Coast live oak, blue oak (*Quercus douglasii*), and leatheroak (*Quercus durata*) with an understory of annual grasses, black mustard (*Brassica nigra*), and/or poison oak. This community is typically located on ridgetops or the upper portions of steep slopes within the site.
- **Chaparral—**co-dominated by California sagebrush (*Artemisia californica*) and coyote brush (*Baccharis pilularis*). Poison oak and foxtail chess are also present in smaller numbers. This community is primarily located on steep south and west facing slopes and is the most common natural community in the site.
- **Cattail Marsh—**dominated by cattail species (Typha sp.), but narrow-leaved willow saplings (*Salix exigua*) and rabbitsfoot grass (*Polypogon monspeliensis*) are also present. Cattail marsh occurs along the north and west edges of the westernmost pond in the site.
- **Open Water—**aquatic open water features within the site include a series of ponds following the historic path of the unnamed intermittent stream, starting in the west and extending generally southeast through the review area. A total of seven man-made ponds, which were used as settling ponds for the mining operation, occur along this drainage. Based on aerial

photo review all of the ponds have been located at the site for years and in most cases for decades.

Special Status Plant Species

A total of 81 special-status plant species have been documented in the Cupertino and eight surrounding USGS 7.5 minute quadrangles. Appendix F describes these species' regulatory status, habitat requirements, and potential to occur within the site. Of the species documented in the vicinity, 77 are unlikely or have no potential to occur within the site. The following four species have a potential to occur onsite:

- Santa Clara red ribbons (*Clarkia concinna* ssp. *automixa*) CRPR 4.3. Moderate Potential
- Western leatherwood (*Dirca occidentalis*), CRPR 1B. High Potential
- Arcuate bush mallow (*Malacothamnus arcuatus*) 1B.2. Moderate Potential
- White-flowered rein orchid (*Piperia candida*) CRPR 1B. Moderate Potential

Special Status Wildlife Species

A total of 53 special-status wildlife species have been documented in the Cupertino and eight surrounding USGS 7.5 minute quadrangles. Appendix F describes these species' regulatory status, habitat requirements, and potential to occur within the site. Of the species documented in the vicinity, 44 are unlikely or have no potential to occur within the site. The following nine special status wildlife species have a potential to occur onsite:

- Pallid bat (*Antrozous pallidus*). CDFW Species of Special Concern, WBWG High Priority. Moderate Potential
- Hoary bat (*Lasiurus cinereus*), WBWG Medium Priority. Moderate Potential
- San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*), CDFW Species of Special Concern. High Potential
- (Brewster's) Yellow warbler (*Setophaga petechia brewsteri*), CDFW Species of Special Concern. Moderate Potential
- Western pond turtle (*Actinemys marmorata*), CDFW Species of Special Concern. Moderate Potential
- Santa Cruz black salamander (*Aneides flavipunctatus niger*), CDFW Species of Special Concern. Moderate Potential
- California giant salamander (*Dicamptodon ensatus*). CDFW Species of Special Concern. High Potential
- California red-legged frog (*Rana draytonii*), Federal Threatened Species, CDFW Species of Special Concern. Moderate Potential
- Red-bellied newt (*Taricha rivularis*). CDFW Species of Special Concern

Aquatic Features

A total of 6.94 acres (ac) of potential jurisdictional waters were mapped in the site area, consisting of approximately 0.36 ac of potential wetlands and 6.58 ac of non-wetland waters. Areas potentially meeting United States Army Corp of Engineers criteria for wetlands in the review area include four adjacent wetlands: three along the margins of the settling ponds and one along Montebello Creek and an isolated wetland at the edge of the equipment staging area. Potential non-wetland waters in the review area include: seven settling ponds, the channels of three natural drainages, and three manipulated drainages. Potential jurisdictional waters are summarized in Table 3, "Summary of Potential Jurisdictional Waters," below and discussed in detail in Appendix G.

TABLE 3
SUMMARY OF POTENTIALLY JURISDICTIONAL WATERS

Waters Type	Acreage
WETLANDS	
Settling Ponds	0.32
Natural drainages	0.01
Isolated Depression	0.03
NON-WETLAND WATERS	
Settling Ponds	5.92
Natural Drainages	0.59
Manipulated Drainages	6.58

2.7.7 Hydrology

Surface Waters

The Stevens Creek Quarry is located within the Stevens Creek watershed, which is a 38–square–mile drainage basin with its headwaters high in the Santa Cruz Mountains. The Stevens Creek Reservoir lies in the central and lower portions of the watershed and was constructed in 1935 for the purpose of storing winter runoff for the recharge of the Santa Clara Groundwater Basin during the summer months. The reservoir dam is located southwest of the City, at the point where Stevens Creek emerges from a deep canyon between Monte Bello Ridge and Table Mountain. Swiss Creek, the largest tributary of Stevens Creek, enters the reservoir from the west. The quarry is located immediately west of Stevens Creek Reservoir. Rattlesnake Creek, Swiss Creek, and an unnamed tributary cross the site.

Drainage and Stormwater Management

Surface drainage at the facility generally flows southeast towards Stevens Creek Reservoir. Stormwater is conveyed through culverts, french drains, concrete swales, and drainage ditches to sediment traps, sediment ponds, and an onsite stormwater storage tank. The facility is divided into seven (7) drainage areas as shown on Figures 8(a&b), "Stormwater Containment and Management." These figures show the facility layout, including the general site topography, storm drainage system, drainage inlets, and discharge locations within their respective drainage areas. A summary of each drainage area is provided below, and a detailed description can be found in Appendix H, "Stormwater Pollution Prevention Plan."

Drainage Area No. 1 is approximately 16 acres and includes a portion of the Parcel B processing plant area and material stockpiles (see Figure 8b). Drainage Area No. 1 is sloped to drain toward a sediment pond with drainage ditches, a concrete swale, and culverts conveying stormwater flows. Water in this sediment pond is retained by a riser and conveyed through a culvert to outfall on Rattlesnake Creek.

Drainage Area No. 2 approximately 43 acres and receives stormwater from the eastern portion of Parcel B and central portion of Parcel A. This area includes the staging area for RVT, fueling area, and fueling tanks. Water is conveyed through drainage ditches, concrete swales, culverts, and sheet flow to one of two sediment traps or to a metal stormwater storage tank. Water from the sediment traps are conveyed through a culvert or weir to an outfall which discharges to Swiss Creek.

Drainage Area No. 3 includes the office buildings, scale house, scale, recycle plant, and quarry maintenance storage. The drainage area is approximately 9 acres and slopes southwest towards Swiss Creek. Stormwater in this area is conveyed through a French drain into sediment trap, then conveyed through a drainage ditch or culvert into another sediment trap where it discharges to an outfall before reaching Swiss Creek.

Drainage Area No. 4 is approximately 11.2 acres and comprises the eastern portion of Parcel A. Runoff from the topsoil plant is contained by on-site berms adjacent to Stevens Canyon Road. Stormwater is collected in a sediment pond, drainage ditches, concrete lined swales, french drains, swales with check dams, culverts, drop inlets, an underground stormwater storage tank by the Office, and an open concrete drainage box with check dams. Stormwater is eventually conveyed into a sediment trap and discharged through a culvert to outfall before reaching Swiss Creek.

Drainage Area No. 5 is approximately 21.4 -acres. This area was recently regraded to direct all stormwater flow towards drainage area 7.

Drainage Area No. 6 is approximately 4.7 acres and collects runoff from the roads on the southern portion of Parcel B. Runoff from this area is directed into drainage ditches, swales, drop inlets, and culverts, a concrete swale, and eventually into a sediment trap, which discharges through a culvert into an outfall before reaching Rattlesnake Creek.

Drainage Area No. 7 is approximately 78 acres. This drainage area encompasses the active mining and changes frequently due to this activity. The area contains one sediment trap, which collects surface runoff from the access roads on the north hillside and the Radio Tower. Flow from this sediment trap is conveyed into the pit pond. The majority of surface runoff from the excavated hillsides sheet flows into the pit pond. Surface runoff from the access roads sheet flows into a drainage ditch which eventually goes into the pit pond. The pit pond does not have any outfall structures.

The National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Industrial Activities (Industrial General Permit) requires BMPs to be implemented to direct off-site and nonindustrial run-on away from industrial areas and erodible surfaces. Berms, drainage ditches, drop inlets, sediment traps, silt fences, check dams, and straw wattles will be implemented to meet this requirement. These BMPs will be located along the quarry roads and throughout the facility as necessary. Figures showing off-site drainage areas and associated stormwater conveyance facilities or BMPs are provided in Appendix H.

Groundwater

There are a series of houses on the hill south of the quarry (Monte Bello Ridge). The water supply to some of those houses is provided by wells. The bottom of some of the eastern wells extends below the elevation of the quarry floor while the bottom of wells higher in the hills is above the elevation of the quarry floor. The quarry is separated from these houses (and wells) by a Swiss Creek and an ephemeral drainage in Rattlesnake Canyon. Rattlesnake Canyon acts as a hydrologic barrier between the quarry and the hill south of the quarry. The elevation of the creek (and the base of the valley) adjacent to the quarry is between 650 and 690 feet msl. The lowest elevation of the quarry floor is projected to be between 700 and 725 feet msl. When quarrying is finished, the quarry will be filled with approximately 200 feet of fill. Subdrain lines are and will be incorporated into the fill. The quarry is relatively dry, and there is no record of long-term, large water inflows into the quarry or historic need for drainage wells to control water inflows. There is no record of water wells within 1000 feet west, north, or east of the quarry. The Parcel B quarry has been active for more than 40 years, and portions have been excavated to approximately 725-foot elevation. The quarry effectively acts as a drainage pit.

Seepage areas have been observed in the quarry walls, located in the west face near the south end of the quarry and in the middle of the north face. The seeps have produced between 5 and 10 gallons per hour. The flow from these seeps is currently directed into the existing gravity drainage system. There is no indication that drainage wells have been used in or around the quarry. The majority of the quarry walls are covered with fill, and no obvious indications of seepage were seen in those areas. A seasonally dry valley and dry stream above this part of the quarry trend towards the northwest corner of the quarry. The majority of effects on the surrounding groundwater have already occurred. It is likely that bedrock groundwater levels adjacent to the quarry will rise when the quarry is backfilled.

2.8 Pre-SMARA Surfaces

Although the site operated before SMARA was implemented, no pre-SMARA surfaces exist on-site that would be excluded from reclamation under this plan.

3. MINING

The following sections cover mining details and activities related to ensuring mining activities align with the reclamation plan.

3.1 Material Quantity and Type

The primary mineral being mined at the site is Franciscan-aged greenstone (metabasalt) rock for aggregate production. Smaller quantities of Franciscan-aged limestone and graywacke (Calera Limestone) have been extracted from the northeast corner of Parcel B. Approximately 13 million tons of materials (i.e., marketable material and overburden) remain within Parcel B to be mined.

SCQ will maintain existing production and sale levels of two million tons per a year with 30 percent of the material being overburden and fines. The annual two million tons a year includes production and sales from the rock plant (aggregate and sand), recycle plant (concrete and asphalt), topsoil plant, salable products generated from overburden and fines, and imported aggregate material from Lehigh.

3.2 Mining Initiation and Termination Dates

Mining has been ongoing since the 1940s. In consideration of a fluctuating demand for materials based on a fluctuating economy, mining will be complete by December 31, 2050.

3.3 Mining Depth

The quarry floor is planned to have an upper pad with a maximum depth of 600 feet msl and a lower pad with a maximum depth of 550 feet msl.

3.4 Quarry Design and Operations

As shown on Figure 9, "Mine Plan," Figure 10, "Mine Plan Cross Sections," Sheet 2, "Mine Plan," and Sheet 3, "Mine Plan Cross Sections," mining will occur within the central, southern, and eastern portions of Parcel B. Expansion will involve lowering the existing quarry floor approximately 300 feet. The quarry expansion will be developed by continuing to mine new benches to a bottom elevation of between 500-600 feet msl in the central, southern, and eastern portion of Parcel B. The highwall will be developed by stripping and transporting materials to the processing facilities for crushing and stockpiling. Cut slopes are planned to be 1.5H:1V. The quarry floor is planned to have an upper pad with a maximum depth of 600 feet msl and a lower pad with a maximum depth of 550 feet msl. As discussed in section 4 below, the quarry floor will then be backfilled to a maximum elevation between 1,100 and 1,200-feet msl with fill slopes not to exceed 2H:1V overall.

Raw aggregate from the active quarry area is transported via loader or haul truck to the rock plant for primary processing. The material is stockpiled or fed directly into the primary crusher/feeder. The material discharged from the primary crusher is moved along a series of conveyors to the secondary and ancillary processing facilities. Aggregate material is separated by a large vibrating screen that isolates the larger material for reduction in a secondary cone crusher. Smaller material is screened out as base material or conveyed for additional screening and reduction in tertiary crushers. The material is conveyed to finished product screens. The fines are further processed using a dewatering screen along with coarse and fine sand screws. The ultra-fine material is then processed through a plate press. The material is then conveyed to individual stockpiles for shipment. Overburden and fines generated from the mining will be hauled to designated areas and stored temporarily for future reclamation (i.e., for backfilling the pit and creating fill slopes) or undergo further processing and sold as product.

Stevens Creek Quarry, Inc. has a license agreement with the adjacent landowner to extend Parcel B mining east to correct a reclamation boundary encroachment and integrate that correction with other reclamation for the entire parcel (see Appendix C). The reclamation-related grading is limited by a power-line corridor and related structures to a wedge-shaped, 9-acre area.

A 1.5-acre fill area exists on the parcel bordering the western boundary of Parcel B (the same landowner of the parcel on the east side of Parcel B). The landowner has consented that the fill can remain until reclamation. This fill will be removed at reclamation and the area returned to its approximate preexisting topography. The operator will revegetate this area.

3.5 Equipment Storage

Equipment, supplies, and other materials are stored in designated areas. Current storage areas are shown in Figure 5 and Sheet 1.

3.6 Circulation and Parking

As shown on Figure 11, "Internal Circulation, Queuing, and Parking," trucks enter the site from Stevens Canyon Road and immediately turn right towards the soil plant and then circle back towards the office and lower scale house. Trucks turn right past the office and proceed to the north, past the tractor shop, continuing northwest through the site to the recycled or finished aggregate plants and stockpile areas. If trucks are delivering or picking up recycled materials, they will turn right into the recycled plant area. Trucks picking up crushed aggregates products will continue to drive northwest into Parcel B where they will make a large circle to pick-up finished aggregate product. Trucks will follow the same route to exit the site, stopping at one of two scale location to be weighed and ticketed.

4. RECLAMATION

4.1 Reclamation Plan and Surface Treatment

4.1.1 Subsequent Use and Approach

The site will be reclaimed to an open space condition suitable for future development as allowed under the County Zoning Ordinance for "Hillside" districts at reclamation. The County "Hillside" district allows by right uses such as general agriculture, livestock, agricultural accessory structures and uses, nurseries, consumer recycling facilities, and wineries. A variety of other uses are allowed subject to a use permit. After mining is complete, all temporary structures and mining and processing equipment will be removed, finished slopes will be graded and engineered where necessary, fill will be imported and used to backfill the quarry floor and slopes to reclamation specifications, and revegetation of the entire quarry site will be performed. Final quarry cut slopes will be graded at a 1.5H:1V angle, and fill slopes will be graded at a minimum 2H:1V but generally range between 3H:1V and 5H:1V. Upon reaching design depth, onsite stockpiled and imported fill will be used to elevate the floor of Parcel B from its design depth of 550-600 feet msl to between 1,100 and 1,200 feet msl. A total volume of approximately 11.7 to 20.5 million cubic yards is required to fill the quarry floor to its final design elevation. Approximately 8 million cubic yards of backfill may be generated on-site from the proposed mining described in section 5.1 above. It is anticipated approximately 3.7 to 12.5 million cubic yards of backfill material will be imported fill generated from off-site sources. Existing permanent Parcel A infrastructure, including the office, shop, access road, and trucking facility, will remain. The remaining portion of Parcel A will be decompacted and graded. A mix of hydroseeding or broadcast seeding and container plants will be used to revegetate the site. The plan for reclamation is shown on Figure 12(a&b), "Reclamation Plan," Figure 13, "Reclamation Plan Cross-Sections," Sheet 4, "Reclamation Plan – Option A," Sheet 5, Reclamation Plan – Option B," and Sheet 6, "Reclamation Plan Cross Sections."

4.1.2 Surface to Remain

Paved and unpaved access roads that provide access to the interior of the site will remain for site access, monitoring, security, and fire protection. The office, shop, and trucking facility on Parcel A will also remain.

4.1.3 Impact on Future Mining and Surrounding Properties

Reclamation activities will not physically or economically preclude future access to mineral resources, should additional recovery be pursued in the future. The open space that would be left in place on-site could be removed in the future and would have no impacts on future mining.

As shown in Table 2 above, the dominant surrounding land use is open space, much of which has approved vested mining rights. Reclamation of this site to open space is consistent with this land use and would not impact surrounding lands.

4.1.4 Public Safety Considerations

The quarry is private property and setback from the nearest public roadway by approximately ¾ mile; the second land use of open space will not increase the level of public exposure to the site.

4.2 Soil Salvage and Storage, Amendments, and Preparation

Virtually all surfaces at the quarry were developed prior to SMARA (pre-1976) when soil salvage and stockpiling for reclamation were not commonly practiced. As a result, little, if any, native soil is available. Soil material used for reclamation is from overburden encountered during mining, fines generated during processing, and import of fill. Soil is stored in stockpiles at various locations throughout the site (see Figure 5 and Sheet 1) until needed for use in fill slope reclamation or to assist revegetation in meeting performance standards (see Section 4.3.3, "Revegetation Success Criteria"). Timing of soil use is described in Section 4.7, "Phased Reclamation."

4.2.1 Soil Salvage and Storage

The geologic materials at the Stevens Creek Quarry vary, and areas of nonmarketable material are periodically encountered. This material is designated to be used in construction of final Parcel B fill slopes. These materials are removed from new mining areas within no more than 1 year of when mining is scheduled to occur.

The following actions will be implemented related to soil harvesting, stockpiling, and placement:

- Soil and vegetation removal will not precede mining by more than 1 year and will be kept to a minimum.
- After soil is stripped, it will be hauled and stored in a designated soil stockpile if it cannot be used at that time for concurrent reclamation activities.
- The soil will be compacted as little as possible. If compacting of a portion of the stockpiles is necessary for stability, compacting will occur to minimum extent necessary.
- The soil should be dry if it must be harvested, moved, stored, or worked during mining or reclamation activities.
- Soil stockpile areas will be identified and well-marked.
- Relocation of soil after it is stockpiled will be minimized.
- If soil is stored during the winter rainy season, erosion control measures will be implemented.
- Placement of soil resources for reclamation should:
  - use a small bulldozer or similar equipment to rip and blend the soil materials as necessary.
  - be track walked to stabilize the soil material, and then the surface will be scarified to allow for proper seed germination.
  - remove rocks and plant material in excess of four inches to the extent feasible.

4.2.2 Resoiling

The conditions of this site limit the conventional SMARA regulation approach to soils salvage and redistribution. The revegetation plan therefore provides options for the operator to employ. Existing stockpiles of soil, new topsoil generated during new mined surfaces (if any), and imported fill will be incorporated with the top layer of overburden rock when present to improve soil conditions. However, the majority of quarry surfaces have long been established, and new disturbance areas will be limited, if any. The overburden rock substrate and potential soil materials are characterized as follows:

Overburden Rock: The results of soil analysis indicate that the overburden rock alone is not an ideal substrate for certain plant communities. The U.S. Department of Agriculture classification for the overburden rock is a gravelly sandy loam with a diverse distribution of particle sizes. With this varied distribution of particle sizes, the susceptibility to consolidation is high. Given its rocky texture and low organic content, the overburden rock would benefit from the addition of topsoil and/or organic amendments. Blending stockpiled overburden rock with topsoil and other materials is a consideration for improving texture and nutrient content.

Native Topsoil: Planned new areas of mining are limited to marginal perimeter at the west boundary of Parcel B, where topsoil salvage and vegetation salvage and chipping may occur, producing little soil for overall site reclamation.

Rock Plant Fines: The rock plant fines material is a by-product of the rock processing activities at the quarry. It has a clay loam texture and contains a substantially greater amount of silt and clay compared to the overburden rock. The rock plant fines material are expected to have virtually no organic matter content. Blending the rock plant fines material with the overburden may improve soil texture conditions.

Imported Soils: SCQ has long imported surplus construction soil that meets site-specific acceptance criteria and will continue to do so under the approved and amended reclamation plan. Sources of this material will continue to be evaluated for contamination and testing for pesticides, salts, and other impediments to plant growth where the materials would be used for final cover. To augment growth media, imported surplus construction soil with higher organic matter content than on-site materials may also be used in revegetation.

Based on investigations of native soils and the planting palette and considering the available and potential materials to develop a planting substrate, the soil preparation depth for areas targeted for scrub planting over the majority of the surfaces is 6 inches. This depth was tested in the test plots and considered suitable to support most shrub and grass species to be seeded.

4.2.3 Soil Amendments

Soil conditions are not likely to limit the establishment of vegetation; stockpiled fill materials have rapidly revegetated voluntarily. Upon completion of quarry operations and before revegetation of soil begins, a soil analysis will be performed. Based on the results of the soil analysis, fertilizer and soil amendments may be used, as recommended, to ensure revegetation success.

If fertilizers and amendments are determined to be necessary, the following actions will be applied to ensure they do not cause contamination of surface or groundwater:

- Manufacturers' directions for use, storage, and disposal of fertilizers will be followed to ensure their safe use.
- Fertilizer will typically be applied once to promote initial seed and container plant establishment for erosion control purposes on areas planned for revegetation.

A storm water pollution prevention plan (SWPPP) will continue to be required during reclamation activities and is required to be updated to provide Best Management Practices (BMPs) for current conditions during reclamation. The SWPPP will include a determination, based on the quantity of fertilizers and amendments determined to be necessary, of whether the potential exists for sufficient pH, dissolved oxygen content, or nitrogen (i.e., nitrate, nitrite, and total nitrogen) and phosphorous loading in receiving waters to require testing for these pollutants as part of water sampling of stormwater discharges.

4.2.4 Criteria for Imported Soil

SCQ will accept imported surplus construction soil to backfill the quarry area. This soil would be subject to site-specific acceptance criteria developed in coordination with regulatory agencies according to the following guidelines:

1. *California Environmental Protection Agency Department of Toxic Substances Control (DTSC) Information Advisory on Clean Imported Fill Material* guidance document (DTSC 2001);
2. Constituents of concern limits established via the RWQCB environmental screening levels and California Human Health Screening Levels (to establish whether the material is considered a “designated waste” under the California Water Code, in which case it would not meet the Quarry’s acceptance criteria);
3. Federal and state hazardous and nonhazardous waste criteria; and
4. Background concentration data using DTSC, U.S. Environmental Protection Agency Commercial Regional Screening Levels, and federal Resource Conservation and Recovery Act guidelines.

Acceptance of soil will be determined for each individual source location (e.g., construction project), and all soil imported to the site will be subject to testing and quality controls to ensure it meets the site-specific acceptance criteria. Imported soil is anticipated to be received and unloaded near the processing plant on Parcel B if not directly unloaded in the fill placement area.

4.3 Revegetation

Revegetation will occur on the Parcel B slopes and fill pad and Parcel A overburden and recycled materials stockpile. Parcel A ancillary facility areas, including the office, shop, access road, and trucking facility, will remain and not be revegetated. Revegetation tasks, described below and in the attached *Revegetation Plan Stevens Creek Quarry* (December 2020) (see Appendix I, “Revegetation Plan”), will provide vegetative cover using predominantly native plants for final contours, thus controlling erosion and stabilizing slopes. Revegetation efforts will utilize plant materials capable of self-regeneration without continued dependence on irrigation, soil amendments, or fertilizer. Seeding of the fill slopes with a mixture of grasses, herbaceous plants, and shrubs will provide surface cover and erosion control. Shrub planting areas will be located on mine benches between largely unvegetated highwalls that must remain for slope stability purposes. This Revegetation Plan, included in Appendix I and summarized in the sections below, provides a comprehensive approach for a test plot program, soil treatment and plant installation, maintenance and adaptive management guidelines, and verifiable monitoring standards to achieve the goals and objectives listed above.

4.3.1 Revegetation

Seeding

Contoured surfaces would be amended as necessary and covered with grass, herb, and shrub species via seeding either bulk seed spread with a broadcast seeder, or by hydroseeding at the discretion of the operator. Drainage ditches and roads not to remain will be left bare until the completion of the contouring and slope seeding, at which time roads will be ripped and revegetated. Table 4, “Species for General Seeding,” provides a preliminary list of plant species to be used.

TABLE 4
SPECIES FOR GENERAL SEEDING

Scientific Name	Common Name
Artemisia californica	California sagebrush
Baccharis pilularis	coyote brush
Eriogonum fasciculatum	California buckwheat
Salvia leucophylla	purple sage
Salvia mellifera	black sage
Achillea millefolium	yarrow
Artemisia douglasiana	mugwort
Bromus carinatus	California brome
Elymus glaucus	blue wildrye
Eschscholzia californica	California poppy
Heterotheca grandiflora	telegraph weed
Acmispon americanus var. americanus	Spanish clover
Acmispon glaber	deerweed
Lupinus nanus	sky lupine
Melica californica	California melic
Stipa pulchra	purple needlegrass
Poa secunda	one-sided bluegrass
Trifolium willdenovii	tomcat clover

Shrub Planting

Shrubs will be planted as container plants or seeds in the revegetation areas. To the extent feasible, shrubs to be planted will be obtained from seeds collected from the site or from local sources. Shrubs will be planted at approximately 4.5-foot spacing in designated planting areas or at a spacing suitable for the location and species of the plantings. The remaining slopes and benches will be covered with shallower topsoil and/or soil-building materials and seeded with a grass/herb/shrub seed mix, without containerized shrub plantings.

Shrub species in undisturbed adjacent habitats or observed to perform well in previous revegetation areas and test plot results, described in section 4.3.4 below, will be selected for planting. A list of potential shrubs to be planted on site is provided in Table 5, "Potential Shrubs for Planting," below. Species selection and numbers will depend on propagule collection and availability; other similar species may be utilized to meet vegetation cover requirements.

TABLE 5
POTENTIAL SHRUBS FOR PLANTING

Scientific Name	Common Name
Heteromeles arbutifolia	toyon
Rhamnus californica	California coffeeberry
Rhamnus crocea	redberry
Ribes californicum	hillside gooseberry
Ribes malvaceum	chaparral currant

4.3.2 Revegetation Timing and Protection

Seeding shall be conducted during the most favorable period of the year (typically September 1 through December 1) for plant establishment. Container planting should be performed during the winter season and completed by approximately the end of January to improve plant establishment.

Protection measures such as high visibility fencing and screening shall be used where needed to prevent unauthorized vehicle access or wildlife to promote revegetation success. Protection measures shall be maintained until revegetation efforts are successfully completed per the success criteria outline in the section below.

4.3.3 Revegetation Success Criteria

Performance standards will be measured through comparisons of species richness, absolute plant cover, species composition, and the presence of noxious weeds. Acceptable threshold values for each of these parameters are presented in Table 6, "Performance Standards for Revegetation Areas." Performance standards represent anticipated conditions five (5) years after installation. SMARA requirements state that performance standards must be met for two consecutive years without significant human intervention prior to release of financial assurances.

TABLE 6
PERFORMANCE STANDARDS FOR REVEGETATED AREAS

	North and East-Facing Benches		South-Facing Benches		Seeded Areas Shrub/Grassland Mix	
	Shrub	***Herb***	***Shrub***	***Herb***	***Shrub***	***Herb***
Richness *(avg. native species per plot)***	50%	75%	50%	75%	50%	75%
Canopy Cover	15%	20%	15%	20%	15%*	20%*

Notes:
*Performance standards for seeded areas may need to be adjusted to reflect the species mix ultimately selected based on reference sites and test plot results. In particular, the balance between shrub and herbaceous species cover may vary.
**Richness standards will be based on a percentage of natives observed in reference plots. 5-meter (m)-radius d 1m-radius plots for herbs/grasses.

4.3.4 Test Plots

Test plots may be required to determine the suitability of growth media, refine the seed mix, determine appropriate seed mix application rates, and other factors affecting revegetation success. To the extent necessary, 100-foot by 100-foot test plots, as well as control and no seed plot areas, will be established. These plots will be representative of fill areas. The test plots will be maintained and monitored, and tests will be conducted to refine revegetation techniques and seeding rates to meet performance standards. Additional tests will be conducted if the initial tests and active revegetation are not successful.

4.3.5 Weed Abatement

Weed control is necessary to reduce the occurrence of undesirable invasive and noxious species of plants that could interfere with revegetation efforts or increase fire hazards. Weeds are undesired, generally introduced, invasive plants that can compete with revegetation efforts. However, many introduced species occur widely in the region and are common in both the surrounding active quarry and adjacent natural open space lands. Eradication of all weeds is therefore unachievable; therefore, specific noxious plant species are targeted for control.

For the purposes of site maintenance and monitoring, non-native plants listed in the California Invasive Plant Council (Cal-IPC) Inventory (2020) as highly invasive will be considered invasive weeds subject to control and performance standards. If invasive weeds are found to exceed a combined 10 percent relative cover over all sampled quadrats, weed abatement activities will commence. The following species should be included as subject to this performance standard: yellow star thistle (*Centaurea solstitialis*, annual), black mustard (*Brassica nigra*, annual), stinkwort (*Dittrichia graveolens*, annual), pampas grass (*Cortaderia* spp., perennial), and fennel (*Foeniculum vulgare*, perennial). Some of these species are only listed as moderately invasive by Cal-IPC, but they should be managed promptly because they are currently present in large numbers near the project site and may impede establishment of native cover. Weed control methods may include chemical and mechanical removal techniques depending on the species and number of individuals encountered.

4.3.6 Monitoring and Maintenance

Monitoring

Monitoring must be performed to document revegetation success. Following installation, each revegetation area should be monitored as necessary to determine if reseeding, irrigation, or soil amendments are necessary to demonstrate the performance criteria at the earliest possible time. Revegetation will be monitored annually until the area meets performance standards for two consecutive years without intervention. Revegetation sites shall be identified on a map and monitored to assure that standards are adequately achieved to within a minimum 80 percent confidence level.

Maintenance

Maintenance of revegetated areas, including weed control, will occur as necessary based on monitoring and the evaluation of meeting performance standards. Maintenance of revegetated areas will consist of reseeding unsuccessful revegetation areas to the extent necessary to achieve the performance goals, to limit the extent of noxious weeds, and to repair erosion damage. If revegetation efforts are not successful, the underperforming areas will be re-evaluated to determine measures necessary to improve performance.

4.4 Geotechnical

4.4.1 Quarry Slopes

Quarry slopes will have an overall final grade of 1.5H:1V, as specified on the mine plan. Benches will be approximately 15 feet wide with a highwall of approximately 50 feet. Slope stability analysis supporting the slope design is included as Appendix E.

4.4.2 Fill Slopes

Fill slopes will be constructed to have an overall minimum grade of 2H:1V without benches/highwalls. The majority of the site will have fill slopes ranging between 3H:1V to 5H:1V as shown on Figure 12(a&b) and Sheets 4 - 6.

4.5 Environmental Protection

The following subsections provide a description of environmental protections related to sensitive plant and wildlife habitat, hydrology, and water quality. In addition to these requirements, SMARA Section 2772.1(a)(7)(B) requires that official copies of the reclamation plan amendment include an index showing any permit conditions of approval or binding mitigation measures adopted or certified pursuant to the California Environmental Quality Act (CEQA) that are necessary to comply with SMARA and the County's Surface Mining Ordinance. Those conditions of approval and mitigation measures are included in an Appendix J, "Conditions of Approval," and are considered part of the reclamation compliance requirements.

4.5.1 Water Quality Protections

Surface Water Management

Surface mining and reclamation activities are conducted in a manner that protects on-site and downstream beneficial uses of water. Existing water quality protection measures at the facility are described in the SWPPP (updated regularly to reflect current site conditions) and the spill prevention control and countermeasure plan (SPCCP). The most recent SWPPP and SPCCP are provided in Appendix H and Appendix K, "Spill Prevention Control and Countermeasure Plan.". A summary of the existing drainage areas, stormwater management, and erosion control was provided in section 2.7 above and a detailed discussion is included in Appendix H. The SWPPP and SPCCP will continue to be updated as site development progresses.

Excavations are conducted in a manner to keep adjacent streams, percolation ponds, or water bearing strata free from undesirable obstruction, siltation, contamination, or pollution. Existing settling ponds are maintained to intercept sediment. Settling ponds and other retention devices are maintained to control sediments so that no sediments are deposited in Stevens Creek Reservoir from the site as a result of the surface mining process.

The SWPPP describes stormwater drainage facilities, identifies possible water pollution sources that could affect the quality of stormwater discharged from the facility, and documents BMPs that have been implemented to minimize or prevent discharge of pollutants that may be in stormwater. Measures in the SWPPP to control erosion and sedimentation include:

- diverting surface water away from the stockpiles and tops of cut slopes;
- tarping all topsoil stockpiles during the rainy season;
- installing wattles around the base of topsoil stockpiles, if evidence of erosion exists;
- regrading and compacting areas with deep and wide erosion rills;
- limiting activities during wet weather;
- limiting use of unpaved roads at the secondary entrance on Lower Quarry Floor during the rainy season; and
- monthly visual inspections during reclamation activities.

As part of the terms of its discharge permit from the San Francisco Bay Regional Water Quality Control Board (San Francisco Bay RWQCB), the quarry operator regularly monitors water quality of the discharge from the quarry and must submit quarterly monitoring reports to the San Francisco Bay RWQCB. The only discharge from the overall property site occurs at the point where Swiss Creek leaves the site and flows into a culvert under Stevens Canyon Road that flows into Stevens Creek Reservoir.

Erosion Control Seeding

Prior to final revegetation of fill slopes, a preliminary erosion control seeding stage may be incorporated. The native erosion control seed mix shown in Table 7, "Erosion Control Seed Mix," includes species that have proven successful in other local revegetation and is recommended to provide erosion control and initial establishment of native grasses and herbaceous species as needed in temporarily disturbed areas. Other similar species may be used as necessary to establish vegetative cover.

TABLE 7
EROSION CONTROL SEED MIX

Scientific Name	Common Name
Bromus carinatus	California brome
Elymus glaucus	blue wildrye
Lupinus nanus	sky lupine
Nassella pulchra	purple needlegrass
Plantago erecta	California plantain
Trifolium willdenovii	tomcat clover
Vulpia microstachys	three weeks fescue

Groundwater

Water for site operations is currently obtained from the on-site settling basins, and groundwater is not used. Moreover, implementation of the reclamation plan would not result in a substantial net change in water use, although some additional water would be necessary for dust control during grading of the area and to establish vegetation on the reclaimed slopes. As a result, the project would not substantially deplete groundwater supplies.

No creeks or other natural drainages are located within mining areas. Upon completion of mining and reclamation, runoff from Parcel B would be routed to rock lined channels, detention basin(s), or other similar control measures for fines settlement prior to discharge via an existing outfall. Therefore, the project would not interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table.

4.5.2 Sensitive Species and Habitat

As provided in section 4 above, the site will be reclaimed to an open space condition. It is anticipated proposed revegetation will facilitate the creation of wildlife habitat, but no specific grading or revegetation measures are planned to develop or enhance wildlife habitat as part of site reclamation. No reclamation actions are proposed that would prohibit or interfere with the sites use by wildlife species.

Wildlife Habitat Protection Measures

As described in Section 2.7.5 above, the site contains potentially suitable biological habitat for several special-status wildlife and bird species. In addition to special-status species, nests of nearly all other native birds are protected by the Migratory Bird Treaty Act and California Fish and Game Code. To avoid potential impacts to these special status species the following measures would be implemented in consultation with a qualified biologist:

Preconstruction Surveys: Ground disturbance into undisturbed areas and vegetation (tree and shrub) removal would be planned to avoid the various habitats and/or breeding season for most species. If such clearing would occur during those seasons, preconstruction surveys will be performed.

Use of Buffers to Avoid Sensitive Habitats or Nests: If preconstruction surveys determine that habitat or nests are found close enough to the land clearing and tree removal area, the biologist will determine a construction-free buffer zone to be established around the area to prevent potential impact.

State and/or Federal Permitting: If avoidance is not feasible the operator will be required to obtain the appropriate permits from state and/or federal agencies prior to disturbance.

Species Protection

Listed species shall be conserved or mitigated as prescribed by the federal and California Endangered Species Acts.

4.6 Removal and Closure Activities

The following subsections describe those project components that will be removed or remain and their related reclamation activities.

4.6.1 Waste Disposal

Any remaining mine waste at closure will be disposed of consistent with Title 27, Chapter 7, Article 1 of the CCR (formerly codified as CCR Title 23, Chapter 15, Article 7). No waste from mining will remain on-site. The SWPPP will ensure all other waste is disposed of in accordance with state and local health and safety ordinances.

4.6.2 Structure and Equipment Removal

The existing developed surfaces on Parcel A would remain following reclamation, including the machine shop, quarry office building, and Rich Voss trucking facility. All other structures and equipment will be removed. Any compacted surface will be decompacted prior to revegetation.

4.6.3 Roads

Developed surfaces, perimeter maintenance roads, and access roads will remain for subsequent land uses as shown on Figure 12(a&b) and Sheets 4 and 5. All other compacted surfaces will be stripped of roadbase (if any), decompacted, and revegetated.

4.6.4 Closure of Openings

Drill holes, water wells, monitoring wells will be completed or abandoned in accordance with current laws, unless demonstrated necessary for the proposed end use.

4.7 Phased Reclamation

Fill will be placed in Parcel B (see Figures 12(a&b) and 13) and cannot be placed until mining is complete. Revegetation of Parcel B can begin after all fill is placed and graded.

No fill or topsoil is necessary in Parcel A, and revegetation of the northernmost portion of the northeast hillside has begun. The remaining portion of the northeast hillside will be revegetated after the material stockpile has been removed, which will occur after mining is complete.

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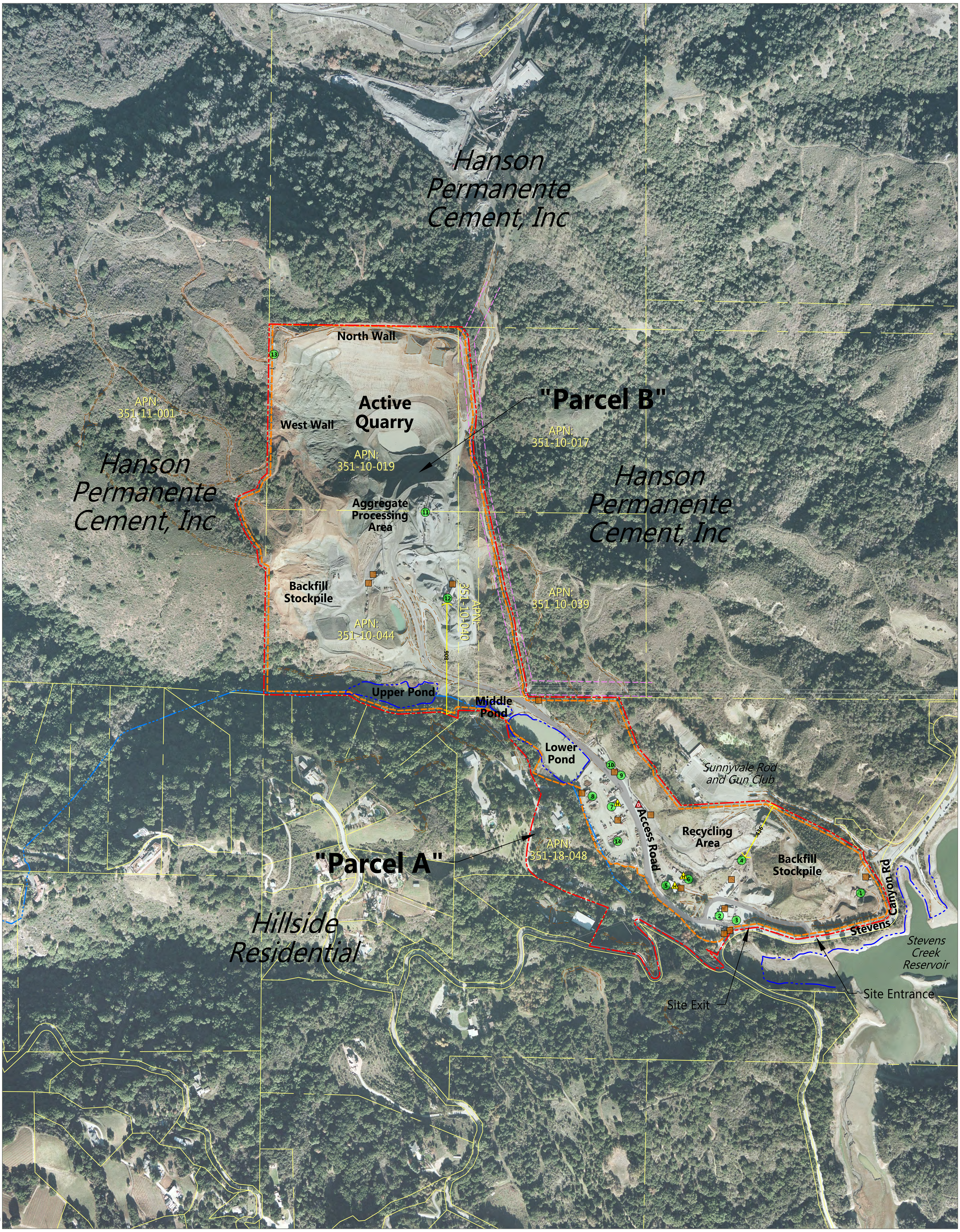


SOURCE: Aerial & Site Parcel Lines–Muir Consulting Inc, flown and surveyed 8-13-2020; Other Parcel Lines–Parcel Quest, accessed December 2020 & Santa Clara Interactive Map, accessed December 2020; compiled by Benchmark Resources in 2020

NOTES:

1. Parcel boundaries, orthophotography and topographic survey data prepared by Muir Consulting, Inc. Aerial survey date: 6-18-2020.
2. See Appendix D for stamped and signed Professional Land Surveyor stamped drawings.

Site Boundary ±170 acres

Reclamation Plan Boundary ±147 acres

APN: 351-18-048 Parcel Line & Assessor's Parcel Number

100-foot Power Line Easement

1 Existing Building/Mining Equipment/Other Facilities (See list below for for callouts shown)

1. Top Soil Plant
2. Main Office
3. Lower Scale House
4. Recycle Plant
5. Tractor Shop
6. Tractor Shop Office
7. Truck Shop
8. Maintenance Shop
9. Upper Scale
10. Maintenance Shop Office
11. Rock Plant
12. Wash Plant (Press)
13. Radio Tower
14. Equipment Storage

Portable Bathroom Facilities (no onsite septic)

D Above Ground Diesel Fuel Storage with Secondary Containment

H Hazardous Materials Storage

806' Distance from Loading Point to nearest Parcel Line

Dirt Road

Asphalt Road

Access Road

Water Border

Swiss Creek

A A' Cross Section

D:_BENCHMARK CURRENT PROJECT\317 - Stevens Creek Inc - General Services\317-02 - Stevens Creek Quarry\317 - Figures\317 - Reclamation Plan Amendment 3_IncResponse

BENCHMARK RESOURCES

N

0 150 300 600 1,200

Existing Conditions Aerial Photograph

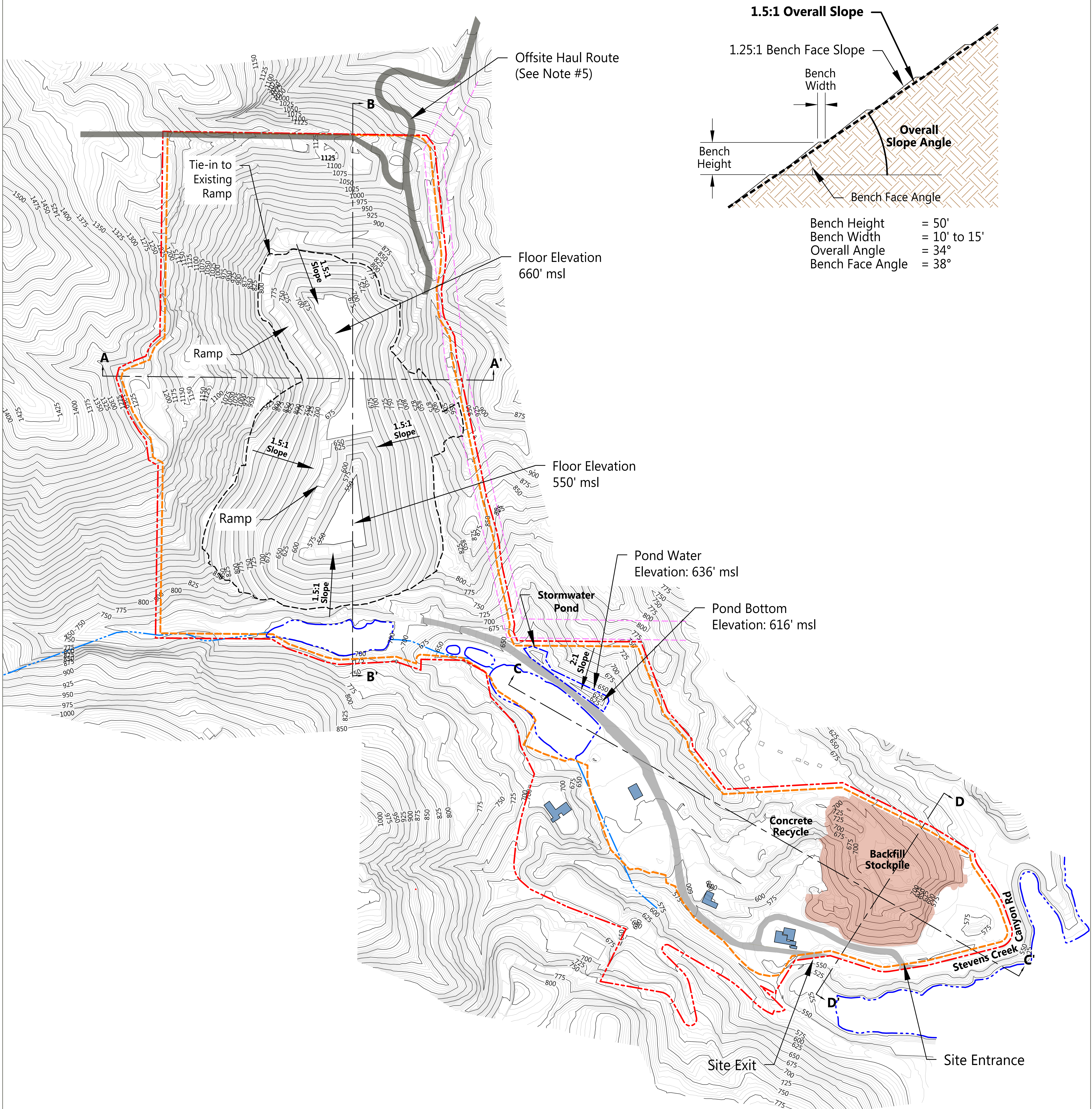
STEVENS CREEK QUARRY

USE PERMIT & RECLAMATION PLAN AMENDMENT

Sheet 1

TYPICAL CUT BENCH
(Not to Scale)

Bench Height	= 50'
Bench Width	= 10' to 15'
Overall Angle	= 34°
Bench Face Angle	= 38°



SOURCE: Topography–Muir Consulting, Inc., flown 6-18-2020; mine plan compiled by Benchmark Resources in 2020

NOTES:
1. Contour intervals: 5'-minor; 25'-major. Elevations shown in mean sea level (msl).
2. Slope angles indicated are overall; see "Typical Cut Slope" for details.
3. Top of cut slopes planned at 25' from Parcel Boundary, but would meet County requirements as specified in Sec. C12-558 of the Design Standards
4. Active slopes may be steeper and have different bench intervals than final reclaimed cut slopes.
5. Planned Mine Cut Slopes: 1.5h:1v.
6. Planned East Wall Cut Slope: 1h:1v.
7. Haul Road Ramp Slope: 10% to 15%. Ramps, access roads, and primary travel routes may vary in location and size throughout operations progression.
8. Off-site "Permanente Rock Plant Haul Road" per Permanente Quarry Amended Reclamation Plan, May 2019.
9. See Sheet 3 for cross sections.
10. Mine and reclamation design based on topography prepared by Muir Consulting, Inc. Aerial survey date: 6-18-2020. See Appendix D for Professional Land Surveyor stamped drawings.
11. Stormwater pond capacity: Approximately 3.9 acre-feet
12. Mine Plan Reserves: 12.4 million tons.
13. The planned reclamation boundary and mining depth are shown; however, the extent of operations may or may not reach these limits. Total acreage to be disturbed and reclaimed will be within the limits of the reclamation plan boundary. Facilities and configurations within this boundary are approximate. All acreages are approximate and not intended to reflect goals for any particular surface type. Variations are subject to actual mined conditions and will not affect success of post mining land uses.

Site Boundary	±170 acres	Cross Section
Reclamation Plan Boundary	±147 acres	Water Border
Mine Plan Modified Below This Elevation to 550' msl		Swiss Creek
100-foot Power Line Easement		Existing Building within Site Boundary
Access Road		Existing Building outside Site Boundary
Backfill Stockpile Area	±10 acres	

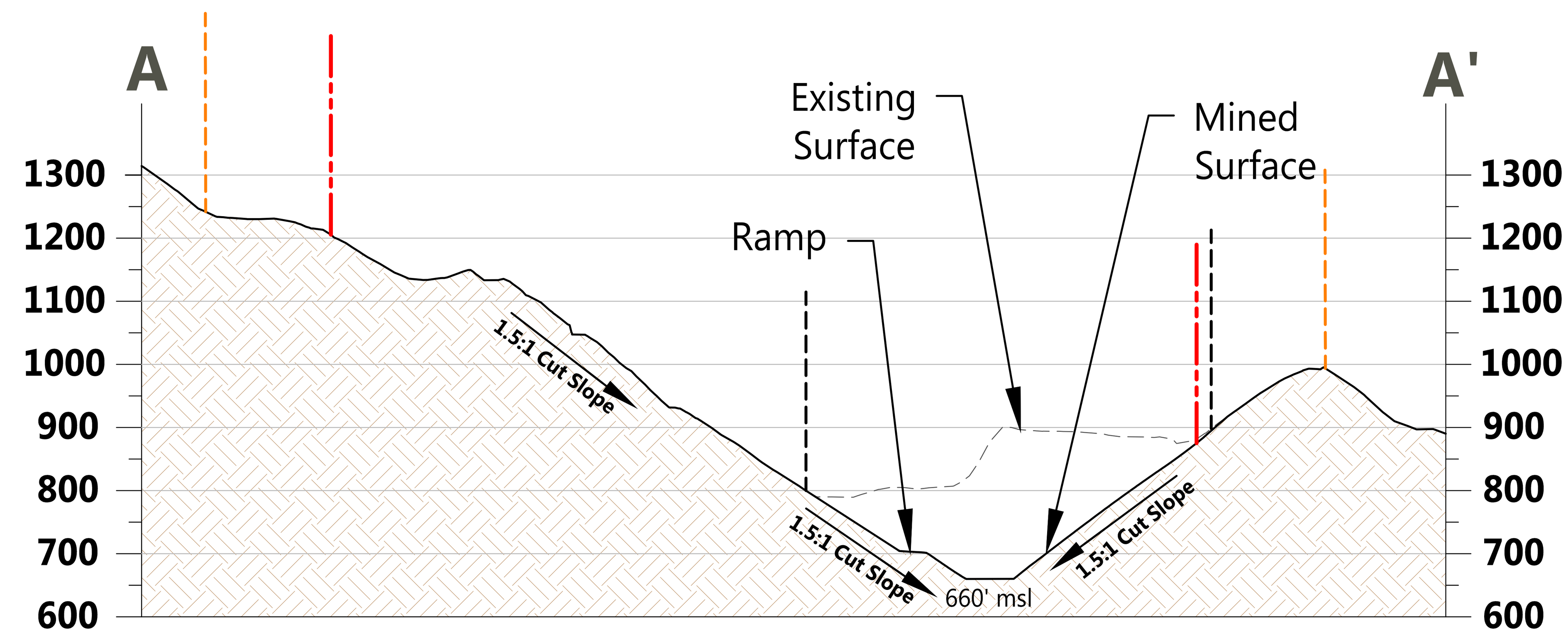
REGISTERED PROFESSIONAL ENGINEER
SANDS H. FIGUERS
No. C-51485
Exp. 6/30/22
S. Figuers
CIVIL
STATE OF CALIFORNIA

BENCHMARK RESOURCES

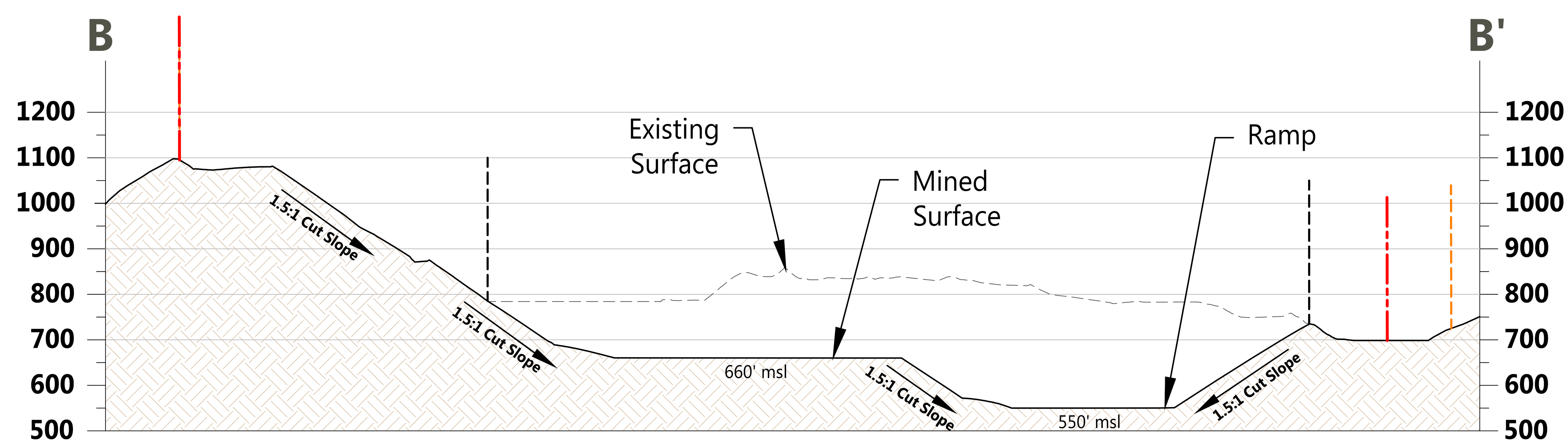
N

0 75 150 300 600 Feet

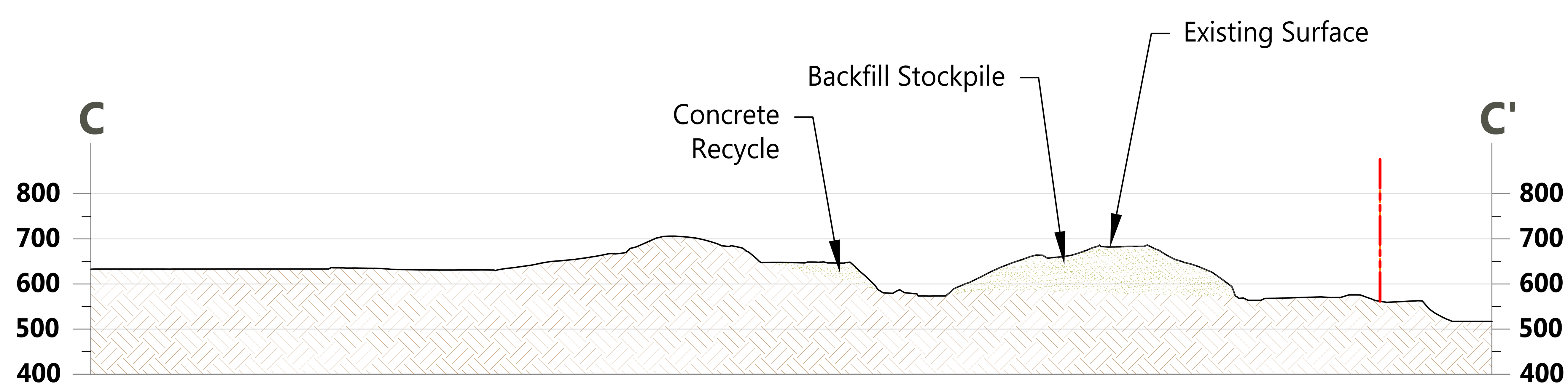
Mine Plan
STEVENS CREEK QUARRY
USE PERMIT & RECLAMATION PLAN AMENDMENT
Sheet 2



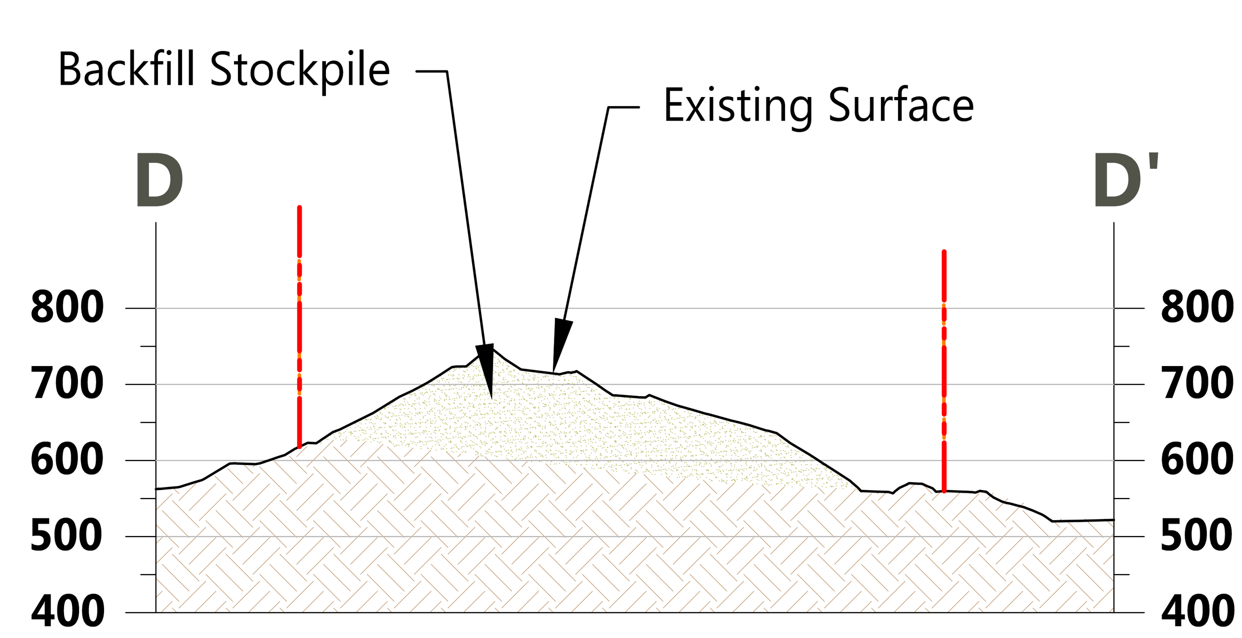
CROSS SECTION A-A'



CROSS SECTION B-B'



CROSS SECTION C-C'



CROSS SECTION D-D'

SOURCE: Topography–Muir Consulting, Inc., flown 6-18-2020; mine plan compiled by Benchmark Resources in 2020

NOTES:

1. Slope angles indicated are overall; see "Typical Cut Slope" on Sheet 2 for details.
2. Active slopes may be steeper and have different bench intervals than final reclaimed cut slopes.
3. Planned Mine Cut Slopes: 1.5h:1v.
4. Planned East Wall Cut Slope: 1h:1v.
5. Haul Road Ramp Slope: 10% to 15%. Ramps, access roads, and primary travel routes may vary in location and size throughout operations progression.
6. East Wall Slope: 1h:1v overall cut slope angle.
7. "msl" = mean sea level.
8. See Sheet 2 for cross section locations shown.
11. Mine and reclamation design based on topography prepared by Muir Consulting, Inc. Aerial survey date: 6-18-2020. See Appendix D for Professional Land Surveyor stamped drawings.
12. Mine Plan Reserves: 12.4 million tons.
13. The planned reclamation boundary and mining depth are shown; however, the extent of operations may or may not reach these limits. Total acreage to be disturbed and reclaimed will be within the limits of the reclamation plan boundary. Facilities and configurations within this boundary are approximate. All acreages are approximate and not intended to reflect goals for any particular surface type. Variations are subject to actual mined conditions and will not affect success of post mining land uses.

Site Boundary

Reclamation Plan Boundary

BENCHMARK RESOURCES

N

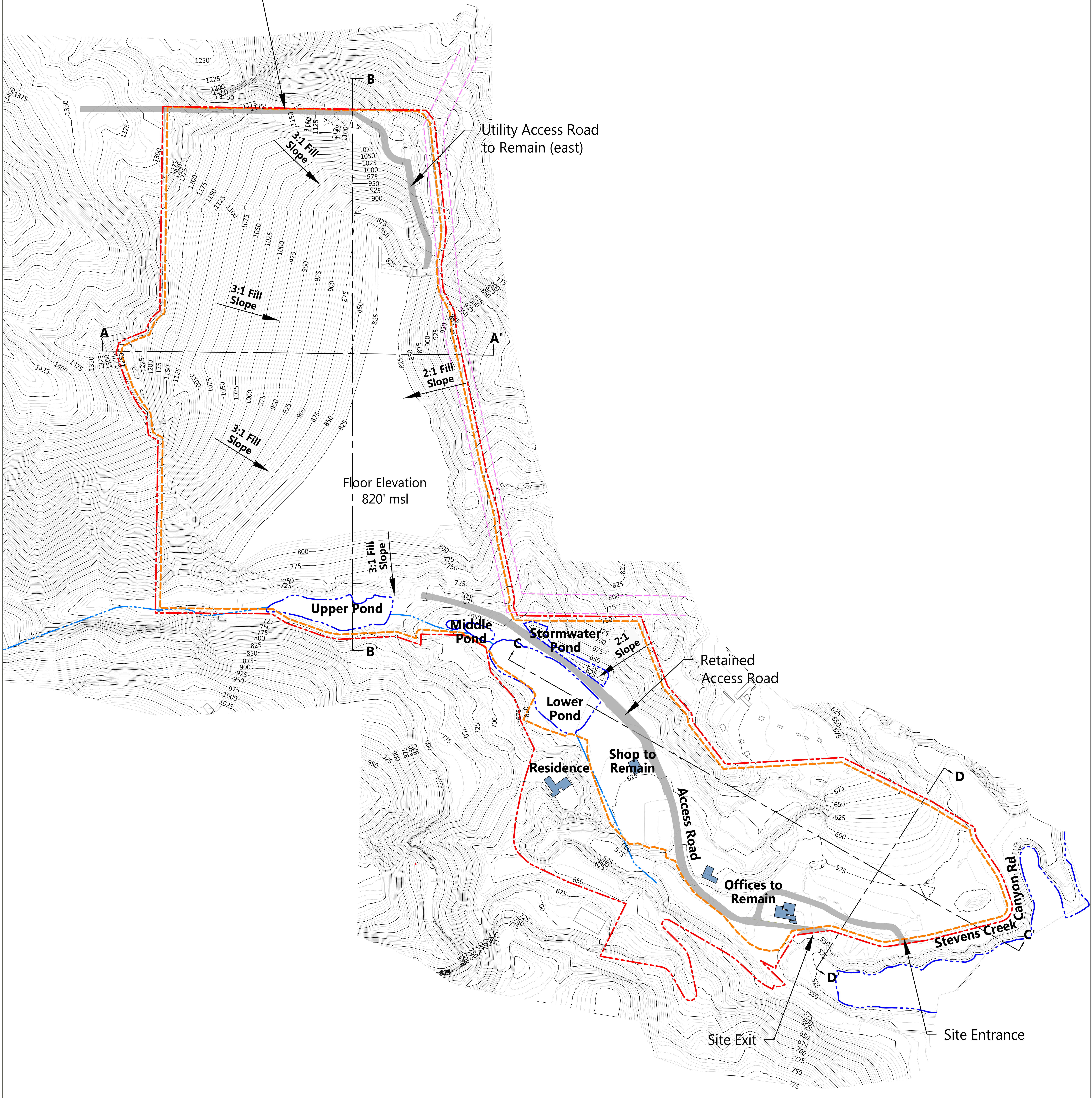
0 100 200 400 600

Mine Plan Cross Sections

STEVENS CREEK QUARRY

USE PERMIT & RECLAMATION PLAN AMENDMENT

Sheet 3



SOURCE: Topography–Muir Consulting, Inc., flown 6-18-2020; mine plan compiled by Benchmark Resources in 2020

NOTES:

1. Contour intervals: 5'-minor; 25'-major. Elevations shown in mean sea level (msl).
3. Planned Reclamation Fill Slope: 3h:1v.
4. Planned East Wall Fill Slope: 2h:1v.
5. "msl" = mean sea level.
6. See Sheet 6 for cross sections shown.
9. Mine and reclamation design based on topography prepared by Muir Consulting, Inc. Aerial survey date: 6-18-2020. See Appendix D for Professional Land Surveyor stamped drawings.
10. Stormwater pond capacity: Approximately 3.9 acre-feet
11. Fill Volume = ±11,700,00 cubic yards (CY).
12. The planned reclamation boundary and mining depth are shown; however, the extent of operations may or may not reach these limits. Total acreage to be disturbed and reclaimed will be within the limits of the reclamation plan boundary. Facilities and configurations within this boundary are approximate. All acreages are approximate and not intended to reflect goals for any particular surface type. Variations are subject to actual mined conditions and will not affect success of post mining land uses.

Site Boundary ±170 acres	Cross Section
Reclamation Plan Boundary ±147 acres	Water Border
100-foot Power Line Easement	Swiss Creek
Access Road	Existing Building within Site Boundary
	Existing Building outside Site Boundary

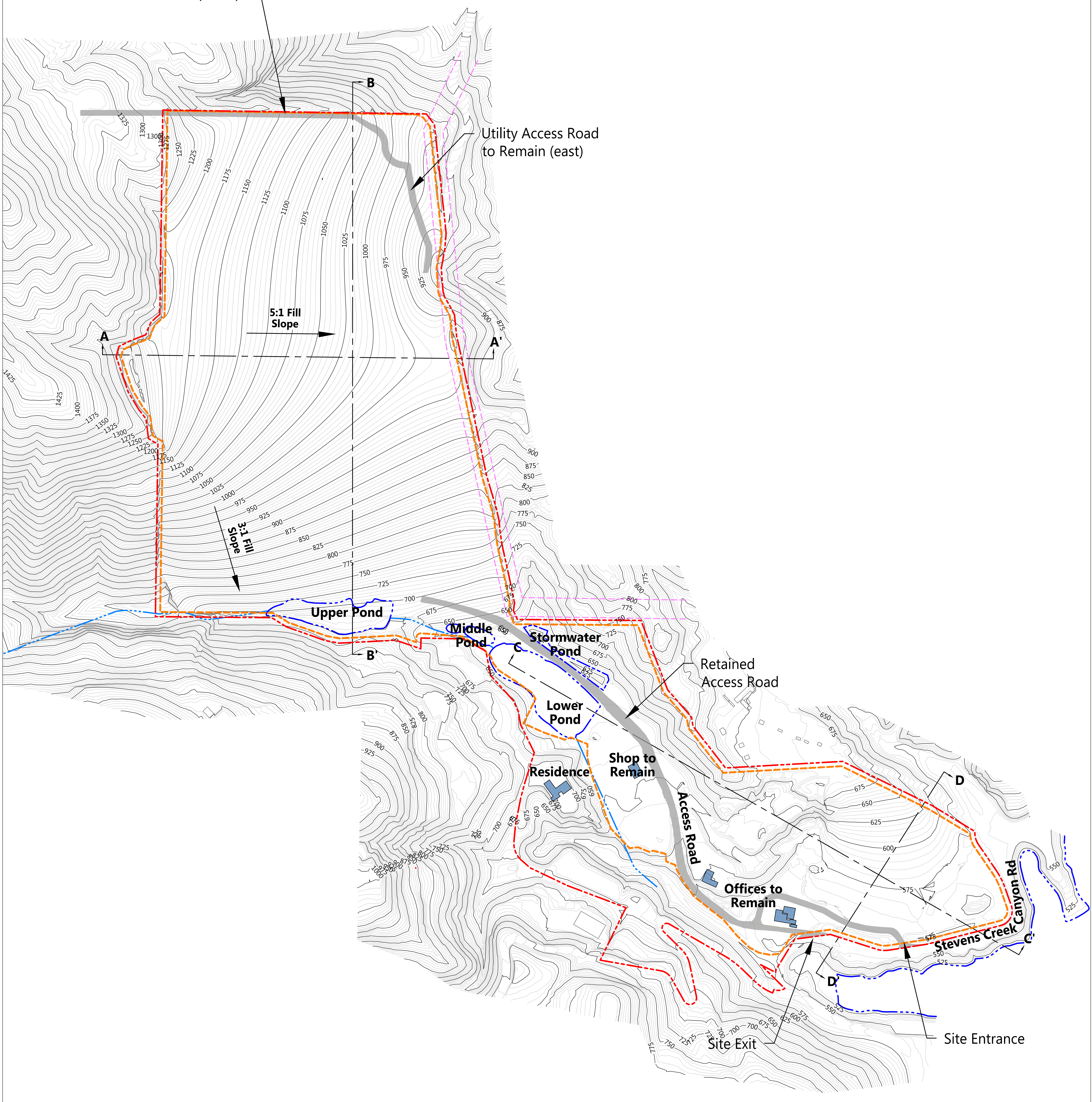
REGISTERED PROFESSIONAL ENGINEER
SANDS H. FIGUERS
No. C-51485
Exp. 6/30/22
S. Figuers
CIVIL
STATE OF CALIFORNIA

BENCHMARK RESOURCES

0 125 250 500 1,000 Feet

Reclamation Plan—Option A

STEVENS CREEK QUARRY
USE PERMIT & RECLAMATION PLAN AMENDMENT
Sheet 4

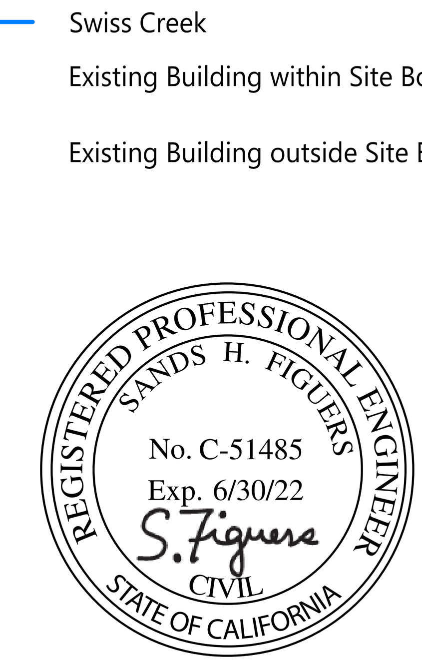


SOURCE: Topography–Muir Consulting, Inc., flown 6-18-2020; mine plan compiled by Benchmark Resources in 2020

NOTES:

1. Contour intervals: 5'-minor; 25'-major. Elevations shown in mean sea level (msl).
3. Planned Reclamation Fill Slope: 5h:1v.
4. "msl" = mean sea level.
5. See Sheet 6 for cross sections shown.
9. Mine and reclamation design based on topography prepared by Muir Consulting, Inc. Aerial survey date: 6-18-2020. See Appendix D for Professional Land Surveyor stamped drawings.
10. Stormwater pond capacity: Approximately 3.9 acre-feet
11. Fill Volume = ±20,500,00 cubic yards (CY).
12. The planned reclamation boundary and mining depth are shown; however, the extent of operations may or may not reach these limits. Total acreage to be disturbed and reclaimed will be within the limits of the reclamation plan boundary. Facilities and configurations within this boundary are approximate. All acreages are approximate and not intended to reflect goals for any particular surface type. Variations are subject to actual mined conditions and will not affect success of post mining land uses.

Site Boundary	±170 acres	Cross Section	
Reclamation Plan Boundary	±147 acres	Water Border	
100-foot Power Line Easement		Swiss Creek	
Access Road		Existing Building within Site Boundary	
		Existing Building outside Site Boundary	

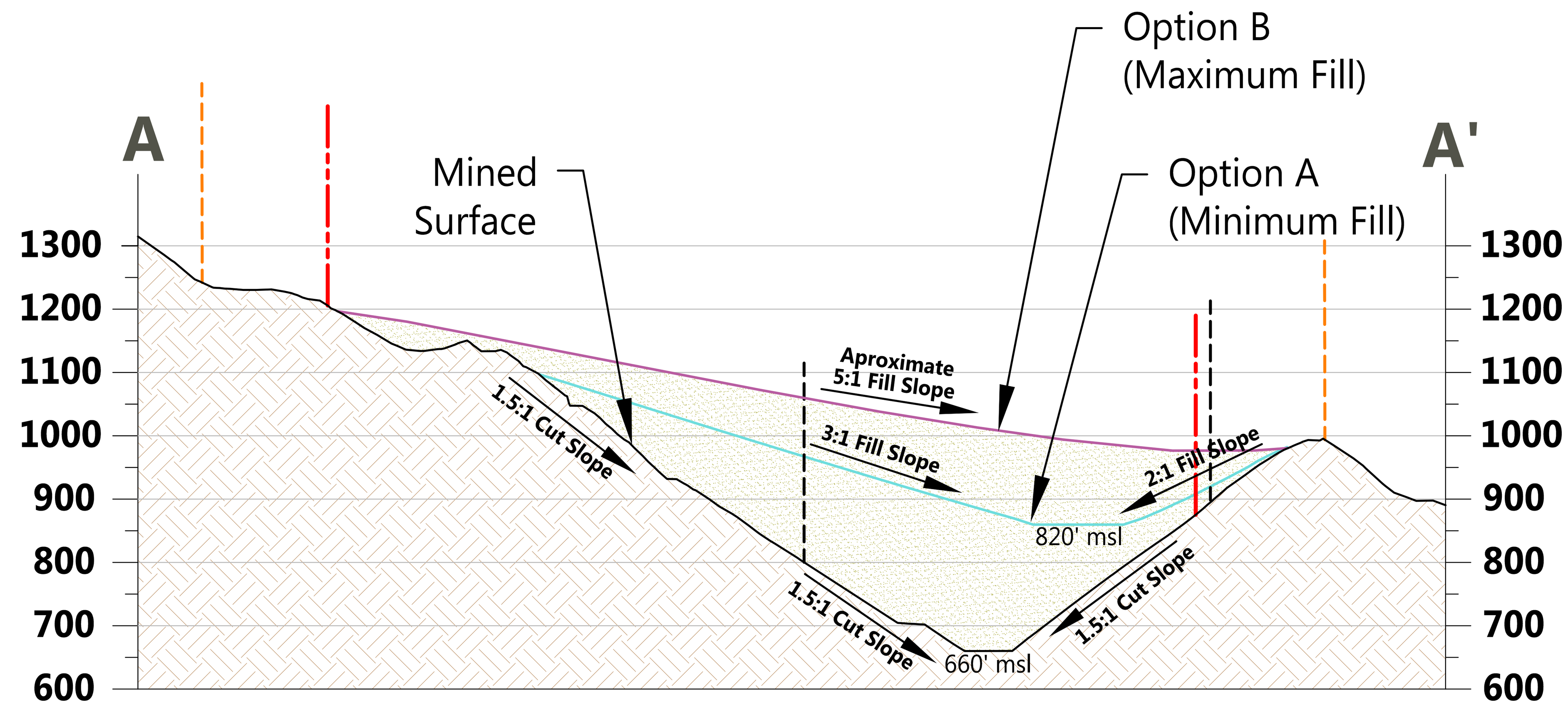


Reclamation Plan—Option B

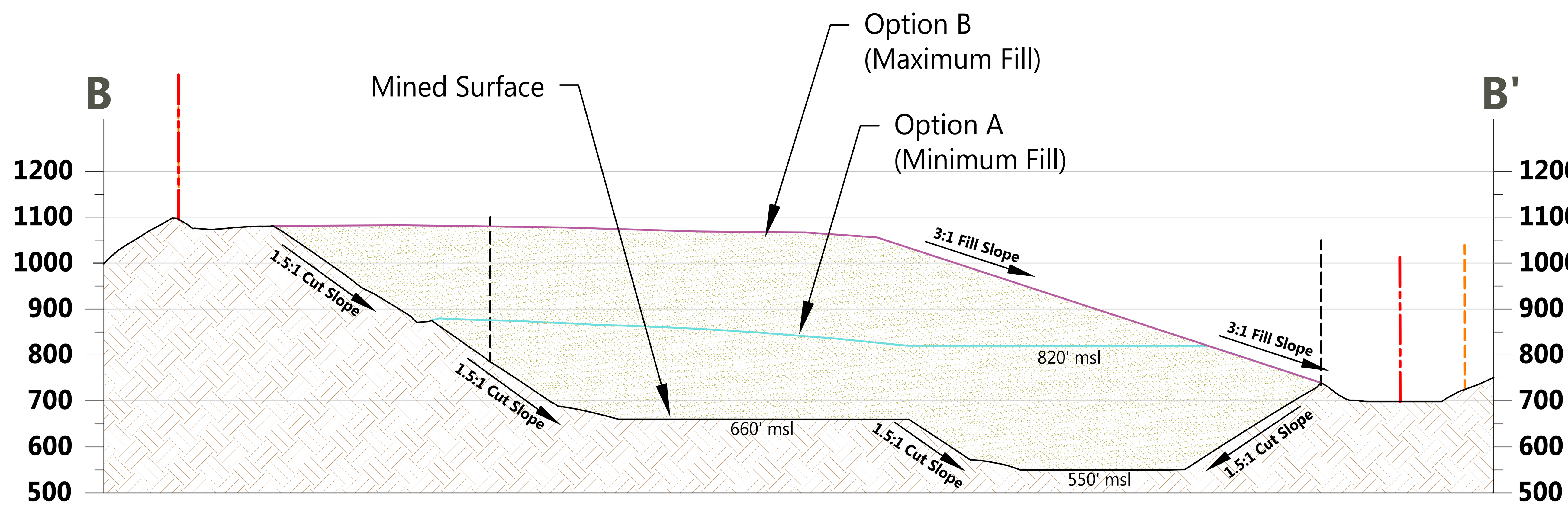
STEVENS CREEK QUARRY
USE PERMIT & RECLAMATION PLAN AMENDMENT
Sheet 5

BENCHMARK RESOURCES

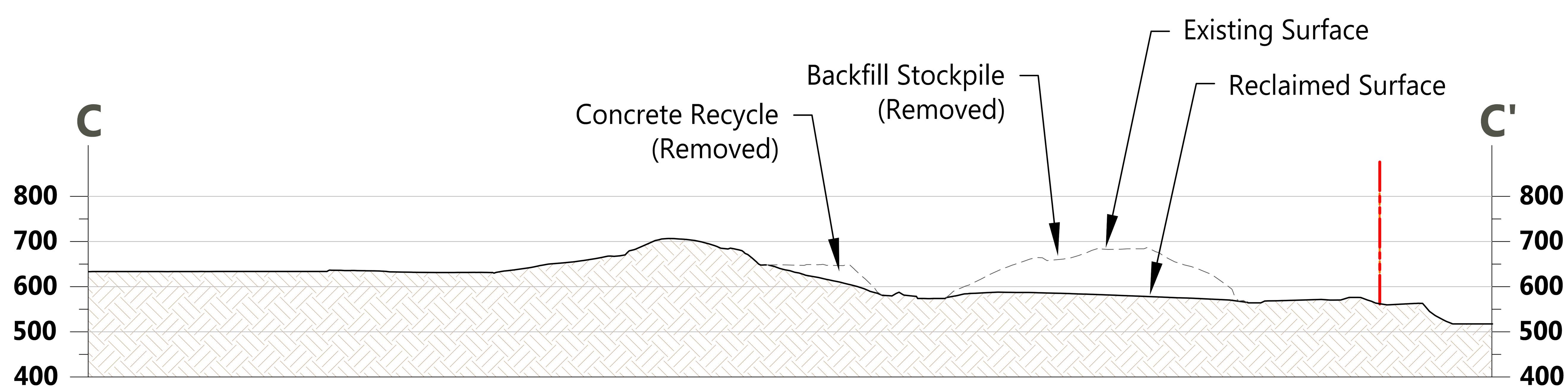
0 125 250 500 1,000 Feet



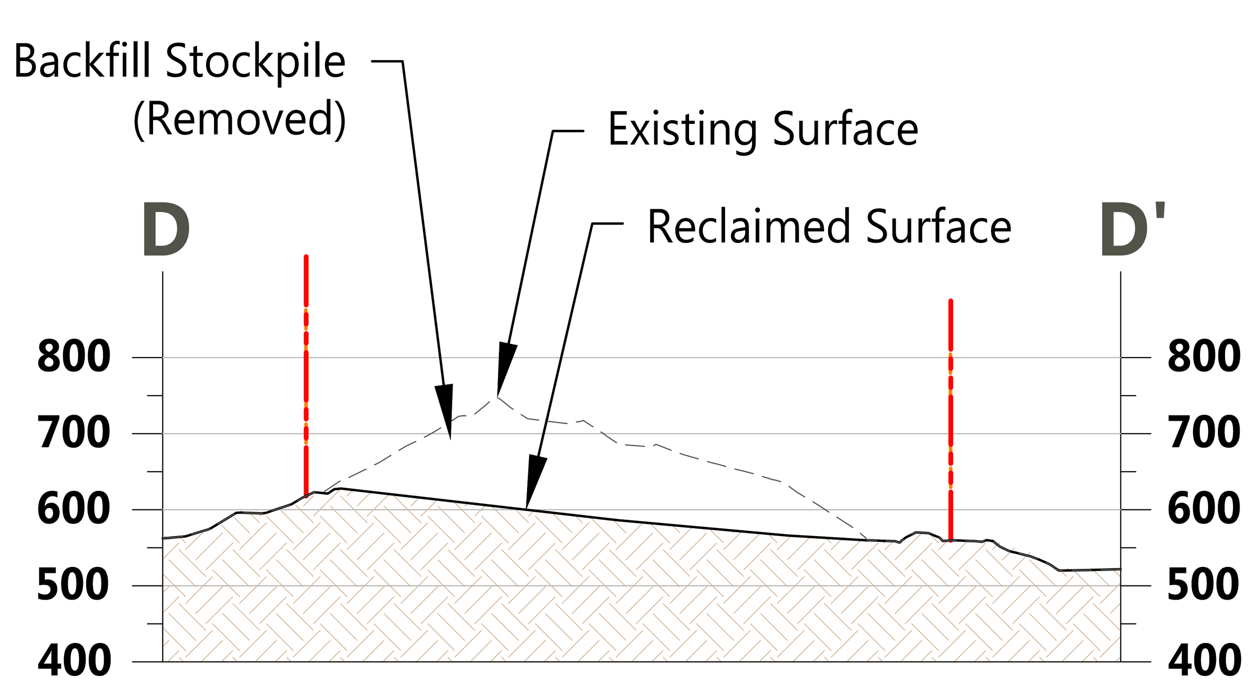
CROSS SECTION A-A'



CROSS SECTION B-B'



CROSS SECTION C-C'



CROSS SECTION D-D'

SOURCE: Topography–Muir Consulting, Inc., flown 6-18-2020; mine plan compiled by Benchmark Resources in 2020

NOTES:

1. Active slopes may be steeper and have different bench intervals than final reclaimed cut slopes.
2. "msl" = mean sea level.
3. Planned Reclamation Fill Slope: 3h:v1 (Option A), 5h:v1 (Option B).
4. See Sheets 4 and 5 for cross section locations shown.
11. Mine and reclamation design based on topography prepared by Muir Consulting, Inc. Aerial survey date: 6-18-2020. See Appendix D for Professional Land Surveyor stamped drawings.
12. Fill Volume Option A = ±11,700,000 cubic yards (CY). Fill Volume Option B = ±20,500,000 cubic yards (CY).
13. The planned reclamation boundary and mining depth are shown; however, the extent of operations may or may not reach these limits. Total acreage to be disturbed and reclaimed will be within the limits of the reclamation plan boundary. Facilities and configurations within this boundary are approximate. All acreages are approximate and not intended to reflect goals for any particular surface type. Variations are subject to actual mined conditions and will not affect success of post mining land uses.

Site Boundary

Reclamation Plan Boundary

REGISTERED PROFESSIONAL ENGINEER
SANDS H. FIGUERS
No. C-51485
Exp. 6/30/22
S. Figuers
CIVIL
STATE OF CALIFORNIA

Reclamation Plan Cross Sections

STEVENS CREEK QUARRY

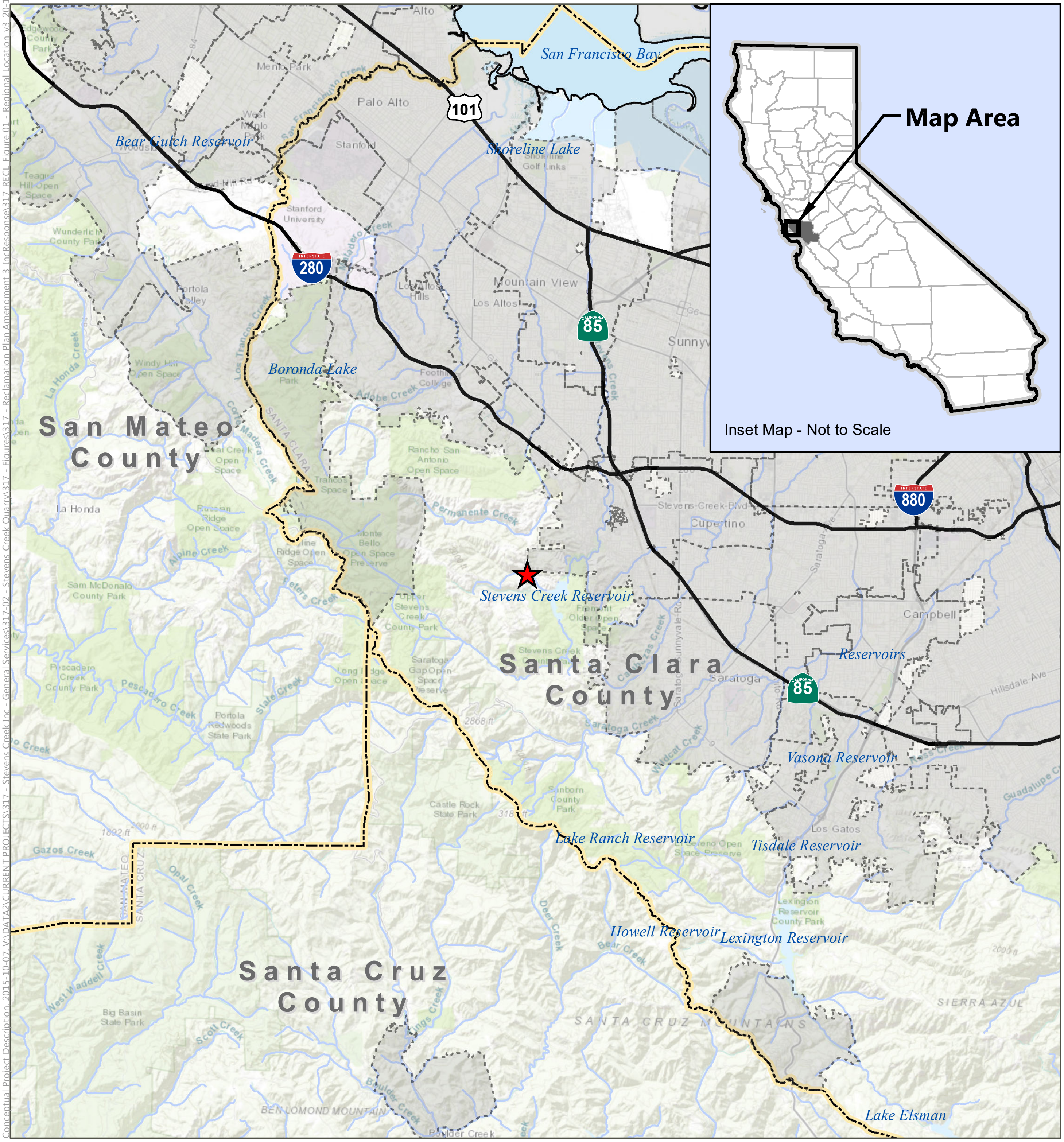
USE PERMIT & RECLAMATION PLAN AMENDMENT

Sheet 6

BENCHMARK RESOURCES

N

0 100 200 400 600



SOURCE: ESRI World Shaded Relief accessed Sept. 2020, ESRI World Topographic Map accessed Sept. 2020; ESRI World Streetmap, 2009; compiled by Benchmark Resources in 2020

NOTES: This figure was prepared for land use planning and informational purposes only. The info shown and its accuracy are refelctive of the date the data was accessed or produced.

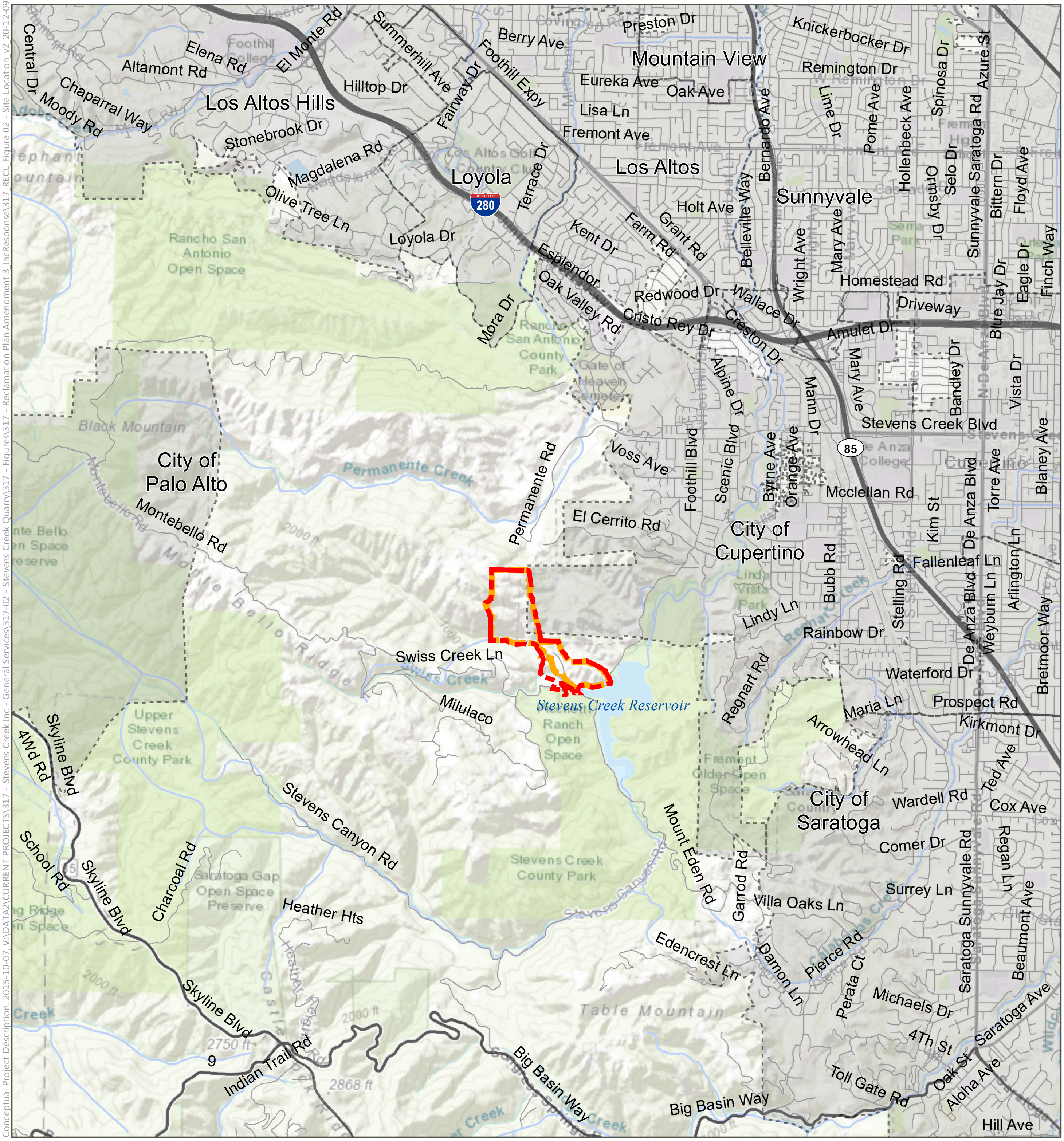
Site Location
City Boundary
County Boundary
Major Highway
Waterway
Water Body

0 1.5 3 6 Miles

BENCHMARK RESOURCES

Regional Location
STEVENS CREEK QUARRY
USE PERMIT & RECLAMATION PLAN AMENDMENT
Figure 1

Conceptual Project Description_2015-10-07 V:\DATA2\CURRENT PROJECTS\317 - Stevens Creek Inc - General Services\317-02 - Stevens Creek Quarry\317 - Figures\317 - Reclamation Plan Amendment 3_IncResponse\317_RECL_Figure 02 - Site Location_v2_20-12-09.mxd



SOURCE: ESRI World Shaded Relief accessed Sept. 2020, ESRI World Topographic Map accessed Sept. 2020; ESRI World Streetmap, 2009; adapted by Benchmark Resources in 2020

NOTES:

1. Property boundary for illustrative purposes only.
2. This figure was prepared for land use planning and informational purposes only. The information shown and its accuracy are refelctive of the date the data was accessed or produced.

Site Boundary
Reclamation Plan Boundary
City Boundary
Water Body
Major Highway
Street
Waterway

BENCHMARK RESOURCES

N

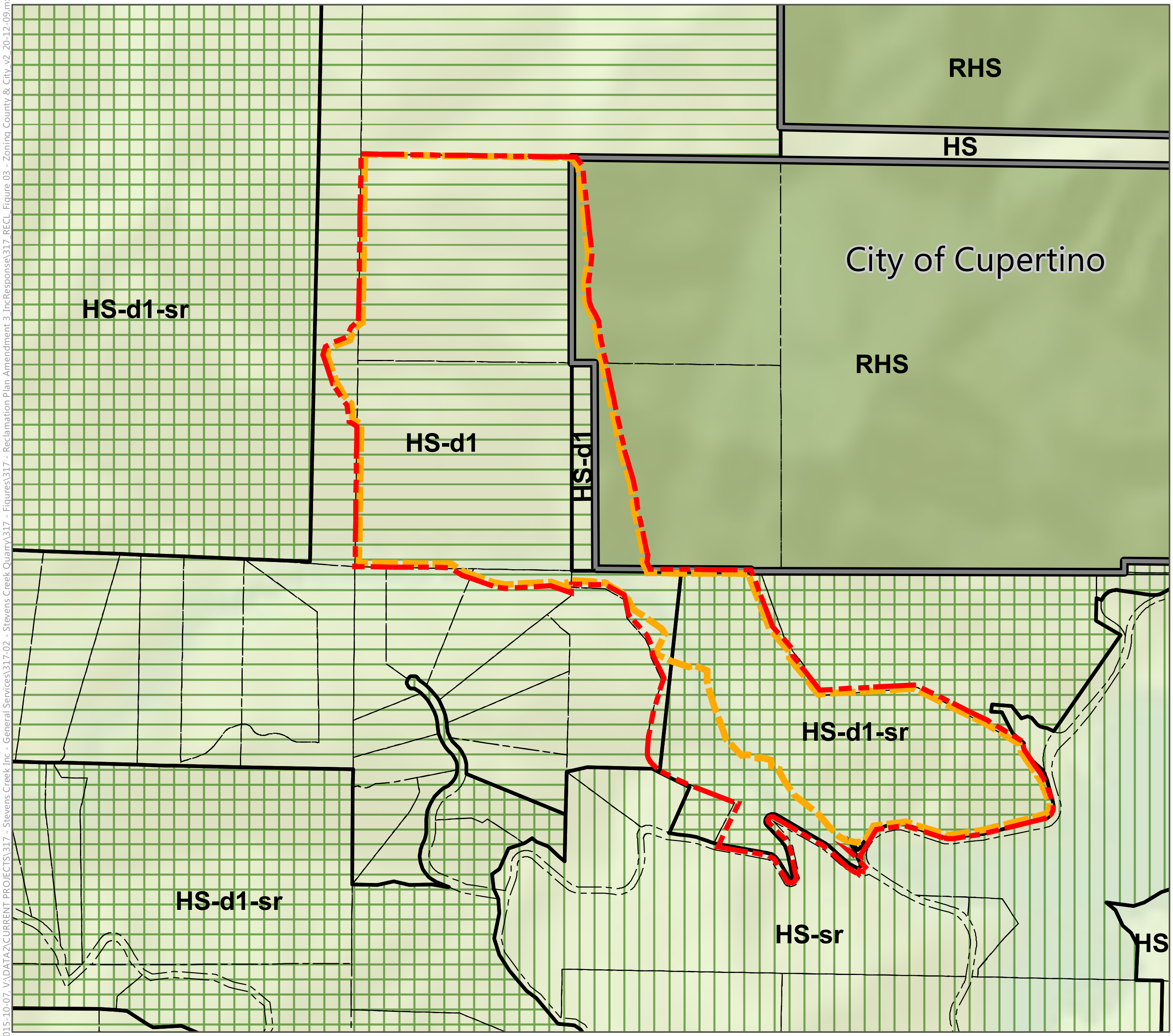
0 0.5 1 2 Mile

Site Location

STEVENS CREEK QUARRY

USE PERMIT & RECLAMATION PLAN AMENDMENT

Figure 2



SOURCE: County Zoning–Santa Clara County Zoning Atlas, pg. 105, updated Aug. 2016; City Zoning–City of Cupertino Zoning Map, prepared by the Community Development Department, updated Sept. 3 2019; Parcels–SCC Assessor's Dept, SCC Info Services Dept, 2017;ESRI World Shaded Relief accessed Sept. 2020; compiled by Benchmark Resources in 2020

Site Boundary
Reclamation Plan Boundary
Cupertino City Limit
Parcel Lines

County of Santa Clara Zoning

HS Hillside
d1 Combining District: -d1 District (Santa Clara Valley Viewshed)
sr Combining District: -sr District (Scenic Roads)

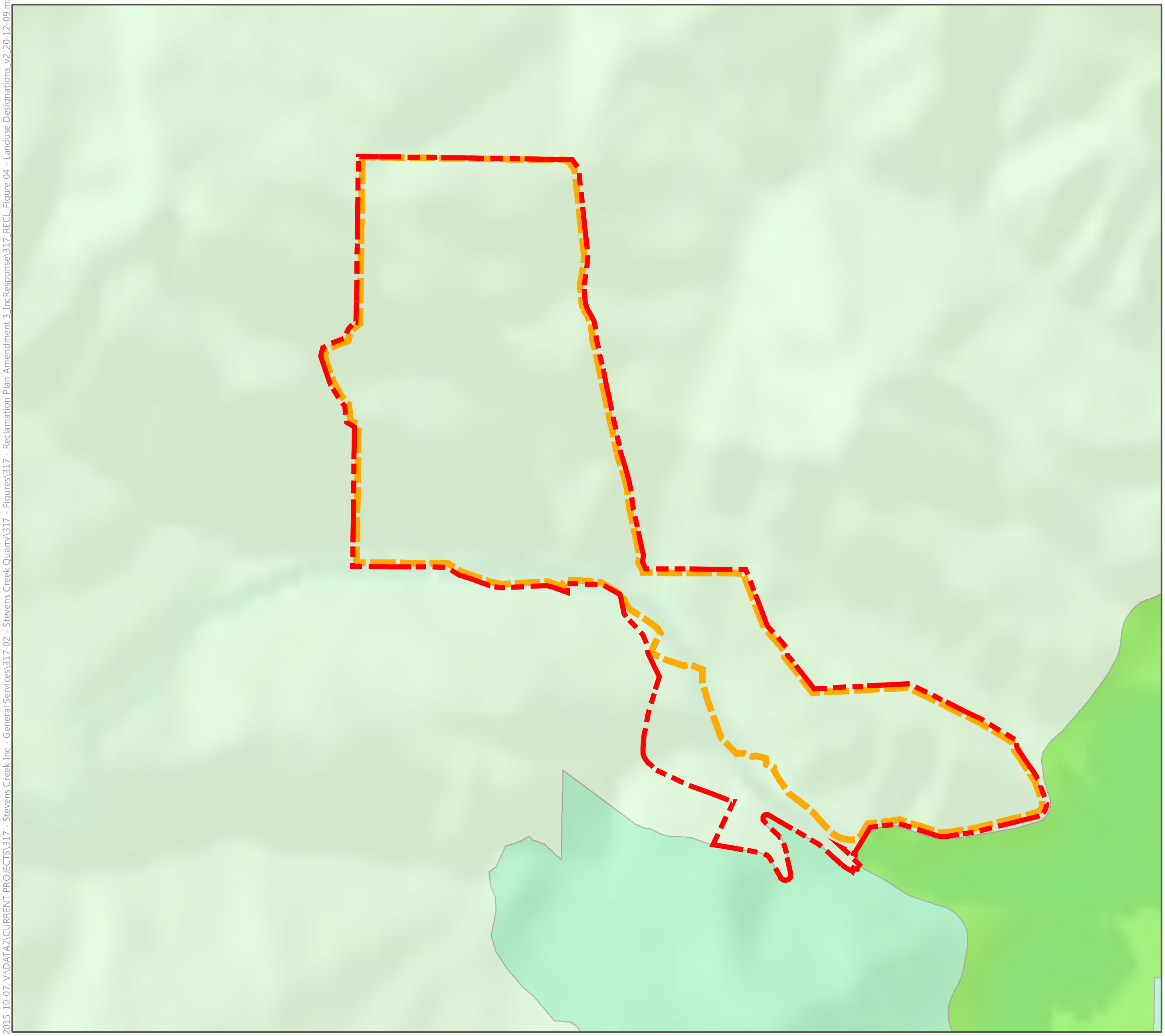
City of Cupertino Zoning

RHS Residential Hillside

Zoning
STEVENS CREEK QUARRY
USE PERMIT & RECLAMATION PLAN AMENDMENT
Figure 3

BENCHMARK RESOURCES

N 0 500 1,000 2,000 Feet



SOURCE: General Plan Designations–County of Santa Clara Planning Office,1995 Santa Clara County General Plan, updated Oct. 2016; ESRI World Shaded Relief accessed Sept. 2020; compiled by Benchmark Resources in 2020

Site Boundary
Reclamation Plan Boundary
Hillsides
Other Public Open Lands
Regional Parks, Existing

Land Use Designations
STEVENS CREEK QUARRY
USE PERMIT & RECLAMATION PLAN AMENDMENT
Figure 4

BENCHMARK RESOURCES

N 0 500 1,000 2,000 Feet

SOURCE: Aerial & Site Parcel Lines–Muir Consulting Inc, flown and surveyed 8-13-2020; Other Parcel Lines–Parcel Quest, accessed December 2020 & Santa Clara Interactive Map, accessed December 2020; compiled by Benchmark Resources in 2020

NOTES:

1. Parcel boundaries, orthophotography and topographic survey data prepared by Muir Consulting, Inc. Aerial survey date: 6-18-2020.
2. See Appendix D for stamped and signed Professional Land Surveyor stamped drawings.

Site Boundary	±170 acres
Reclamation Plan Boundary	±147 acres
APN: 351-18-048 Parcel Line & Assessor's Parcel Number	
100-foot Power Line Easement	
Existing Building/Mining Equipment/Other Facilities (See list below for for callouts shown)	

1. Top Soil Plant
2. Main Office
3. Lower Scale House
4. Recycle Plant
5. Tractor Shop
6. Tractor Shop Office
7. Truck Shop
8. Maintenance Shop
9. Upper Scale
10. Maintenance Shop Office
11. Rock Plant
12. Wash Plant (Press)
13. Radio Tower
14. Equipment Storage

- Portable Bathroom Facilities (no onsite septic)
- D Above Ground Diesel Fuel Storage with Secondary Containment
- H Hazardous Materials Storage
- 806' Distance from Loading Point to nearest Parcel Line
- Dirt Road
- Asphalt Road
- Access Road
- Water Border
- Swiss Creek
- A A' Cross Section

Existing Conditions Aerial Photograph

STEVENS CREEK QUARRY

USE PERMIT & RECLAMATION PLAN AMENDMENT

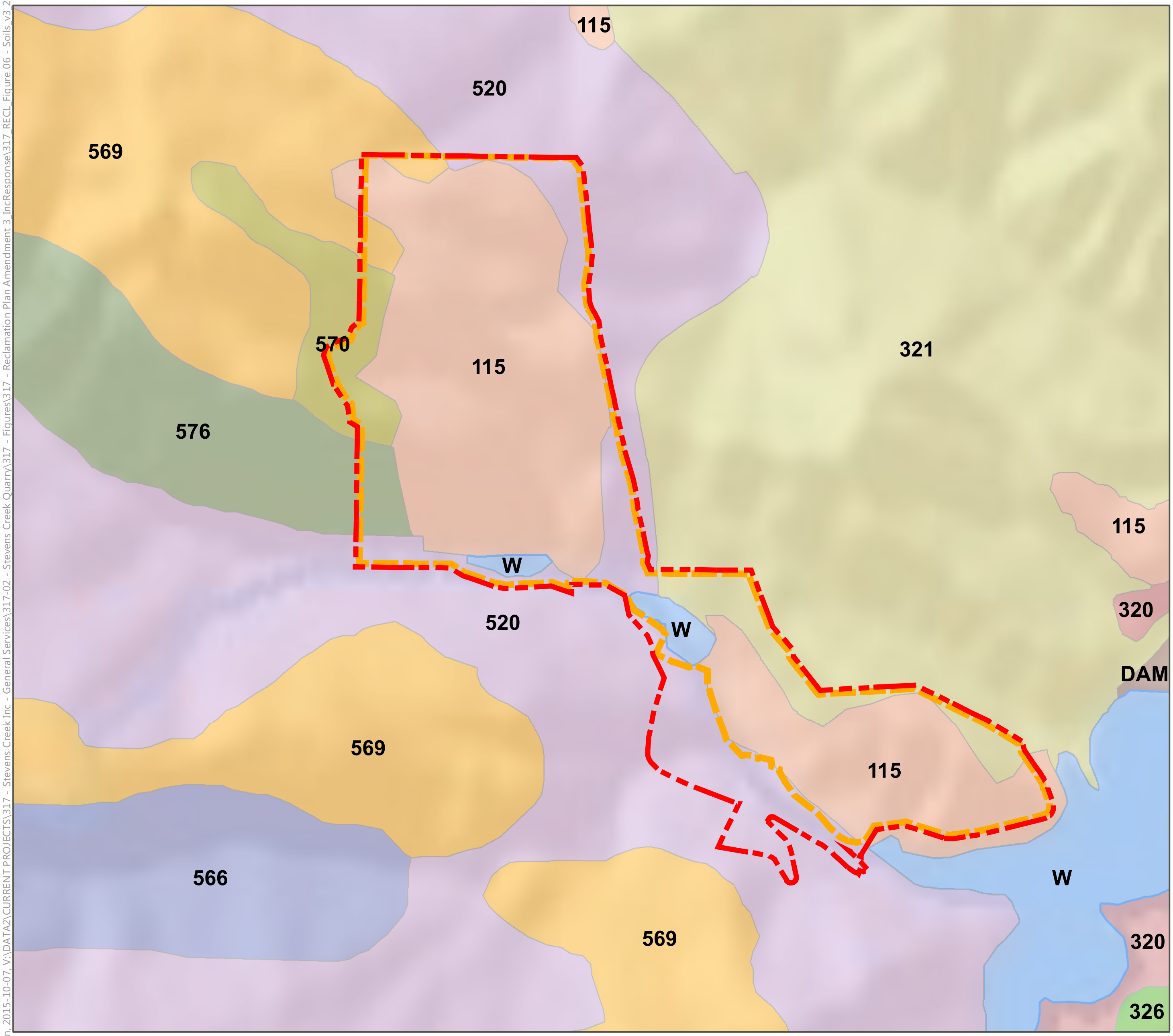
Figure 5

BENCHMARK RESOURCES

N

0 150 300 600 1,200

D:_BENCHMARK CURRENT PROJECTS\317 - Stevens Creek Inc - General Services\317-02 - Stevens Creek Quarry\317 - Figures\317 - Reclamation Plan Amendment 3_IncResponse



SOURCE: ESRI World Shaded Relief accessed Sept. 2020, U.S. Department of Agriculture Natural Resources Conservation Service Web Soils Survey, accessed Sept. 2020; adapted by Benchmark Resources in 2020

Site Boundary
Reclamation Plan Boundary

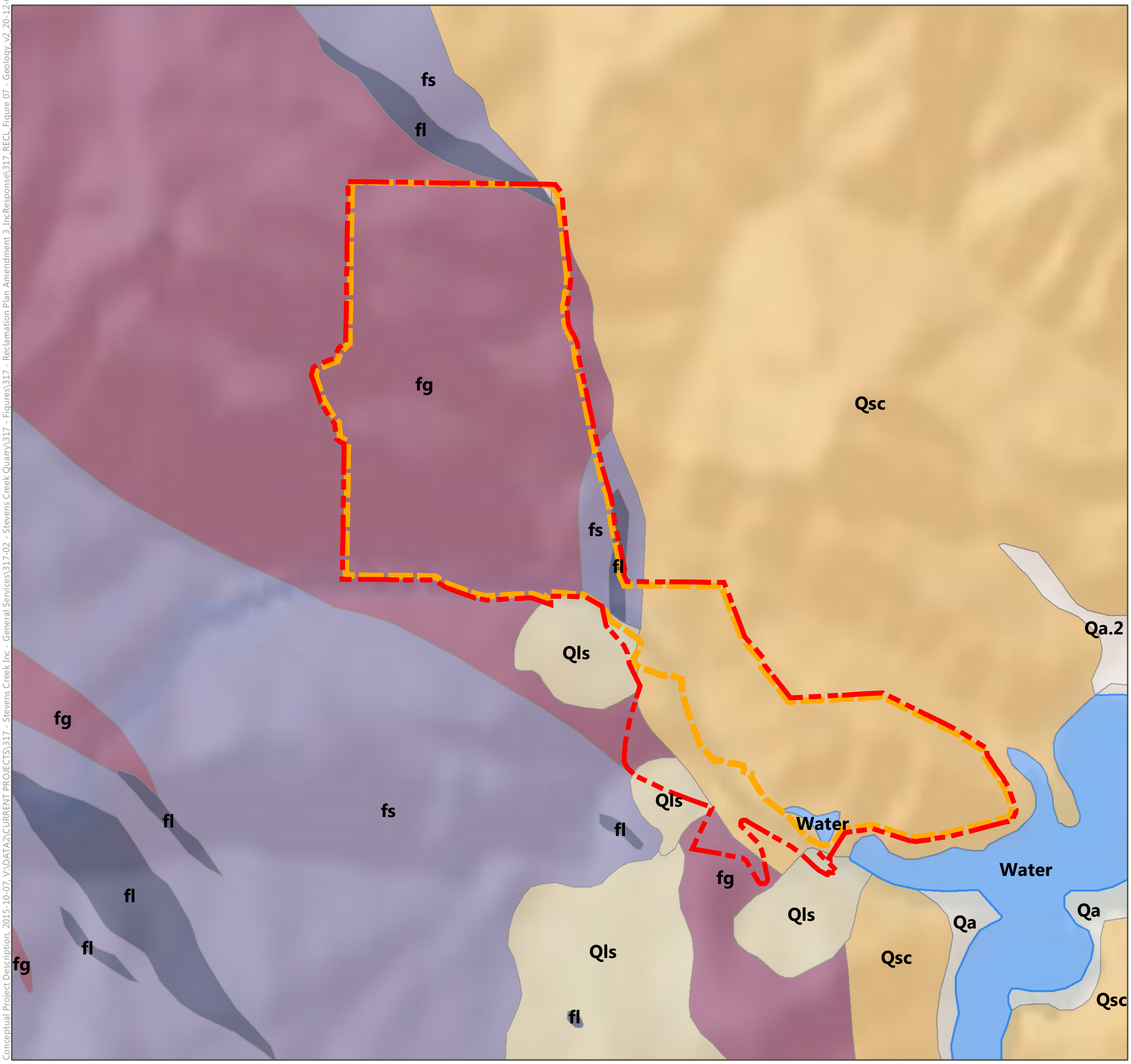
Map Units

325	Airship-Minlum complex, 40 to 65 percent slopes	566	Mouser-Katykat-Sanikara complex, 50 to 75 percent slopes
570	Footpath-Mouser complex, 50 to 75 percent slopes	520	Mouser-Maymen complex, 30 to 75 percent slopes
569	Katykat-Sanikara complex, 8 to 30 percent slopes	115	Pits, mine
DAM	Large dams	576	Sanikara-Footpath complex, 30 to 75 percent slopes
320	Literr-Merbeth complex, 15 to 30 percent slopes	W	Water
321	Merbeth-Literr complex, 30 to 65 percent slopes		

BENCHMARK RESOURCES

N 0 500 1,000 2,000 Feet

Soils
STEVENS CREEK QUARRY
USE PERMIT & RECLAMATION PLAN AMENDMENT
Figure 6



SOURCE: ESRI World Shaded Relief accessed Sept. 2020, National Geologic Map Database, Cupertino & San Jose West Quadrangles, 2007; digitized and compiled by Benchmark Resources in 2020

Site Boundary

Reclamation Plan Boundary

Map Units

fg	Franciscan Assemblage, greenstone
fl	Franciscan Assemblage, limestone
fs	Franciscan Assemblage, sandstone
Qls	Landslide Debris
Qsc	Santa Clara Formation/Nonmarine Sedimentary Rocks
Qa	Surficial Sediments
Qa.2	Surficial Sediments, younger stream alluvium
Water	Water

BENCHMARK RESOURCES

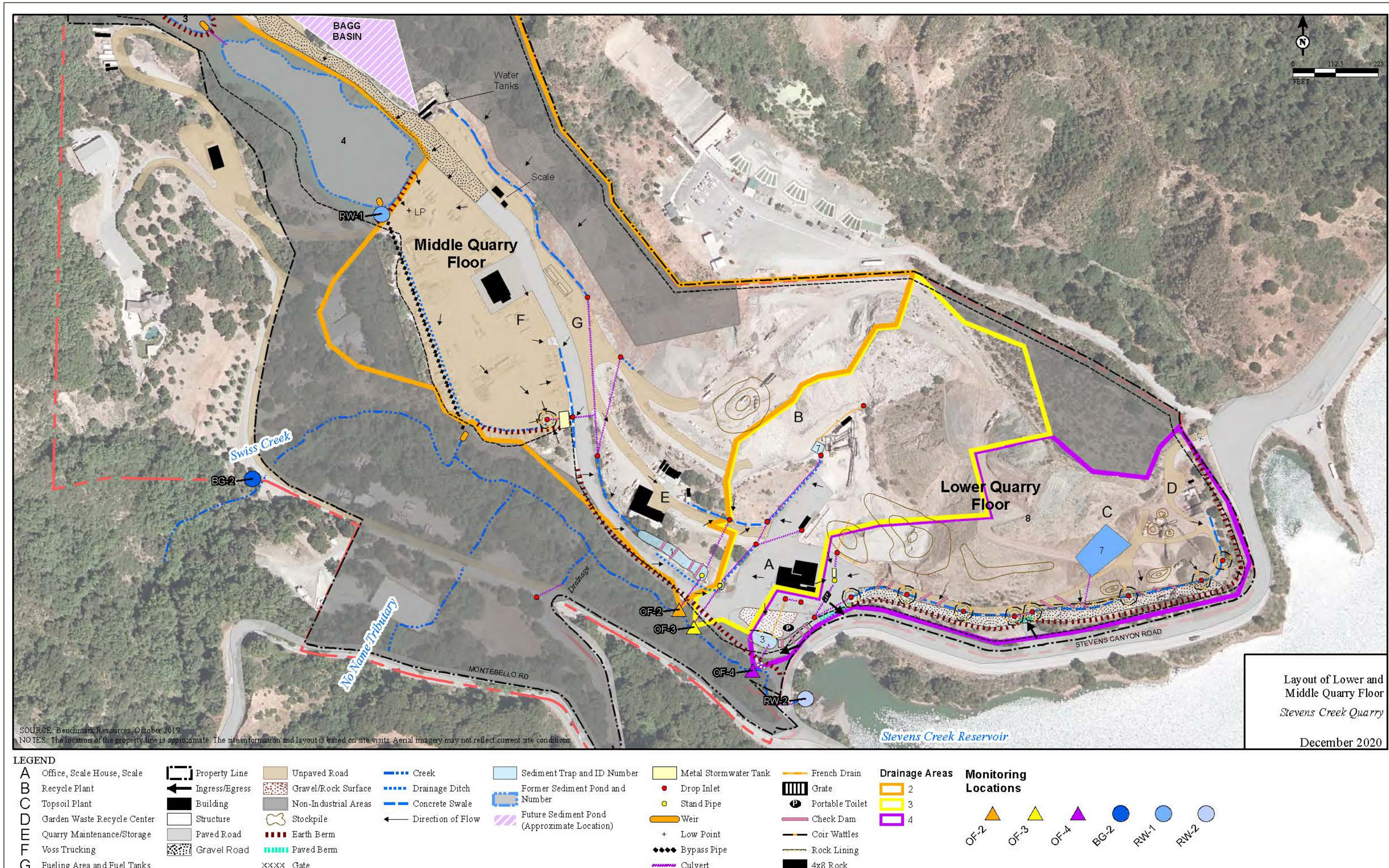
N 0 500 1,000 2,000 Feet

Geology

STEVENS CREEK QUARRY

USE PERMIT & RECLAMATION PLAN AMENDMENT

Figure 7



Source: Geosyntech (December 2020)

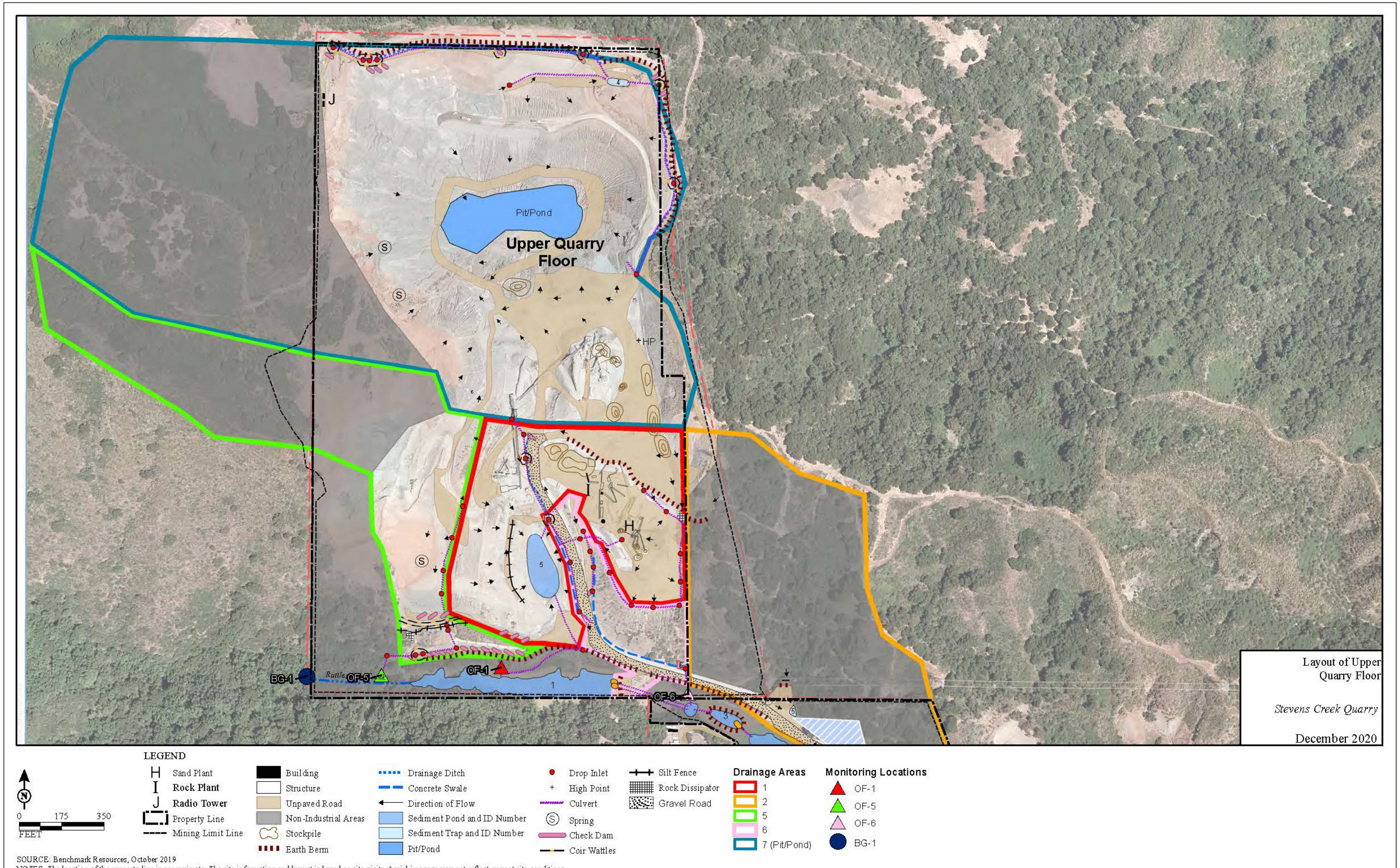
BENCHMARK RESOURCES

Stormwater Containment and Management

STEVENS CREEK QUARRY

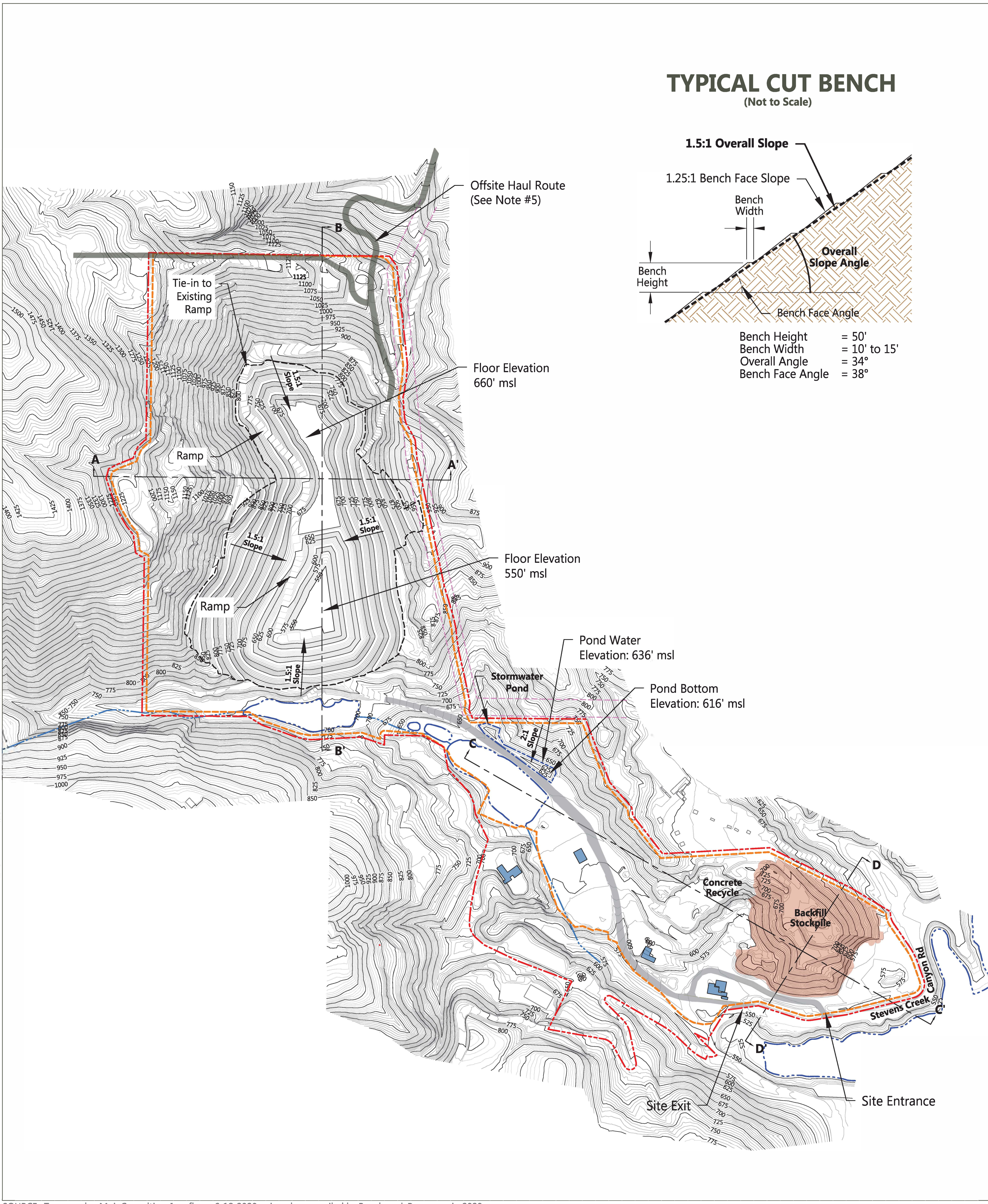
USE PERMIT & RECLAMATION PLAN AMENDMENT

Figure 8a



Source: Geosyntech (December 2020)

Stormwater Containment and Management
STEVENS CREEK QUARRY
USE PERMIT & RECLAMATION PLAN AMENDMENT
Figure 8b



SOURCE: Topography–Muir Consulting, Inc., flown 6-18-2020; mine plan compiled by Benchmark Resources in 2020

NOTES:

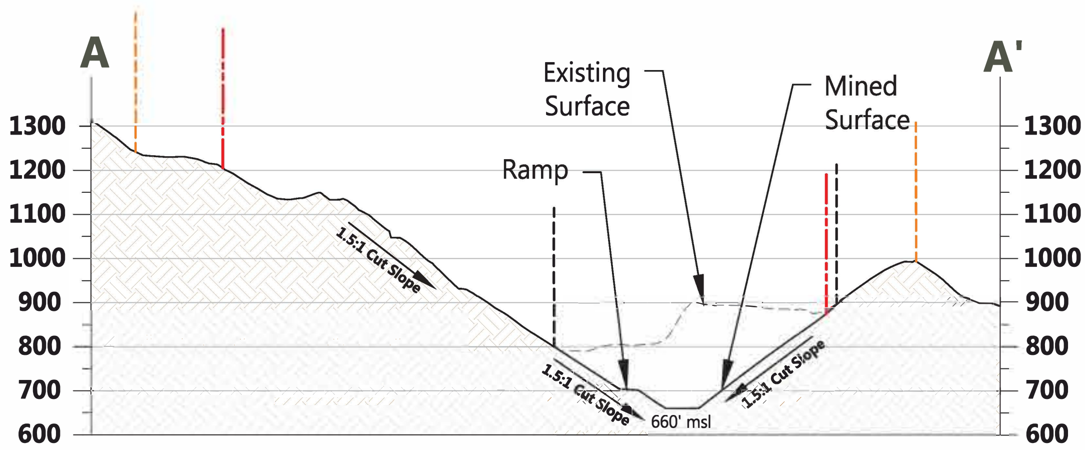
1. Contour intervals: 5'-minor; 25'-major. Elevations shown in mean sea level (msl).
2. Slope angles indicated are overall; see "Typical Cut Slope" for details.
3. Top of cut slopes planned at 25' from Parcel Boundary, but would meet County requirements as specified in Sec. C12-558 of the Design Standards
4. Active slopes may be steeper and have different bench intervals than final reclaimed cut slopes.
5. Planned Mine Cut Slopes: 1.5h:1v.
6. Planned East Wall Cut Slope: 1h:1v.
7. Haul Road Ramp Slope: 10% to 15%. Ramps, access roads, and primary travel routes may vary in location and size throughout operations progression.
8. Off-site "Permanente Rock Plant Haul Road" per Permanente Quarry Amended Reclamation Plan, May 2019.
9. See Sheet 3 for cross sections.
10. Mine and reclamation design based on topography prepared by Muir Consulting, Inc. Aerial survey date: 6-18-2020. See Appendix D for Professional Land Surveyor stamped drawings.
11. Stormwater pond capacity: Approximately 3.9 acre-feet
12. Mine Plan Reserves: 12.4 million tons.
13. The planned reclamation boundary and mining depth are shown; however, the extent of operations may or may not reach these limits. Total acreage to be disturbed and reclaimed will be within the limits of the reclamation plan boundary. Facilities and configurations within this boundary are approximate. All acreages are approximate and not intended to reflect goals for any particular surface type. Variations are subject to actual mined conditions and will not affect success of post mining land uses.

Site Boundary	±170 acres	Cross Section	
Reclamation Plan Boundary	±147 acres	Water Border	
Mine Plan Modified Below This Elevation to 550' msl		Swiss Creek	
100-foot Power Line Easement		Existing Building within Site Boundary	
Access Road		Existing Building outside Site Boundary	
Backfill Stockpile Area	±10 acres		

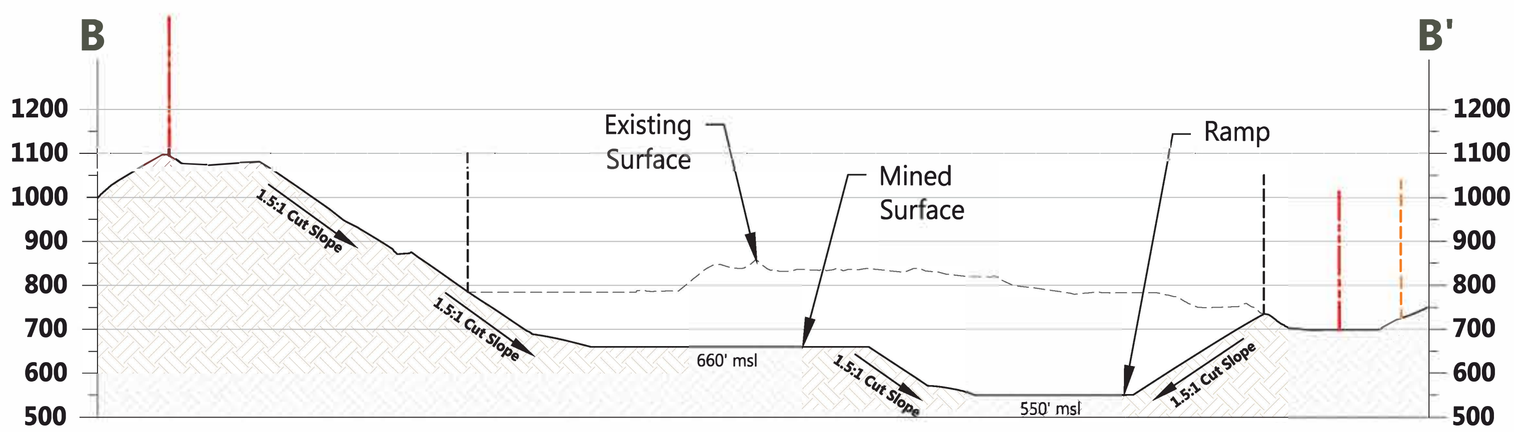
BENCHMARK RESOURCES

N 0 75 150 300 600 Feet

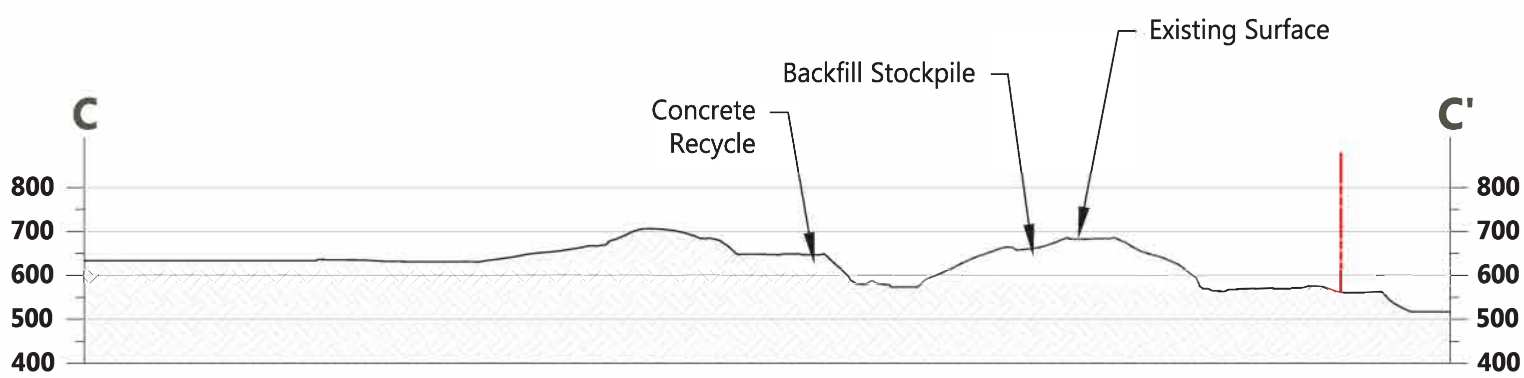
Mine Plan
STEVENS CREEK QUARRY
USE PERMIT & RECLAMATION PLAN AMENDMENT
Figure 9



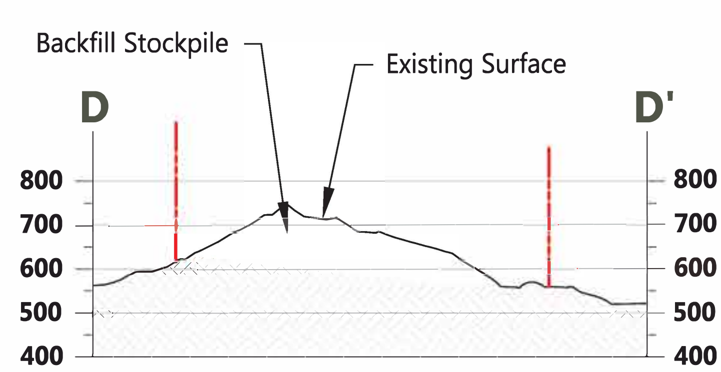
CROSS SECTION A-A'



CROSS SECTION B-B'



CROSS SECTION C-C'



CROSS SECTION D-D'

SOURCE: Topography–Muir Consulting, Inc., flown 6-18-2020; mine plan compiled by Benchmark Resources in 2020

NOTES:

1. Slope angles indicated are overall; see "Typical Cut Slope" on Sheet 2 for details.
2. Active slopes may be steeper and have different bench intervals than final reclaimed cut slopes.
3. Planned Mine Cut Slopes: 1.5h:1v.
4. Planned East Wall Cut Slope: 1h:1v.
5. Haul Road Ramp Slope: 10% to 15%. Ramps, access roads, and primary travel routes may vary in location and size throughout operations progression.
6. East Wall Slope: 1h:1v overall cut slope angle.
7. "msl" = mean sea level.
8. See Sheet 2 for cross section locations shown.
11. Mine and reclamation design based on topography prepared by Muir Consulting, Inc. Aerial survey date: 6-18-2020. See Appendix D for Professional Land Surveyor stamped drawings.
12. Mine Plan Reserves: 12.4 million tons.
13. The planned reclamation boundary and mining depth are shown; however, the extent of operations may or may not reach these limits. Total acreage to be disturbed and reclaimed will be within the limits of the reclamation plan boundary. Facilities and configurations within this boundary are approximate. All acreages are approximate and not intended to reflect goals for any particular surface type. Variations are subject to actual mined conditions and will not affect success of post mining land uses.

Site Boundary
Reclamation Plan Boundary

BENCHMARK RESOURCES

N

0 100 200 400 600

Mine Plan Cross Sections
STEVENS CREEK QUARRY
USE PERMIT & RECLAMATION PLAN AMENDMENT
Figure 10

Aerial Image Dated June 18, 2020

BENCHMARK RESOURCES

Internal Circulation, Queuing, and Parking

STEVENS CREEK QUARRY

USE PERMIT & RECLAMATION PLAN AMENDMENT

Figure 11a

LEGEND

Employee Parking

Customer Queue/Load

Circulation Route

Aerial Image Dated June 18, 2020

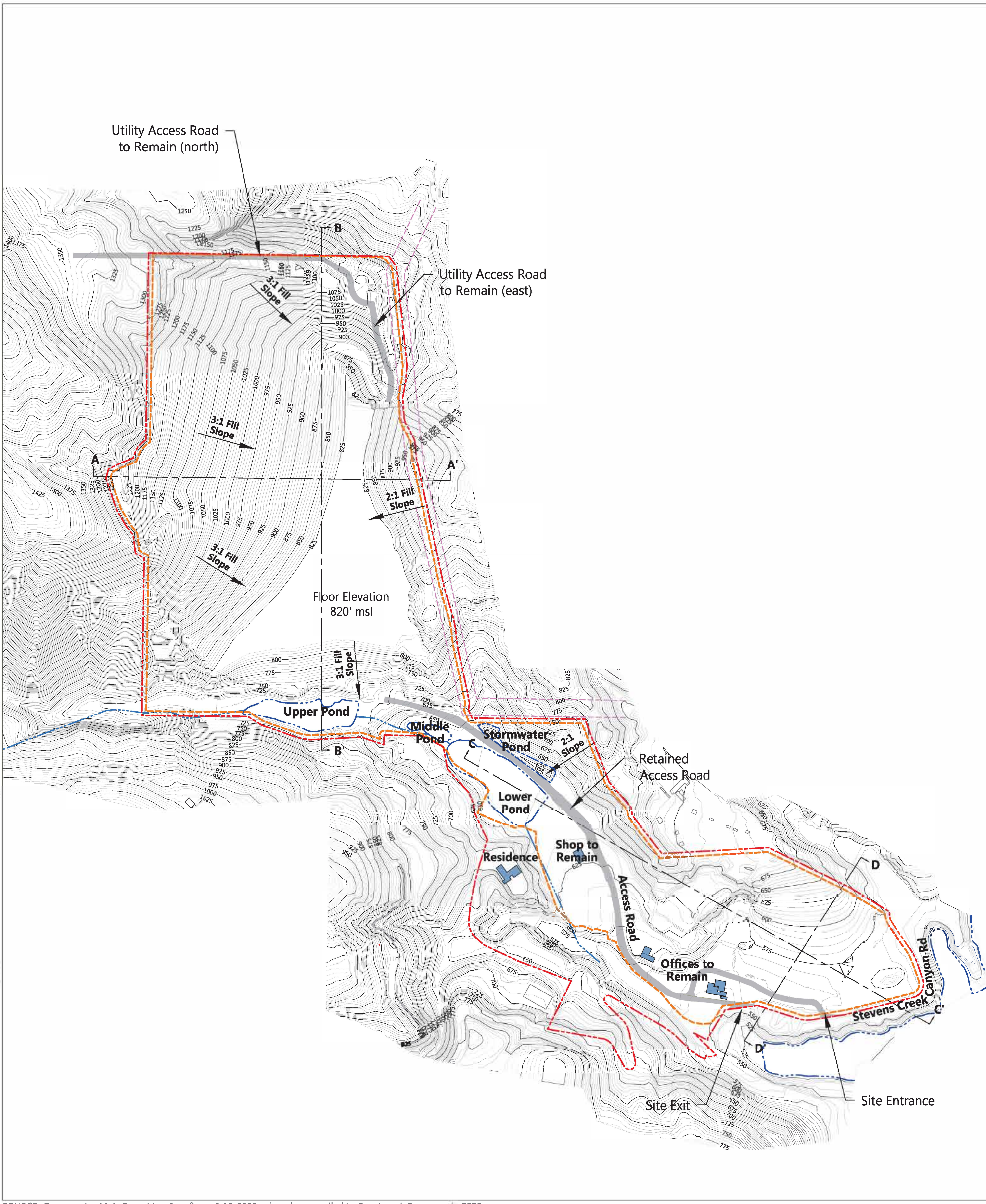
BENCHMARK RESOURCES

Internal Circulation, Queuing, and Parking

STEVENS CREEK QUARRY

USE PERMIT & RECLAMATION PLAN AMENDMENT

Figure 11b



SOURCE: Topography–Muir Consulting, Inc., flown 6-18-2020; mine plan compiled by Benchmark Resources in 2020

NOTES:

1. Contour intervals: 5'-minor; 25'-major. Elevations shown in mean sea level (msl).
3. Planned Reclamation Fill Slope: 3h:1v.
4. Planned East Wall Fill Slope: 2h:1v.
5. "msl" = mean sea level.
6. See Sheet 6 for cross sections shown.
9. Mine and reclamation design based on topography prepared by Muir Consulting, Inc. Aerial survey date: 6-18-2020. See Appendix D for Professional Land Surveyor stamped drawings.
10. Stormwater pond capacity: Approximately 3.9 acre-feet
11. Fill Volume = ±11,700,00 cubic yards (CY).
12. The planned reclamation boundary and mining depth are shown; however, the extent of operations may or may not reach these limits. Total acreage to be disturbed and reclaimed will be within the limits of the reclamation plan boundary. Facilities and configurations within this boundary are approximate. All acreages are approximate and not intended to reflect goals for any particular surface type. Variations are subject to actual mined conditions and will not affect success of post mining land uses.

Site Boundary	±170 acres	Cross Section
Reclamation Plan Boundary	±147 acres	Water Border
100-foot Power Line Easement		Swiss Creek
Access Road		Existing Building within Site Boundary
		Existing Building outside Site Boundary

BENCHMARK RESOURCES

N

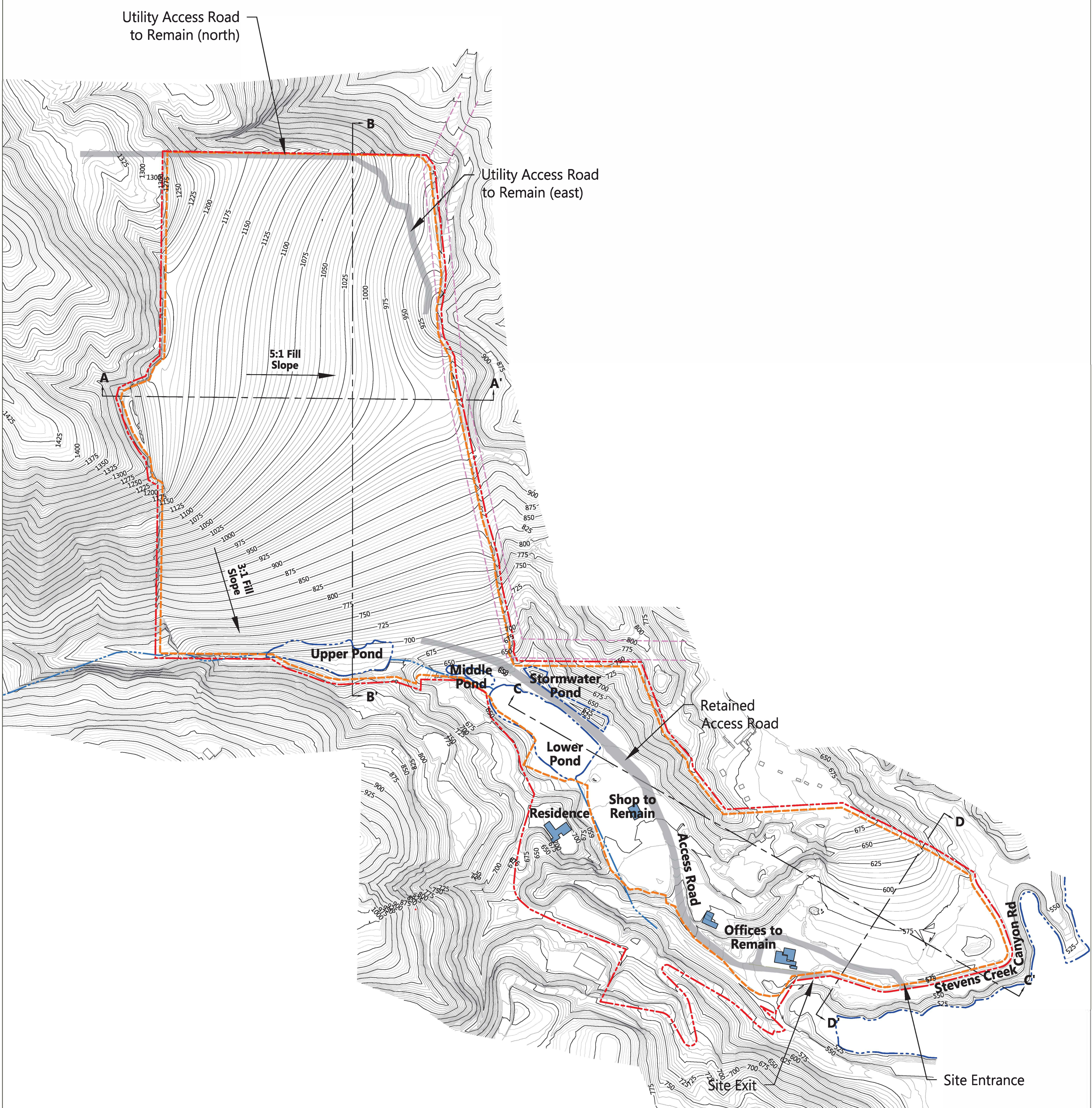
0 125 250 500 1,000 Feet

Reclamation Plan—Option A

STEVENS CREEK QUARRY

USE PERMIT & RECLAMATION PLAN AMENDMENT

Figure 12a



SOURCE: Topography–Muir Consulting, Inc., flown 6-18-2020; mine plan compiled by Benchmark Resources in 2020

NOTES:

1. Contour intervals: 5'-minor; 25'-major. Elevations shown in mean sea level (msl).
3. Planned Reclamation Fill Slope: 5h:1v.
4. "msl" = mean sea level.
5. See Sheet 6 for cross sections shown.
9. Mine and reclamation design based on topography prepared by Muir Consulting, Inc. Aerial survey date: 6-18-2020. See Appendix D for Professional Land Surveyor stamped drawings.
10. Stormwater pond capacity: Approximately 3.9 acre-feet
11. Fill Volume = ±20,500,00 cubic yards (CY).
12. The planned reclamation boundary and mining depth are shown; however, the extent of operations may or may not reach these limits. Total acreage to be disturbed and reclaimed will be within the limits of the reclamation plan boundary. Facilities and configurations within this boundary are approximate. All acreages are approximate and not intended to reflect goals for any particular surface type. Variations are subject to actual mined conditions and will not affect success of post mining land uses.

Site Boundary ±170 acres
Reclamation Plan Boundary ±147 acres
100-foot Power Line Easement
Access Road
Cross Section
Water Border
Swiss Creek
Existing Building within Site Boundary
Existing Building outside Site Boundary

BENCHMARK RESOURCES

N

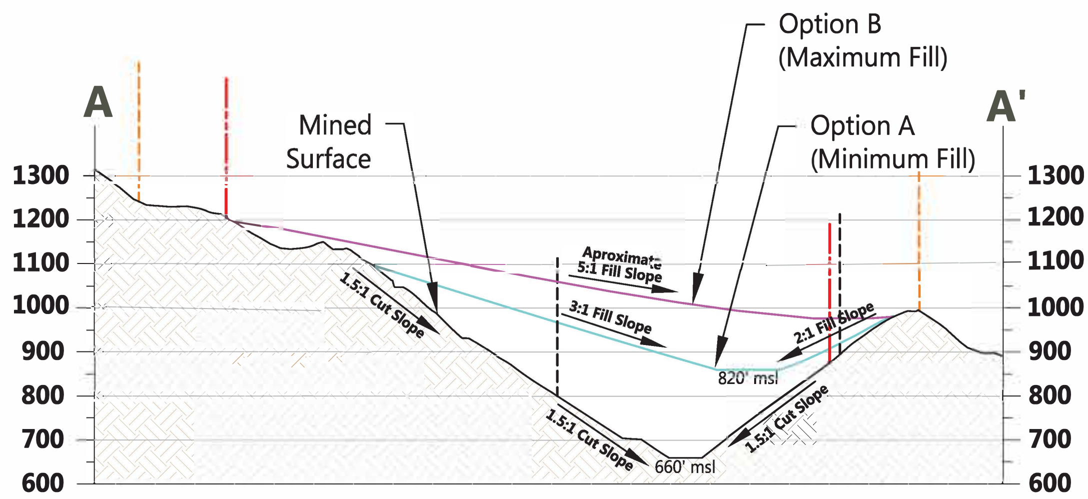
0 125 250 500 1,000 Feet

Reclamation Plan—Option B

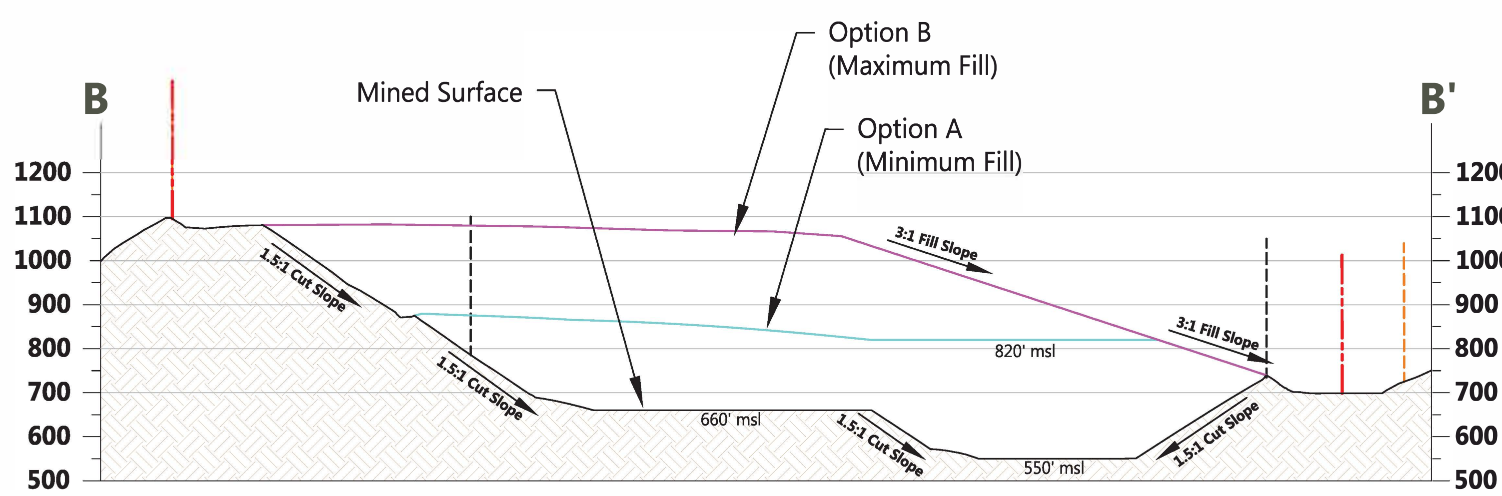
STEVENS CREEK QUARRY

USE PERMIT & RECLAMATION PLAN AMENDMENT

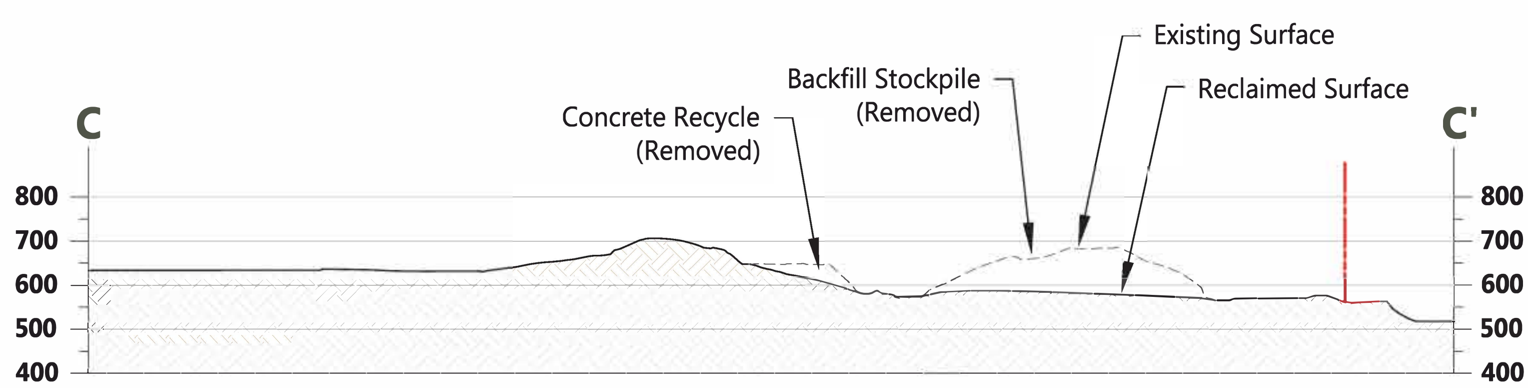
Figure 12b



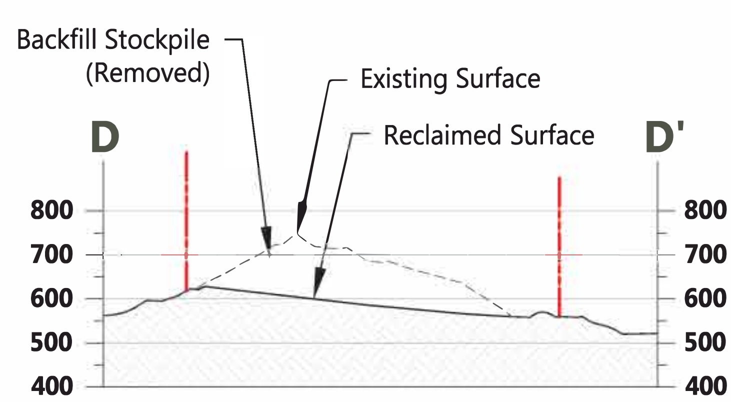
CROSS SECTION A-A'



CROSS SECTION B-B'



CROSS SECTION C-C'



CROSS SECTION D-D'

SOURCE: Topography–Muir Consulting, Inc., flown 6-18-2020; mine plan compiled by Benchmark Resources in 2020

NOTES:

1. Active slopes may be steeper and have different bench intervals than final reclaimed cut slopes.
2. "msl" = mean sea level.
3. Planned Reclamation Fill Slope: 3h:v1 (Option A), 5h:v1 (Option B).
4. See Sheets 4 and 5 for cross section locations shown.
11. Mine and reclamation design based on topography prepared by Muir Consulting, Inc. Aerial survey date: 6-18-2020. See Appendix D for Professional Land Surveyor stamped drawings.
12. Fill Volume Option A = ±11,700,000 cubic yards (CY). Fill Volume Option B = ±20,500,000 cubic yards (CY).
13. The planned reclamation boundary and mining depth are shown; however, the extent of operations may or may not reach these limits. Total acreage to be disturbed and reclaimed will be within the limits of the reclamation plan boundary. Facilities and configurations within this boundary are approximate. All acreages are approximate and not intended to reflect goals for any particular surface type. Variations are subject to actual mined conditions and will not affect success of post mining land uses.

Site Boundary
Reclamation Plan Boundary

Reclamation Plan Cross Sections
STEVENS CREEK QUARRY
USE PERMIT & RECLAMATION PLAN AMENDMENT
Figure 13

BENCHMARK RESOURCES

N

0 100 200 400 600

APPENDIX A
INDEX TO REQUIRED CONTENT

BENCHMARK RESOURCES

APPENDIX A
INDEX TO REQUIRED CONTENT

Mine Name:	Stevens Creek Quarry	**Checklist Completed by:**	Benchmark Resources
Reclamation Plan:	Stevens Creek Quarry Reclamation Plan Amendment (September 2020)	**Amendments:**	
End Use:	Open Space	**Date:**	December 11, 2020

Authority	Requirements/Practices/Standards	Applicable	Source or Explanation
GENERAL CONSIDERATIONS			
PRC 2772(b)	Required contents chart: A chart identifying the location (e.g. page number, chapter, appendix, or other location in the reclamation plan) of content that meets the requirements of PRC Sections 2772, 2773, 2773.3 and CCR Articles 1 and 9 (as delineated in this checklist).	Y	Appendix A
PRC 2772(c)(1)	Contact information: Name and address of the surface mining operator and any person designated by the operator as an agent for service of process (must reside in CA).	Y	Section 2.1
PRC 2772(c)(2)	Material quantity and type: The anticipated total quantity and type of minerals to be mined (see Annual Report Instructions, Exhibit B, for mineral types and units of measure).	Y	Section 3.1
PRC 2772(c)(3)	Dates: The initiation and termination dates of mining (be as specific as possible, e.g. December 31, 2030).	Y	Section 3.2
PRC 2772(c)(4)	Depth of mining: The maximum anticipated depth of surface mining in relation to a verifiable benchmark such as Mean Sea Level.	Y	Section 3.3
PRC 2772(c)(5) (A-F)	Reclamation plan maps shall include: Size and legal description of lands affected by surface mining operations;	Y	Section 2 & Appendix D
	Names and addresses of owners of all surface interests and mineral interests;	Y	Section 2 & Appendix D
	Property lines, setbacks, and the reclamation plan boundary;	Y	Appendix D & Sheets 1 & 2
	Existing and final topography with contour lines at appropriate intervals;	Y	Appendix D & Sheet 4 & 5
	Detailed geologic description of the area of the surface mining operation;	Y	Section 2.7.5 & Figure 7
	Locations of railroads, utility features, and roads (access roads, temporary roads to be reclaimed, and any roads remaining for the end use).	Y	Figure 5 & Sheets 1 - 5

Authority	Requirements/Practices/Standards	Applicable	Source or Explanation
	All maps, diagrams, or calculations that are required to be prepared by a California-licensed professional shall include the preparer's name, license number, signature & seal.	Y	Appendix D & Sheet 2 - 6
PRC 2772(c)(6)	Mining method and schedule: A description of the mining methods and a time schedule that provides for completion of mining on each segment so that reclamation can be concurrent or phased.	Y	Sections 3.4 and 4.7
PRC 2772(c)(7)	Subsequent use(s): A description of the proposed subsequent use(s) after reclamation	Y	Section 4.1
	Evidence that all landowners have been notified of the proposed use.	Y	Appendix C
PRC 2772(c)(9)	Impact on future mining: A statement regarding the impact of reclamation on future mining on the site.	Y	Section 4.1.3
PRC 2772(c)(10)	Signed statement: Statement signed by the operator accepting responsibility for reclamation of the mined lands per the reclamation plan.	Y	Appendix B
PRC 2776(b-c)	Pre-SMARA areas: Reclamation plans shall apply to operations conducted after January 1, 1976 or to be conducted in the future. Mined lands disturbed prior to January 1, 1976 *and not disturbed after that date* may be excluded from the reclamation plan.	Y	2.8
CCR 3502(b)(2)	Public health and safety: A description of how any potential public health and safety concerns that may arise due to exposure of the public to the site will be addressed.	Y	Section 4.1.4
CCR 3709(a)	Equipment storage and waste disposal: Designate areas for equipment storage and show on maps.	Y	Section 4.6 and Sheet 2
	All waste shall be disposed of in accordance with state and local health and safety ordinances.	Y	Section 4.6
CCR 3709(b)	Structures and equipment removed: Structures and equipment should be dismantled and removed at closure, except as demonstrated to be necessary for the proposed end use.	Y	Sections 4.1.2 & 4.6
CCR 3713(a)	Well closures: Drill holes, water wells, monitoring wells will be completed or abandoned in accordance with laws, unless demonstrated necessary for the proposed end use.	Y	Section 4.6

Authority	Requirements/Practices/Standards	Applicable	Source or Explanation
CCR 3713(b)	Underground openings: Any portals, shafts, tunnels, or openings will be gated or protected from public entry, and to preserve access for wildlife (e.g. bats).	Y	Section 4.6
GEOLOGY AND GEOTECHNICAL			
PRC 2772(c)(5)	A description of the general geology of the area	Y	Section 2.7.5 & Figure 7
	A detailed description of the geology of the mine site.	Y	Section 2.7.5 & Figure 7
PRC 2773.3	If a metallic mine is located on, or within one mile of, any "Native American sacred site" and is located in an "area of special concern, " the reclamation plan shall require that all excavations and/or excess materials be backfilled and graded to achieve the approximate original contours of the mined lands prior to mining.	NA	--
CCR 3502(b)(4)	The source and disposition of fill materials used for backfilling or grading shall be considered in the reclamation plan.	Y	Section 4.2
CCR 3502(b)(3)	The designed steepness and treatment of final slopes must consider the physical properties of slope materials, maximum water content, and landscaping.	Y	Section 4.4
	The reclamation plan shall specify slope angles flatter than the critical gradient for the type of slope materials.	Y	Section 4.4
	When final slopes approach the critical gradient, a Slope Stability Analysis will be required.	Y	Section 4.4
CCR 3704.1	Backfilling required for surface mining operations for metallic minerals.	NA	--
CCR 3704(a)	For urban use, fill shall be compacted in accordance with Uniform Building Code, local grading ordinance, or other methods approved by the lead agency.	NA	--
CCR 3704(b)	For resource conservation, compact to the standards required for that end use.	NA	--
CCR 3704(d)	Final reclamation fill slopes shall not exceed 2:1 (H:V), except when allowed by site-specific engineering analysis, and the proposed final slope can be successfully revegetated. See also Section 3502(b)(3).	Y	Section 4.4
CCR 3704(e)	At closure, all fill slopes shall conform with the surrounding topography or approved end use.	Y	Section 4.4
CCR 3704(f)	Final cut slopes must have a minimum slope stability factor of safety that is suitable for the end use and conforms with the surrounding topography or end use.	Y	Section 4.4

Authority	Requirements/Practices/Standards	Applicable	Source or Explanation
HYDROLOGY AND WATER QUALITY			
PRC 2770.5	For operations within the 100-year flood plain (defined by FEMA) and within one mile up- or downstream of a state highway bridge, Caltrans must be notified and provided a 45-day review period by the lead agency.	NA	--
PRC 2772(c)(8)(A)	Description of the manner in which contaminants will be controlled and mine waste will be disposed.	Y	Section 4.5, 4.6.1, & Appendix H & K
PRC 2772(c)(8)(B)	The reclamation plan shall include a description of the manner in which stream banks/beds will be rehabilitated to minimize erosion and sedimentation.	NA	--
PRC 2773(a)	The reclamation plan shall establish site-specific sediment and erosion control criteria for monitoring compliance with the reclamation plan.	Y	Section 2.7, 4.5, & Appendix H
CCR 3502(b)(6)	Temporary stream and watershed diversions shall be detailed in the reclamation plan.	NA	--
CCR 3503(a)(2)	Stockpiles of overburden and minerals shall be managed to minimize water and wind erosion.	Y	Sections 4.2 & 4.5
CCR 3503(b)(2)	Operations shall be conducted to substantially prevent siltation of groundwater recharge areas.	Y	Section 4.5 & & Appendix H
CCR 3503(a)(3)	Erosion control facilities shall be constructed and maintained where necessary to control erosion.	Y	Sections 2.7, 4.2, 4.5 & & Appendix H
CCR 3503(b)(1)	Settling ponds shall be constructed where they will provide a significant benefit to water quality.	Y	Sections 2.7, 4.5, & Appendix H
CCR 3503(d)	Disposal of mine waste and overburden shall be stable and shall not restrict natural drainage without suitable provisions for diversion.	NA	--
CCR 3503(e)	Grading and revegetation shall be designed to minimize erosion and convey surface runoff to natural drainage courses or interior basins.	Y	Section 2.7, 4.5, & Appendix H
	Spillway protection shall be designed to prevent erosion.	NA	--
CCR 3706(a)	Surface mining and reclamation activities shall be conducted to protect on-site and downstream beneficial uses of water.	Y	Section 2.7, 4.5, & Appendix H
CCR 3706(b)	Water quality, recharge potential, and groundwater storage that is accessed by others shall not be diminished.	Y	Section 4.5.1 & Appendix H
CCR 3706(c)	Erosion and sedimentation shall be controlled during all phases of construction, operation, reclamation, and closure of surface mining operations to minimize siltation of lakes and water courses as per RWQCB/SWRCB.	Y	Section 4.5 & Appendix H

Authority	Requirements/Practices/Standards	Applicable	Source or Explanation
CCR 3706(d)	Surface runoff and drainage shall be controlled to protect surrounding land and water resources.	Y	Section 2.7, 4.5, & Appendix H
	Erosion control methods shall be designed for not less than 20 year/1 hour intensity storm event.	Y	Section 2.7, 4.5, & Appendix H
CCR 3706(e)	Impacted drainages shall not cause increased erosion or sedimentation. Mitigation alternatives shall be proposed in the reclamation plan.	NA	--
CCR 3706(f)(1)	Stream diversions shall be constructed in accordance with the Lake and Streambed Alteration Agreement (LSAA) between the operator and the Department of Fish and Wildlife.	NA	--
CCR 3706(f)(2)	Stream diversions shall also be constructed in accordance with Federal Clean Water Act and the Rivers and Harbors Act of 1899.	NA	--
CCR 3706(g)	All temporary stream diversions shall eventually be removed and the affected land reclaimed.	NA	--
CCR 3710(a)	Surface and groundwater shall be protected from siltation and pollutants in accordance with the Porter-Cologne Act, the Federal Clean Water Act, and RWQCB/SWRCB requirements.	Y	Section 2.7, 4.5, & Appendix H
CCR 3710(b)	In-stream mining shall be conducted in accordance with Section 1600 et seq. of the California Fish and Game Code, Section 404 of the Clean Water Act, and Section 10 of the Rivers and Harbors Act of 1899.	NA	--
CCR 3710(c)	In-stream mining shall be regulated to prevent impacts to structures, habitats, riparian vegetation, groundwater levels, and banks.	NA	--
	In-stream channel elevations and bank erosion shall be evaluated annually using extraction quantities, cross-sections, and aerial photos.	NA	--
CCR 3712	Mine waste and tailings and mine waste disposal units are governed by SWRCB waste disposal regulations and shall be reclaimed in accordance with this article: CCR Article 1. Surface Mining and Reclamation Practice. Section 3500 et seq.	Y	Section 4.6.1
SENSITIVE SPECIES AND HABITAT			
CCR 3502(b)(1)	A description of the environmental setting (identify sensitive species, wildlife habitat, sensitive natural communities, e.g. wetlands).	Y	Section 2.7.6 & Appendix F
	Impacts of reclamation on surrounding land uses.	Y	Section 4.1.3
CCR 3503(c)	Fish and wildlife habitat shall be protected by all reasonable measures.	Y	Section 4.5.2

Authority	Requirements/Practices/Standards	Applicable	Source or Explanation
CCR 3703(a)	Sensitive species shall be conserved or mitigated as prescribed by the federal and California Endangered Species Acts.	Y	Section 4.5.2
CCR 3703(b)	Wildlife habitat shall be established on disturbed land at least as good as pre-project, unless end use precludes its use as wildlife habitat.	NA	Section 4.5.2
CCR 3703(c)	Wetlands shall be avoided or mitigated at 1:1 minimum for both acreage and habitat value.	NA	--
CCR 3704(g)	Piles or dumps shall not be placed in wetlands without mitigation.	NA	--
CCR 3710(d)	In-stream mining shall not cause fish to be trapped in pools or off-channel pits, or restrict migratory or spawning activities.	NA	--
TOPSOIL			
CCR 3503(a)(1)	Removal of vegetation and overburden preceding mining shall be kept to a minimum.	Y	Section 4.2
CCR 3503(f)	When the reclamation plan calls for resoiling, mine waste shall be leveled and covered with a layer of finer material. A soil layer shall then be placed on this prepared surface.	NA	--
	The use of soil conditioners, mulches, or imported topsoil shall be considered where such measures appear necessary.	Y	Section 4.2 & 4.3
CCR 3704(c)	Mine waste shall be stockpiled to facilitate phased reclamation and kept separate from topsoil or other growth media.	Y	Section 4.2
CCR 3705(e)	If soil is altered or other than native topsoil, soil analysis is required. Add fertilizers or soil amendments if necessary.	Y	Section 4.2 & 4.3
CCR 3711(a)	All salvageable topsoil shall be removed as a separate layer.	Y	Section 4.2
	Topsoil and vegetation removal should not precede mining by more than one year.	Y	Section 4.2
CCR 3711(b)	Topsoil resources shall be mapped prior to stripping and location of topsoil stockpiles shown on map included in the reclamation plan.	Y	Section 4.2
	Topsoil and other growth media shall be maintained in separate stockpiles.	Y	Section 4.2
	Test plots may be required to determine the suitability of growth media for revegetation purposes.	Y	Section 4.3.4
CCR 3711(c)	Soil salvage operations and phases of reclamation shall be set forth in the reclamation plan to minimize the area disturbed and to achieve maximum revegetation success.	Y	Section 4.2 & 4.3

Authority	Requirements/Practices/Standards	Applicable	Source or Explanation
CCR 3711(d)	Topsoil and growth media shall be used to phase reclamation as soon as can be accommodated following the mining of an area.	Y	Section 4.2 & 4.3
	Topsoil stockpiles shall not be disturbed until needed for reclamation.	Y	Section 4.2
	Topsoil stockpiles shall be clearly identified with signs.		Section 4.2
	Topsoil shall be planted with vegetation or otherwise protected to prevent erosion and discourage weeds.	Y	Section 4.2 & 4.3
CCR 3711(e)	Topsoil shall be redistributed in a manner resulting in a stable, uniform thickness consistent with the end use.	Y	Sections 4.2 & 4.3
REVEGETATION			
PRC 2773(a)	The reclamation plan shall be specific to the property and shall establish site-specific criteria for evaluating compliance with the reclamation plan with respect to revegetation.	Y	Section 4.3 & Appendix I
CCR 3503(g)	Available research regarding revegetation methods and selection of species given the topography, resoiling characteristics, and climate of the mined areas shall be used.	Y	Section 4.3 & Appendix I
CCR 3705(a)	Baseline studies shall be conducted prior to mining activities to document vegetative cover, density, and species richness.	Y	Section 4.3 & Appendix I
	Vegetative cover shall be similar to surrounding habitats and self-sustaining.	Y	Section 4.3 & Appendix I
CCR 3705(b)	Test plots shall be conducted simultaneously with mining to ensure successful implementation of the proposed revegetation plan.	Y	Section 4.3.4 & Appendix I
CCR 3705(c)	Decompaction methods, such as ripping and disking, shall be used in areas to be revegetated to establish a suitable root zone for planting.	Y	Section 4.6 & Appendix I
CCR 3705(d)	Roads shall be stripped of roadbase materials, resoiled, and revegetated, unless exempted.	Y	Section 4.6
CCR 3705(f)	Temporary access shall not disrupt the soil surface on arid lands except where necessary for safe access. Barriers shall be installed to keep unauthorized vehicles out.	NA	-
CCR 3705(g)	Use local native plant species (unless non-native species meet the end use).	Y	Section 4.3 & Appendix I
	Areas to be developed for industrial, commercial, or residential shall be revegetated for the interim period to control erosion.	Y	Section 4.3 & Appendix I
CCR 3705(h)	Planting shall be conducted during the most favorable period of the year for plant establishment.	Y	Section 4.3 & Appendix I

Authority	Requirements/Practices/Standards	Applicable	Source or Explanation
CCR 3705(i)	Use soil stabilizing practices and irrigation when necessary to establish vegetation.	Y	Section 4.3 & Appendix I
CCR 3705(j)	If irrigation is used, demonstrate that revegetation has been self-sustaining without irrigation for two years prior to the release of financial assurance.	Y	Section 4.3 & Appendix I
CCR 3705(k)	Weeds shall be monitored and managed.	Y	Section 4.3 & Appendix I
CCR 3705(l)	Plant protection measures such as fencing and caging shall be used where needed for revegetation success. Protection measures shall be maintained until revegetation efforts are successfully completed and the lead agency authorizes removal.	Y	Section 4.3 & Appendix I
CCR 3705(m)	Quantitative success standards for vegetative cover, density, and species richness shall be included in the reclamation plan.	Y	Section 4.3 & Appendix I
	Monitoring to occur until success standards have been achieved.	Y	Section 4.3 & Appendix I
	Sampling techniques for measuring success shall be specified. Sample size must be sufficient to provide at least an 80 percent statistical confidence level.	Y	Section 4.3 & Appendix I
AGRICULTURE			
CCR 3707(a)	Where the end use will be agriculture, prime agricultural land shall be returned to a fertility level specified in the reclamation plan.	NA	--
CCR 3707(b)	Segregate and replace topsoil in proper sequence by horizon in prime agricultural soils.	NA	--
CCR 3707(c)	Post reclamation productivity rates for prime agricultural land must be equal to pre-project condition or to a similar site for two consecutive years.	NA	--
	Productivity rates shall be specified in the reclamation plan.	NA	--
CCR 3707(d)	If fertilizers and amendments are applied, they shall not cause contamination of surface or groundwater.	Y	Section 4.3, 4.5. & Appendix H & I
CCR 3708	For sites where the end use is to be agricultural, non-prime agricultural land must be reclaimed to be capable of sustaining economically viable crops common to the area.	NA	--

NOTIFICATION OF LANDOWNER (*PRC § 2772(c)(7)*)

SMARA requires that a reclamation plan provide evidence that all owners of a possessory interest in the land have been notified of the proposed use or potential uses after reclamation. The Stevens Creek Quarry Reclamation Plan Amendment proposes that reclamation actions prepare the site to be adaptable to continued use as open space.

I (We) hereby acknowledge the planned mine reclamation for parcels listed below. Further, consent is given to the operator, the State of California, and Santa Clara County or its authorized agents, to access the property for annual inspections and evaluation to achieve the satisfactory completion of the provisions of the reclamation plan approved pursuant to the California Surface Mining and Reclamation Act of 1975, as amended.

Parcel(s): 351-10-017, 351-10-033, 351-10-039, and 351-11-001

Landowner(s):

Hanson Permanente Cement, Incorporated
24001 Stevens Creek Boulevard
Cupertino, CA 95014

LEHIGH
HEIDELBERGCEMENT Group

Permanente Plant
24001 Stevens Creek Blvd
Cupertino, CA 95014
Phone (408) 996-4000
Fax (408) 725-1104

May 7, 2009

Richard A. Voss, President
Stevens Creek Quarry, Inc.
12100 Stevens Canyon Road
Cupertino, CA 95014

Lehigh Southwest Cement Company ("Lehigh") operates the Permanente Cement Plant and Quarry. As you know, parcels 351-10-017, 351-10-033, 351-10-039, and 351-11-001 are properties owned by Lehigh's affiliate, Hanson Permanente Cement, Inc. ("HPC"), and are part of the Permanente Quarry. At least 9.5 acres within these four parcels (the "Disturbed Property") have been disturbed as part of the historic mining operations of Stevens Creek Quarry, Inc. ("SCQ"). The Disturbed Property and the reclamation work related thereto to be performed by SCQ are more fully described in that certain Stevens Creek Quarry Reclamation Plan Amendment (May 2007, revised January 2008) prepared for the County of Santa Clara (the "Amended Reclamation Plan").

Subject to the satisfaction of the requirements outlined below, Lehigh, for itself and HPC, hereby grants SCQ a limited, non-exclusive license to enter the Disturbed Property for purposes related to reclamation and other work required by the Amended Reclamation Plan. This license to conduct reclamation work expires on April 30, 2010.

Lehigh has the following requirements:

- SCQ agrees to provide Lehigh a certificate of insurance naming Lehigh and HPC as additional insureds and evidencing insurance coverages pursuant to the attached "Insurance Requirements for Contractors".

- SCQ agrees to provide financial assurances in a form reasonably satisfactory to Lehigh guaranteeing (i) the reclamation of the Disturbed Property in accordance with the Amended Reclamation Plan and (ii) the long-term stability of the Disturbed Property after reclamation.

- SCQ agrees to indemnify, defend, and protect Lehigh and HPC and their employees, contractors, and agents against any and all claims, liabilities, or losses in connection with SCQ's reclamation work on the Disturbed Property or the presence of SCQ and its employees, contractors, and agents on the Disturbed Property.

Regarding the second requirement above, Lehigh acknowledges that SCQ has provided or will provide financial assurances to the County and/or the State of California as part of the Amended Reclamation Plan. However, Lehigh is not a beneficiary of these financial assurances and therefore requests independent assurances to protect its interests.

File 1253--07P

Lehigh and HPC reserve all rights relating to the Disturbed Property and prior actions taken by SCQ on the Disturbed Property. The license granted in this letter to SCQ is without prejudice to any rights and remedies Lehigh and HPC may have or wish to assert in the future.

This letter may be shared with the Planning Department of Santa Clara County as evidence of Lehigh's and HPC's consent to the reclamation work on the Disturbed Property.

Please acknowledge this letter by countersigning below and returning the fully-executed letter to me.

Sincerely,

H. Wesseling

Henrik Wesseling
Plant Manager

Attachment; Figure 5, Reclamation Plan Amended Areas

cc: Stuart Tomlinson Lehigh Southwest Cement Company
County of Santa Clara, Planning Dept.

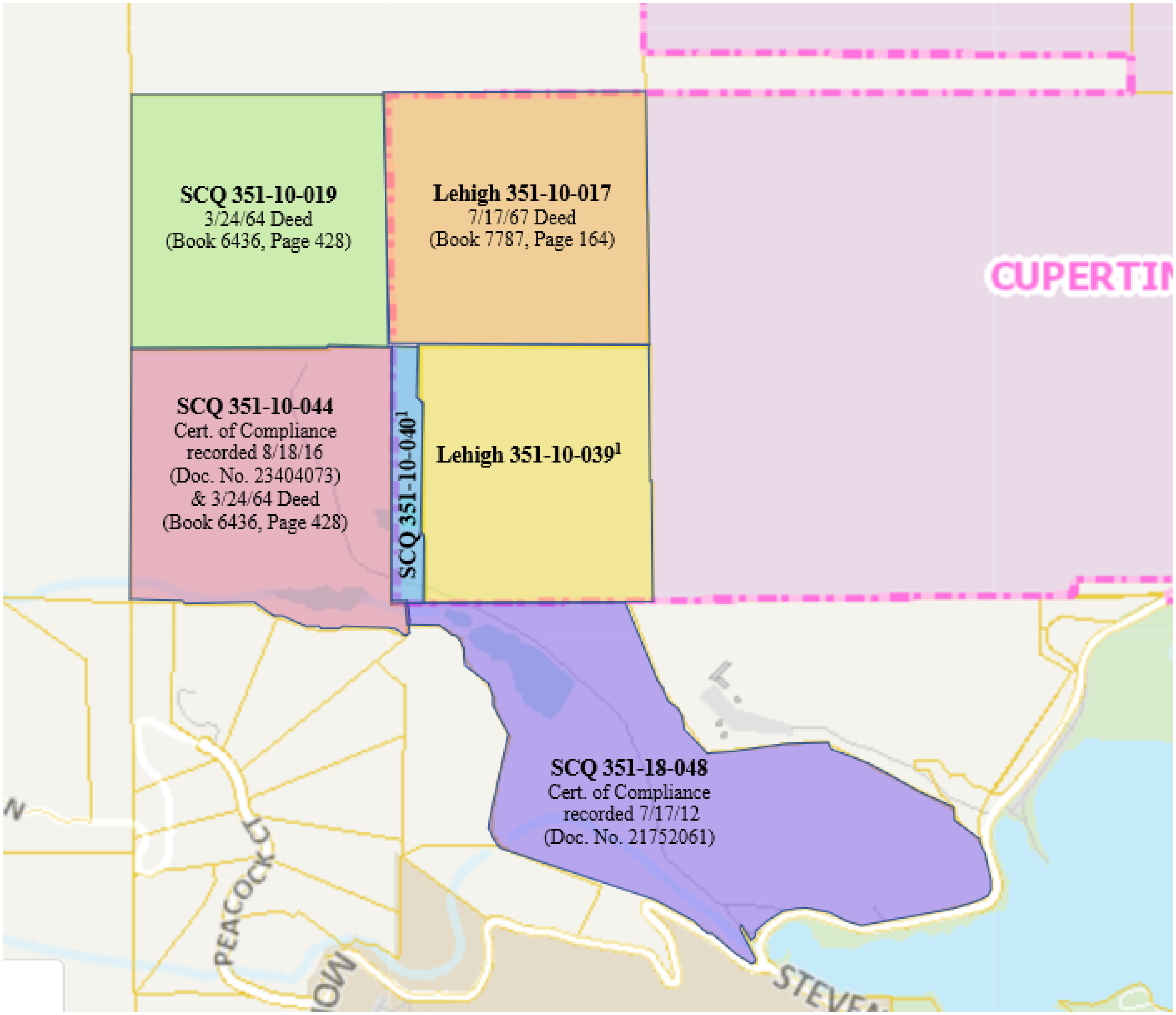
ACKNOWLEDGED AND AGREED TO:

Stevens Creek Quarry, Inc.

By: ______________________________

Name: ____________________________

Date: _____________________________



[1] The yellow and blue parcels were conveyed as one parcel from Kaiser Cement & Gypsum Corp. to Kaiser Cement & Gypsum Corporation via a deed recorded 7/17/67 in Book 7787, Page 163. The blue parcel was then conveyed from Kaiser to SCQ via a 12/11/69 Deed that was recorded 3/26/70 in Book 8869, Page 706. Pursuant to the November 1969 Record of Survey recorded 2/10/70 in Book 264, Page 23, of Maps, and the definition of a "lot" per Section 18.08.010 of the City of Cupertino's Municipal Code, the blue parcel is a legal lot.

BOOK 3073 PAGE 162

DEED

SANTA CLARA VALLEY WATER CONSERVATION DISTRICT,

a public corporation, the first party, hereby grants to

STEVENS CREEK QUARRY, INC.,
a corporation,

the second party, all that real property situated in the County of Santa Clara, State of California, comprising approximately 2.658 acres, platted and described upon that certain right of way plat numbered S-1 Parcel No. 2A and S-2 Parcel No. 1A, entitled "Stevens Creek Reservoir Surplus Lands", consisting of 2 sheets, dated January 12, 1955, which said right of way plat is hereunto attached, marked "Exhibit A", and made a part hereof.

IN WITNESS WHEREOF, the said first party has executed this conveyance as of the 31st day of January, 1955, in its corporate name, under its corporate seal, and by its undersigned officers thereunto duly authorized.

1049731
BOOK 3073 PAGE 162
FILED FOR RECORD
AT REQUEST OF
Stevens Creek Quarry, Inc
FEB 1 11 17 AM 1955
OFFICIAL RECORDS
SANTA CLARA COUNTY
[signature]
RECORDER

SANTA CLARA VALLEY WATER CONSERVATION DISTRICT

By [signature: Reginald Parry]
President

By [signature]
Secretary

Doc. 2.40
Diag. 1.00
12
$ 3.40

STATE OF CALIFORNIA
County of SANTA CLARA } ss.

On this 31st day of January in the year one thousand nine hundred and Fifty-five before me, BRUCE P. GRISWOLD, a Notary Public in and for the County of Santa Clara, State of California, residing therein, duly commissioned and sworn, personally appeared REGINALD L. PARRY and THELMA M. WRIGHT known to me to be the President and Secretary respectively of the corporation described in and that executed the within instrument, and also known to me to be the persons who executed the within instrument on behalf of the corporation therein named, and acknowledged to me that such corporation executed the same.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my official seal in the County of Santa Clara the day and year in this certificate first above written.

Bruce P. Griswold

Notary Public in and for the County of Santa Clara State of California.

My Commission Expires Nov. 5, 1957

Cowdery's Form No. 28 (Acknowledgement Corporation).
(C. C. Secs. 1190-1190.1)

(Over)

U. S. INT. REV. STAMP CANCELLED $3.30

Ryl C. Tully, Recorder
By M. D. Crowley, Deputy

BOOK 3073 PAGE 163

SANTA CLARA VALLEY WATER CONSERVATION DISTRICT

SANTA CLARA COUNTY, CALIFORNIA

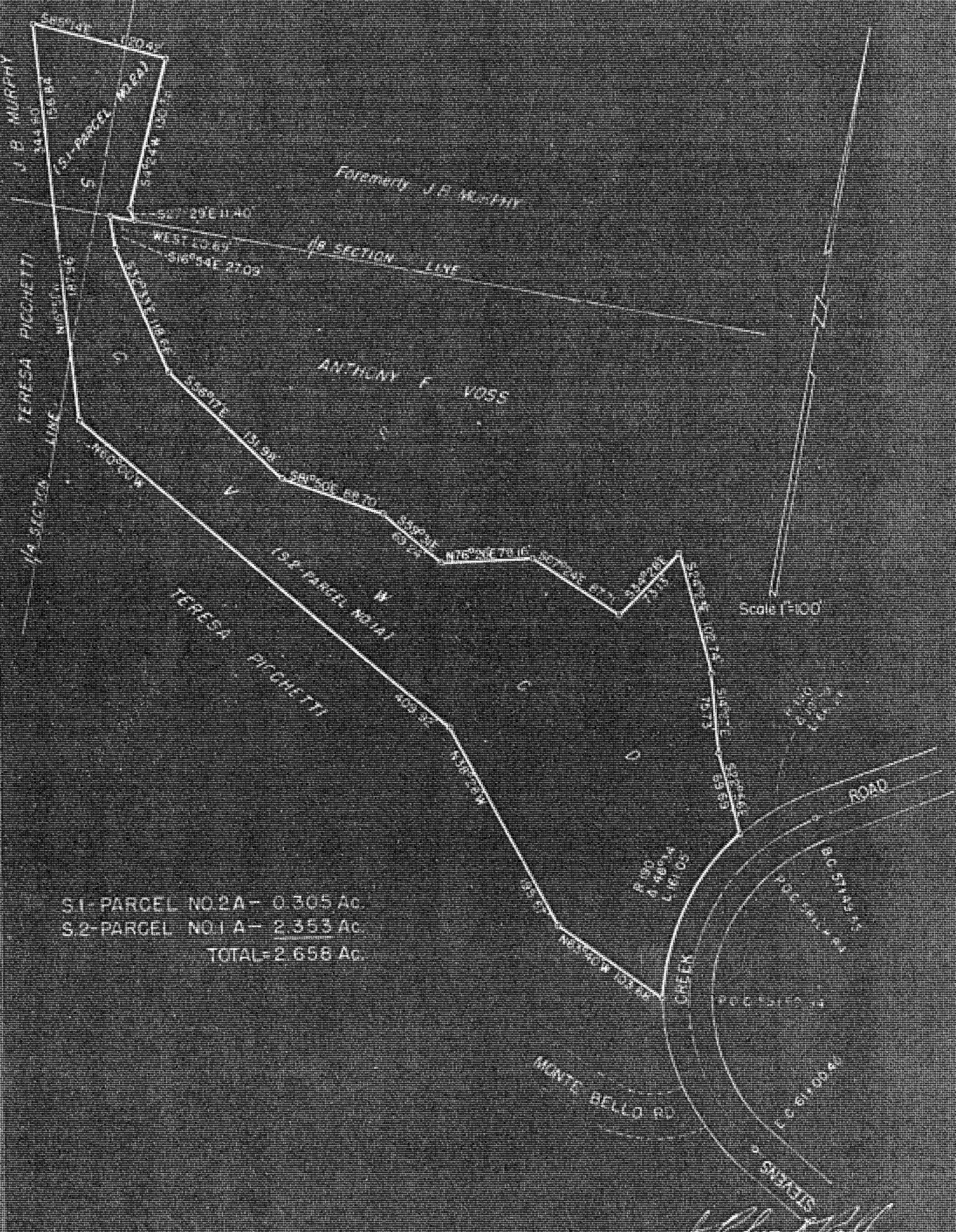
RIGHT OF WAY PLAT

SHEET 1 OF 2 SHEETS

SURVEY NO. S-1 Parcel No. 2A and S-2 Parcel No. 1 A

SURVEYED BY ____________ EXHIBIT A DATE January 1, 1955

FOR Stevens Creek Reservoir Surplus Lands



S1-PARCEL NO.2A – 0.305 Ac.
S2-PARCEL NO.1 A – 2.353 Ac.
TOTAL = 2.658 Ac.

CHIEF ENGINEER, S.C.V.W.C.D.

DR.	CK.
TR.	AP.

BOOK 3073 PAGE 164

SANTA CLARA VALLEY WATER CONSERVATION DISTRICT

SANTA CLARA COUNTY, CALIFORNIA

RIGHT OF WAY PLAT

SHEET 2 OF 2 SHEETS.

SURVEY NO. S-1 Parcel No. 2A and S-2 Parcel No. 1A

SURVEYED BY ______ DATE January 12, 1955

FOR STEVENS CREEK RESERVOIR SURPLUS LANDS

All that certain parcel of land situate in the County of Santa Clara, State of California, and more particularly described as follows:

Beginning on the western boundary of Stevens Creek Road at the southwest corner of lands conveyed by the Santa Clara Valley Water Conservation District to Anthony F. Voss by deed dated March 10, 1941, and recorded in Book 1078 of Official Records at page 2[illegible], Santa Clara County Records; thence running along the western boundary of Stevens Creek Road along a curve, curving to the left from a tangent bearing of S 39°23' W, with a radius of 190 feet through an angle of 48°34' for a distance of 161.05 feet to a point on the southern boundary of lands designated as Parcel No. 1, and conveyed by Teresa Picchetti to the Santa Clara Valley Water Conservation District by deed recorded November 16, 1935, in book 759 of Official Records at page 86, Santa Clara County Records; thence leaving the western boundary of Stevens Creek Road in a northwesterly direction, to and along the western boundary of lands so conveyed to the Santa Clara Valley Water Conservation District N 63°40' W 103.68 feet; N 38°28' W 195.77 feet; N 60°00' W 409.92 feet and N 16°51' W 187.96 feet to the southwest corner of lands conveyed by Elizabeth S. Murphy, a widow, designated as parcel No. 2 in deed recorded November 18, 1935, in Book 751 of Official Records at page 83, Santa Clara County Records; thence continuing on the last course of N 16°51' W along the western boundary of last mentioned lands 156.84 feet to the northwest corner thereof; thence S 85°14' E along the north boundary of last mentioned lands 120.42 feet to the northeast corner thereof; thence to and along the eastern boundary of last mentioned lands S 4°24' W 130.38 feet and S 27°29' E 11.40 feet to the southeast corner thereof on the north boundary of aforementioned lands conveyed by Teresa Picchetti to the Santa Clara Valley Water Conservation District; thence to and along the north, northeastern and eastern boundary of last mentioned lands, West 20.69 feet; S 16°54' E 27.09 feet; S 32°33' W 118.66 feet; S 56° 17' E 131.98 feet; S 81°50' E [illegible].70 feet; S 59°31' E 69.24 feet; N 76°26' E 78.16 feet; S 67°24' E 87.71 feet; S 34°28' E 73.13 feet; S 24°23' E 102.74 feet; S 14°27' E 75.73 feet and S 22°56' E 69.69 feet to the place of beginning.

Containing 2.658 acres of land, more or less, and being a portion of Parcel No. 1 as conveyed by Teresa Picchetti to the Santa Clara Valley Water Conservation District by deed recorded November 16, 1936, in Book 759 of Official Records at page 86 and all of Parcel No. 2 as conveyed by Elizabeth S. Murphy to the Santa Clara Valley Water Conservation District by deed recorded November 18, 1935, in Book 751 of Official Records at page 83 Santa Clara County Records.

CHIEF ENGINEER, S.C.V.W.C.D.

DR.	CK.
TR.	AP.

COMPARED

BOOK 3247 PAGE 382 1116002 22

GRANT DEED

By this instrument dated August 8, 1955, for a valuable consideration,

ANTHONY VOSS, also known as
ANTHONY F. VOSS, and VIDA L. VOSS,
his wife, as joint tenants,

hereby GRANT to

STEVENS CREEK QUARRY, INC.

The following described Real Property in the State of California,

County of Santa Clara:

All that certain real property situate in the County of Santa Clara, State of California, described as follows:

PARCEL NO. 1

All that certain parcel of land lying in Section 28, Township 7 South, Range 2 West, Mt. Diablo Base and Meridian, and more particularly described as follows:

Beginning at a 2" x 2" stake at the Northeast corner of the lands conveyed by Teresa Pichetti to the Santa Clara Valley Water Conservation District, by Deed dated January 15, 1936 and recorded January 16, 1936 in Book 759 O.R., page 86, Santa Clara County Records, said stake being also at the Northeast corner of the Southwest one-quarter of the Northeast one-quarter of Section 28, Township 7 South, Range 2 West, M.D.B.& M., and running thence along the line dividing the said Water Conservation District lands from the lands conveyed by Spring Valley Water Company to J. B. Murphy, by Deed recorded November 30, 1914 in Book 423 of Deeds, page 446, Santa Clara County Records, due West 1288.44 feet to a 1" iron bar; thence leaving last said line and running the following courses and distances:

South 16° 54' East 27.09 feet to a 3/4 inch pipe; South 32° 33' East 118.66 feet to a 3/4 inch pipe; South 56° 17' East 131.98 feet to a 3/4 inch pipe; South 81° 50' East 88.70 feet to a 3/4 inch pipe; South 59° 31' East 69.24 feet to a 3/4 inch pipe; North 76° 26' East 78.16 feet to a 3/4 inch pipe; South 67° 24' East 87.71 feet to a 1 inch iron bar; North 34° 28' East 73.13 feet to a 1 inch pipe; South 24° 23' East 102.74 feet to a 3/4 inch pipe; South 14° 27' East 75.73 feet to a 1 inch iron bar; South 22° 56' East 69.69 feet to a 1 inch iron bar, on the Northerly line of Stevens Creek Road as said Northerly line was established by Deed from Santa Clara Valley Water Conservation District, a corporation, to County of Santa Clara, by Deed dated January 27, 1941, recorded February 11, 1941 in Book 1023 O.R., page 205; thence along the Northerly line of said Stevens Creek Road with the following courses and distances: Northeasterly on the arc of a curve concave to the right, having a radius of 190.0 feet, the tangent to which curve at last mentioned point bears North 39° 23' East a distance of 66.26 feet; thence tangent to last mentioned curve at last mentioned point North 59° 22' East 118.95 feet; thence Easterly on the arc of a curve concave to the right, tangent to last mentioned course at last mentioned point, having a radius of 95.00 feet a distance of 152.26 feet; thence tangent to last mentioned curve at last mentioned point; South 28° 48' East 68.50 feet; thence Southeasterly on the arc of a curve concave to the left, having a radius of 90.00 feet, tangent to last mentioned course at last mentioned point, a distance of 111.76 feet; thence tangent to last mentioned curve at last mentioned point, North 80° 03' East 258.01 feet to a 2" x 2" stake in the line dividing the aforesaid lands of the Water Conservation District and aforesaid lands of Murphy; thence leaving aforesaid Stevens Creek Road and running along last said dividing line, North 0° 57' East 426.48 feet to the point of beginning.

Containing an area of 9.23 acres more or less, and being a portion of that certain aforesaid parcel of land conveyed by Teresa Pichetti to the Santa Clara Valley Water Conservation District.

PARCEL NO. 2

THE SOUTH 1/2 of the Northwest 1/4 of the Northeast 1/4 of Section 28 and the Northeast 1/4 of the Northwest 1/4 of Section 28 in Township 7 South, Range 2 West, M.D.M.

EXCEPTING THEREFROM that certain 0.305 acre parcel of land described as Parcel No. 2 in the Deed from Elizabeth S. Murphy to Santa Clara Valley Water Conservation District, dated November 14, 1935, recorded November 18, 1935 in Book 751 O.R. page 83, as follows:

All that certain piece or parcel of land lying in Section 28, Township 7 South, Range 2 West, M.D.B. & M., more particularly described as follows:

Beginning at a point on the line dividing the hereinafter mentioned lands conveyed by Spring Valley Water Company to J. D. Murphy from that certain piece or parcel of land heretofore conveyed by the Estate of V. Pichetti to Teresa Pichetti by Deed recorded May 12, 1905 in Book 16 of Miscellaneous Records, page 384, distant thereon due West 36.28 feet from the point of intersection thereof with the 1/4 Section line running North and South through said Section 28; and running thence the following courses and distances: North 16° 51' West 156.84 feet, South 85° 14' East 120.42 feet, South 4° 24' West 130.38 feet and South 27° 29' East 11.40 feet to a point on the dividing line dividing said lands of Murphy from that certain piece or parcel of land heretofore conveyed by Banca F. Fugazi to Teresa Pichetti by Deed recorded July 7, 1920, recorded in Book 518 of Deeds, page 205; thence along said last said line due West 69.80 feet to the point of beginning.

CONTAINING approximately 0.305 acres and being a portion of that certain piece or parcel of land heretofore conveyed by Spring Valley Water Company to J. D. Murphy by Deed recorded November 30, 1914 in Book 423 of Deeds, page 446, records of Santa Clara County, California.

Anthony F. Voss

Vida L. Voss

STATE OF CALIFORNIA }
COUNTY OF SANTA CLARA } ss.

1116002

BOOK 3247 PAGE 382

FILED FOR RECORD AT REQUEST OF J. E. Longinotti
AUG 9 11 31 AM 1955
OFFICIAL RECORDS SANTA CLARA COUNTY
RECORDER

On August 8, 1955, before me, the undersigned, a Notary Public in and for said County and State, personally appeared

ANTHONY VOSS, also known as
ANTHONY F. VOSS, and
VIDA L. VOSS,

known to me to be the persons whose names are subscribed to the within instrument, and acknowledged to me that they executed the same.

WITNESS my hand and Official Seal,

J. E. Longinotti 270 13

After recording mail to:

Rankin, Oneal, Luckhardt, Center & Hall
Attorneys at Law
315 First National Bank Building
San Jose, California

O.R. BOOK 6436 PAGE

2597255

2597255 BOOK 6436 PAGE 428

BOOK 6436 PAGE 428 FILED FOR RECORD AT REQUEST OF Vida L. Voss

MAR 24 11 43 AM 1964

OFFICIAL RECORDS SANTA CLARA COUNTY PAUL R. TEILH RECORDER

RECORDING REQUESTED BY

WHEN RECORDED MAIL TO
Mrs Anthony Voss
10445 Foothill Blvd
Cupertino, Calif

2.00

Grant Deed

~~JOINT TENANCY~~ V.V.

By this instrument dated March 24, 1964 for a valuable consideration,
ANTHONY F. VOSS and VIDA L. VOSS, his wife, as joint tenants

hereby GRANT(S) to STEVENS CREEK QUARRY, INC.

~~JOINT TENANCY~~ V.V.

The following described Real Property in the State of California, County of SANTA CLARA

Parcel I The Southwest quarter of the Southwest quarter of Section 21 in Township 7 South Range 2 West, Mount Diablo Base and Meridian.

Parcel II Northwest quarter of Southwest quarter ($NW\frac{1}{4}$ of $SW\frac{1}{4}$) Section Twenty-one (21), Township 7 South, Range 2 West, M.D.B.& M., containing 40 acres, more or less. Subject to any and all easements over or across said parcel, and subject to the reservation of all oil, gas and minerals, existing on said premises with right-of-way and other easements necessary to the commercial exploitation of any or all of said oil, gas and minerals for a period of twenty(20) years as appears in that certain Deed executed by Henry J. Crocker and others to Anthony F. Voss and Vida L. Voss, dated July 15, 1955, and recorded in the office of the County Recorder, County of Santa Clara in Book 3253 of Official Records at Page 93.

Vida L Voss
Anthony F. Voss

STATE OF CALIFORNIA
COUNTY OF Santa Clara } ss.

On March 24, 1964 before me, a Notary Public, in and for said County and State, personally appeared Vida L Voss Anthony F Voss known to me to be the person whose name s are subscribed to the within instrument and acknowledged to me that they executed the same.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my official seal in the County of Santa Clara the day and year in this certificate first above written.

Harold D. Samsburg
Notary Public in and for Said County and State

My Commission Expires

OFFICIAL SEAL
HAROLD D. SAMSBURG
NOTARY PUBLIC-CALIFORNIA
PRINCIPAL OFFICE IN
SANTA CLARA COUNTY

VALLEY TITLE COMPANY

VTC-103

03-24-64

6436/428

GT PL LOC

VALLEY TITLE COMPANY

Escrow #

Co. Bill #

Code Area

WHEN RECORDED MAIL TO

Stevens Creek Quarry, Inc.
12100 Stevens Creek Canyon Road
Cupertino, California

3569530

BOOK 8435 PG 475 BOOK 8435 PG 475

FILED FOR RECORD
AT REQUEST OF
McFarlane, Schaeffer, Fitch & Co.

FEB 14 9 24 AM '69

3 60/

OFFICIAL RECORDS
SANTA CLARA COUNTY
GEORGE E. FOWLES
RECORDER

MAIL TAX STATEMENT TO

Name Stevens Creek Quarry, Inc.
Address 12100 Stevens Creek Canyon Road
City & State Cupertino, California

GRANT DEED

NO TAX DUE

Affix IRS $

By this instrument dated January 31, 1969, for a valuable consideration,

Anthony Voss and Vida L. Voss, his wife, as joint tenants

hereby GRANT (S) to

Stevens Creek Quarry, Inc. (a California corporation)

the real property situate in the County of Santa Clara, State of California, described as follows:

For description see Exhibit A, attached

Anthony Voss
Anthony Voss

Vida L. Voss
Vida L. Voss

3569530

STATE of CALIFORNIA
COUNTY of Santa Clara } ss

On February 13, 1969 before me, the undersigned, a Notary Public in and for said Santa Clara County and State, personally appeared Anthony Voss and Vida L. Voss

known to me to be the person s whose name s subscribed to the within instrument and acknowledged that they executed the same.

WITNESS my hand and official seal. Richard H. Schaeffer

My Commission Expires: RICHARD H. SCHAEFFER Notary Public

VTC-101 My Commission Expires June 2, 1970

MAIL TAX STATEMENTS AS DIRECTED ABOVE

FEB 14 1969

GT PL LOC

GI | PL | LOC

BOOK 8435 PG 476

EXHIBIT A

All that certain real property situate in the County of Santa Clara, State of California, described as follows:

COMMENCING at a point in the line dividing lands conveyed by the Estate of V. Picchetti to Teresa Picchetti by Deed recorded May 12, 1905 in Volume 16 of Miscellaneous Records, page 384, Santa Clara County Records, from that certain piece or parcel of land conveyed by Spring Valley Water Co. to J. B. Murphy by Deed recorded November 30, 1914 in Volume 423 of Deeds, page 446, Santa Clara County Records, distant thereon due West 36.28 feet from the point of intersection thereof with the quarter section line running North and South through Section 28, Township 7 South, Range 2 West, Mount Diablo Base and Meridian, said point of commencement being in a Southwesterly line of that certain 2.658 acre parcel of land conveyed from Santa Clara Valley Water Conservation District to Stevens Creek Quarry, Inc., a corporation, by Deed recorded in Book 3073 of Official Records, page 162, on February 1, 1955, Santa Clara County Records; thence on and along the Southwesterly boundary of said parcel conveyed to Stevens Creek Quarry, South 16° 51' East 187.96 feet, South 60° 00' East 409.92 feet, South 2° 28' East 195.57 feet and South 63° 40' East to a point in the Westerly boundary of a 40 foot strip of land (Stevens Canyon Road) described as Parcel No. 2 in the Deed from Teresa Picchetti, a widow to Santa Clara Valley Water Conservation District, a water conservation district, dated January 15, 1936, recorded January 16, 1936 in Book 759 Official Records, page 86, Santa Clara County Records; thence Southerly along said Westerly line of Stevens Canyon Road and Northwesterly along the Northerly line of Montebello Road, as said line was established by said Parcel No. 2 above referred to, to the Northwesterly corner of said Parcel No. 2; thence South 42° 59' West 20.00 feet to the center line of Montebello Road, as now exists; thence along said center line of Montebello Road for the following courses and distances: North 47° 01' West 89.67 feet; thence on a tangent curve deflecting to the left from last said course, with a radius of 500.00 feet, through a central angle of 13° 56' 00", an arc distance of 121.59 feet; thence North 60° 57' West 336.90 feet; thence on a tangent curve deflecting to the left from last said course, with a radius of 25.00 feet, through a central angle of 165° 08', an arc distance of 72.05 feet; thence South 46° 05' East 137.21 feet; thence on a tangent curve deflecting to the right from last said course with a radius of 150.00 feet, through a central angle of 33° 15' 00", an arc distance of 87.05 feet; thence South 12° 50' East 175.21 feet; thence on a tangent curve deflecting to the right from last said course, with a radius of 35.00 feet, through a central angle of 162° 35' 00", an arc distance of 99.32 feet; thence North 30° 15' West 138.07 feet; thence on a tangent curve deflecting to the left from last said course, with a radius of 80.00 feet, through a central angle of 50° 44', an arc distance of 70.84 feet; thence North 80° 59' West 324.91 feet; thence on a tangent curve deflecting to the right from last said course, with a radius of 500.00 feet,

3569530

FEB 14 1969

GI | PL | LOC

GI PL LOC

through a central angle of 8° 30' 00", an arc distance of 74.18 feet; thence North 72° 29' 00" West 62.54 feet; thence on a tangent curve, deflecting to the left from last course, with a radius of 300.00 feet, through a central angle of 13° 48', an arc distance of 72.26 feet; thence North 86° 17' West 58.89 feet; thence on a tangent curve deflecting to the right from last said course with a radius of 300.00 feet, through a central angle of 16° 37', an arc distance of 87.00 feet; thence North 69° 40' West 76.19 feet; thence along and leaving said center line of Montebello Road, North 81° 20' West 94.88 feet to a 2" x 2" stake; thence North 52° 42' 42" West 593.09 feet, more or less, to the Northwest corner of the Southeast 1/4 of the Northwest 1/4 of Section 28, Township 7 South, Range 2 West, said corner being also the Southwest corner of a parcel described in the Grant Deed from Anthony Voss, also known as Anthony F. Voss, and Vida L. Voss, his wife, to Stevens Creek Quarry, Inc., a corporation, and recorded August 9, 1955 in Book 3247 Official Records, page 382, Santa Clara County Records; thence Easterly along the Southerly line of last said parcel conveyed from Voss to Stevens Creek Quarry, Inc., to the point of commencement, and being a portion of the Southeast 1/4 of the Northwest 1/4 and a portion of the Southwest 1/4 of the Northeast 1/4 of Section 28, Township 8 South, Range 1 West, M. D. B. & M.

5/16/67
TF/pn

FEB 14 1969
3569530

GI PL LOC

GI | PL | LOC

3782332

AFTER RECORDING, RETURN TO:
Stevens Creek Quarry, Inc.
12100 Stevens Canyon Road
Cupertino, California 95104

MAIL TAX STATEMENTS TO:
SAME AS ABOVE...
VTC #141321-B/GRE

IRS $NIL

FOR RECORDER'S USE ONLY

3782332

8869 706

Recorded at the request of
Valley Title Company
MAR 2 6 1970 9:00 AM
George E. Fowles, Recorder
Santa Clara County Official Records

8869 706

KAISER CEMENT & GYPSUM CORPORATION, a California corporation, hereby quit-claims to STEVENS CREEK QUARRY, INC., a corporation, all of grantor's right, title, and interest in and to that certain real property, situate partly within and partly without the city limits of the City of Cupertino, County of Santa Clara, State of California, described as follows:

The portion of the southwest quarter of Section 21, Township 7 South, Range 2 West, M.D.B.& M., lying on the westerly side of a line which begins at a 3/4 inch iron pipe (tagged L.S. 3613) set in the southerly boundary line of said Section 21 from which the 2 inch iron pipe marking the southwest corner of said Section 21 bears south 89° 29' 57" west 1551.61 feet distant and runs thence north 0° 59' 00" west 1332.26 feet to a 3/4 inch iron pipe (tagged L.S. 3613); thence south 89° 44' 29" west 145.35 feet to a 3/4 inch iron pipe (tagged L.S. 3613); thence north 0° 59' 00" west 1332.85 feet to a 3/4 inch iron pipe (tagged L.S. 3613) set in the northerly boundary line of the southwest quarter of said Section 21.

Dated December 11, 19 69.

KAISER CEMENT & GYPSUM CORPORATION

By James E. Boyce
Its Vice President

And By James E. Kelly
Its Vice President

(NO Seal)

MAIL TAX STATEMENT TO:

Name	Address	Zip
Stevens Creek Quarry, Inc.	12100 Stevens Canyon Road Cupertino, Calif.	95014

3782332

MAR 2 6 1970

GI | PL | LOC

GI			PL			LOC		

8869 707

STATE OF CALIFORNIA)
) ss.
COUNTY OF ALAMEDA)

On this 11th day of [illegible], 1969, before me, the undersigned, a Notary Public in and for the State of California, whose principal place of business is located in Alameda County, California, personally appeared [illegible], known to me to be the Vice President, and [illegible], known to me to be the Vice President of the Corporation that executed the within instrument and the officers who executed the within instrument on behalf of the Corporation therein named and acknowledged to me that such Corporation executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

OFFICIAL SEAL
MARIAN L. MORTENSEN
NOTARY PUBLIC CALIFORNIA
ALAMEDA COUNTY
My Commission Expires Mar. 31, 1973

Marian L. Mortensen
Marian L. Mortensen
Notary Public, State of California

[Notarial Seal]

My Commission Expires Mar. 31, 1973

MAR 26 1970

GI			PL			LOC		

RECORDING REQUESTED BY

AND WHEN RECORDED MAIL DOCUMENT TO:

Stevens Creek Quarry Inc
12100 Stevens Canyon Rd
Cupertino, CA 95014

DOCUMENT: 21227129

Pages: 3

Fees .	31.00
Taxes.	
Copies	
AMT PAID	31.00

REGINA ALCOMENDRAS
SANTA CLARA COUNTY RECORDER
Recorded at the request of
First American Title Company

RDE # 008
7/06/2011
8:00 AM

Space Above This Line for Recorder's Use Only

A.P.N.: Portion of 351-18-038

GRANT DEED

The Undersigned Grantor(s) Declare(s): NO CONSIDERATION

DOCUMENTARY TRANSFER TAX $_0.00________; CITY TRANSFER TAX $__________________________;
SURVEY MONUMENT FEE $

[ ] computed on the consideration or full value of property conveyed, OR
[ ] computed on the consideration or full value less value of liens and/or encumbrances remaining at time of sale,
[x] unincorporated area; [ ] City of , and
[ ] ______________________________
Signature of Declarant

FOR A VALUABLE CONSIDERATION, receipt of which is hereby acknowledged,

Richard A. Voss and Denise Voss, husband and wife as community property

hereby GRANTS to

Stevens Creek Quarry Incorporated, a California corporation

the following described property in the unincorporated area of Santa Clara County, State of **California**:

SEE EXHIBIT "A" ATTACHED HERETO AND INCORPORATED HEREIN

THIS GRANT DEED IS BEING RECORDED FOR THE PURPOSE OF A LOT LINE ADJUSTMENT PURSUANT TO THE CERTAIN LOT LINE ADJUSTMENT ISSUED BY THE CITY OF CUPERTINO AND RECORDED HERWITH, RECORDER'S DOCUMENT NO. 21170009, SANTA CLARA COUNTY RECORDS

MAIL TAX STATEMENTS AS DIRECTED ABOVE

Grant Deed - continued

A.P.N.: Portion of 351-18-038

Dated: 6-28-11

By: Richard A Voss
Richard A. Voss

By: Denise Voss
Denise Voss

STATE OF CA)SS
COUNTY OF SANTA CLARA)

On 6-28-11, before me, MEADINA G BONDOC, Notary Public, personally appeared RICHARD A VOSS and DENISE VOSS, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) ~~is~~/are subscribed to the within instrument and acknowledged to me that ~~he/she~~/they executed the same in ~~his/her~~/their authorized capacity(ies), and that by ~~his/her~~/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature
Meadina G Bondoc

My Commission Expires: 11-17-2011

Notary Name: MEADINA G BONDOC
Notary Registration Number: 1780353

MEADINA G. BONDOC
COMM. # 1780353
NOTARY PUBLIC - CALIFORNIA
SANTA CLARA COUNTY
MY COMM. EXP. NOV. 17, 2011

This area for official notarial seal

Notary Phone: 408 253-2512
County of Principal Place of Business: SANTA CLARA

EXHIBIT A

All of that certain property situate in the unincorporated area of Santa Clara County, California described as follows:

BEGINNING at the Northwesterly corner of Parcel 1 as shown on the Parcel Map filed for record on June 26, 1992 in Book 638 of Maps at page 11, Santa Clara County Records; thence proceeding along the Northerly line of said Parcel 1 N89° 29'57"E 740.50 feet to the common Northerly corner of Parcels 1 and 2 as shown on said Parcel map; thence proceeding along the common line of said parcels S06° 16'16"W 1321.05 feet to the common Southerly corner of said parcels; thence leaving said line and proceeding N49°46'48"W 60.31 feet to a point of curvature; thence along a curve to the right with a radius of 120.00 feet, an internal angle of 54°11'51" and a length of 113.51 feet to a point of tangency; thence N04°25'03"E 86.84 feet; thence N10°03'06"E 139.56 feet; thence; N13°48'26"E 84.35 feet; thence N16° 26'23"E 171.07 feet; thence N27°01'44"W 166.34 feet; thence N10°09'12"W 67.08 feet; thence N25°21'28"W 63.89 feet; thence N43°03'07"W 179.88 feet; thence N11° 54'33"W 130.71 feet; thence N62°08'49"W 134.34 feet; thence N89°43'40"W 224.95 feet to a point in the Westerly line of the aforementioned Parcel 1; thence along said line N00°28'19"E 101.77 feet to the point of **BEGINNING.**

Containing 6.30 acres more or less and consisting of a portion of Parcel 1 as shown on the above mentioned map.

May 9, 2011

DOCUMENT: 21752061

Pages:	4
Fees	24.00
Taxes .	
Copies .	
AMT PAID	24 00

RECORDING REQUESTED BY:
County of Santa Clara

RETURN TO:
Santa Clara County Planning Office
East Wing, 7th Floor
70 West Hedding Street
San Jose, CA 95110

REGINA ALCOMENDRAS
SANTA CLARA COUNTY RECORDER
Recorded at the request of
Owner

RDE # 005
7/17/2012
1:55 PM

CERTIFICATE OF COMPLIANCE

Lot Line Adjustment between two lots
A.P.N.s 351-18-022 and 351-18-039
Santa Clara County Zoning Ordinance Section 5.55

Owners of Property Affected: Richard A. Voss, Denise Mills Voss and Stevens Creek Quarry, Inc.

Notice is hereby given that the boundaries of the property described in Exhibits A and B and shown on Exhibit C attached hereto and made a part hereof, do not create separate parcels but only adjust the lot line(s) between existing parcels recorded with Document # 19666853 and Document # 21227131. The new parcel configurations resulting there from comply with the provisions of Division 2 of Title 7 of the Government Code of the State of California, cited as the Subdivision Map Act, and all local ordinances enacted pursuant thereto.

This relates only to issues of compliance or noncompliance with the Subdivision Map Act and local ordinances enacted pursuant thereto. The parcel described herein may be sold, leased or financed without further compliance with the Subdivision Map Act or any local ordinance enacted pursuant thereto. Development of parcels may require issuance of a permit or other grant or grants of approval.

This is valid for a period of one year from the effective approval date of May 18, 2012, per Section 5.55.090 of the County Zoning Ordinance. Deed(s) revising the lot configurations must be recorded within one year of the approval date, unless an extension of time is granted by the County of Santa Clara, but not to exceed two years from the effective approval date.

Certificate of Compliance File No. 10110-12LA

Approved by: Carolyn T. Walsh
Carolyn T. Walsh
Principal Planner, County of Santa Clara

State of California)
County of Santa Clara)

On July 10, 2012, before me, Michael Dolan, the undersigned Notary Public, personally appeared Carolyn T. Walsh, who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that she executed the same in her authorized capacity, and that by her signature on the instrument the person or the entity upon behalf of which the person acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Michael Dolan
Michael Dolan

MICHAEL DOLAN
COMM. NO. 1935495
NOTARY PUBLIC - CALIFORNIA
SANTA CLARA COUNTY
COMM EXPIRES JUNE 4, 2015

EXHIBIT A
APN: 581-18-022
ADJUSTED CONFIGURATION

All of that certain property situate in the unincorporated area of the County of Santa Clara, State of California described as follows:

All of the lands of Parcel A as said parcel is shown on the Parcel Map recorded In Book 297 of Maps at page 51, Santa Clara County records.

Together with the following described property:

BEGINNING at the most Northeasterly corner of said Parcel A thence along the centerline of an access and egress easement, 30 feet wide, as shown on said Parcel Map S70°16'58"E 329.30 feet; thence leaving said centerline and proceeding S25°08'39"W 308.68 feet to a point in the centerline of Montebello Road, 40 feet wide, as shown on the Parcel Map recorded in Book 638 of Maps at pages 11 and 12; thence proceeding along said centerline on a non-tangent curve to the right with an initial tangent bearing N80°59'00"W, a radius of 500.00 feet, an internal angle of 8°30'00", and a length of 74.18 feet to a point of tangency; thence N72°29'00"W 62.54 feet; thence along a tangent curve to the left with a radius of 300.00 feet, an internal angle of 13°48'00", and a length of 72.26 feet to a point of tangency; thence N86°17'00"W 60.73 feet; thence along a tangent curve to the right with a radius of 300.00 feet, an internal angle of 12°40'50", and a length of 66.40 feet to the most Southeasterly corner of the above mentioned Parcel A; thence leaving said centerline and proceeding along the Easterly line of said parcel N24°23'05"E 357.98 feet to the point of **BEGINNING**.

Containing 7.05 acres gross and 6.92 acres net more or less and consisting of all of the above mentioned Parcel A and a portion Parcel B as shown on the above mentioned Parcel Map.

REGISTERED PROFESSIONAL ENGINEER
MARIUS E. NELSEN
No. 20592
Exp 9-13
CIVIL
STATE OF CALIFORNIA

EXHIBIT B
APN: 581-18-046
ADJUSTED CONFIGURATION

All of that certain property situate in the unincorporated area of the County of Santa Clara, State of California described as follows:

All of the lands of Stevens Creek Quarry, Inc. as described in the deeds for a lot line adjustment recorded as document numbers 21227129 and 21227131 Santa Clara County records.

Excepting there from the following described property:

BEGINNING at the most Northeasterly corner of Parcel A as said parcel is shown on the Parcel Map recorded in Book 297 of Maps at page 51 Santa Clara County records, thence along the centerline of an access and egress easement, 30 feet wide, as shown on said Parcel Map S70°16'58"E 329.30 feet; thence leaving said centerline and proceeding S25°08'39"W 308.68 feet to a point in the centerline of Montebello Road, 40 feet wide, as shown on the Parcel Map recorded in Book 638 of Maps at pages 11 and 12; thence proceeding along said centerline on a non-tangent curve to the right with an initial tangent bearing N80°59'00"W, a radius of 500.00 feet, an internal angle of 8°30'00", and a length of 74.18 feet to a point of tangency; thence N72°29'00"W 62.54 feet; thence along a tangent curve to the left with a radius of 300.00 feet, an internal angle of 13°48'00", and a length of 72.26 feet to a point of tangency; thence N86°17'00"W 60.73 feet; thence along a tangent curve to the right with a radius of 300.00 feet, an internal angle of 12°40'50", and a length of 66.40 feet to the most Southeasterly corner of the above mentioned Parcel A; thence leaving said centerline and proceeding along the Easterly line of said parcel N24°23'05"E 357.98 feet to the point of **BEGINNING**.

Containing 66.27 acres more or less and consisting of a portion of the above mentioned lands of Stevens Creek Quarry, Inc. being a portion of Parcel B as said parcel is shown on the above mentioned Parcel Map.

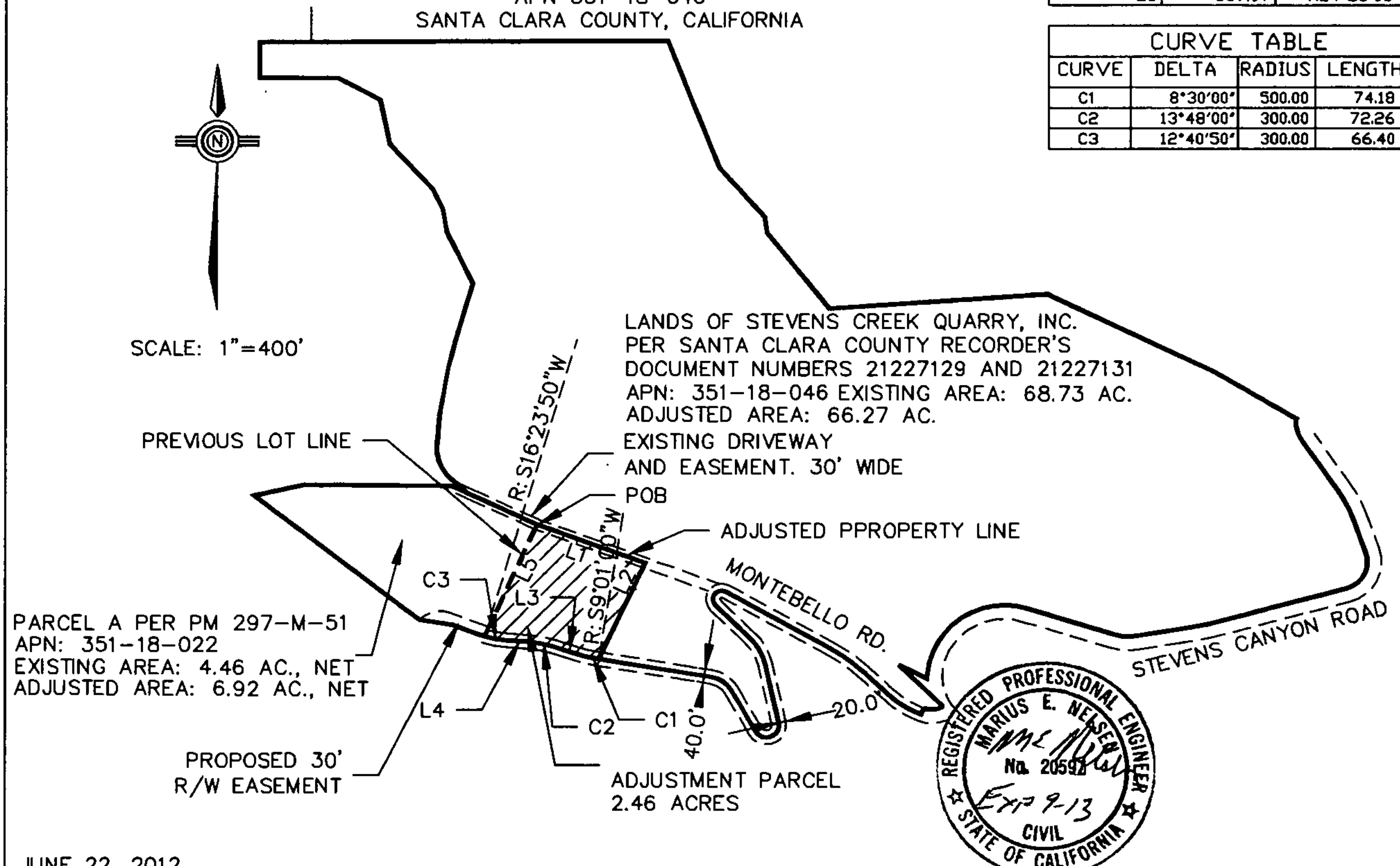
REGISTERED PROFESSIONAL ENGINEER
MARIUS E. NIELSEN
No. 20597
Exp 9-13
CIVIL
STATE OF CALIFORNIA

EXHIBIT C

PLAT TO ACCOMPANY DOCUMENTS
FOR A LOT LINE ADJUSTMENT
BETWEEN APN 351-18-022 AND
APN 351-18-046
SANTA CLARA COUNTY, CALIFORNIA

LINE TABLE		
LINE	LENGTH	BEARING
L1	329.30	S70°16'58"E
L2	308.68	S25°08'39"W
L3	62.54	N72°29'00"W
L4	60.73	N86°17'00"W
L5	357.97	N24°23'05"E

CURVE TABLE			
CURVE	DELTA	RADIUS	LENGTH
C1	8°30'00"	500.00	74.18
C2	13°48'00"	300.00	72.26
C3	12°40'50"	300.00	66.40



JUNE 22, 2012

DOCUMENT: 21782654

Pages: 3

Fees 21 00
Taxes
Copies
AMT PAID 21 00

RECORDING REQUESTED BY

AND WHEN RECORDED MAIL DOCUMENT TO:

Stevens Creek Quarry Inc
12100 Stevens Canyon Rd
Cupertino, CA 95014

REGINA ALCOMENDRAS
SANTA CLARA COUNTY RECORDER
Recorded at the request of
First American Title Company

RDE # 001
8/09/2012
8:00 AM

Space Above This Line for Recorder's Use Only

A.P.N.: 351-18-039

GRANT DEED

The Undersigned Grantor(s) Declare(s): DOCUMENTARY TRANSFER TAX $__________; CITY TRANSFER TAX $__________; SURVEY MONUMENT FEE $

[ ] computed on the consideration or full value of property conveyed, OR
[ ] computed on the consideration or full value less value of liens and/or encumbrances remaining at time of sale,
[ ] unincorporated area; [ ] City of , and
[ ] ____________________
Signature of Declarant

FOR A VALUABLE CONSIDERATION, receipt of which is hereby acknowledged,

Stevens Creek Quarry Incorporated, a California corporation

hereby GRANTS to

Stevens Creek Quarry Incorporated, a California corporation

the following described property in the unincorporated area of Santa Clara County, State of **California**:

SEE EXHIBIT "B" ATTACHED HERETO AND INCORPORATED HEREIN

THIS GRANT DEED IS BEING RECORDED FOR THE PURPOSE OF A LOT LINE ADJUSTMENT PURSUANT TO THE CERTAIN LOT LINE ADJUSTMENT ISSUED BY THE CITY OF CUPERTINO AND RECORDED HERWITH, RECORDER'S DOCUMENT NO. 21752061, SANTA CLARA COUNTY RECORDS

MAIL TAX STATEMENTS AS DIRECTED ABOVE

A.P.N.: 351-18-039

Dated: 8-6-2012

Stevens Creek Quarry Incorporated, a California corporation

By: Richard A Voss
Richard A. Voss

STATE OF CALIFORNIA)SS
COUNTY OF SANTA CLARA)

On 8-6-2012, before me, MEADINA G BONDOC, Notary Public, personally appeared RICHARD A VOSS, who proved to me on the basis of satisfactory evidence to be the person~~(s)~~ whose name~~(s)~~ is/~~are~~ subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/~~her~~/~~their~~ authorized capacity~~(ies)~~, and that by his/~~her~~/~~their~~ signature~~(s)~~ on the instrument the person(s), or the entity upon behalf of which the person~~(s)~~ acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

MEADINA G. BONDOC
Commission # 1957250
Notary Public - California
Santa Clara County
My Comm. Expires Nov 17, 2015

Signature Meadina G Bondoc

My Commission Expires: 11-17-2015

This area for official notarial seal

Notary Name: MEADINA G BONDOC
Notary Registration Number: 1957250

Notary Phone: 408 253-2512
County of Principal Place of Business: SANTA CLARA

EXHIBIT B

ADJUSTED CONFIGURATION

All of that certain property situate in the unincorporated area of the County of Santa Clara, State of California described as follows:

All of the lands of Stevens Creek Quarry, Inc. as described in the deeds for a lot line adjustment recorded as document numbers 21227129 and 21227131 Santa Clara County records.

Excepting there from the following described property:

BEGINNING at the most Northeasterly corner of Parcel A as said parcel is shown on the Parcel Map recorded in Book 297 of Maps at page 51 Santa Clara County records, thence along the centerline of an access and egress easement, 30 feet wide, as shown on said Parcel Map S70°16'58"E 329.30 feet; thence leaving said centerline and proceeding S25°08'39"W 308.68 feet to a point in the centerline of Montebello Road, 40 feet wide, as shown on the Parcel Map recorded in Book 638 of Maps at pages 11 and 12; thence proceeding along said centerline on a non-tangent curve to the right with an initial tangent bearing N80°59'00"W, a radius of 500.00 feet, an internal angle of 8°30'00", and a length of 74.18 feet to a point of tangency; thence N72°29'00"W 62.54 feet; thence along a tangent curve to the left with a radius of 300.00 feet, an internal angle of 13°48'00", and a length of 72.26 feet to a point of tangency; thence N86°17'00"W 60.73 feet; thence along a tangent curve to the right with a radius of 300.00 feet, an internal angle of 12°40'50", and a length of 66.40 feet to the most Southeasterly corner of the above mentioned Parcel A; thence leaving said centerline and proceeding along the Easterly line of said parcel N24°23'05"E 357.98 feet to the point of **BEGINNING**.

Containing 66.27 acres more or less and consisting of a portion of the above mentioned lands of Stevens Creek Quarry, Inc. being a portion of Parcel B as said parcel is shown on the above mentioned Parcel Map.

REGISTERED PROFESSIONAL ENGINEER
MARIUS E. NELSEN
No. 20597
Exp 9-13
CIVIL
STATE OF CALIFORNIA

DOCUMENT: 23404073

Pages:	8
Fees	46.00
Taxes...	
Copies..	
AMT PAID	46 00

RECORDING REQUESTED BY:
County of Santa Clara

RETURN TO:
Santa Clara County Planning Office
East Wing, 7th Floor
70 West Hedding Street
San Jose, CA 95110

REGINA ALCOMENDRAS
SANTA CLARA COUNTY RECORDER
Recorded at the request of
Grantor

RDE # 001
8/18/2016
3:51 PM

CERTIFICATE OF COMPLIANCE

Lot Line Adjustment between three lots
A.P.N.s 351-42-007 and 351-42-006 and 351-10-020
Santa Clara County Zoning Ordinance Section 5.55

Owners of Property Affected: Paul C. Gallo, as Trustee of the Paul C. Gallo Trust dated 8/1/06; Stephen Hoo and Deborah A. Hoo; Stevens Creek Quarry, Inc.

Notice is hereby given that the boundaries of the property described in Exhibit A, Exhibit B, Exhibit C and shown on Exhibit D attached hereto and made a part hereof, do not create separate parcels but only adjust the lot line(s) between existing parcels recorded with Document # 21644471, Document # 10765042 (Book L580 Page 1937) and Document # 2597255 (Book 6436 Page 428). The new parcel configurations resulting there from comply with the provisions of Division 2 of Title 7 of the Government Code of the State of California, cited as the Subdivision Map Act, and all local ordinances enacted pursuant thereto.

This relates only to issues of compliance or noncompliance with the Subdivision Map Act and local ordinances enacted pursuant thereto. The parcels described herein may be sold, leased or financed without further compliance with the Subdivision Map Act or any local ordinance enacted pursuant thereto. Development of parcels may require issuance of a permit or other grant or grants of approval.

This is valid for a period of one year from the effective approval date of July 21, 2016, per Section 5.55.090 of the County Zoning Ordinance. Deed(s) revising the lot configurations must be recorded within one year of the approval date, unless an extension of time is granted by the County of Santa Clara, but not to exceed two years from the effective approval date.

Certificate of Compliance File No. 10885-16LA

Approved by: Carolyn T. Walsh

Carolyn T. Walsh
Principal Planner, County of Santa Clara

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document, to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of Santa Clara)

On Aug 18, 2016, before me, David Cheung, the undersigned Notary Public, personally appeared Carolyn T. Walsh, who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that she executed the same in her authorized capacity, and that by her signature on the instrument the person or the entity upon behalf of which the person acted; executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

David Cheung

David Cheung, Notary Public

DAVID CHEUNG
Commission # 2068209
Notary Public - California
Santa Clara County
My Comm. Expires May 13, 2018

EXHIBIT A

All that certain real property situate in the Unincorporated Area of the County of Santa Clara, State of California, being described as follows:

All of Lot 7 as shown on that certain Tract Map entitled, "Tract No. 7707", filed for Record on August 8, 1988 in Book 589 of Maps at Pages 43-46, Santa Clara County Records.

And, excepting therefrom, the following area:

That portion of said Lot 7 being described as follows:

BEGINNING at the most Northeasterly Corner of said Lot 7; thence

from the Point of Beginning and along the Easterly Boundary Line of said Lot 7 South 21° 46′ 06″ West 72.10 feet to a point; thence

leaving said Easterly Boundary Line of Lot 7 North 70° 59′ 30″ West 54.89 feet to a point; thence

North 58° 55′ 25″ West 95.00 feet to a point lying on the Northerly Boundary Line of said Lot 7; thence

along said Northerly Boundary Line of Lot 7 North 89° 59′ 06 East 160.00 feet to the POINT OF BEGINNING.

Containing 6.671 acres, more or less, of land.

See Exhibit D1, Plat to Accompany Description, attached hereto and made a part hereof.

LICENSED LAND SURVEYOR
HARRY BABICKA
No. 4953
Exp. 12/31/17
STATE OF CALIFORNIA

Lot Line Adjustment
County File No. 10885-16LA
Stevens Canyon Road / Peacock Court

C. & D. C., Inc.
Job No. 15-025
August 8, 2016

EXHIBIT B

All that certain real property situate in the Unincorporated Area of the County of Santa Clara, State of California, being described as follows:

All of Lot 6 as shown on that certain Tract Map entitled, "Tract No. 7707", filed for Record on August 8, 1988 in Book 589 of Maps at Pages 43-46, Santa Clara County Records.

And, excepting therefrom, the following area:

That portion of said Lot 6 being described as follows:

BEGINNING at the most Northeasterly Corner of said Lot 6; thence

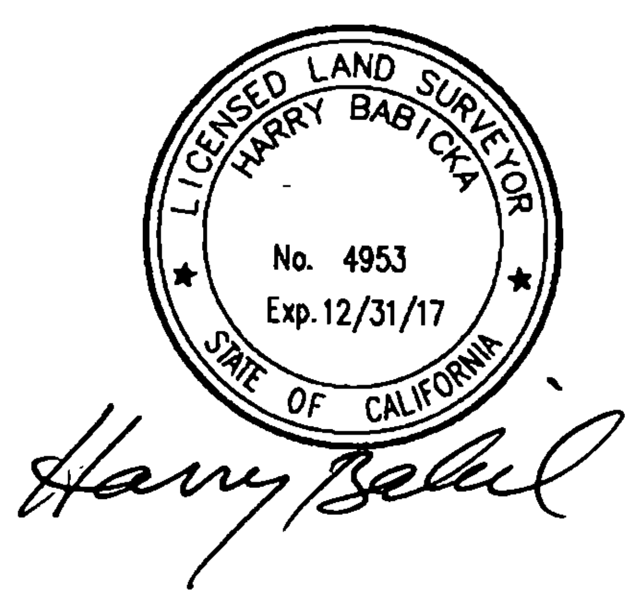
from the Point of Beginning and along the Easterly Boundary Line of said Lot 6 South 00° 57′ 28″ West 158.60 feet to a point; thence

leaving said Easterly Line of Lot 6 the following courses and distances:
North 71° 31′ 27″ West 139.33 feet to a point; thence
South 86° 34′ 58″ West 300.00 feet to a point; thence
North 79° 59′ 35″ West 75.00 feet to a point; thence
North 70° 59′ 30″ West 160.11 feet to a point lying on the Westerly Boundary Line of said Lot 6; thence along said Westerly Boundary Line of Lot 6 North 21° 46′ 06″ East 72.10 feet to a point lying on the Northerly Boundary Line of said Lot 6, said point also being the most Northwesterly corner of said Lot 6; thence

along said Northerly Boundary Line of Lot 6 North 89° 59′ 06″ East 632.77 feet to the POINT OF BEGINNING.

Containing 7.200 acres, more or less, of land.

See Exhibit D2, Plat to Accompany Description, attached hereto and made a part hereof.



Lot Line Adjustment
County File No. 10885-16LA
Stevens Canyon Road / Peacock Court

C. & D. C., Inc.
Job No. 15-025
August 8, 2016

EXHIBIT C

All that certain real property situate in the Unincorporated Area of the County of Santa Clara, State of California, being described as follows:

All of the Southwest Quarter of the Southwest Quarter of Section 21, Township 7 South, Range 2 West, Mount Diablo Base and Meridian.

And, in addition thereto, the following area:
(Addition 1)

Being a portion of Lot 7 as shown on that certain Tract Map entitled, "Tract No. 7707", filed for Record on August 8, 1988 in Book 589 of Maps at Pages 43-46, Santa Clara County Records, and being more particularly described as follows:

BEGINNING at the most Northeasterly Corner of said Lot 7; thence

from the Point of Beginning and along the Easterly Boundary Line of said Lot 7 South 21° 46′ 06″ West 72.10 feet to a point; thence

leaving said Easterly Boundary Line of Lot 7 North 70° 59′ 30″ West 54.89 feet to a point; thence

North 58° 55′ 25″ West 95.00 feet to a point lying on the Northerly Boundary Line of said Lot 7; thence

along said Northerly Boundary Line of Lot 7 North 89° 59′ 06 East 160.00 feet to the POINT OF BEGINNING.

And, in addition thereto, the following area:
(Addition 2)

Being a portion of Lot 6 as shown on that certain Tract Map entitled, "Tract No. 7707", filed for Record on August 8, 1988 in Book 589 of Maps at Pages 43-46, Santa Clara County Records, and being more particularly described as follows:

BEGINNING at the most Northeasterly Corner of said Lot 6; thence

from the Point of Beginning and along the Easterly Boundary Line of said Lot 6 South 00° 57′ 28″ West 158.60 feet to a point; thence

leaving said Easterly Line of Lot 6 the following courses and distances:
North 71° 31′ 27″ West 139.33 feet to a point; thence
South 86° 34′ 58″ West 300.00 feet to a point; thence
North 79° 59′ 35″ West 75.00 feet to a point; thence
North 70° 59′ 30″ West 160.11 feet to a point lying on the Westerly Boundary Line of said Lot 6; thence along said Westerly Boundary Line of Lot 6 North 21° 46′ 06″ East 72.10 feet to a point lying on the Northerly Boundary Line of said Lot 6, said point also being the most Northwesterly corner of said Lot 6; thence

along said Northerly Boundary Line of Lot 6 North 89° 59′ 06″ East 632.77 feet to the POINT OF BEGINNING.

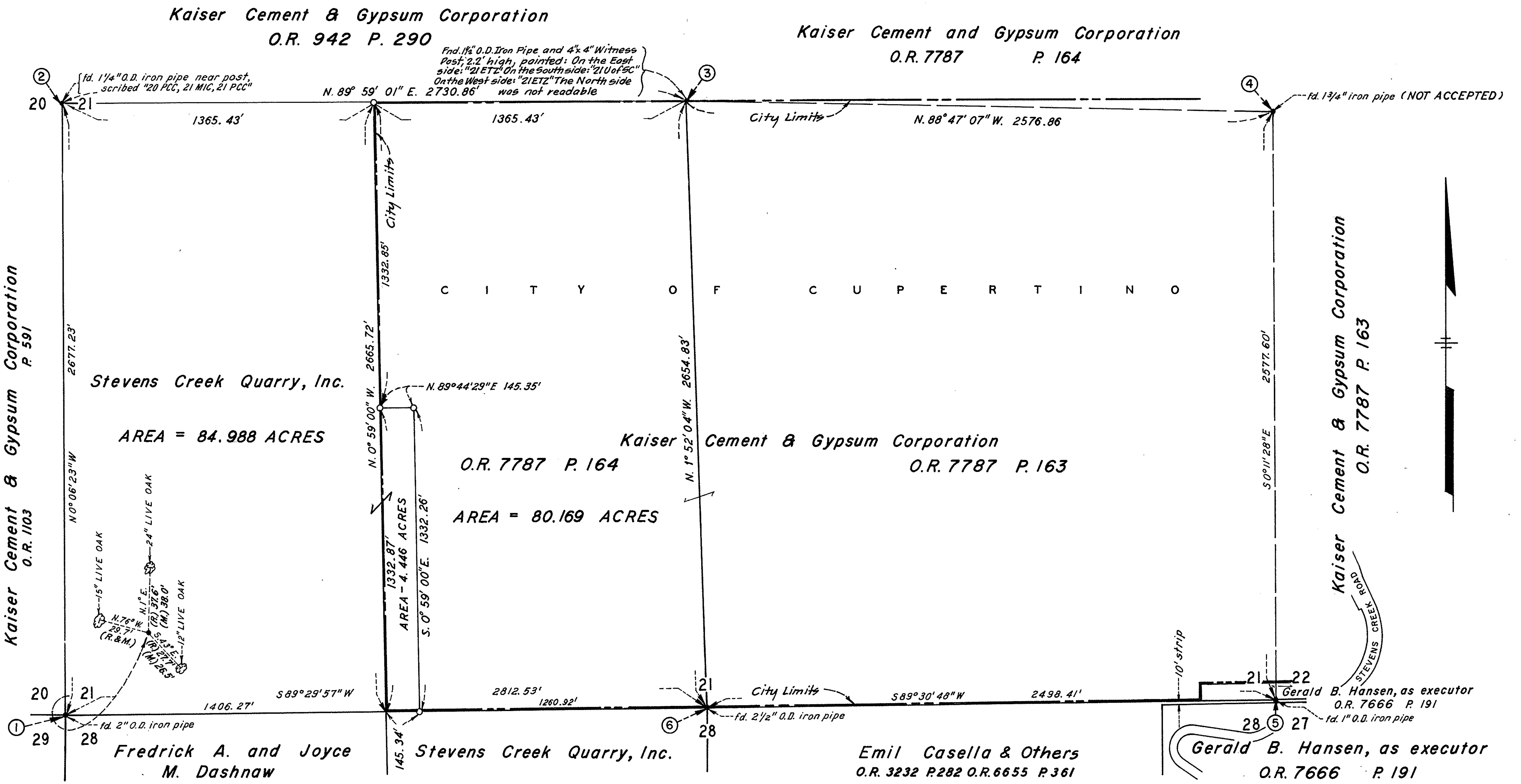
Containing 41.918 acres, more or less, of land.

See Exhibit D3, Plat to Accompany Description, attached hereto and made a part hereof.

LICENSED LAND SURVEYOR
HARRY BABICKA
No. 4953
Exp. 12/31/17
STATE OF CALIFORNIA

Lot Line Adjustment
County File No. 10885-16LA
Stevens Canyon Road / Peacock Court

C. & D. C., Inc.
Job No. 15-025
August 8, 2016



264
23

BASIS OF BEARINGS

Solar observation taken at a point which is S 33°28'14"E 1117.11 feet from the southeast corner of said section 21.

SURVEYOR'S CERTIFICATE

This map correctly represents a survey made by me or under my direction in conformance with the requirements of the Land Surveyors' Act at the request of Pacific Gas and Electric Company in November, 1969.

Peter K. Willerup
PETER K. WILLERUP L.S. 3613

LEGEND AND NOTE

—o— Indicates ¾" O.D. Iron Pipe set and tagged L.S. 3613.

Bearings and distances of record are shown upon the maps filed as follows: MAP Book D page 232. MAP Book 6 Pages 36, 37, 38 and 39. MAP Book 83 Page 40. MAP Book 121 Page 56. MAP Book 192 Page 9.

COUNTY SURVEYOR'S CERTIFICATE

This map has been examined for conformance with the requirements of the Land Surveyors' Act this 9th day of February 1970.

JAMES T. POTT
County Surveyor

By Deputy Dean G. Larson

① First described in BLM Field Notes by C. Herrmann, Bk. 329 Sec. 25 P. 13 October, 1882.
② & ③ First shown on Map Bk. 6 P. 37 (Wade).
④, ⑤ & ⑥ First shown on Map Bk. 83 P. 40 (Pisano).

#3761544

RECORDER'S CERTIFICATE

Filed this 10th day of FEBRUARY 1970 at 2:55 PM. in Book 264 of Maps at page 23 at the request of PETER K. WILLERUP

$5.00 GEORGE E. FOWLES
County Recorder

By Deputy

RECORD OF SURVEY

OF THE SOUTHWEST QUARTER OF
SECTION 21, T.7S. R.2W. M.D.B. & M.
LYING PARTLY WITHIN THE CITY OF CUPERTINO
SANTA CLARA COUNTY, CALIFORNIA

SCALE: 1" = 300' NOVEMBER, 1969

SHEET 1 OF 1 SHEET

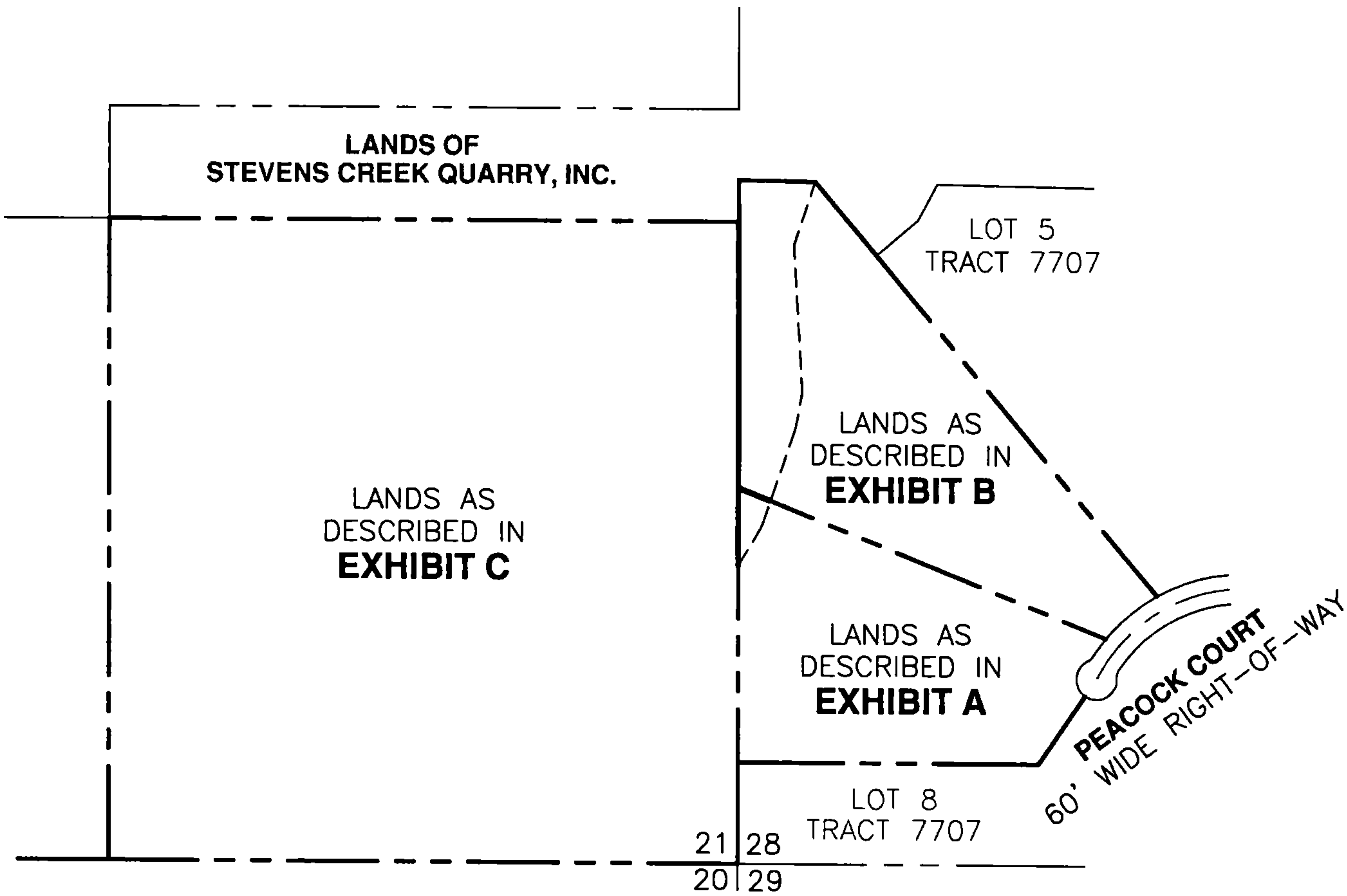
23 23

NOTES:
All bearings & distances shown are Record Data or as noted. Dimensions shown are in feet & decimals thereof.

EXHIBIT D

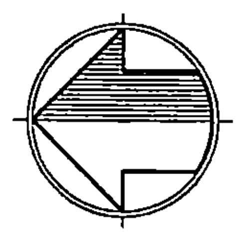
LEGEND:

- = PROPERTY LINE
- = ADJACENT PROPERTY LINE
- = CENTERLINE
- = EX. RIGHT OF WAY
- P.O.B. = POINT OF BEGINNING



LICENSED LAND SURVEYOR
HARRY BABICKA
No. 4953
Exp. 12/31/17
STATE OF CALIFORNIA

Harry Babicka



SCALE: 1"=400'

NOTES:
1. SEE PAGE 2 OF 4 FOR DETAIL OF EXHIBIT A.
2. SEE PAGE 3 OF 4 FOR DETAIL OF EXHIBIT B.
3. SEE PAGE 4 OF 4 FOR DETAIL OF EXHIBIT C.

C.&D.C.Inc.
5901 Cadiz Drive
San Jose, CA 95123
(408) 966-0165

PLAT TO ACCOMPANY DESCRIPTION

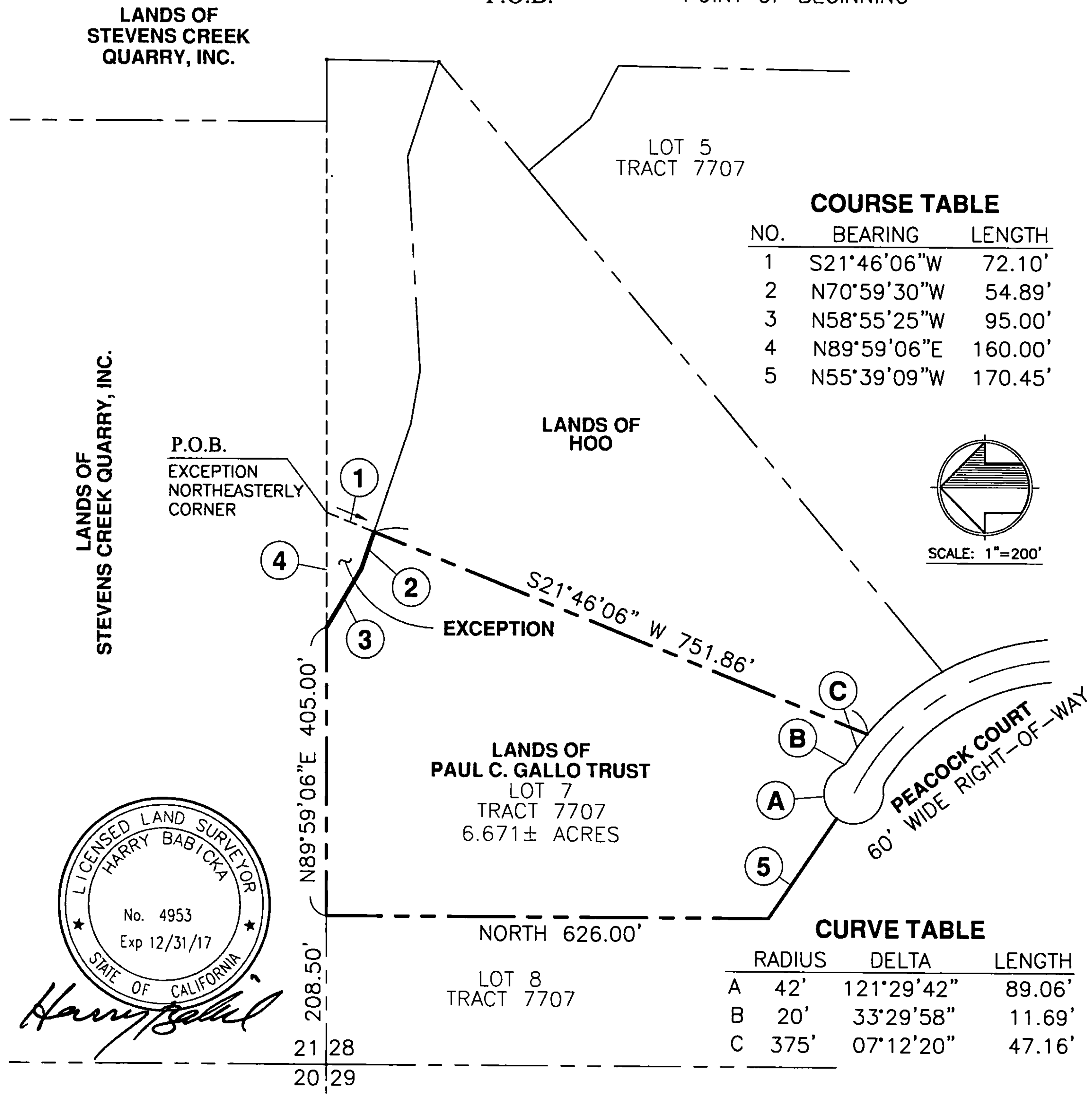
SCALE: AS SHOWN	LOT LINE ADJUSTMENT	DRAWN BY: R.S.C.
DATE: AUGUST 8, 2016		APPROVED BY: V.S. / H.B.
COUNTY FILE NO. 10885-16LA		
STEVENS CANYON ROAD/PEACOCK COURT CUPERTINO, CALIFORNIA		DRAWING NUMBER 15025-D

NOTES:
All bearings & distances shown are Record Data or as noted. Dimensions shown are in feet & decimals thereof.

EXHIBIT D1

LEGEND:

(heavy long-dash line)	=	PROPERTY LINE
(light long-dash line)	=	ADJACENT PROPERTY LINE
(light long-short line)	=	CENTERLINE
(solid line)	=	EX. RIGHT OF WAY
P.O.B.	=	POINT OF BEGINNING



COURSE TABLE

NO.	BEARING	LENGTH
1	S21°46'06"W	72.10'
2	N70°59'30"W	54.89'
3	N58°55'25"W	95.00'
4	N89°59'06"E	160.00'
5	N55°39'09"W	170.45'

CURVE TABLE

	RADIUS	DELTA	LENGTH
A	42'	121°29'42"	89.06'
B	20'	33°29'58"	11.69'
C	375'	07°12'20"	47.16'

C.&D.C.Inc.
5901 Cadiz Drive
San Jose, CA 95123
(408) 966-0165

PLAT TO ACCOMPANY DESCRIPTION

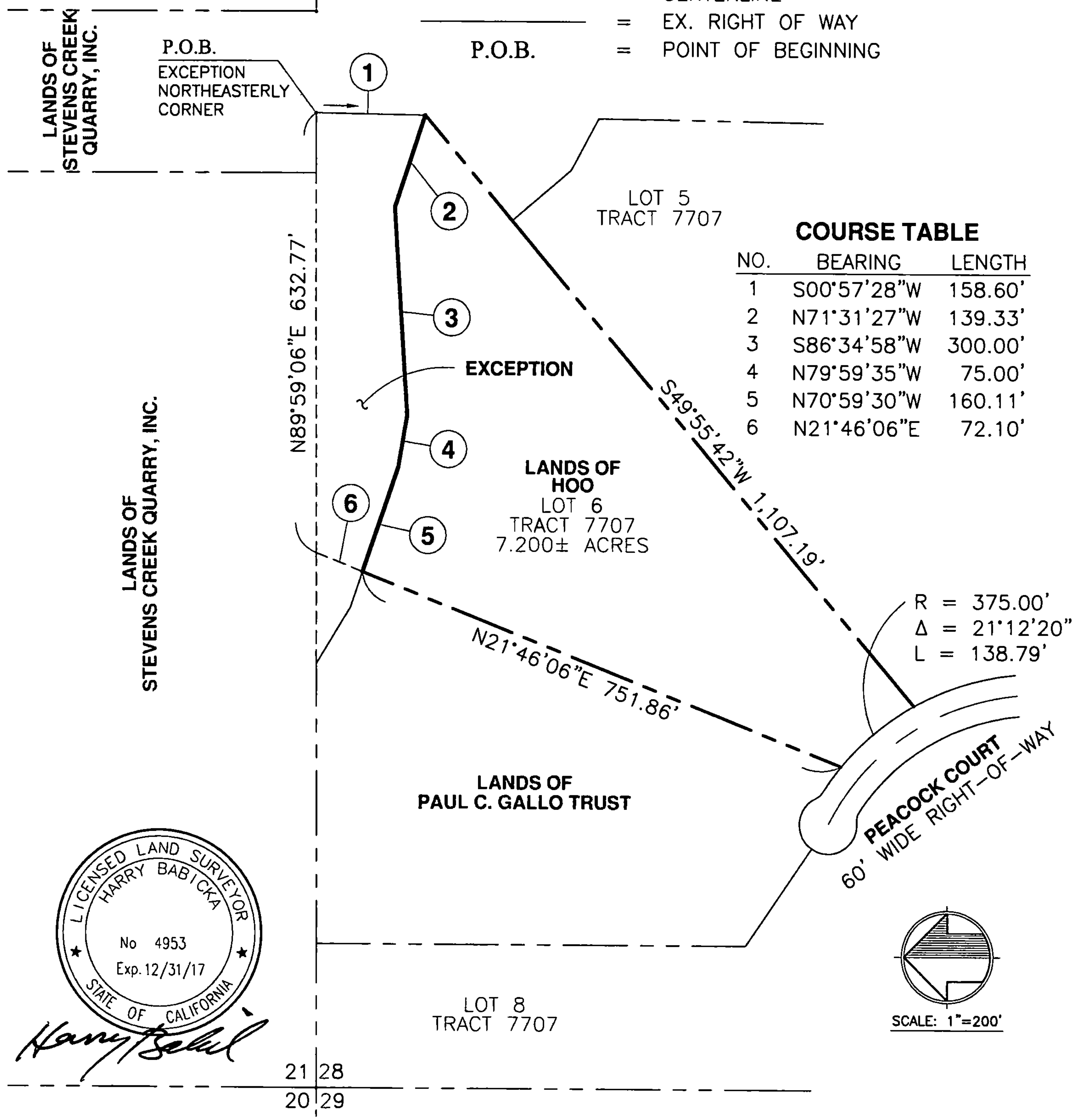
SCALE: AS SHOWN	LOT LINE ADJUSTMENT	DRAWN BY: R.S.C.
DATE: AUGUST 8, 2016		APPROVED BY: V.S. / H.B.
COUNTY FILE NO. 10885-16LA		
STEVENS CANYON ROAD/PEACOCK COURT CUPERTINO, CALIFORNIA		DRAWING NUMBER 15025-D1

NOTES:
All bearings & distances shown are Record Data or as noted.
Dimensions shown are in feet & decimals thereof.

LEGEND:

EXHIBIT D2

(heavy dashed line)	=	PROPERTY LINE
(light dashed line)	=	ADJACENT PROPERTY LINE
(long-short dashed line)	=	CENTERLINE
(solid line)	=	EX. RIGHT OF WAY
P.O.B.	=	POINT OF BEGINNING



COURSE TABLE

NO.	BEARING	LENGTH
1	S00°57'28"W	158.60'
2	N71°31'27"W	139.33'
3	S86°34'58"W	300.00'
4	N79°59'35"W	75.00'
5	N70°59'30"W	160.11'
6	N21°46'06"E	72.10'

LICENSED LAND SURVEYOR
HARRY BABICKA
No 4953
Exp. 12/31/17
STATE OF CALIFORNIA

Harry Babicka

C.&D.C.Inc.
5901 Cadiz Drive
San Jose, CA 95123
(408) 966-0165

PLAT TO ACCOMPANY DESCRIPTION

SCALE: AS SHOWN	LOT LINE ADJUSTMENT	DRAWN BY: R.S.C.
DATE: AUGUST 8, 2016		APPROVED BY: V.S. / H.B.
	COUNTY FILE NO. 10885-16LA	
	STEVENS CANYON ROAD/PEACOCK COURT CUPERTINO, CALIFORNIA	DRAWING NUMBER 15025-D2

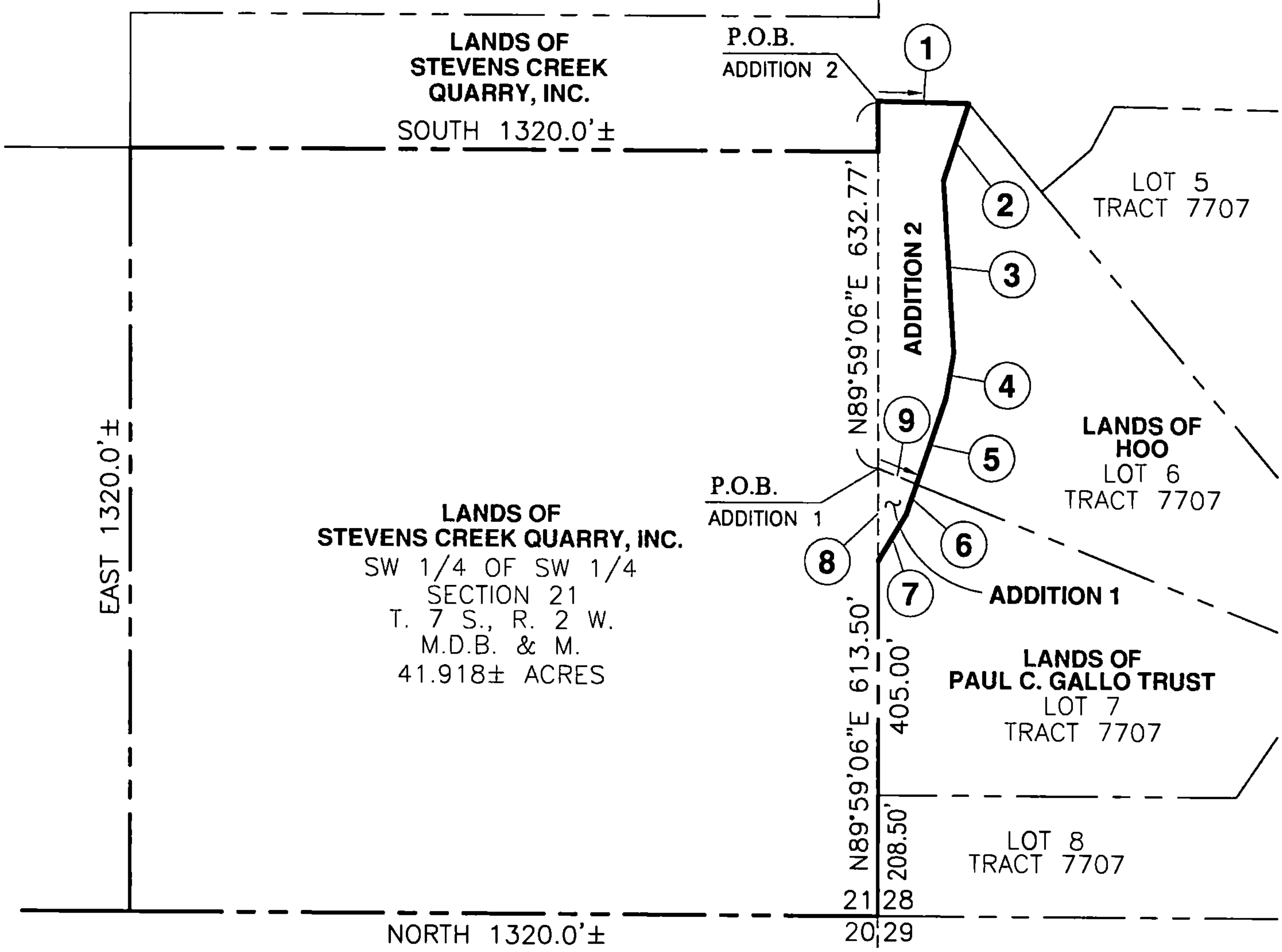
NOTES:
All bearings & distances shown are Record Data or as noted.
Dimensions shown are in feet & decimals thereof.

EXHIBIT D3

LEGEND:

(heavy dashed line)	=	PROPERTY LINE
(light dashed line)	=	ADJACENT PROPERTY LINE
(long-short dash line)	=	CENTERLINE
(solid line)	=	EX. RIGHT OF WAY
P.O.B.	=	POINT OF BEGINNING

SCALE: 1"=300'



COURSE TABLE

NO.	BEARING	LENGTH	NO.	BEARING	LENGTH
1	S00°57'28"W	158.60'	6	N70°59'30"W	54.89'
2	N71°31'27"W	139.33'	7	N58°55'25"W	95.00'
3	S86°34'58"W	300.00'	8	N89°59'06"E	160.00'
4	N79°59'35"W	75.00'	9	S21°46'06"W	72.10'
5	N70°59'30"W	160.11'			

LICENSED LAND SURVEYOR
HARRY BABICKA
No. 4953
Exp. 12/31/17
STATE OF CALIFORNIA

Harry Babicka

C.&D.C.Inc.
5901 Cadiz Drive
San Jose, CA 95123
(408) 966-0165

PLAT TO ACCOMPANY DESCRIPTION

SCALE: AS SHOWN DATE: AUGUST 8, 2016	LOT LINE ADJUSTMENT	DRAWN BY: R.S.C. APPROVED BY: V.S. / H.B.
COUNTY FILE NO. 10885-16LA		
STEVENS CANYON ROAD/PEACOCK COURT CUPERTINO, CALIFORNIA		DRAWING NUMBER 15025-D3

This document was electronically submitted to Santa Clara County for recording

23701181

Regina Alcomendras
Santa Clara County - Clerk-Recorder
07/19/2017 09:59 AM

Titles: 1 Pages: 10
Fees: $52.00
Tax: $0.00
Total: $52.00

RECORDING REQUESTED BY:

Recorded As Accomodation Only
Old Republic Title Company

Escrow No.: 0618015236
APN: 351-42-007 (Portion)
351-42-006 (Portion)
351-10-020

When Recorded Mail Document and Tax Statements to:

Stevens Creek Quarry, Inc.
12100 Stevens Creek Road
Cupertino, CA 95014

SPACE ABOVE THIS LINE IS FOR RECORDER'S USE

Grant Deed

The undersigned grantor(s) declare(s):
Documentary Transfer Tax is $0.00 ________ Deed required for completion of Lot Line Adjustment
Bill Hastings

( ) computed on full value of property conveyed, or
( ) computed on full value less of liens and encumbrances remaining at time of sale.
(X) Unincorporated area: ( ) City of

FOR A VALUABLE CONSIDERATION, receipt of which is hereby acknowledged,
Stevens Creek Quarry Inc.

hereby GRANT(S) to
Stevens Creek Quarry Inc.

that property in Unincorporated area of Santa Clara County, State of California, described as follows:
* * * See "Exhibit A & B & C" attached hereto and made a part hereof. * * *

This Grant Deed is recorded pursuant to that certain Certificate of Compliance recorded August 18, 2016 under instrument no. 23404073

Date: June 29, 2017

Stevens Creek Quarry, Inc

By: ________
Richard Voss, President

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California
County of Santa Clara

On 7-12-17 before me, Jodi Silva a Notary Public, personally appeared Richard F Voss, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature: Jodi Silva

Name: Jodi Silva
(Typed or Printed)

(Seal)

JODI SILVA
Commission # 2058944
Notary Public - California
Santa Clara County
My Comm. Expires Mar 16, 2018

ILLEGIBLE NOTARY CERTIFICATION AND SEAL DECLARATION

(GOVERNMENT CODE 27361.7)

Fill in applicable information and print "N/A" for any items not required.

STATE OF CALIFORNIA
) ss.
COUNTY OF SANTA CLARA

NAME OF NOTARY: JODI SILVA

PLACE OF NOTARY'S OATH/BOND: SANTA CLARA
(County in the Seal)

COMMISSION I.D. NUMBER: 2058944

VENDOR I.D. NUMBER: NNA1

COMMISSION EXPIRATION DATE: MARCH 16, 2018

I certify under penalty of perjury under the laws of the State of California that the foregoing is true and correct. (CCP 2015.5)

PLACE OF EXECUTION OF THIS DECLARATION San Jose, CA
(City and State)

Date__July 19, 2017

BY: S. LAWS (408)283-9440
(Printed Name)

By______________________
(Signature)

For SYNRGO Inc.
(Firm Name)

EXHIBIT A

All that certain real property situate in the Unincorporated Area of the County of Santa Clara, State of California, being described as follows:

All of Lot 7 as shown on that certain Tract Map entitled, "Tract No. 7707", filed for Record on August 8, 1988 in Book 589 of Maps at Pages 43-46, Santa Clara County Records.

And, excepting therefrom, the following area:

That portion of said Lot 7 being described as follows:

BEGINNING at the most Northeasterly Corner of said Lot 7; thence

from the Point of Beginning and along the Easterly Boundary Line of said Lot 7 South 21° 45' 06" West 72.10 feet to a point; thence

leaving said Easterly Boundary Line of Lot 7 North 70° 59' 30" West 54.89 feet to a point; thence

North 58° 55' 25" West 95.00 feet to a point lying on the Northerly Boundary Line of said Lot 7; thence

along said Northerly Boundary Line of Lot 7 North 89° 59' 06 East 160.00 feet to the POINT OF BEGINNING.

Containing 6.671 acres, more or less, of land.

See Exhibit D1, Plat to Accompany Description, attached hereto and made a part hereof.

LICENSED LAND SURVEYOR HARRY BABICKA No. 4953 Exp. 12/31/17 STATE OF CALIFORNIA

Harry Babicka

Lot Line Adjustment
County File No. 10885-16LA
Stevens Canyon Road / Peacock Court

C. & D. C., Inc.
Job No. 15-025
August 8, 2016

EXHIBIT B

All that certain real property situate in the Unincorporated Area of the County of Santa Clara, State of California, being described as follows:

All of Lot 6 as shown on that certain Tract Map entitled, "Tract No. 7707", filed for Record on August 8, 1986 in Book 589 of Maps at Pages 43-46, Santa Clara County Records.

And, excepting therefrom, the following area:

That portion of said Lot 6 being described as follows:

BEGINNING at the most Northeasterly Corner of said Lot 6; thence

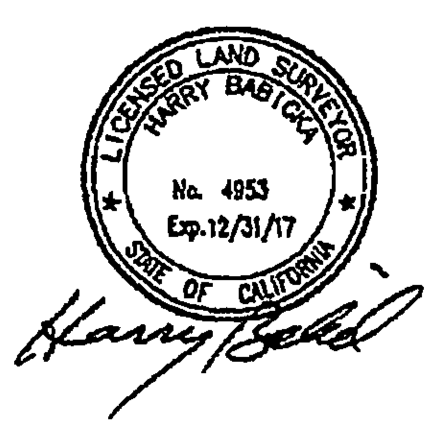
from the Point of Beginning and along the Easterly Boundary Line of said Lot 6 South 00° 57' 28" West 158.60 feet to a point; thence

leaving said Easterly Line of Lot 6 the following courses and distances:
North 71° 31' 27" West 139.33 feet to a point; thence
South 86° 34' 58" West 300.00 feet to a point; thence
North 79° 59' 35" West 75.00 feet to a point; thence
North 70° 59' 30" West 160.11 feet to a point lying on the Westerly Boundary Line of said Lot 6; thence along said Westerly Boundary Line of Lot 6 North 21° 46' 06" East 72.10 feet to a point lying on the Northerly Boundary Line of said Lot 6, said point also being the most Northwesterly corner of said Lot 6; thence

along said Northerly Boundary Line of Lot 6 North 89° 59' 06" East 632.77 feet to the POINT OF BEGINNING.

Containing 7.200 acres, more or less, of land.

See Exhibit D2, Plat to Accompany Description, attached hereto and made a part hereof.



Lot Line Adjustment
County File No. 10885-16LA
Stevens Canyon Road / Peacock Court

C. & D. C., Inc.
Job No. 15-025
August 8, 2016

EXHIBIT C

All that certain real property situate in the Unincorporated Area of the County of Santa Clara, State of California, being described as follows:

All of the Southwest Quarter of the Southwest Quarter of Section 21, Township 7 South, Range 2 West, Mount Diablo Base and Meridian.

And, in addition thereto, the following area:
(Addition 1)

Being a portion of Lot 7 as shown on that certain Tract Map entitled, "Tract No. 7707", filed for Record on August 8, 1988 in Book 589 of Maps at Pages 43-46, Santa Clara County Records, and being more particularly described as follows:

BEGINNING at the most Northeasterly Corner of said Lot 7; thence

from the Point of Beginning and along the Easterly Boundary Line of said Lot 7 South 21° 46' 06" West 72.10 feet to a point; thence

leaving said Easterly Boundary Line of Lot 7 North 70° 59' 30" West 54.89 feet to a point; thence

North 58° 55' 25" West 95.00 feet to a point lying on the Northerly Boundary Line of said Lot 7; thence

along said Northerly Boundary Line of Lot 7 North 89° 59' 06 East 160.00 feet to the POINT OF BEGINNING.

And, in addition thereto, the following area:
(Addition 2)

Being a portion of Lot 6 as shown on that certain Tract Map entitled, "Tract No. 7707", filed for Record on August 8, 1988 in Book 589 of Maps at Pages 43-46, Santa Clara County Records, and being more particularly described as follows:

BEGINNING at the most Northeasterly Corner of said Lot 6; thence

from the Point of Beginning and along the Easterly Boundary Line of said Lot 6 South 00° 57' 28" West 158.60 feet to a point; thence

leaving said Easterly Line of Lot 6 the following courses and distances:
North 71° 31' 27" West 139.33 feet to a point; thence
South 86° 34' 58" West 300.00 feet to a point; thence
North 79° 59' 35" West 75.00 feet to a point; thence
North 70° 59' 30" West 160.11 feet to a point lying on the Westerly Boundary Line of said Lot 6; thence along said Westerly Boundary Line of Lot 6 North 21° 46' 06" East 72.10 feet to a point lying on the Northerly Boundary Line of said Lot 6, said point also being the most Northwesterly corner of said Lot 6; thence

along said Northerly Boundary Line of Lot 6 North 89° 59' 06" East 632.77 feet to the POINT OF BEGINNING.

Containing 41.918 acres, more or less, of land.

See Exhibit D3, Plat to Accompany Description, attached hereto and made a part hereof.

LICENSED LAND SURVEYOR
HARRY BABICKA
No. 4953
Exp. 12/31/17
STATE OF CALIFORNIA

Harry Babicka

Lot Line Adjustment
County File No. 10885-16LA
Stevens Canyon Road / Peacock Court

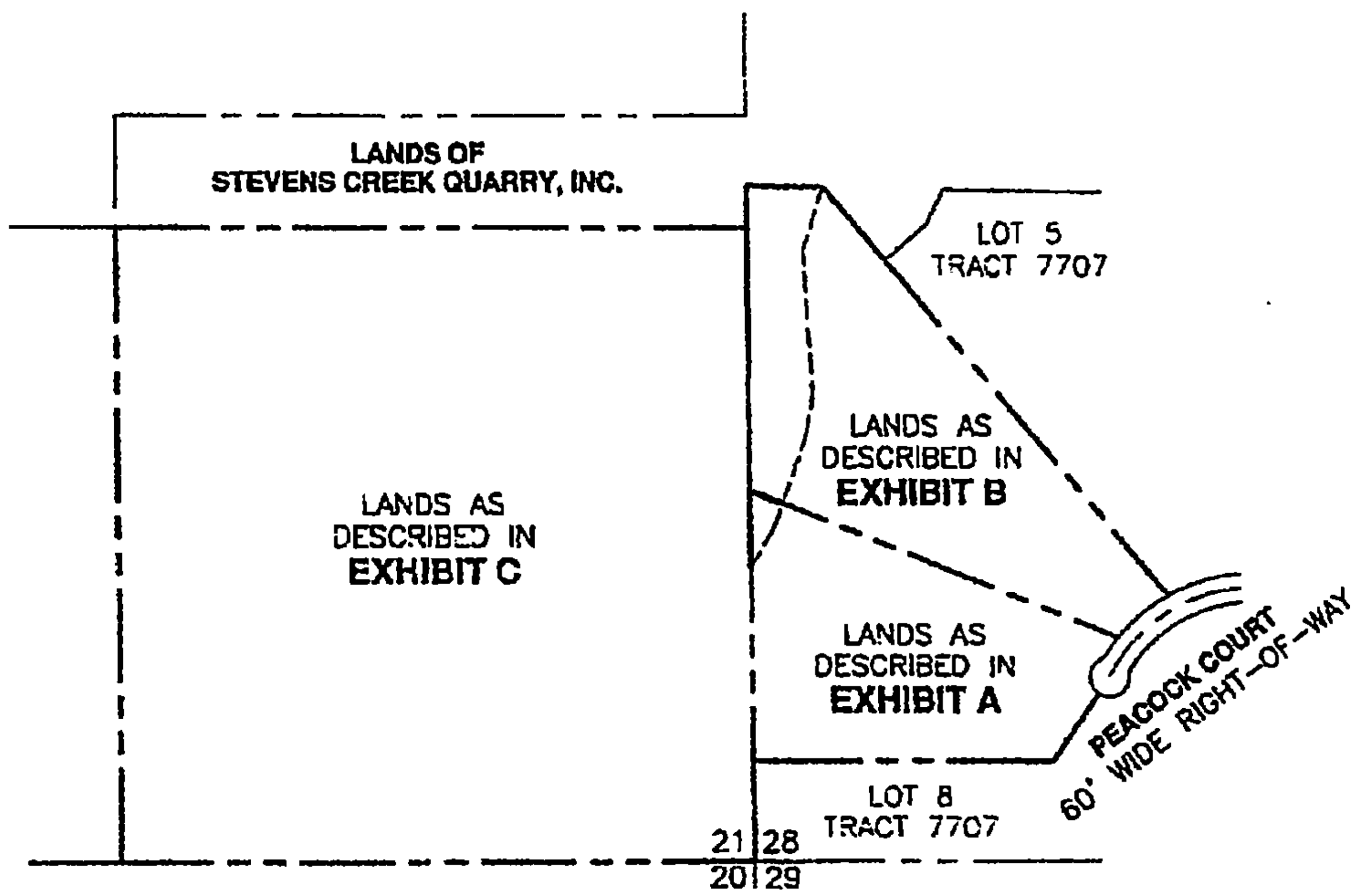
C. & D. C., Inc.
Job No. 15-025
August 8, 2016

NOTES:
All bearings & distances shown are Record Data or as noted. Dimensions shown are in feet & decimals thereof.

EXHIBIT D
PAGE 1 OF 4

LEGEND:

——— — — ———	=	PROPERTY LINE
——— — — ———	=	ADJACENT PROPERTY LINE
——— — ———	=	CENTERLINE
———————	=	EX. RIGHT OF WAY
P.O.B.	=	POINT OF BEGINNING



LICENSED LAND SURVEYOR
HARRY BABICKA
No. 4953
Exp. 12/31/17
STATE OF CALIFORNIA

SCALE: 1"=400'

NOTES:
1. SEE PAGE 2 OF 4 FOR DETAIL OF EXHIBIT A.
2. SEE PAGE 3 OF 4 FOR DETAIL OF EXHIBIT B.
3. SEE PAGE 4 OF 4 FOR DETAIL OF EXHIBIT C.

C&DC Inc. 5901 Cadiz Drive San Jose, CA 95123 (408) 986-0165

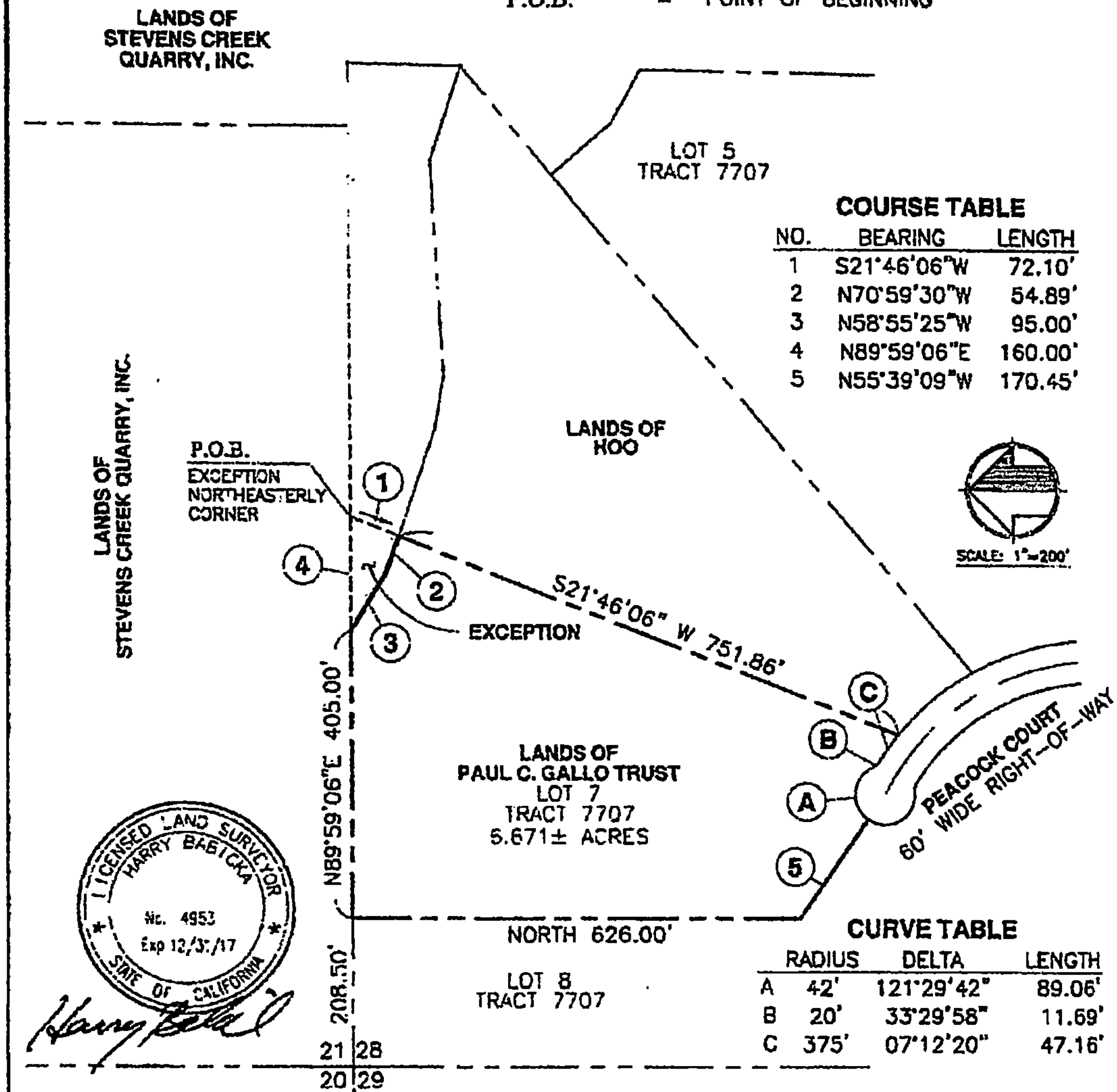
PLAT TO ACCOMPANY DESCRIPTION		
SCALE: AS SHOWN / DATE: AUGUST 8, 2016	LOT LINE ADJUSTMENT	DRAWN BY: R.S.C. / APPROVED BY: V.S. / H.B.
COUNTY FILE NO. 10885-16LA		
STEVENS CANYON ROAD/PEACOCK COURT CUPERTINO, CALIFORNIA		DRAWING NUMBER 15025-D

NOTES:
All bearings & distances shown are Record Data or as noted. Dimensions shown are in feet & decimals thereof.

EXHIBIT D1
PAGE 2 OF 4

LEGEND:

——— — — ———	=	PROPERTY LINE
——— — — ———	=	ADJACENT PROPERTY LINE
——— — ———	=	CENTERLINE
———————	=	EX. RIGHT OF WAY
P.O.B.	=	POINT OF BEGINNING



COURSE TABLE

NO.	BEARING	LENGTH
1	S21°46'06"W	72.10'
2	N70°59'30"W	54.89'
3	N58°55'25"W	95.00'
4	N89°59'06"E	160.00'
5	N55°39'09"W	170.45'

CURVE TABLE

	RADIUS	DELTA	LENGTH
A	42'	121°29'42"	89.06'
B	20'	33°29'58"	11.69'
C	375'	07°12'20"	47.16'

C.S.D.C.Inc.
5901 Cadiz Drive
San Jose, CA 95123
(408) 968-0165

PLAT TO ACCOMPANY DESCRIPTION

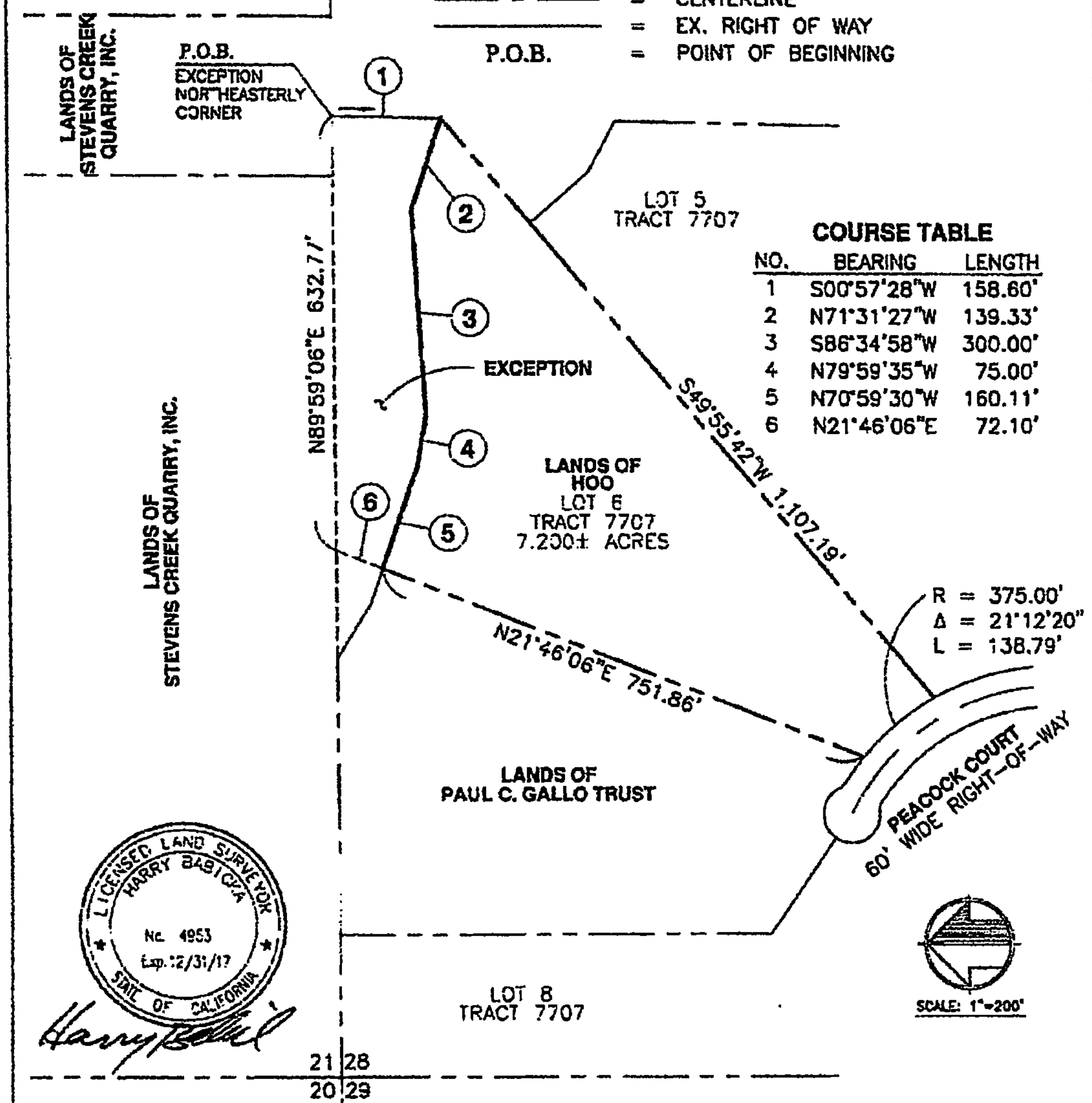
SCALE: AS SHOWN DATE: AUGUST 8, 2016	LOT LINE ADJUSTMENT	DRAWN BY: R.S.C. APPROVED BY: V.S. / H.B.
COUNTY FILE NO. 10885-16LA		
STEVENS CANYON ROAD/PEACOCK COURT CUPERTINO, CALIFORNIA		DRAWING NUMBER 15025-D1

NOTES
All bearings & distances shown are Record Data or as noted. Dimensions shown are in feet & decimals thereof.

EXHIBIT D2
PAGE 3 OF 4

LEGEND:

——— — — ———	=	PROPERTY LINE
——— — — ———	=	ADJACENT PROPERTY LINE
——— — ———	=	CENTERLINE
————————	=	EX. RIGHT OF WAY
P.O.B.	=	POINT OF BEGINNING



COURSE TABLE

NO.	BEARING	LENGTH
1	S00°57'28"W	158.60'
2	N71°31'27"W	139.33'
3	S86°34'58"W	300.00'
4	N79°59'35"W	75.00'
5	N70°59'30"W	160.11'
6	N21°46'06"E	72.10'

C.S.D.C. Inc.
6901 Cadiz Drive
San Jose, CA 95123
(408) 966-0168

PLAT TO ACCOMPANY DESCRIPTION

SCALE: AS SHOWN DATE: AUGUST 8, 2016	LOT LINE ADJUSTMENT	DRAWN BY: R.S.C. APPROVED BY: V.S. / H.B.
COUNTY FILE NO. 10885-16LA		
STEVENS CANYON ROAD/PEACOCK COURT CUPERTINO, CALIFORNIA		DRAWING NUMBER 15025-D2

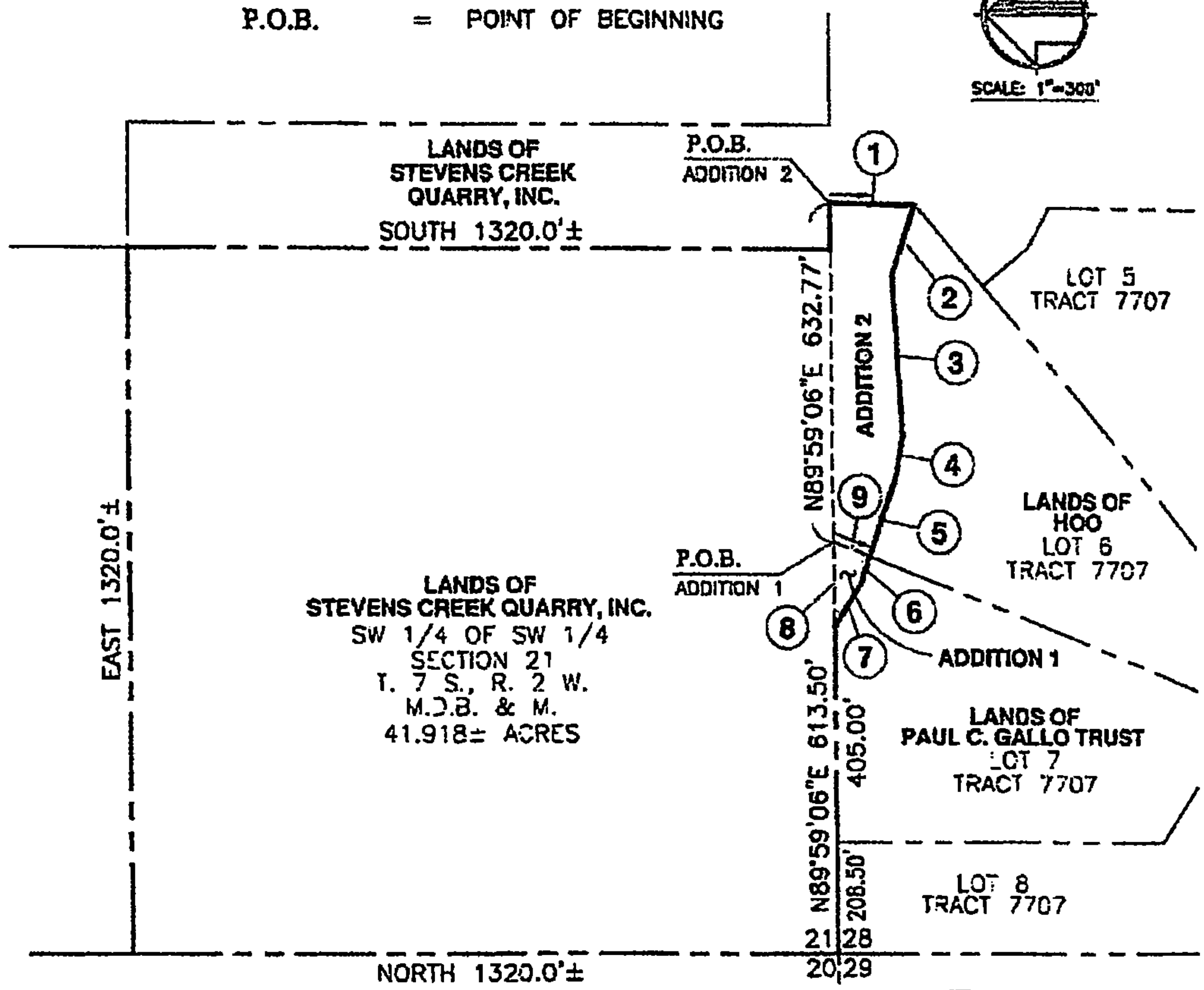
NOTES:
All bearings & distances shown are Record Data or as noted. Dimensions shown are in feet & decimals thereof.

EXHIBIT D3
PAGE 4 OF 4

LEGEND:

——— – – ———	=	PROPERTY LINE
——— – – – ———	=	ADJACENT PROPERTY LINE
——— – ———	=	CENTERLINE
—————————	=	EX. RIGHT OF WAY
P.O.B.	=	POINT OF BEGINNING

SCALE: 1"=300'



COURSE TABLE

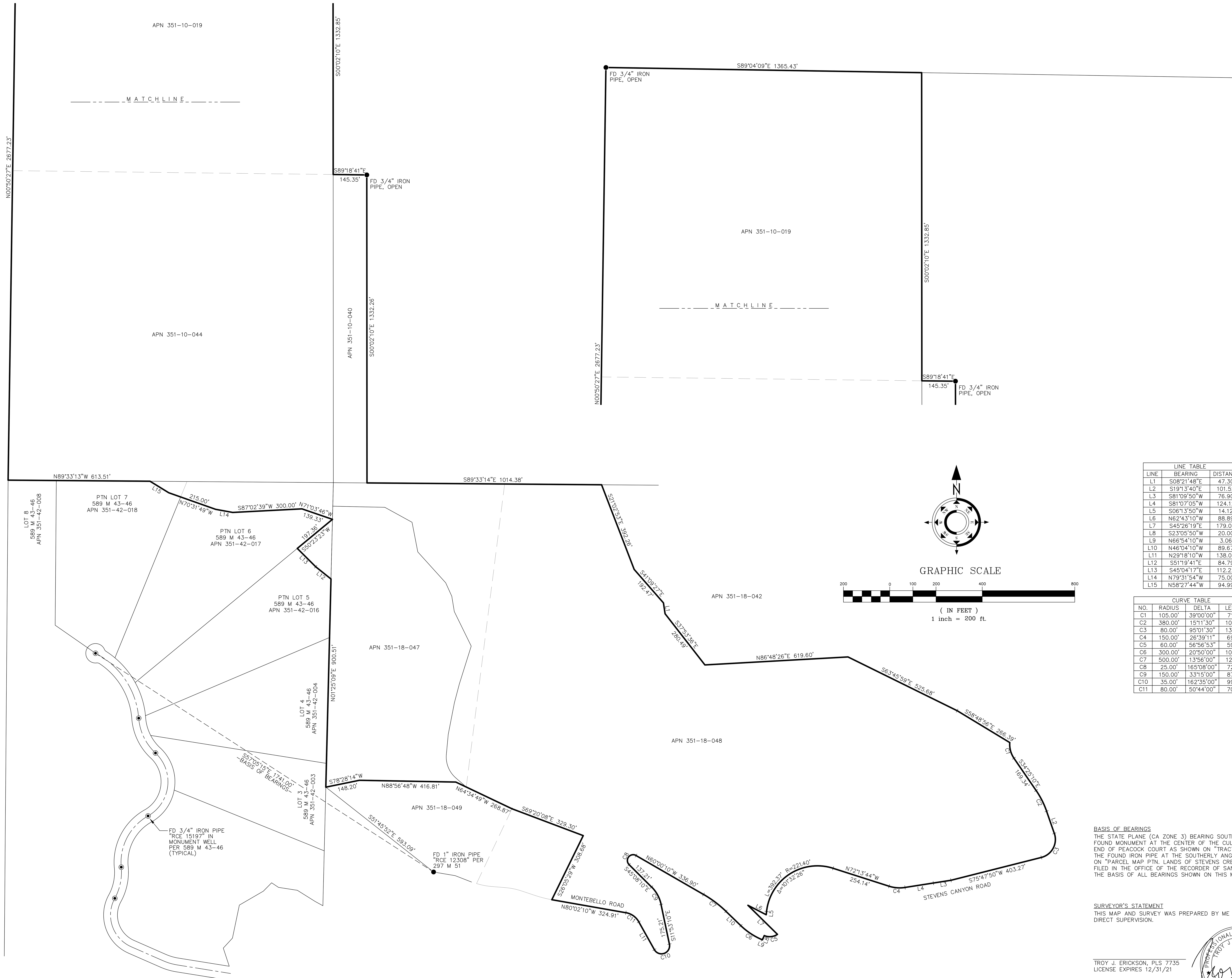
NO.	BEARING	LENGTH	NO.	BEARING	LENGTH
1	S00°57'28"W	158.60'	6	N70°59'30"W	54.89'
2	N71°31'27"W	139.33'	7	N58°55'25"W	95.00'
3	S86°34'58"W	300.00'	8	N89°59'06"E	160.00'
4	N79°59'35"W	75.00'	9	S21°46'06"W	72.10'
5	N70°59'30"W	160.11'			

LICENSED LAND SURVEYOR
HARRY BABICKA
No. 4953
Exp 12/31/17
STATE OF CALIFORNIA

C.&D.C.Inc.
5901 Cadiz Drive
San Jose, CA 95123
(408) 956-0165

PLAT TO ACCOMPANY DESCRIPTION

SCALE: AS SHOWN DATE: AUGUST 8, 2016	LOT LINE ADJUSTMENT	DRAWN BY: R.S.C. APPROVED BY: V.S. / H.B.
	COUNTY FILE NO. 10885-16LA	
	STEVENS CANYON ROAD/PEACOCK COURT CUPERTINO, CALIFORNIA	DRAWING NUMBER 15025-D3



LINE TABLE		
LINE	BEARING	DISTANCE
L1	S08°21'48"E	47.30'
L2	S19°13'40"E	101.52'
L3	S81°09'50"W	76.90'
L4	S81°07'05"W	124.12'
L5	S06°13'50"W	14.12'
L6	N62°43'10"W	88.89'
L7	S45°26'19"E	179.06'
L8	S23°05'50"W	20.00'
L9	N66°54'10"W	3.06'
L10	N46°04'10"W	89.67'
L11	N29°18'10"W	138.07'
L12	S51°19'41"E	84.79'
L13	S45°04'17"E	112.22'
L14	N79°31'54"W	75.00'
L15	N58°27'44"W	94.99'

CURVE TABLE			
NO.	RADIUS	DELTA	LENGTH
C1	105.00'	39°00'00"	71.47'
C2	380.00'	15°11'30"	100.75'
C3	80.00'	95°01'30"	132.68'
C4	150.00'	26°39'11"	69.78'
C5	60.00'	56°56'53"	59.64'
C6	300.00'	20°50'00"	109.08'
C7	500.00'	13°56'00"	121.59'
C8	25.00'	165°08'00"	72.05'
C9	150.00'	33°15'00"	87.05'
C10	35.00'	162°35'00"	99.32'
C11	80.00'	50°44'00"	70.84'

BASIS OF BEARINGS

THE STATE PLANE (CA ZONE 3) BEARING SOUTH 57°05'15" EAST BETWEEN THE FOUND MONUMENT AT THE CENTER OF THE CUL-DE-SAC BULB AT THE NORTHERLY END OF PEACOCK COURT AS SHOWN ON "TRACT NO. 7707", 589 M 43-46 AND THE FOUND IRON PIPE AT THE SOUTHERLY ANGLE POINT OF PARCEL A, AS SHOWN ON "PARCEL MAP PTN. LANDS OF STEVENS CREEK QUARRY, INC.", 297 M 51, ALL FILED IN THE OFFICE OF THE RECORDER OF SANTA CLARA COUNTY, WAS TAKEN AS THE BASIS OF ALL BEARINGS SHOWN ON THIS MAP.

SURVEYOR'S STATEMENT

THIS MAP AND SURVEY WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION.

TROY J. ERICKSON, PLS 7735
LICENSE EXPIRES 12/31/21

PROFESSIONAL LAND SURVEYOR
TROY J. ERICKSON
NO. 7735
STATE OF CALIFORNIA

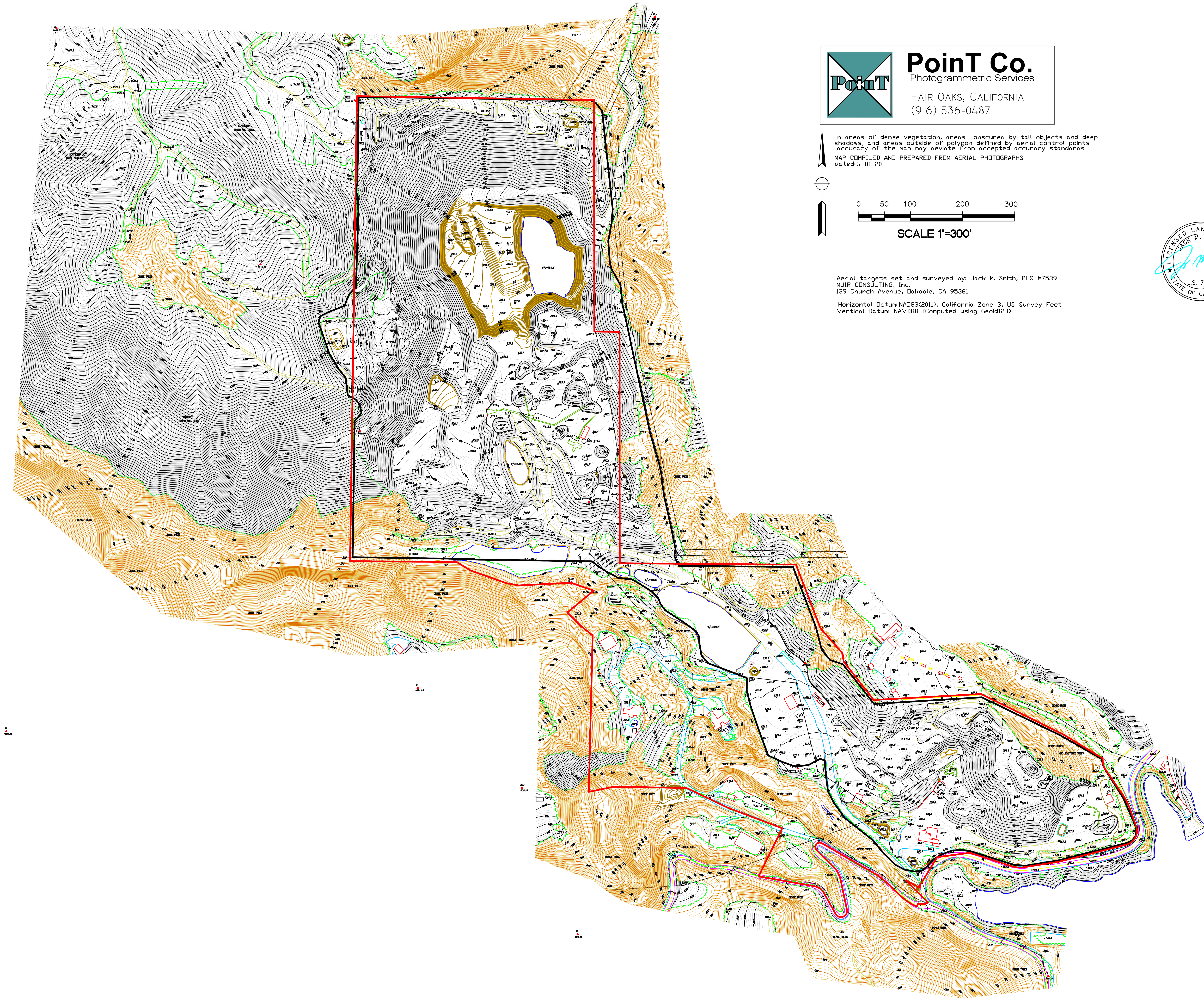
MUIR CONSULTING, INC.
139 CHURCH AVENUE
OAKDALE, CA 95361
(209) 845-8630 FAX (209) 845-8639
LAND SURVEYING • GPS • UNMANNED AERIAL SURVEYS
www.muirconsulting.com

RECORD BOUNDARY EXHIBIT

STEVENS CREEK QUARRY

CALIFORNIA

REVISIONS	JOB NUMBER 5090-02	
	DRAWN BY TJE	DRAWING NAME
	CHECKED BY	SHEET NO. 1 OF 1
	DATE 12/9/20	



PoinT Co.
Photogrammetric Services
Fair Oaks, California
(916) 536-0487

In areas of dense vegetation, areas obscured by tall objects and deep shadows, and areas outside of polygon defined by aerial control points accuracy of the map may deviate from accepted accuracy standards

MAP COMPILED AND PREPARED FROM AERIAL PHOTOGRAPHS dated: 6-18-20

0 50 100 200 300

SCALE 1"=300'

LICENSED LAND SURVEYOR
JACK M. SMITH
L.S. 7539
STATE OF CALIFORNIA

Aerial targets set and surveyed by: Jack M. Smith, PLS #7539
MUIR CONSULTING, Inc.
139 Church Avenue, Oakdale, CA 95361

Horizontal Datum: NAD83(2011), California Zone 3, US Survey Feet
Vertical Datum: NAVD88 (Computed using Geoid12B)

MUIR CONSULTING, INC.
139 CHURCH AVENUE
OAKDALE, CA 95361
(209) 845-8630 FAX (209) 845-8639
SURVEYING • HD SCANNING • GPS • UAV
www.muirconsulting.com

AERIAL TOPOGRAPHIC SURVEY OF STEVENS CREEK QUARRY

CUPERTINO SANTA CLARA CALIFORNIA

REVISIONS	
JOB NUMBER 5090-03	
DRAWN BY JMS, MWS	DRAWING NAME 5090-03TOPO
CHECKED BY JMS	SHEET NO. 1 OF 1
DATE 12/1/2020	

NORFLEET CONSULTANTS

Engineering
Geology
Hydrogeology
Geophysics

537 Joyce Street.
Livermore, Ca 94550
(925) 606-8595

Mr. J. Voss
Stevens Creek Quarry, Inc.
12100 Stevens Canyon Road
Cupertino, CA 95014

December 7, 202
NC Proj. No. 201881.61

RE: Stevens Creek Quarry Use Permit and
Reclamation Plan Application
12100 Stevens Canyon Road
Cupertino, CA 95014

Dear Mr. Voss,

I have reviewed the proposed working and final slope angles outlined in the 2020 Stevens Creek Quarry Use Permit and Reclamation Plan Application. The proposed working (1.5 to 1) temporary cut slopes and final fill slope angles of 2 to 1 and 3 to 1 are consistent with the slope recommendations discussed in my previous reports, Norfleet Consultants (2008, 2020a, and 2020b). The final 3 to 1 fill slope angle is also consistent with the recommendations in the Bagg (2020) report.

LIMITATIONS OF THIS REPORT

This report was prepared at the request of, and for the exclusive use of the addressee. Release to any other company, concern, or individual is solely the responsibility of the addressee. Norfleet Consultants is an independent consultant who was retained to provide a preliminary evaluation of slope instability causes. Any other use of this report is strictly forbidden by Norfleet Consultants.

We have employed generally accepted civil engineering and engineering geology procedures. Our observations, professional opinions and conclusions were made using that degree of care and skill ordinarily exercised, under similar conditions, by civil engineers engineering geologists, geophysicists practicing in this area at this time. Norfleet Consultants expressly denies any third party liability arising from the unauthorized use of this report.

If you have any questions, please contact us at 925-606-8595.

Yours truly,
Norfleet Consultants

S. Figuers

S. Figuers

REGISTERED PROFESSIONAL ENGINEER
SANDS H. FIGUERS
No. C-51485
Exp. 6/30/22
CIVIL
STATE OF CALIFORNIA

CERTIFIED ENGINEERING GEOLOGIST
SANDS H. FIGUERS
PG-4749
CEG-1850
Exp. 10/31/22
GEOLOGY
STATE OF CALIFORNIA

References:

Bagg, 2020, BAGG Engineers, 2019, In-depth Engineering Geologic Investigation and Slope Stability Analysis Western Rim Slope Stevens Creek Canyon Road, Cupertino, California 94117, dated January 2, 2019

Norfleet Consultants, 2008, Geologic and Slope Stability Analysis, Reclamation Plan Amendment, Stevens Creek Quarry, California Mine ID 91-43-007, San Jose, California., Dated January 22, 2008

Norfleet Consultants, 2020a,Preliminary Analysis of Slope Failure at the Northeast Corner of the Stevens Creek Quarry 12100 Stevens Canyon Road Cupertino, CA 94501, dated May 18, 2020

Norfleet Consultants, 2020b, Stability Assessment of the Proposed Cut Slope of the Northwest Corner of the Stevens Creek Quarry. 12100 Stevens Canyon Road Cupertino, CA 95014, dated September 19, 2020

NORFLEET CONSULTANTS

Engineering
Geology
Geohydrology
Geophysics

6430 Preston Ave.
Suite A
Livermore, CA 94551
(925) 606-8595

January 22, 2008

Stevens Creek Quarry
Box 26430
San Jose CA 95159

Attention: Mr. R. Voss

Re: Geologic and Slope Stability Analysis,
Reclamation Plan Amendment
Stevens Creek Quarry
California Mine ID 91-43-007
San Jose, California

Dear Mr. Voss:

At your request, we have completed our geologic and slope stability evaluation relating to the Reclamation Plan Amendment for the Stevens Creek Quarry. The Reclamation Plan Amendment is an update of the approved 1983 Reclamation Plan for the site.

Our scope of work included:

- A site meeting and overall site reconnaissance with quarry personnel and several data collection site visits to the quarry.
- Compilation, review and summary of available pertinent geologic and geotechnical documents, including a review of recent aerial photographs of the site, to support slope design analysis and recommendations for the Reclamation Plan Amendment.
- Numerical evaluation of cross-sections for slope stability in static and pseudo-static loading conditions of the proposed reclamation slope geometry.
- Discussions with quarry personnel about the implications of the findings of this study.
- Preparation of this report.

The intent and purpose of this of this report is to provide a summary of the geologic and geotechnical issues as they pertain to long-term, global slope stability of the final slope geometries as defined in the Reclamation Plan Amendment. Working and interim slope stability were not evaluated. This study evaluated the pit west of the Berrocal fault, referred to by the operator as Parcel B.

GEOLOGIC SETTING AND SITE GEOLOGY

The quarry is located on unincorporated land just west of the city of Cupertino in the western foothills of Santa Clara County, east of the San Andreas Fault (Figure 1 and Photo 1). Currently, Franciscan-aged greenstone rocks are mined in the western pit.

The area was regionally mapped in 1909 by Branner et al., and again by the California Geological Survey in 1961. The area was mapped in greater detail by Dibblee (1966), who mapped the general rock types and faults in the study area (Figure 2). The first detailed mapping of the site was performed by Rogers and Armstrong (1973, their Plate 1) at a scale of 1 inch to 1000 feet. That study identified rock types, landslides, faults, and a shear zone in the quarry area (Figure 3). The faults in the area were mapped in detail by Sorg and McLaughlin (1975; Figure 5) at a scale of 1 inch to 2000 feet (their field map had a scale of 1 inch to 100 feet).

Franciscan-aged greenstone (metabasalt) is the primary rock type mined in the pit (Figure 6). A small volume of Franciscan-aged limestone and graywacke (Calera Limestone – Sliter and McGann, 1992; Walker, 1950) have been mined in the northeast corner of the pit. Field observations indicate that the majority of the rocks in the pit are sheared metamorphosed mafic volcanics, with occasional metamorphosed pillow basalts found along the upper part of the west side of the pit. Bailey and Everhart (1964) and McLaughlin and Clark (1997) contain excellent descriptions of the rock types in the quarry area. The north and west sides of the pit are separated by a NW-SE trending shear zone that is 50 to 100 feet wide (Rogers and Armstrong, 1973, and Sorg and McLaughlin, 1975).

All rocks in the pit are fractured/jointed/sheared to varying levels. The rocks underwent multiple stages of deformation/shearing during subduction and later tectonic events. Localized shearing also occurred during development of the Berrocal fault. Field observations indicate that rocks within the pit can be separated into three zones (Figure 6). These zones consist of two linear greenstone cores and a limestone (sedimentary Franciscan) unit. They are separated from each other by high dip shear zones. Both the shear zones and the rock cores appear to trend southeast-northwest at an oblique angle to the northerly trending Berrocal fault. These units are part of the Franciscan melange (Raymond, 1984). Even though they appear to be separate units at quarry scale, the rock cores and shear zones are not regional in scale.

Fracturing within the greenstone cores is relatively widely spaced, and the unfractured greenstone is quite hard (Photo 4). When the cores are mined, the larger greenstone blocks are broken up with a concrete breaker (these rocks were blasted in the past). Fracture spacing, block size, and global rock competence all decrease away from the core to the degree that the rock can be ripped. The shear between the two greenstone zones appears to be combination of serpentine, clay, and highly sheared greenstone (Photos 5 and 6). It can be easily broken apart with a geologist's hammer. Surface topography mimics rock competence. The high ridges overlie the competent cores, while a valley is located over the more fractured rocks in and around the shear zone. In this report, we will refer to shears/joints/fractures as joints unless otherwise indicated.

Superimposed on these relationships is the effect of weathering. The upper 2 to 20 feet consists of a reddish brown residual soil (Photos 7 and 8). This overlies moderately to highly weathered bedrock (a 50 to 90 percent rock/soil mixture) that can extend another 5 to 20 feet. Below this is slightly weathered bedrock. This has weathered brown but contains no observable soil. It is more fractured than the underlying unweathered bedrock. Overall weathering and fracturing (with respect to gross rock competence) decreases with depth. Based on color changes and failure mechanisms, the weathered zone extends 80 to 100 feet below the ground surface. We will refer to the rocks below the visibly weathered units (about 100 feet below the ground surface) as unweathered rocks even though weathering on the microscopic level likely extends hundreds of feet below the ground surface. It appears that as weathering increases, joint persistence is reduced. This change increases the surface unraveling of rocks in the weathered zone, but, at the same time, reduces the potential for large-scale wedge failure.

A small area of Franciscan limestones and sedimentary units is located at the northeast corner of the pit (Photo 9). This unit appears to be the southern continuation of a limestone trend on the Kaiser-Permanente quarry. A shear zone separates greenstone from limestone units. The shear zone is 50 to 80 feet wide. Shear indicators were not visible. The Berrocal fault marks the eastern boundary of this area. Like the greenstones, the limestones and sedimentary units are strongly fractured, and it appears that fracturing increases adjacent to the Berrocal fault. Sandstone units at the northeast corner of the quarry (adjacent to the Berrocal fault) showed indications of mineralization while adjacent clays (not the shear zone clays) were moist. No free groundwater was encountered. The moist zone was about 100 feet in diameter and confined to the clays along the eastern border of the pit.

We walked approximately ½ mile of valley (rattlesnake Canyon) just southwest of the quarry. The valley floor appeared to have been cut in hard greenstone. We did not observe obvious indications of shear zones.

Berrocal Fault

The Berrocal fault trends northerly-southerly a few hundred feet east of the pit (Figures 5 and 6). It appears to be high-angle reverse fault, dipping 50 to 70 degrees west. The units west of the fault (Franciscan units) were thrust east over the Santa Clara formation. It is unlikely that there is a specific fault plane. Instead, the fault appears to be a shear zone 50 to 100 feet wide. Mapping by Sorg and McLaughlin (1975) at the southeast corner of the pit suggests that deposition of the Santa Clara formation pre-dates (or occurred early in) development of the Berrocal fault. The original Berrocal fault was mapped by Bailey and Everhart (1964, p. 84 and 92) as a strike-slip fault southwest of the New Alamden mining district (about 20 miles southeast of Los Gatos). The name was subsequently applied by Sorg and McLaughlin (1975), and McLaughlin and Clark (1997) to the fault in the Stevens Creek area. These two faults likely have a similar genesis, but we believe that they are separate, unrelated faults. For the sake of continuity we will use the term Berrocal fault in this report, but our discussion only refers to the fault in the Stevens Creek area.

We identified the approximate trace of the Berrocal fault adjacent to the east side of the quarry. There was no obvious surface expression of the fault trace on the ground or on aerial photographs except for the juxtaposition of Franciscan with Santa Clara units. We identified three areas where the location of the Berrocal fault could be narrowed down to between 50 and 100 feet (Locations 1, 2, and 3 on Figures 5 and 12; Photos 2, 3, 25, and 26). These locations had been previously identified by Sorg and McLaughlin (1975) and Rogers and Armstrong (1973). These locations constrain the strike and dip of the fault zone.

At the southern two locations (Locations 2 and 3 -Figures 5 and 12 and Photos 3 and 26), readily identifiable Santa Clara units crop out, but the Franciscan is covered with float. The fault zone is west of these locations. These locations are at approximately the same elevation (650 to 675 feet) and provide an approximate fault trace of N 5^{o} to 7^{o} W.

The other location is adjacent to the northeast corner of the quarry (Location 1 - Figures 5 and 12 and Photo 2). Here, the fault cuts obliquely across a north-south trending dirt road. Franciscan limestones crop out in the road south of the fault zone and apparently undistrupted Santa Clara units crop out in sidecuts a hundred feet or so to the north. This outcrop is at an elevation of about 915 feet.

The Sorg and McLaughlin map (Figure 5) shows the fault with a shallower dip (<40 degrees west) cuting through Franciscan units at Location 2. This localized change in fault dip is inconsistent with thrust behavior. It is more likely that Santa Clara units extend further west at location 2 (than shown on the Sorg and McLaughlin map) and the Berrocal fault has a steeper dip. A three-point evaluation suggests that the fault zone currently dips 50 to 70 degrees to the west. The Santa Clara east of the Berrocal fault has a gentle synclinal form with an axis that trends about N45W and dips to the southeast, oblique to the trend of the Berrocal fault in this area.

It is likely that the Berrocal fault formed as part of a flower structure related to slip on the San Andreas. It is unlikely that it is currently an independent seismogenic feature. Slip may occur when the near-by section of the San Andreas fault shifts. The lack of surface displacement features along the trace of the Berrocal fault in the Stevens Creek area suggests that there is little historic (10,000 years or more) displacement on the fault. It is also possible that this section of the fault has been rotated to a steeper dip (20 to 30 degrees) by subsequent movement on deeper faults and is now no longer active. It appears that the global movement of the Franciscan units in this area are north-northeast (not east) and that this section of the Stevens Creek fault was never a true thrust, but is instead a high-angle, lateral reverse fault with oblique movement.

Air Photo Analysis

Table 1 contains a list of aerial photographs of the Stevens Creek Quarry area reviewed as part of this study. Landslides had been mapped by Sorg and McLaughlin (1975; Figure 5), Rogers and Armstrong (1973; Figure 4), and Pike (1997). Our air photo analysis does not support the identification of landslides in the vicinity of the quarry interpreted by previous workers. The large landslide at the northwest corner of the quarry mapped by Sorg and McLaughlin (1975) is located along a ridge crest, not on the side of a ridge. It appears to be a tectonic block bound by shear zones. The trace of the Berrocal fault could not be readily identified on the aerial photographs.

Table 1
Aerial photographs evaluated as part of this study.

Source	Date	Line and Photo Nos.	Scale
Pacific Aerial	7-14-04	AV8769-2-7, 8, 9	1:7,200
Pacific Aerial	7-14-04	AV8769-1-7, 8, 9	1:7,200
Pacific Aerial	7-28-97	AV5472-3-9, 10, 11	1:24,000
Pacific Aerial	7-28-97	AV5472-4-8, 9, 10	1:24,000
Pacific Aerial	10-8-96	AV5200-17-72, 73, 74	1:12,000

Seismicity

The San Andreas fault is approximately 5 miles west of the quarry. This section of the San Andreas fault is classified as a Type A fault and has an estimated Mmax of 7.9 (ICBO, 1998). The site has a 10 percent chance in 50 years of experiencing 0.57g peak ground acceleration (PGA) (USGS, 2007; Earthquake Ground Motion web site).

The quarry was active during the Loma Prieta Earthquake of October 17, 1989. The estimated ground acceleration from that earthquake at the quarry was about 0.2g. Quarry personnel indicated that the quake did not cause rock falls or slope failures. Reportedly, only a single water glass fell off a counter in a nearby house during the Loma Prieta earthquake. Historic aerial photograph review indicates that the quarry was smaller in 1989. The highest slopes were 100 to 200 feet high at the time of the 1989 Loma Prieta Earthquake.

A study of aftershocks from the Loma Prieta Earthquake in the Santa Cruz Mountains (Lindley and Archuleta, 1994) found that Franciscan ridgetops had little ridgetop amplification, and the average amplification at Franciscan sites was 3 times less than amplification at Miocene and Pliocene sites.

The slopes surrounding the quarry floor were identified by the California Geological Survey (2002, Cupertino Quad) as having a potential for permanent ground displacements (earthquake-induced landslides). No liquefaction potential was identified in this area.

Groundwater

There is a series of houses on the hill south of the quarry (Monte Bello Ridge). The water supply to some of those houses is provided by wells. The bottom of some of the eastern wells extends below the elevation of the quarry floor while the bottom of wells higher in the hills is above the elevation of the quarry floor. The quarry is separated from these houses (and wells) by an unnamed stream in Rattlesnake Canyon (local name). The elevation of the stream (and the base of the valley) adjacent to the quarry is between 650 and 690 feet. The lowest elevation of the quarry floor is projected to be between 700 and 725 feet. When quarrying is finished, the quarry will be filled with ~150 feet of fill. Subdrain lines are and will be incorporated into the fill. The quarry is relatively dry, and there is no record of long-term, large water inflows into the quarry or historic need for drainage wells to control water inflows. There is no record of water wells within 1000 feet west, north, or east of the quarry.

We observed two seepage areas in the quarry walls (Figure 8). One is located in the west face near the south end of the quarry, and the second is located in the middle of the north face. The western seepage area (Photo 10) consists of a series of sub-horizontal seeps that extend 100 to 150 feet at about the 800 foot elevation. At the time of our site visit (in the fall, the driest time of year), only the southernmost seep was active, producing in the range of 5 to 10 gallons of water per hour. The remainder of the seeps were marked by rinds of efflorescent salts. There was no obvious alteration/weathering of the bedrock in the vicinity of the seeps. This area is at the base of weathered greenstone, and it appears that this zone is related to slope interflow through the weathered zone. It is likely that the flow increases during the winter.

The second seep area is located in hard bedrock in the middle of the north face (Photos 11 and 12) at about elevation 925 feet (the top of the face is above 1200 feet elevation). This zone consists of two seeps, spaced 20 to 30 feet apart at about the same elevation. The flow is in the range of 10 to 20 gallons per hour. There is a 2 to 3 inch wide, vertical clay zone below the eastern seep. The flow from these seeps is currently directed into the existing gravity drainage system. There is no indication that drainage wells have been used in or around the quarry. The majority of the quarry walls are covered with fill, and no obvious indications of seepage were seen in those areas. It is likely that there is some seepage in the northeast corner of the quarry. A seasonally dry valley and dry stream above this part of the quarry trend towards the northwest corner of the quarry.

Quarry personnel indicated that a few years ago, a gush of water occurred when a new cut was made at the east end of the north face in the limestone area. The flow of water was initially large. The flow slowly decreased over a few days and was negligible a week or two later. This flow appears to have occurred at the junction between the greenstone and the limestone at the northeast corner of the pit. The nature of the flow suggests that this was an isolated pocket.

This pit has been active for more than 40 years, and portions have been excavated to approximately 725 foot elevation. The quarry acts as a very large diameter drainage pit.

Currently, total flow from the quarry is in the range of 5 to 10 gallons per minute. The majority of effects on the surrounding groundwater have already occurred. It is likely that bedrock groundwater levels adjacent to the quarry will rise when the quarry is backfilled.

Rattlesnake Canyon acts as a hydrologic barrier between the quarry and the hill south of the quarry. We are unaware of any complaints or comments about groundwater elevation changes in the surrounding area that might be related to quarry operations.

Slope Stability Considerations

More than 60 percent of the northern and western faces was covered with side cast fill at the time of our site visits. We observed numerous landslides within the fill (at all scales) but did not observe obvious indications of failure of the underlying rock in the side cast areas.

The current western and northern quarry faces are 250 to 300 feet high and slope steeply. The western face is about 12 years old (slopes 40 to 50 degrees east; Photos 8 and 17). The upper bench was cut 6 to 7 years ago. The northern face is 2 to 3 years old (slopes 45 to 70 degrees south; (Photo 13). Variously sized wedge failures occur in the lower, unweathered material in the western face (Photo 14). These failures range in size from a few cubic yards to hundreds of cubic yards. We did not observe similar wedge failures in the northern face. It is likely that the observed failure differences between the two faces is a function of joint patterns and the trend of each face.

A northwest-southeast trending shear zone is located at the northwest corner of the quarry. Much of this area is covered with fill. The only exposure of the shear zone is a 40 foot high by ~100 foot long cut at the base of the slope (about 200 feet below the original ground surface; Photo 5). The western part of the zone was covered, but the zone is in the range of 50 to 100 feet wide. The shear zone is serpentine. Shearing is pervasive. At small scale, shears occur in almost all directions, but the shears are short (a few inches), curvilinear, and are truncated by other shears (Photo 6). Polished shear surfaces are common.

In outcrop scale, the overall shear trend in the exposed face is N25-30W with a high dip (~80 degrees east/west). The eastern end of the face contains fracture-bound angular greenstone blocks (6 inches to a few feet in size), while the western end of the face is highly sheared serpentine that contains numerous greenish pods in a black matrix. The pods are football shaped that are few inches to a few feet long. The long axes are sub-parallel to the overall shear strike direction. The pods do not appear to be significantly stronger than the surrounding matrix. We picked up a pod that was about 2 feet long by the ends. After a few minutes, the pod fell apart under its own weight along internal fractures. The pods and matrix can easily be broken apart with a rock hammer. The cut face is perpendicular to the overall shear trend and is a few months old. The face is failing by localized wedge failures and face spalling (Photos 15). There is no evidence of large-scale arcuate failures.

An inactive eastern face extends the length of the quarry (Photo 16). The northern end of the face was cut in Franciscan sedimentary units (limestones, sandstones, and clays). The rest of the face was cut in weathered greenstone. The greenstone face is 50 to 75 feet high and slopes 45 to 55 degrees west. This face is sub-parallel to the Berrocal fault which is 300 to 400 feet to the east. The southern end of the face is more than 45 years old, the middle part of the face is about 30 years old and the northern end of the face is 8 to 12 years old. The middle part of the face contains a series of landslides (both circular and planar failure surfaces). The area adjacent to the toe of this slope is used for temporary rock storage. The toe of this slope is occasionaly destabilized as the stored material is removed.

Joints

We mapped fracture/joint trends in the northern and western quarry faces as well as in two exposures in the middle of the quarry. There is a wide variation in joint density, orientation, and length. We did not observe quarry-wide joint patterns. The majority are short (a foot to less than 40 feet long) and truncate against other joints. Joint spacing varied from less than an inch to 5 to 10 feet. Some joints were planar, but most were curvilinear (the strike and dip could vary ±20 to 30 degrees). The joints are rarely filled, and the joints in the unweathered greenstone are tight. Scattered slickensides were observed. Occasional shear zones were observed in the western face. These appeared to be late stage for they were not cut by other joints or shears. The zones are 1 to 5 feet wide and 20 to 60 feet long. These shears have a high dip (70 to 90 degrees) and trend easterly-westerly. The rock within the shear zone is broken into smaller pieces but no gouge was visible. The shears were occasionally filled with vein material (1/4 to ½ inch wide).

Stereonet plots of all measured joints are shown in Figure 9, and stereonet plots of joints in the western face are shown in Figure 10 (combined weathered and unweathered units). There is a wide scatter, but there is a general northeast-southwest strike trend with dips steeper than 40 degrees to the east. This is based on a limited data set (73 data points). Several hundred data points would be needed to confirm these trends. Few fractures were measured in the northern face because the face was steep and the lower 10 to 20 feet of the face was dangerous to climb on. The western face data is consistent with the wedge failures on the west face. The apparent lack of persistent joints with a moderate dip to the south is consistent with the lack of large-scale wedge failures in the north face.

Failure Types

We did not observe large-scale failures in the quarry walls, and there has been no reported history of large-scale failures. The majority of observed rock failures were relatively small block and wedge failures related to joint orientation.

A zone of wedge failures in the unweathered greenstone occurs along the central section of the western face between elevations 750 to 1050[1] feet (Photos 14 and 18). These failures progress upwards to but do not appear to extend into the overlying weathered greenstone. This face trends ~N20E and slopes ~45 degrees east. We measured the failure planes of several of the wedge failures. The basal surface of those failures trends N10W to N20E and dips 45 to 60 degrees south. The dips of joints with a N-S trend and easterly dip in this area were mainly 45 to 60 degrees, but some dipped 25 to 35 degrees. The wedge failures appeared to be restricted to the more competent, less fractured greenstones. They did not extend south into more fractured greenstone (either weathered or unweathered).

In the west slope, engineered wedge fill placed as part of the reclamation plan will extend to between 1000 and 1050 feet elevation, and much of the current zone of wedge failures will be covered and buttressed with fill. The western face final rock slope above the fill will dip approximately 32 degrees east (1.5:1). It appears at this time that the dip of basal planes of the current wedge failures will not daylight in the final rock slope.

There are partial failures of the weathered greenstone face in the high bench in the western slope (Photo 19). The face is about 40 feet high, slopes about 75 degrees east, and trends north-south. There is a series of shears that trend east-west across that face. The shears are semi-vertical and are spaced 10 to 20 feet apart. There were several failures in the cut slope. It appears that the these failures began with spalling of fractured rocks within the shear zone itself and progressively widened laterally (Photo 20). There was no obvious classical wedge failure or global failure of the cut face. The cut face in this bench more than 17 years old. The cut face below the bench is 7 to 8 years old.

There are failures in weathered bedrock along the eastern cut slope of the quarry (Photo 16). That cut slope varies from 30 to 60 feet high and is 20 to 45 years old. The face trends ~N15W and slopes 45 to 55 degrees west. This face is quasi-parallel to and several hundred feet west of the trace of the Berrocal fault. The middle part of the face contains a series of landslides (both circular and planar failure surfaces; Photo 21). The area adjacent to the toe of this slope is used for temporary rock storage. The toe of this slope is routinely destabilized (a minor amount) by equipment as the stored material is removed.

The northern face trends ~N60E. The west end of the slope is covered with spill fill and slopes ~45 degrees south (Photo 13). The fill is marginally stable, and soil-related landslide features are common. We did not observe obvious large-scale failure of the underlying bedrock. The center part of the slope contains exposed hard greenstone that dips ~60 degrees south. The face was irregular, and smaller block failures were common. We did not observe obvious wedge failures (as observed in the western face) in this area.

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[1] Note: All elevations are approximate.

SLOPE STABILITY ANALYSIS

Final slope configuration

The proposed Reclamation Plan Amendment (Resource Design Technology, 2007; Figure 11) indicates that reclamation includes construction of an engineered wedge fill around the perimeter of the quarry. The base of the wedge fill will rest on the quarry floor at approximately 700 foot elevation and the upper edge of the wedge fill will extend to about 1000 foot elevation and rest against the quarry walls. The surface of the wedge fill will slope 2:1 towards the interior of the quarry. The center of the quarry will be filled with ~150 feet of fill (to ~850 foot elevation). The western and northern quarry faces will extend from tens of feet to approximately 250 feet above the top of the wedge fill. The exposed rock face (weathered and unweathered units) will have a 1.5:1 slope.

Limit Equilibrium Method

We used GSTABL7, a computer program, to evaluate the Factor of Safety (FS) for various slope orientations and material properties. We performed both static and pseudo-static (seismic) slope evaluations. Bishop's method of slices was used to evaluate circular failure modes. Joint mapping did not identify persistent fracture sets that would justify evaluation of the slopes with Janbu's method. Based on our seismicity analysis, we used a pseudo-static coefficient of 0.2g to evaluate the stability of each slope for pseudo-static (seismic) loading conditions.

Under the Uniform Building Code (UBC), the minimum static FS for slopes where human occupancy is planned is 1.5, and 1.1 for pseudo-static conditions. Based on the use of the site after reclamation as open space, with no engineered structures or concentrated public access, we propose that a static FS between 1.3 and 1.5 is acceptable. Table 2 lists the significance of various Factors of Safety according to Sowers (1979, p. 587).

Table 2
Significance of the Factor of Safety (Sowers, 1979, p. 587)

Factor of Safety	Significance
Less than 1.0	Unsafe
1.0 to 1.2	Questionable safety
1.3 – 1.4	Satisfactory for cuts and fills
1.5- 1.75	Safe for dams

The limit equilibrium method was developed for soil slope stability analysis and assumes particle friction, a relatively homogenous material, and a smooth (arcuate) failure surface. When used for rock slopes, the phi and cohesion values are average, non-directional rock mass parameters. They can only account for fractures and other material irregularities in an indirect manner. Most of the time, rock slope stability is controlled by other factors such as particle/block interlock or failure on existing, non-circular surfaces. Equivalent phi angle and cohesion strength [phi $_{eqv}$ (P_{eqv}) and cohesion $_{eqv}$ (C_{eqv})] are used to signify estimated rock properties in the limit equilibrium analysis.

Rock mass rating systems began to be developed in the 1960's to evaluate the stability of underground openings. Several have been expanded to evaluate rock slopes. These include: RMR, MRMR, RMS, SMR, SRMR, SSPC, CSMR, GSI, USC, Q, M-RMR, BQ, RMi, and others. All of these rating systems attempt to identify and incorporate the main features of a rock mass that define rock shear strength, and, subsequently, rock stability. The basic parameters used in these rating systems include block size and spacing (typically defined by RQD, derived from drill cores, but some allow scan mapping of a rock face), the nature of rock defects (persistence, roughness, infilling, width, weathering, spacing, orientation), and ground water. These parameters are evaluated and combined into a single value. That value is typically used with design curves to estimate overall rock stability. Some of the classification systems are based on specific rock types, conditions, and slope height and have limited applications. Ongoing debates about the nature and incorporation of the various rock parameters cause modifications of existing rating systems and creation of new ones. Palmstrom (2001) contains a good review of rock characterization for rock rating systems. Hack (2002) and Douglas (2002) reviewed many of the rock mass rating systems.

Numeric modeling methods (FEM, FDM, Distinct Element, Discontinuous Deformation Analysis) are also used to evaluate rock slopes. FEM, FDM codes require an extensive set of rock and joint properties which can be difficult to reasonably define. It is also difficult to model rock that is extensively fractured.

A Block-in-Matrix (BIM) rock analysis is useful to evaluate soil/rock mixtures (Lindquist, 1994; Medley, 1994; and Kim, Snell, and Medley, 2004). Except for the residual soils, the majority of the quarry rocks (weathered and unweathered) contain greater than 75 percent rock. This rock percentage indicates that the exposed greenstone slopes are fractured rocks instead of BIM rocks. The serpentine shear zone in the northwest corner of the quarry could be considered a BIM rock. The effect of blocks within a fine-grained matrix is to increase create a complex shaped failure surface. This is represented in a limit equilibrium model by increasing the phi angle by 10 to 20 degrees (Kim, Snell, and Medley, 2004; Medley, 1994).

A limit equilibrium method with a circular failure surface analysis is used in this evaluation for the following reasons.

> The deeper quarried slopes will be backfilled and supported by engineered fill. Rock mass rating systems are not designed to evaluate soil slopes. They could provide an estimate of the stability of the rock portion of the slopes, but that estimate would have to be transferred into a limit equilibrium analysis. Only up to about 100-150 feet of unweathered rock will be exposed. At this depth, internal rock dilation/deformation is expected to be minimal.

Parametric studies of rock properties can more easily be performed with a limit equilibrium analysis. Phi and cohesion values can be quickly varied to accommodate layer thickness variations, estimate effects of joints on global rock properties, and estimate variations in both soil and rock types on slope stability.

For the most part, weathered rock will be present on the upper cut slopes above the engineered fill. Rock weathering reduces the effect of rock structure and increases the likelihood of arcuate, soil-like failures.

It is unlikely that a rock mass rating evaluation would provide a better evaluation of the final rock slopes. The rock mass ratings are lumped parameter characterization systems, not classification systems or design methodologies (Stille and Palmstrom, 2003). They can only provide an estimate of the global stability of a slope. The proposed quarry final slope height and dip are at the lower end of most of the rock mass rating system design curves. It is also difficult to vary the parameters that make up a rock mass rating evaluation in order to perform parametric evaluations.

Material properties

For stability evaluation purposes, four rock types (unweathered greenstone, weathered greenstone, sheared rock, and fill) are used in the stability analyses (Table 3). Spatial changes in weathering, joint density and persistence will cause variations in rock properties, but the range of that variation can only be estimated at this time.

We performed a back-analysis on both cut and natural slopes to estimate in-place weathered and unweathered rock properties (phi $_{eqv}$ and cohesion $_{eqv}$). We then lowered those strength values to include lower strength rock/joint conditions (called lower bound values). It is likely that the actual rock strength values are closer to or higher than the back-analysis properties. We chose to vary cohesion and keep phi values fixed.

Table 3
Assumed Engineering Material Properties

Material Type	Lower bound Cohesion (C psf)	Back-calculated Cohesion (C psf)	Friction Angle (Phi - ϕ) (degrees)	Unit Weight (pcf)	Analysis Layer Number
Unweathered Greenstone	2000 (C_{eqv})	5000 (C_{eqv})	32 (P_{eqv})	155	1
Weathered Greenstone	1000 (C_{eqv})	3000 (C_{eqv})	28 (P_{eqv})	155	2
Compacted Fill	150	-	31	130	3
Sheared rock	500 (C_{eqv})	1000 (C_{eqv})	38 (P_{eqv})	130	4

COMPACTED FILL - The CGS (2002) seismic hazard zone report listed a regional value of fill (af) as 20 degrees/ 560 to 651 pcf. The CGS values are the mean/median of 27 tests.

A value of 31 degrees/ 150 pcf were used in this report. This value come from triaxial testing of two samples from on-site imported fill (Appendix A). It is likely that this material is similar to the material that will be used to fill the quarry. Additional strength testing of the onsite fill could refine this value. The fill comes from the greater San Jose area. It is typically sandy and has been tested for contaminants. Little to no bay muds are imported. These are low end values. The material was sieved prior to testing to remove larger (> 1/2 inch) material. Having larger sized material in the fill will tend to increase the phi angle (create a BIM like material).

WEATHERED GREENSTONE - The CGS (2002) seismic hazard zone report listed greenstone (fg) strength properties as 28 degrees/ 680 to 565 pcf. The CGS values are the mean/median of 43 tests. It is likely that the majority of these values represent deeply weathered greenstone (10 to 40 feet from the ground surface) instead of mild or moderately unweathered greenstone.

The northern side of the Rattlesnake Canyon is adjacent to the southwest corner of the quarry (Figure 7; Photo 22). The natural slope adjacent to the quarry is about 500 feet high. The top of the slope (1100 to 1225 feet elevation) dips south at 2:1 (~26 degrees). The lower part of the slope (725 to 1100 feet elevation) dips south at 1.5:1 (32 degrees). The bottom of the slope is at about 700 feet elevation. The overall dip is 1.65:1 (31 degrees) south. We walked this slope to confirm the nature of the slope and the topography. The slope cover is soil with occasional rock outcrops, and the dip is relatively planar. We observed a small, shallow landslide at the base of the slope (below 825 feet elevation). This landslide appears to have occurred in soil, not bedrock. It is not visible on the aerial photographs because of tree cover. Aerial photograph evaluation indicates that this area is consistent with the overall slope in this canyon. This slope is thousands of years old and has experienced numerous large earthquakes from the nearby San Andreas fault. We did not observe obvious large landslides on the historic aerial photographs.

We back-calculated the stability of this slope using varying phi and cohesion values to estimate lower bound strength properties of weathered greenstone using static and pseudo-static slope stability analyses. The initiation points and termination limits in the limit equilibrium analysis were set to force the failure surfaces to extend over more than one-half the slope. The resulting factors of safety (FS) are shown in Table 4. These analyses suggest that the cohesion $_{eqv}$ of weathered bedrock would be in the range of 2500 psf to obtain an FS value of 1.5.

Table 4
Static FS for various equivalent phi and cohesion values for cross-section W-W'

	Cohesion $_{eqv}$					
Phi $_{eqv}$	500 psf	1000 psf	1500 psf	2000 psf	2500 psf	3000 psf
28	1.03	1.16	1.24	1.32	-	1.47
30	1.10	1.24	1.33	1.41	1.48	-
32	1.18	1.32	1.42	1.49	1.57	-

To evaluate a lower bound FS for this slope, we completed a pseudo-static back analysis using the static failure surfaces that developed from apparent phi and cohesion values of 28 degrees / 3000 psf and 32 degrees / 2000 psf. Using a horizontal acceleration of 0.2 g, the cohesion $_{eqv}$ was increased until an FS of 1.15 was obtained. For a 28 degree phi $_{eqv}$, the back-calculated cohesion $_{eqv}$ was 4000 psf. For a 32 degree phi $_{eqv}$, the back-calculated cohesion $_{eqv}$ was 3000 psf.

The weathered greenstone layer in cross-sections A-A' and B-B' was evaluated with a phi $_{eqv}$ of 28 degrees and a cohesion $_{eqv}$ of 3000 psf (high strength value) as well as with a phi $_{eqv}$ of 28 degrees and cohesion $_{eqv}$ of 1000 psf (low strength value).

UNWEATHERED GREENSTONE - The CGS (2002) seismic hazard zone report listed greenstone (fg) strength properties as 28 degrees/ 680 to 565 pcf. It is likely that these values represent weathered greenstone, not unweathered values (100 feet or more below the ground surface).

Cross-section Z-Z' is a current cut slope located at the north end of the quarry where the more competent greenstone is located. This area is less fractured than other parts of the quarry. Table 5 shows the results of the static back analyses for this cross-section.

Table 5
Static FS for various equivalent phi and cohesion values for cross-section Z-Z'

	Cohesion $_{eqv}$				
Phi $_{eqv}$	2000 psf	3000 psf	4000 psf	5000 psf	6000 psf
32	0.98	1.21	1.27	1.41	1.53
35	1.05	1.21	1.35	1.49	1.62

The static analysis assumes minimal jointing and a high cohesion value can be assumed. An overlying weathered rock layer was included in the cross-section. The strength of the weathered rock had little effect on the overall FS of the slope. If the weathered zone was set to unweathered rock properties (at phi $_{eqv}$ of 32 degrees and a cohesion $_{eqv}$ of 5000), the FS increased from 1.41 to 1.46.

The unweathered greenstone layer in cross-sections A-A' and B-B' was evaluated with a phi $_{eqv}$ of 32 degrees and a cohesion $_{eqv}$ of 5000 psf (high strength value) and with a phi $_{eqv}$ of 32 degrees and a cohesion $_{eqv}$ of 2000 psf (low strength value).

RESULTS

The results of our slope stability analyses are listed below. The GSTABL7 computer outputs are included in Appendix B. The slope configurations, material properties, and critical failure surfaces determined for these cross-section locations are shown on the computer output figures. We assumed total stress conditions and that groundwater levels were below the base of potential failure surfaces. Quarry fill consists of two layers. A wedge buttress fill placed against the cut slopes and a flat fill (up to 150 feet thick) placed in the middle of the quarry. The two fills will be referred to as the wedge fill and the flat fill, respectively.

Cross-section A-A', west

Cross-section A-A' west trends east-west across the southern end of the west face of the quarry (Figure 7; Photo 22). A series of slope stability analyses was done with varying rock and weathered rock cohesion values to evaluate overall slope stability (Table 3). The results are summarized in Table 6. On this section, the wedge fill extends to 1050 feet elevation, and the fill layer is 150 feet thick.

Table 6
FS values for cross-section A-A' west. Cohesion $_{eqv}$ in psf.

Analysis Type	Section Evaluated	Unweathered rock		Weathered Rock		FS	Newmark Displacment
		P_{eqv}	C_{eqv}	P_{eqv}	C_{eqv}		
Static	Full Slope	32	5000	28	3000	1.76	-
Static	Full Slope	32	2000	28	1000	1.42	-
Static	Rock only	32	5000	28	3000	2.55	-
Static	Rock only	32	2000	28	1000	1.73	-
Static	Fill only	31 (fill)	150/250	-	-	1.39 / 1.47	-
Pseudo-Static	Full Slope	32	5000	28	3000	1.22	0.17 ft
Pseudo-Static	Full Slope	32	3000	28	2000	1.11	-
Pseudo-Static	Full Slope	32	2000	28	1000	0.97	0.54 ft

Full Slope Analysis – The initiation points and termination limits in the limit equilibrium analysis were set to force the failure surfaces to start at the upper part of the slope and daylight in the vicinity of the toe of the fill slope. Both high and low rock properties were evaluated.

Rock Only Analysis - The initiation points and termination limits in the limit equilibrium analysis were set to force the failure surfaces to start at the upper part of the slope and daylight in the vicinity of the top of the fill slope. The failure surface would be in rock only. Both high and low rock properties were evaluated.

Fill Only Analysis - The initiation points and termination limits in the limit equilibrium analysis were set to force the failure surfaces to start at the top of the fill and daylight in the vicinity of the toe of the fill slope.

The variation in cohesion $_{eqv}$ values suggests that the slope will be stable (above 1.3 FS) for a wide range of rock cohesion $_{eqv}$. Rock cohesion $_{eqv}$ has to be at least 3000 psf for the pseudo-static FS to exceed 1.1

A zero fill cohesion value create a shallow, surface failure within the wedge fill.

Cross Section B-B'

Cross-section B-B' trends north-south across the middle of the quarry (Figure 7; Photo 23). The slope in Section B is not as high as the slope in Section A-west. It has a similar layer geometry as section A-A', west, but the ground surface north of the quarry property line drops in elevation. On this section, the wedge fill extends to 950 feet elevation, and the fill layer is 150 feet thick.

Fill stability was not evaluated because fill has the same geometry and material properties as in Section A-A', west and the FS for fill in Section B-B' will be similar to that in Section A-A', west. The results are summarized in Table 7.

Table 7
FS values for cross-section B-B'. Cohesion $_{eqv}$ in psf
Phi $_{eqv}$ held constant. Fill properties held constant.

Analysis Type		Unweathered rock		Weathered Rock		FS	Newmark displacement
		P_{eqv}	C_{eqv}	P_{eqv}	C_{eqv}		
Static	Full Slope	32	5000	28	3000	2.00	-
Static	Full Slope	32	2000	28	1000	1.52	-
Static	Rock only	32	5000	28	3000	2.62	-
Static	Rock only	32	2000	28	1000	1.72	-
Pseudo-Static	Full Slope	32	5000	28	3000	1.40	0.09 ft
Pseudo-Static	Full Slope	32	2000	28	1000	1.05	0.35 ft

The factors of safety for section B-B' are higher than in section A-A' because of the change in the surface geometry along the top of the slope.

Cross Section A-A', east

Cross-section A-A', east trends east-west across the east side of the quarry at the south end of the eastern face (Figure 7; Photo 24). The flat fill will extend above unweathered rock and only weathered rock will be exposed. The nature of the weathered rock in this area indicated that lower cohesion values should be used in the evaluation. The results are summarized in Table 7.

Table 7
FS values for cross-section A-A', east. Cohesion $_{eqv}$ in psf
Phi $_{eqv}$ held constant. Fill properties held constant.

Conditions	FS
Static; moderate failure, Rock C_{eqv} =1500, Weath. Rock C_{eqv} =450	1..6 to 1.9
Static; shallow failure, Rock C_{eqv} =1500, Weath. Rock C_{eqv} = 450	1.51

Very low unweathered rock values were assumed in this analysis, but the failure surfaces did not pass through unweathered rock. The current east face is over steepened (50 to 60 degrees dip) and is marginally stable (FS<1.2). That slope will be reconfigured to a 2:1 slope.

Cross Section E-E'

Cross-section E-E' trends southeast-northwest across the west side of the quarry just south of section A-A', west (Figure 7; Photo 22). The wedge will extends to 1050 feet and no flat fill is planned to be placed against the wedge fill in this area. The fill properties and rock/weathered rock phi values were fixed. The results are summarized in Table 8.

Table 8
FS values for cross-section E-E' west. Cohesion $_{eqv}$ in psf.

Analysis Type		Unweathered rock		Weathered Rock		FS	Newmark Disp.
		P_{eqv}	C_{eqv}	P_{eqv}	C_{eqv}		
Static	Full Slope	32	5000	28	3000	1.61	-
Static	Full Slope	32	2000	28	1000	1.37	-
Static	Rock only	32	5000	28	3000	2.33	-
Static	Rock only	32	2000	28	1000	1.65	-
Static	Wedge Fill only	31	0 150 300	-	-	1.29 1.33 1.40	-
Pseudo-Static	Full Slope	32	5000	28	3000	1.07	0.33 ft
Pseudo-Static	Full Slope	32	1500	28	1000	0.93	0.81 ft
Pseudo-Static	Wedge Fill only	31	150 300	-	-	0.87 0.92	1.1 ft 0.74 ft

CONCLUSIONS

Based on the results of our limited field investigation and mapping, review of the reclamation plan, and static and pseudo-static slope stability analyses, it is our opinion that the planned reclamation configuration will result in permanent slopes which will have acceptable stability for their intended use. The slopes stability analyses indicate that using reasonable lower bound strength values for the various rock and soil types, the static factors of safety exceed 1.3 and some are greater than 1.5. Since the strength values used in the analyses are considered to be representative of lower bound strengths, we believe that the demonstrated level of long-term stability is acceptable. If the long-term intended use of the reclaimed site changes from open space use, it may be warranted to perform additional studies relating to in-situ rock and soil strengths to better define as-constructed factors-of-safety.

Until vegetation is established, it is likely that there will be localized surface unraveling of bare rock slopes. The final rock slopes will be shaped several years prior to placement of the wedge fills. This will provide time for vegetation to become established on the rock slopes.

Operational constraints may be needed to reduce wedge failures along the western slope until fill can be placed.

When fill has been placed, bedrock water levels will rise. We have assumed that groundwater levels will remain below potential failure surfaces. This is based upon the current elevation of seeps in the west and northern walls and the fill being drained.

We do not know the width and extent of the shear zone in the northwest corner of the quarry. The western end is covered and we assumed that it is relatively narrow (less than 150 to 200 feet wide). This should be confirmed during mining. If the shear zone is significantly wider, an additional wedge fill cover (~25 feet thick) may have to be placed on top of this zone. A sample of this material was tested (Appendix A).

The perimeter road along the west and north sides of the quarry will be located on in-place residual soils. We recommend that these soils be removed to a depth of 10 to 20 feet and replaced/recompacted to form an engineered fill/embankment. The actual depth of excavation should be determined in the field. The perimeter road should be located on top of this engineered fill.

LIMITATIONS

These conclusion assume that the material properties of the imported fill that was tested are representative of the fill material that will be placed and that the nature of weathered and unweathered bedrock and the observed orientations of joints and shears on the existing quarry slopes are representative of the actual field conditions on the proposed final cut slopes.

The Public Resources Code (PRC), Title14, Article 9, Section 3704, states that lead regulatory agencies shall require formal slope stability investigations whenever design-slopes approach or exceed *critical gradient.* Critical gradient is defined as the maximum unsupported slope which can be maintained under the most adverse conditions. The term "most adverse conditions" is not a engineering term and it is not defined in the regulations. Our calculations were performed using conservative, reasonable assumptions about adverse natural conditions. The final design slopes are considered not to approach or exceed the critical gradient.

The express purpose of this slope stability investigation is to provide for public safety. The regulations do not require that the final design slopes be brought into compliance with Uniform Building Code (UBC) requirements for engineered slopes.

The analysis, conclusions, and Factors of Safety are not valid for evaluation of working slopes or the final slopes prior to placement of backfill.

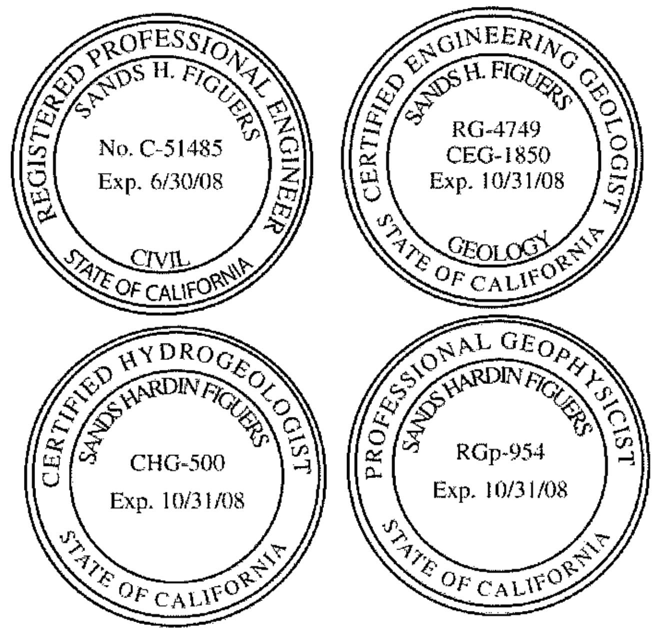
The analysis, conclusions, and Factors of Safety determined in this report are based on the final slope geometries with the backfill in place as shown in Sheet 3 of the Resource Design Technology report (2007). If changes are made to the final slope geometry or backfill depths as described in that report, then the conclusions and recommendations presented in this report should be considered invalid by all parties. We should be allowed to review and prepare written responses to comments to this report or to changes in the final slope geometry. If possible, we will prepare modified recommendations after a review of the proposed changes. Additional field and laboratory testing work may be required for us to develop any modifications to our recommendations.

The opinions and/or recommendations presented in this report could be subject to revision should additional information become available. The timing and location of events reported to us by the owners or their representatives were not independently confirmed.

We have employed generally accepted civil engineering and engineering geology procedures. Our observations, professional opinions and conclusions were made using that degree of care and skill ordinarily exercised, under similar conditions, by civil engineers and engineering geologists practicing in this area at this time. Norfleet consultants expressly denies any third party liability arising from the unauthorized use of this report.

Yours Truly,

S. Figuers



S. Figuers, PhD
NORFLEET CONSULTANTS
Principal Engineering Geologist
Registered Geologist RG-4749
Registered Civil Engineer C51485
Professional Geophysicist GP954
Certified Engineering Geologist EG1850
Certified Hydrogeologist HG500

P. Gregory
Cal Engineering & Geology, Inc.
Principal Geotechnical Engineer
Geotechnical Engineer GE2193
Registered Civil Engineer C40728

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Photo 1: Stevens Creek Quarry, looking southeast. Note: all photographs taken by S. Figures in the fall of 2007.

Photo 2: A dirt road northeast of the quarry, looking north. The red line indicates the approximate location of the Berrocal fault northeast of the Quarry. See Figure 6 for the location. Santa Clara units crop out on the far side of the red line. Franciscan limestones crop out in the road on the near side of the red line. Also see photograph 16.

Photo 3: Looking north along a dirt road at the southeast corner of the quarry. See Figure 6 for the location. Santa Clara units (labeled sc, dipping more than 40 degrees to the east) are on the right side of the road. The Berrocal fault trends semi-parallel to and left (west) of the road. Franciscan float (Fg) is on the left side of the road. See Photograph 25 for location.

Photo 4: Hard (less jointed) greenstone in the core of the north face.

Photo 5: The serpentine shear zone at the northwest corner of the quarry, looking north. Note the wedge-like failure. Picture 4 is at the far right side of this photograph. The cliff at the wedge-like failure is about 40 feet high.

Photo 6: Shearing within the serpentine wedge zone seen in the previous photograph.

Photo 7: In-place residual soils at the top of the north face. In this area, the residual soils are more that 40 feet thick.

Photo 8: The west face. Note the change in color marking the irregular boundary between weathered and unweathered greenstone. The slope on the right is side cast fill. The elevations are approximate.

Photo 9: Franciscan limestones at the northeast corner of the quarry. This outcrop has been mined.

Photo 10: The lower circled area marks a sub-horizontal zone of seeps at the south end of the west face during the summer. The upper circled area marks seeps active during the winter. There were no seep to the right of these zones.

Photo 11: Seeps in the core of the north face (arrows).

Photo 12: A close-up of the right seep shown in the previous photograph. Note the gray clay seam below the water entry point

Photo 13: The north face. The reddish-brown slopes on either side of the center of the face are side-cast fills.

Photo 14: Wedge failures in the lower part of the western face.

Photo 15: An apparent wedge failure in the shear zone in the northwest corner of the quarry. This is, instead, a spalling failure. A narrow zone along a vertical shear plane began to fail. There was then progressive spalling laterally away from the shear. The cliff at the wedge failure is about 40 feet high.

Photo 16: The east face (weathered greenstone). The arrows indicate landslides where machinery has removed the toe of the slope and caused landslides (see photograph 21). The Berrocal fault is semi-parallel to and just on the other (east) side of the power lines.

Photo 17: The west slope looking south. The arrow indicates the approximate location of the western property line.

Photo 18: Wedge failure in the lower part of the western face.

Photo 19: The upper bench in the west face. Note the localized failures. This face is more than 17 years old.

Photo 20: The failure in the middle of the upper bench. This is a progressive spalling failure rather than a wedge failure. Note the small size of the debris. This face is about 40 feet high.

Photo 21: A landslide in the middle of the eastern face. The left arrow in photograph 16 shows its location. The lower arrows in this photograph mark the slide plane of the landslide that has been exposed by machinery as spoil piles were removed.

Photo 22: The approximate locations of cross-sections W-W' and A-A'-west (red lines).

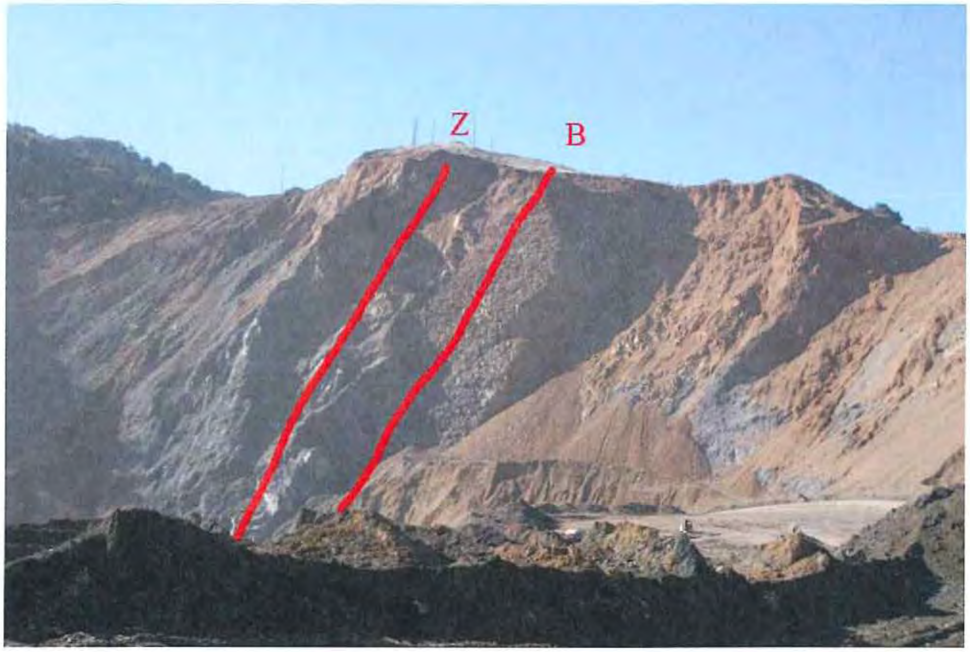
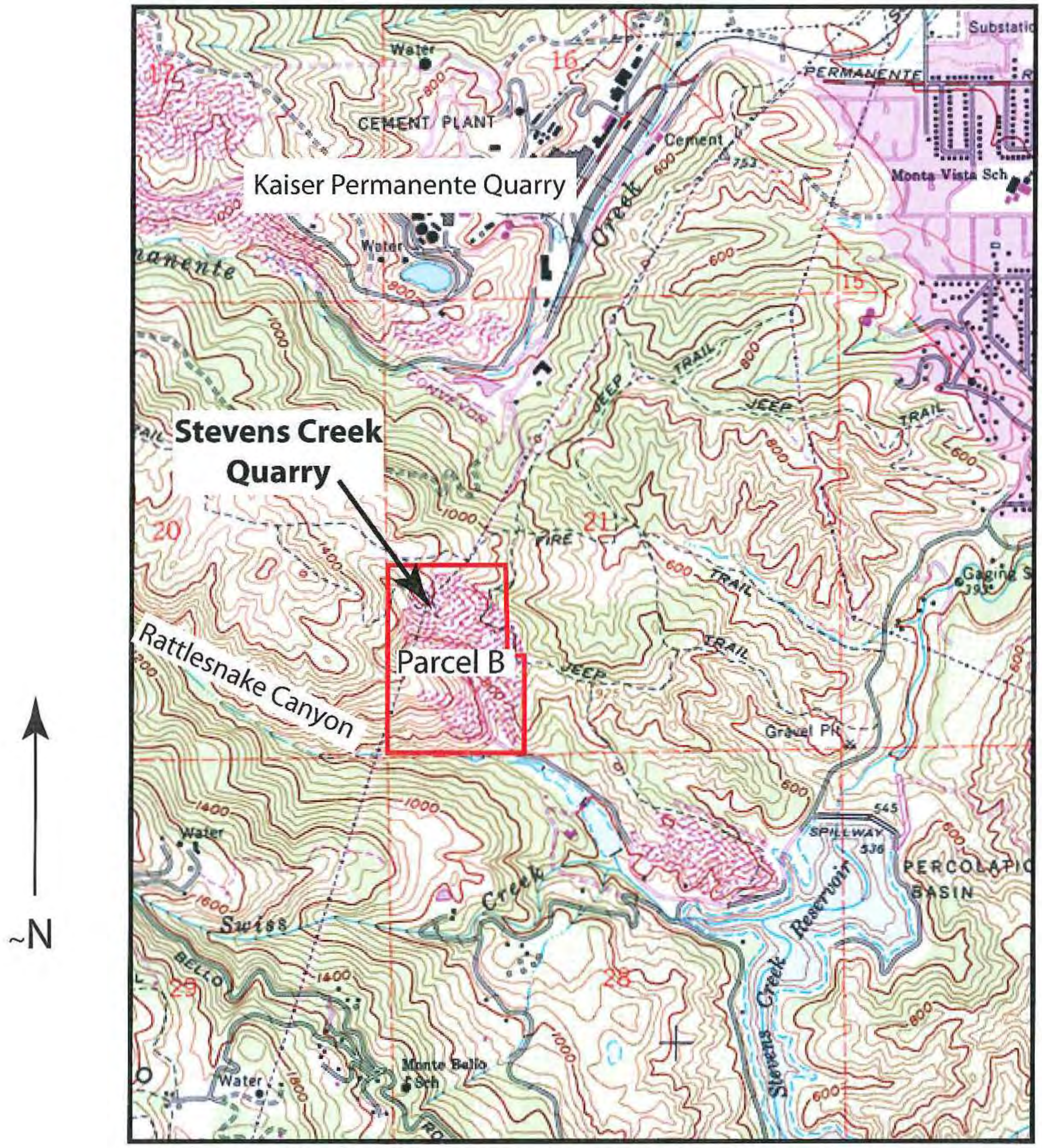


Photo 23: The approximate location of cross-sections Z-Z' and B-B' (red lines).

Photo 24: The approximate location of cross-section A-A'- east (red line).

Photo 25: The approximate location of the Berrocal fault (red line). Looking north across the access road to Parcel B. The arrow indicates the location of Photograph 3 The southeast corner of the quarry is at the upper left side of the photograph.

Photo 26: The red line indicates the approximate location of the Berrocal fault. View is to west on the south side of Rattlesnake canyon. The arrow marks the location of the basal Santa Clara fossil bed mapped by Sorg and McLaughlin (1974).



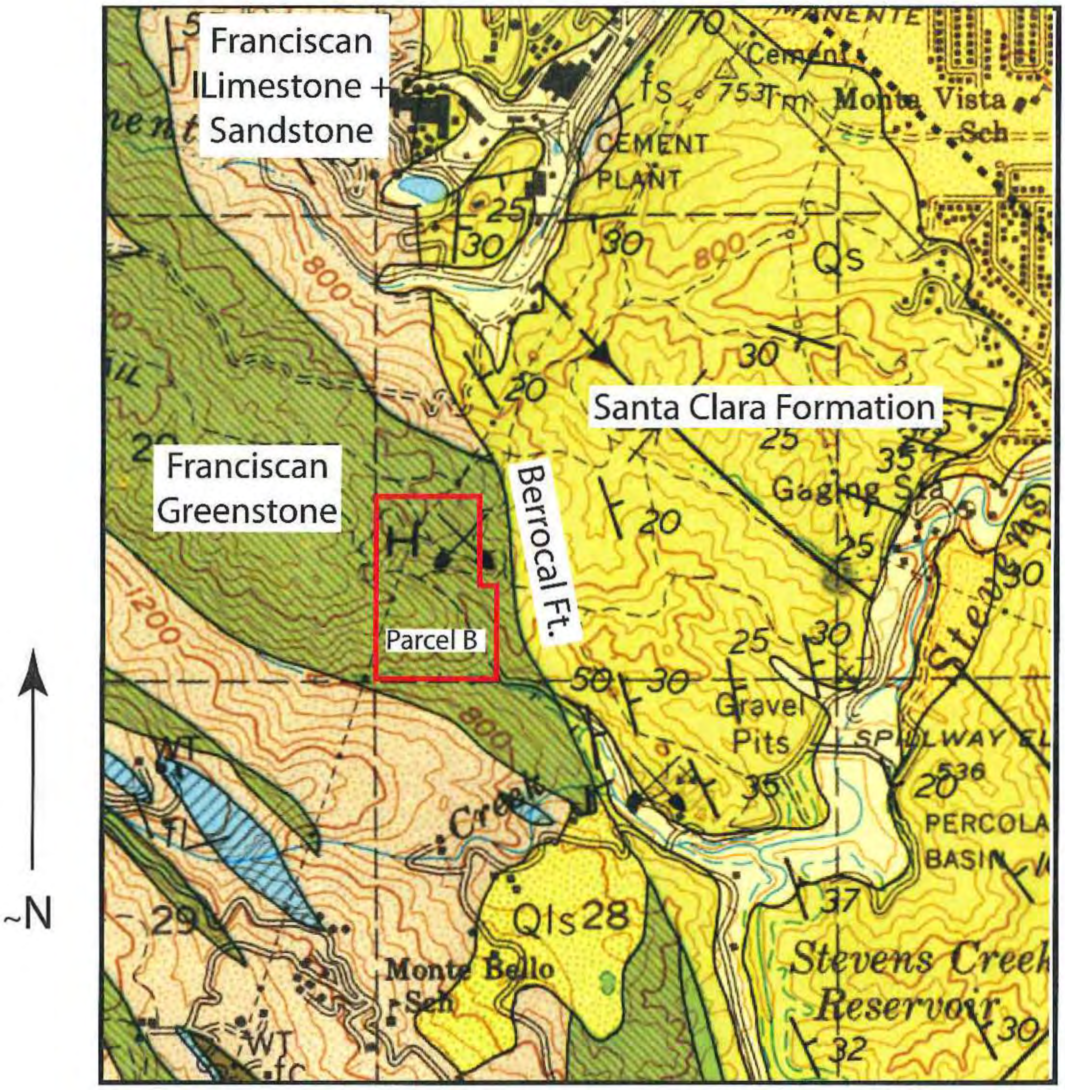
Base is USGS Topographic Map, Cupertino 7-1/2 min. Quad.

The quarry boundary is approximate

The approximate quarry coordinates are 37.2931° and 122.0125°

Red grid on map is 1 mile long.

Norfleet Consultants	Stevens Creek Quarry, Parcel B		
	Location Map		
	PROJ NO: 071781	DATE: Dec. 15, 2007	FIGURE: 1



A portion of Dibblee Jr., T.W.; 1966; Geology of the Palo Alto Quadrangle, Santa Clara and San Mateo Counties, California; California Division of Mines and Geology, Map Sheet 8

The quarry boundary is approximate

Black dashed grid on map is 1 mile long.

Norfleet Consultants	Stevens Creek Quarry, Parcel B		
	Dibblee Map		
	PROJ NO: 071781	DATE: Dec. 15, 2007	FIGURE: 2

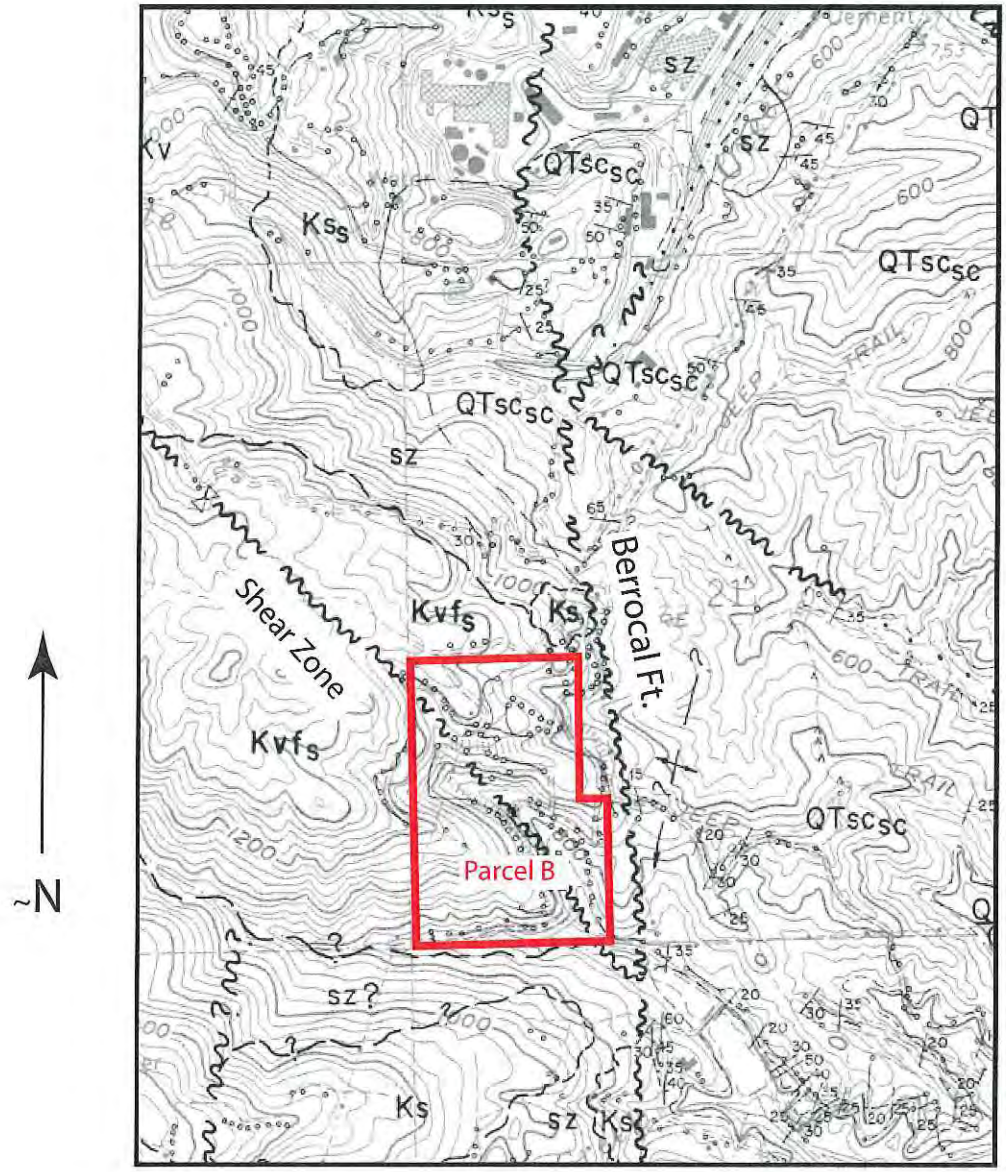
QTsc$_{sc}$ Santa Clara Formation, Stevens Creek Member

Ks$_s$ Franciscan Formation, sheared sandstone

Ks Franciscan Formation, sandstone

Kvf$_s$ Franciscan Formation, sheared fragmental volcanic rocks

sz Shear zone (melange)



A portion of Plate 1 from Rogers, T. and Armstrong, C.; 1973; Environmental Geologic Analysis of the Monte Bello Ridge Mountain Study Area Santa Clara County, California; California Division of Mines and Geology, Preliminary Report 17

The quarry boundary is approximate
Black dashed grid on map is 1 mile long.

Norfleet Consultants	Stevens Creek Quarry, Parcel B		
	Rogers and Armstrong Geologic Map		
	PROJ NO: 071781	DATE: Dec. 15, 2007	FIGURE: 3

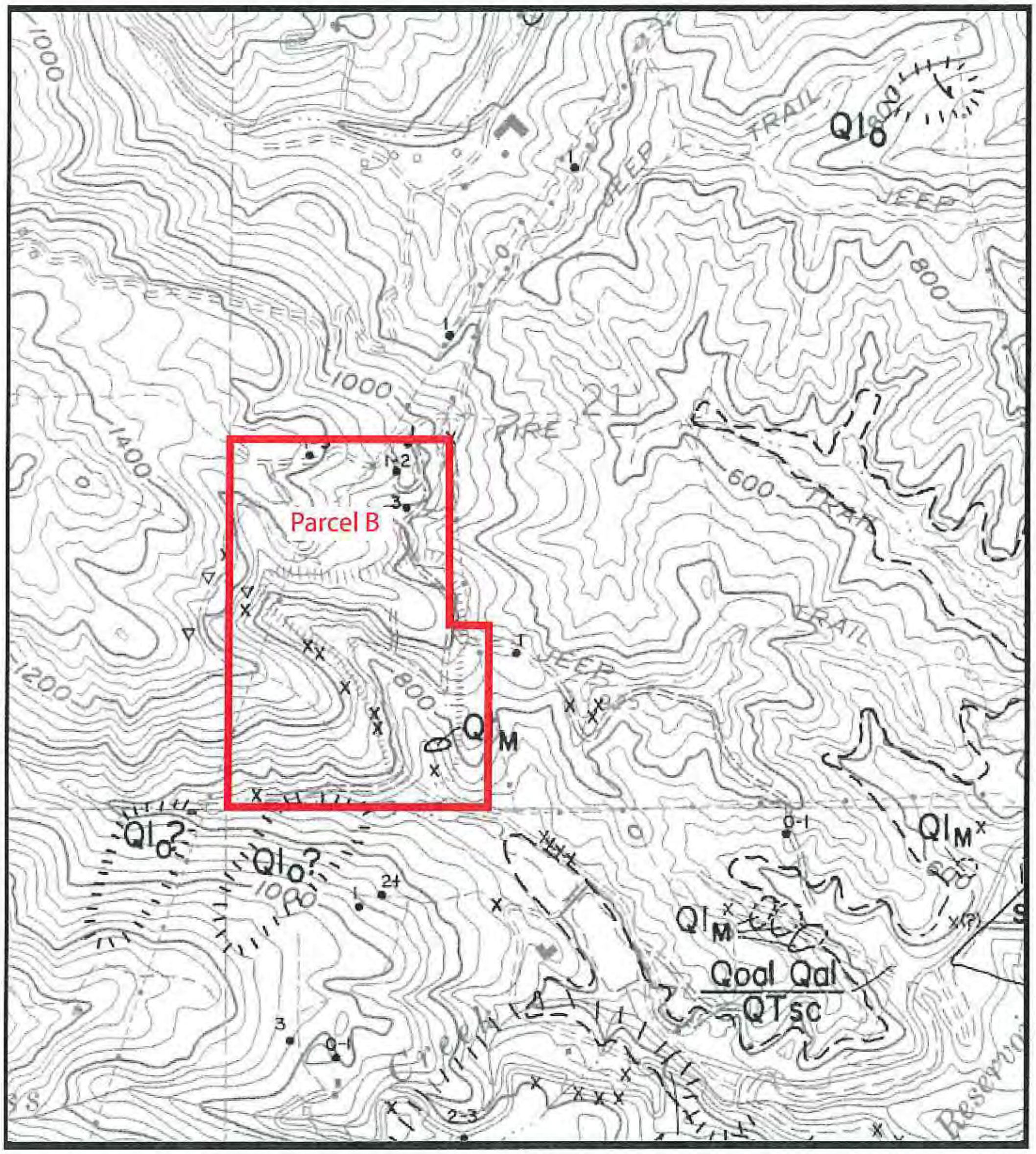
Ql_o Old Landslide

Ql_m Modern Landslide

x Modern Landslide, max. dimension < 100 ft

▽ Colluvium-filled ancient stream channel

●$_{10}$ Thickness of colluvium



A portion of Plate 2 from Rogers, T. and Armstrong, C.; 1973; Environmental Geologic Analysis of the Monte Bello Ridge Mountain Study Area Santa Clara County, California; California Division of Mines and Geology, Preliminary Report 17

The quarry boundary is approximate.

The western quarry property line is about 2700 feet long.

Norfleet Consultants	Stevens Creek Quarry, Parcel B					
	Rogers and Armstrong Landslide Map					
	PROJ NO:	071781	DATE:	Dec. 15, 2007	FIGURE:	4

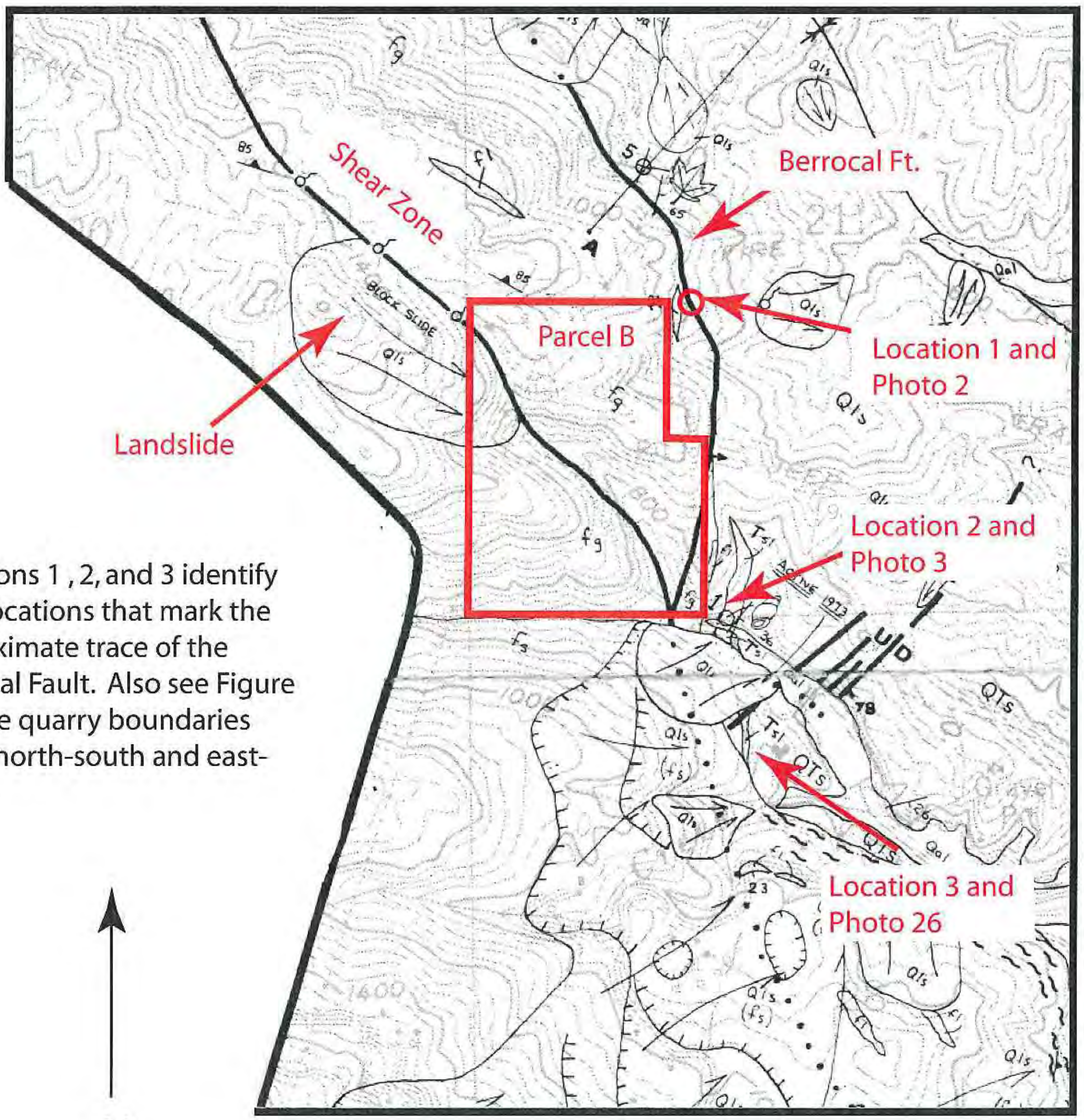
Ql_s Landslide

QT_s Santa Clara Formation

T_{sl} Santa Clara Formation - Lake beds

f_g Franciscan Assemblage - greenstone member

f_l Franciscan Assemblage - Calera limestone member



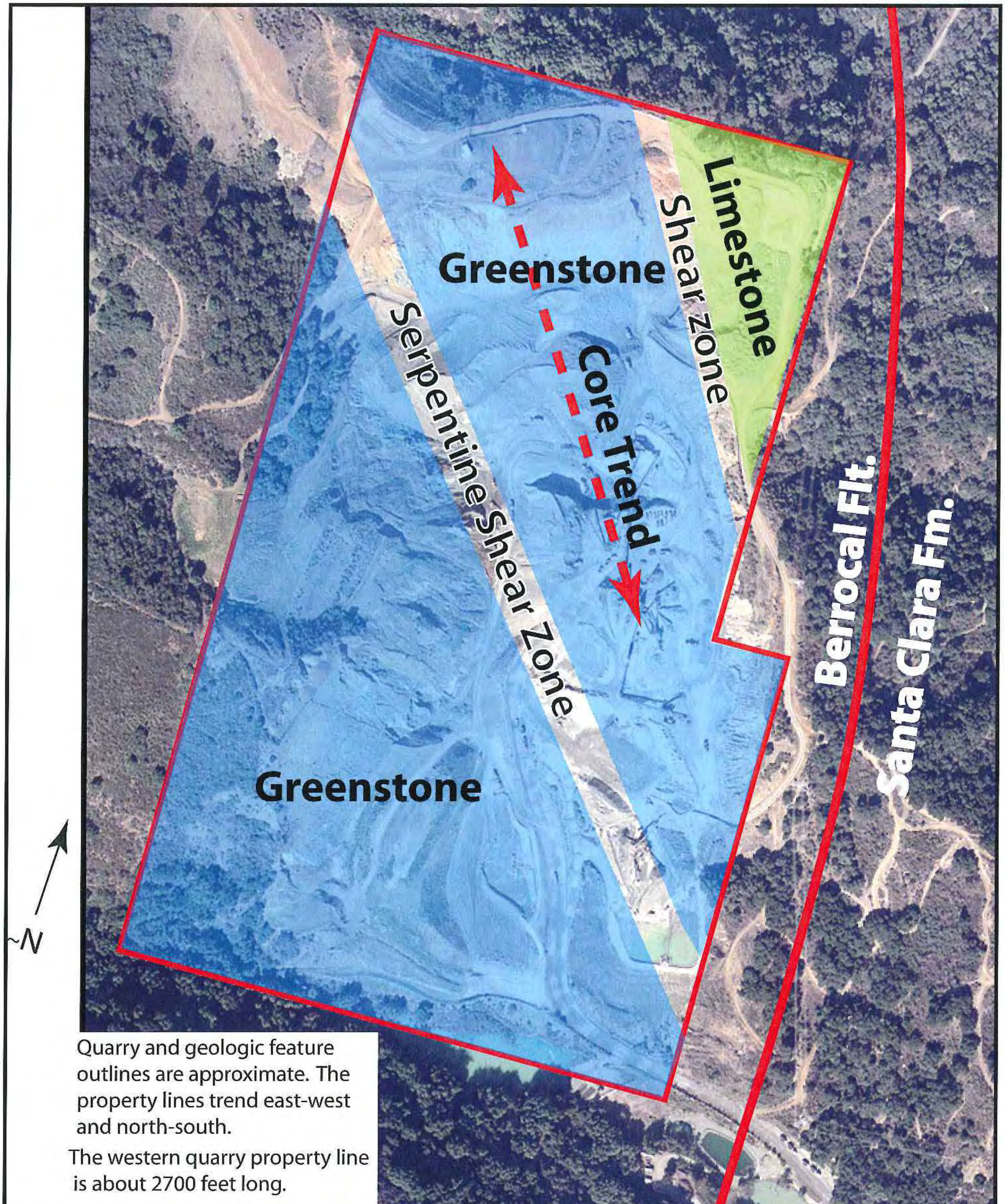
Locations 1 , 2, and 3 identify field locations that mark the approximate trace of the Berrocal Fault. Also see Figure 12. The quarry boundaries trend north-south and east-west.

~N

A portion of Sorg, D. and McLaughlin, R.; 1975; Geologic map of the Sargent-Berrocal Fault Zone between Los Gatos and Los Altos Hills, Santa Clara County, California; USGS MF-643

The western quarry property line is about 2700 feet long. The quarry boundary is approximate.

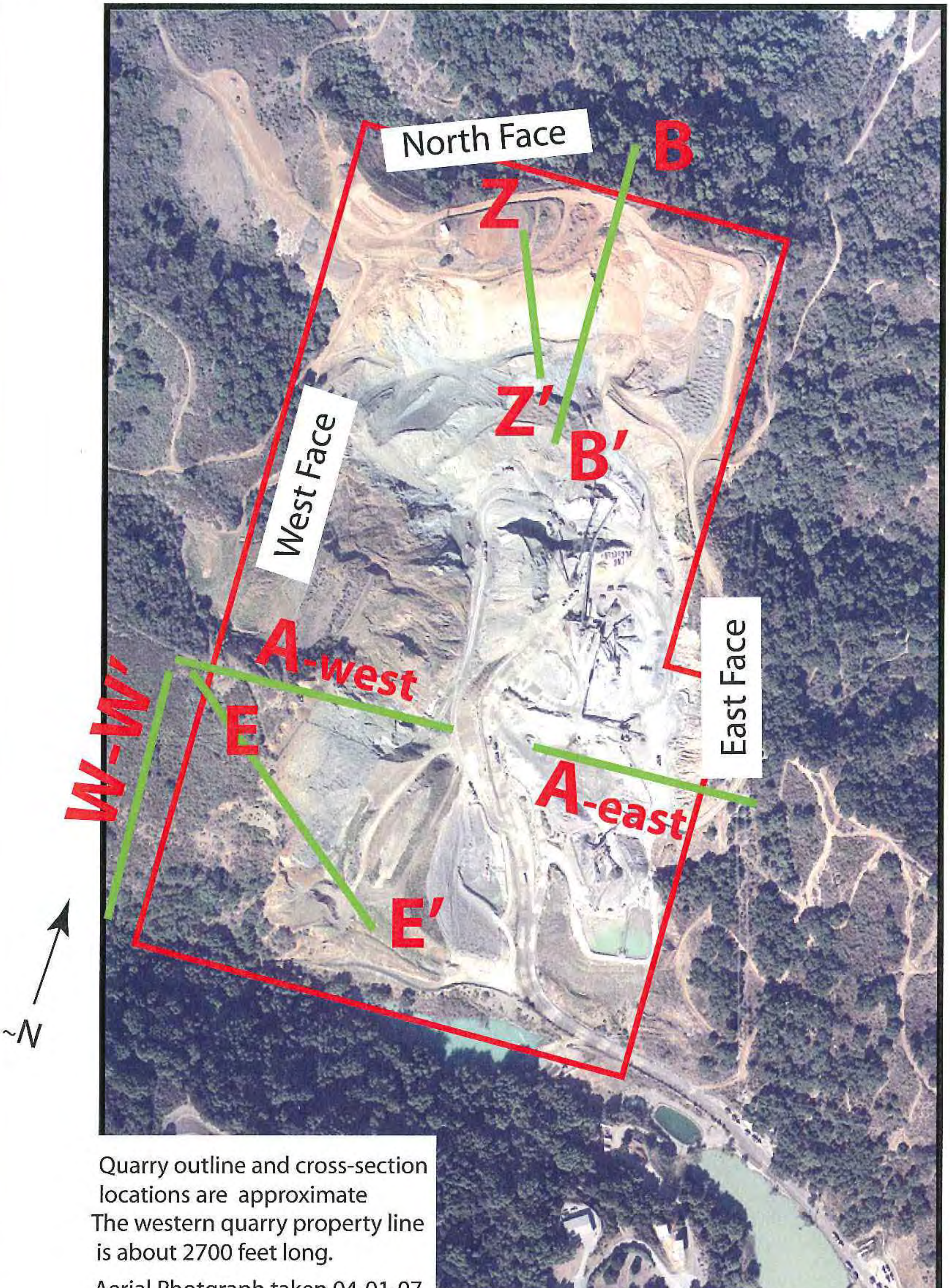
Norfleet Consultants	Stevens Creek Quarry, Parcel B		
	Sorg and McLaughlin Geologic Map		
	PROJ NO: 071781	DATE: Dec. 15, 2007	FIGURE: 5



Quarry and geologic feature outlines are approximate. The property lines trend east-west and north-south.

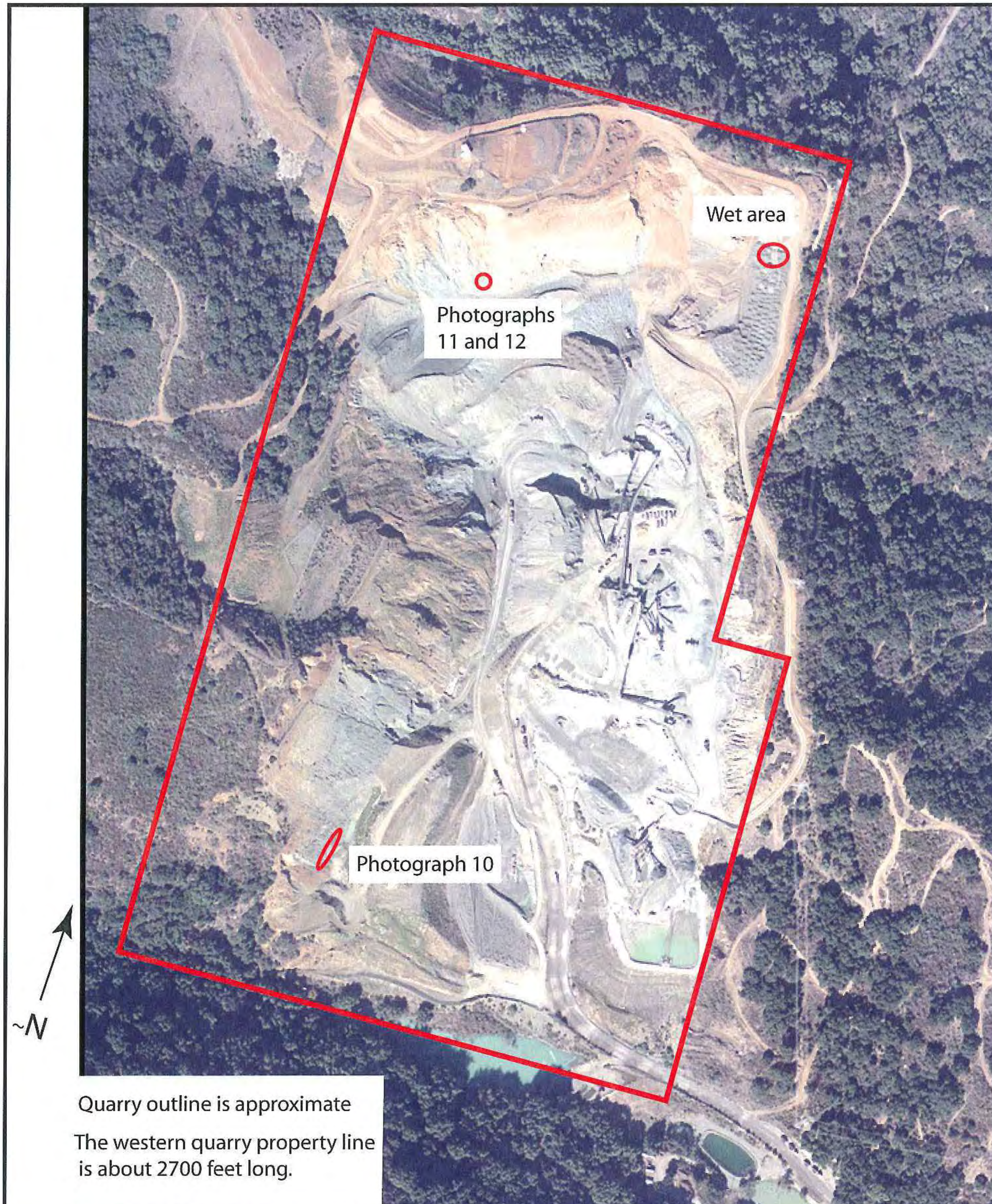
The western quarry property line is about 2700 feet long.

Norfleet Consultants	Stevens Creek Quarry, Parcel B		
	General Geology		
	PROJ NO:071781	DATE: Dec. 15, 2007	FIGURE: 6

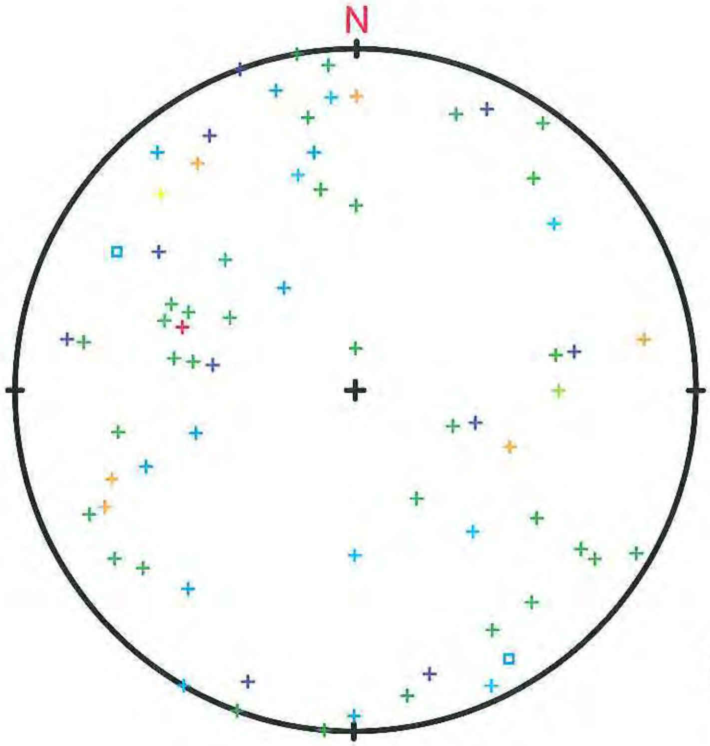


Quarry outline and cross-section locations are approximate
The western quarry property line is about 2700 feet long.
Aerial Photgraph taken 04-01-07

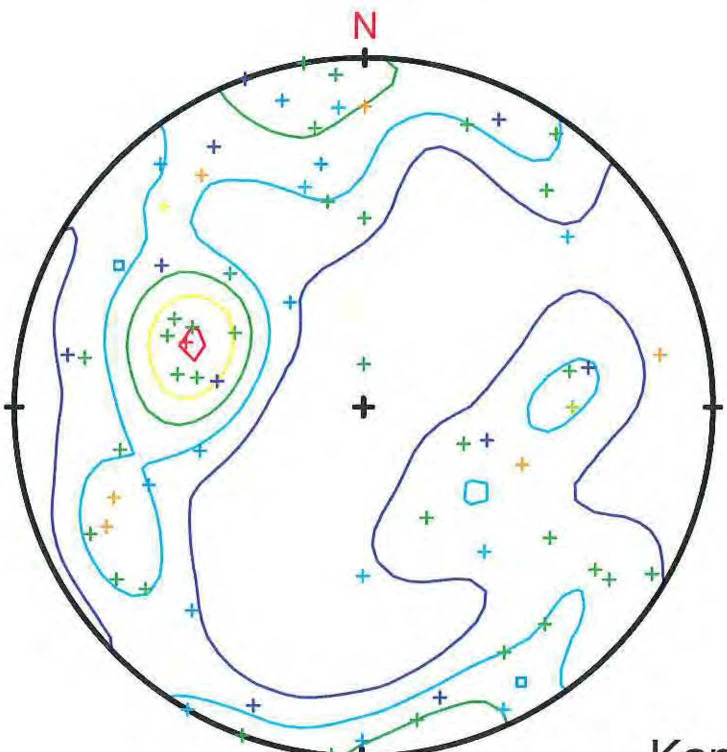
Norfleet Consultants	Stevens Creek Quarry, Parcel B
	Quarry Details
	PROJ NO: 071781 · DATE: Dec. 15, 2007 · FIGURE: 7



Norfleet Consultants	Stevens Creek Quarry, Parcel B		
	Seepage Areas		
	PROJ NO: 071781	DATE: Dec. 15, 2007	FIGURE: 8



Pole Plot

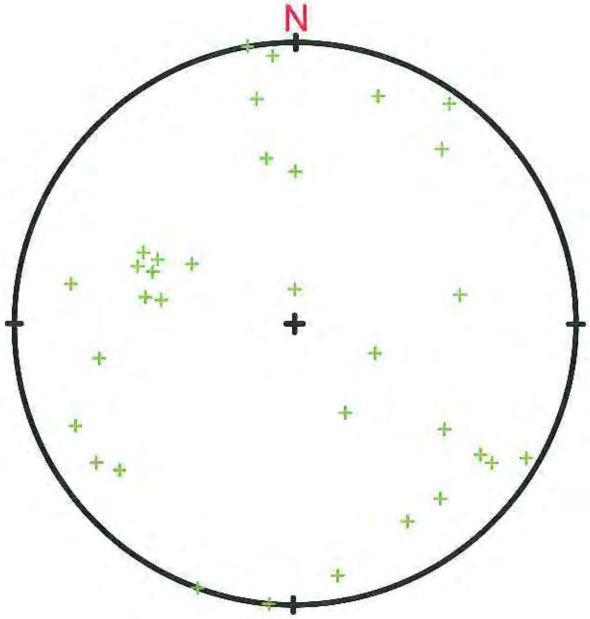


Kamb Contour Plot

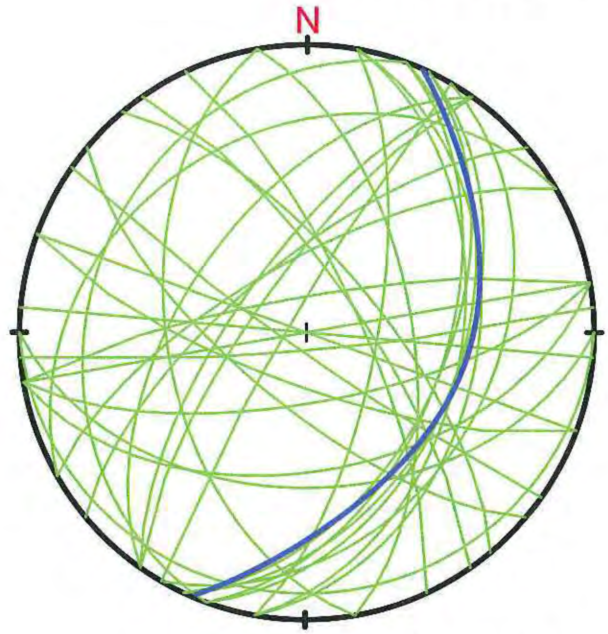
73 Data Points
Equal Area, Lower Hemisphere Plot

Norfleet Consultants	Stevens Creek Quarry				
	Stereonet Plot of all Joint/Shear Data				
	PROJ NO: 071781	DATE: Dec. 15, 2007		FIGURE: 9	

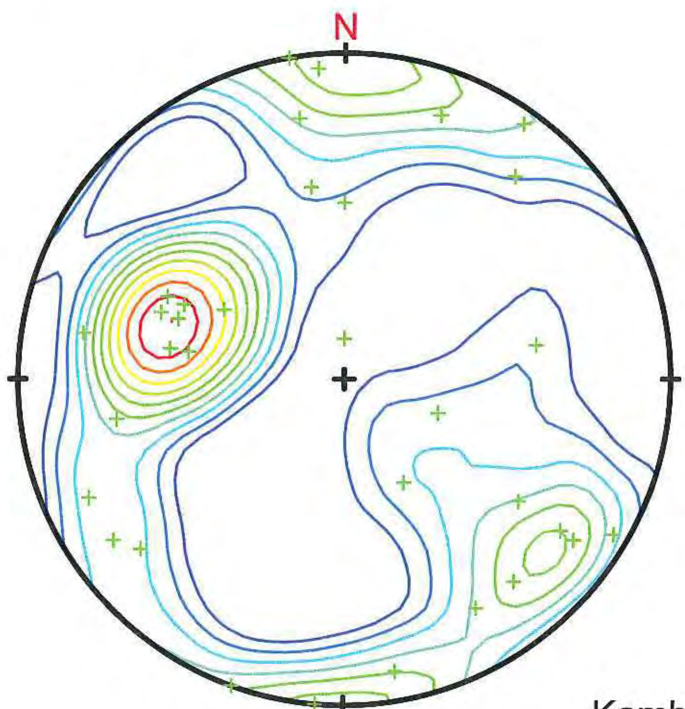
The blue line is the trend of the west face



Pole Plot



Plane Plot



Kamb Contour Plot

35 Data Points
Equal Area, Lower Hemisphere Plot

Norfleet Consultants	Stevens Creek Quarry		
	Stereonet Plot of Joint/Shear Data in West Face		
	PROJ NO: 071781	DATE: Dec. 15, 2007	FIGURE: 10

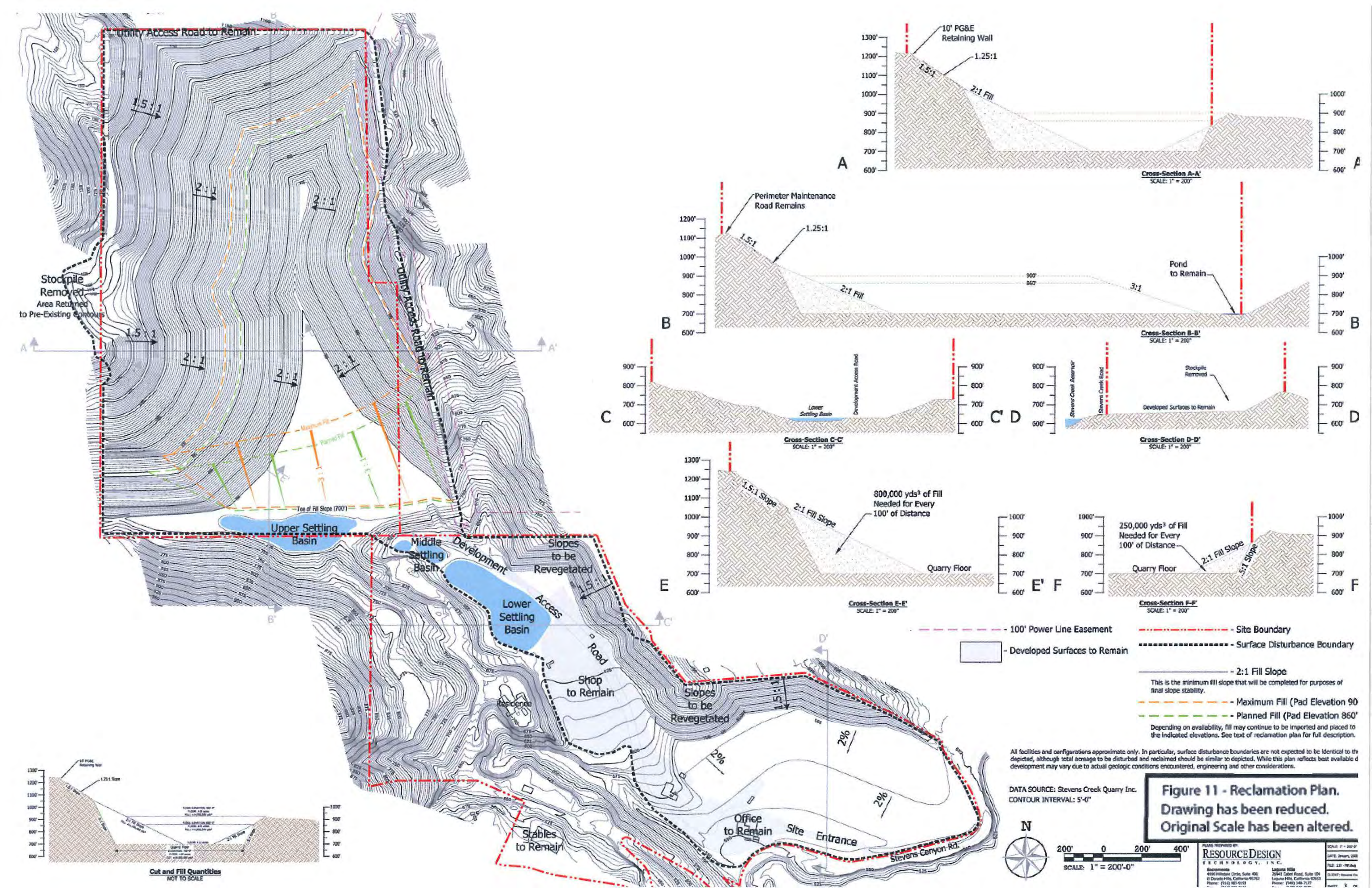
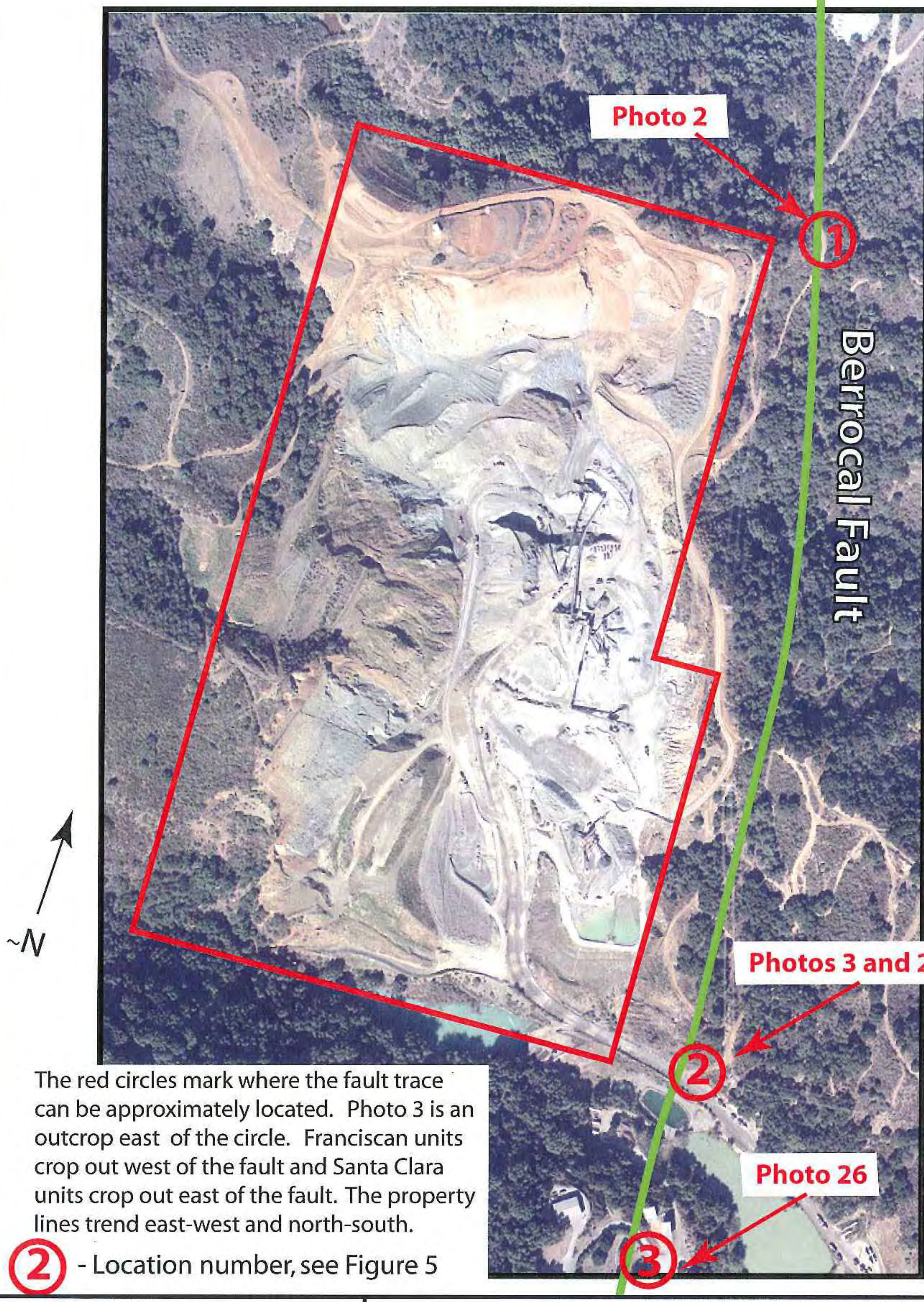


Figure 11 - Reclamation Plan. Drawing has been reduced. Original Scale has been altered.



The red circles mark where the fault trace can be approximately located. Photo 3 is an outcrop east of the circle. Franciscan units crop out west of the fault and Santa Clara units crop out east of the fault. The property lines trend east-west and north-south.

2 - Location number, see Figure 5

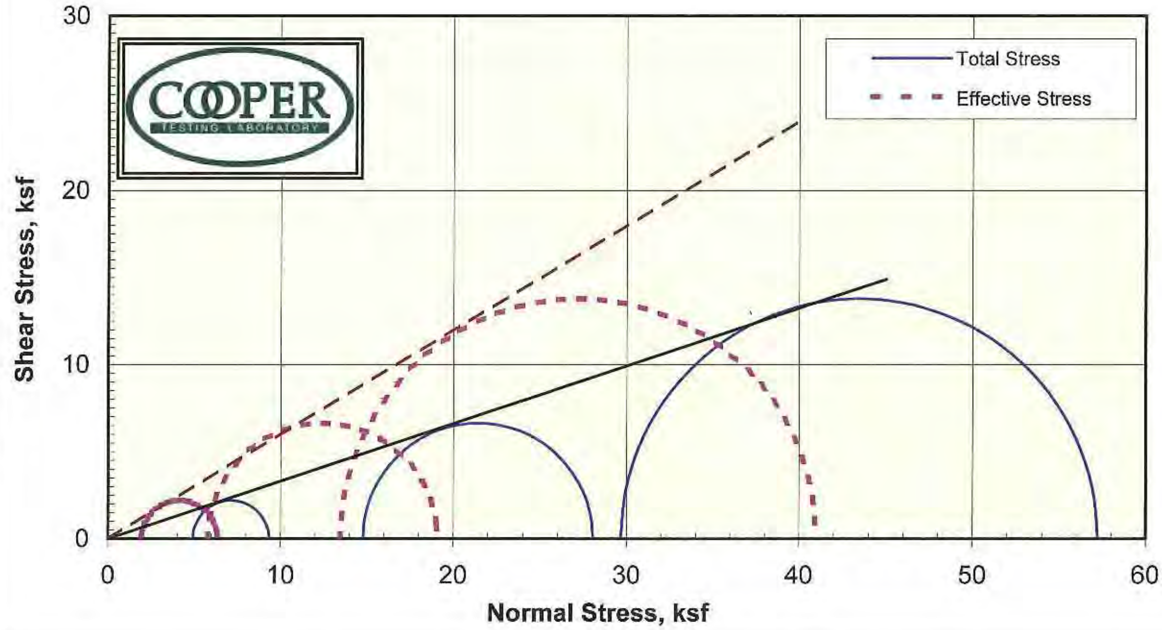
Norfleet Consultants	Stevens Creek Quarry, Parcel B		
	Berrocal Fault		
	PROJ NO:071781	DATE: Dec. 15, 2007	FIGURE: 12

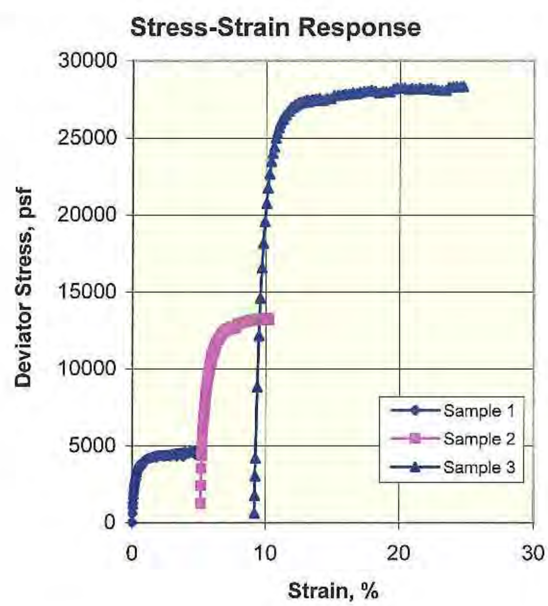
APPENDIX A

Soil tests.

Two samples of imported material (Import #1 [Figure 13] and Import #2 [Figure 14]), and one sample of the shear zone material (Shear [Figure 15]) from the northwest corner of the quarry were triaxially tested. All the tests were triaxial consolidated undrained with pore pressure (ASTM D-4767). The tests were modified in that they were staged tests. Import 2 was tested with a 3 inch ring (the sample contained ½ inch sized material). The Import 1 and Shear samples were tested with a 2.5 inch diameter ring (minus ½ inch sized material). The removal of plus ½ inch material means that the material properties are likely lower than the actual values.

The Imported samples were taken from a stock pile just north of the quarry offices. The Shear sample was taken from a fresh rock face at the northwest corner of the quarry (Photo 15). That location was at about elevation 850 feet, about 200 feet below the original ground surface.





Stage	1	2	3
MC, %	12.5		
Dry Dens., pcf.	115.0		
Sat. %	72.5		
Void Ratio	0.466		
Diameter in	2.38		
Height, in	5.00		
		Final	
MC, %	15.7	13.8	12.4
Dry Dens., pcf.	118.0	122.5	125.8
Sat. %	100.0	100.0	100.0
Void Ratio	0.425	0.372	0.336
Diameter, in	2.36	2.36	2.37
Height, in	4.94	4.76	4.58
Cell, psi	94.7	164.2	268.3
BP, psi	60.6	61.6	62.2
		Effective Stresses At:	
Strain, %	5.0	5.0	5.0
Deviator ksf	4.434	13.292	27.575
Excess PP	2.993	8.978	16.238
Sigma 1	6.355	19.086	41.013
Sigma 3	1.921	5.794	13.438
P, ksf	4.138	12.440	27.225
Q, ksf	2.217	6.646	13.787
Stress Ratio	3.308	3.294	3.052
Rate in/min	0.001	0.001	0.001

Total C	0	Effective C	0.0
Total Phi	18.3	Effective Phi	31.0

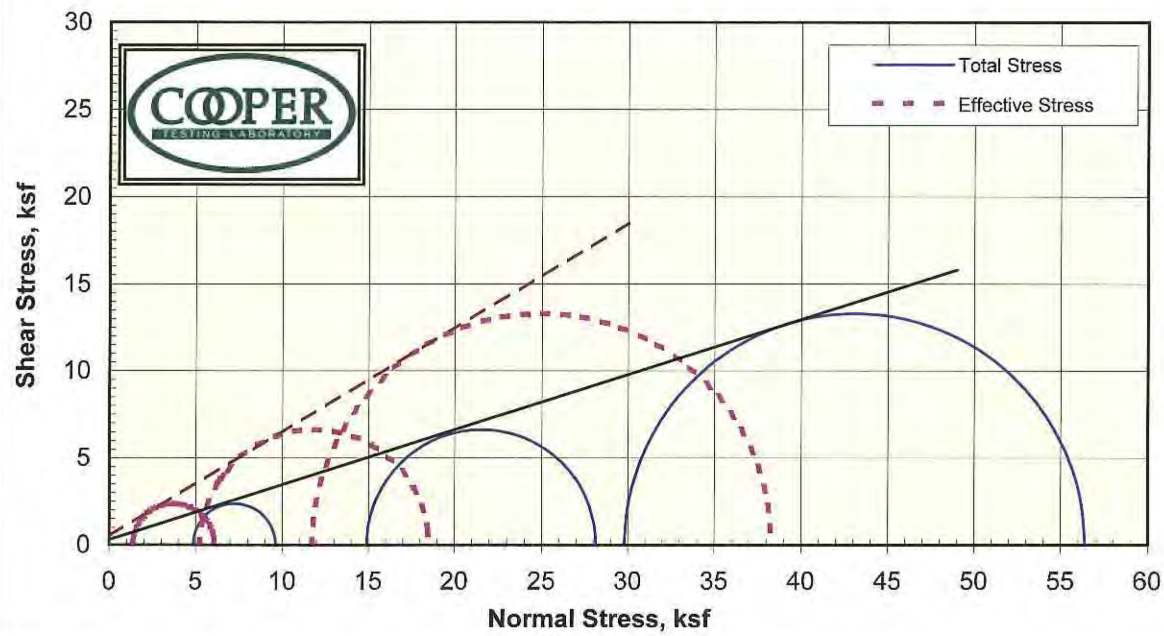
Job No.: 471-021 **Date:** 1/10/2008

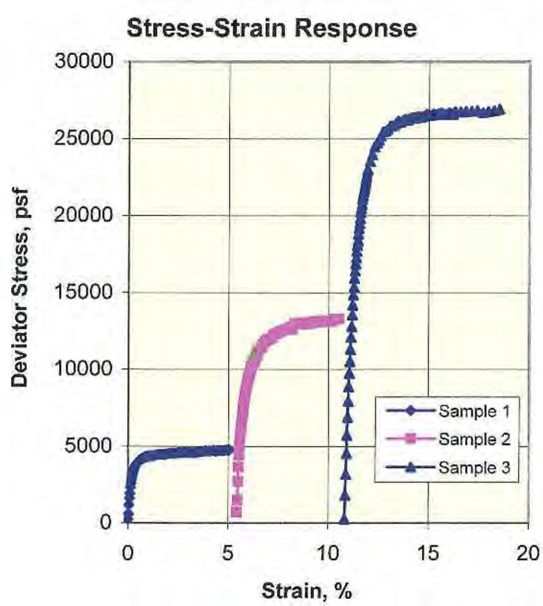
Client: Cal Engineering & Geolog) BY:DC

Project: Stevens Creek Quarry - 071210

Sample: Import #1 Brown Sandy CLAY w/ Gravel

Remarks: ** Staged Test ** Strengths at 5% strain. Remolding Target: 90% of 128.1 @ 12.5 (OP +2). This sample was taken from the processed imported material stock pile just north of the Qarry office (Parcel A).





Stage	1	2	3
MC, %	12.3		
Dry Dens., pcf.	119.0		
Sat. %	79.9		
Void Ratio	0.416		
Diameter in	2.88		
Height, in	6.00		
	Final		
MC, %	14.8	13.1	11.8
Dry Dens., pcf.	123.1	127.2	130.8
Sat. %	100.0	100.0	100.0
Void Ratio	0.399	0.354	0.318
Diameter, in	2.85	2.86	2.89
Height, in	5.91	5.69	5.41
Cell, psi	94.7	164.2	268.3
BP, psi	60.9	60.7	61.3
	Effective Stresses At:		
Strain, %	5.0	5.0	5.0
Deviator ksf	4.755	13.255	26.585
Excess PP	3.519	9.664	18.081
Sigma 1	6.109	18.496	38.310
Sigma 3	1.354	5.241	11.725
P, ksf	3.731	11.868	25.017
Q, ksf	2.378	6.627	13.292
Stress Ratio	4.513	3.529	3.267
Rate in/min	0.001	0.001	0.001

Total C	0.3	Effective C	0.5
Total Phi	17.6	Effective Phi	31.0

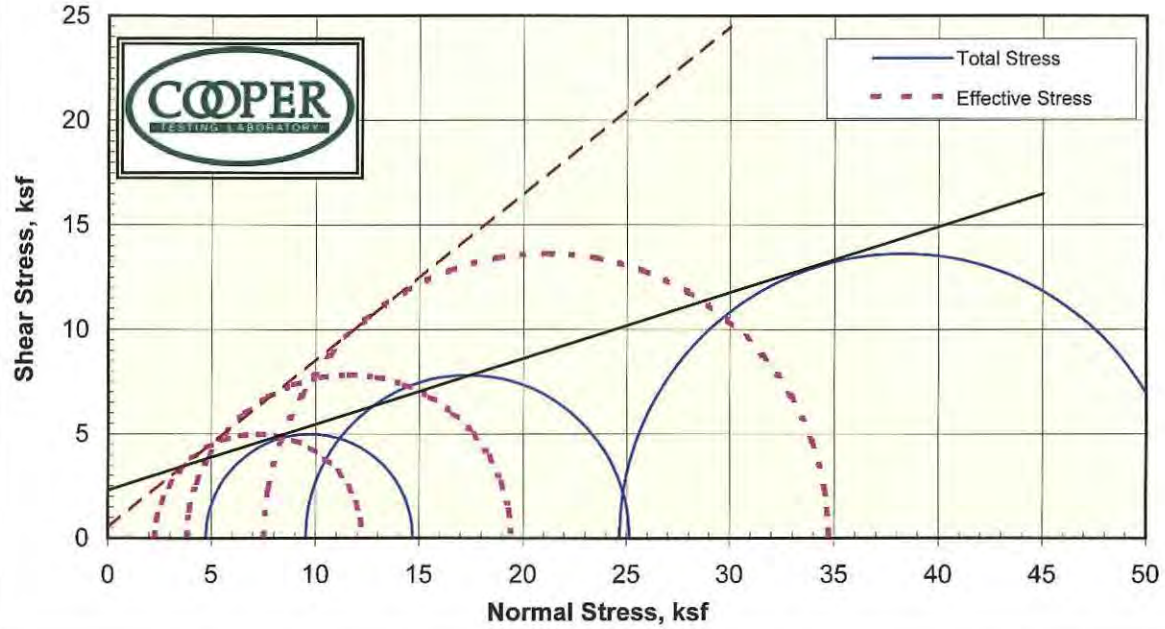
Job No.: 471-021 **Date:** 1/10/2008

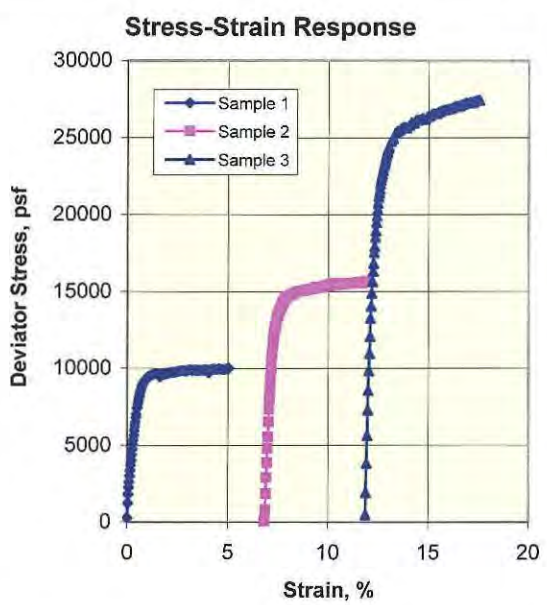
Client: Cal Engineering & Geolog) BY:DC

Project: Stevens Creek Quarry - 071210

Sample: Import #2 Brown Clayey SAND w/ Gravel

Remarks: ** Staged Test ** Strengths at 5% strain. Remolding Target: 90% of 132 @ 12.3 (OPT +2). This sample was taken from the processed imported material stock pile just north of the Qarry office (Parcel A).





Stage	1	2	3
MC, %	10.3		
Dry Dens., pcf.	125.1		
Sat. %	80.1		
Void Ratio	0.347		
Diameter in	2.38		
Height, in	5.00		
	Final		
MC, %	13.6	13.3	12.0
Dry Dens., pcf.	126.1	127.1	130.3
Sat. %	100.0	100.0	100.0
Void Ratio	0.368	0.358	0.325
Diameter, in	2.38	2.44	2.46
Height, in	4.96	4.68	4.47
Cell, psi	114.7	149.4	253.6
BP, psi	81.8	83.2	82.4
	Effective Stresses At:		
Strain, %	5.0	5.0	5.0
Deviator ksf	9.977	15.619	27.258
Excess PP	2.463	5.719	17.152
Sigma 1	12.246	19.436	34.754
Sigma 3	2.270	3.817	7.496
P, ksf	7.258	11.627	21.125
Q, ksf	4.988	7.810	13.629
Stress Ratio	5.396	5.092	4.636
Rate in/min	0.001	0.001	0.001

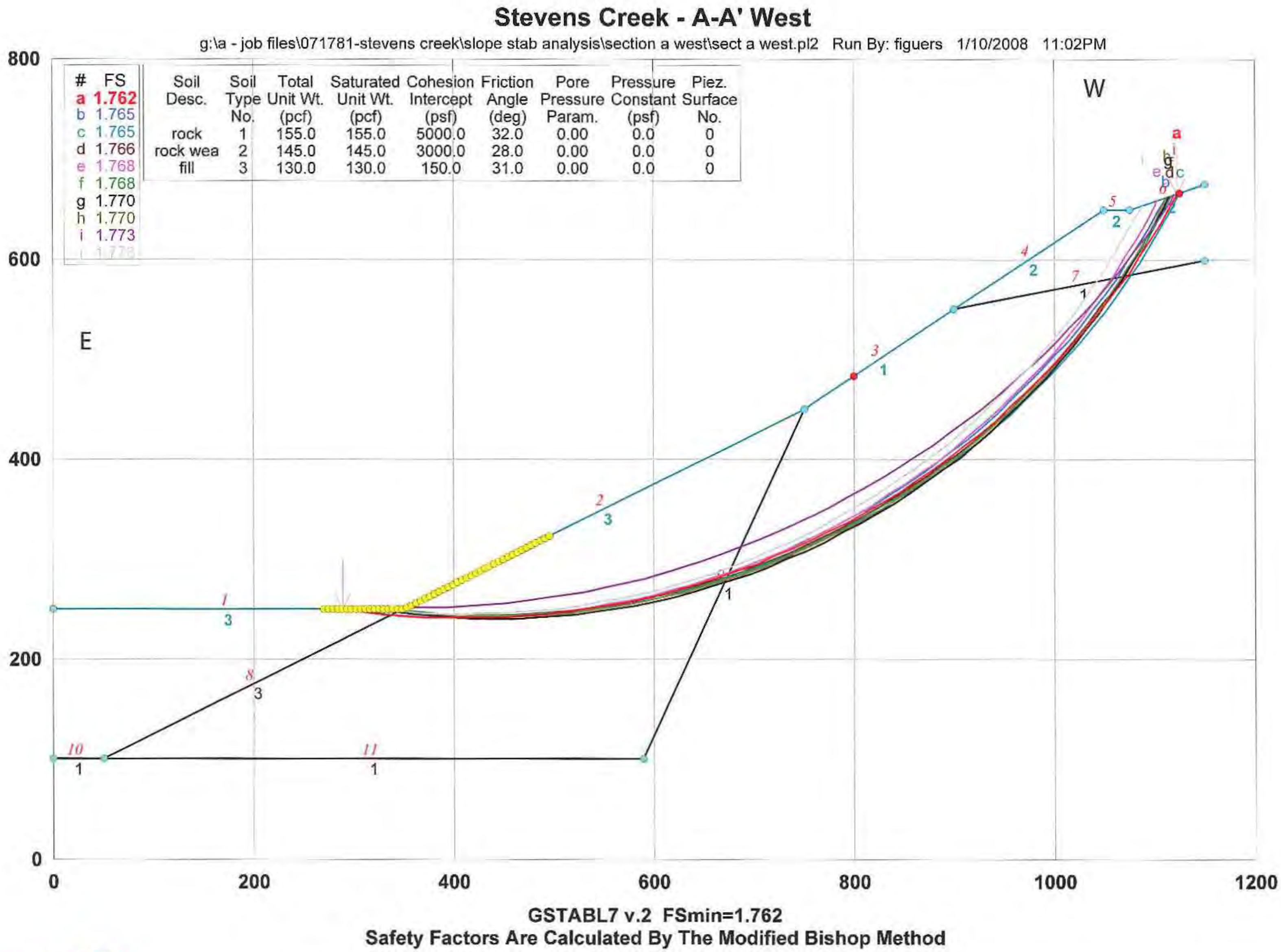
Total C	2.3	Effective C	0.5
Total Phi	17.5	Effective Phi	38.7

Job No.: 471-021 **Date:** 1/10/2008
Client: Cal Engineering & Geolog) BY:DC
Project: Stevens Creek Quarry - 071210
Sample: Shear Gray GRAVEL w/ Clay & Sand

Remarks: ** Staged Test ** Strengths at 5% strain.
Remolding Target: 90% of 139.3 pcf @ 10.3 (OPT+2). This sample was taken from the shear zone at the NW corner of the Quarry (at elev ~850 ft).

APPENDIX B

Representative copies of slope stability diagrams are included in this appendix.

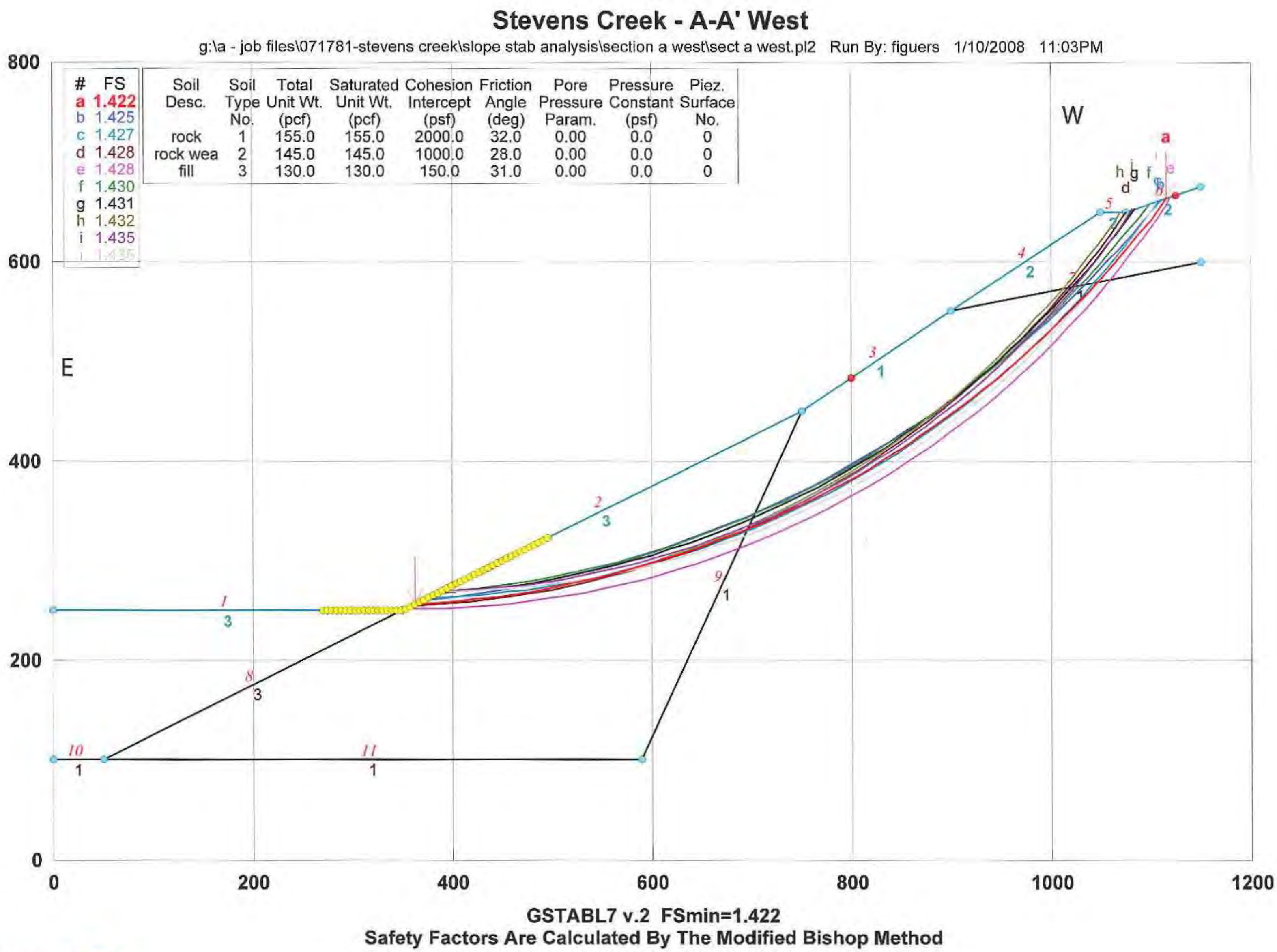


GSTABL7

Add 600 ft to vertical scale for actual elevations.

Norfleet Consultants

Limit Equlibrum Analysis - Stevens Creek Quarry	
Static analysis, High rk strength, Full failure only, Cross-sect A-A -west'	
PROJ NO: 071781	DATE: Jan 10, 2008	FIGURE: 16



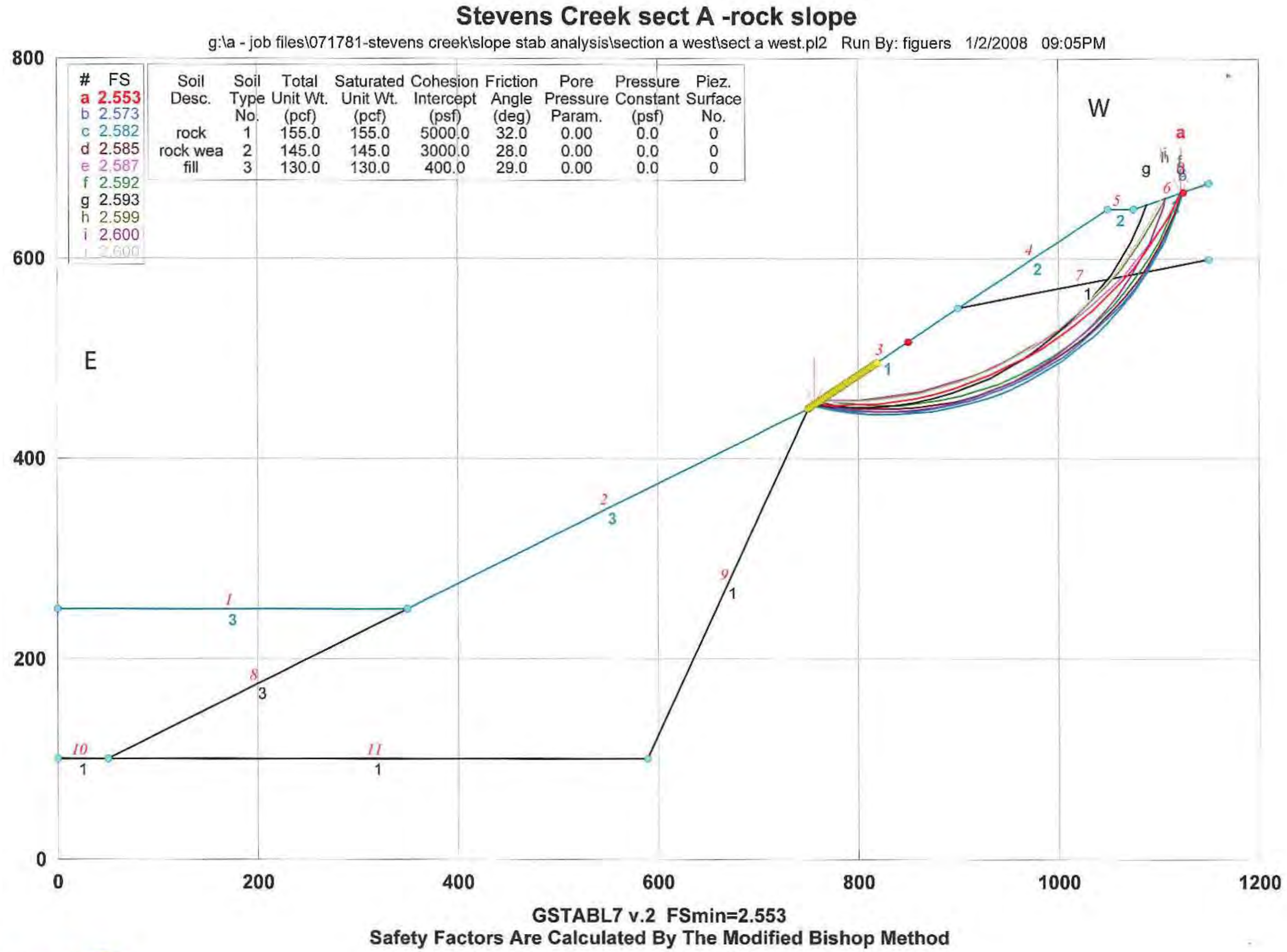
Add 600 ft to vertical scale for actual elevations.

Norfleet Consultants

Limit Equlibrum Analysis - Stevens Creek Quarry

Static analysis, Low rk strength, Full failure only, Cross-sect A-A -west'

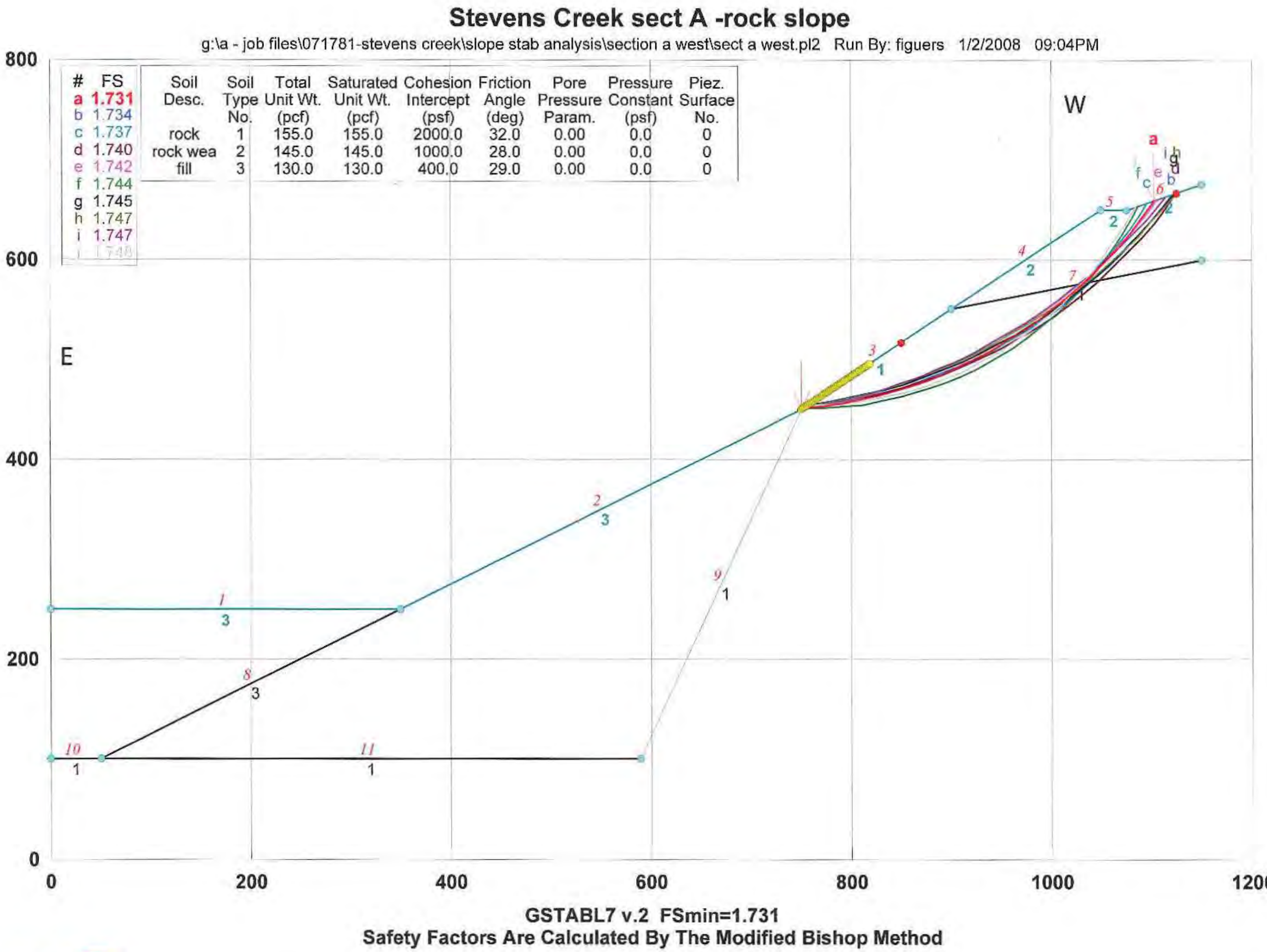
PROJ NO:	071781	DATE:	Jan 10, 2008	FIGURE:	17



GSTABL7

Add 600 ft to vertical scale for actual elevations.

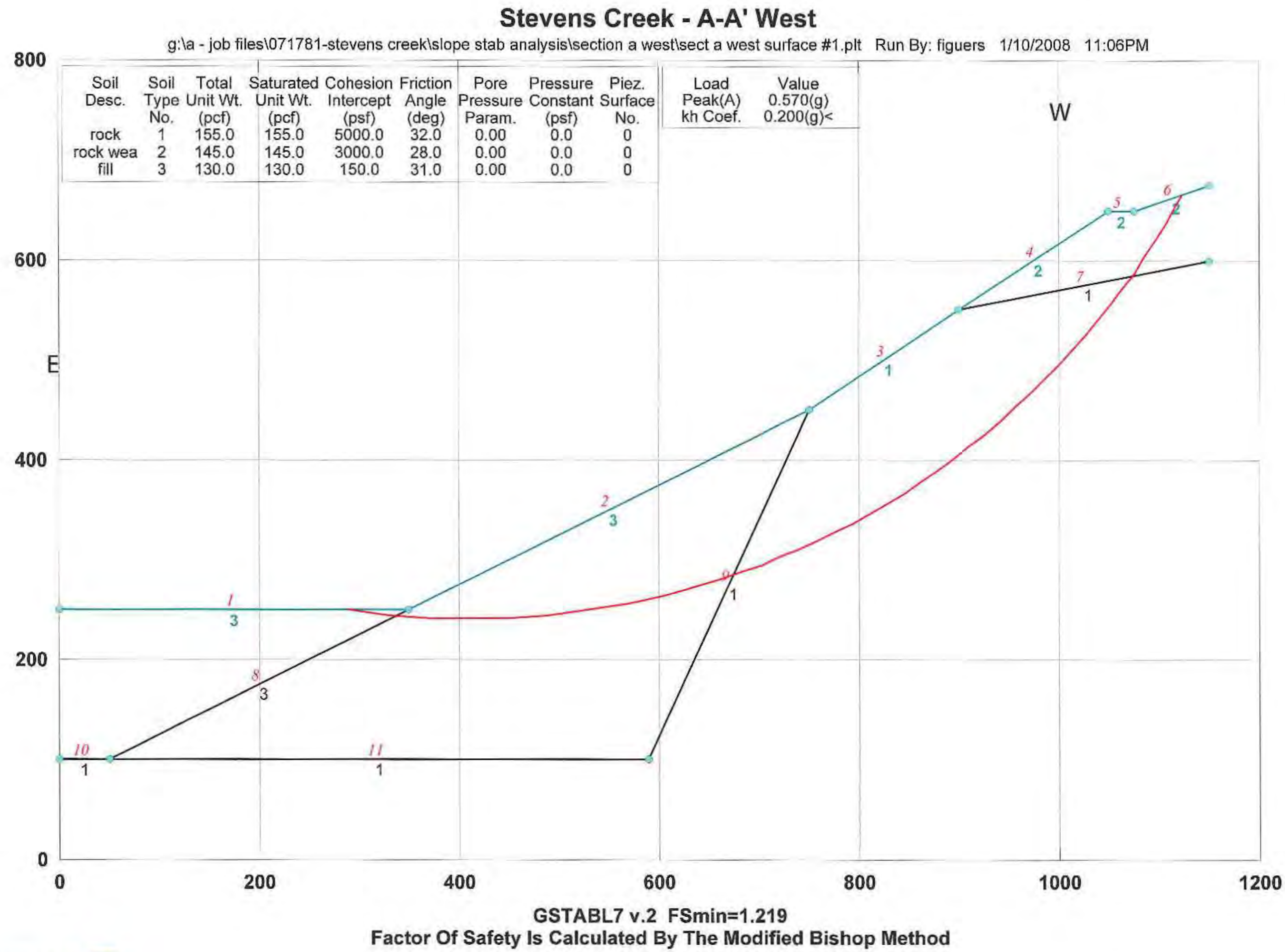
Norfleet Consultants	Limit Equlibrum Analysis - Stevens Creek Quarry				
	Static analysis, High rk strength, Rock failure only, Cross-sect A-A -west'				
	PROJ NO: 071781	DATE:	Jan 10, 2008	FIGURE:	18



GSTABL7

Add 600 ft to vertical scale for actual elevations.

Norfleet Consultants	Limit Equlibrum Analysis - Stevens Creek Quarry				
	Static analysis, Low rk strength, Rock failure only, Cross-sect A-A -west'				
	PROJ NO: 071781	DATE:	Jan 10, 2008	FIGURE:	19



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
rock	1	155.0	155.0	5000.0	32.0	0.00	0.0	0
rock wea	2	145.0	145.0	3000.0	28.0	0.00	0.0	0
fill	3	130.0	130.0	150.0	31.0	0.00	0.0	0

Load	Value
Peak(A)	0.570(g)
kh Coef.	0.200(g)<

GSTABL7

Add 600 ft to vertical scale for actual elevations.

Norfleet Consultants

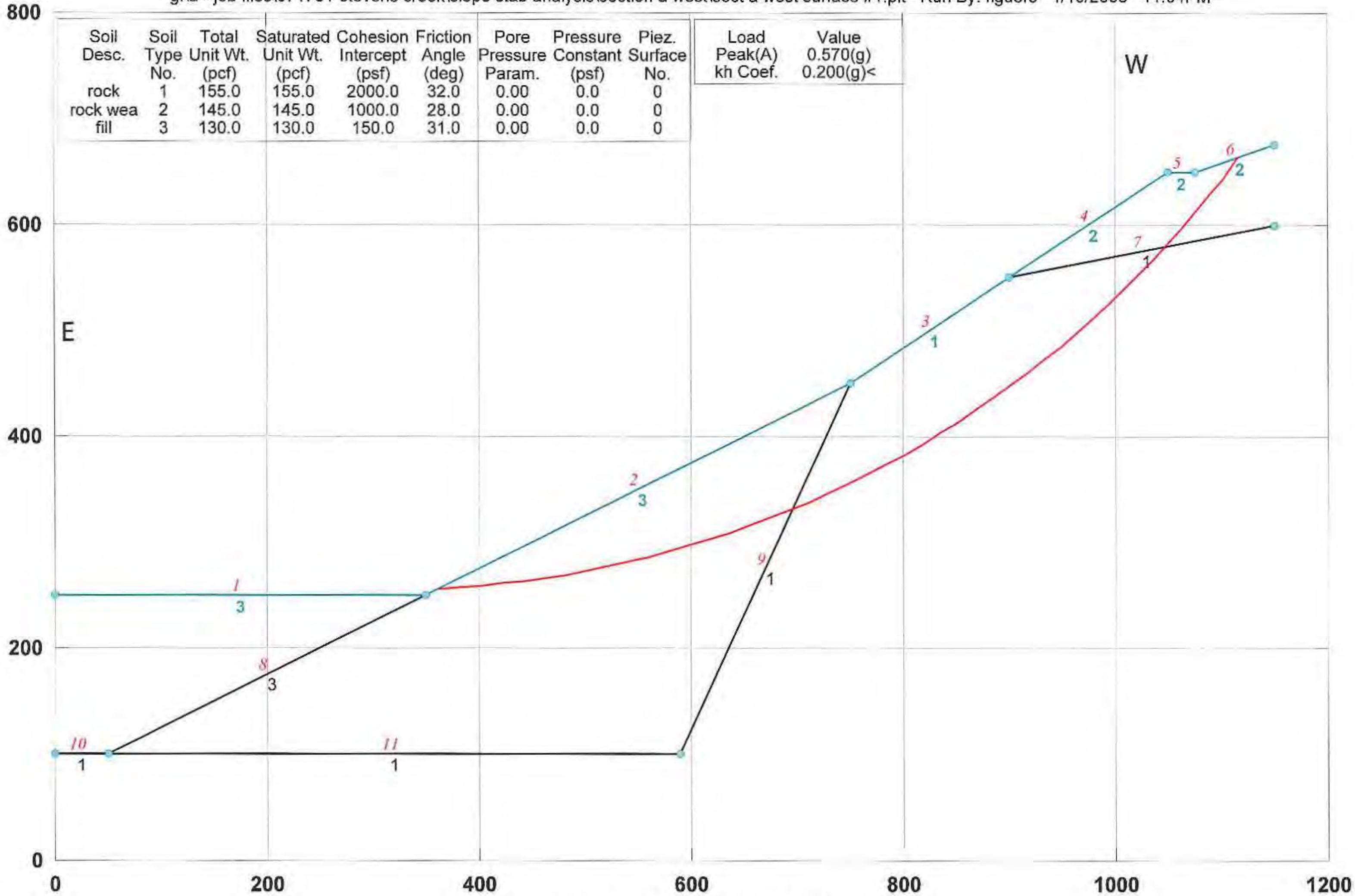
Limit Equlibrum Analysis - Stevens Creek Quarry

Pseudo-static analysis, High strength, Full failure, Cross-sect A-A -west'

PROJ NO: 071781 | DATE: Jan 10, 2008 | FIGURE: 20

Stevens Creek - A-A' West

g:\a - job files\071781-stevens creek\slope stab analysis\section a west\sect a west surface #1.plt Run By: figuers 1/10/2008 11:04PM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
rock	1	155.0	155.0	2000.0	32.0	0.00	0.0	0
rock wea	2	145.0	145.0	1000.0	28.0	0.00	0.0	0
fill	3	130.0	130.0	150.0	31.0	0.00	0.0	0

Load	Value
Peak(A)	0.570(g)
kh Coef.	0.200(g)<

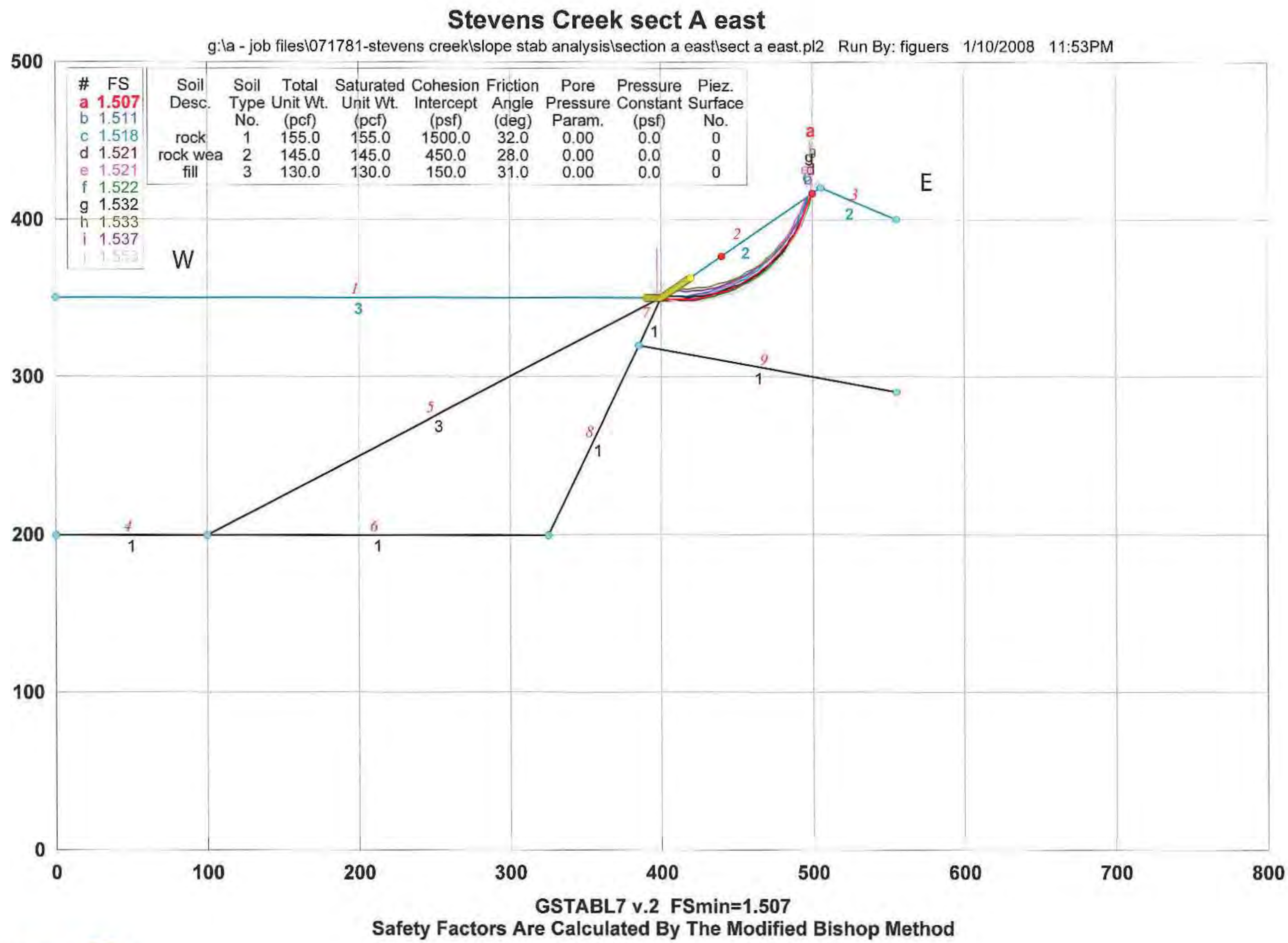
GSTABL7 v.2 FSmin=0.971

Factor Of Safety Is Calculated By The Modified Bishop Method

GSTABL7

Add 600 ft to vertical scale for actual elevations.

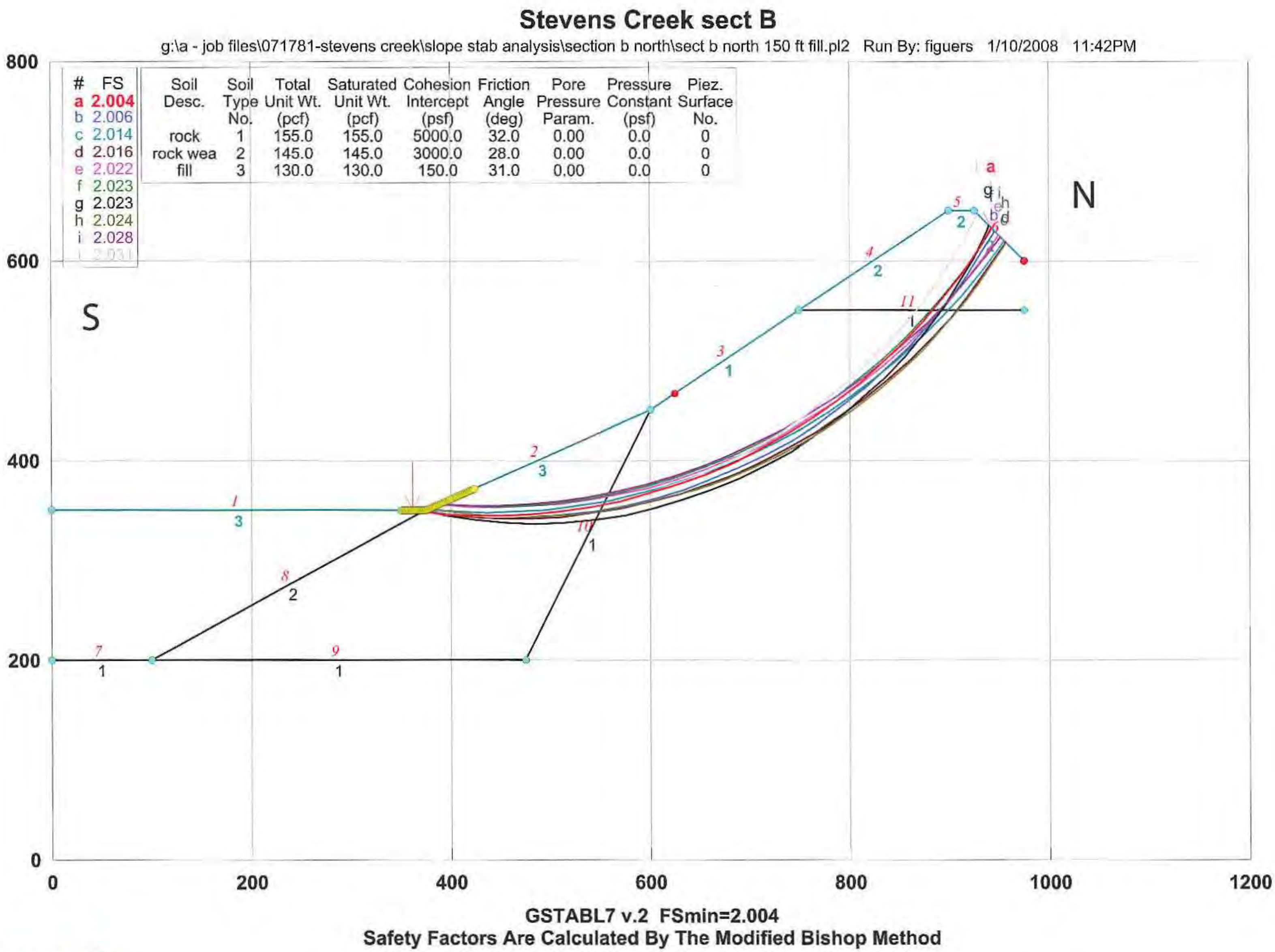
Norfleet Consultants	Limit Equlibrum Analysis - Stevens Creek Quarry				
	Pseudo-static analysis, Low strength, Full failure, Cross-sect A-A -west'				
	PROJ NO: 071781	DATE:	Jan 10, 2008	FIGURE:	21



Add 500 ft to vertical scale for actual elevations.

Norfleet Consultants

Limit Equlibrum Analysis - Stevens Creek Quarry					
Static analysis, , Full failure, Cross-sect A-A' -east					
PROJ NO:	071781	DATE:	Jan 10, 2008	FIGURE:	22



GSTABL7

Add 500 ft to vertical scale for actual elevations.

Norfleet Consultants

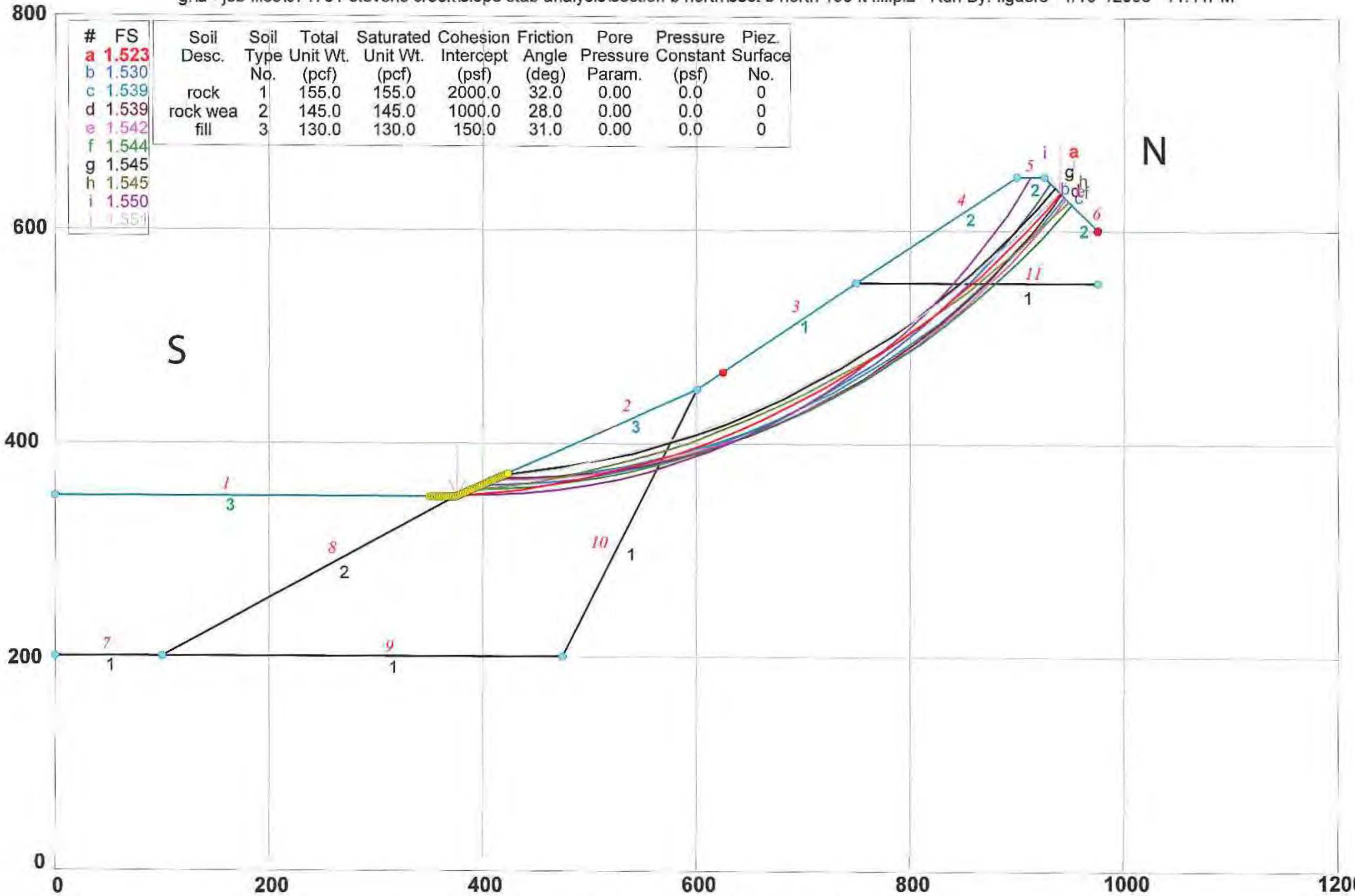
Limit Equlibrum Analysis - Stevens Creek Quarry

Static analysis, High Rk Strenght, Full failure, Cross-sect B-B'

PROJ NO:	071781	DATE:	Jan 10, 2008	FIGURE:	23

Stevens Creek sect B

g:\a - job files\071781-stevens creek\slope stab analysis\section b north\sect b north 150 ft fill.pl2 Run By: figuers 1/10 /2008 11:41PM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
rock	1	155.0	155.0	2000.0	32.0	0.00	0.0	0
rock wea	2	145.0	145.0	1000.0	28.0	0.00	0.0	0
fill	3	130.0	130.0	150.0	31.0	0.00	0.0	0

GSTABL7 v.2 FSmin=1.523
Safety Factors Are Calculated By The Modified Bishop Method

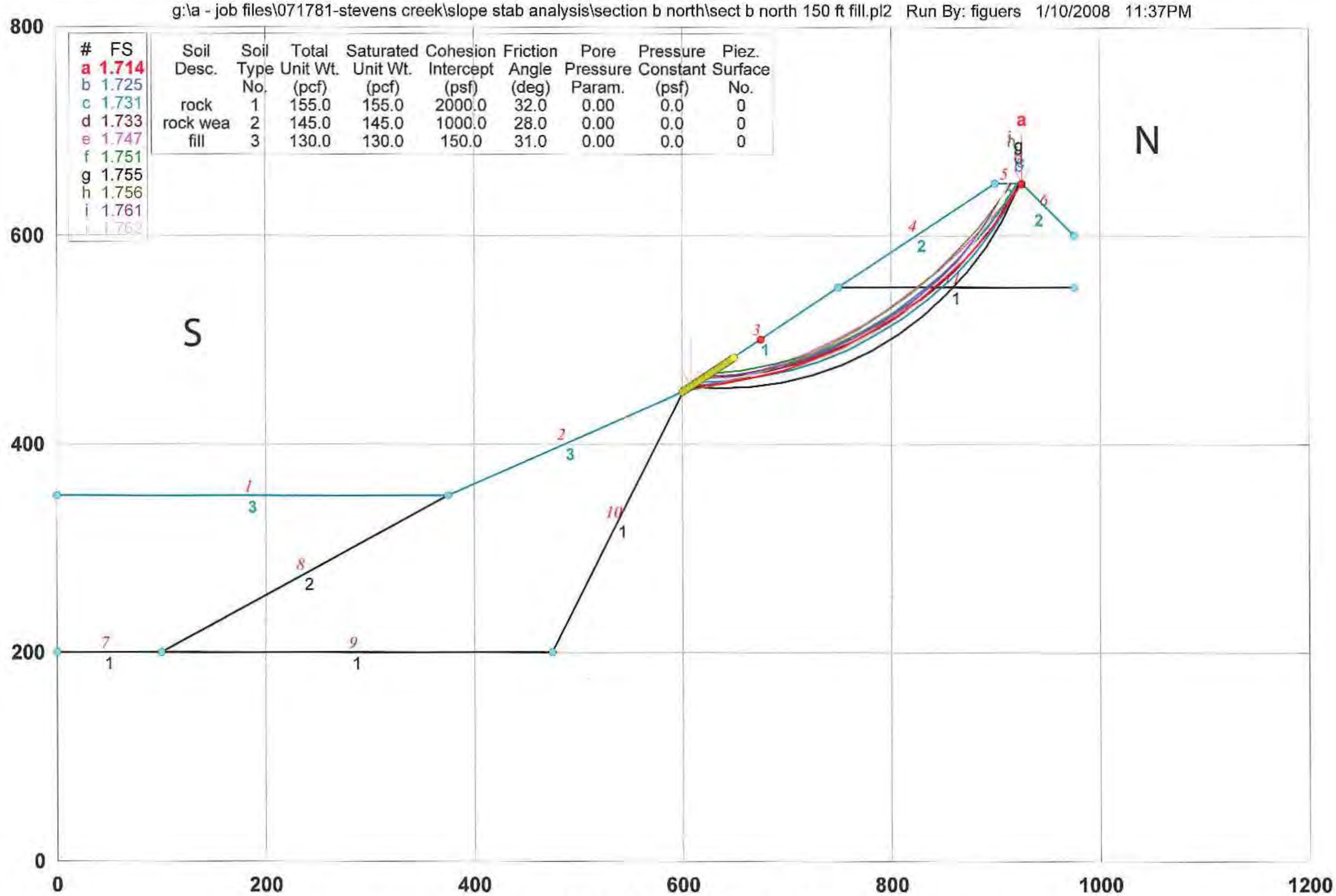
GSTABL7

Add 500 ft to vertical scale for actual elevations.

Norfleet Consultants	Limit Equlibrum Analysis - Stevens Creek Quarry				
	Static analysis, Low Rk Strenght, Full failure, Cross-sect B-B'				
	PROJ NO: 071781	DATE: Jan 10, 2008	FIGURE: 24		

Stevens Creek sect B

g:\a - job files\071781-stevens creek\slope stab analysis\section b north\sect b north 150 ft fill.pl2 Run By: figuers 1/10/2008 11:37PM



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
rock	1	155.0	155.0	2000.0	32.0	0.00	0.0	0
rock wea	2	145.0	145.0	1000.0	28.0	0.00	0.0	0
fill	3	130.0	130.0	150.0	31.0	0.00	0.0	0

GSTABL7 v.2 FSmin=1.714
Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

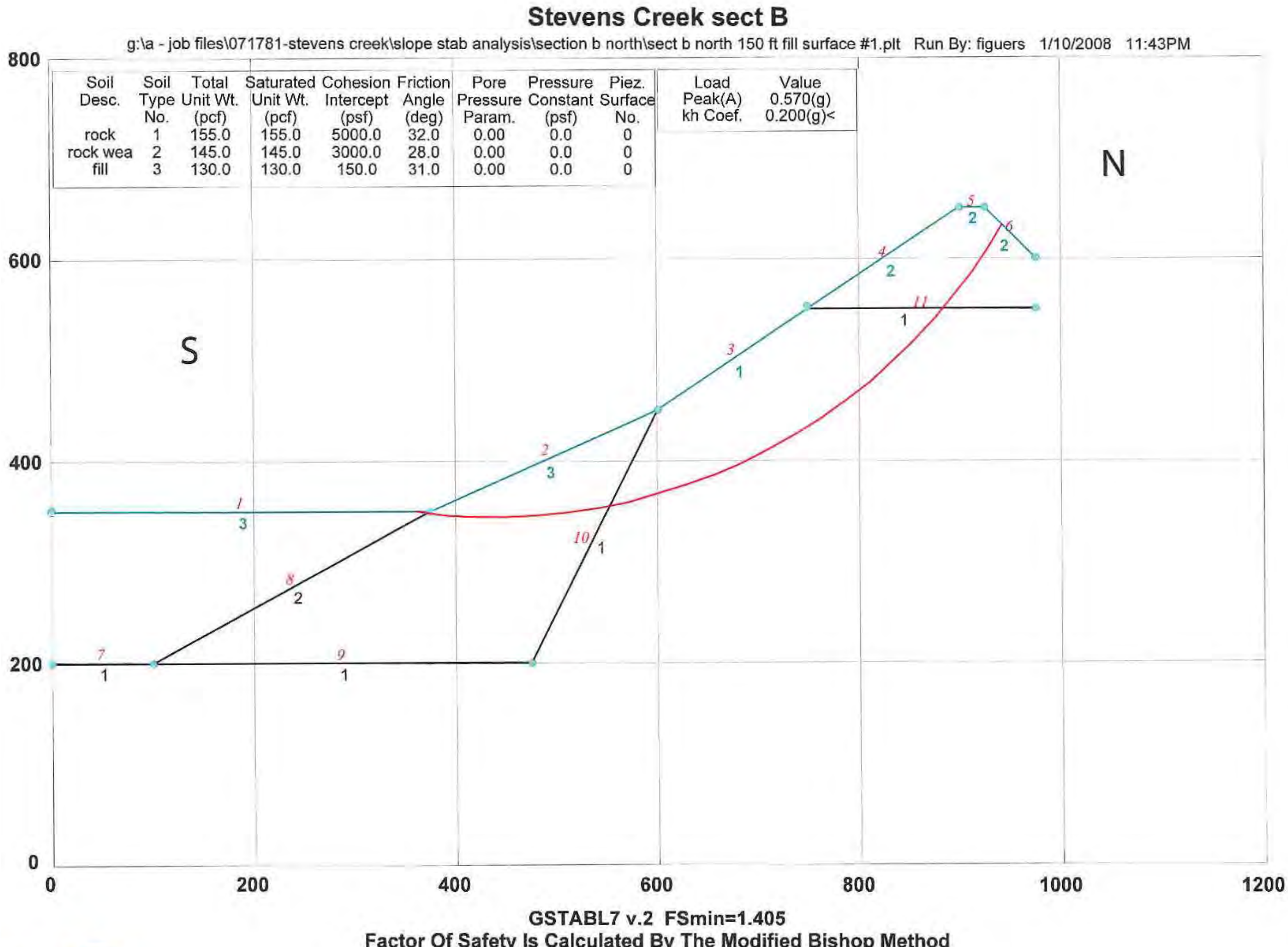
Add 500 ft to vertical scale for actual elevations.

Norfleet Consultants

Limit Equlibrum Analysis - Stevens Creek Quarry

Static analysis, Low Rk Strenght, Rk failure, Cross-sect B-B'

PROJ NO: 071781 | DATE: Jan 10, 2008 | FIGURE: 25



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
rock	1	155.0	155.0	5000.0	32.0	0.00	0.0	0
rock wea	2	145.0	145.0	3000.0	28.0	0.00	0.0	0
fill	3	130.0	130.0	150.0	31.0	0.00	0.0	0

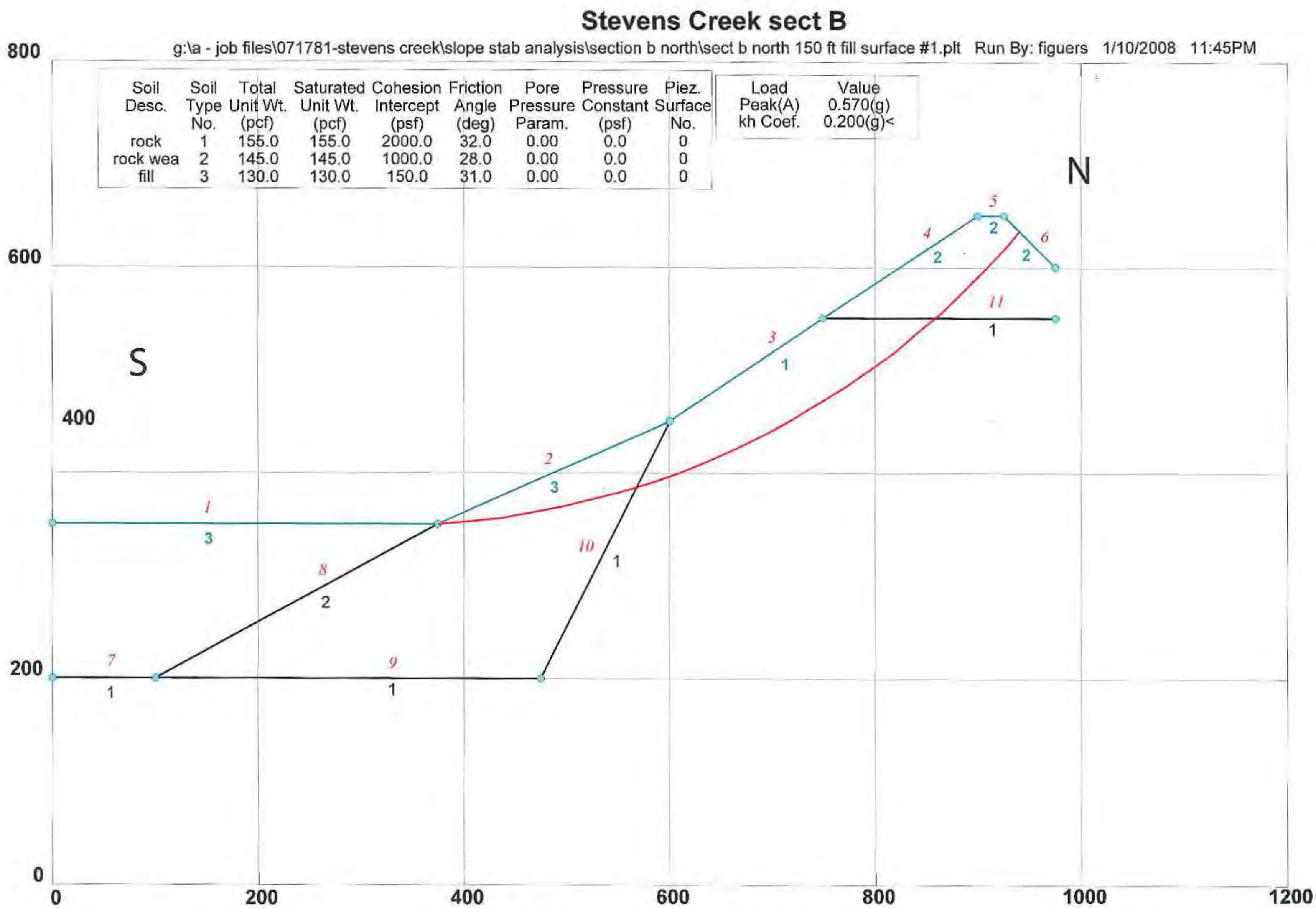
Load	Value
Peak(A)	0.570(g)
kh Coef.	0.200(g)<

GSTABL7

Add 500 ft to vertical scale for actual elevations.

Norfleet Consultants

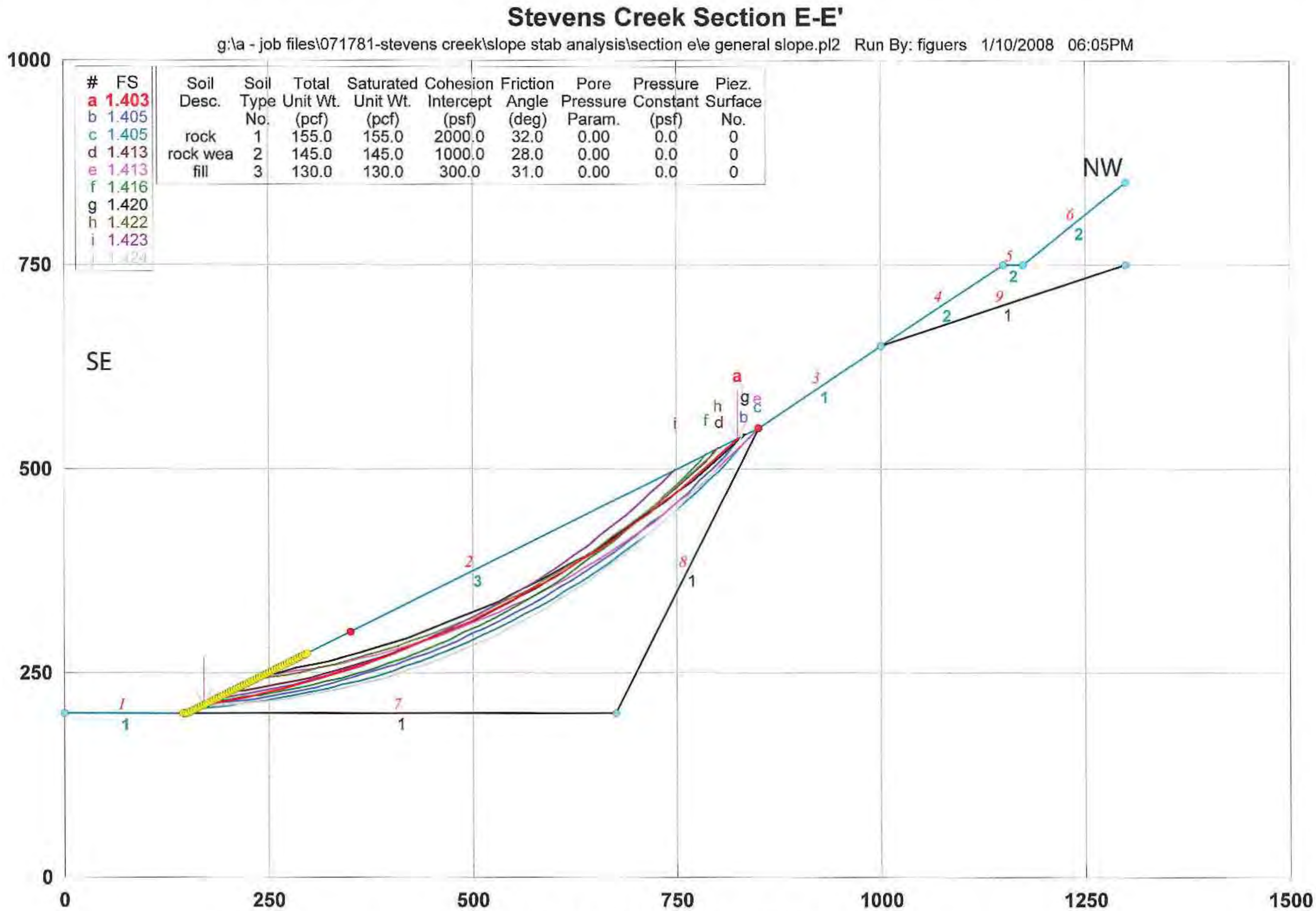
Limit Equlibrum Analysis - Stevens Creek Quarry					
Pseudo-static analysis, High Rk Strenght, Cross-sect B-B'					
PROJ NO:	071781	DATE:	Jan 10, 2008	FIGURE:	26



GSTABL7 v.2 FSmin=1.049
Factor Of Safety Is Calculated By The Modified Bishop Method

Add 500 ft to vertical scale for actual elevations.

Norfleet Consultants	Limit Equlibrum Analysis - Stevens Creek Quarry					
	Pseudo-static analysis, Low Rk Strenght, Cross-sect B-B'					
	PROJ NO: 071781		DATE: Jan 10, 2008		FIGURE: 27	

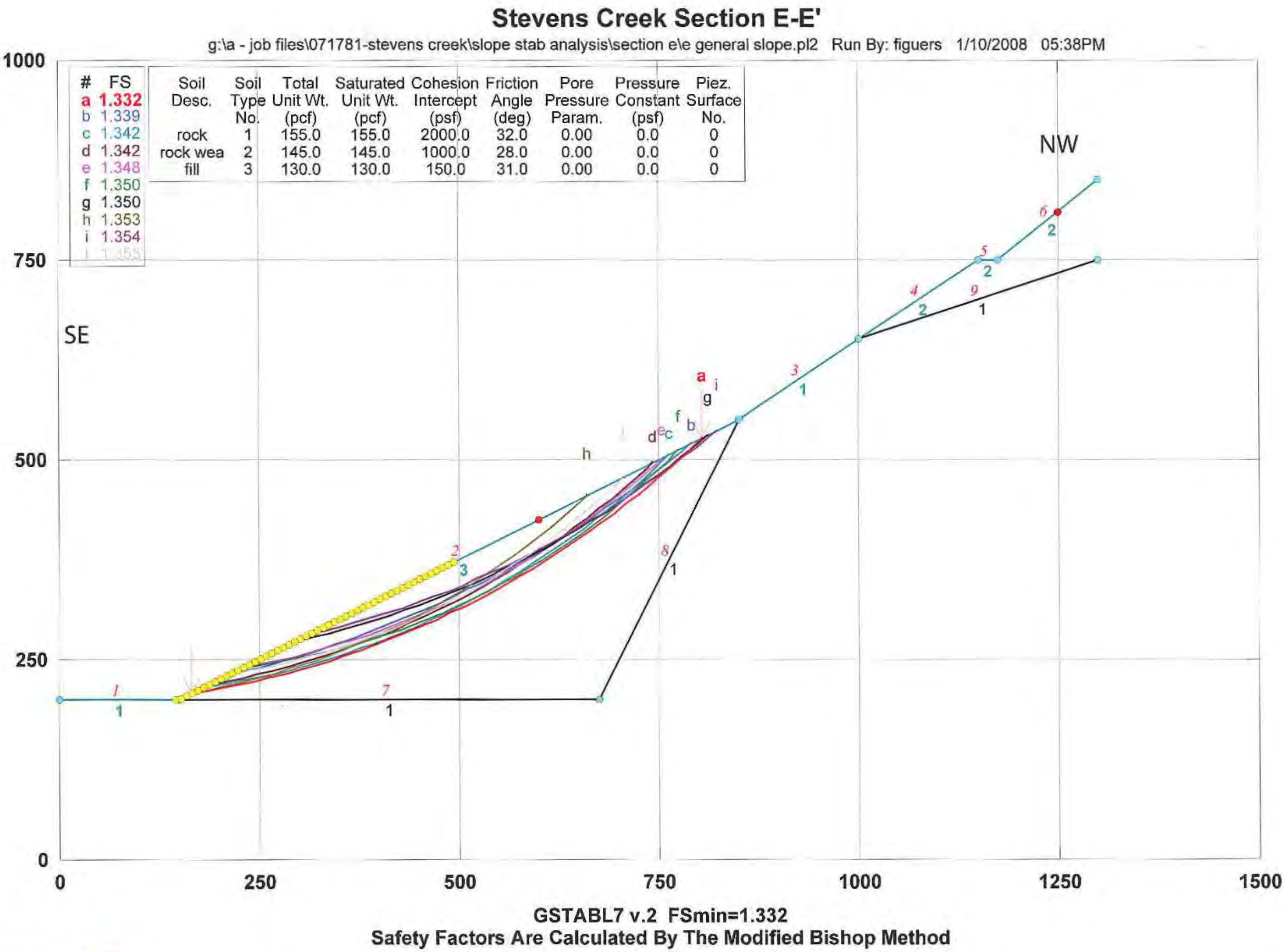


Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
rock	1	155.0	155.0	2000.0	32.0	0.00	0.0	0
rock wea	2	145.0	145.0	1000.0	28.0	0.00	0.0	0
fill	3	130.0	130.0	300.0	31.0	0.00	0.0	0

GSTABL7 v.2 FSmin=1.403
Safety Factors Are Calculated By The Modified Bishop Method

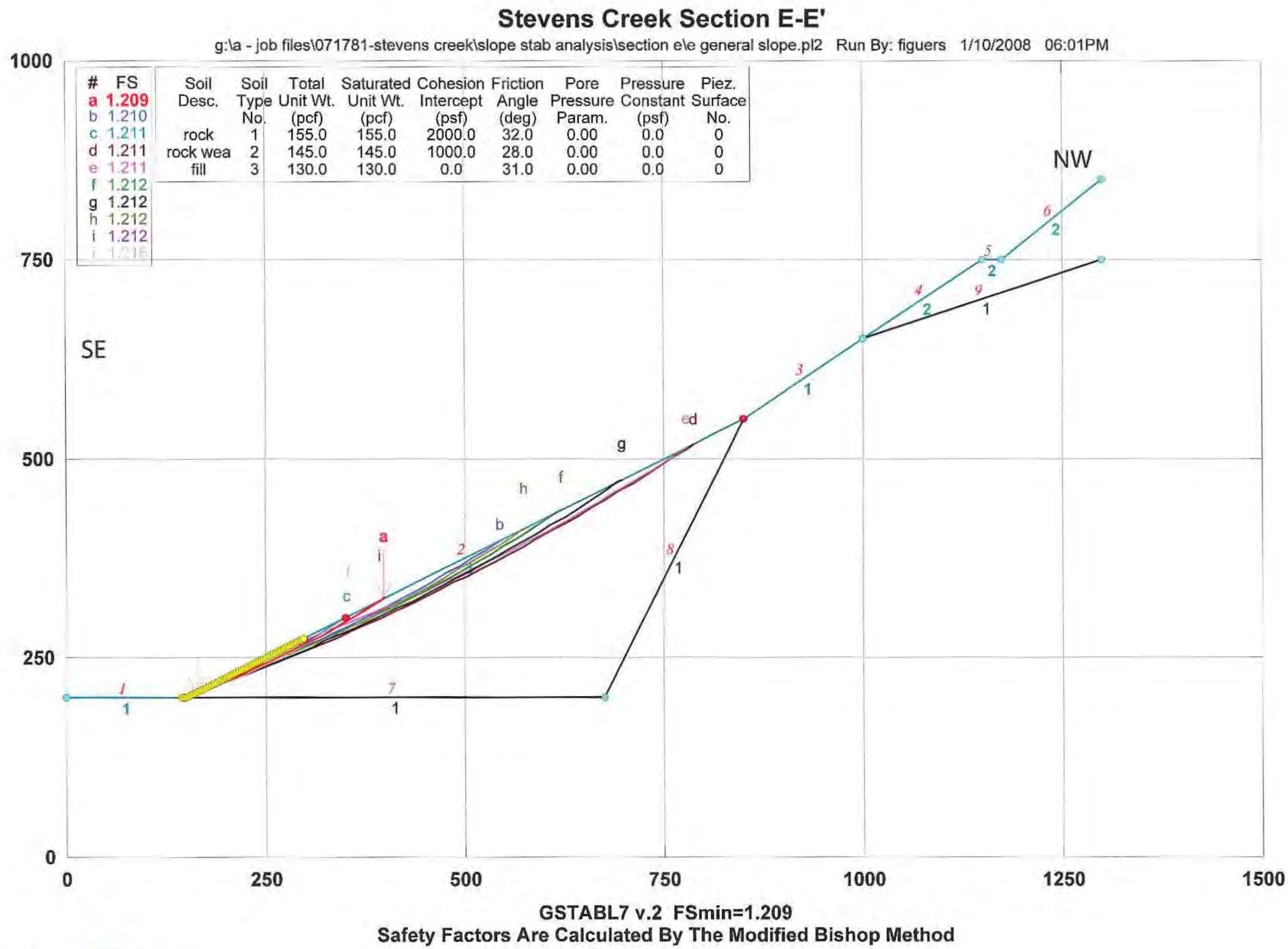
Add 500 ft to vertical scale for actual elevations.

Norfleet Consultants	Limit Equlibrum Analysis - Stevens Creek Quarry				
	Static analysis, 300 psf Coh. wedge fill only, cross-section E-E'				
	PROJ NO: 071781	DATE:	Jan 10, 2008	FIGURE:	28



Add 500 ft to vertical scale for actual elevations.

Norfleet Consultants	Limit Equlibrum Analysis - Stevens Creek Quarry					
	Static analysis, 150 psf Coh. wedge fill only, cross-section E-E'					
	PROJ NO:	071781	DATE:	Jan 10, 2008	FIGURE:	29



GSTABL7

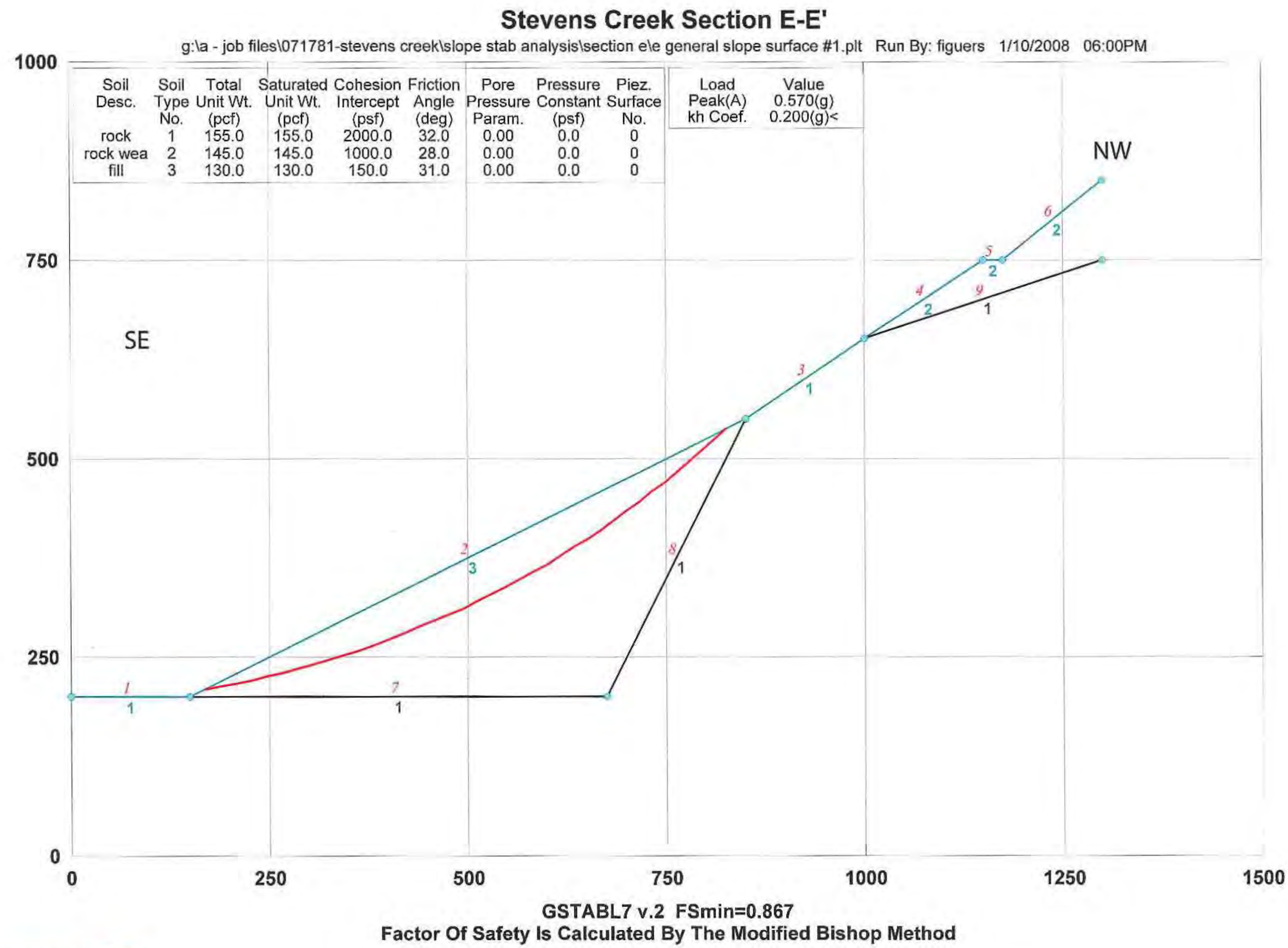
Add 500 ft to vertical scale for actual elevations.

Norfleet Consultants

Limit Equlibrum Analysis - Stevens Creek Quarry

Static analysis, 0 Coh. wedge fill only, cross-section E-E'

PROJ NO:	071781	DATE:	Jan 10, 2008	FIGURE:	30



Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
rock	1	155.0	155.0	2000.0	32.0	0.00	0.0	0
rock wea	2	145.0	145.0	1000.0	28.0	0.00	0.0	0
fill	3	130.0	130.0	150.0	31.0	0.00	0.0	0

GSTABL7

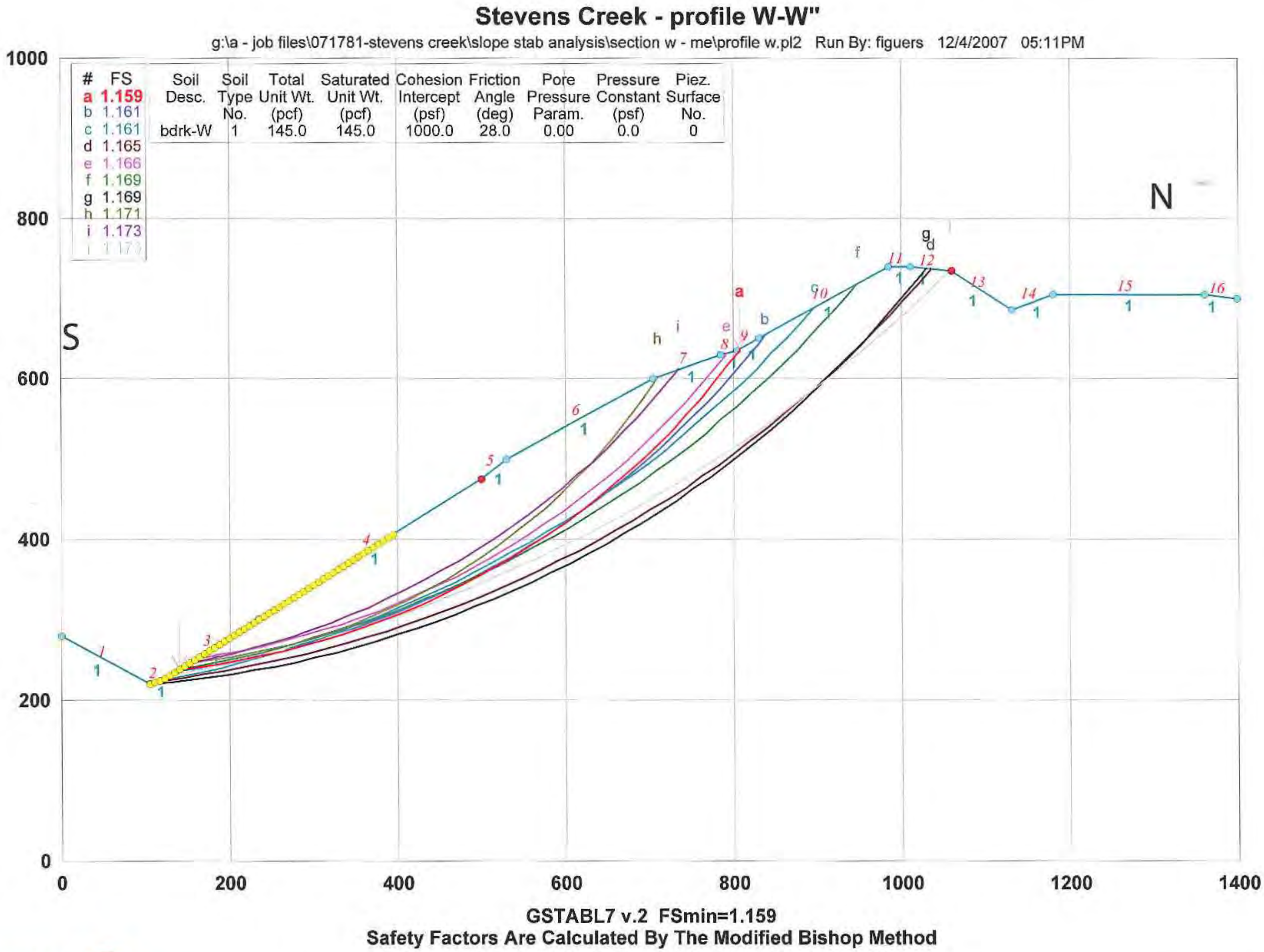
Add 500 ft to vertical scale for actual elevations.

Norfleet Consultants

Limit Equlibrum Analysis - Stevens Creek Quarry

Pseudo-static analysis, 150 coh., wedge fill only, cross-section E-E'

PROJ NO:	071781	DATE:	Jan 10, 2008	FIGURE:	31



GSTABL7

Add 500 ft to vertical scale for actual elevations.

Norfleet Consultants

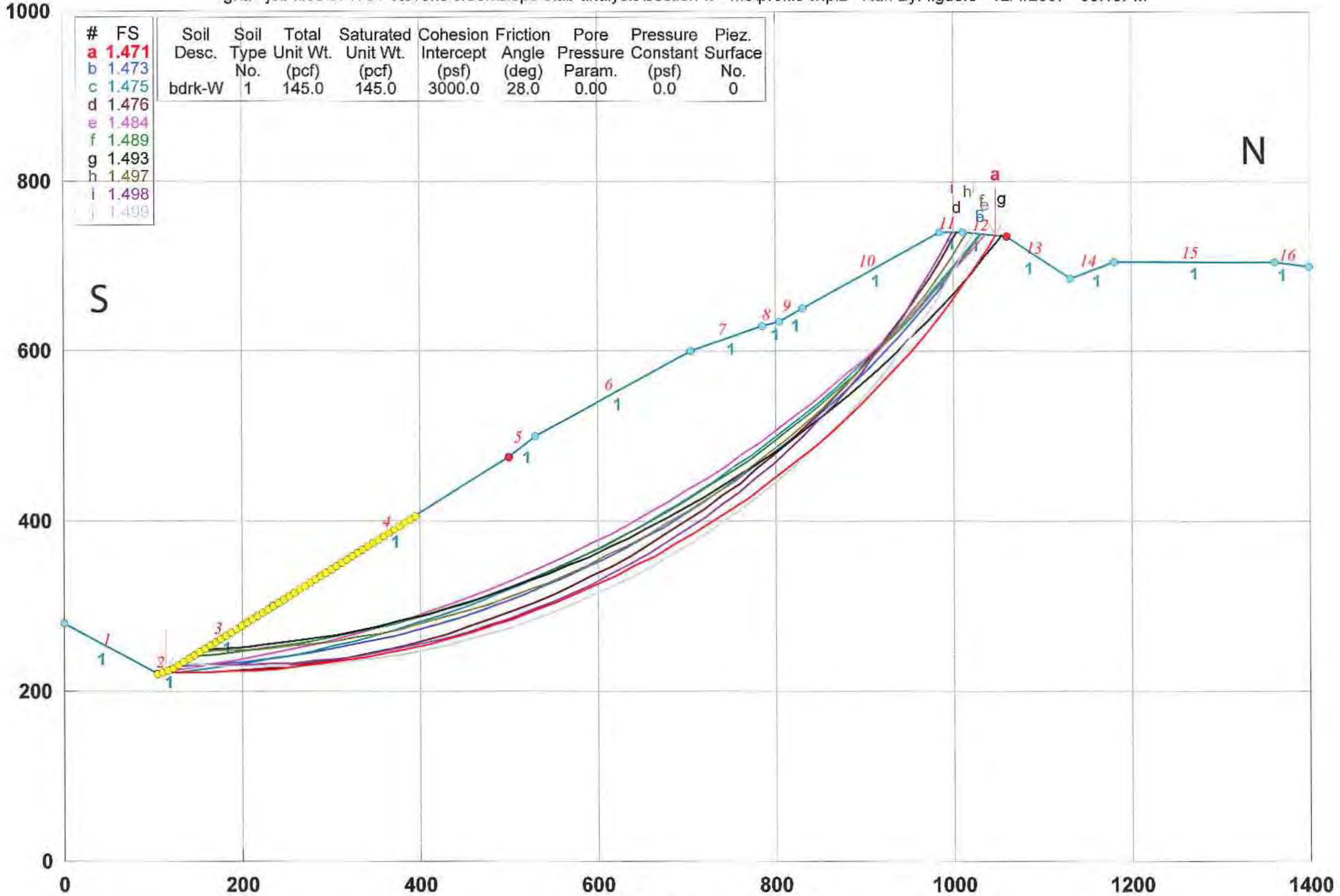
Limit Equlibrum Analysis - Stevens Creek Quarry

Static analysis, 1000 psf Coh., weathered Greenstone, cross-section W

PROJ NO: 071781 | DATE: Jan 10, 2008 | FIGURE: 32

Stevens Creek - profile W-W''

g:\a - job files\071781-stevens creek\slope stab analysis\section w - me\profile w.pl2 Run By: figuers 12/4/2007 05:15PM



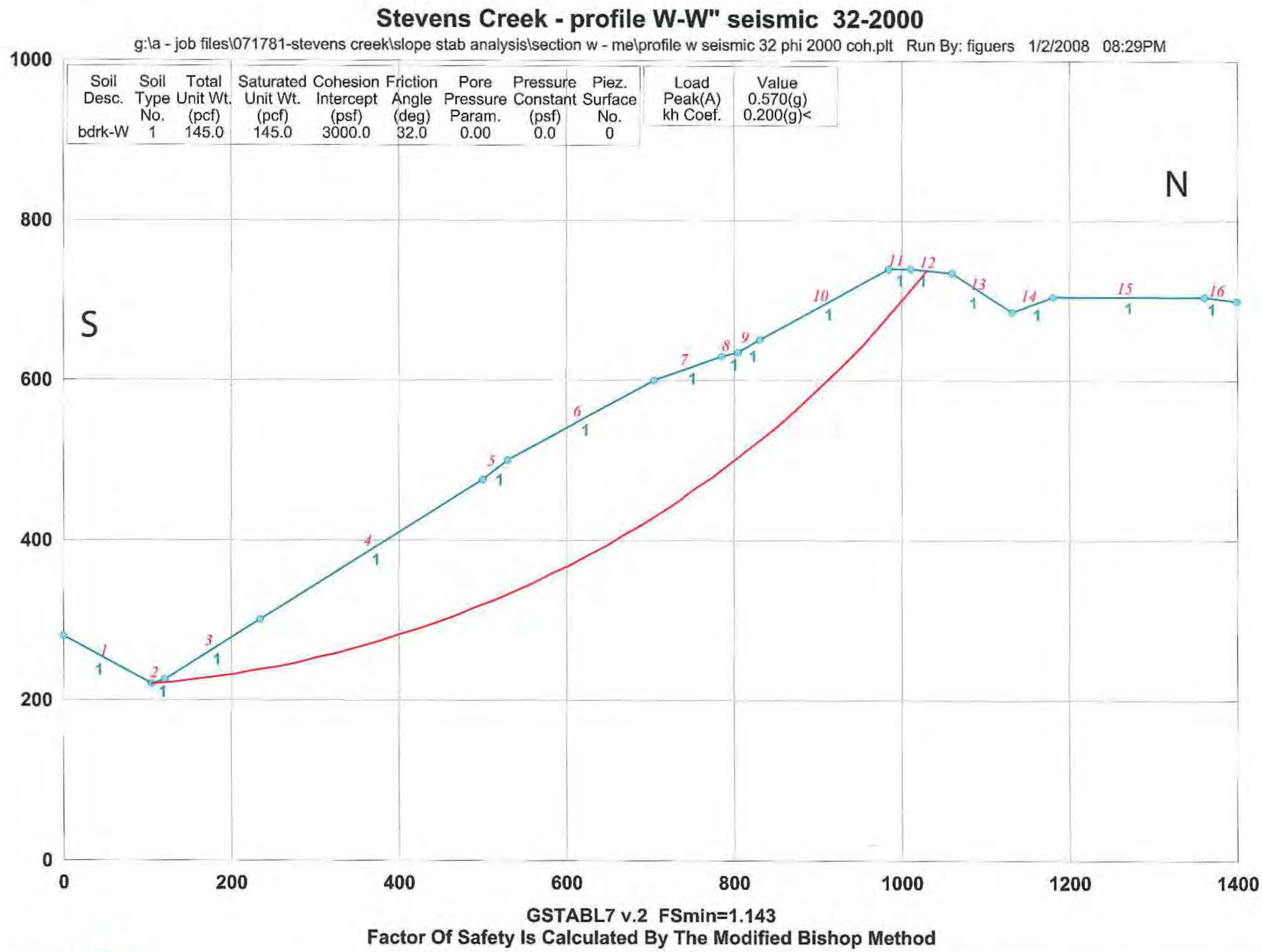
GSTABL7 v.2 FSmin=1.471

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

Add 500 ft to vertical scale for actual elevations.

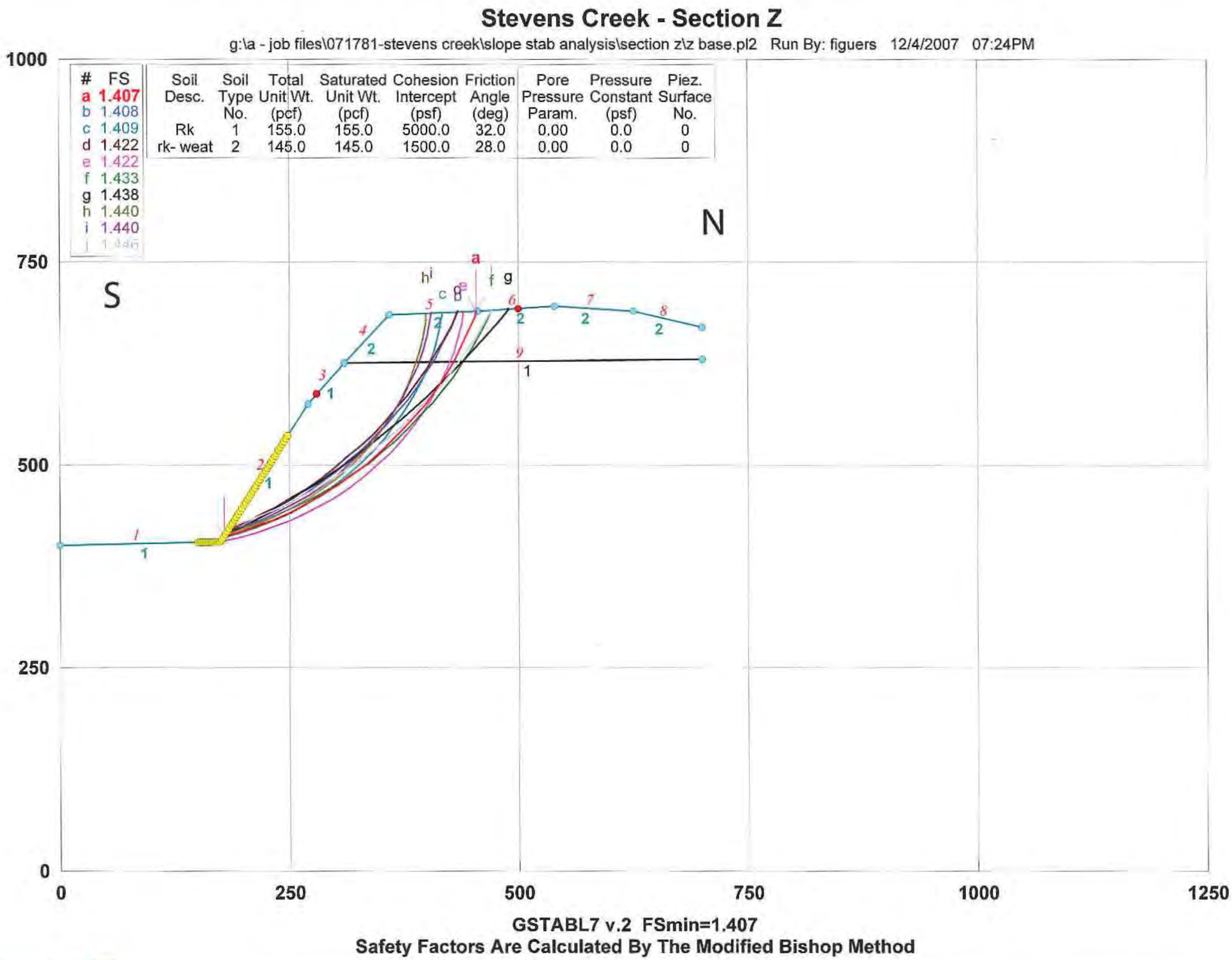
Norfleet Consultants	Limit Equlibrum Analysis - Stevens Creek Quarry		
	Static analysis, 3000 psf Coh., weathered Greenstone, cross-section W		
	PROJ NO: 071781	DATE: Jan 10, 2008	FIGURE: 33



GSTABL7

Add 500 ft to vertical scale for actual elevations.

Norfleet Consultants	Limit Equlibrum Analysis - Stevens Creek Quarry
	Pseudo-static analysis, weathered Greenstone, cross-section W
	PROJ NO: 071781 | DATE: Jan 10, 2008 | FIGURE: 34



Add 500 ft to vertical scale for actual elevations.

Norfleet Consultants	Limit Equlibrum Analysis - Stevens Creek Quarry		
	Static analysis, 5000 psf Coh., unweath. Greenstone, cross-section Z		
	PROJ NO: 071781	DATE: Jan 10, 2008	FIGURE: 35

January 9, 2020
BAGG Job No: STEVE-18-02
California Mine ID 91-43-007

Mr. Jason Voss
jvoss@scqinc.com
Stevens Creek Quarry, Inc. (SCQ)
12100 Stevens Canyon Road
Cupertino, California 95014

REVISED REPORT
In-Depth Engineering Geologic Investigation
and Slope Stability Analysis
Western Rim Slope
Stevens Creek Quarry
12100 Stevens Canyon Road
Cupertino, California 95014

Dear Mr. Voss:

This revised letter report presents the results of our engineering geologic evaluation and slope stability analysis performed for the approximately 2,000-foot long Western Rim Slope at the SCQ in Cupertino, California. BAGG Engineers has issued this report initially on January 3, 2019 and it is being revised herein to check if the modified Reclamation Plan, developed after the issuance of our January 2019 report with input from our technical experts for the Western Rim Slope, has satisfactory long-term factors of safety.

It is important to note that this letter report pertains exclusively to the Western Rim Slope portion of the quarry. This report is intended to assess the stability of the temporary (short-term) and permanent (long-term) cut and fill slopes proposed currently along the Western Rim Slope as part of the quarry's revised/modified Reclamation Plan and it also presents grading recommendations for the planned fill placement.

SITE DESCRIPTION AND PLANNED RECLAMATION

The attached Plate 1, Vicinity Map, delineates the general location of the overall quarry while Plates 2 and 3, which were provided to us by Benchmark Resources, show the magnitude and configuration of the proposed Cut and Fill Phases along the subject slope with six scaled cross section lines and cross sections (labeled as Cross Sections 1-1' through 6-6' on both plates). Plates 4 and 5, show the Cut and Fill Phases planned at the Western Rim Slope and the cross section lines presented at a scale (one inch equals 200 feet) that matches our structural geologic cross sections, which we will discuss further in upcoming sections of this report.

The northern portion of the east-facing Western Rim Slope (subject slope) abuts the mining pit along its western side while the central and southern parts of the subject slope are situated along the west side of the main staging/processing and jaw crusher areas, respectively. Mining cuts along the subject slope were generally initiated along the quarry's western property line and then extended downslope eastward. Based on preliminary cross sections we performed utilizing a topographic base map, prepared by Muir Consulting, Inc. and flown December 2018, the mined slope gradient appeared to vary between about 1.4H:1V and 1.6H:1V (Horizontal to Vertical) overall, although some localized areas appeared to have steeper gradients.

The northern portion of the Western Rim Slope opposite the mining pit has experienced surficial slumping and failure of the Franciscan Complex greenstone bedrock nearly along the entire height of the mined slope as a result of the noted mining cuts. The central and southern sections of the Western Rim Slope have been covered with fill stockpiles that obscured the greenstone bedrock and which appeared to have experienced surficial slumping and slope movement also, except at the far southern end of the subject slope where slumping greenstone bedrock was exposed at the ground surface. A prominent landslide, which we will discuss further in upcoming sections of this report, has occurred along the northernmost portion of the subject slope (northwestern corner of the quarry) near its connection with the Northern Rim Slope. The landslide's headscarp is evident in the field manifesting itself as open arcuate soil cracks coupled with down-dropped zones that extended upslope beyond the property line and encroached onto the adjacent property to the west.

Furthermore, there are three Pacific and Gas Electric Company (PG&E) wooden pole installations present near the top of the northern, central, and southern parts of the Western Rim Slope generally along the quarry's western property line. The northernmost PG&E Installation #1 consists of wooden poles that are located near the radio station and storage containers present along the top of the slope where the above-noted landslide's arcuate extensional soil cracks have developed upslope and around the noted power poles as a result of the mentioned slope failure and mass wasting downslope along the cut slope face. Plate 6 is an aerial site plan that approximately delineates the location of the three PG&E wooden pole installations along the quarry's western property line in addition to our surficial geologic mapping performed as part of our scope along the Western Rim Slope.

The new Reclamation Plan configuration prepared by Benchmark Resources (2019) along the subject slope was developed with input from our Certified Engineering Geologist (CEG) and it generally consisted of Cut and Fill Phases. The Cut Phase (see Plates 2 and 4) will consist of initiating 1.5H:1V cuts at the western property line and then extending the cut downslope to a set elevation of 1,050 feet above mean sea level (MSL) where a 100-foot wide mid-slope bench will be constructed. Downslope of the noted mid-slope bench, a temporary mining slope will be cut at a steeper 1H:1V gradient down to and terminating at elevation 700 feet MSL. Upslope of the quarry's western property line, the 1.5H:1V cut will be extended until daylighting higher up the slope. Based on six preliminary cross sections (1-1' through 6-6'), it appears that the top of the cut would daylight between about 80 and 440 feet beyond the quarry's western property line depending on the localized topographic conditions. Once the Cut Phase is completed, the Fill Phase will be undertaken and it will generally consist of depositing engineered fills starting at elevation 700 feet MSL and terminating at elevation 900 feet MSL with a 3H:1V fill slope extending from the 900-foot elevation to the downslope edge of the planned mid-slope bench constructed at elevation 1,050 feet MSL. No fill will be deposited higher than the noted mid-slope bench elevation of 1,050 feet MSL.

PURPOSE AND SCOPE OF SERVICES

The purpose of our services was to observe the existing field conditions, provide input to the quarry manager and Benchmark Resources, analyze the stability of the proposed Cut and Fill Phases of the revised/modified Reclamation Plan, and provide grading recommendations for the construction of the planned fill and cut slopes. It is important to note that Benchmark Resources has provided us with topographic base maps depicting the existing ground surface during December 2018. the planned Cut and Fill Phases (Plates 2 through 5) and six cross sections (1-1' through 6-6' shown on Plates 2 and 3) the locations of which were selected by us. We utilized Cross Sections 1-1' through 6-6' prepared by Benchmark Resources to depict our geologic models and to perform the stability analysis, which will be discussed in upcoming sections of this letter report.

Specifically, our scope of work included the following elements:

- Review the pertinent parts of the Reclamation Plan amendment dated 2008 and a site-specific geologic and stability analysis report prepared by Norfleet Consultants in 2008 (Appendix D of the noted amendment).
- Perform slope reconnaissance and mapping visits to the Western Rim Slope by our CEG and geotechnical engineer. Our slope reconnaissance included observing the Western Rim Slope including the locations of the three PG&E power pole installations present along the top of the Western Rim Slope roughly located along the quarry's western property line.
- Collect clayey gouge samples from a rock slide basal rupture surface along the central part of the Western Rim Slope and from prominent shear/slip surfaces near the northern end of the subject slope that have developed within the Franciscan Complex greenstone exposed along the slope face.
- Atterberg Limits and torsional ring shear testing were conducted on the two clayey samples noted above by an independent testing laboratory (Cooper Testing Laboratory).
- Evaluate the collected data and perform slope stability analyses under static and pseudo-static (seismic) loading conditions.

- Meeting attendance and consultation with the quarry manager and other design team members.
- Prepare this letter report summarizing our findings, conclusions, and recommendations based on our analysis of six geologic Cross Sections 1-1' through 6-6' that were extended across portions of the Western Rim Slope where approximately shown on Plates 2 through 5. This report includes a vicinity map, site plans, area geologic map, geologic cross sections, laboratory testing results, stability analysis plots, and our conclusions and recommendations as they pertain to the stability of the planned Cut and Fill Phases. The stability plots were based on geologic cross sections and models, which we developed as part of our scope and which we discuss further in subsequent sections of this letter report.

PROJECT BACKGROUND

Norfleet Consultants (Norfleet) issued a report titled *Geologic and Stability Analysis, Reclamation Plan Amendment, Stevens Creek Quarry, California Mine ID 91-43-007, San Jose, California* dated January 22, 2008. The Norfleet study included site reconnaissance, review of available documentation, laboratory testing of fill import, and numerical evaluation of cross sections for slope stability of the proposed reclamation slope geometry.

The Norfleet study was intended to provide a summary of the geologic and geotechnical issues as they pertain to long-term, global stability of the final slope geometries as defined in the Reclamation Plan amendment revised January 2008 for the "pit west of the Berrocal fault" referred to as Parcel B by the quarry operator.

GEOLOGY AND SEISMICITY

Area and Site Geology

The geology and seismicity of the site area have been described in detail by Norfleet in 2008 and the intent of this section is to provide an overall summary of the site geology and seismicity. The site area has been mapped by several mappers including Dibblee (1966), Rogers (1972), Rogers and Armstrong (1973), Rogers and Williams (1974), Sorg and McLaughlin (1975), Brabb et al. (1998), Brabb et al. (2000), and Dibblee and Minch (2007). The site area is underlain by Cretaceous/Jurassic age Franciscan Complex greenstone bedrock that is closely and highly fractured, sheared, and foliated. Our mapping of the surficial geology observed along the subject slope is depicted on Plate 6, Aerial Site Plan and Geology while the portion of Brabb et al. (1998) that covers the site area is included as Plate 7, Area Geology Map.

The upper approximately 40 to 60 feet of the greenstone bedrock appeared weathered and colored yellowish brown due to oxidation while the greenstone bedrock exposed on the mined slope generally appeared greenish gray due to reduction below the upper oxidized zone.

A prominent shear zone was observed along the north end of the Western Rim Slope (near the northwestern corner of the quarry pit), which consisted of several steep shear planes some of which were lined with plastic greenish clayey gouge. The shears extended the entire height of the cut slope and several of the shear planes appeared to strike east/west and dip steeply to the south with one prominent shear plane trending northwestward and dipping steeply to the southwest. The noted shear zone can be seen in Figure 8, Site Photo, which was taken prior to the slope failures that occurred in that area subsequently. The shear zone was mapped by Sorg and McLaughlin (1975) to extend diagonally across Parcel B of the quarry and connect with the main trace of the Berrocal fault to the southeast, which was mapped by them extending along the east side of Parcel B. Norfleet (2008) shows the shear zone as a band of serpentine that extended through the greenstone bedrock. Although we observed the shear zone on the initial cut near the northern end of the Western Rim Slope, our CEG did not observe the serpentine inclusions delineated by Norfleet in 2008 as the area was underlain by greenstone entirely.

Initially, the Western Rim Slope was mined from the top and up to 8 drainage terraces (benches) were constructed across the slope face. However, due to the height and steep gradient of the mined cut (0.5H to 0.75H:1V) and the foliated, sheared, and fractured nature of the greenstone, slope failures developed along the cut face, which resulted in shearing and damaging the noted intermediate benches and further steepening the cut slope locally. The slope failures appeared to have mobilized in a translational fashion due to removal of lateral support nearly along the entire Western Rim Slope except along the central portion where fill stockpiles covered the slope face and provided some lateral support. Extensional cracking was observed during our reconnaissance of the slope along the top of the cut and even upslope of the noted fill stockpiles that are present along the central and southern portions of the Western Rim Slope. Arcuate soil cracking developed subsequently beyond the top of the mined slope along the northern end of the subject slope extending upslope of and around the wooden power poles at the PG&E Installation #1 (see Plates 6 and 8). The soil cracking marked the upper reaches of the prominent landslide that has developed near the northernmost part of the subject slope, which extended beyond the quarry's western property line. Numerous concrete stitch piers and a soldier pile and lagging retaining wall have been installed immediately downslope of the wooden power pole to help protect it and container-like structures present along the top of the slope in that area. As the ground surface down-dropped along the top of the slope where PG&E Installation #1 is situated, the tops of the concrete stitch piers noted above were observed sticking up higher than the ground surface. PG&E Installation #2 did not appear to have been impacted by the surficial slumping occurring along the slope face. At PG&E Installation #3 situated along the southern part of the subject slope, another soldier pile and lagging retaining wall has been constructed to support the power installation, which did not appear to have been impacted by the surficial slope failures that have occurred along the cut slope face downslope of that installation.

Landslides

None of the referenced mappers delineated landslide deposits along the Western Rim Slope except Sorg and McLaughlin (1975) who mapped a large-scale block slide upslope of the shear zone mapped near the northernmost portion of the subject slope and discussed above. Brabb et al. (1998) mapped a large-scale landslide deposit on the south side of the drainage course bordering the Western Rim Slope to the south. The noted landslide is shown to have encroached on and shifted the drainage channel located to the south of the Western Rim Slope, curving it northeastward slightly (See Plate 8). Our CEG did not observe evidence of the large-scale block slide mapped by Sorg and McLaughlin (1975) on the mined cut slope face where the side margins and basal rupture surface should have been present if the slide had existed. Furthermore, as part of our scope, we reviewed historical Google Earth Pro aerial photographs that spanned the period 1948 (before the slope was mined) through 2018 but we did not observe geomorphic evidence of the noted block slide.

The Western Rim Slope is shown by the California Geological Survey (CGS) on their regulatory Seismic Hazard Zone maps (2002) to be within a Seismic Hazard Zone associated with earthquake-induced landslides. The subject slope was not shown to be within a Seismic Hazard Zone associated with soil liquefaction, however.

Faulting and Seismicity

The main trace of the Berrocal fault has been mapped by Sorg and McLaughlin (1975), Brabb et al. (1998), and Norfleet (2008) in addition to several other mappers to extend roughly north/south along the east side of the quarry's Parcel B where the active mining pit is situated. The Barrocal fault is a high-angle reverse fault dipping between 50 to 70 degrees to the west. The older Franciscan units to the west of the fault appear to have been thrusted over the younger terrestrial Santa Clara Formation sedimentary units. Norfleet (2008) indicated that it is unlikely a specific fault plane is present and that the fault is represented by a shear zone measuring between 50 to 100 feet in width and which extended along the east side of the main mining pit.

The Berrocal fault was not zoned as active by the Division of Mines and Geology (DMG, 1974) and the CGS (2000) because it did not meet their zonation criteria. However, while the fault is within a Santa Clara County (County) Fault Rupture Hazard Zone (SCC, 2012), the fault trace and the hazard zone delineated by the County do not encroach onto the subject Western Rim Slope.

The San Andreas fault is mapped about 2 miles to the southwest and the Monte Vista-Shannon fault is mapped about 1.25 miles to the northeast of the site area. Norfleet (2008) indicated that while the quarry was active during the Loma Prieta Earthquake of October 17, 1989, the quarry personnel reported that the quake did not cause rockfalls or slope failures and only a single water glass fell off a counter in a nearby house. Furthermore, Norfleet (2008) indicated that a study of aftershocks from the 1989 earthquake in the Santa Cruz Mountains performed by Lindley and Archuleta (1994) found that Franciscan ridgetops had little ridgetop amplification and shatter and that the average amplification at Franciscan Complex sites was 3 times less than amplification at Miocene and Pliocene sites.

Groundwater

Based on input from the quarry operator, groundwater has not been encountered at the site area for along as the quarry has functioned. In addition, the quarry operator reported that a well drilled at a residence within the immediate area of the quarry did not encounter a groundwater phreatic level. Isolated seepages were observed along the subject slope face and free water was present within the main mining pit and also within the Upper, Middle, and Lower Settling Basins within the overall quarry, the noted water is detained storm water runoff and not groundwater. It is important to note that groundwater levels can vary seasonally due to inclement weather and irrigation.

Site Reconnaissance and Observations

As part of our current scope, our CEG performed a reconnaissance of the Western Rim Slope and his summarized observations are presented below:

- The overall slope, which measured about 2,000 feet in length, has been mined starting near the property line at an approximate gradient of about 1.4-1.6H:1V. According to the Reclamation Plan amendment (2008), the mining excavation will bottom out at about 700 feet MSL and the height of the mined Western Rim Slope will vary between about 600 and 700 feet in height.
- The noted mining cuts generally exposed foliated and highly/closely fractured and sheared Franciscan Complex greenstone bedrock except for the central portion of the subject slope, which was obscured with fill stockpiles. The upper approximately 40 to 60 feet of greenstone bedrock appeared yellowish brown due to weathering and oxidation while the lower remaining exposed portion of the slope appeared gray to greenish gray due to reduction.
- Isolated water seepages coupled with white evaporate mineral staining were observed near the northern end of the subject slope.
- A prominent and well-developed shear plane trending northwestward and dipping steeply to the southwest was observed extending the entire height of the mined slope generally near the northern end of the subject slope. The shear plane surface was lined with greenish gray clayey gouge that appeared wet and moderately to highly plastic. Sorg and McLaughlin (1975) and Norfleet (2008) mapped a shear zone, which is associated with the Berrocal fault, in the general area of the noted shear plane/zone. They extended the shear zone southeastward where it is shown to cross the entire Parcel B of the quarry in a diagonal fashion and connecting with the main trace of the Berrocal fault near the southeast corner of Parcel B. Norfleet (2008) mapped the feature as a serpentine shear zone and although the clays lining the shear plane we observed appeared greenish/bluish gray, our CEG did not observe any serpentine in the immediate vicinity of the shear plane/zone, as we noted above.
- Due to the fractured and weak nature of the greenstone bedrock and the relatively high mining cuts made along the subject Western Rim Slope, the outer approximately 30 to 40 feet of the exposed greenstone underlying the slope face appeared to have experienced failure in a chiefly translational mode leading to the occurrence of rockfalls, rock slides, and block gliding coupled with minor toppling nearly along the entire length and height of the slope except where fill is stockpiled blanketing the greenstone along the central and southern sections of the subject slope. Along the uppermost part of the placed fill stockpiles against the central and southern portions of the subject slope, our CEG observed arcuate, open extensional soil cracking marking the upper boundaries of the fill.

- Near the northern end of the subject slope and as noted above, our CEG observed an active landslide that had occurred along the mining cut slope face near the northern end of the Western Rim Slope. The landslide extended the whole height of the mined slope and its headscarp formed arcuate open soil cracks that appeared to extend westward beyond the quarry's western property line. A level pad was created along the top of the slope in that area where three container-like structures and wooden power poles were observed. In response to the noted slope movement and cracking in that area, several concrete "stitch" piers have been installed downslope of the noted structures and a soldier pile and lagging retaining wall was installed along the edge of the cut. Slope movement appeared to have continued since the installation of the concrete piers and the retaining wall since the noted cracking extended under a portion of the retaining wall and voids were observed around the tops of the visible concrete piers as the ground level appears to have settled and dropped in that area. The open soil cracks extended around and upslope of the wooden power pole (PG&E Installation #1) present in that area and they displayed lateral separation that is coupled with vertical displacement.
- The central part of the Western Rim Slope, generally upslope of the conveyor belt that spans the haul road and connects with the Jaw Crusher, was observed covered with fill stockpiles that have relatively high side slopes and near-level tops.
- PG&E Installation #2 situated near the central top of the subject slope, consists of a single wooden power pole that is located about 650 feet to the southwest of PG&E Installation #1 and about 100 feet upslope and to the west beyond the top of the mining cut. No separation/gap between the base of the power pole and the surrounding soil was observed and no soil cracks were observed in the immediate vicinity of the power pole at this location.
- Farther to the south and approximately 700 feet to the south of PG&E Installation #2, we observed another PG&E support structure (PG&E Installation #3) consisting of three wooden poles that are supported by a soldier pile and lagging wall along their eastern side, which separates the power poles from the edge of the mining cut. No open soil cracks or other distress features were observed in the vicinity of PG&E Installation #3 and the edge of the cut appeared to be about 50-75 feet downslope of the power poles.
- A fill buttress has been initiated near the toe of the Western Rim Slope northern end and its construction is ongoing.
- During our reconnaissance, our CEG collected two disturbed clayey gouge samples for Atterberg Limits and torsional shear testing purposes by Cooper Testing laboratory. Sample A was collected from clays lining the prominent shear plane present near the northern end of the subject slope and discussed above while Sample B was obtained from a basal rock glide rupture surface exposed near the top of the central mined slope.

LABORATORY TESTING

Atterberg Limits and torsional ring shear testing were performed by Cooper Testing Laboratory on the two samples collected from the shear surfaces described above to evaluate their plasticity index and to generate peak and residual internal angles of friction values for landslide rupture surfaces. The laboratory test plots are included in Appendix A along with remolded shear testing plots developed by Norfleet Consultants for the import fill material.

SLOPE STABILITY ANALYSIS

Geologic Model

As discussed above, the mining cuts along the Western Rim Slope were initiated near the quarry's western property line and extended downslope. Numerous intermittent drainage/access benches were initially constructed as part of the mining operation (See Plate 8, Site Photo). The noted mining cuts resulted in relatively high and steep slope gradients that were made in sheared/foliated/fractured and weak greenstone bedrock. As a result of the noted cuts, surficial translational slope failures occurred along the entire height of the mined slope displacing and damaging the mentioned drainage/access benches.

According to the latest Reclamation Plan (Benchmark Resources, 2019) and as discussed above, the Cut Phase will consist of permanent 1.5H:1V mining cuts that will be initiated at the quarry's western property line and carried downslope to an elevation of 1,050 feet MSL where a 100-foot wide mid-slope bench will be constructed. Downslope of the noted bench, the slope will be cut at a steeper temporary 1H:1V configuration down to elevation 700 feet MSL. Upslope of the quarry's western property line, the 1.5H:1V cuts will be extended higher towards the west until they daylight out of the slope and depending on the topographical constraints, the cuts are expected to daylight between about 70 and 400 feet beyond the quarry's western property line. The Fill Phase, according to the latest Reclamation Plan, will consist of depositing engineered fills starting at elevation 700 feet MSL and terminating at elevation 900 feet MSL. A permanent 3H:1V reclamation fill slope will extend from elevation 900 feet MSL to the downslope edge of the 100-foot wide mid-slope bench planned at elevation 1,050 feet MSL. It is important to note that Cross Sections 4-4' and 5-5' (Benchmark Resources, 2019), show the permanent slope cuts above the mid-slope bench planned at elevation 1,050 feet MSL to have a shallower 1.9H:1V gradient, which is most likely dictated by the topographic conditions in those areas.

As part of developing our geologic model, we have assumed that the greenstone bedrock will be exposed along the permanent cut slope planned upslope of the mid-slope bench at 1,050 feet MSL once the undocumented fill stockpiles are over-excavated and removed along the central and southern sections of the Western Rim Slope. Furthermore, we anticipate that the planned 1.5H:1V permanent cut planned upslope of the mid-slope bench will remove the landslide debris at Cross Section 1-1'. Plate 9 depicts the planned reclamation grading along Cross Section 1-1' and based on the knowledge that the prominent landslide mapped near the northern end of the Western Rim Slope is anticipated to measure between 40 and 60 feet in depth, it appears that the planned cuts will result in removing the majority of the landslide debris. Our CEG should be presented the opportunity to observe the noted cut slopes at this area and the undocumented fill stockpile areas to verify that the existing fill and landslide debris have been over-excavated fully. If the planned cuts do not result in the complete removal of the undocumented fill and landslide debris, additional remedial grading recommendations will be developed and implemented, depending on the lateral extent and depth of the remaining undocumented fill and/or landslide debris.

To develop our geologic models, we delineated the geologic units on Cross Sections 1-1' through 6-6' needed for our slope stability analysis. Accordingly, our geologic models accounted for the planned engineered fill (AF) to be constructed as part of the Reclamation Plan downslope of the 100-foot wide mid-slope bench, the upper weathered and oxidized greenstone (wgs), and the gray fresh un-weathered greenstone (gs). Plates 10 through 15 present Cross Sections 1-1' through 6-6' with the geologic conditions depicted on them and which we utilized in our slope stability analysis.

Slope Modeling and Analysis Method

The stability of the cut and fill slopes was evaluated with the conventional method of limit equilibrium stability analysis on two dimensional slope cross section with the aid of the computer program GeoStudio 2019 (Slope/W). Our analysis used the Morgenstern-Price Method, which considers both interslice shear and normal forces of the individual slices, into which the soil mass above the failure surface is divided, and includes both moment and force equilibrium. Various trial failure surfaces are analyzed in this manner until a minimum factor of safety is obtained.

Soil Strength Parameters

For stability analysis purposes and as noted above, three (3) earth material types were established, which include engineered fill soil (AF), weathered yellowish brown oxidized greenstone bedrock (wgs), and fresh (un-weathered) gray greenstone (gs). Norfleet (2008) performed back-calculations on both cut and natural greenstone slopes to estimate in-place weathered and un-weathered greenstone rock phi angles and cohesion properties. They then lowered the cohesion values to include lower strength rock/joint conditions (lower bound values) while keeping the phi values fixed. Norfleet concluded that it is likely the actual rock strength values are closer to or higher than the back-analysis properties.

For the weathered greenstone (wgs), Norfleet obtained a back-calculated cohesion value of 3,000 psf and assigned a 1,000 psf for the lower bound cohesion value coupled with a phi angle of 28 degrees. For our analysis, we selected to use the conservative lower bound cohesion value of 1,000 psf and the 28-degree phi angle for the weathered greenstone.

For the fresh (un-weathered) greenstone bedrock (gs), Norfleet obtained a back-calculated cohesion value of 5,000 psf and assigned a 2,000 psf for the lower bound cohesion value coupled with a phi angle of 32 degrees. For our analysis, we utilized the lower bound cohesion value of 2,000 psf for all our cross sections except at Cross Section 2-2' where we utilized a reasonable cohesion value of 3,000 psf instead while maintaining the 32-degree phi angle assigned by Norfleet in 2008.

Furthermore, as part of the Norfleet 2008 study, Cooper Testing Laboratory performed shear testing on two import remolded fill samples that Norfleet submitted to establish their phi and cohesion values. For our analysis, we elected to use a lower bound cohesion value of 150 psf and a phi value of 31 degrees, which were assigned by Norfleet for the engineered fill (AF).

Additionally, as noted in our previous report, groundwater has not been encountered anywhere in the quarry and a well drilled within the limits of the quarry indicated that groundwater levels are relatively deep. Hence, groundwater was not included in our stability analysis. The strength parameters for the various earth materials mentioned above and which we incorporated into our analysis are presented in the following table.

Soil Strength Parameters

Material Type	Lower Bound Cohesion C (psf)	Friction Angle Phi-ϕ (degrees)	Unit Weight (pcf)
Artificial Fill (AF)	150	31	130
Weathered Greenstone (wgs)	1,000	28	155
Fresh Greenstone (gs) All sections except 2-2’	2,000	32	155
Fresh Greenstone (gs) Section 2-2’	3,000	32	155

Cut Phase Slope Stability Analysis

As noted previously, the Cut Phase will consist of cutting the slope portion above elevation 1,050 feet MSL (bench) at a 1.5H:1V gradient except at Cross Sections 4 and 5 where the cut will be made at a 1.9H:1V gradient. In addition, the slope portion below elevation 1,050 feet MSL will be cut at a 1H:1V gradient along the entire length of the slope and at all six cross sections. Based on the encountered geologic conditions, the selected strength parameters and the geometry of Cross Sections 1-1’ through 6-6’, the results of our slope stability analysis yielded static safety factors ranging from 1.15 to 1.32 for the Cut Phase condition as is shown on Plates 16 through 21.

It is important to note that the 1H:1V cut downslope of the proposed mid-slope bench at elevation 1,050 feet MSL is a temporary (short-term) configuration since engineered fill will be placed to buttress the 1H:1V cut as part of the Fill Phase. A factor of safety of 1.0 is deemed acceptable under static conditions and no seismic loading was modeled since the noted 1H:1V configuration is temporary as noted prior. In addition, the stability of the 1.5H-1.9H:1V permanent reclamation cut slopes above the mid-slope bench were analyzed as part of the Fill Phase, which we discuss below.

Fill Phase Slope Stability Analysis

Static Slope Stability Analysis

Engineered fill will be deposited starting at elevation 700 feet MSL and terminating at elevation 900 feet MSL with 3H:1V fill slopes extending from elevation 900 feet MSL to the downslope edge of the mid-slope future bench to be constructed at elevation 1,050 feet MSL. Based on the results of our analysis, the Fill

Phase static factors of safety at Cross Sections 1-1’ through 6-6’ ranged from about 1.57 to 2.04 with a factor of safety of 1.5 as the minimum required.

Seismic Slope Stability Analysis

The seismic stability of the permanent long term condition was analyzed using a pseudo-static approach per the general guidelines included in CGS Special Publication 117A (2008) and the Southern California Earthquake Center (2002). The Earthquake Engineering Research Institute has published a screening analysis procedure for seismic slope stability (Stewart et al., 2003), which takes into account local variations in the seismicity as presented by the earthquake magnitude, as well as the distance from the fault that most significantly contributes to the ground motion hazard at the site. The screening procedure is based on a statistical relationship previously developed by Bray et al. (1998) between seismic slope displacement (u), peak amplitude of shaking in the underlying bedrock (kmax), significant duration of shaking (D5-95), and the ratio of slope resistance to peak demand (ky/kmax), where ky is the yield acceleration, or the horizontal acceleration required to reduce the safety factor to unity. A tolerable seismic slope displacement (u) for residential range from 5 cm to 15 cm. A safety factor of 1 is the minimum required for passing the screening procedure.

Using the slope screening procedure, a pseudo-static coefficient of 0.29g was estimated for the analyses based on respective deformation of 15 cm. A minimum seismic factor of safety of 1.0 was obtained for all six cross sections analyzed as is shown on the stability analysis plots presented on Plates 28 through 33. In addition, the results of our static and seismic slope stability analyses are summarized in the table below. The results of the analyses indicate that the planned temporary cut slopes (downslope of the bench) and permanent cut and fill reclamation slopes (above and below the bench, respectively) are generally considered stable based on the geometry of the cross sections provided by Benchmark Resources utilizing the noted strength parameters coupled with the assumption that the reclamation grading and earthwork operation will remove the landslide debris and fill stockpiles and expose relatively firm Greenstone (gs) along the slope surface.

Summary of Slope Stability Analyses Results

Section	Cut Phase	Fill Phase	
	Static Factor of Safety*	Static Factor of Safety*	Seismic Factor of Safety* (0.29g)
1-1'	1.15	1.58	1.00
2-2'	1.32	1.61	1.01
3-3'	1.16	1.61	1.00
4-4'	1.15	2.04	1.01
5-5'	1.15	2.01	1.01
6-6'	1.15	1.57	1.00

* Rounded to two decimal points

CONCLUSIONS AND RECOMMENDATIONS

General

1. Our slope stability analysis results indicate that all the planned temporary (short-term) cut slopes and permanent (long-term) cut and fill slopes have acceptable factors of safety under static conditions and seismic loading.

2. Cross Sections 4-4’ and 5-5’ indicate that the permanent reclamation cut slopes above the mid-slope bench planned at elevation 1,050 feet MSL will have 1.9H:1V gradient while the remaining sections (1-1’ through 3-3’ and 6-6’) indicate that the noted permanent reclamation cut slopes above the mid-slope bench will have a 1.5H:1V gradient. We recommend that the gradient variation should be made gradual laterally and should not be made abruptly from 1.5H:1V to 1.9H:1V and vice versa. Such an approach will allow for a seamless lateral transition between the sections.

3. Our CEG should be provided the opportunity to observe the condition of the temporary and permanent cut slopes prior to the placement of the planned fill to verify that the landslide debris at Cross Section 1-1’ and the existing fill stockpiles have been over-excavated completely and to develop remedial grading recommendations to address the presence of undocumented fills or landslide debris on the cut slopes, if deemed necessary during construction.

4. The planned 100-foot wide mid-slope bench should be constructed to slightly dip into the hillside so that storm water runoff is directed towards the inboard side of the bench. A cobble-lined earthen ditch or a concrete V-ditch should be constructed along the inboard edge (heel) of the bench to collect runoff water and direct it to flow laterally into approved drainage inlets.

5. The proposed reclamation fill should be moisture conditioned, and deposited horizontally in 8-inch (loose thickness) lifts, compacted to a minimum of 90 percent relative compaction of the maximum dry density at near the optimum moisture content in accordance with ASTM method D1557.

6. The fill should be benched and keyed into the backcut slope as the fill placement progresses upslope. The fill slope face should be overbuilt and then trimmed back so that a uniform and compacted slope face is exposed. This recommendation is made because it is difficult to compact soil along the outer edge of the fill, which is needed to help prevent the occurrence of subsequent shallow slope failures and localized slumps.

7. Thick-walled subdrain lines consisting of perforated 4- to 6-inch diameter PVC pipes (Type SDR-23.5 or equivalent) that are encased in a 2-foot wide by 3-foot high envelope of Caltrans Class 2 permeable material should be placed beneath and behind the proposed fill section, in a manner which would provide positive gravity flow, to help keep subsurface water from encroaching on and adversely impacting the sides and underside of the fill. The subdrain lines/pipes should be

installed at no greater than 30-foot vertical intervals and be equipped with cleanouts at all ends and bends to permit future access for cleaning and video viewing.

8. The bottom of all excavations and the placement of subdrain lines should be observed by the project CEG prior to fill placement.

9. The fill placement and compaction should be performed under the direct observation of the project Geotechnical Engineer and/or his field representatives. Field observation and compaction testing should be performed periodically so that the process of fill placement, moisture conditioning, and compaction effort is consistent. Our field representative should be provided the opportunity to perform compaction testing on every foot of fill placed and compacted prior to the placement of the next fill lift. The frequency of compaction testing will depend on the contractor's compaction production rates and the lateral extent of area to be filled.

Plan Review

It is recommended that the Geotechnical Engineer (BAGG Engineers) be retained to review the final grading plans. This review is to assess general suitability of the earthwork and drainage recommendations contained in this report and to verify the appropriate implementation of our recommendations into the project plans and specifications.

Observation and Testing

It is recommended that BAGG Engineers be retained to provide observation and testing services during site grading, excavation, and backfilling phases of work. This is intended to verify that the work in the field is completed per our recommendations and in accordance with the approved plans and specifications, and more importantly verify that subsurface conditions encountered during construction are similar to those anticipated during the design phase. Unanticipated soil conditions may warrant revised recommendations. Therefore, BAGG cannot accept responsibility for the recommendations contained in this report if we are not retained to provide observation and testing services during construction.

CLOSURE

This report has been prepared in accordance with generally accepted engineering geology and geotechnical engineering practices for the strict use of Stevens Creek Quarry in Cupertino, and other professionals associated with the specific project described in this report. The recommendations presented in this report are based on our understanding of the proposed project as depicted and described on the Reclamation Plans prepared and provided to us by Benchmark Resources (2019). Furthermore, the conclusions and recommendations contained in this report are based on the observations of our CEG, review of available published geologic literature developed by the U.S. Geological Survey and CGS and site-specific studies prepared by other consultants, limited laboratory testing, stability analysis results, and our experience with similar projects in Northern California. No subsurface exploration was performed as part of our current scope of work. It is not uncommon for unanticipated conditions to be encountered during site grading and it is not possible for all such variations to be detected by our limited program for this type of project. The recommendations contained in this report are therefore contingent upon the review of the final grading and drainage plans by this office, and upon geotechnical observation and testing by BAGG Engineers of all pertinent aspects of site grading, including placement of subdrains, fills and backfills.

Subsurface conditions and standards of practice change with time. Therefore, we should be consulted to update this report, if grading and construction does not commence within five years from the date of this report provided the site conditions, the building code or standard of practice in this area do not change significantly. Additionally, the recommendations of this report are only valid for the proposed project as described herein. If the proposed project is modified, our recommendations should be reviewed and approved or modified by this office in writing.

We trust this letter report provides you with the information required at this time. If you have any questions, please feel free to contact us.

Very truly years,
BAGG Engineers

Sadek M. Derrega, PG, CEG #2175
Principal Engineering Geologist

Mike Matusich, PE, GE #3013
Senior Geotechnical Engineer

SMD/MM

Attachments:

Plates

Plate 1	Vicinity Map
Plate 2	Site Plan-Cut Phase, Cross Sections & Section Lines
Plate 3	Site Plan-Fill Phase, Cross Sections & Section Lines
Plate 4	Site Plan-Cut Phase, Location of Section Lines
Plate 5	Site Plan-Fill Phase, Location of Section Lines
Plate 6	Aerial Site Plan and Geology
Plate 7	Area Geology Map
Plate 8	Site Photo
Plate 9	Geologic Cross Section 1-1’ Showing Prominent Landslide
Plate 10	Analyzed Geologic Cross Section 1-1’
Plate 11	Analyzed Geologic Cross Section 2-2’
Plate 12	Analyzed Geologic Cross Section 3-3’
Plate 13	Analyzed Geologic Cross Section 4-4’
Plate 14	Analyzed Geologic Cross Section 5-5’

Plate 15	Analyzed Geologic Cross Section 6-6'
Plates 16 through 33	Slope Stability Analysis Plots

Appendix A

Atterberg Limits Test Results
Drained Residual and peak Torsional Shear Strengths (clayey gouge)
Remolded Shear Strength Test Data (Norfleet Consultants, 2008)

ASFE document titled "Important Information About Your Geotechnical Engineering Report"

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Base Map: Google Earth

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WESTERN RIM SLOPE
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VICINITY MAP

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	1

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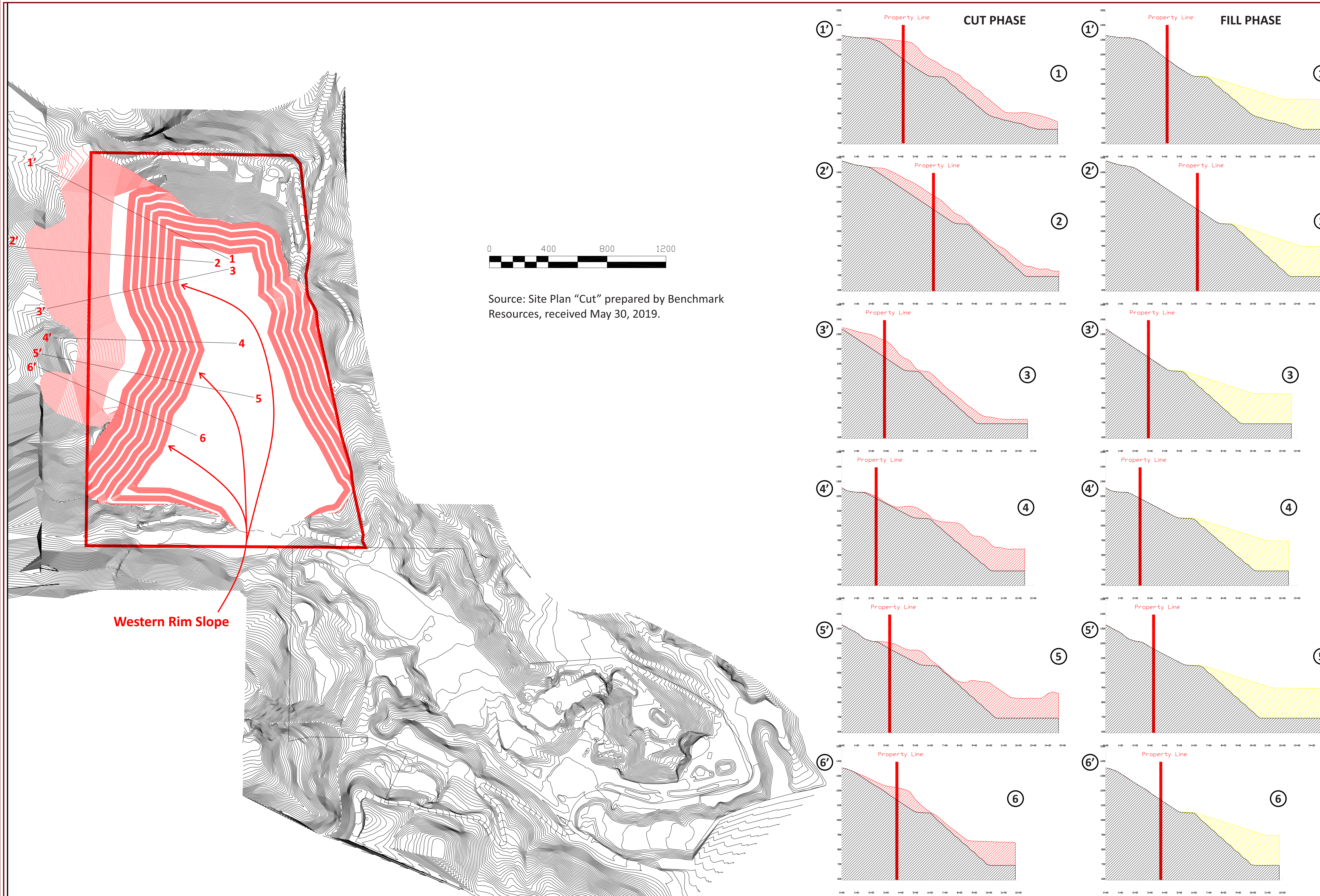

SITE PLAN- CUT PHASE
CROSS SECTIONS & SECTION LINES

PLATE 2

DATE December 2019

SCALE: 1" ≈ 600'

JOB NO.: STEVE-18-02

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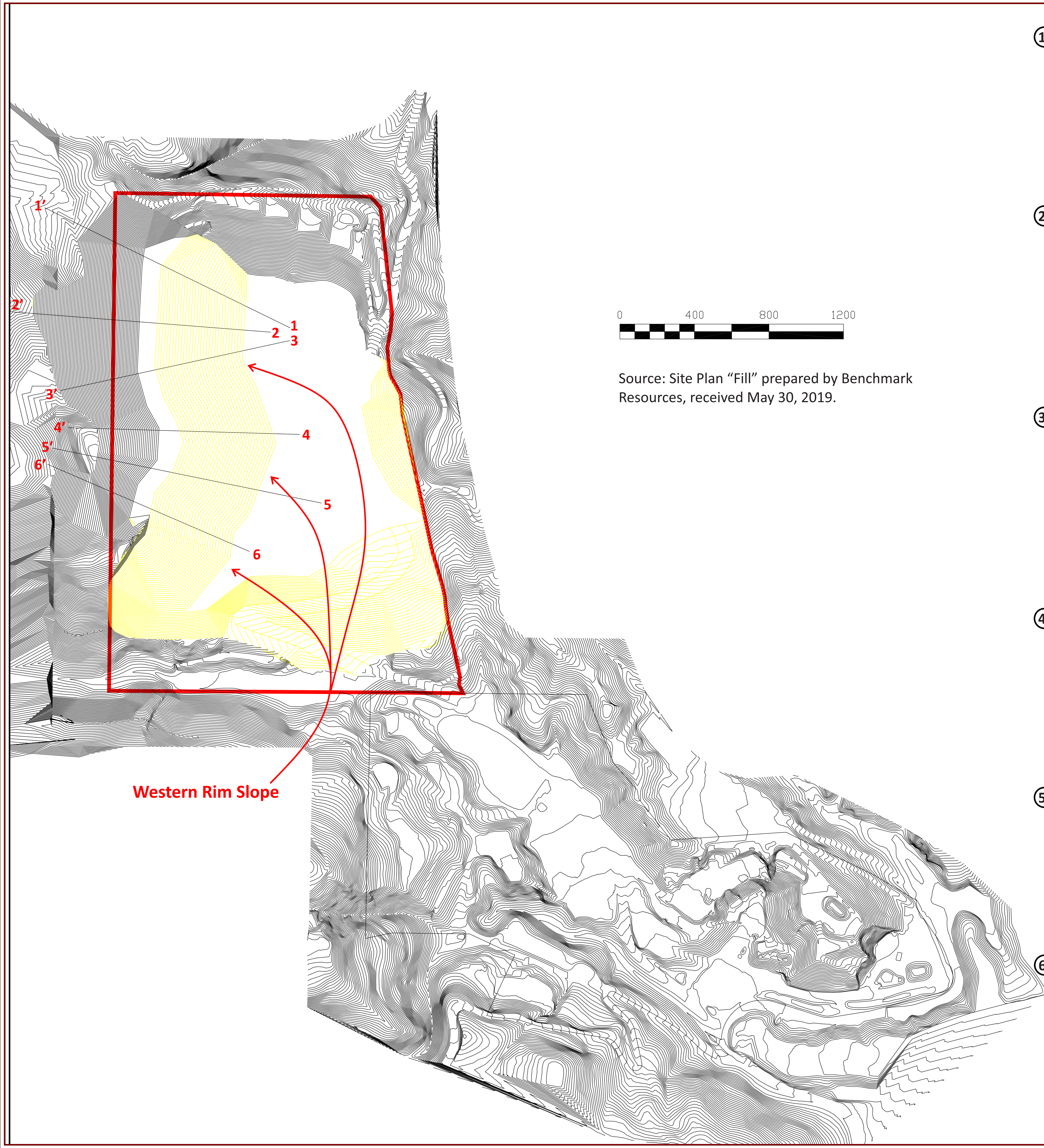
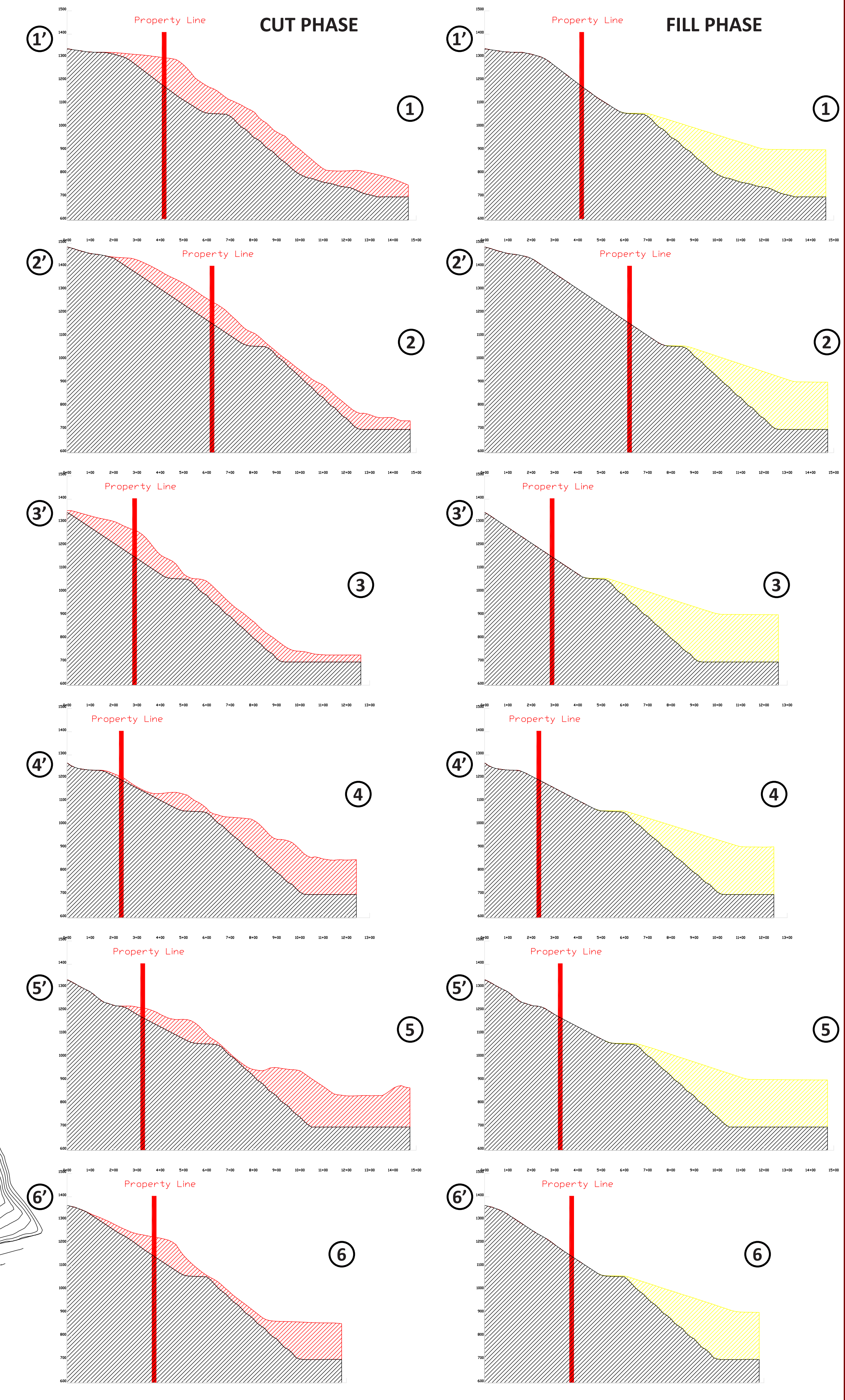


Source: Site Plan "Fill" prepared by Benchmark Resources, received May 30, 2019.



SITE PLAN- FILL PHASE
CROSS SECTIONS & SECTION LINES

PLATE
3

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December 2019

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1" ≈ 600'

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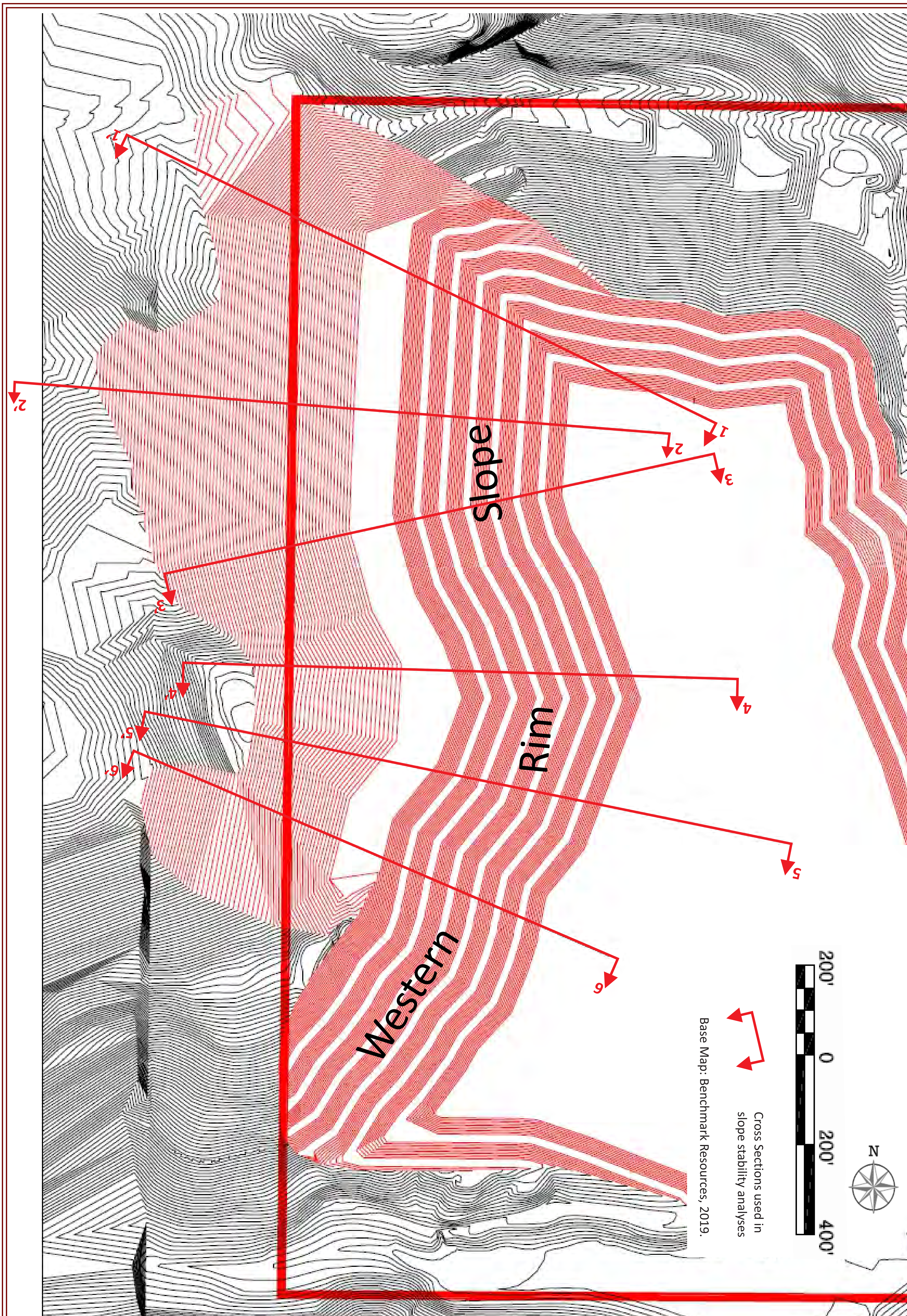

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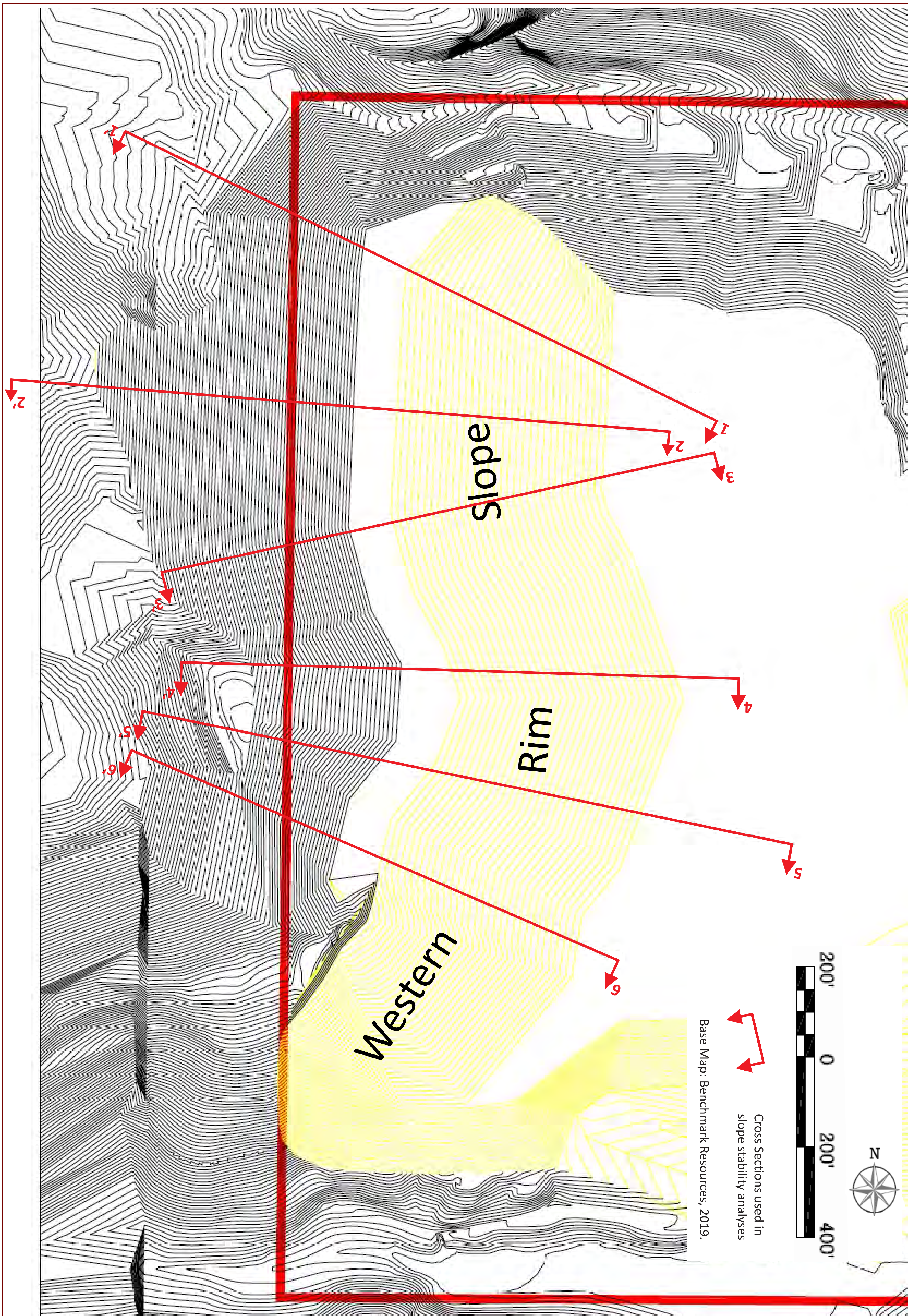
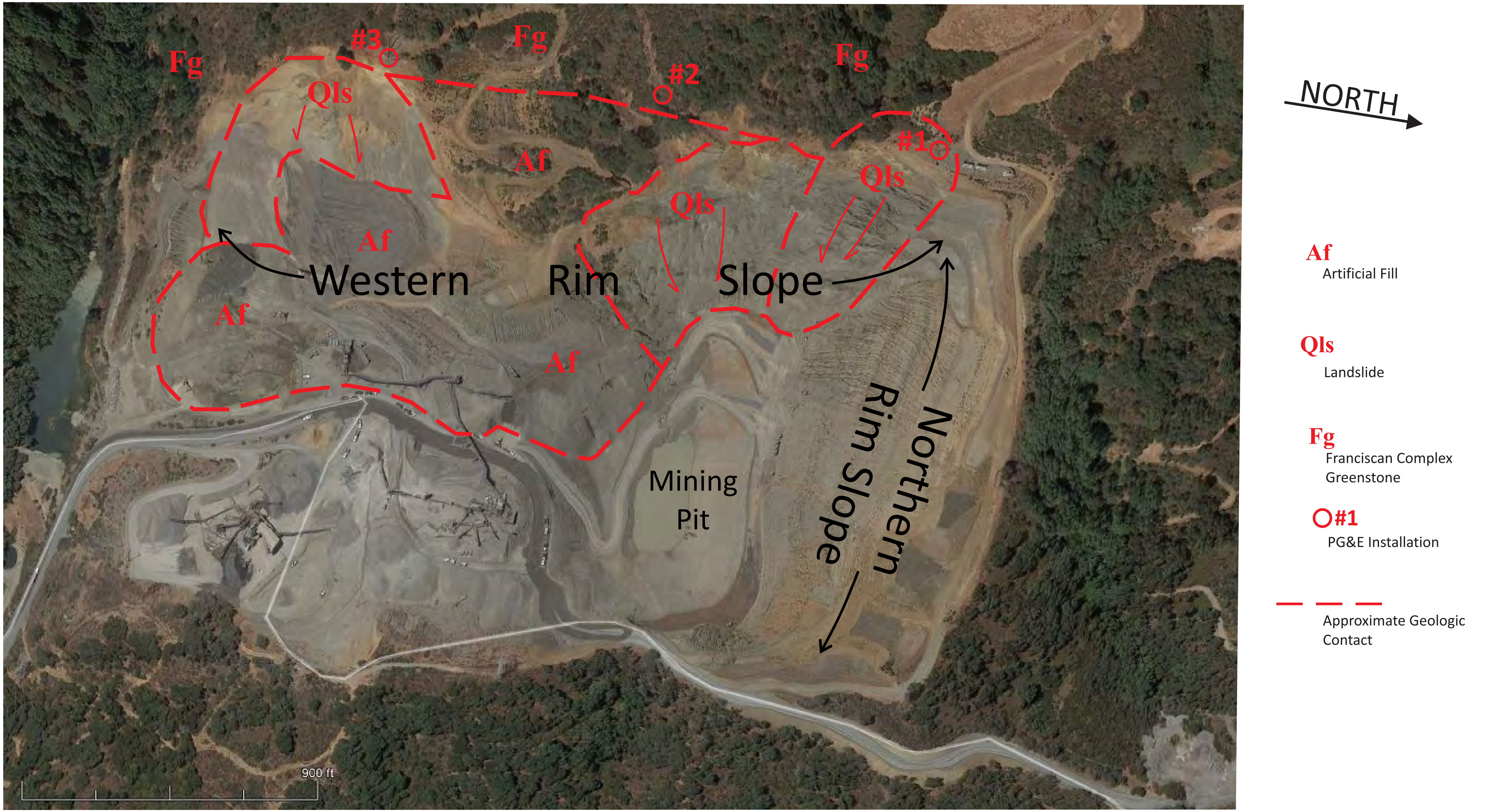
SITE PLAN- CUT PHASE
LOCATION OF SECTION LINES

JOB NO.:	SCALE:	DATE	PLATE
STEVE-18-02	1" = 200'	December 2019	4



ENGINEERING GEOLOGIC SLOPE CHARACTERIZATION, STABILITY ANALYSIS AND GEOTECHNICAL CONSULTATION WESTERN RIM SLOPE STEVENS CREEK QUARRY CUPERTINO, CALIFORNIA 95014	BAGG ENGINEERS	SITE PLAN- FILL PHASE LOCATION OF SECTION LINES	
JOB NO.: STEVE-18-02	SCALE: 1" = 200'	DATE December 2019	PLATE 5



Base Map:
Google Earth Image

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AERIAL SITE PLAN AND GEOLOGY

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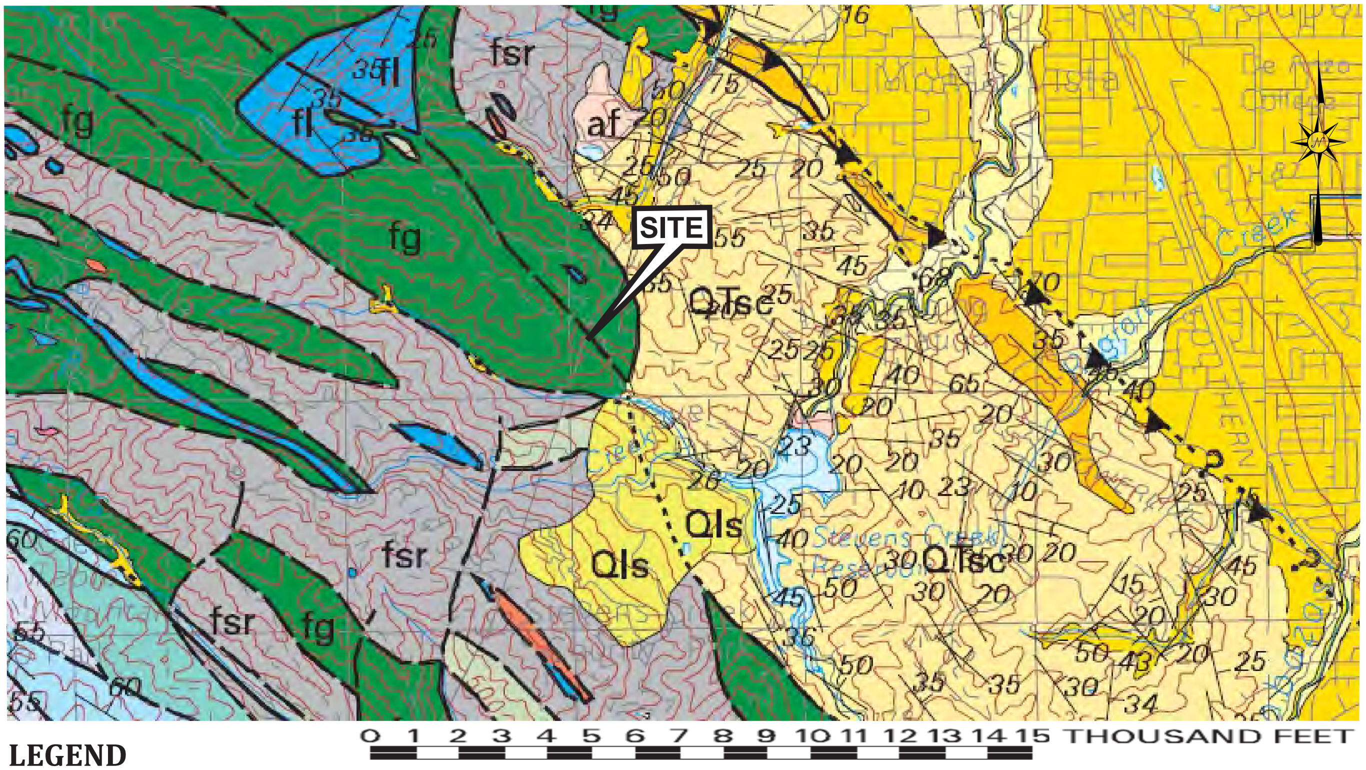
STEVE-18-02	as indicated	December 2019	6



LEGEND

af **Artificial Fill (Historic) --** Loose to very well consolidated gravel, silt, sand, clay, rock fragments, organic matter, and man-made debris in various combinations. Thickness is variable and may exceed 30 meters in places. Some is compacted and quite firm, but fill made before 1965 is nearly everywhere not compacted and consists simply of dumped materials.

Qls **Landslide Deposits (Pleistocene and/or Holocene) --** Poorly sorted clay, silt, sand and gravel. Only a few very large landslides have been mapped. For a more complete map of landslide deposits, see Nilsen and other (1979).

QTsc **Santa Clara Formation (lower Pleistocene and upper Pliocene) --** Gray to red brown poorly indurated conglomerate, sandstone, and mudstone in irregular and lenticular beds. Conglomerate consists mainly of subangular to subrounded cobbles in a sandy matrix but locally includes pebbles and boulders. On Coal Mine Ridge, south of Portola Valley, conglomerate contains boulders of an older conglomerate as long as one meter. Gray to buff claystone and siltstone beds on Coal Mine Ridge, contain carbonized wood fragments as large as 60 cm in diameter. Included in Santa Clara Formation are similar coarse-grained clastic deposits near Burlingame. Sarna-Wojcicki (1976) found a tuff bed in Santa Clara Formation near Woodside, and correlated it with a similar tuff in the Merced Formation. Later work indicated that the tuff correlates with the 435 ka Rockland ash (Sarna-Wojcicki, oral comm., 1997). Thickness is variable but reaches a maximum of about 500 meters along Coal Mine Ridge.

fg **Greenstone of Franciscan Complex (Cretaceous and Jurrasic) --** Dark green to red altered basaltic rocks, including flows, pillow lavas, breccias, tuff breccias, tuffs, and minor related intrusive rocks, in unknownj proportions. Unit includes some Franciscan chert and limestone bodies that are too small to show on map. Greenstone crops out in lenticular bodies varying in thickness from a few meters to many hundreds of meters.

fs **Greenstone of Franciscan Complex (Cretaceous and Jurrasic) --** Dark green to red altered basaltic rocks, including flows, pillow lavas, breccias, tuff breccias, tuffs, and minor related intrusive rocks, in unknownj proportions. Unit includes some Franciscan chert and limestone bodies that are too small to show on map. Greenstone crops out in lenticular bodies varying in thickness from a few meters to many hundreds of meters.

fl **Limestone of Franciscan Complex (Cretaceous and Jurrasic) --** Light gray, finely to coarsely crystalline limestone. In places limestone is unbedded, in other places it is distinctly bedded between beds of black chert. Limestone crops out in lenticular bodies up to 120 meters thick, in most places surrounded by Franciscan greenstone.

fsr **Shearerd Rock (melange) of Franciscan Complex (Cretaceous and Jurrasic) --** Predominantly graywacke, siltstone, and shale, substantial portions of which have been sheared, but includes hard blocks of all other Franciscan rock types. Total thickness of unit is unknown, but is probably at least several tens of meters.

Reference: Geology of Palot Alto 30x60 Minute Quadrangle, California: A Digital Database by E.E. Brabb, R.W. Graymer, and D.L. Jones, Pamphlet Dervied From Digital Open-File Report 98-348

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AREA GEOLOGY MAP

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	7

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Base Map: Google Earth

ENGINEERING GEOLOGIC SLOPE CHARACTERIZATION, STABILITY ANALYSIS AND GEOTECHNICAL CONSULTATION **WESTERN RIM SLOPE** **STEVENS CREEK QUARRY** **CUPERTINO, CALIFORNIA 95014**	**SITE PHOTO**		
	DATE: December 2019	JOB NUMBER: STEVE-18-02	PLATE 8

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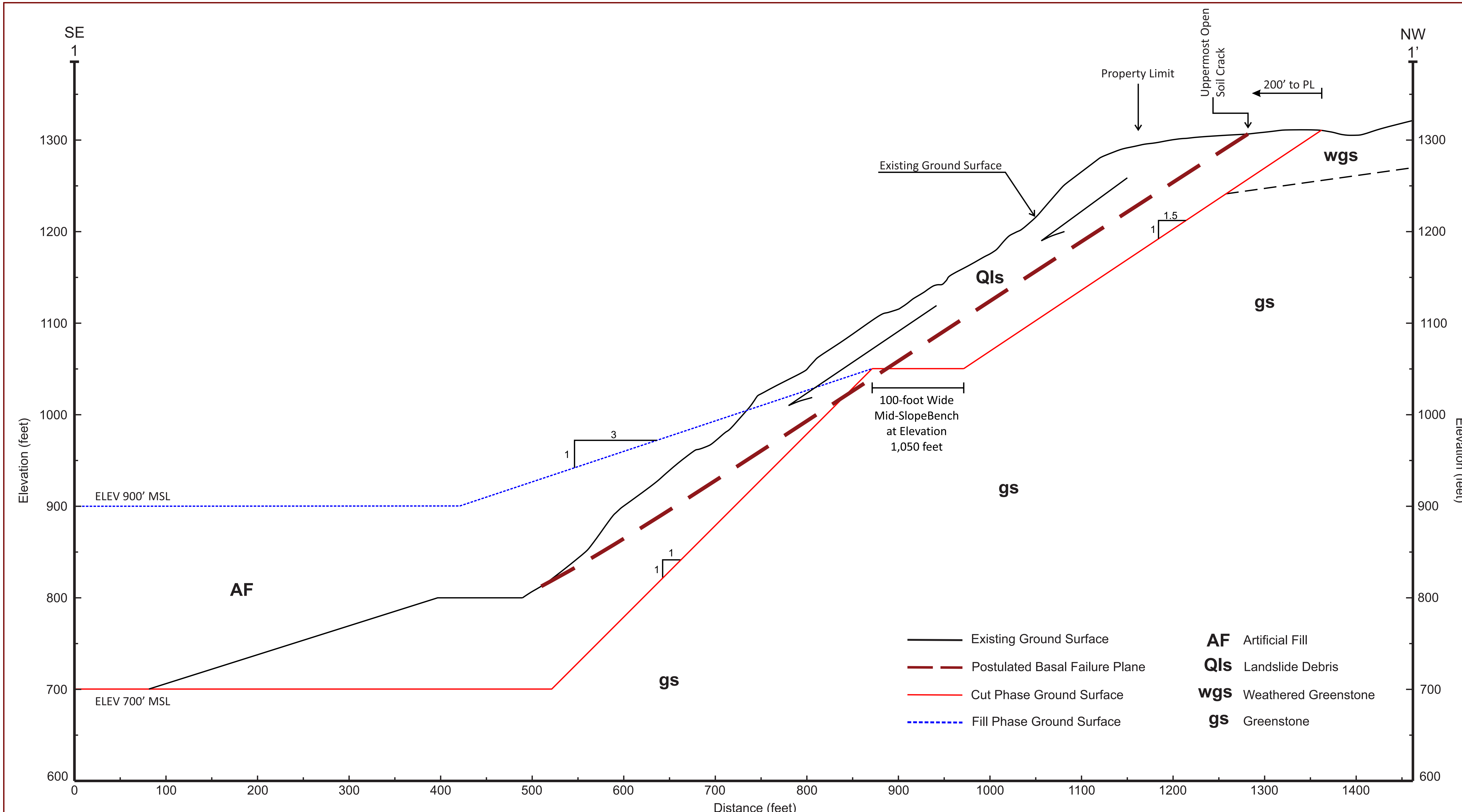

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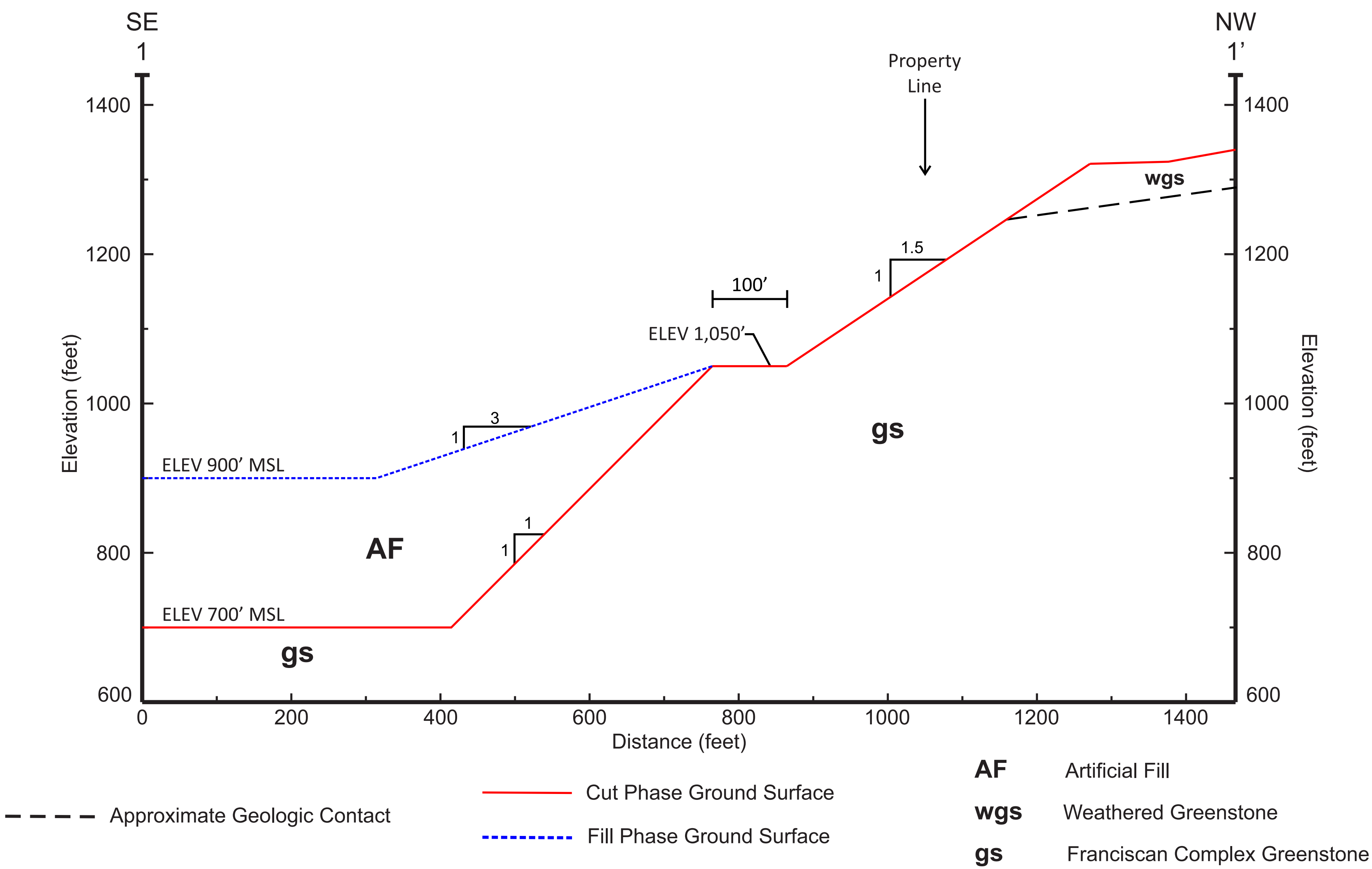
GEOLOGIC CROSS SECTION 1-1'
SHOWING PROMINENT LANDSLIDE

JOB NUMBER:	SCALE:	DATE:	PLATE:
STEVE-18-02	1" = 100'	December 2019	9



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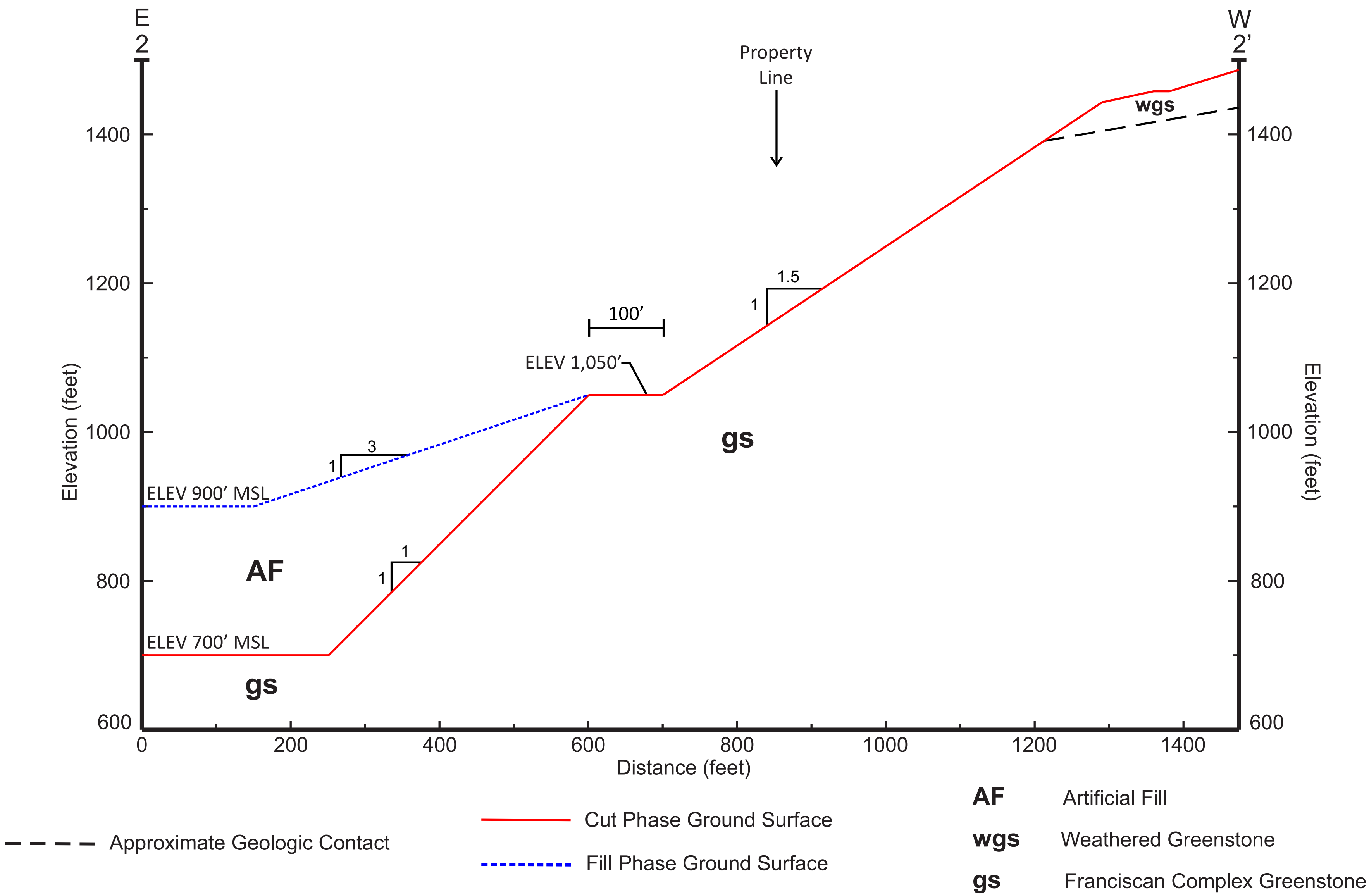
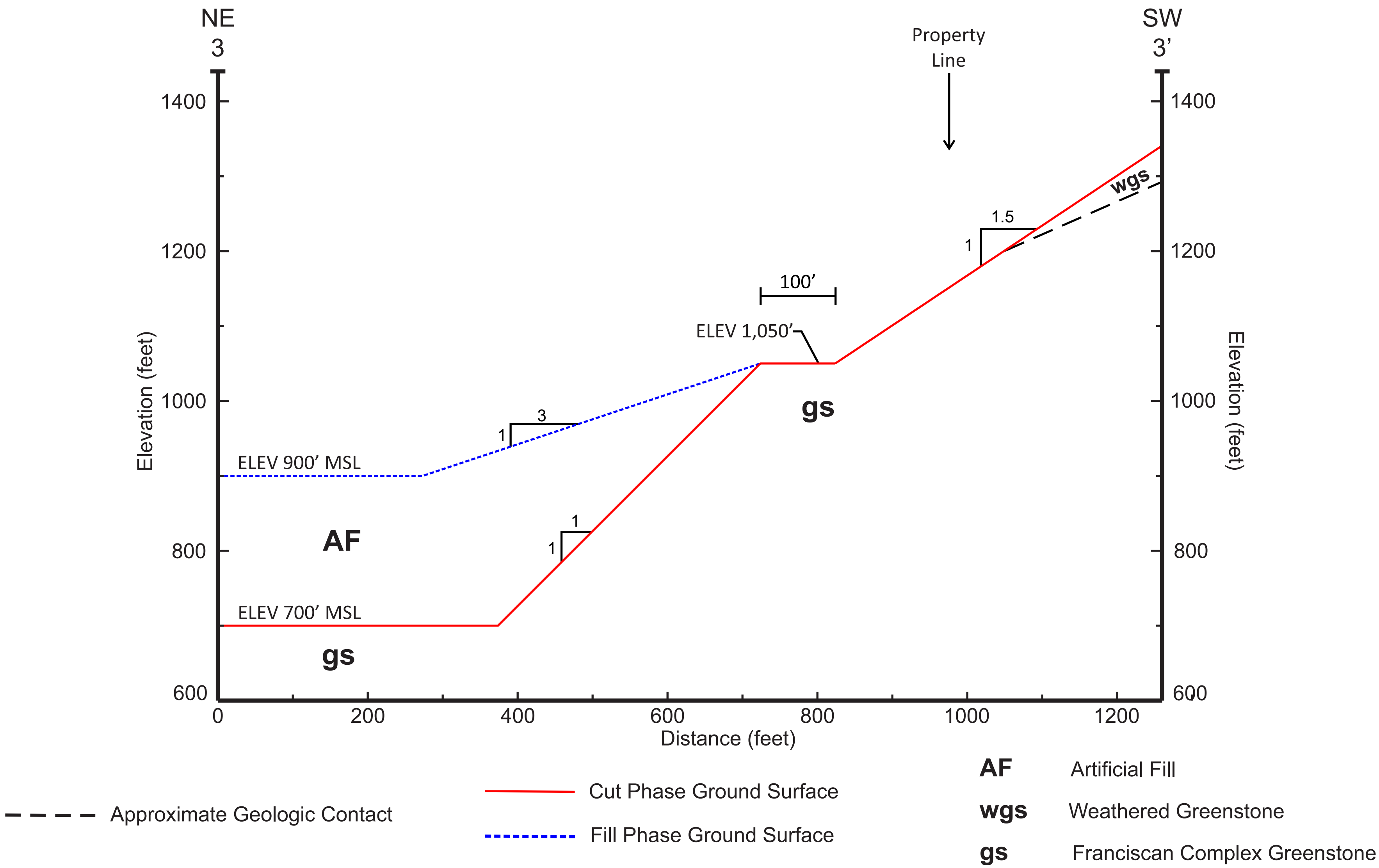
ANALYZED GEOLOGIC CROSS SECTION 1-1'

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	10



ENGINEERING GEOLOGIC SLOPE CHARACTERIZATION, STABILITY ANALYSIS AND GEOTECHNICAL CONSULTATION WESTERN RIM SLOPE STEVENS CREEK QUARRY, CUPERTINO, CALIFORNIA 95014	BAGG ENGINEERS	ANALYZED GEOLOGIC CROSS SECTION 2-2'		
		DATE: December 2019	JOB NUMBER: STEVE-18-02	PLATE 11



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WESTERN RIM SLOPE
STEVENS CREEK QUARRY,
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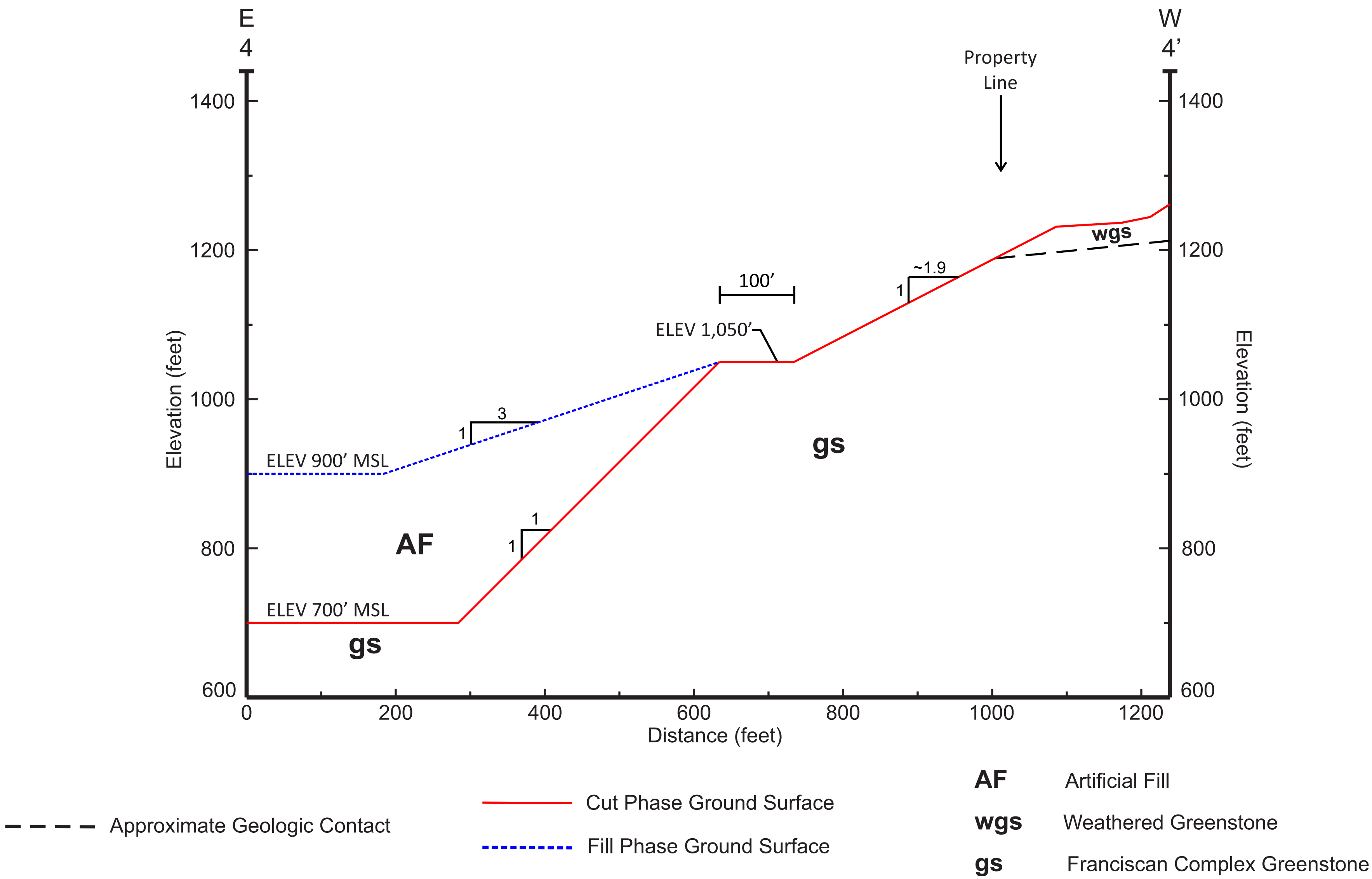
ANALYZED GEOLOGIC CROSS SECTION 3-3'

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	12



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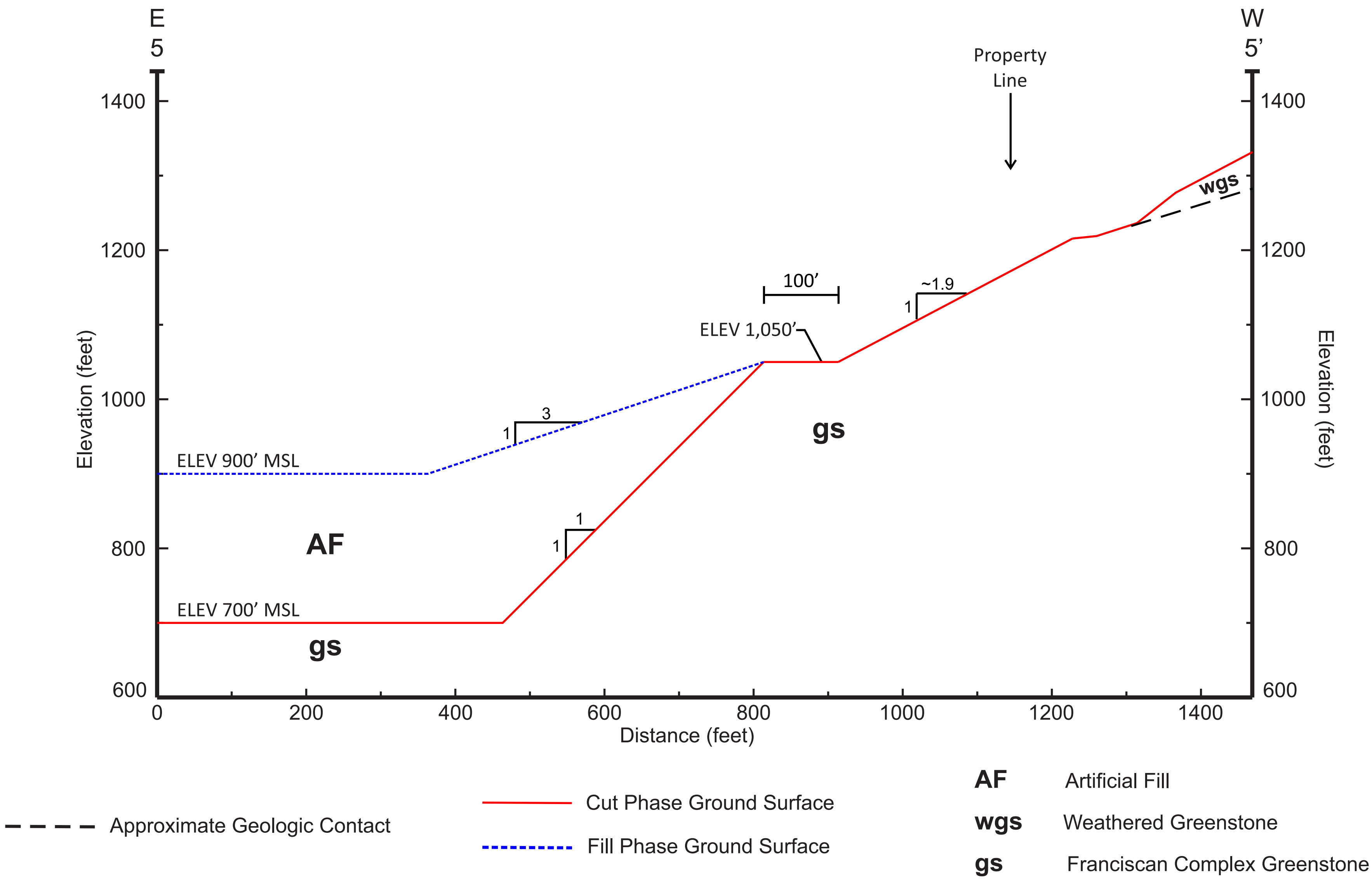
ANALYZED GEOLOGIC CROSS SECTION 4-4'

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	13

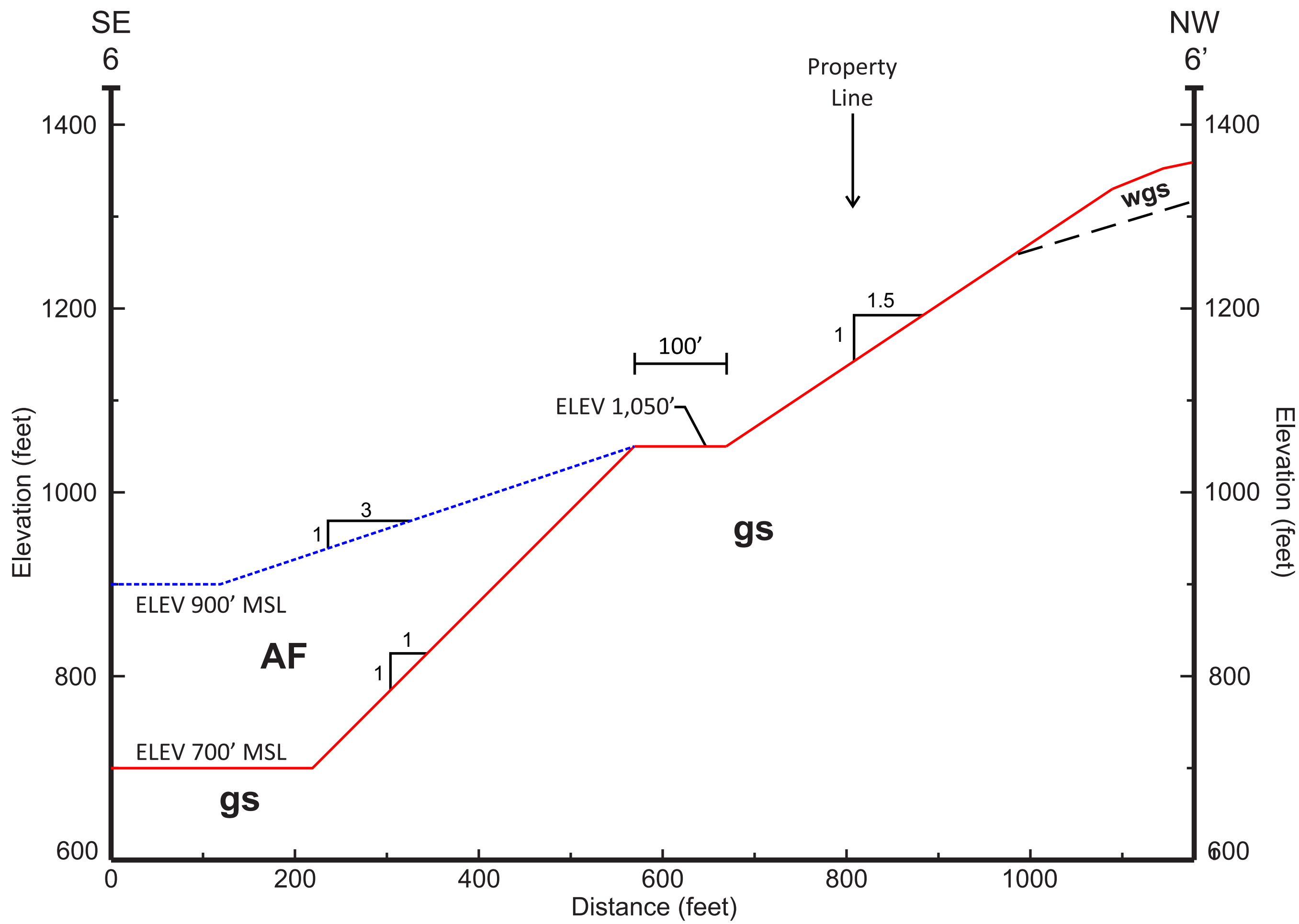


ENGINEERING GEOLOGIC SLOPE CHARACTERIZATION, STABILITY ANALYSIS AND GEOTECHNICAL CONSULTATION
WESTERN RIM SLOPE
STEVENS CREEK QUARRY,
CUPERTINO, CALIFORNIA 95014

BAGG ENGINEERS

ANALYZED GEOLOGIC CROSS SECTION 5-5'

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	14



- - - - Approximate Geologic Contact

Cut Phase Ground Surface

Fill Phase Ground Surface

AF	Artificial Fill
wgs	Weathered Greenstone
gs	Franciscan Complex Greenstone

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WESTERN RIM SLOPE
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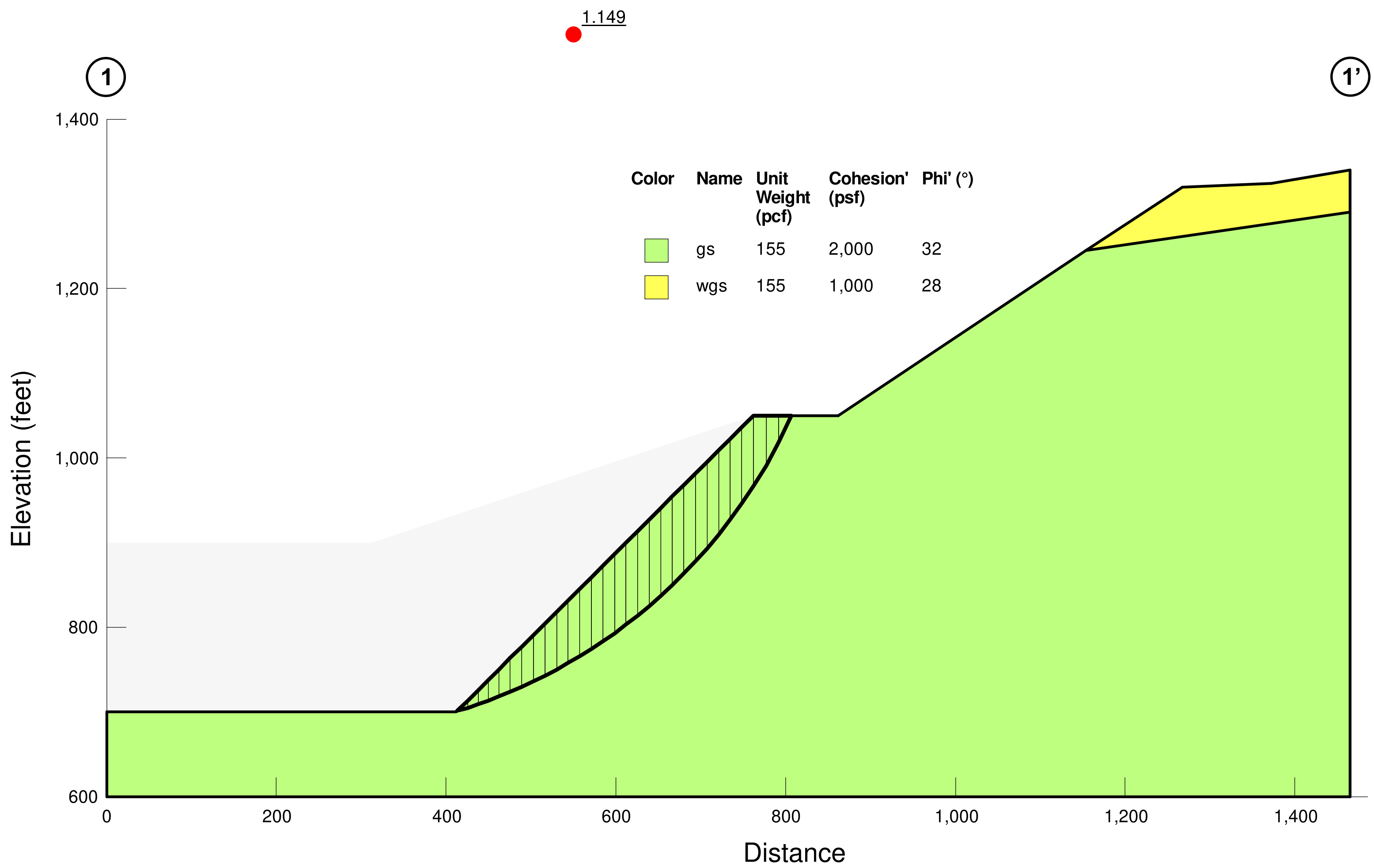
ANALYZED GEOLOGIC CROSS SECTION 6-6'

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	15



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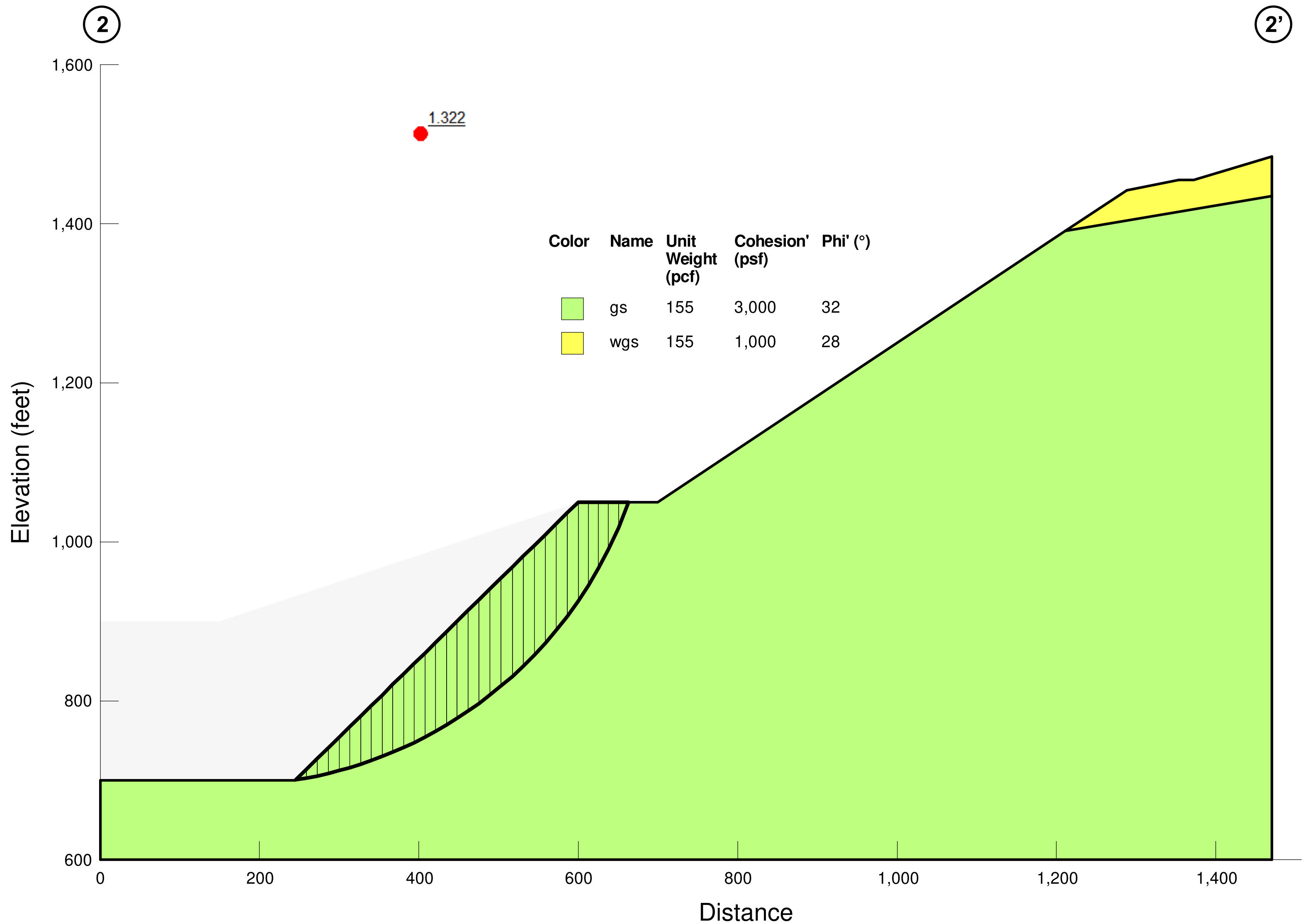
SLOPE STABILITY ANALYSIS - CUT PHASE
CROSS SECTION 1-1', STATIC

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	16



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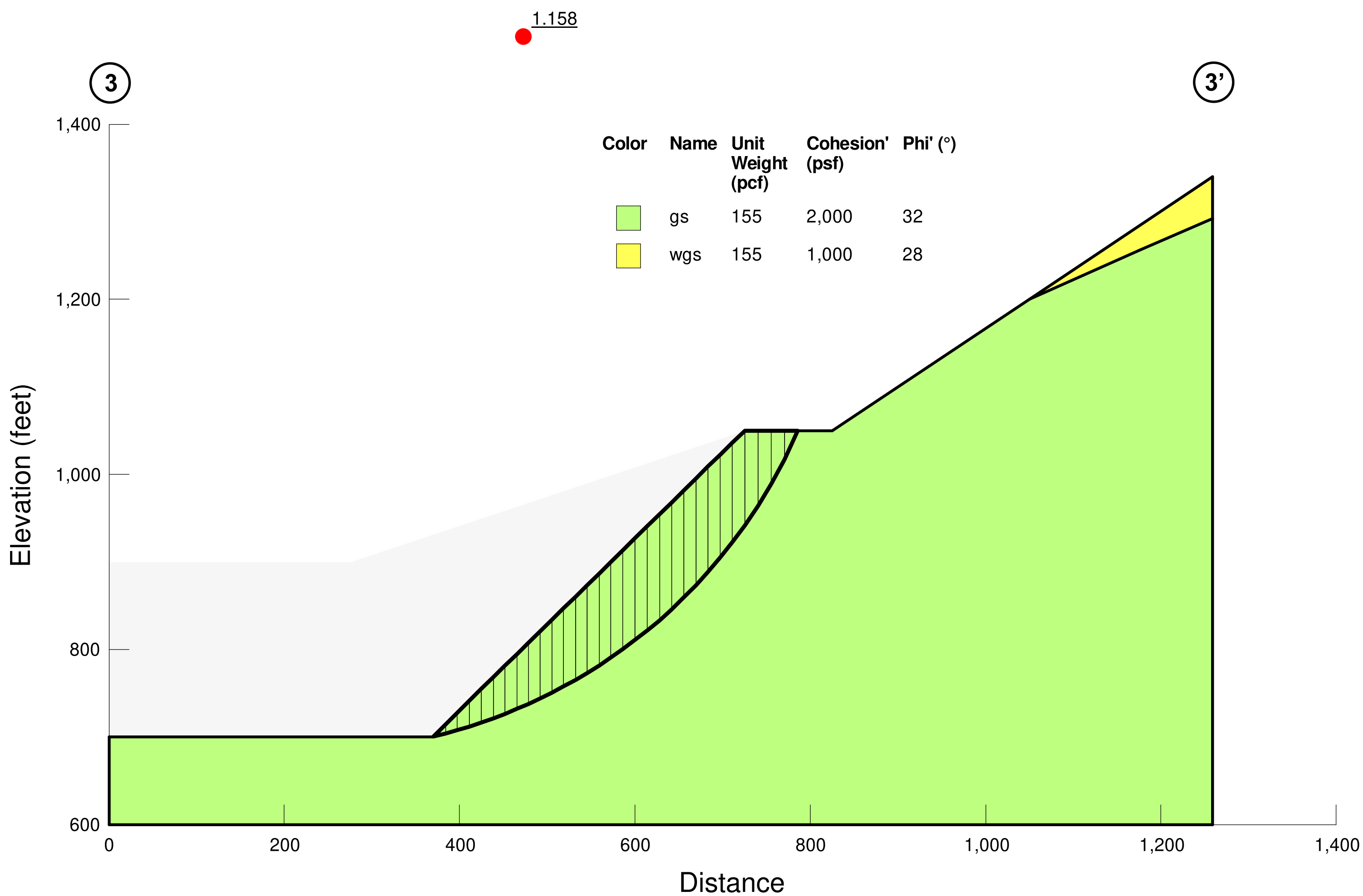
SLOPE STABILITY ANALYSIS - CUT PHASE
CROSS SECTION 2-2’, STATIC

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	17



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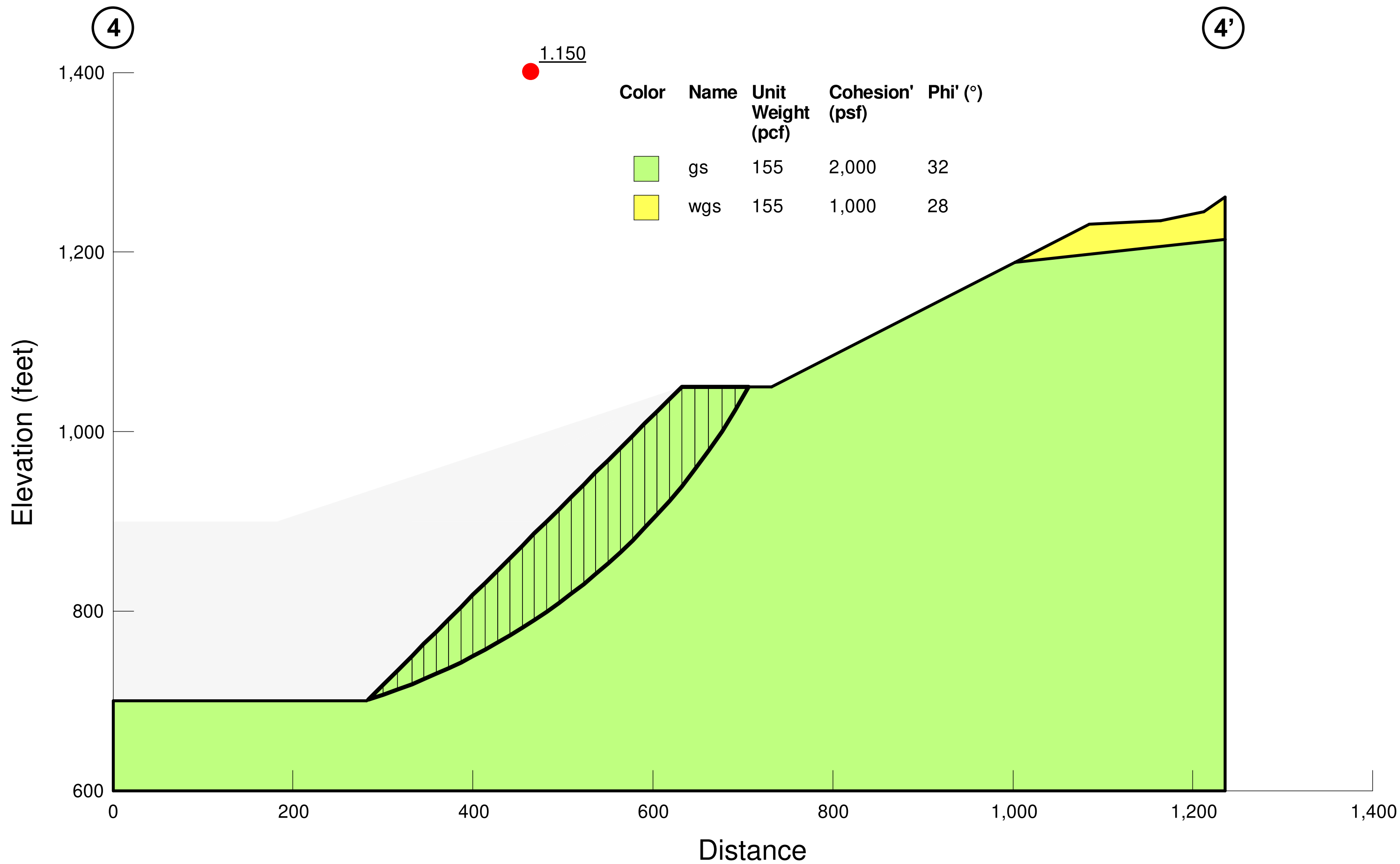
SLOPE STABILITY ANALYSIS - CUT PHASE CROSS SECTION 3-3', STATIC

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	18



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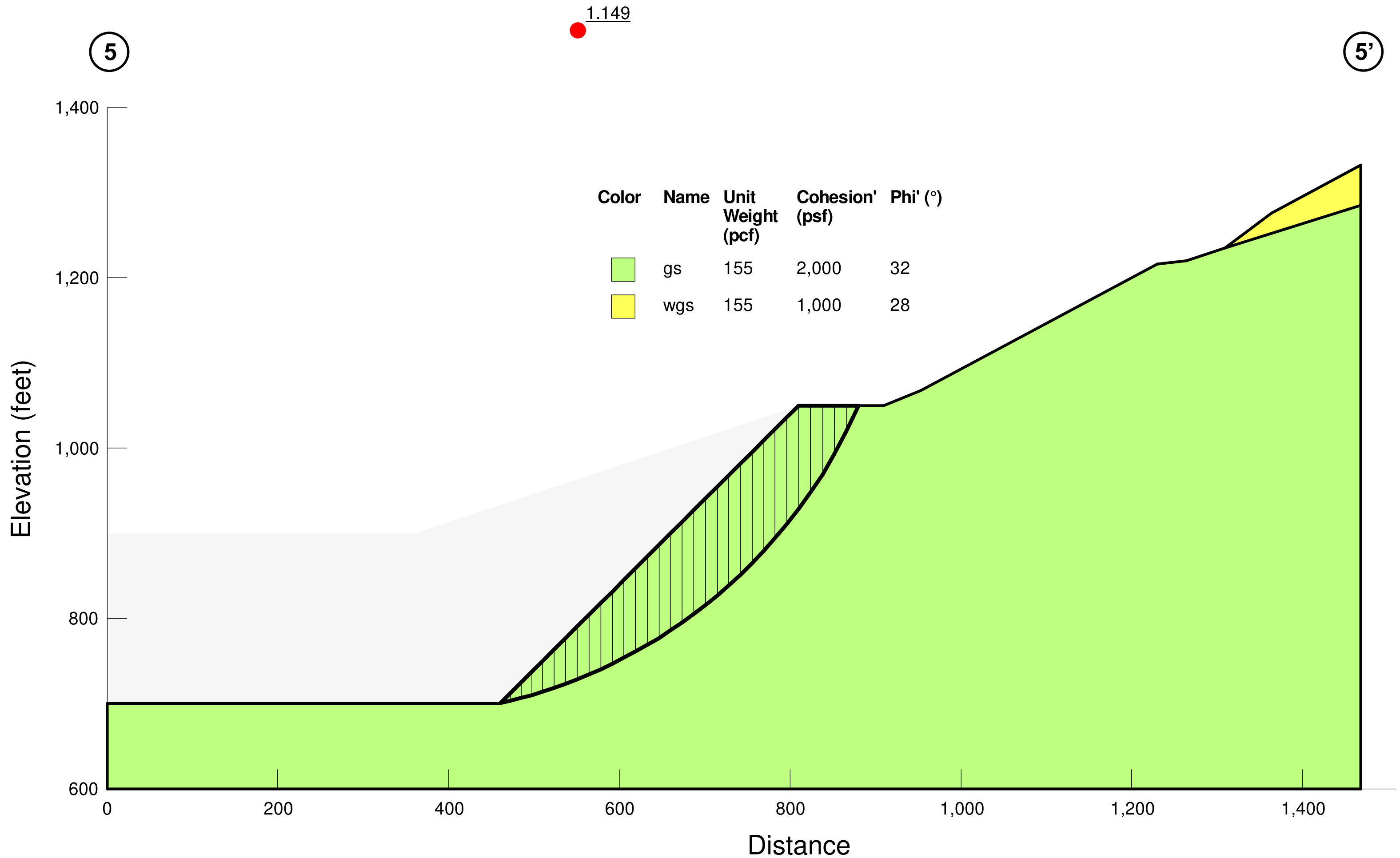
SLOPE STABILITY ANALYSIS - CUT PHASE
CROSS SECTION 4-4', STATIC

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	19



Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	gs	155	2,000	32
	wgs	155	1,000	28

ENGINEERING GEOLOGIC SLOPE CHARACTERIZATION, STABILITY ANALYSIS AND GEOTECHNICAL CONSULTATION
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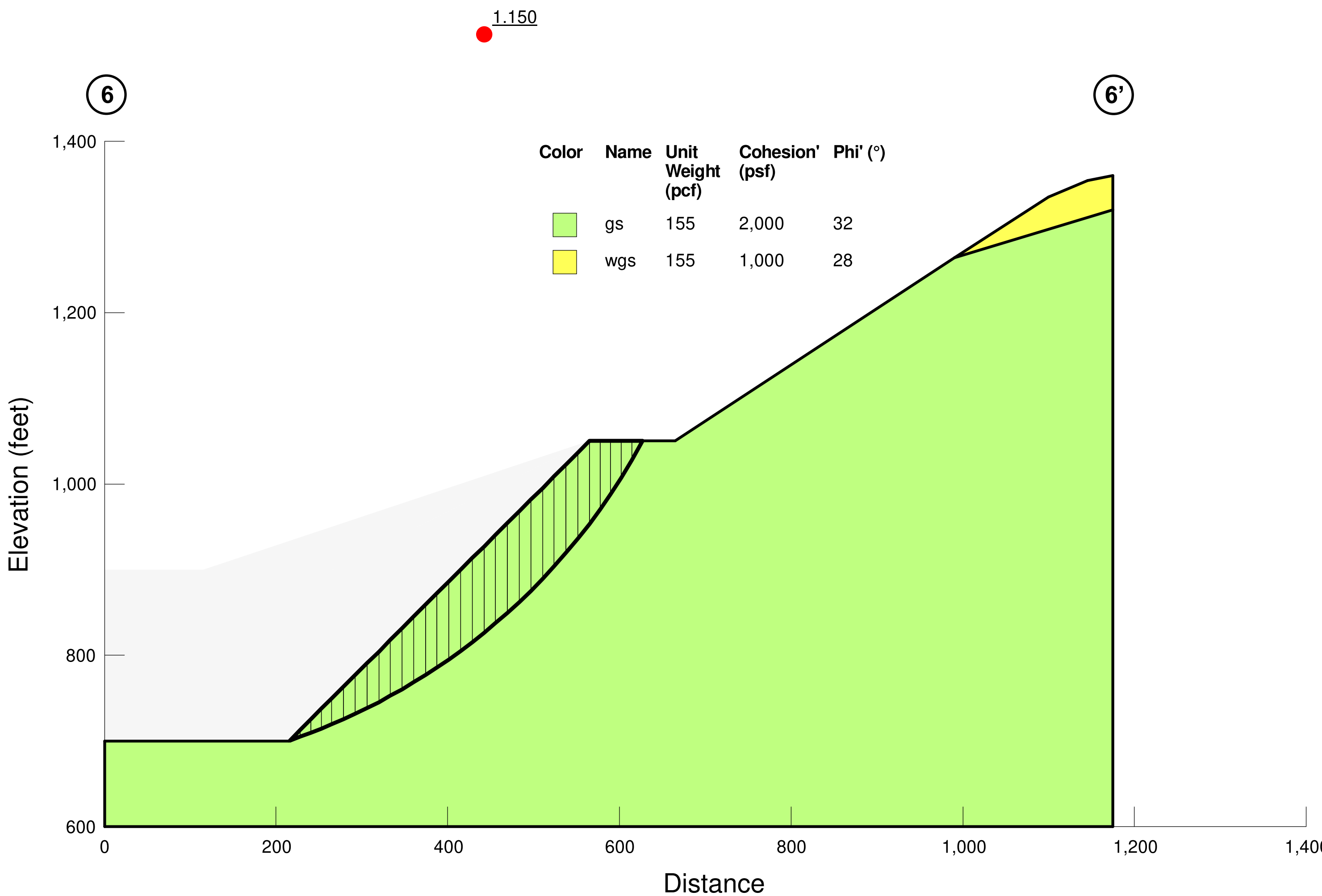
SLOPE STABILITY ANALYSIS - CUT PHASE
CROSS SECTION 5-5', STATIC

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	20



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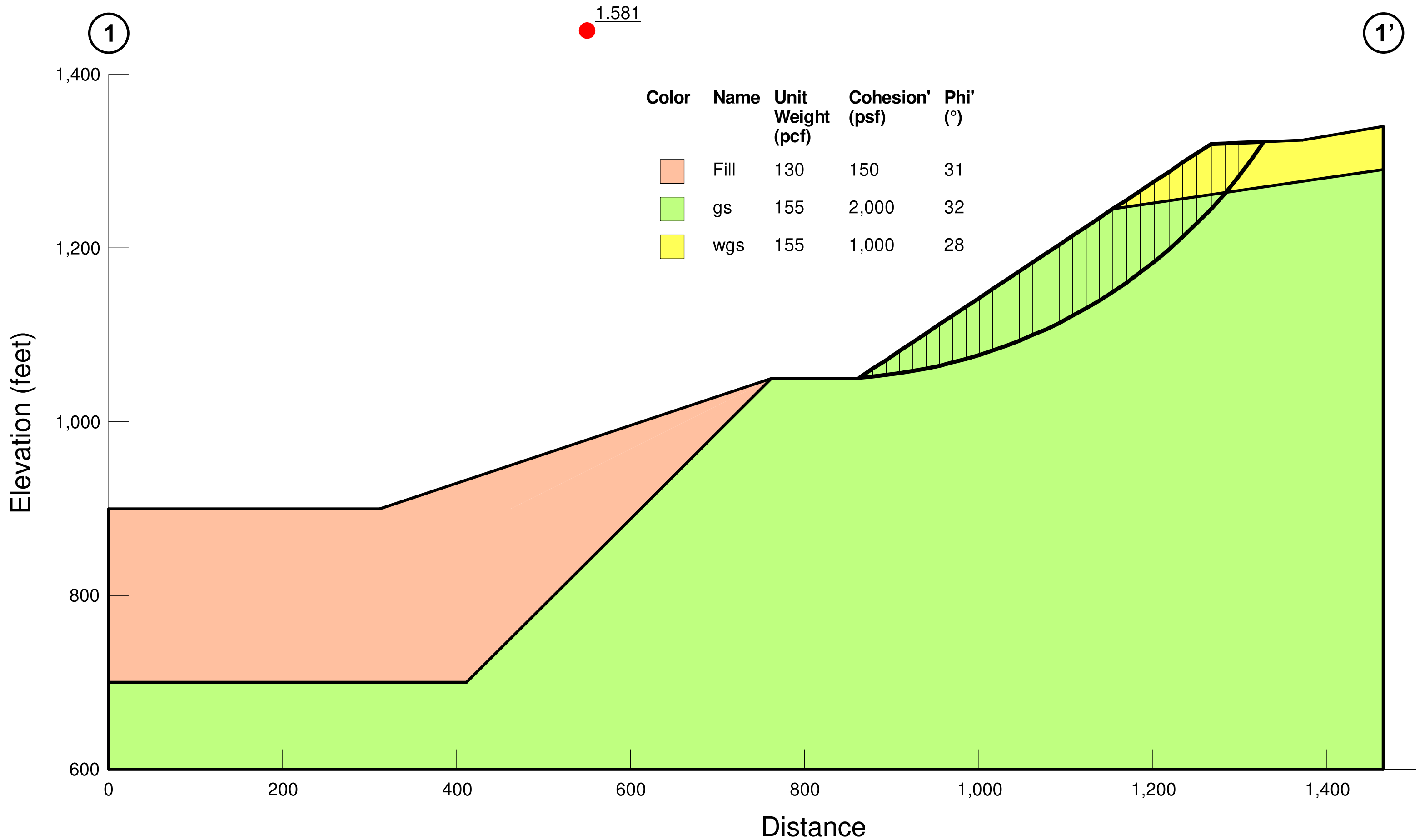
**SLOPE STABILITY ANALYSIS - CUT PHASE
CROSS SECTION 6-6', STATIC**

DATE: December 2019

JOB NUMBER: STEVE-18-02

PLATE 21



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STABILITY ANALYSIS AND GEOTECHNICAL CONSULTATION
WESTERN RIM SLOPE
STEVENS CREEK QUARRY
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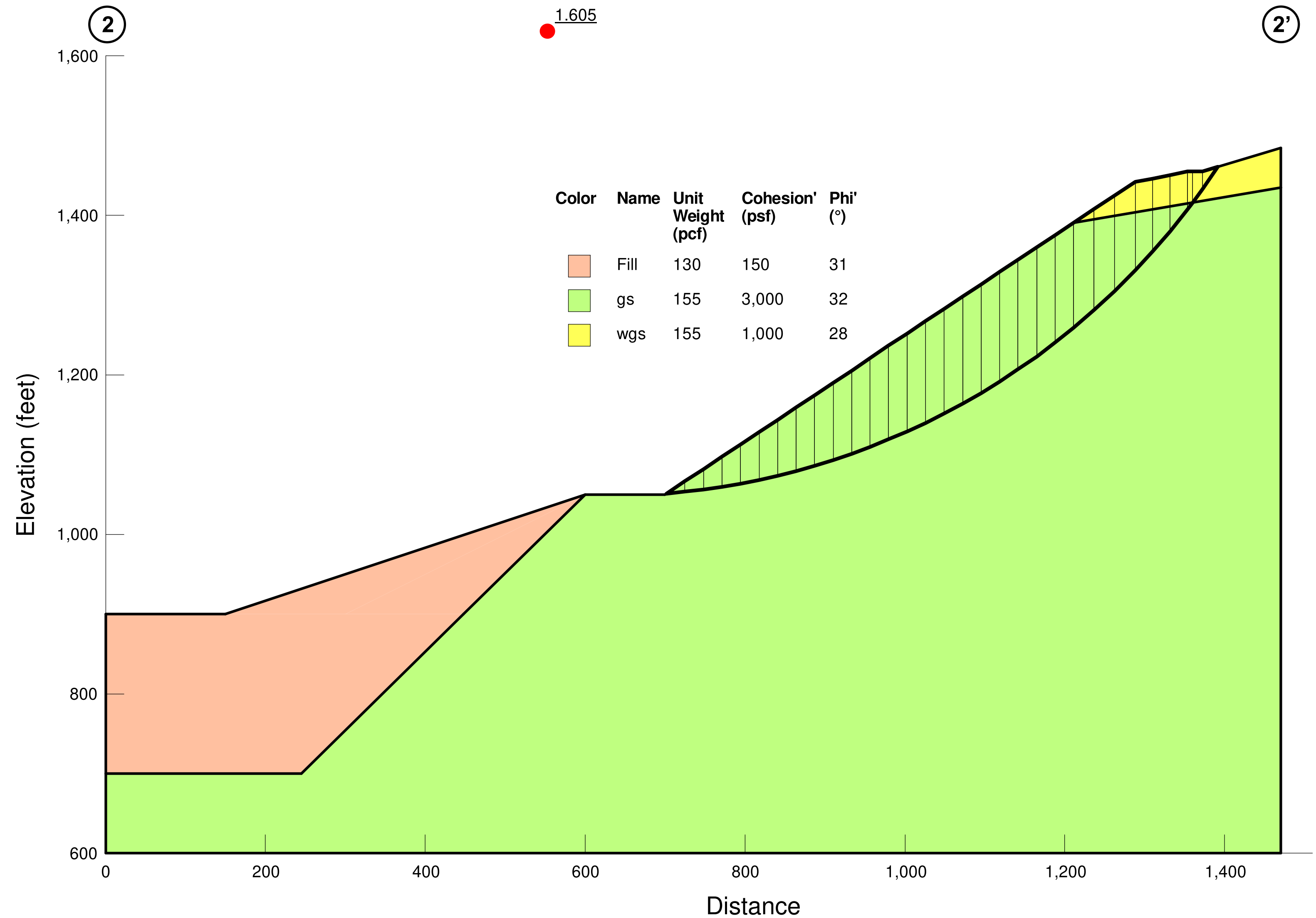
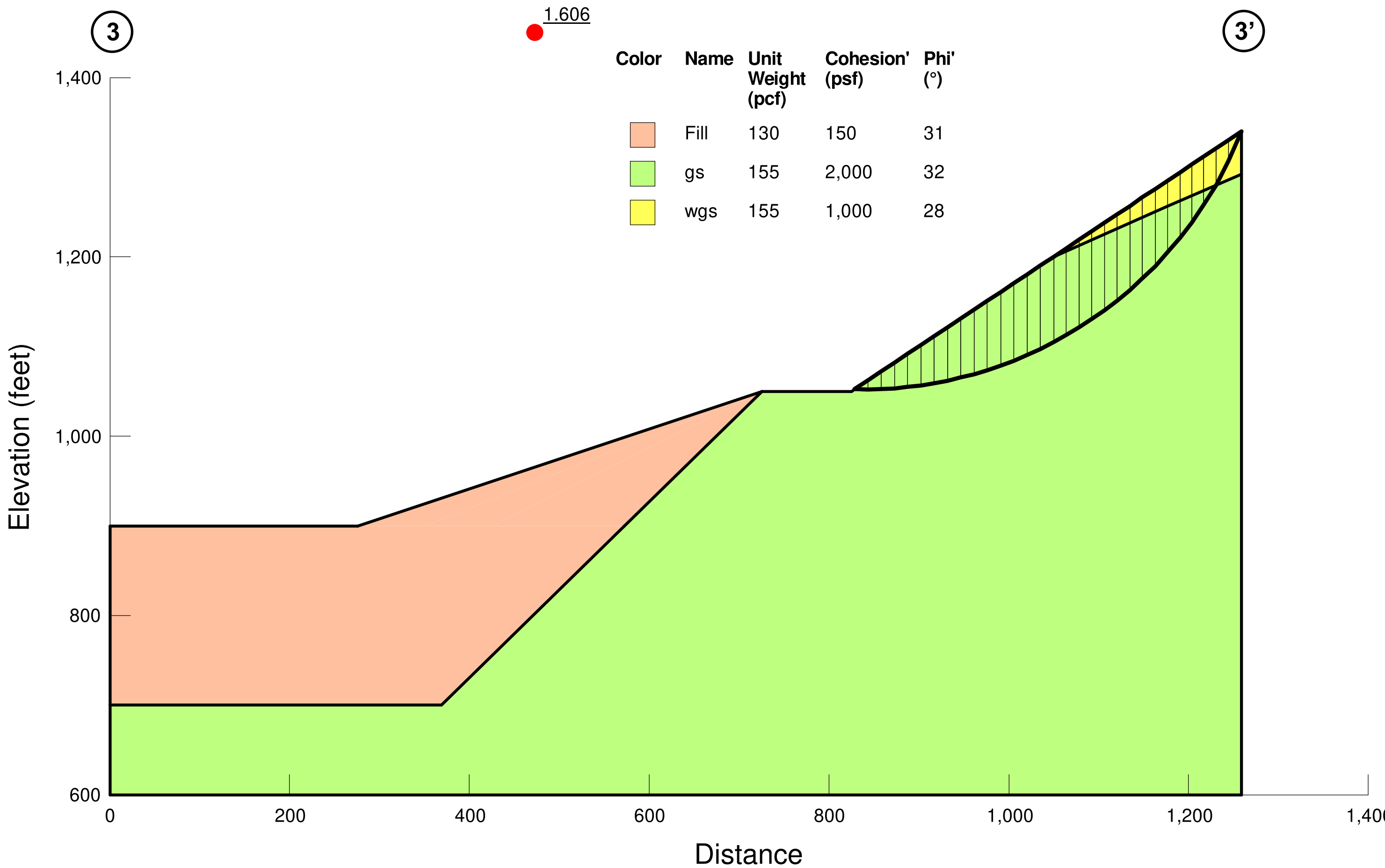
SLOPE STABILITY ANALYSIS - FILL PHASE
CROSS SECTION 1-1', STATIC

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	22



ENGINEERING GEOLOGIC SLOPE CHARACTERIZATION, STABILITY ANALYSIS AND GEOTECHNICAL CONSULTATION WESTERN RIM SLOPE STEVENS CREEK QUARRY CUPERTINO, CALIFORNIA 95014	BAGG ENGINEERS	SLOPE STABILITY ANALYSIS - FILL PHASE CROSS SECTION 2-2', STATIC
		DATE: December 2019
		JOB NUMBER: STEVE-18-02
		PLATE 23



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WESTERN RIM SLOPE
STEVENS CREEK QUARRY
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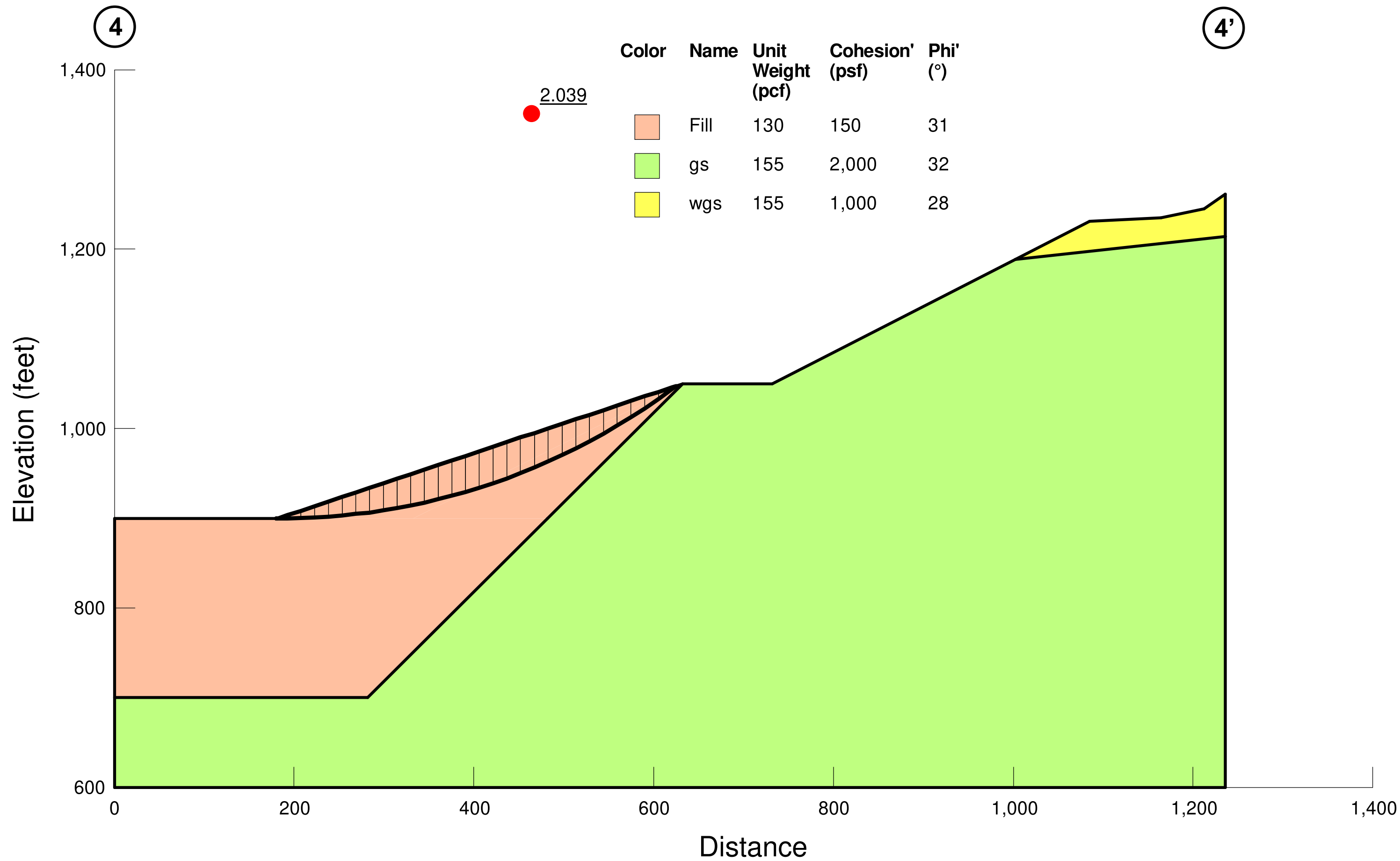
SLOPE STABILITY ANALYSIS - FILL PHASE
CROSS SECTION 3-3', STATIC

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	24



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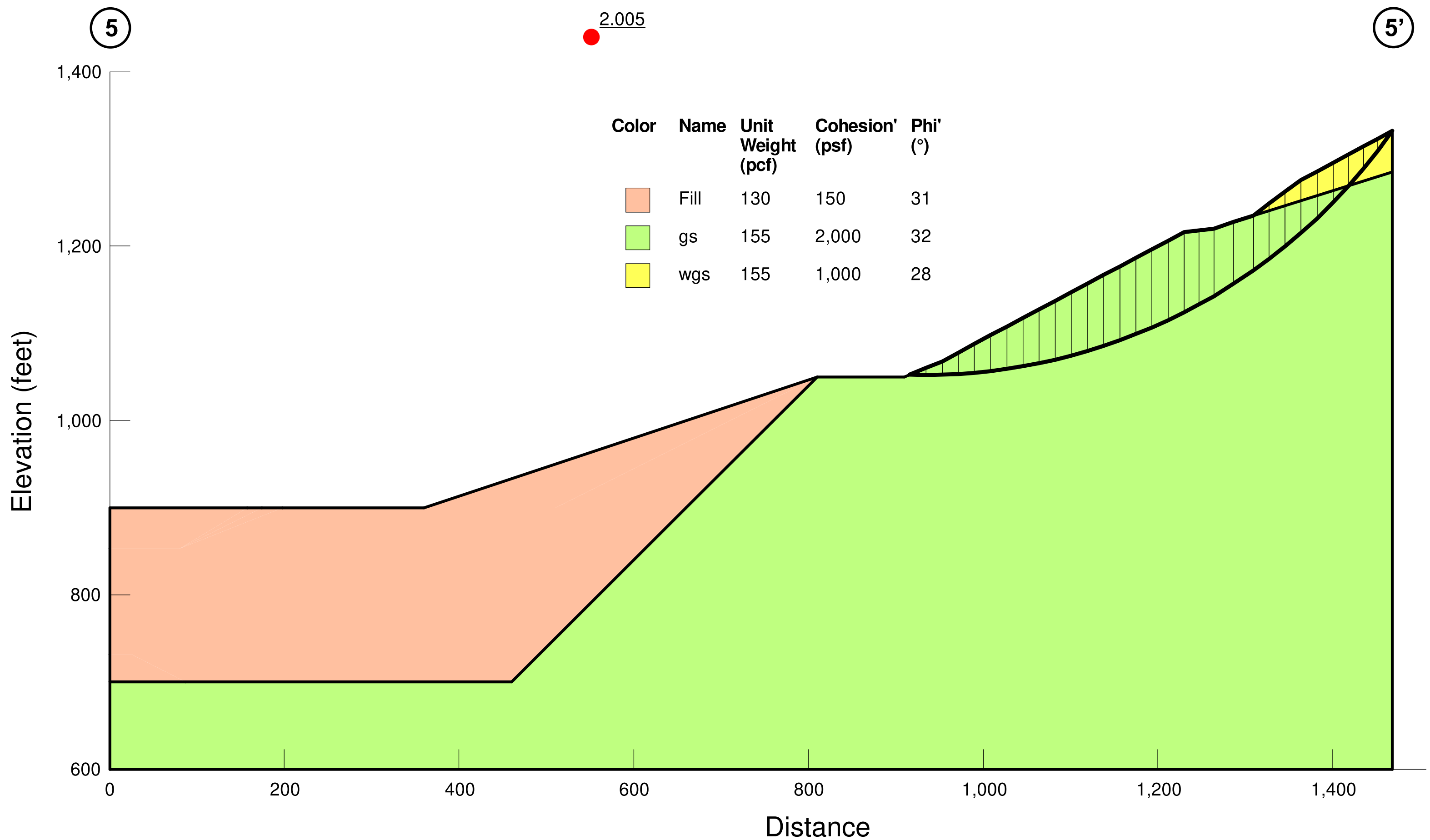
SLOPE STABILITY ANALYSIS - FILL PHASE CROSS SECTION 4-4', STATIC

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	25



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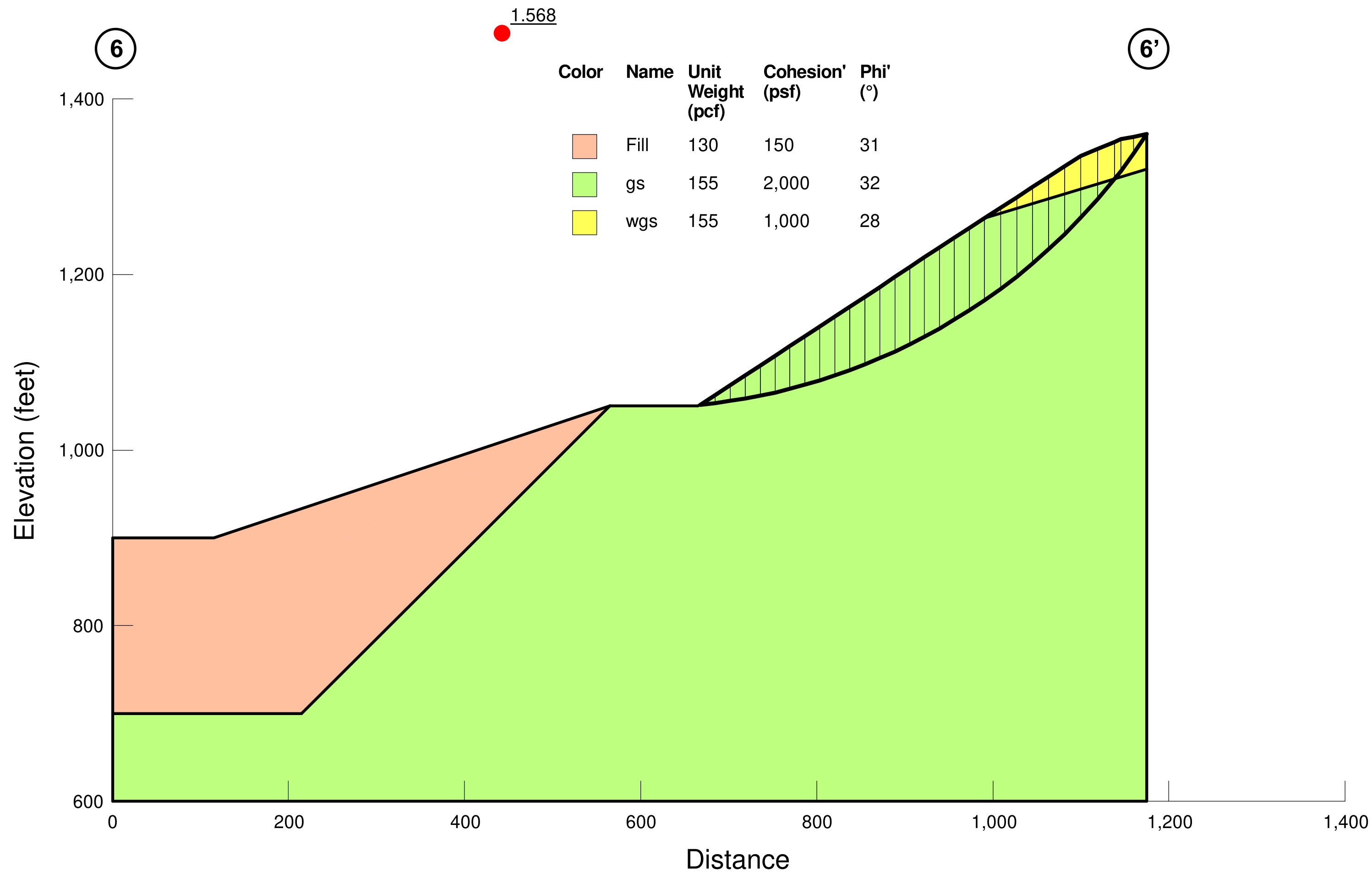
SLOPE STABILITY ANALYSIS - FILL PHASE
CROSS SECTION 5-5', STATIC

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	26



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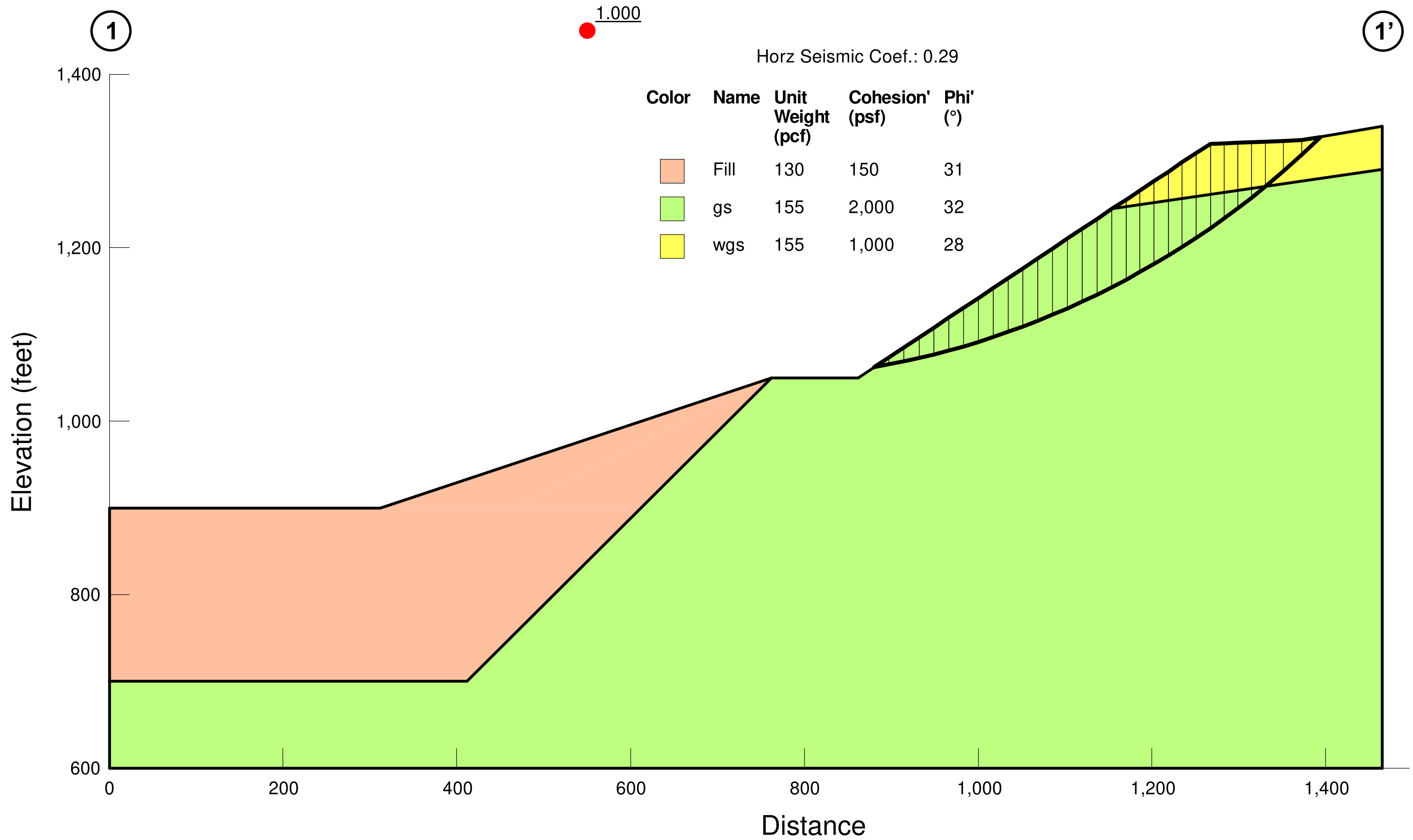
SLOPE STABILITY ANALYSIS - FILL PHASE
CROSS SECTION 6-6', STATIC

DATE: December 2019	JOB NUMBER: STEVE-18-02	PLATE 27



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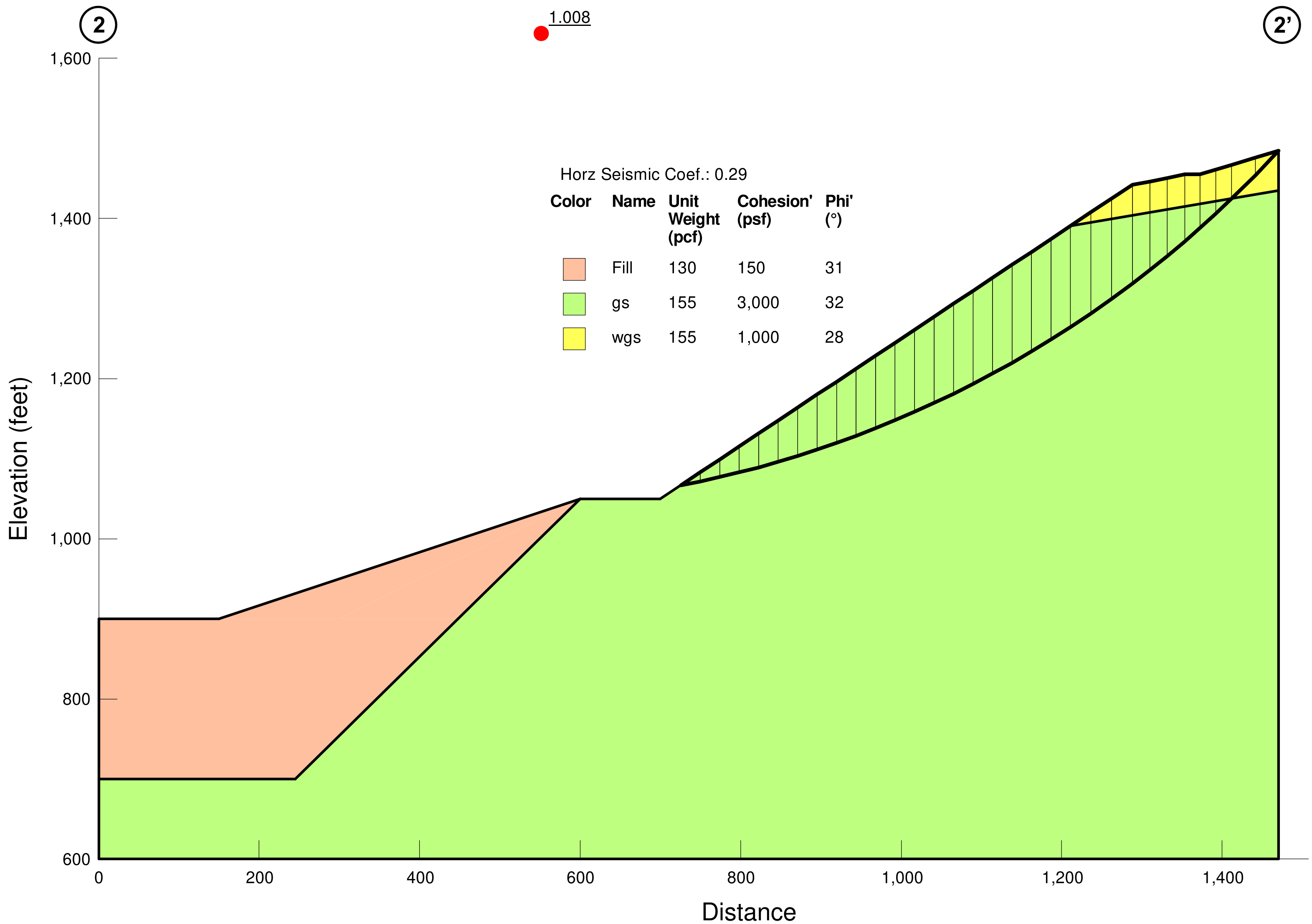
SLOPE STABILITY ANALYSIS - FILL PHASE
CROSS SECTION 1-1', PSEUDO-STATIC

DATE: December 2019

JOB NUMBER: STEVE-18-02

PLATE 28



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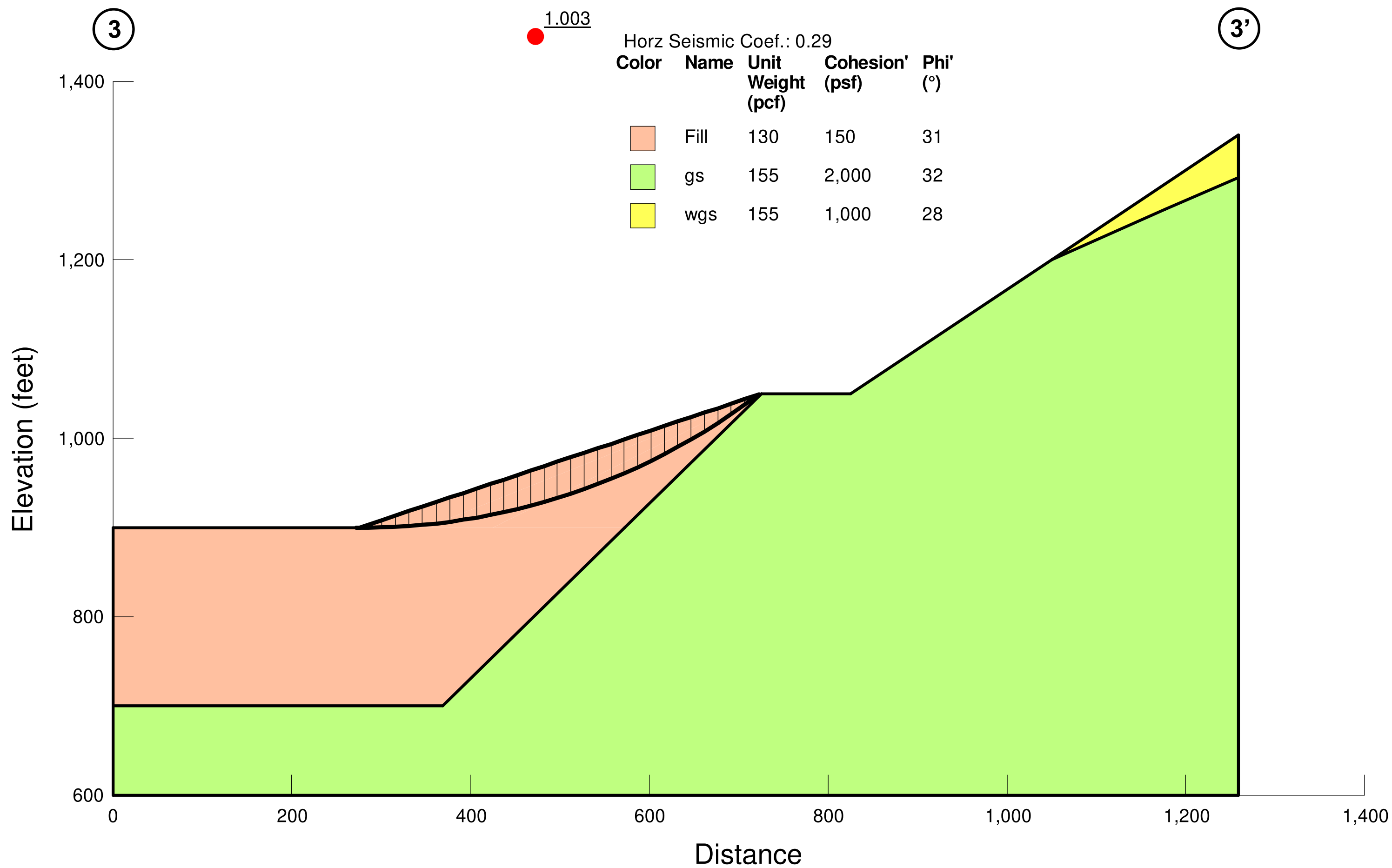
SLOPE STABILITY ANALYSIS - FILL PHASE
CROSS SECTION 2-2', PSEUDO-STATIC

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	29



Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Fill	130	150	31
	gs	155	2,000	32
	wgs	155	1,000	28

ENGINEERING GEOLOGIC SLOPE CHARACTERIZATION,
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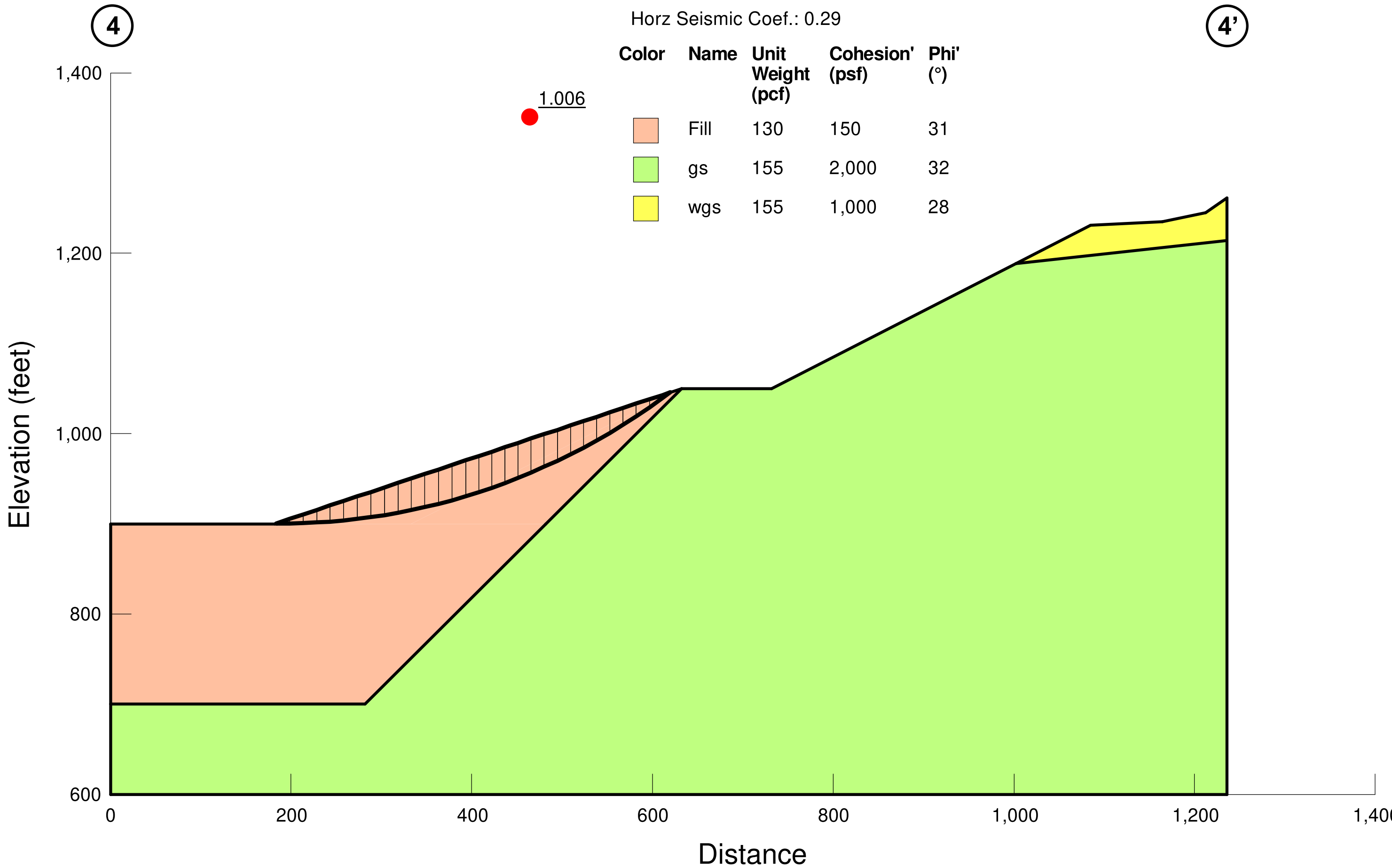
SLOPE STABILITY ANALYSIS - FILL PHASE
CROSS SECTION 3-3', PSEUDO-STATIC

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	30



Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Fill	130	150	31
	gs	155	2,000	32
	wgs	155	1,000	28

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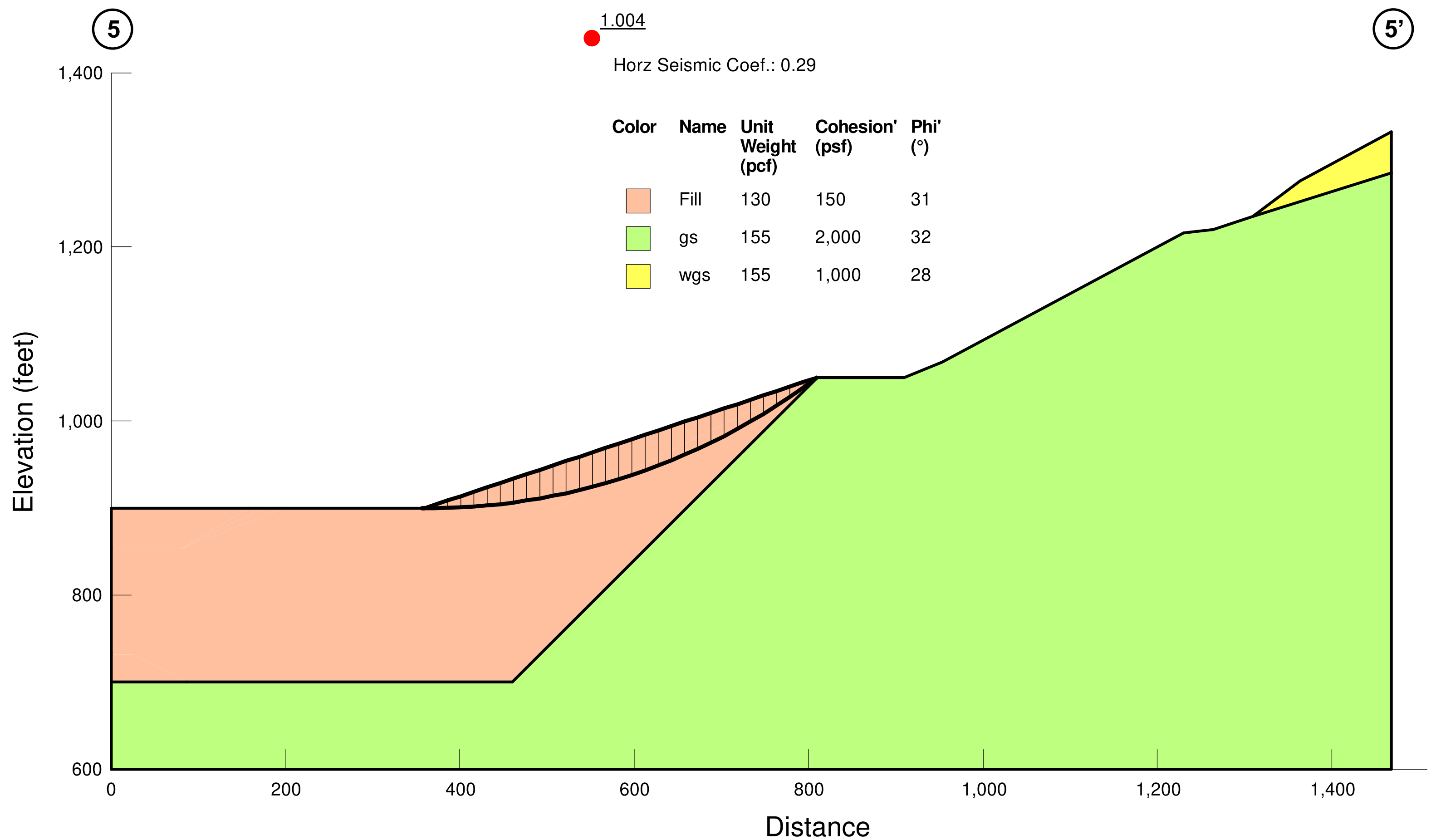
SLOPE STABILITY ANALYSIS - FILL PHASE
CROSS SECTION 4-4', PSEUDO-STATIC

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	31



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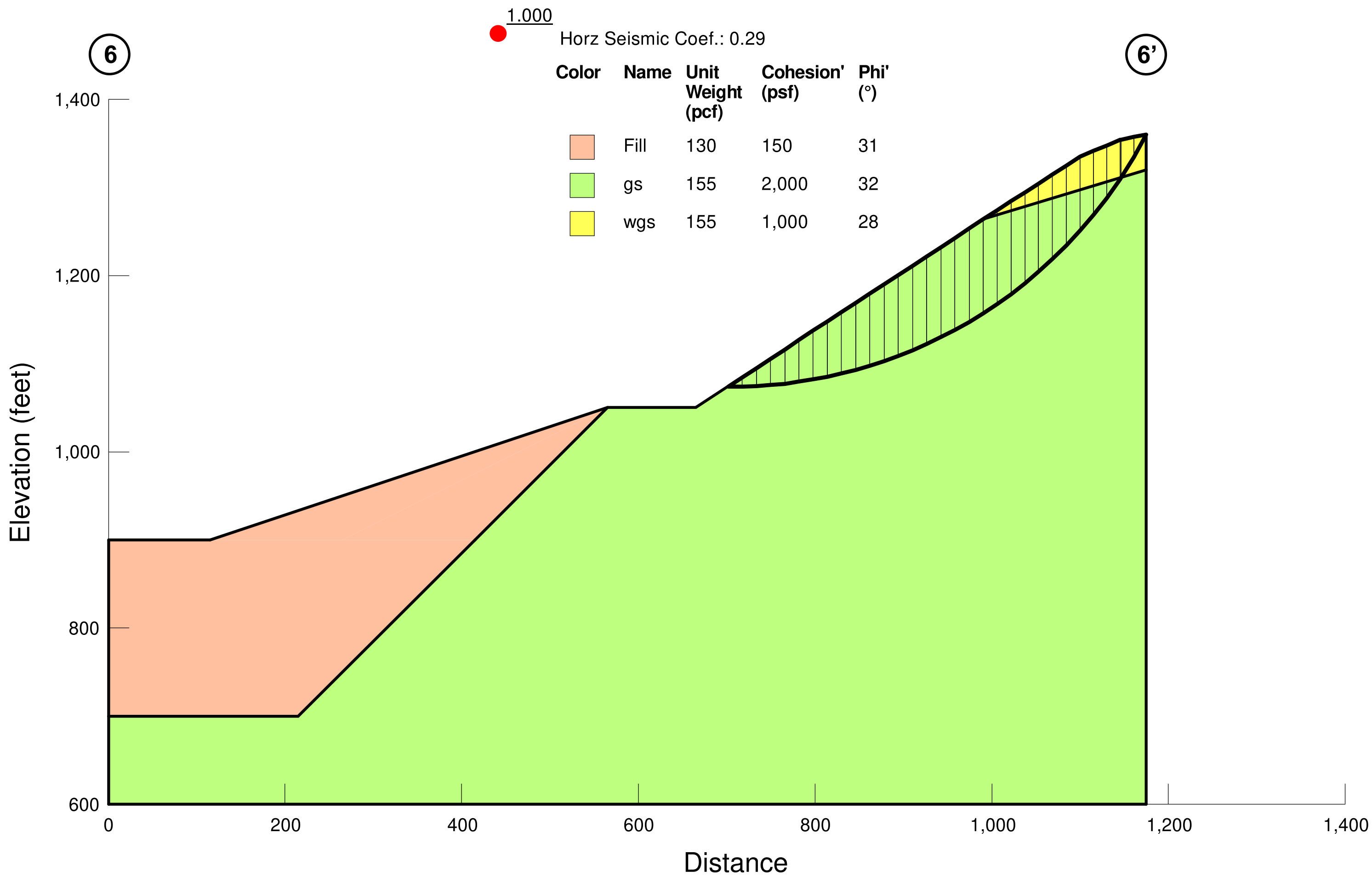
SLOPE STABILITY ANALYSIS - FILL PHASE
CROSS SECTION 5-5', PSEUDO-STATIC

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	32



ENGINEERING GEOLOGIC SLOPE CHARACTERIZATION,
STABILITY ANALYSIS AND GEOTECHNICAL CONSULTATION
WESTERN RIM SLOPE
STEVENS CREEK QUARRY
CUPERTINO, CALIFORNIA 95014

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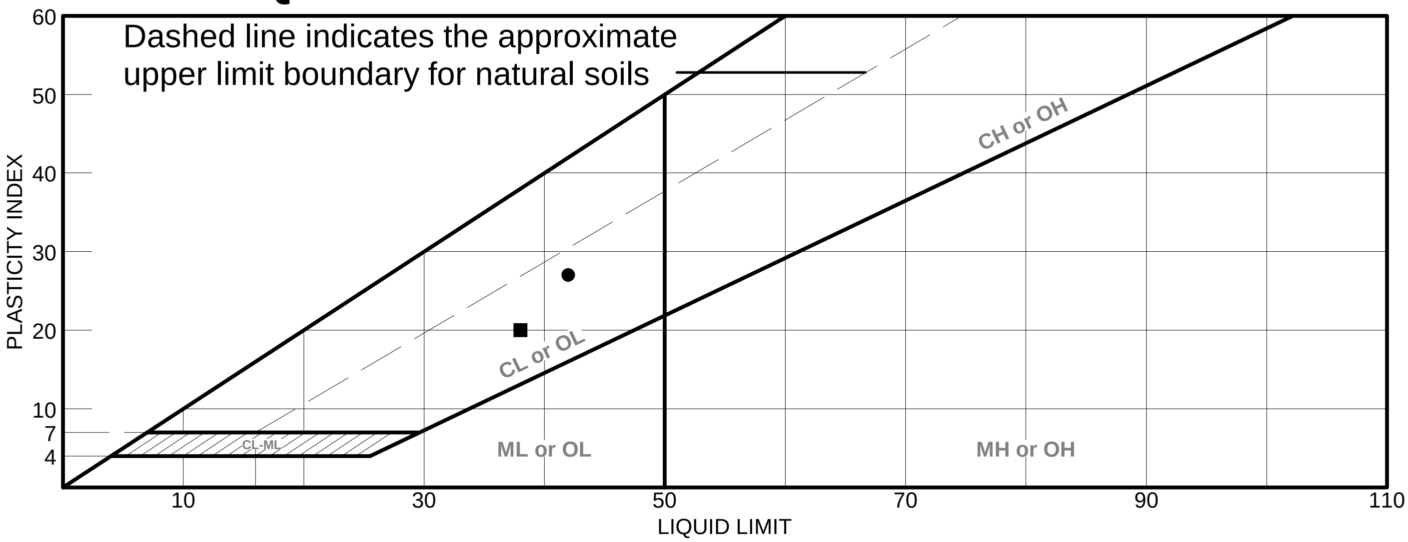
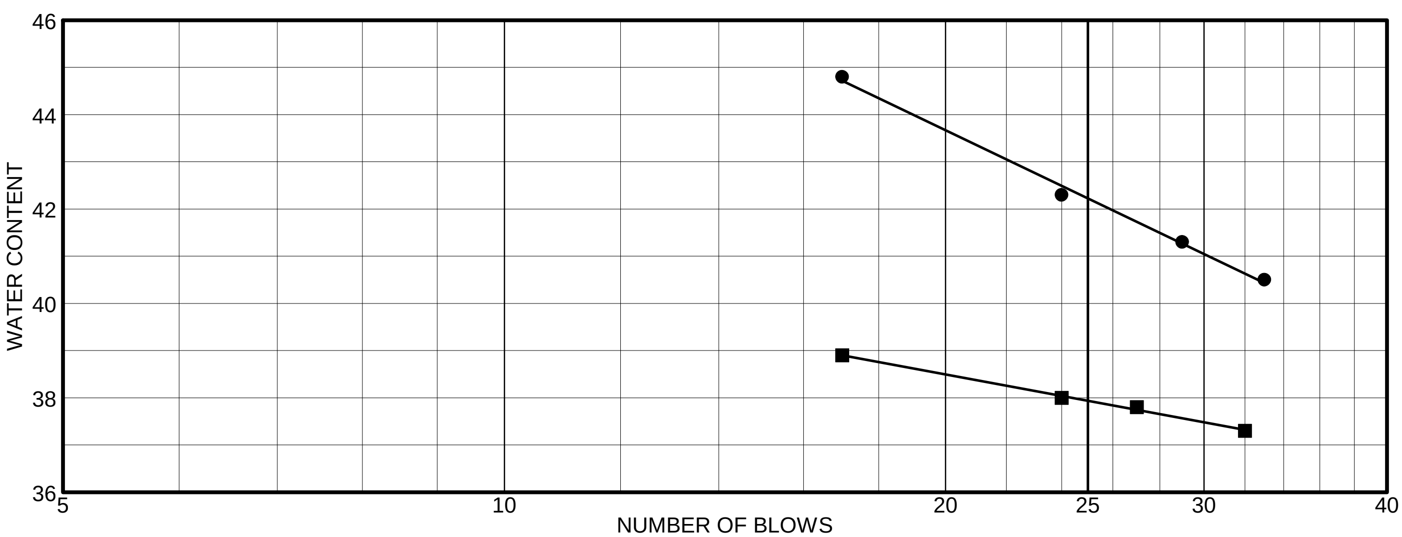
SLOPE STABILITY ANALYSIS - FILL PHASE
CROSS SECTION 6-6', PSEUDO-STATIC

DATE:	JOB NUMBER:	PLATE
December 2019	STEVE-18-02	33

Appendix A

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Greenish Gray Lean CLAY w/ Sand	42	15	27			
■	Greenish Gray Lean CLAY w/ Sand	38	18	20			

Project No. 011-828 **Client:** BAGG

Project: Stevens Creek Quarry, Western Slope - STEVE-18-02

● **Source:** A-SCQ **Elev./Depth:** 50-75'

■ **Source:** B-SCQ

Remarks:
●
■

LIQUID AND PLASTIC LIMITS TEST REPORT

COOPER TESTING LABORATORY

Figure

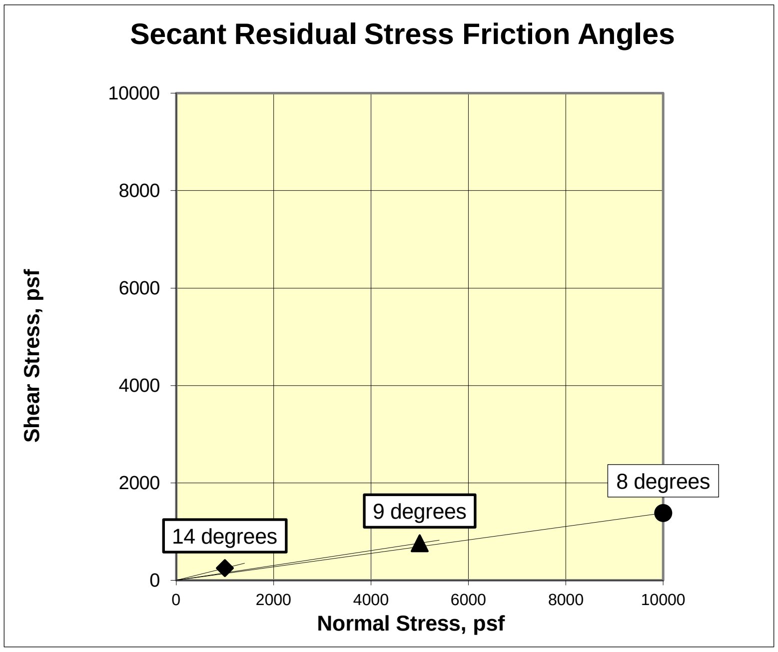
Drained Residual Torsional Shear Strength (ASTM D6467)

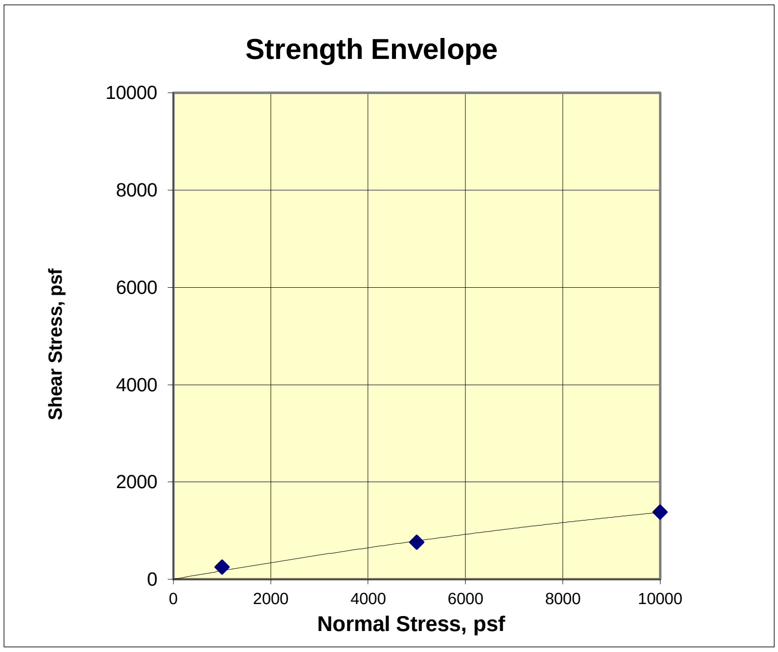
CTL Job No.:	011-828	**Boring:**		**Date:**	11/1/2018	**Clay, %:**	
Client:	BAGG	**Sample:**	A-SCQ	**By:**	PJ	**LL:**	42
Project Name:	Stevens Creek Quarry, Western Slope	**Depth (ft):**	50-75	**Checked:**	DC	**PL:**	15
Project Number:	STEVE-18-02	**Test Type:**	Fully Softened Residual				

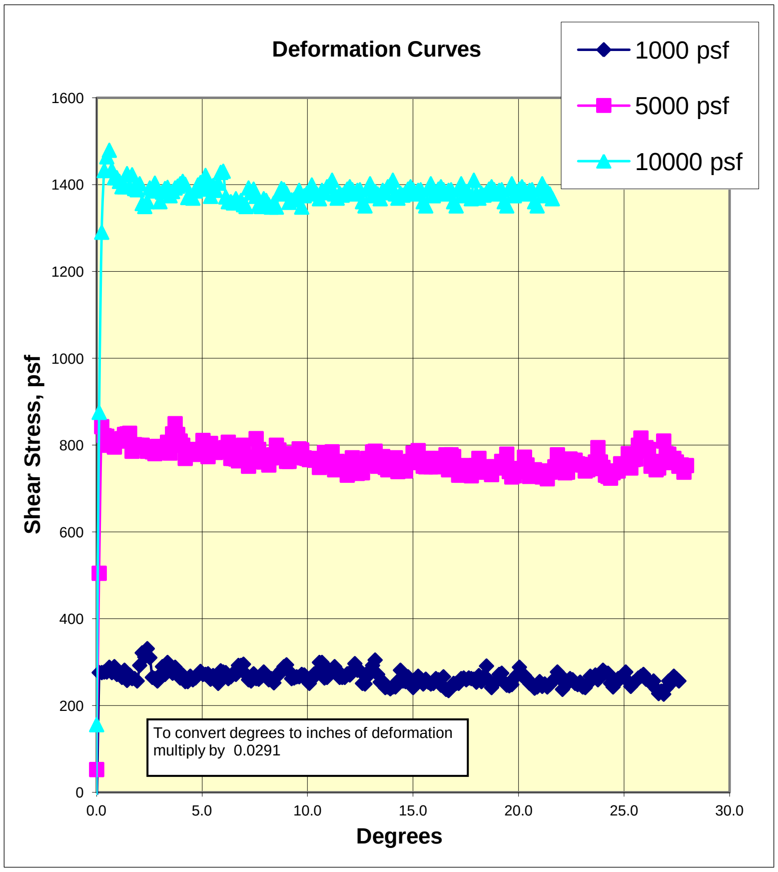
Soil Type: Greenish Gray Lean CLAY w/ Sand

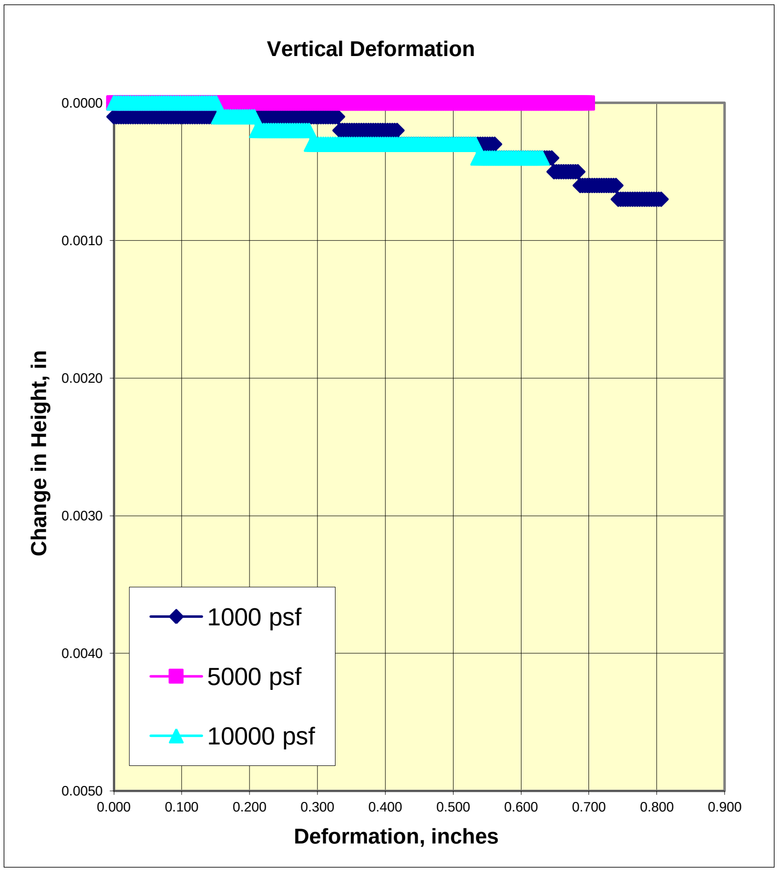
Normal Stress, psf:	1000	5000	10000
Secant Phi, deg.:	14	9	8

Remarks: A small friction correction was applied to each point.









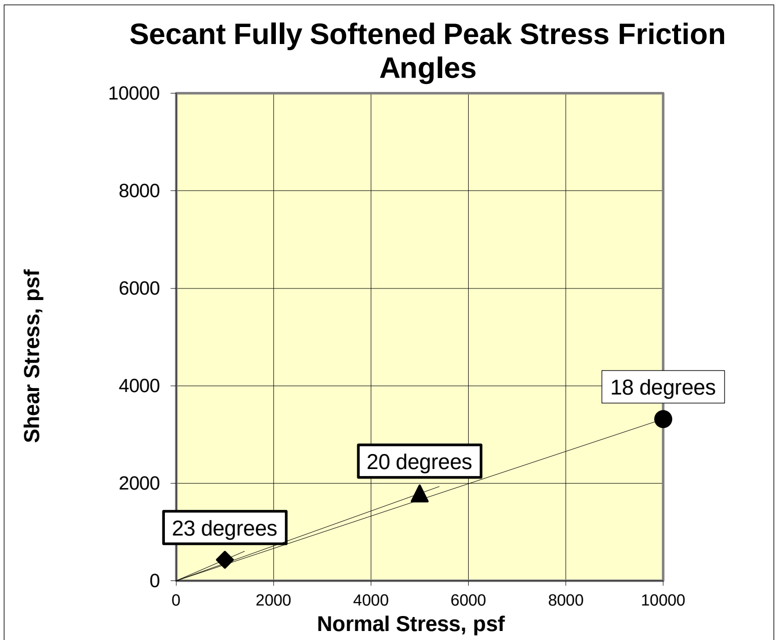
Drained Fully Softened Peak Torsional Shear Strength (ASTM D7608)

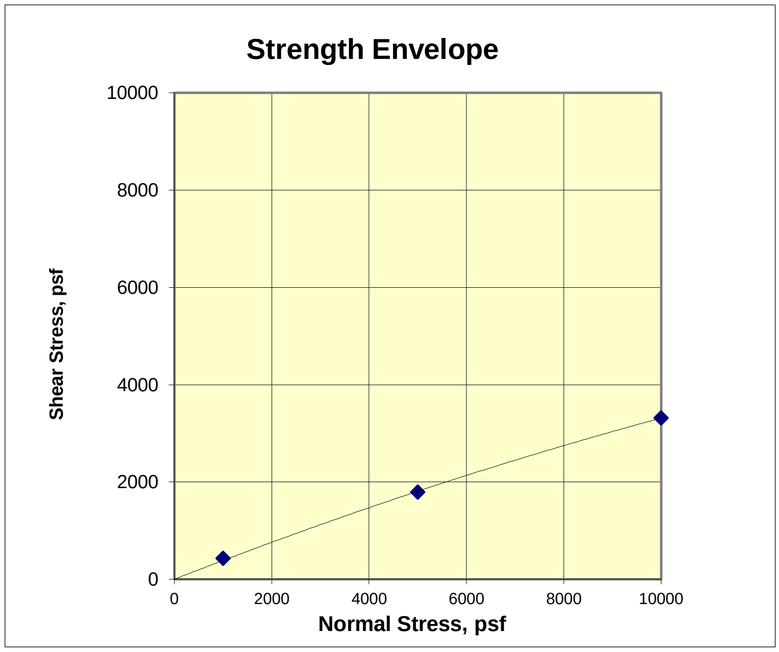
CTL Job No.:	011-828	**Boring:**		**Date:**	11/1/2018	**Clay, %:**	
Client:	BAGG	**Sample:**	A-SCQ	**By:**	PJ	**LL:**	42
Project Name:	Stevens Creek Quarry, Western Slope	**Depth (ft):**	50-75	**Checked:**	DC	**PL:**	15
Project Number:	STEVE-18-02	**Test Type:**	Fully Softened Peak				

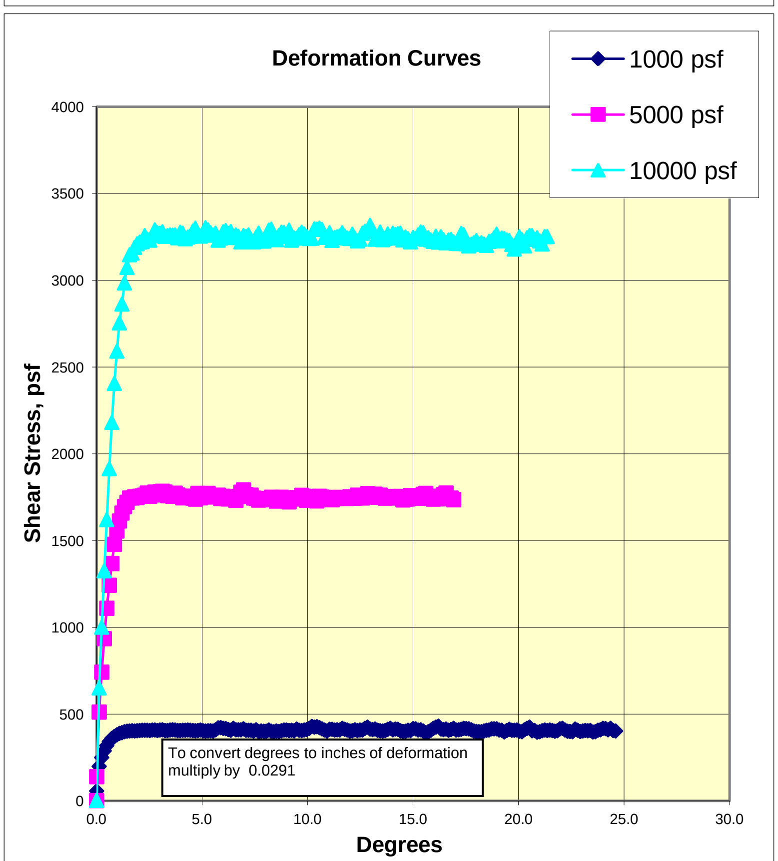
Soil Type: Greenish Gray Lean CLAY w/ Sand

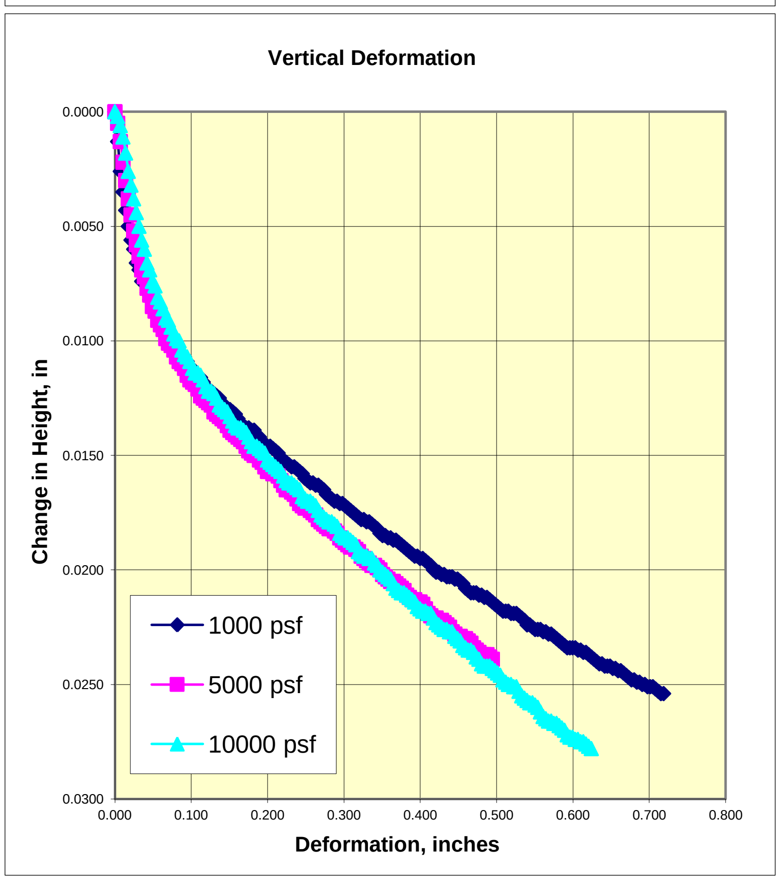
Remarks:

Normal Stress, psf:	1000	5000	10000
Secant Phi, deg.:	23	20	18









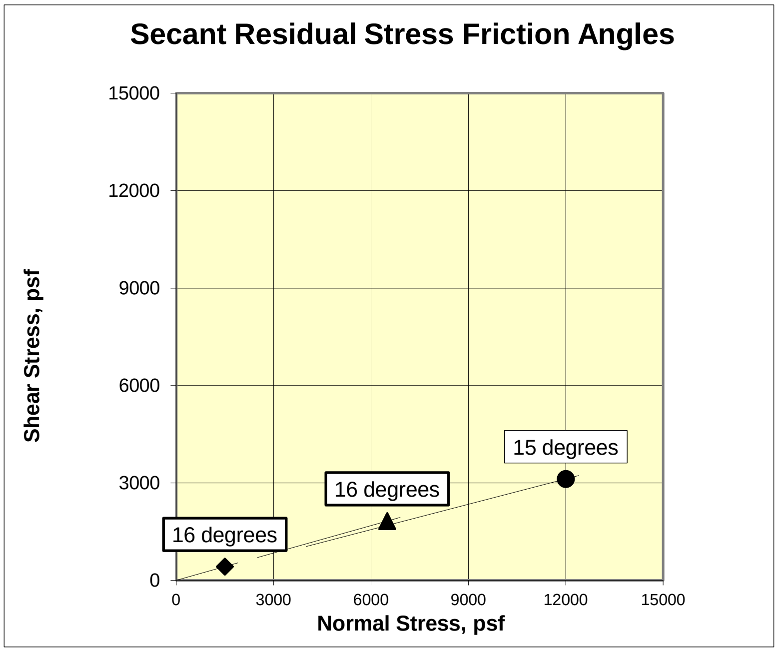
Drained Residual Torsional Shear Strength (ASTM D6467)

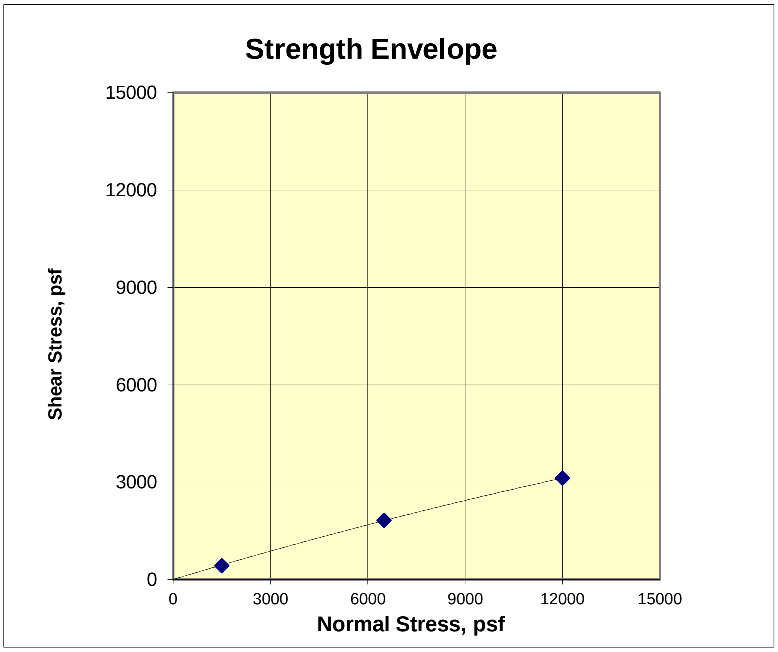
CTL Job No.:	011-828	**Boring:**		**Date:**	11/28/2018	**Clay, %:**	
Client:	BAGG	**Sample:**	B-SCQ	**By:**	PJ	**LL:**	38
Project Name:	Stevens Creek Quarry, Western Slope	**Depth (ft):**		**Checked:**	DC	**PL:**	18
Project Number:	STEVE-18-02	**Test Type:**	Fully Softened Residual				

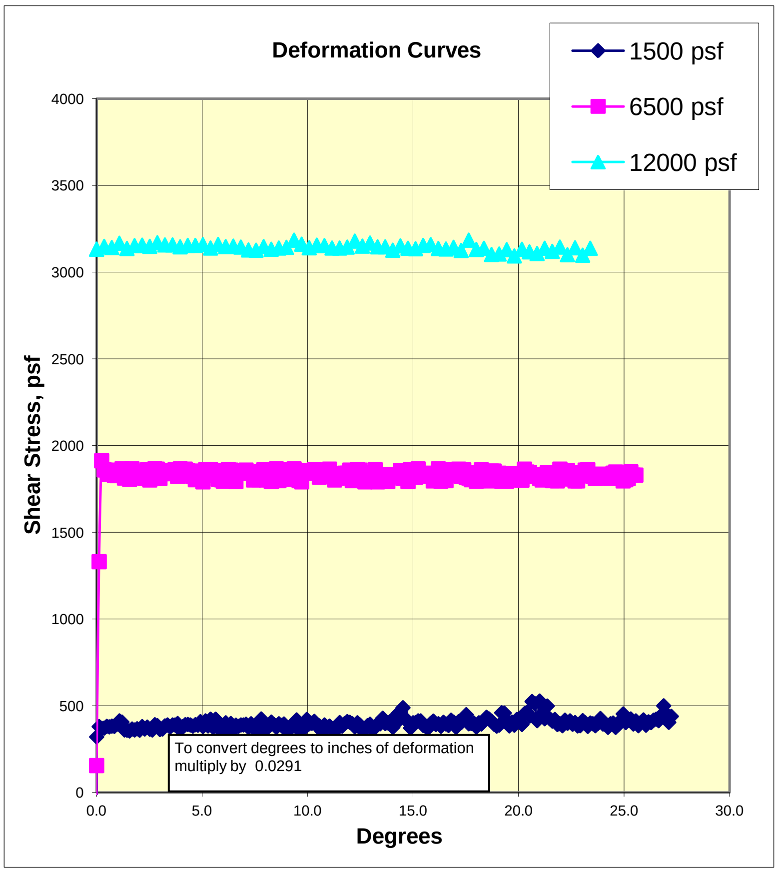
Soil Type: Greenish Gray Lean CLAY w/ Sand

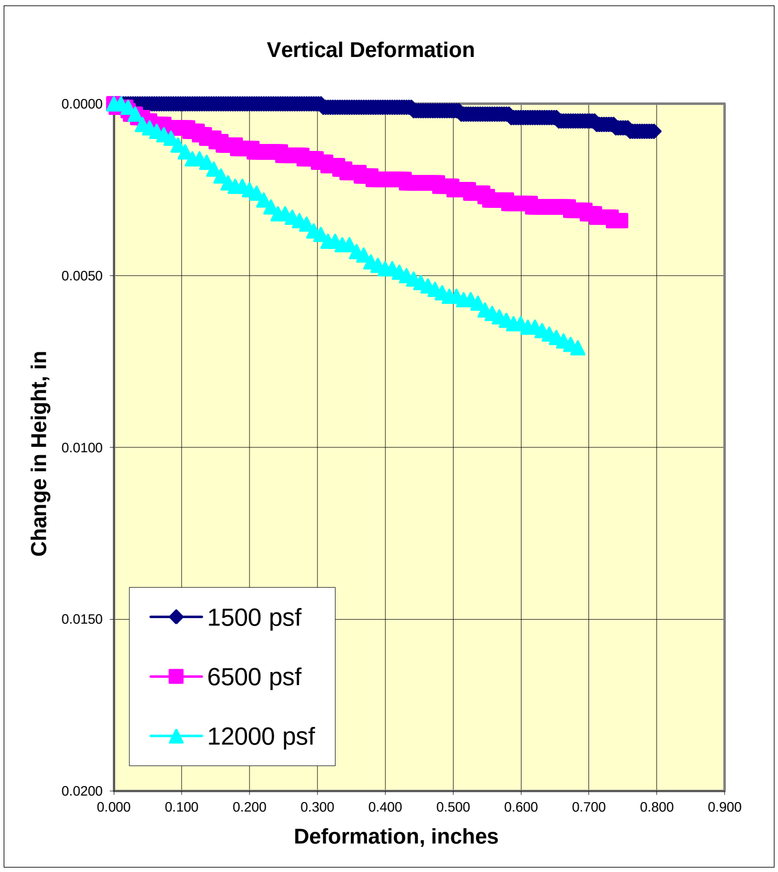
Normal Stress, psf:	1500	6500	12000
Secant Phi, deg.:	16	16	15

Remarks: A small friction correction was applied to each point.









Drained Fully Softened Peak Torsional Shear Strength (ASTM D7608)

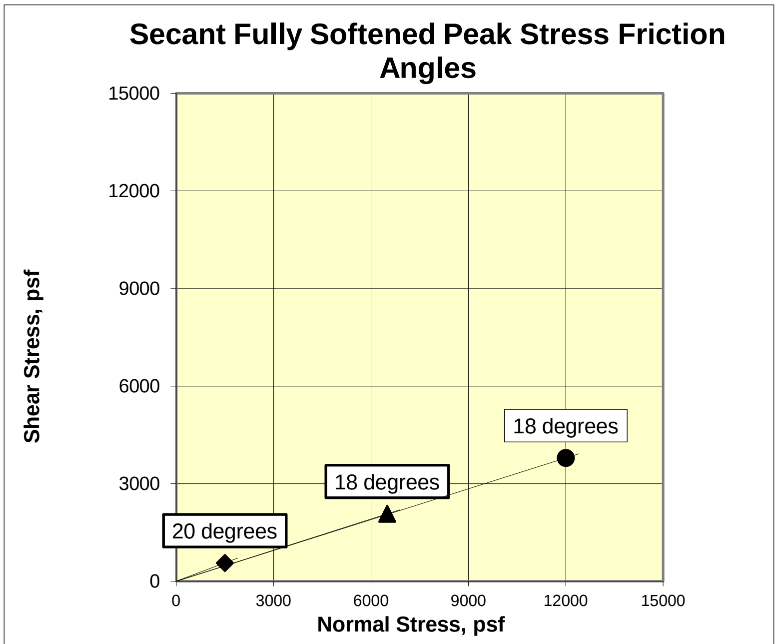
COOPER TESTING LABORATORY

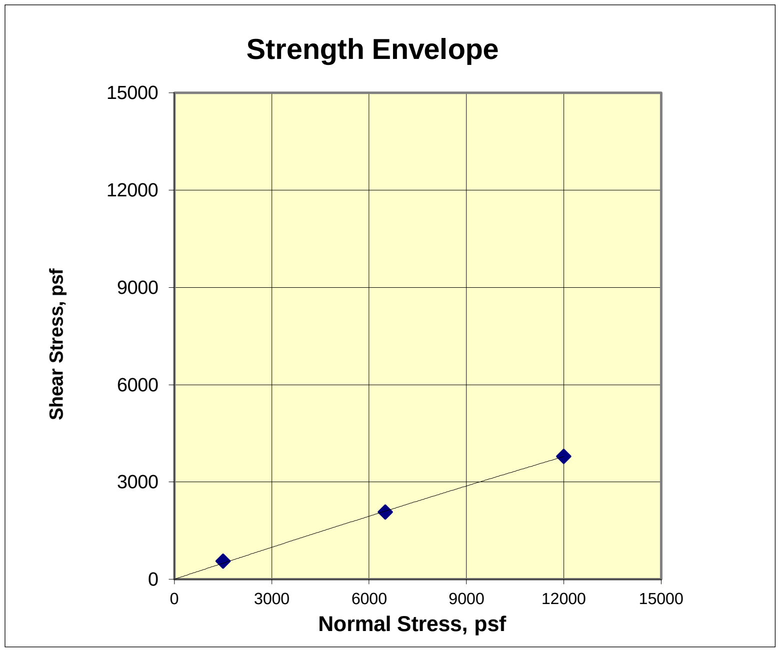
CTL Job No.:	011-828	Boring:		Date:	11/28/2018	Clay, %:	
Client:	BAGG	Sample:	B-SCQ	By:	PJ	LL:	38
Project Name:	Stevens Creek Quarry, Western Slope	Depth (ft):		Checked:	DC	PL:	18
Project Number:	STEVE-18-02	Test Type:	Fully Softened Peak				

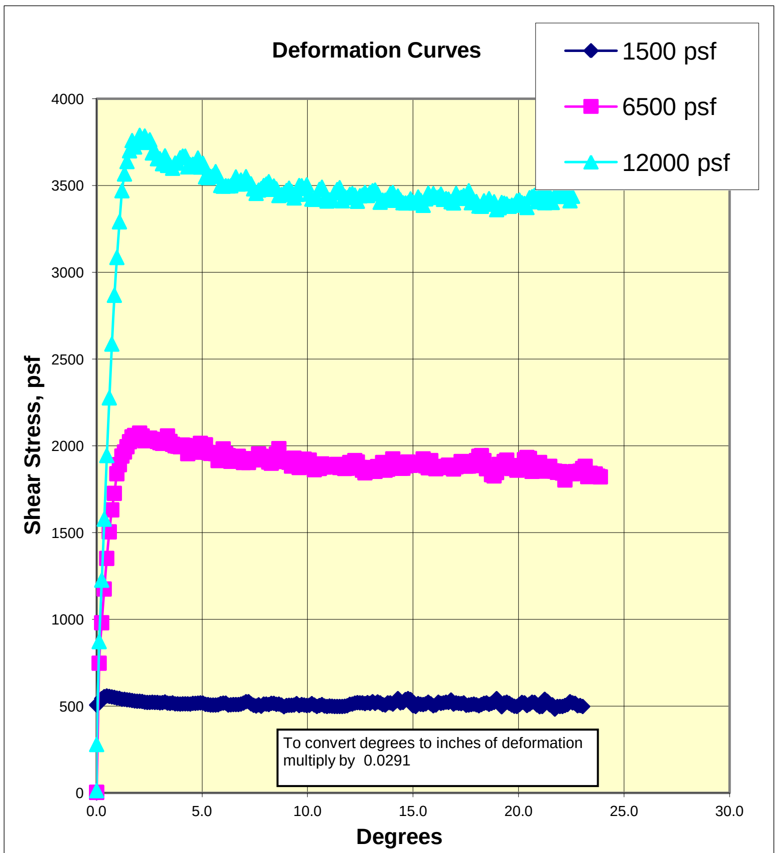
Soil Type: Greenish Gray Lean CLAY w/ Sand

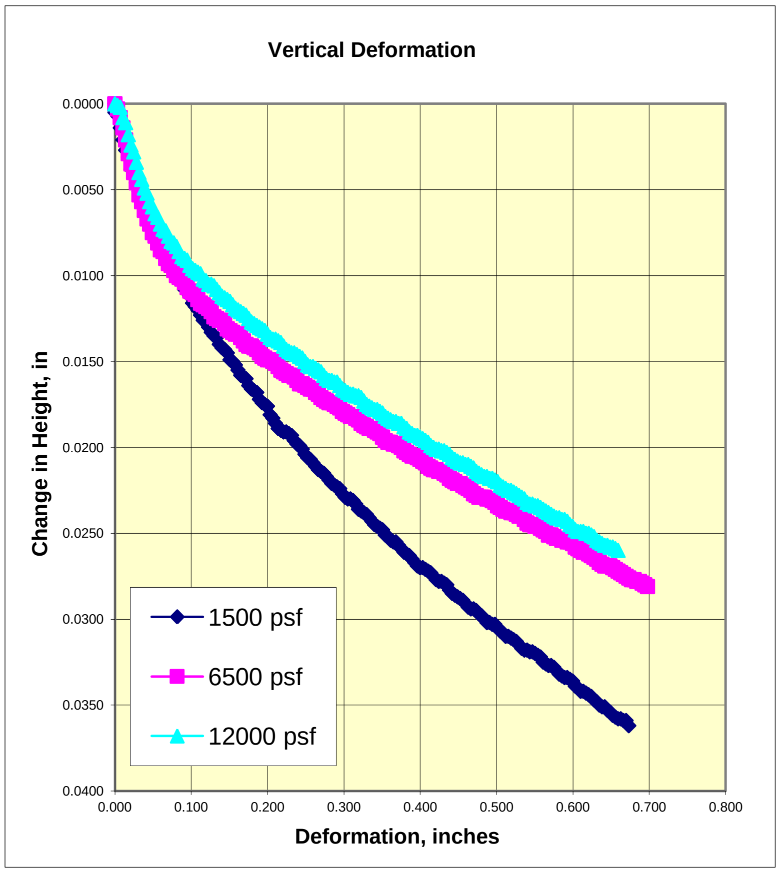
Remarks:

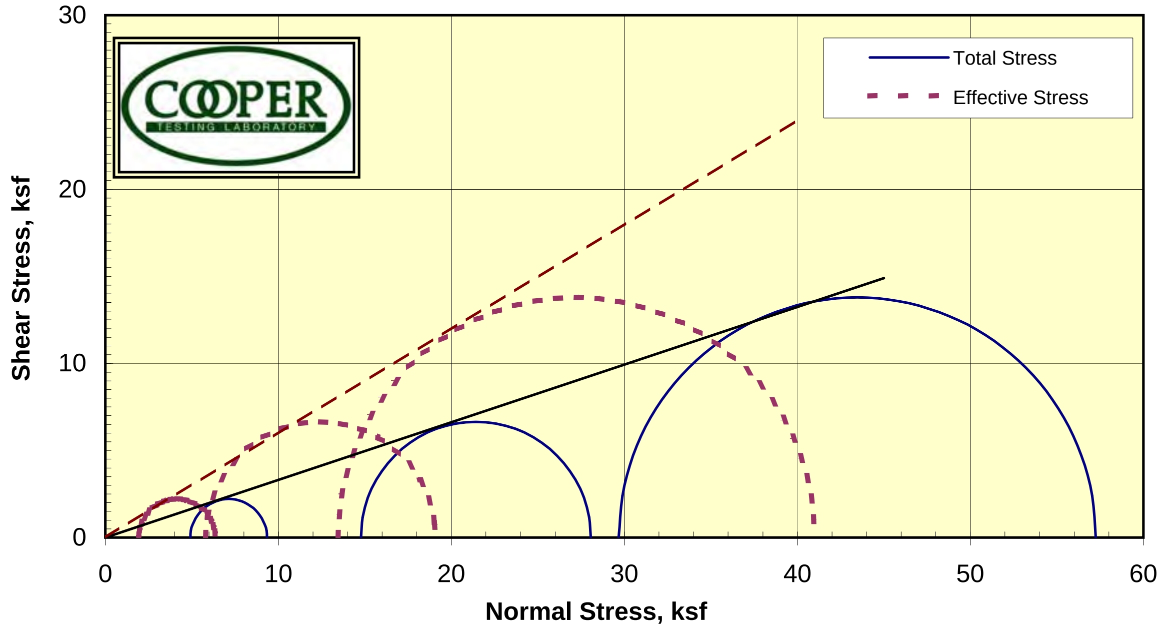
Normal Stress, psf:	1500	6500	12000
Secant Phi, deg.:	20	18	18

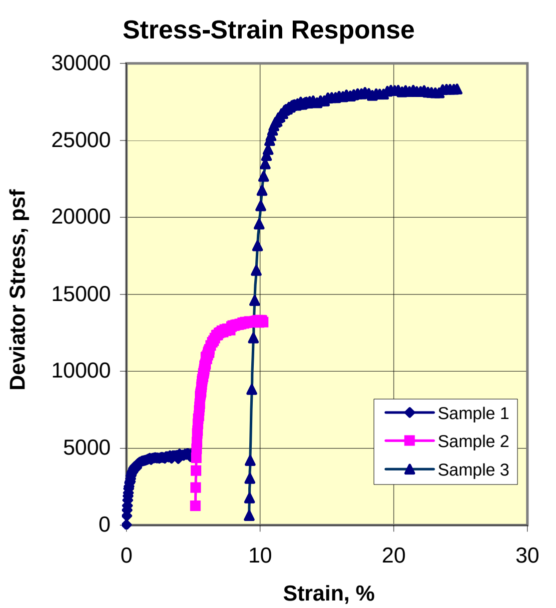












Stage	1	2	3
MC, %	12.5		
Dry Dens., pcf.	115.0		
Sat. %	72.5		
Void Ratio	0.466		
Diameter in	2.38		
Height, in	5.00		
		Final	
MC, %	15.7	13.8	12.4
Dry Dens., pcf.	118.0	122.5	125.8
Sat. %	100.0	100.0	100.0
Void Ratio	0.425	0.372	0.336
Diameter, in	2.36	2.36	2.37
Height, in	4.94	4.76	4.58
Cell, psi	94.7	164.2	268.3
BP, psi	60.6	61.6	62.2
		Effective Stresses At:	
Strain, %	5.0	5.0	5.0
Deviator ksf	4.434	13.292	27.575
Excess PP	2.993	8.978	16.238
Sigma 1	6.355	19.086	41.013
Sigma 3	1.921	5.794	13.438
P, ksf	4.138	12.440	27.225
Q, ksf	2.217	6.646	13.787
Stress Ratio	3.308	3.294	3.052
Rate in/min	0.001	0.001	0.001

Total C	0	Effective C	0.0
Total Phi	18.3	Effective Phi	31.0

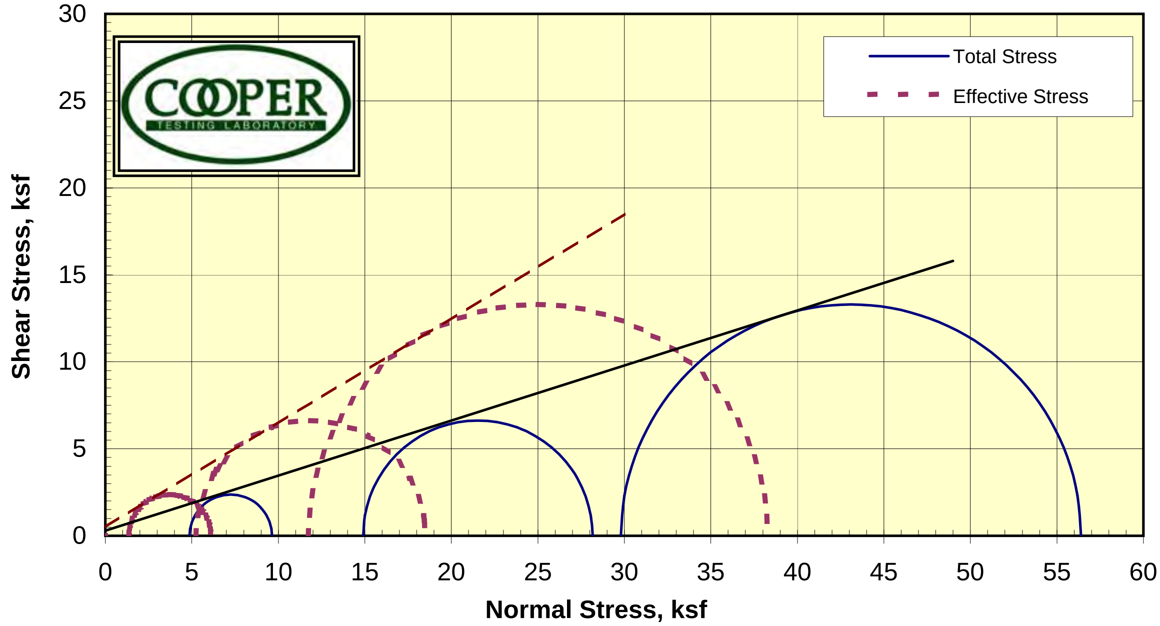
Job No.: 471-021 **Date:** 1/10/2008

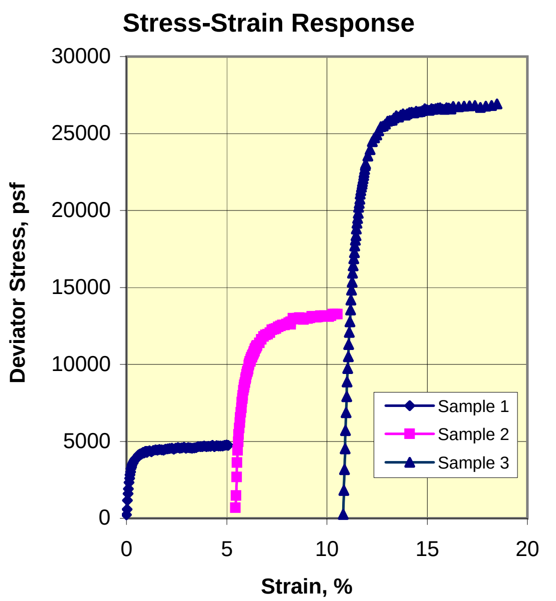
Client: Cal Engineering & Geology BY:DC

Project: Stevens Creek Quarry - 071210

Sample: Import #1 Brown Sandy CLAY w/ Gravel

Remarks: ** Staged Test ** Strengths at 5% strain. Remolding Target: 90% of 128.1 @ 12.5 (OP +2). This sample was taken from the processed imported material stock pile just north of the Qarry office (Parcel A).





Stage	1	2	3
MC, %	12.3		
Dry Dens., pcf.	119.0		
Sat. %	79.9		
Void Ratio	0.416		
Diameter in	2.88		
Height, in	6.00		
	Final		
MC, %	14.8	13.1	11.8
Dry Dens., pcf.	123.1	127.2	130.8
Sat. %	100.0	100.0	100.0
Void Ratio	0.399	0.354	0.318
Diameter, in	2.85	2.86	2.89
Height, in	5.91	5.69	5.41
Cell, psi	94.7	164.2	268.3
BP, psi	60.9	60.7	61.3
	Effective Stresses At:		
Strain, %	5.0	5.0	5.0
Deviator ksf	4.755	13.255	26.585
Excess PP	3.519	9.664	18.081
Sigma 1	6.109	18.496	38.310
Sigma 3	1.354	5.241	11.725
P, ksf	3.731	11.868	25.017
Q, ksf	2.378	6.627	13.292
Stress Ratio	4.513	3.529	3.267
Rate in/min	0.001	0.001	0.001

Total C	0.3	Effective C	0.5
Total Phi	17.6	Effective Phi	31.0

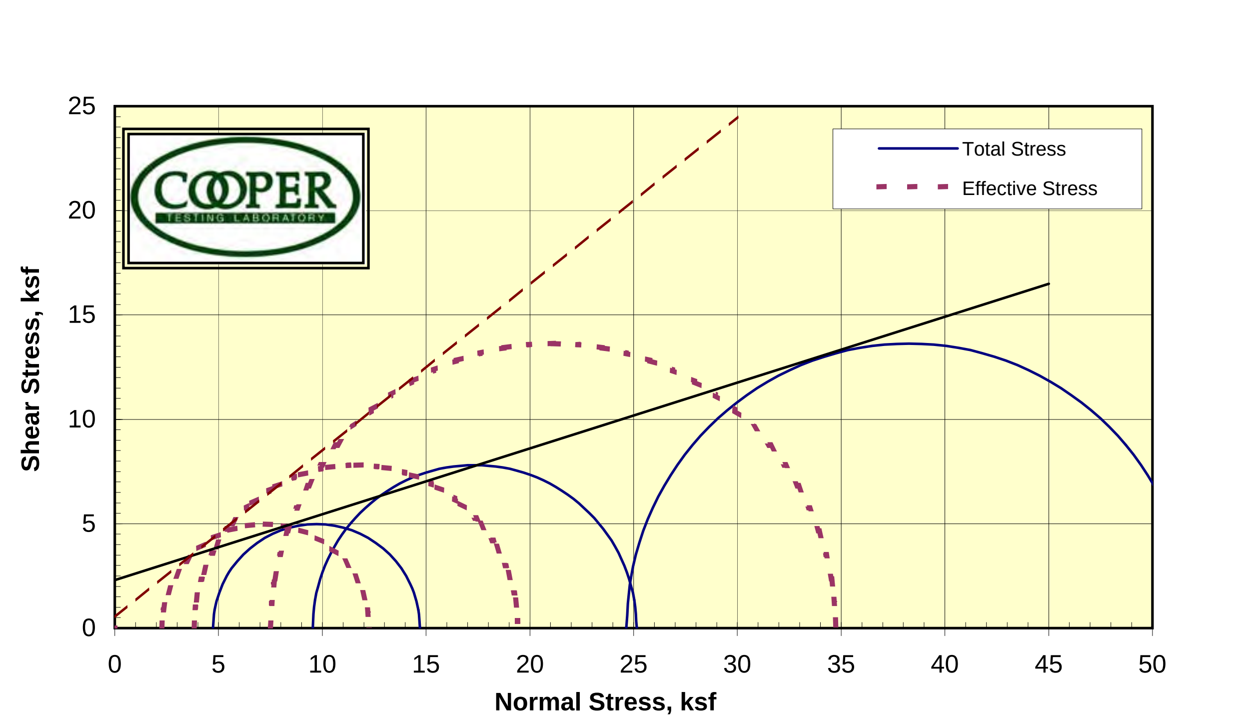
Job No.: 471-021 **Date:** 1/10/2008

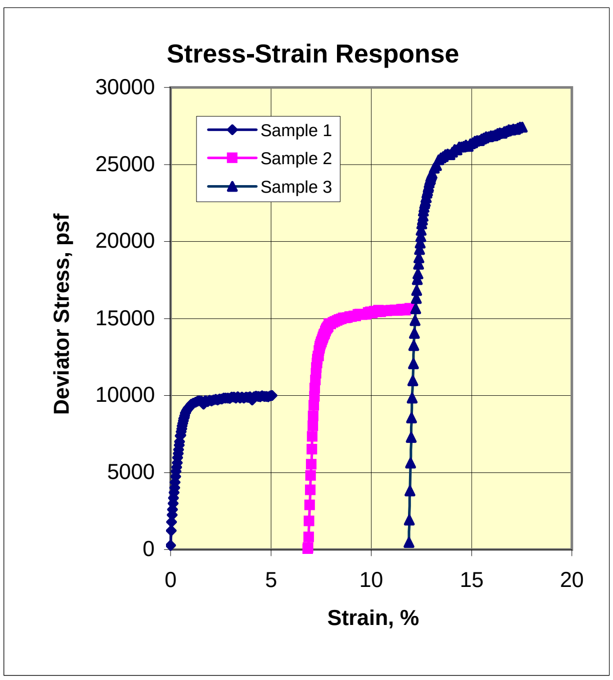
Client: Cal Engineering & Geology BY:DC

Project: Stevens Creek Quarry - 071210

Sample: Import #2 Brown Clayey SAND w/ Gravel

Remarks: ** Staged Test ** Strengths at 5% strain.
Remolding Target: 90% of 132 @ 12.3 (OPT +2). This sample was taken from the processed imported material stock pile just north of the Qarry office (Parcel A).





Job No.: 471-021 **Date:** 1/10/2008

Client: Cal Engineering & Geology BY:DC

Project: Stevens Creek Quarry - 071210

Sample: Shear Gray GRAVEL w/ Clay & Sand

Remarks: ** Staged Test ** Strengths at 5% strain. Remolding Target: 90% of 139.3 pcf @ 10.3 (OPT+2). This sample was taken from the shear zone at the NW corner of the Quarry (at elev ~850 ft).

Stage	1	2	3
MC, %	10.3		
Dry Dens., pcf.	125.1		
Sat. %	80.1		
Void Ratio	0.347		
Diameter in	2.38		
Height, in	5.00		
		Final	
MC, %	13.6	13.3	12.0
Dry Dens., pcf.	126.1	127.1	130.3
Sat. %	100.0	100.0	100.0
Void Ratio	0.368	0.358	0.325
Diameter, in	2.38	2.44	2.46
Height, in	4.96	4.68	4.47
Cell, psi	114.7	149.4	253.6
BP, psi	81.8	83.2	82.4
		Effective Stresses At:	
Strain, %	5.0	5.0	5.0
Deviator ksf	9.977	15.619	27.258
Excess PP	2.463	5.719	17.152
Sigma 1	12.246	19.436	34.754
Sigma 3	2.270	3.817	7.496
P, ksf	7.258	11.627	21.125
Q, ksf	4.988	7.810	13.629
Stress Ratio	5.396	5.092	4.636
Rate in/min	0.001	0.001	0.001

Total C	2.3	Effective C	0.5
Total Phi	17.5	Effective Phi	38.7

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled*. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed*. The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

NORFLEET CONSULTANTS

Engineering
Geology
Hydrogeology
Geophysics

6430 Preston Ave.
Suite A
Livermore, CA 94551
(925) 606-8595

Mr. J. Voss
Stevens Creek Quarry, Inc.
12100 Stevens Canyon Road
Cupertino, CA 95014

May 18, 2020
NC Proj. No. 201881.5

RE: Preliminary Analysis of Slope Failure at the Northeast Corner of the Stevens Creek Quarry.
12100 Stevens Canyon Road
Cupertino, CA 95014

Dear Mr. Voss,

The County of Santa Clara sent a letter, dated October 23, 2019, to Stevens Creek Quarry concerning the Quarry's Reclamation Plan Amendment. In Section II, Paragraph 10 (p.5) in that letter, the county stated:

> The County has observed significant ground-cracks at the top of the slope of the north and east wall of the Quarry pit. The RPA will need to include a geotechnical report that evaluates ground cracks and the stability buttress fill that is already in place.

At your request, I performed an initial evaluation of the cause of that cracking and landsliding in the Northeast (NE) corner of the quarry.

Field Observations

I visited the site on May 8, 2019. Figure 1 is a June, 2019 Google aerial photograph of the NE corner of the quarry. It shows the location of the features discussed in this report and will be used as an index map. Photos 1 and 2 show oblique views of the NE corner of the quarry, the location of Pad 1, and the recent landslide.

The settling pond (Photos 4 and 5) is located at the north end of Pad 1. Runoff from the uphill area is directed into the pond. Silt settles into the pond, and the runoff flows out though the pipe at the east end of the pond. That water flows to the west side of the haul road (Figure 1) and then flows down an unlined v-ditch at the side of the haul road to the base of the pit. Note that the pipes are not placed to completely drain the pond. The water remaining in the pond either evaporates or seeps into the ground. I did not perform hydraulic calculations on the pond.

Photos 6 and 7 show Pads 1 and 2 (looking south). They are flat and have berms along their outside edges. Photos 7 and 8 show the ground cracks in the south end of Pad 2. The cracks exhibit both horizontal and vertical offset (south side down). The orientation of the northern crack in Pad 2 indicates that the crack dip is fairly steep. The cracks extend west into Pad 1, where they extend one-half to three-quarters of the way across Pad 1. The cracks narrow as they go into Pad 1. Cracking did not appear to extend to the west side of Pad 1.

I was unable to trace the cracks southeast of Pad 2.

Google Aerial Photograph Evaluation

I downloaded a series of aerial photographs from Google Earth, from March, 2003 to June, 2019 (the most recent photograph available). Evaluation of these photographs was done to evaluate the timing, location, and nature of fill placement in this part of the quarry. Not all photographs within this time frame were downloaded. Some of the photographs were cloud covered or had insufficient resolution.

The discussion for each photograph is on the Figures (not in the report text). Figure 1 is an index to the features discussed in the following Figures. Figures 2 through 10 illustrate the mining history of the NE corner (2014 through 2019). Figure 11 shows the conditions that existed just prior to development of the large cracks (fractures) (October, 2017).

Analysis and Conclusions

The fill material in this area is similar to fill material in other parts of the quarry. The fill soil properties in this area are consistent with other fill slopes in the quarry.

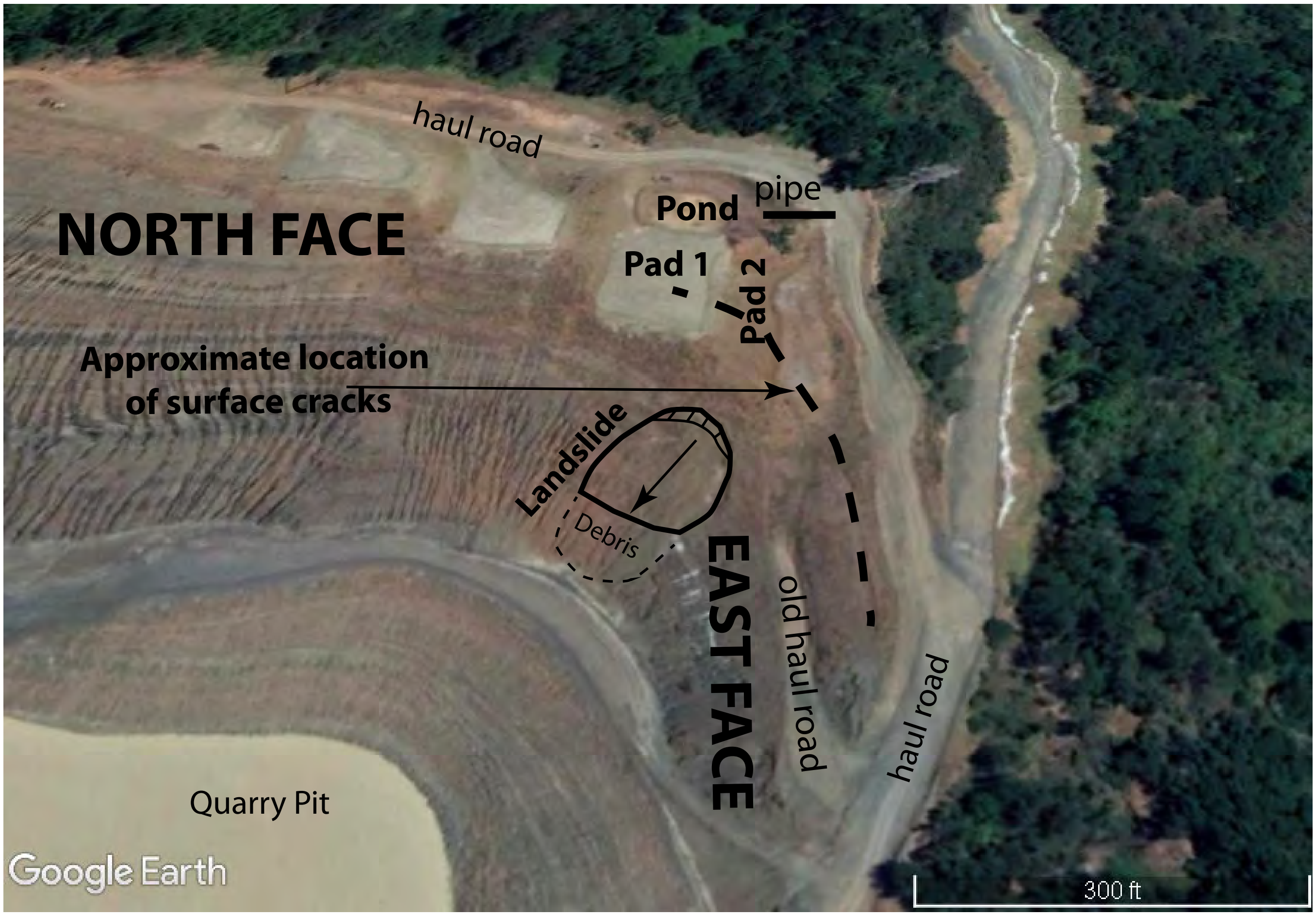
The recent surface landslide (Photos 2 and 3) was caused by the rains during the 2019-20 winter (likely in December, 2019). It is a surface feature and does not present a global slope stability problem. The white, horizontal bands visible on the slope face to the right of the lower part of the landside on Photo 3 are suggestive of groundwater evaporation from that zone. Water evaporates, leaving calcium minerals on the ground surface. On a smaller scale, the process is called efflorescent deposition. This is most likely unsaturated water flow. Because of the excavated geometry of this area (a curved valley), it appears that subsurface water concentrates in this area. There are no seeps/vegetation growth that would indicate saturated flow (current or historic) flowing out of the fill.

The fractures developed during the winter of 2017-2018. There were heavy rainfalls throughout that winter. Rainfall totals reached 100% of historic averages by early February and the rains continued into March. Figure 11 shows the relationships of surface and subsurface slope features in October, 2018, prior to development of the fractures. The location of the fractures and the buried gully (Figure 2) are approximately shown. The fill face in this area appears to have had its historically steepest slope angle. Note the curved road cut into the base of the slope at this location. These geometrical relationships coupled with a very rainy winter caused incipient slope failure, creating the cracks at the top of the slope. Subsequently, additional fill was placed on the toe, helping to stabilize it (reducing the slope angle).

The minor extension of the fractures into Pad 2 in 2018 (Figure 10) suggest that this slope is still marginally stable. Placing additional fill at the bottom of this slope would increase the Factor of Safety by further reducing the slope angle.

The settling pond does allow water to seep in the ground episodically during the winter (depending on rain events). I doubt it was a direct contributory factor to the 2017 failure, but it likely had some effect. The surficial slope surface failure during the 2018-19 winter suggests that this area has a higher fill soil moisture content during the winter than surrounding areas because of the geometry of this area.

Google photograph date: June, 2019



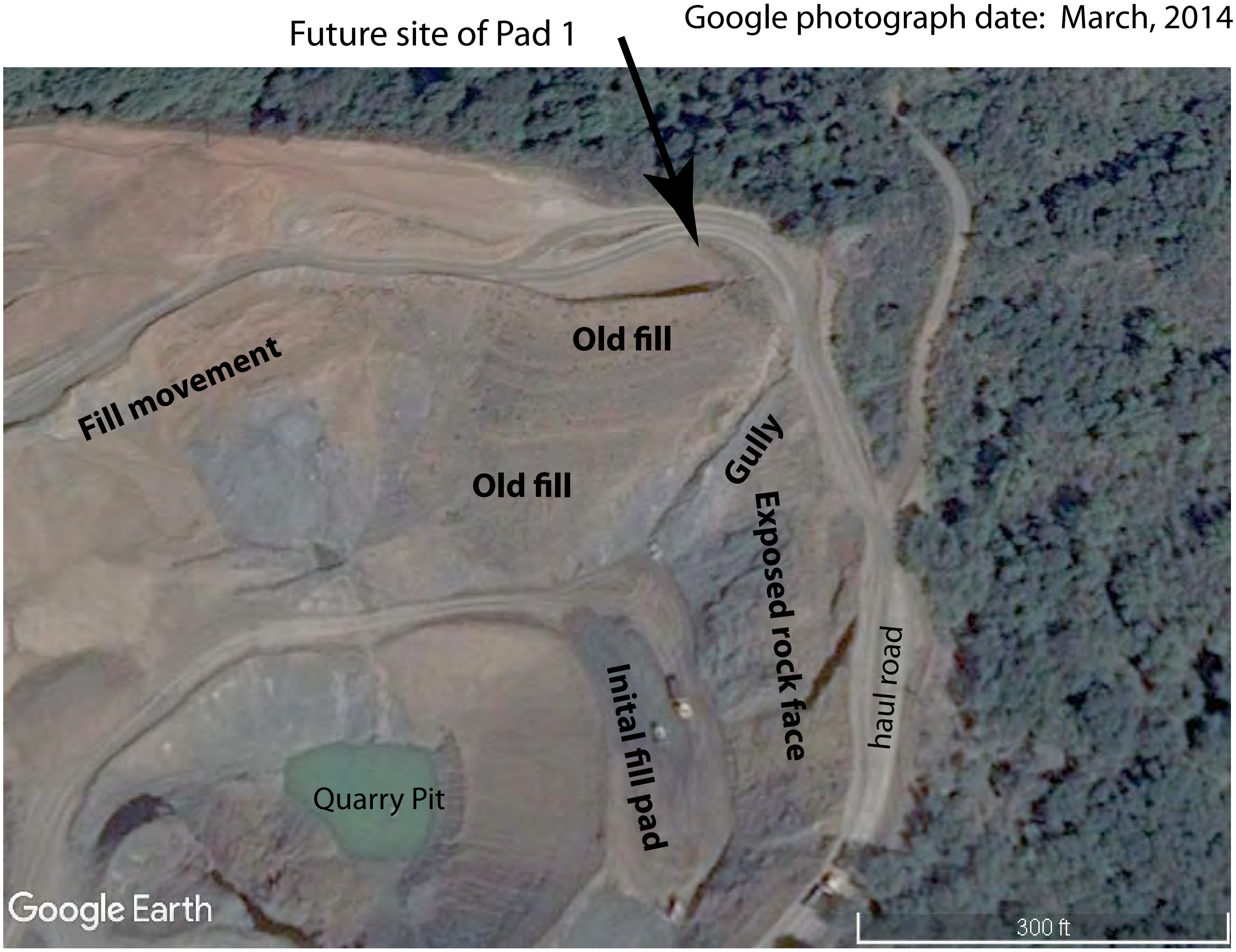
~N

Index Map

This photo shows the approximate location of features that are the subject of this report. This is the most current photo of this area on Google Earth. The location of the landslide is approximate. That landslide likely occurred October-November, 2019, after this photograph was taken.

Norfleet Consultants	North East Corner of Stevens Creek Quarry Pit
	Index Map - June, 2019
	PROJ NO: 201881.5 DATE: 2-25-2020 FIGURE: 1

Google photograph date: March, 2014



This photo shows the quarry soon after mining of the eastern face stopped (labeled - exposed rock). New fill is beginning to be placed along the base of the east face (initial fill pad). Note the gully that marks the junction between exposed rock and the old fill that had been placed on the north face. As fill was placed in this corner of the quarry, the gully formed a buried valley and a focus for groundwater.

Old fill is several years old and can be identifed by bushes growing on it. At this time, new fill is also being placed/stored on the west side of the north face (fill movement). Note the shifting of pond at the bottom of the pit (quarry pit) as mining progresses.

Norfleet Consultants	North East Corner of Stevens Creek Quarry Pit		
	March, 2014		
	PROJ NO: 201881.5	DATE: 2-25-2020	FIGURE: 2

Google photograph date: November 2014

Future site of Pad 1

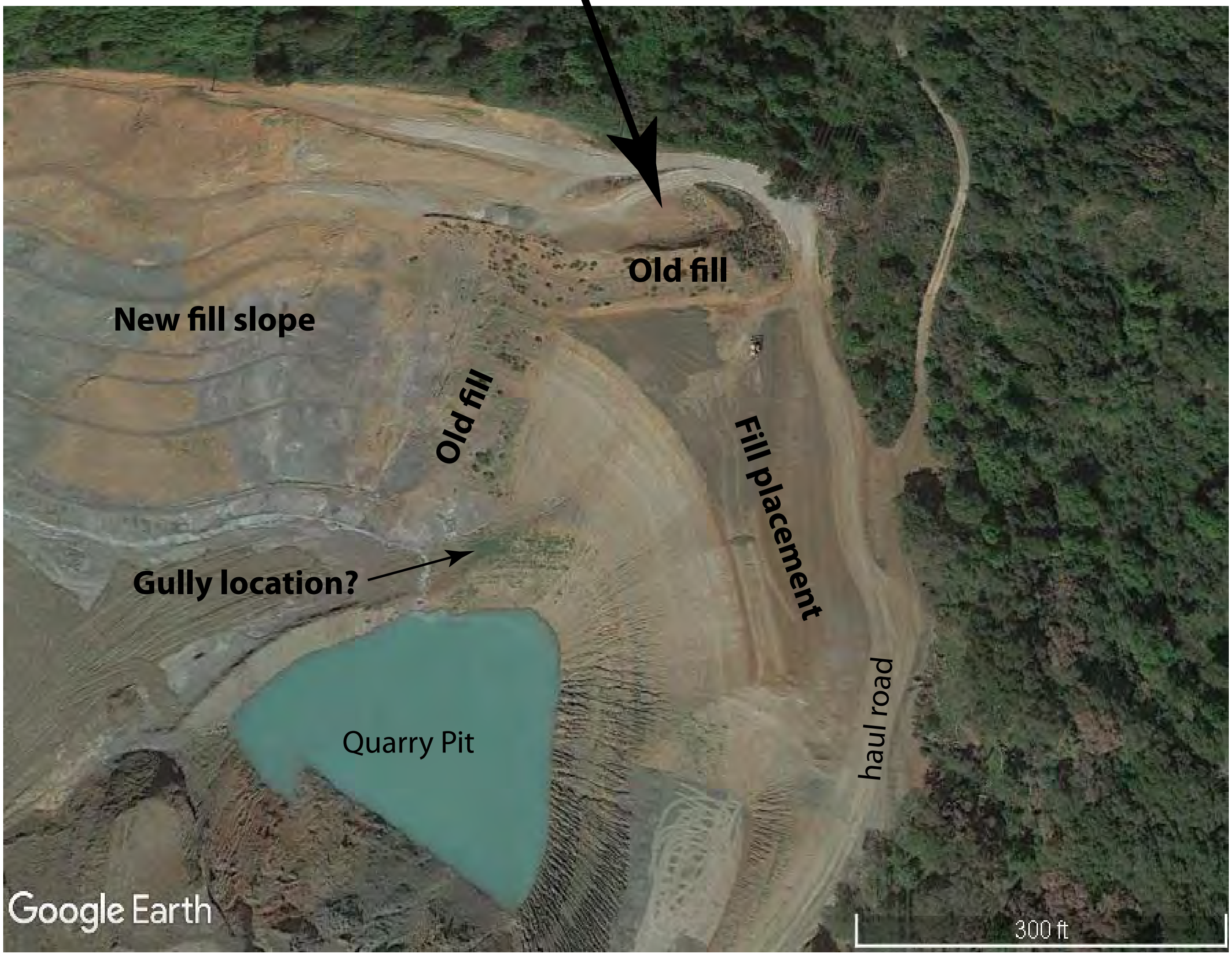
~N

Fill continues to be placed on the east quarry face. New fill has also been placed on the north face. Just a small area of old fill remains unburied. The arrow indicates the approximate future location of pads 1 and 2 and the pond. Only the upper portion of the gully is visible.

Norfleet Consultants	North East Corner of Stevens Creek Quarry Pit		
	November, 2014		
	PROJ NO: 201881.5	DATE: 2-25-2020	FIGURE: 3

Early Pond

Google photograph date: March, 2015

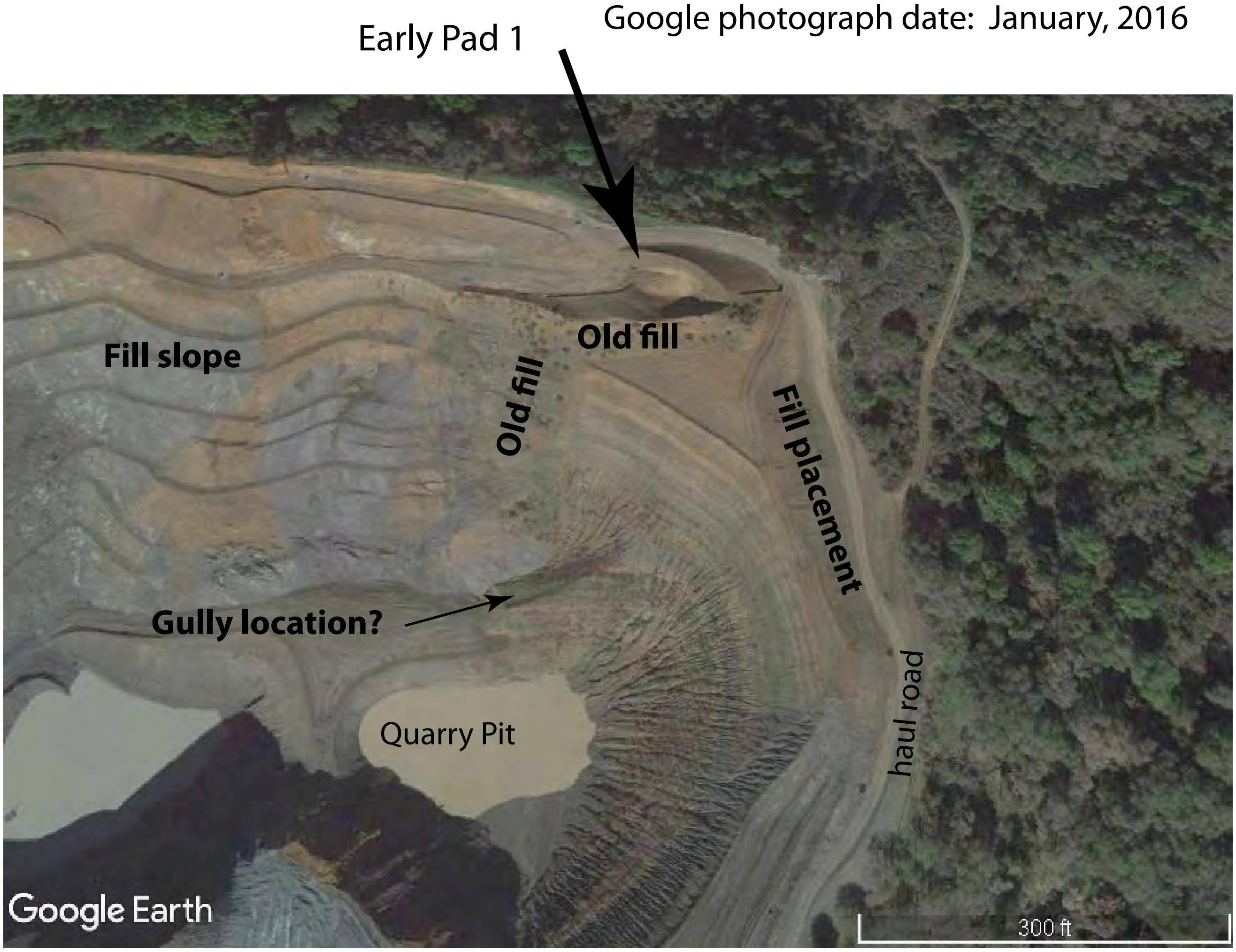


~N

The fill prism on the east face has continued to grow. Only small areas of old fill in the NE corner remain exposed. The gully is completely covered. It appears that a pond or pad had been constructed at the top of the NE quarry corner.

Norfleet Consultants	North East Corner of Stevens Creek Quarry Pit					
	March, 2015					
	PROJ NO:	201881.5	DATE:	2-25-2020	FIGURE:	4

Google photograph date: January, 2016



~N

The eastern fill prism has grown higher. The face of the east fill prism is steep. A green area is visible at the toe of the slope where the east and north fills connect (the toe of the gully). The green area indicates that water is collecting in this area. The photo was taken in January and it is likely that surface water is concentrating in this area.

Norfleet Consultants	North East Corner of Stevens Creek Quarry Pit		
	January, 2016		
	PROJ NO: 201881.5	DATE: 2-25-2020	FIGURE: 5

Google photograph date: November, 2016

Creation of Pond ?

~N

Fill continues to be placed on the north face and in the north-east corner. Fill is also being placed at the location of the current pond. Only a small sliver of old fill is visible. Note the shifting of the quarry pit.

Norfleet Consultants	North East Corner of Stevens Creek Quarry Pit				
	November, 2016				
	PROJ NO: 201881.5	DATE: 2-25-2020	FIGURE: 6		

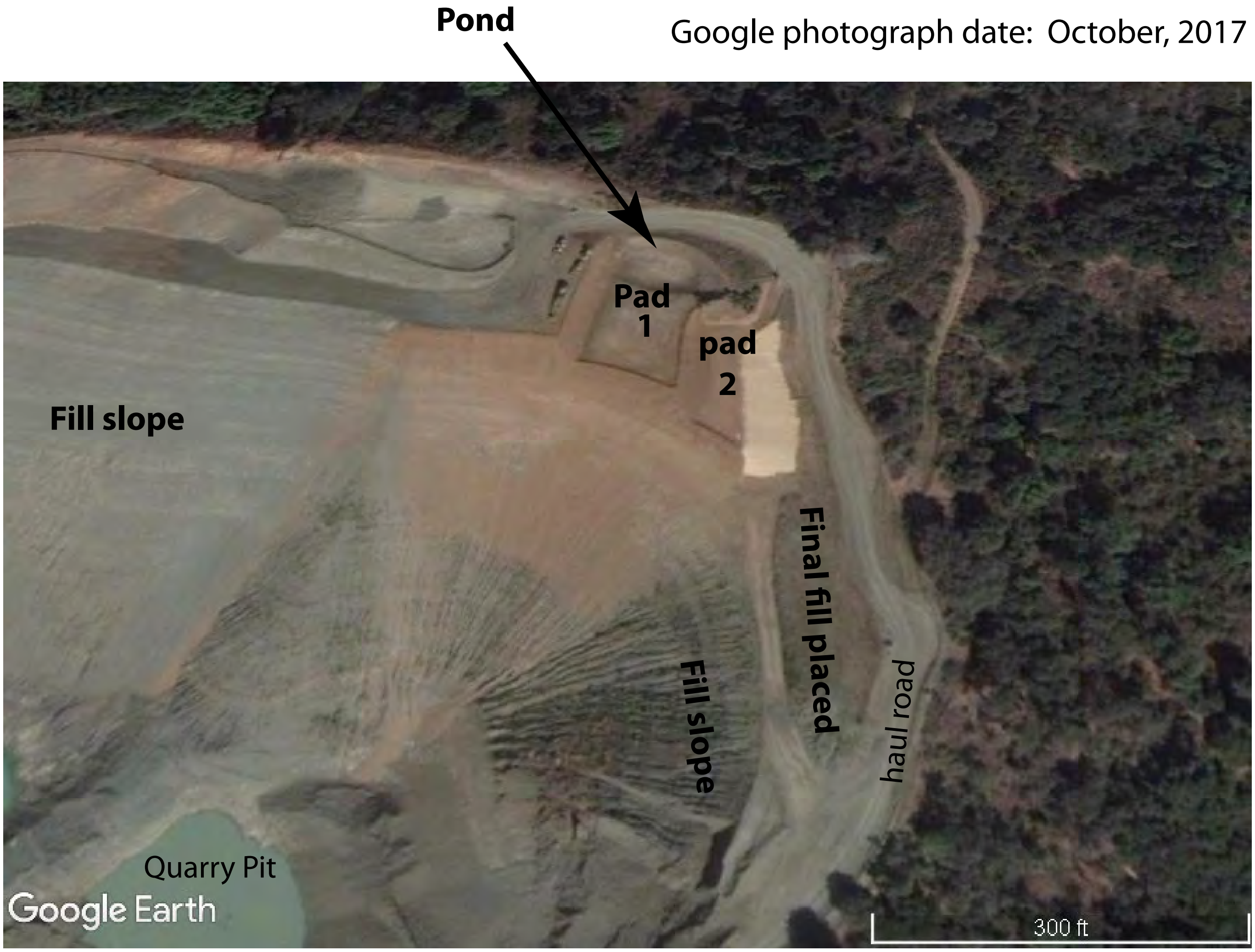
Settling pond Google photograph date: September, 2017

~N

Fill continued to be placed on the north slope. Fill was removed from the base of the east slope (note the new quarry pit), and the top of the east face fill prism has narrowed slightly (see fill configuration on Figure 6.

Norfleet Consultants	North East Corner of Stevens Creek Quarry Pit		
	September, 2017		
	PROJ NO: 201881.5	DATE: 2-25-2020	FIGURE: 7

Google photograph date: October, 2017

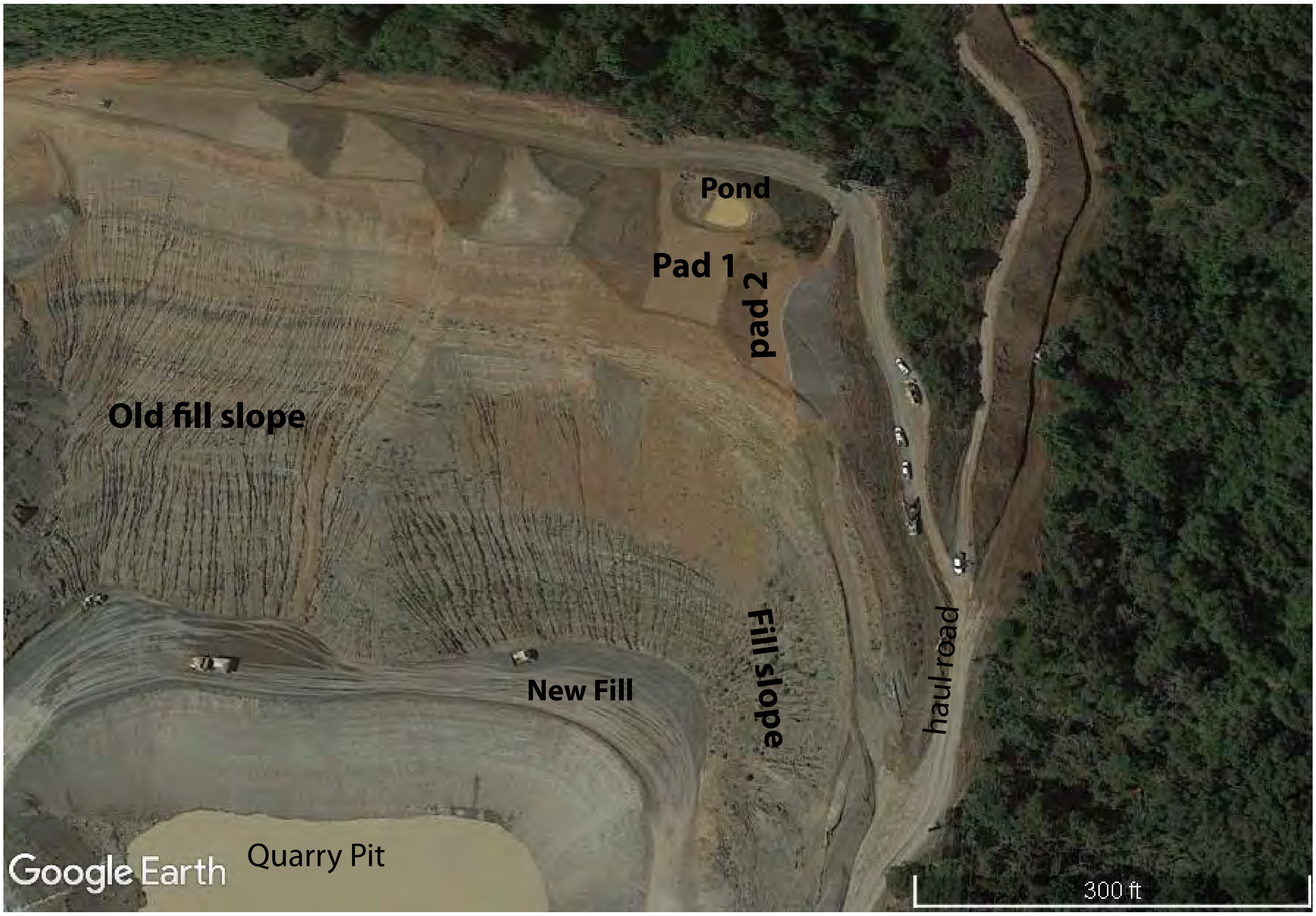


~N

The current pads and settling pond are in place. No old fill is visible. Additional fill was placed at the top of the east face fill prism.

Norfleet Consultants	Northeast Corner of Stevens Creek Quarry Pit		
	October, 2017		
	PROJ NO: 201881.5	DATE: 2-25-2020	FIGURE: 8

Google photograph date: May, 2018



~N

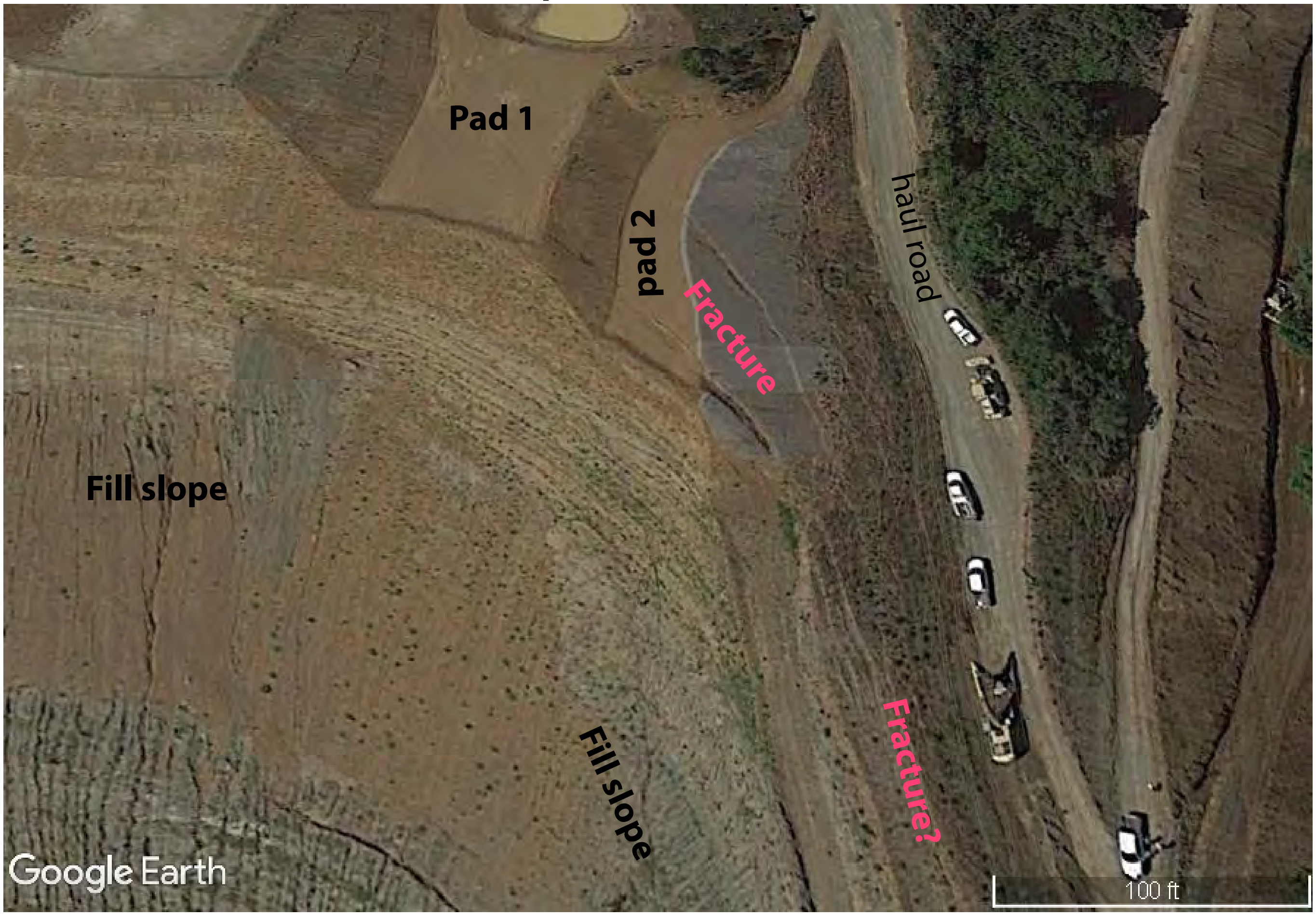
The quarry has deepened. Fractures have developed along the south edges of pads 1 and 2 (see next figures).

The winter of 2017-2018 was quite rainy. One hundred percent of historic rainfall had fallen by early February and rain continued into March. Note the gullying in the fill faces.

No landsliding is visible on the quarry faces.

Norfleet Consultants	North East Corner of Stevens Creek Quarry Pit		
	May, 2018		
	PROJ NO: 201881.5	DATE: 2-25-2020	FIGURE: 9

Google photograph date: May, 2018

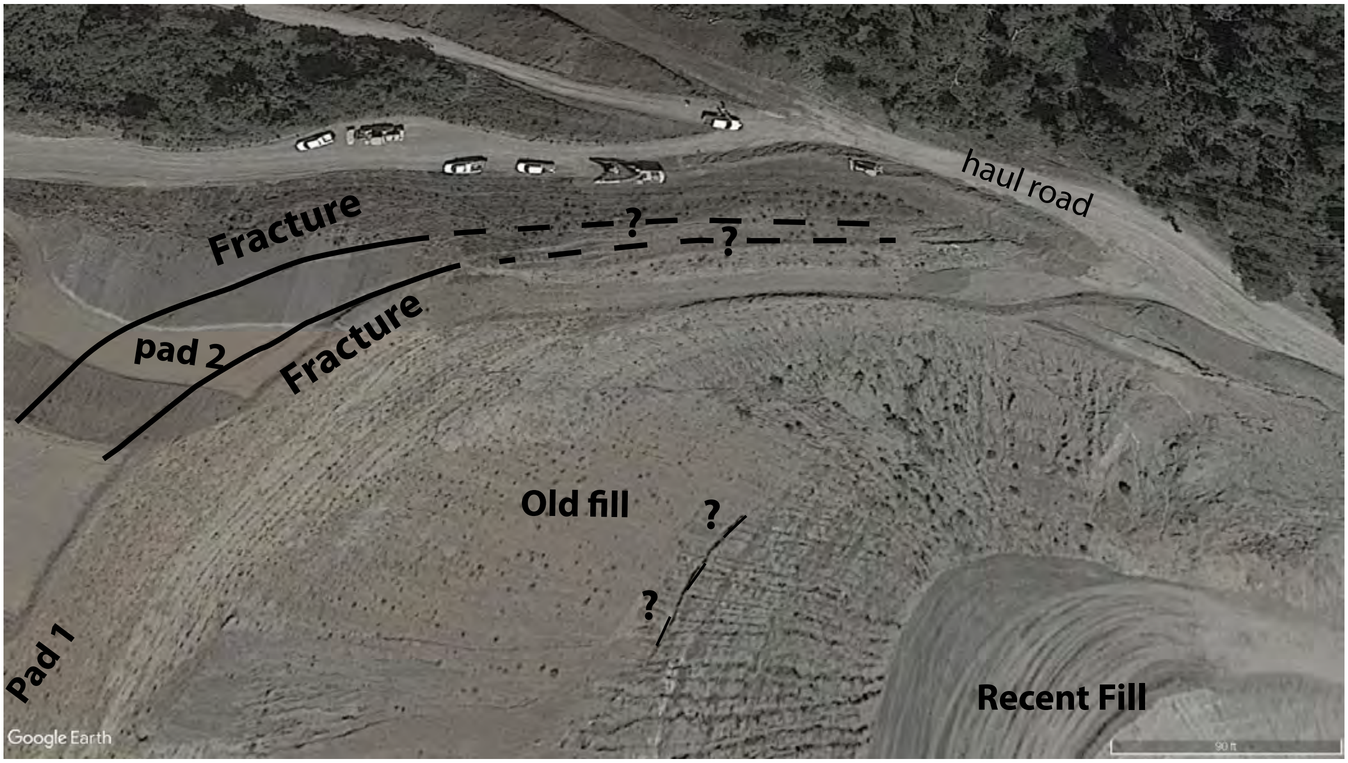


~N

This is an enlargement of the photograph in figure 9. The fractures extend from the east side of Pad 1, across Pad 2 and curve south along the top of the east fill prism. The northern end of of the two fractures is easy to see, but their southern extent is unclear (hence the ?).

Norfleet Consultants	North East Corner of Stevens Creek Quarry Pit		
	May, 2018		
	PROJ NO: 201881.5	DATE: 2-25-2020	FIGURE: 9a

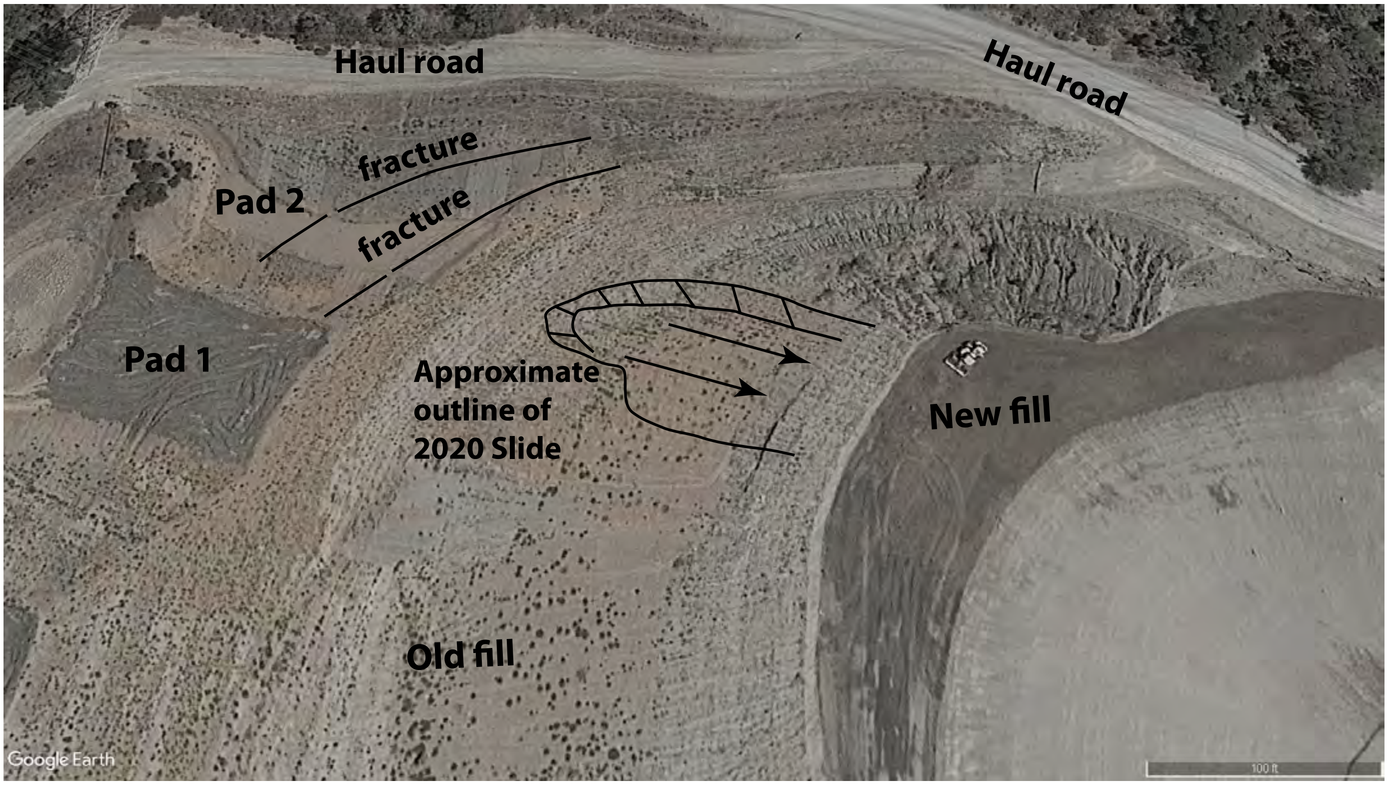
Google photograph date: May, 2018



This is an oblique view of the Figure 9a photograph. The fracture traces are shown (dashed where uncertain). There maybe a fracture in the fill face at the approximate location of the future fill face landslide.

Norfleet Consultants	North East Corner of Stevens Creek Quarry Pit, Oblique View		
	May, 2018		
	PROJ NO: 201881.5	DATE: 2-25-2020	FIGURE: 9b

Google photograph date: August, 2018



This is the most recent photograph on Google Earth. The approximate location and size of the currently visible land-slide on the fill face is shown. I observed that landslide in May, 2019. See Figures 2 and 3.

It appears that the surface of Pad 1 was smoothed in early 2018. The current extension of the fractures into Pad 1 indicates that there has been minor movement on the fractures.

Norfleet Consultants	North East Corner of Stevens Creek Quarry Pit				
	August, 2018				
	PROJ NO:	201881.5	DATE: 2-25-2020	FIGURE:	10

Google photograph date: October, 2017

~N

These are the physical relationships just prior to when the fractures formed (winter of 2017-18). The fractures occurred at the crest of the slope and define the zone of movement. The fill above the buried gully is at its the thickest when compared to either side (see Figure 2). This section of the face also has its steepest historical slope because fill was removed from the base of this slope (compare with Figure 6).

Norfleet Consultants	North East Corner of Stevens Creek Quarry Pit		
	October, 2017		
	PROJ NO: 201881.5	DATE: 2-25-2020	FIGURE: 11

LIMITATIONS OF THIS REPORT

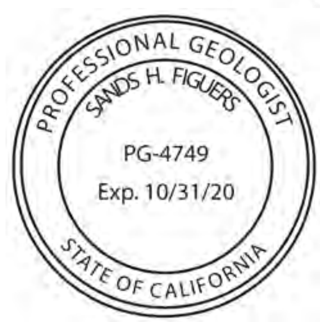
This report was prepared at the request of, and for the exclusive use of the addressee. Release to any other company, concern, or individual is solely the responsibility of the addressee. Norfleet Consultants is an independent consultant who was retained to provide a preliminary evaluation of slope instability causes. Any other use of this report is strictly forbidden by Norfleet Consultants.

We have employed generally accepted civil engineering, engineering geology, and geophysical procedures. Our observations, professional opinions and conclusions were made using that degree of care and skill ordinarily exercised, under similar conditions, by civil engineers engineering geologists, geophysicists practicing in this area at this time. Norfleet Consultants expressly denies any third party liability arising from the unauthorized use of this report.

If you have any questions, please contact us at 925-606-8595.

Yours truly,
Norfleet Consultants

S. Figuers



Photograph 1. An oblique view, looking east towards the NE corner of the quarry (from the NW corner). The horizontal arrow marks the 2019 landslide. The vertical arrow marks pad 1.

Photograph 2. The east end of the north face, looking north. The horizontal arrow marks the 2019 landslide. The vertical arrow marks pad 1. The white band marks are on the east quarry face and are a possible indication of water seepage.

Photograph 3. An enlarged area from Photograph 2. The landslide is visible and Pad 1 is above the landslide. The landslide toe does not extend to the bottom of the slope.

Photograph 4. The settling pond at the north end of Pad 1, looking east. Water flows into the pond through the pipe in the foreground. It leaves the pond through the pipe opening (black dot) in the far bank. Pad 1 is on the right. Note the bathtub rings that mark water levels in the pond.

Photograph 5. The settling pond, looking NW. Water enters the pond through the pipe visible below the truck.

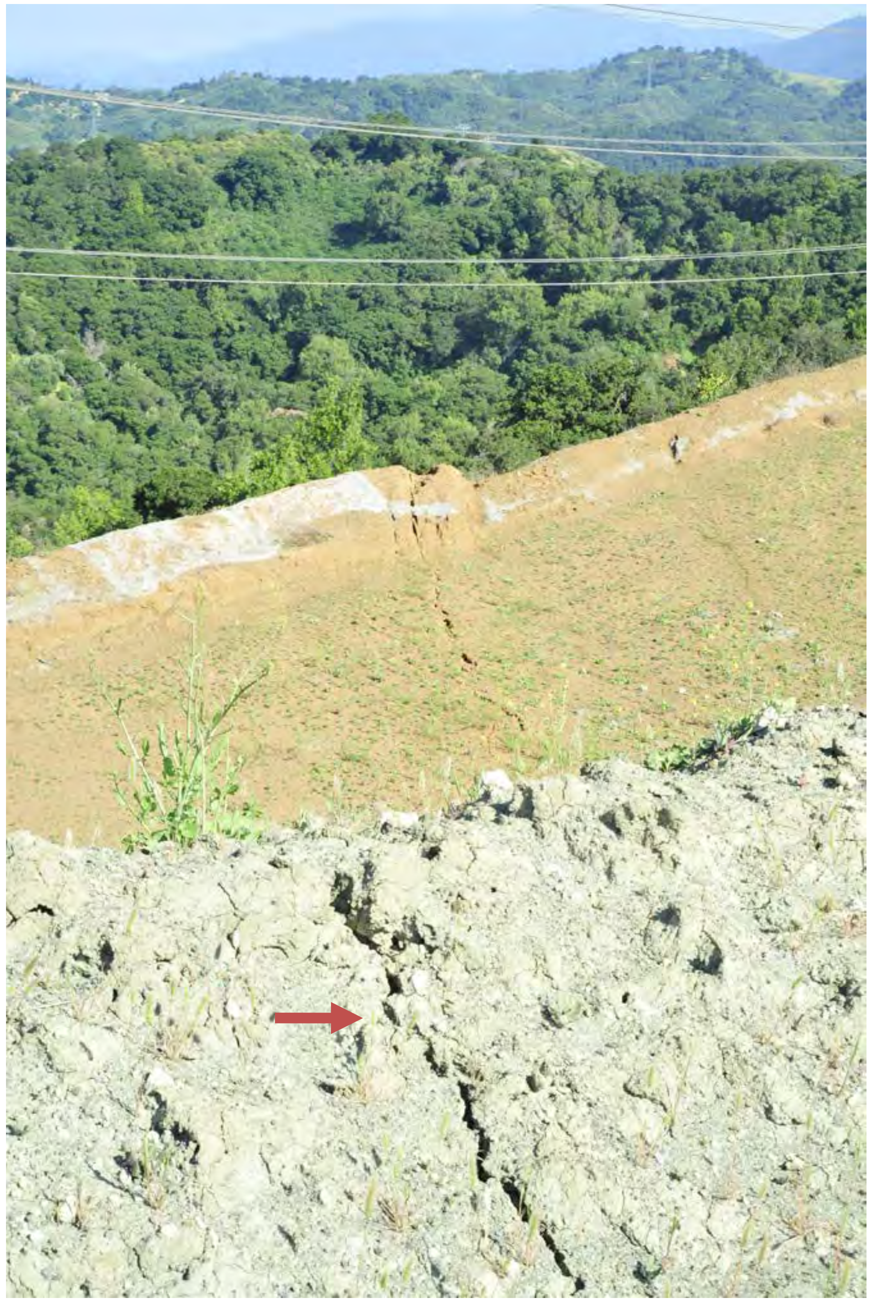
Photograph 6. Pad 1, looking south towards the pit face.

Photograph 7. Pad 2 as viewed from Pad 1. Ground cracks are visible at the south end of Pad 2.

Photograph 8. Ground cracks at the south end of Pad 2 (visible in Photo 7). Looking from Pad 1 (foreground). The cracks extend into Pad 1 (arrow).

Photograph 9.

Extension of a crack in Pad 2 into Pad 1 (arrow). The crack extends about 3/4 of the width of Pad 1 (to the south). The orientation of the crack suggests that the failure plane dip is fairly steep.



NORFLEET CONSULTANTS

Engineering
Geology
Hydrogeology
Geophysics

537 Joyce Street.
Livermore, Ca 94550
(925) 606-8595

Mr. J. Voss
Stevens Creek Quarry, Inc.
12100 Stevens Canyon Road
Cupertino, CA 95014

September 19, 2020
NC Proj. No. 201881.5

RE: Stability Assessment of the Proposed Cut Slope of the Northwest Corner of the Stevens Creek Quarry.
12100 Stevens Canyon Road
Cupertino, CA 95014

Dear Mr. Voss,

At your request, I performed a slope stability assessment of the proposed final 2:1 cut slope at the northwest (NW) corner of the quarry (with and without fill). Rock and soil properties in this area were evaluated by Norfleet (2008), BaGG (2019), and Stantec (2019).

Slope Stability Analysis

The location of the evaluated slope profile was provided by Benchmark Resources. The cross-section is the longest part of the proposed cut. The cut slope will have a 2:1, east dipping slope (~1550 feet long with a ~750 vertical elevation change). The cut is primarily in weathered greenstone bedrock, but a thin layer (40-60 feet) of deeply weathered bedrock will crop out around the western rim of the cut. This material has been observed by BAGG, Norfleet, and Cotton and Shires. A large, flat topped fill pad will be constructed along the eastern side of the cut slope. It will have a 200 foot maximum thickness.

Slope stability analyses were performed to evaluate the stability of the cut slope. The first analysis (Figures 2 and 3) evaluated the overall stability of the cut slope (without fill pad). The second (Figures 4 and 5) evaluated the stability of the near surface weathered greenstone that would remain at the top of the west end of the cut slope . The third set (Figures 5 and 6) evaluated the overall stability of the cut slope with the 200 foot thick fill pad.

To be conservative, the material properties used (Table 1) are at the lower end of the range of property values discussed in Norfleet (2008), BaGG (2019), and Stantec (2019). The results of the stability analyses are listed in Tables 2 and 3. The static evaluation was performed using the modified Bishop Method. Seismic displacement was determined by a Newmark analysis.

Table 1. Rock Material Properties.

Rock type	Graph No	Total Unit Wt. (pcf.)	Cohesion (pcf.)	Phi Angle (deg.)
Sheared Greenstone	1	130	500	31
Weathered Sheared Greenstone	2	120	300	26
Fill	3	150	150	31

Table 2 Results of stability analysis (without fill pad). The PGA was 0.6g

Rock Type Analyzed	Static FS	Seismic FS	Seismic Displacement
Sheared Greenstone	1.39	0.82	4.6 cm
Weathered Sheared Greenstone	1.56	0.94	1.2 cm

Table 3 Results of stability analysis (with fill pad). The PGA was 0.6g

Rock Type Analyzed	Static FS	Seismic FS	Seismic Displacement
Sheared Greenstone	1.55	0.9	2.2 cm
Weathered Sheared Greenstone	1.56	0.94	1.2 cm

Cotton and Shires Proposed Landslide

Cotton and Shires (2020 a and b) prepared a PowerPoint presentation for the City of Cupertino based on Google Earth historic aerial photographs of the Permanete Quarry property and the Stevens Creek Quarry areas. On Google photographs of the NW corner of the Stevens Creek Quarry area (their Figures 37 and 38) they noted a feature that appeared to be the headscarp of a large, deep-seated landslide that they called the NW Wall Landslide (Figure 7). This proposed landslide was more than 1000 feet long, hundreds of feet wide and deep, with the toe extending into the floor of the quarry.

This feature first appeared in a November, 2014, Google photograph. The presence of what they interpreted as a recent head scarp (Cotton and Shire's Figure 38 and my Figure 8) suggested to them that this landslide is recent. There is no field evidence to support this conjecture. What is visible on the Google photographs is a shadow. Cotton and Shire interpreted this shadow as a ditch. It could just as likely be a small earthen berm created by grading. The top of this hill, and many flat surfaces in the surrounding area show evidence of the quasi-annual grass/brush cutting fire prevention program. Grading is a common part of this activity.

Cotton and Shire (2020b, p 4) further noted: "It appears that attempts were made to grade some drainage ditches in the headscarp area to divert water away from the slide". The drainage ditch appears to have been cut directly within and along the headscarp (as proposed by Cotton and Shires). Both Stevens Creek and Permanente Quarry operators have years of experience dealing with landslides. Excavating a ditch within a headscarp "crack" would only concentrate and direct water into the headscarp, having the opposite effect of what was intended. This would be contradictory to actions taken by companies with decades of experience dealing with landslides.

I observed and photographed the northwest corner of the quarry since that slope was finished prior to visible failure (ca. 2012), as well as the beginnings of slope failure and its development. The initial failure was a localized small feature high on the slope. Over the next five years additional localized failures developed that then coalesced into mass failure of the face. I did not observe failures in the lower third of the slope and there was and still is no visible single basal failure surface. The observed failure style of the slope is inconsistent with the type of failure proposed by Cotton and Shires (2020).

I visited the area (including the hill top) in early September, 2020. The graded area was still visible, but no headscarp was visible. There is a landslide in this area, but it is much smaller and shallower than suggested by Cotton and Shires. This landslide is restricted to the deeply weathered surface bedrock (upper 40 to 50 feet).

The NW Landslide

Based on my observations, the failures in the NW face are shallow, not deep-seated. Figure 9 is a Google photograph of the NW face in May, 2018. Landsliding began as several scattered small features in the vicinity of A. As those features enlarged, they destabilized the slope above them (B) and removed lateral support from either side (D) causeing those areas to destabilize. Debris from the upper slides slid down and covered the lower part of the slope. I did not observe landslide deformation in the base of the slope. The failures visible in Figure 8 took 4 to 5 years of slow, progressive movement to develop.

Figure 10 is an oblique view to the east of the top of the slope. The quarry is in the background. The three major features are (from right to left): a slope (labeled ancient landslide), a dissected alluvial fan and associated streams, and a low bedrock hill. The ancient landslide is no longer active. However, it directs surface and ground water west into the alluvial fan. The alluvial fan was formed by soil from the landslide mass. When the soil supply reduced, the alluvial fan began to erode. The streams flow to the east and drain onto the top of the cut face. More importantly, ground water also flows to the east.

Figure 11 illustrates the relationship between the top of the west face and the top of the ridge. Ridge top surface water funnels through a narrow gully on to the top of the west face. The water flows onto the slope above the location where the first landslide developed.

During the winter, groundwater is recharged. As it percolates it will eventually encounter less permeable material and begin to flow quasi-horizontally to the east. The initiation location of landsliding on the NW quarry face (Figure 7, location C) likely marks the area where groundwater flows from the cut face surface. This area is about 1/3 the way down from the top of the slope. Groundwater currently seeps from the face, with the seepage points in the middle third of the slope. There is no visible seepage from either the lower or upper parts of the slope.

Conclusions

The static FS of the cut slope (without fill pad) is 1.39. The seismic displacement is 4.6 cm. When the fill pad is constructed, the static FS increase to 1.55 and the seismic displacement decreases to 2.2 cm. These calculation are based on lower bound material strength values.

Surface and groundwater movement around the western rim of the proposed cut slope within the weathered zone should be assumed. Appropriate surface and subsurface preventive measures should be taken to gather/control this water. Currently, the weathered rock zone gathers and directs groundwater east towards the quarry. It is one of the drivers of the current landslide movement on the NW face. Bedrock in this area is sheared. It is likely that the operator will encounter variable strength rock in this area (no wide-spread rock strength consistency). The weathered/less weathered rock interface is gradational and will vary in depth and thickness. I found no evidence for the large-scale, deep-seated landslide proposed by Cotton and Shires.

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S.Figuers

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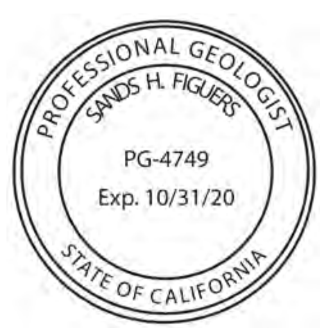

References

BAGG Engineers, 2019, In-depth Engineering Geologic Investigation and Slope Stability Analysis Western Rim Slope Stevens Creek Canyon Road, Cupertino, California 94117, dated January 2, 2019, 16 pages and 30 Plates

Cotton and Shires, 2020a, Outline of Cupertino Quarry Issues Corresponding to Presentation Slides, dated May, 2020, reference G6020, 5pp

Cotton and Shires, 2020b, Geologic and Geotechnical Review of Permanente Quarry and Stevens Creek Quarry Reclamation Plan Amendments, Cupertino, California, dated April, 2020, copy of presentation slides, 57 pp

Norfleet Consultants, 2008, Geologic and Slope Stability Analysis, Reclamation Plan Amendment, Stevens Creek Quarry, California Mini ID 91-43-007, San Jose, California, dated January 22, 2008

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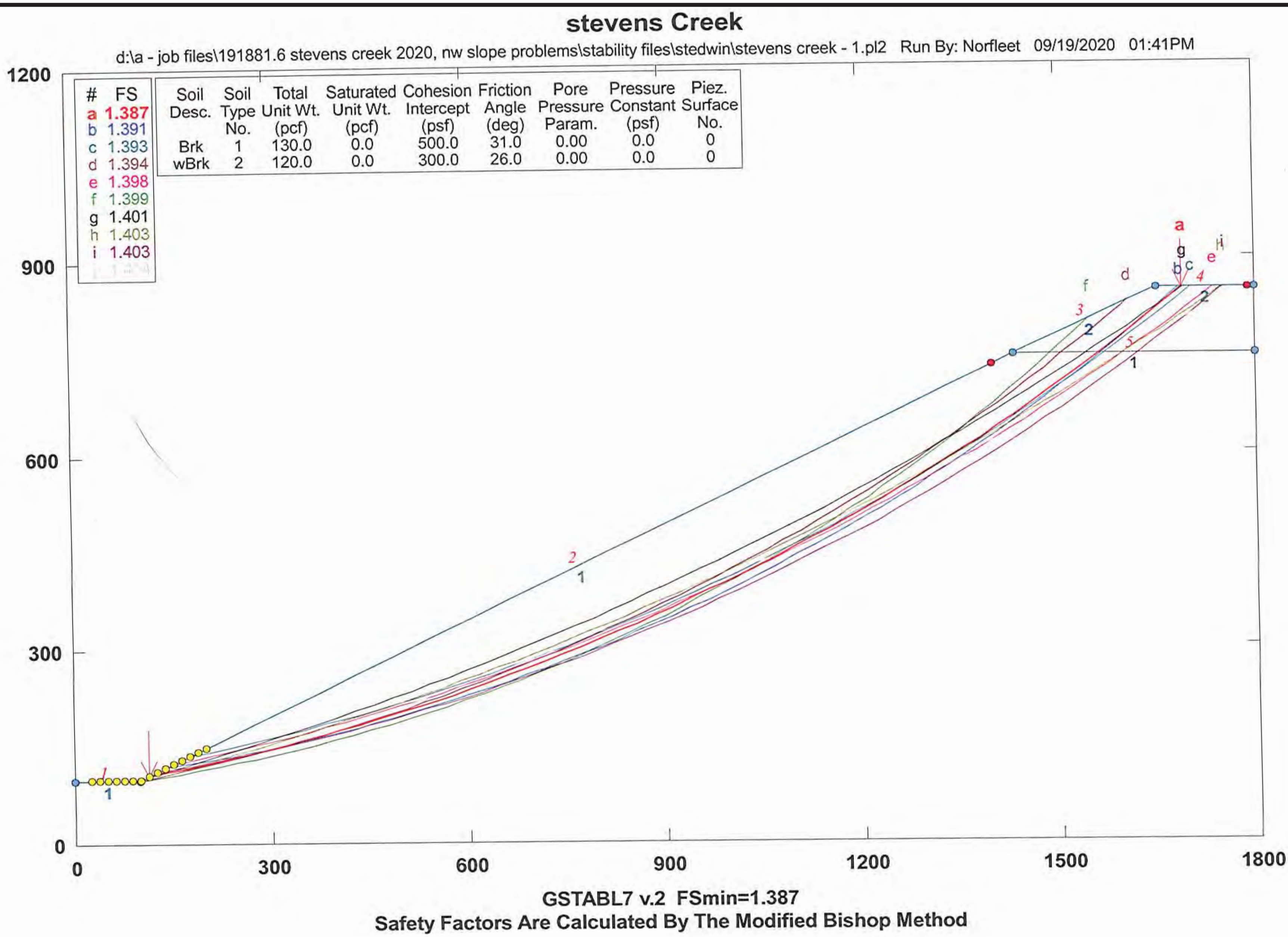
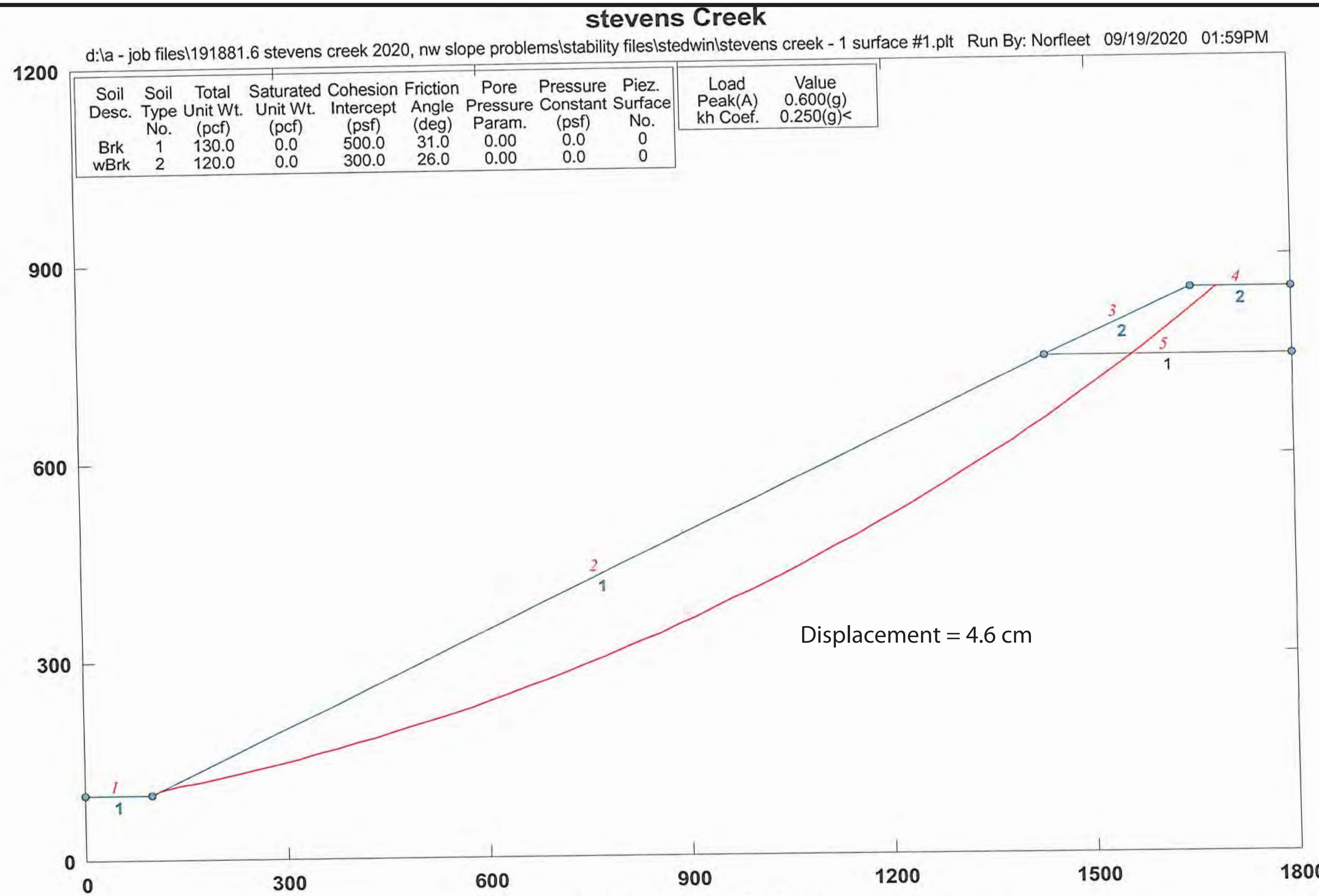
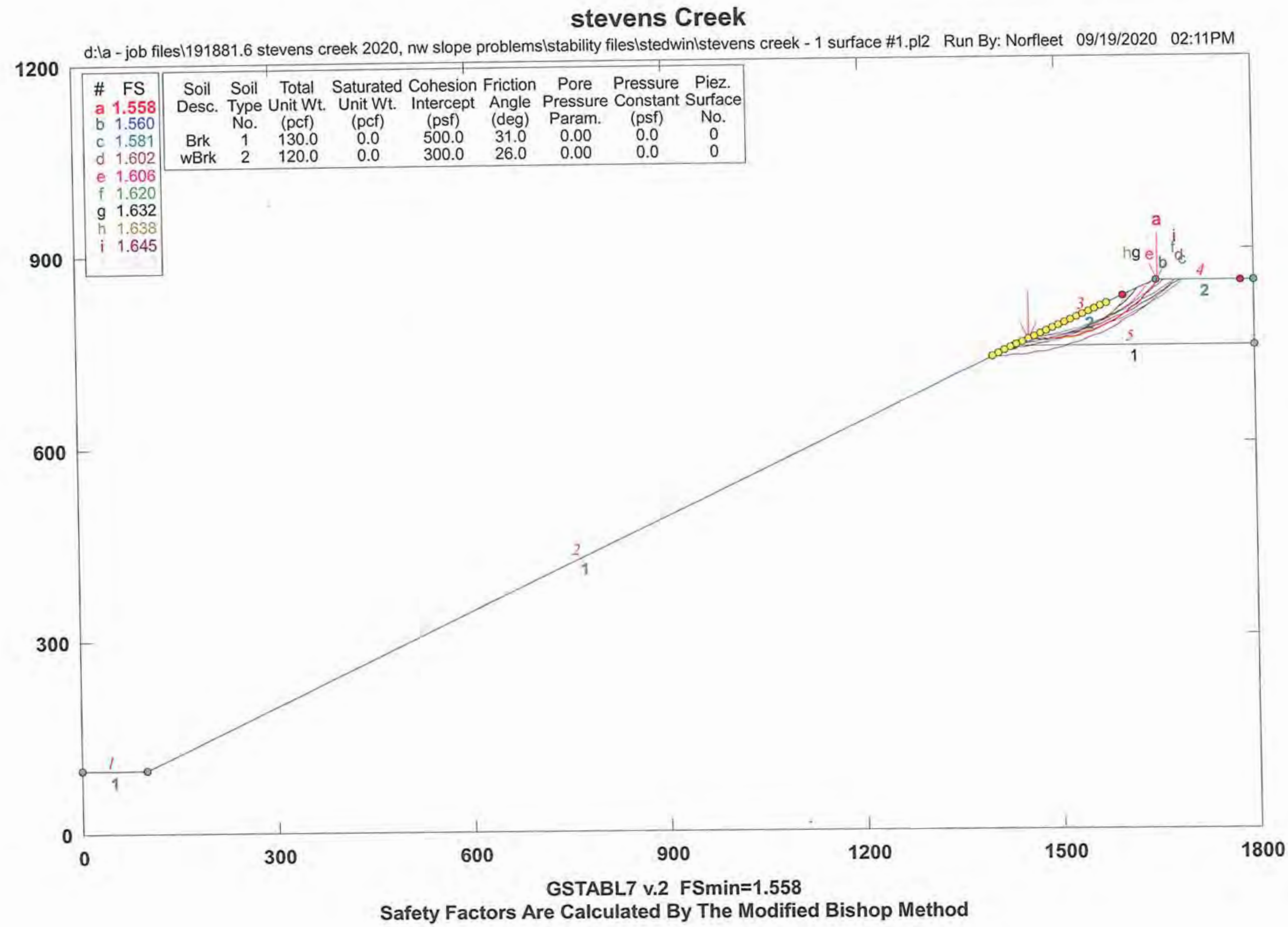


Norfleet Consultants	Stevens Creek Quarry				
	Stability Analysis of Full Slope				
	PROJ NO: 191881.6	DATE: 9-17-2020		FIGURE: 1	

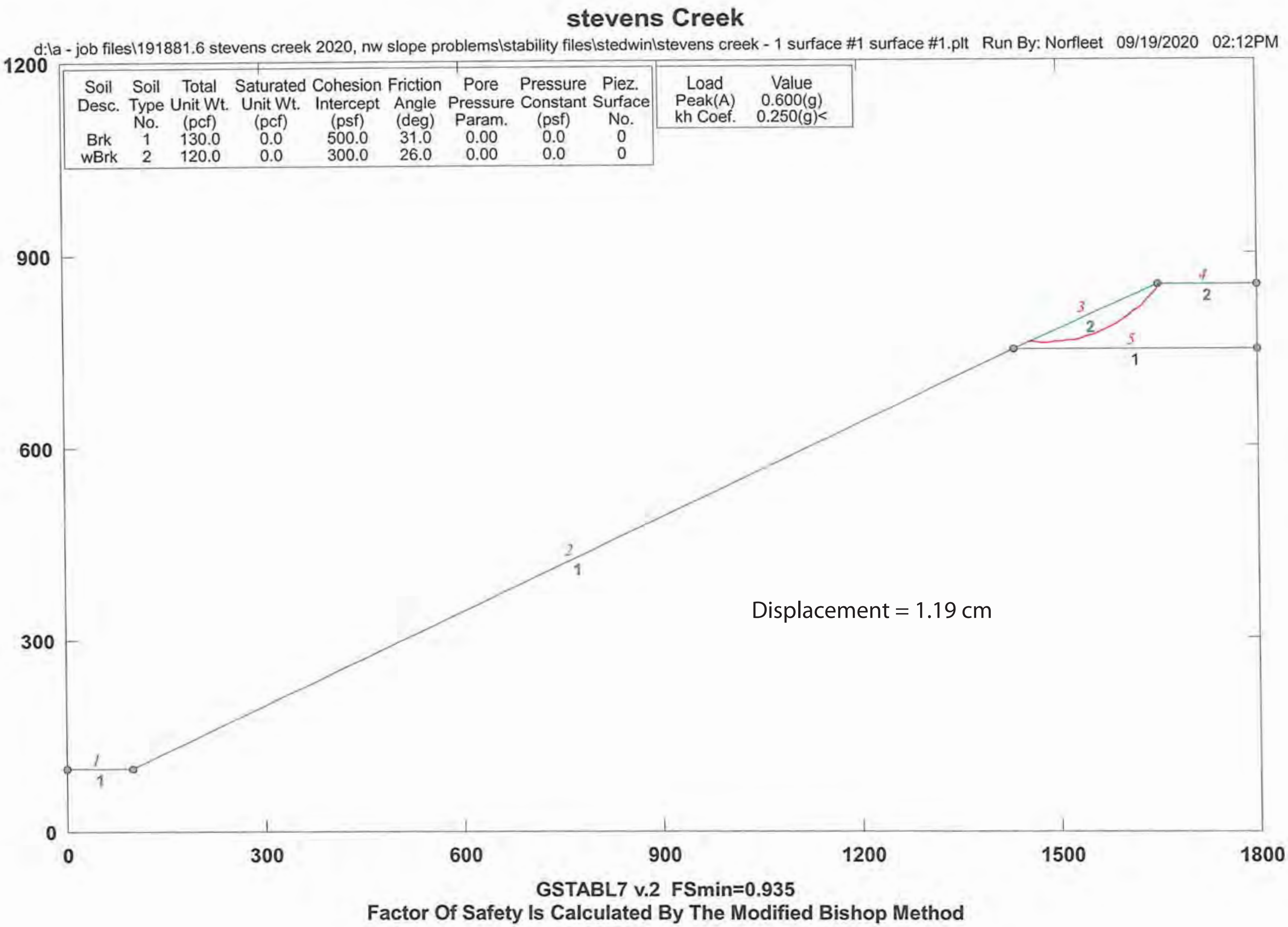


GSTABL7 v.2 FSmin=0.819
Factor Of Safety Is Calculated By The Modified Bishop Method

Norfleet Consultants	Stevens Creek Quarry				
	Seismic Analysis of Full Slope				
	PROJ NO: 191881.6	DATE:	9-17-2020	FIGURE:	2



Norfleet Consultants	Stevens Creek Quarry		
	Stability Analysis of Weathered Layer		
	PROJ NO: 191881.6	DATE: 9-17-2020	FIGURE: 3

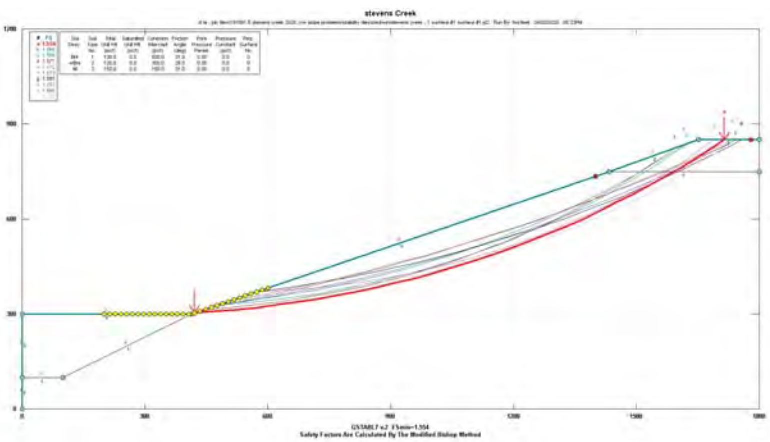


Norfleet Consultants

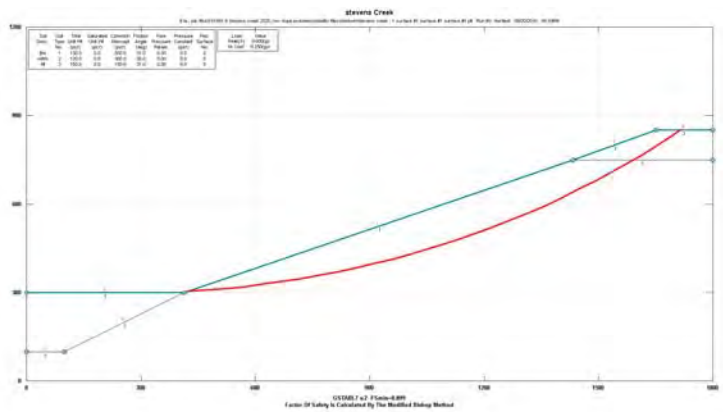
Stevens Creek Quarry

Seismic Analysis of Weathered Layer

PROJ NO: 191881.6 | DATE: 9-17-2020 | FIGURE: 4



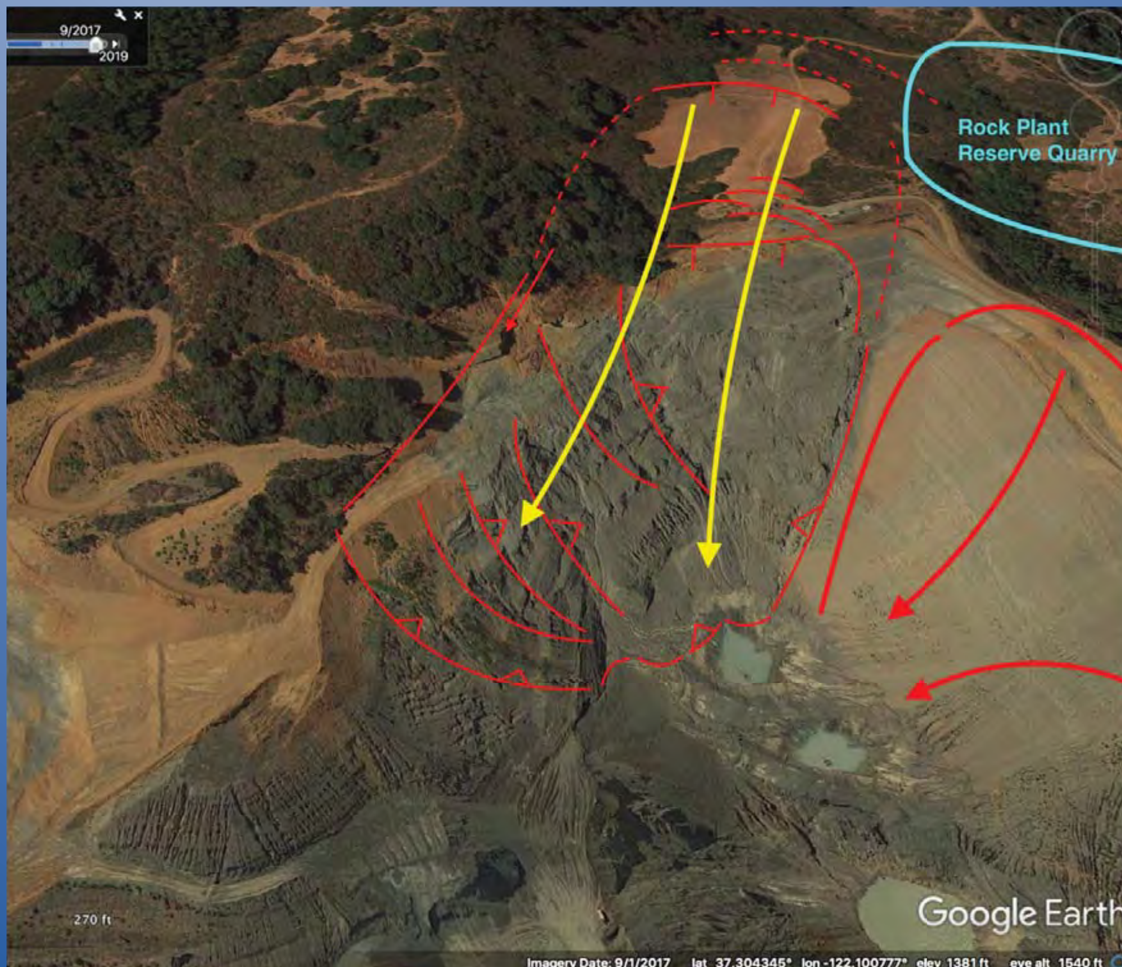
Norfleet Consultants	Stevens Creek Quarry		
	Stability Analysis of Full Slope with Fill Pad		
	PROJ NO: 191881.6	DATE: 9-17-2020	FIGURE: 5



Displacement = 2.2 cm

Norfleet Consultants	Stevens Creek Quarry	
	Seismic Analysis of Full Slope with Fill Pad	
PROJ NO: 191881.6	DATE: 9-17-2020	FIGURE: 6

Stevens Creek NW Wall Landslide



- Activated in 2013
- 1,300 feet long
- 550 feet wide
- 250 to 350 feet deep
- Up to 10 mil cu. Yrds
- Approx 500 to 700 feet into Lehigh Property

2017

COTTON, SHIRES & ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Norfleet Consultants	Stevens Creek Quarry				
	Cotton and Shire, Figure 37				
	PROJ NO:	191881.6	DATE: 9-17-2020	FIGURE:	7

Massive Bedrock Landslide

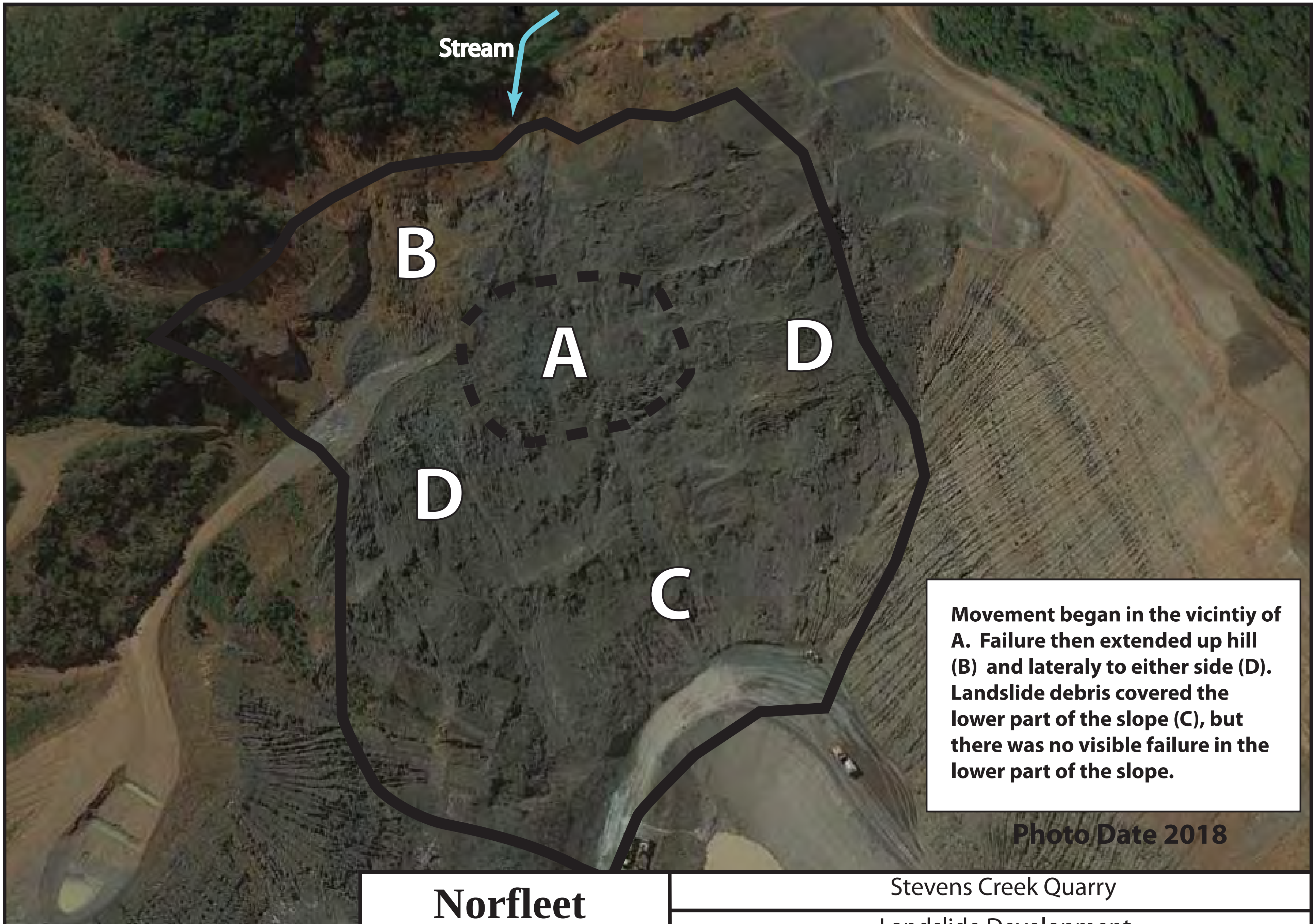
The white arrows indicate features that Cotton and Shires associate with the headscarp of a large, deep-seated landslide.

- **Ground Cracks 740 feet from property line**
- **Not just a cut slope failure**

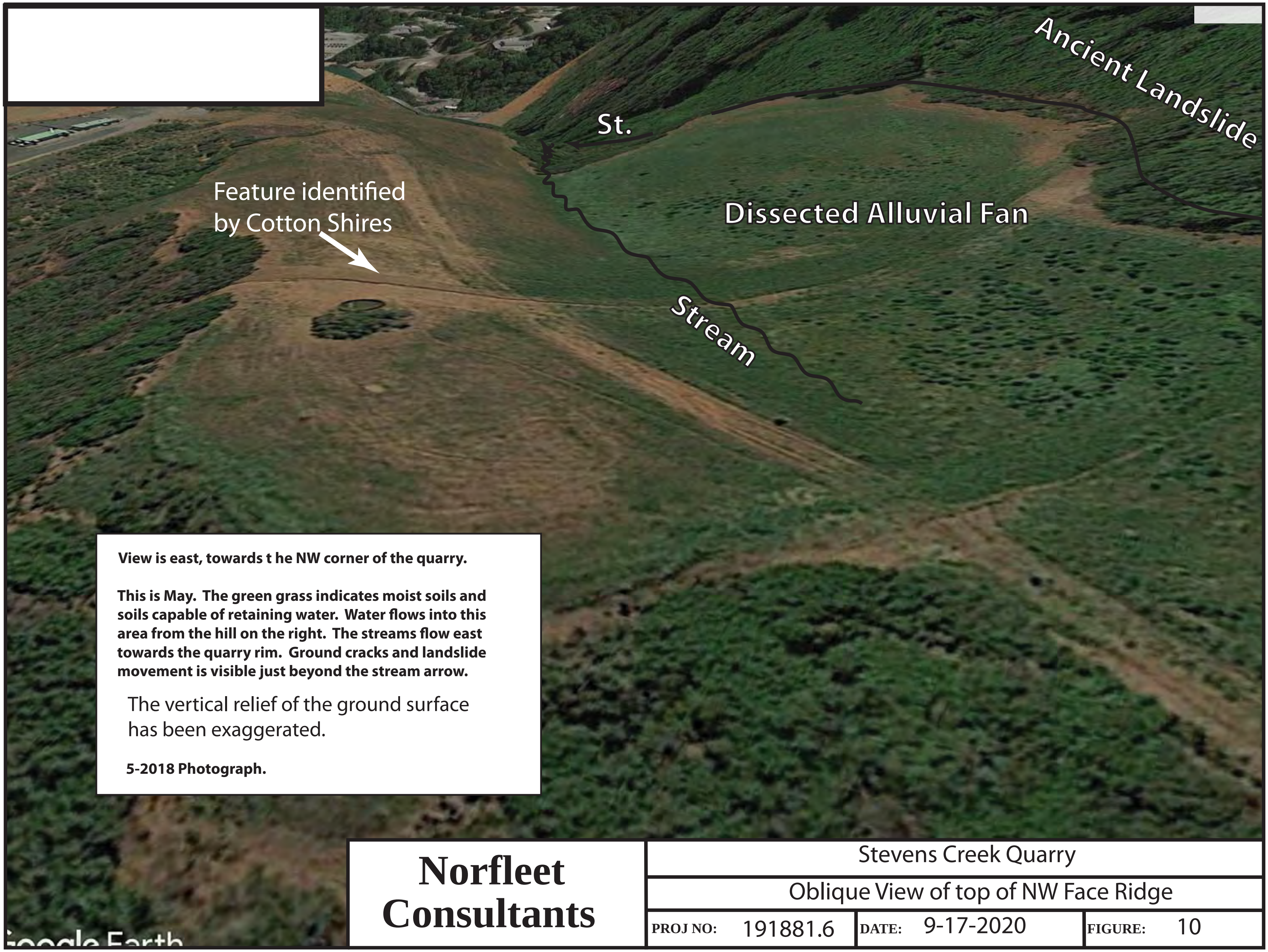
March 2015

COTTON, SHIRES & ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Norfleet Consultants	Stevens Creek Quarry				
	Cotton and Shire, Figure 37				
	PROJ NO: 191881.6		DATE: 9-17-2020		FIGURE: 8



Norfleet Consultants	Stevens Creek Quarry		
	Landslide Development		
	PROJ NO: 191881.6	DATE: 9-17-2020	FIGURE: 9



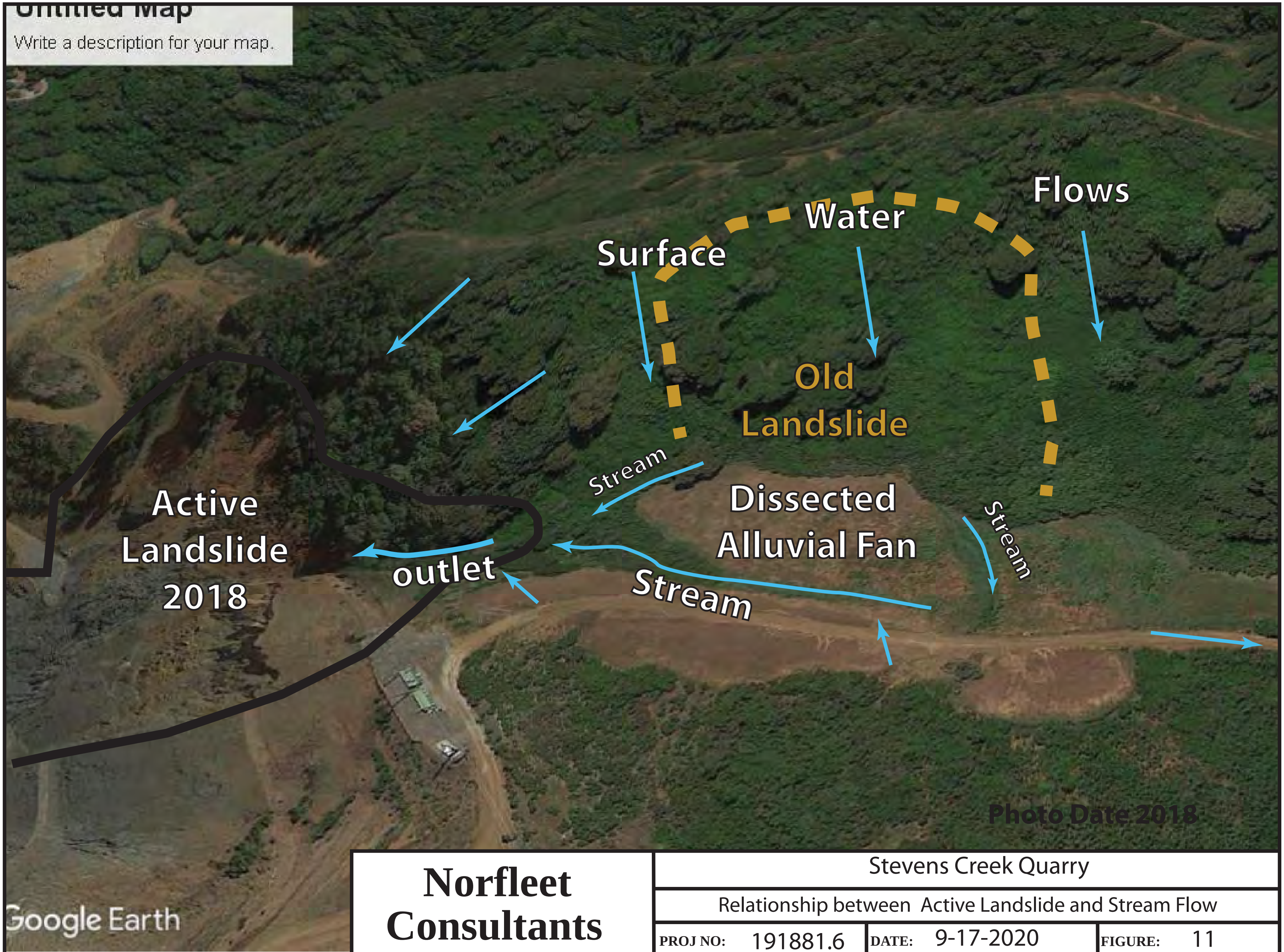
View is east, towards t he NW corner of the quarry.

This is May. The green grass indicates moist soils and soils capable of retaining water. Water flows into this area from the hill on the right. The streams flow east towards the quarry rim. Ground cracks and landslide movement is visible just beyond the stream arrow.

The vertical relief of the ground surface has been exaggerated.

5-2018 Photograph.

Norfleet Consultants	Stevens Creek Quarry		
	Oblique View of top of NW Face Ridge		
	PROJ NO: 191881.6	DATE: 9-17-2020	FIGURE: 10



Norfleet Consultants	Stevens Creek Quarry
	Relationship between Active Landslide and Stream Flow
	PROJ NO: 191881.6 / DATE: 9-17-2020 / FIGURE: 11

December 9, 2020

Andrew White
Benchmark Resources

Re: Biological Resources Constraints Assessment of Stevens Creek Quarry, Cupertino, California

Dear Mr. White,

This letter report provides the results of the biological resources constraints assessment conducted for Stevens Creek Quarry (Study Area; see Appendix A, Figure 1) in Cupertino, Santa Clara County, California. This report describes the results of the assessment, which evaluated the Study Area for: (1) the potential to support special-status species and (2) the potential presence of other sensitive biological resources, including sensitive and jurisdictional communities that are protected by local, state, and federal laws and regulations.

The Study Area is approximately 252 acres and located near the intersection of Stevens Canyon Rd and Montebello Rd in Cupertino, approximately 3 miles west of State Route 85. The Study Area is bound by Permanente Quarry to the north, Stevens Creek Reservoir and Stevens Creek County Park to the east, Picchetti Ranch Open Space, scattered agricultural, and residential development to the south, and open space to the west. The Study Area is primarily characterized as an active quarry with almost the entire Study Area disturbed by aggregate extraction, processing, and associated facilities and infrastructure.

Based on a review of background literature and databases, the relatively small amount of undisturbed Study Area contains four sensitive biological communities. The Study Area has potential to support eight special-status plant and nine special-status wildlife species. In addition, non-special-status nesting birds may be present in the Study Area during the breeding season (February 1 to August 31).

REGULATORY BACKGROUND

The following sections explain the regulatory context of the biological assessment, including applicable laws and regulations that were applied to the database reviews and analysis of potential impacts.

Federal and State Regulatory Setting

Vegetation and Aquatic Communities

CEQA provides protections for particular vegetation types defined as sensitive by the California Department of Fish and Game (CDFW), and aquatic communities protected by laws and regulations administered by the U.S Army Corps of Engineers (Corps), State Water Resources Control Board (SWRCB), and Regional Water Quality Control Boards (RWQCB). The laws and regulations that provide protection for these resources are summarized below.

Sensitive Natural Communities: Sensitive natural communities include habitats that fulfill special functions or have special values. Natural communities considered sensitive are those identified in local or regional plans, policies, regulations, or by the CDFW. CDFW ranks sensitive communities as "threatened" or "very threatened" (CDFW 2020a) and keeps records of their occurrences in its California Natural Diversity Database (CNDDB; CDFW 2020). CNDDB vegetation alliances are ranked 1 through 5 based on NatureServe's (2020) methodology, with those alliances ranked globally (G) or statewide (S) as 1 through 3 considered sensitive. Impacts to sensitive natural communities identified in local or regional plans, policies, or regulations or those identified by the CDFW or U.S. Fish and Wildlife Service (USFWS) must be considered and evaluated under CEQA (CCR Title 14, Div. 6, Chap. 3, Appendix G).

Waters of the United States, Including Wetlands: The Corps regulates "Waters of the United States" under Section 404 of the Clean Water Act (CWA). Waters of the United States are defined in the Code of Federal Regulations (CFR) as including the territorial seas, and waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, such as tributaries, lakes and ponds, impoundments of waters of the U.S., and wetlands that are hydrologically connected with these navigable features (33 CFR 328.3). Potential wetland areas, according to the three criteria used to delineate wetlands as defined in the Corps Wetlands Delineation Manual (Environmental Laboratory 1987), are identified by the presence of (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology. Unvegetated waters including lakes, rivers, and streams may also be subject to Section 404 jurisdiction and are characterized by an ordinary high water mark (OHWM) identified based on field indicators such as the lack of vegetation, sorting of sediments, and other indicators of flowing or standing water. The placement of fill material into Waters of the United States generally requires a permit from the Corps under Section 404 of the CWA.

The Corps also regulates construction in navigable waterways of the U.S. through Section 10 of the Rivers and Harbors Act (RHA) of 1899 (33 USC 403). Section 10 of the RHA requires Corps approval and a permit for excavation or fill, or alteration or modification of the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor or refuge, or enclosure within the limits of any breakwater, or of the channel of any navigable water of the United States. Section 10 requirements apply only to navigable waters themselves, and are not applicable to tributaries, adjacent wetlands, and similar aquatic features not capable of supporting interstate commerce.

Waters of the State, Including Wetlands: The term "Waters of the State" is defined by the Porter-Cologne Act as "any surface water or groundwater, including saline waters, within the boundaries of the state." The SWRCB and nine RWQCBs protect waters within this broad regulatory scope through many different regulatory programs. Waters of the State in the context of a CEQA Biological Resources evaluation include wetlands and other surface waters protected by the *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*. The SWRCB and RWQCB issue permits for the discharge of fill material into surface waters through the State Water Quality Certification Program, which fulfills requirements of Section 401 of the CWA and the Porter-Cologne Water Quality Control Act. Projects that require a Clean Water Act permit are also required to obtain a Water Quality Certification. If a project does not require a federal permit, but does involve discharge of dredge or fill material into surface waters of the State, the SWRCB and RWQCB may issue a permit in the form of Waste Discharge Requirements.

Sections 1600-1616 of California Fish and Game Code: Streams and lakes, as habitat for fish and wildlife species, are regulated by CDFW under Sections 1600-1616 of California Fish and

Game Code (CFGC). Alterations to or work within or adjacent to streambeds or lakes generally require a 1602 Lake and Streambed Alteration Agreement. The term “stream”, which includes creeks and rivers, is defined in the California Code of Regulations (CCR) as “a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life [including] watercourses having a surface or subsurface flow that supports or has supported riparian vegetation” (14 CCR 1.72). The term “stream” can include ephemeral streams, dry washes, watercourses with subsurface flows, canals, aqueducts, irrigation ditches, and other means of water conveyance if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife (CDFG 1994). Riparian vegetation has been defined as “vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself” (CDFG 1994).

Special-status Species

Endangered and Threatened Plants, Fish, and Wildlife. Specific species of plants, fish, and wildlife species may be designated as threatened or endangered by the federal Endangered Species Act (ESA), or the California Endangered Species Act (CESA). Specific protections and permitting mechanisms for these species differ under each of these acts, and a species’ designation under one law does not automatically provide protection under the other.

The ESA (16 USC 1531 et seq.) is implemented by the USFWS and the National Marine Fisheries Service (NMFS). The USFWS and NMFS maintain lists of "endangered" and "threatened" plant and animal species (referred to as "listed species"). "Proposed" or "candidate" species are those that are being considered for listing, and are not protected until they are formally listed as threatened or endangered. Under the ESA, authorization must be obtained from the USFWS or NMFS prior to take of any listed species. Take under the ESA is defined as “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Take under the ESA includes direct injury or mortality to individuals, disruptions in normal behavioral patterns resulting from factors such as noise and visual disturbance, and impacts to habitat for listed species. Actions that may result in “take” of an ESA-listed species may obtain a permit under ESA Section 10, or via the interagency consultation described in ESA Section 7. Federally listed plant species are only protected when take occurs on federal land.

The ESA also provides for designation of critical habitat, which are specific geographic areas containing physical or biological features “essential to the conservation of the species”. Protections afforded to designated critical habitat apply only to actions that are funded, permitted, or carried out by federal agencies. Critical habitat designations do not affect activities by private landowners if there is no other federal agency involvement.

The CESA (California Fish and Game Code 2050 et seq.) prohibits a "take" of any plant and animal species that the California Fish and Game Commission determines to be an endangered or threatened species in California. CESA regulations include take protection for threatened and endangered plants on private lands, as well as extending this protection to “candidate species” which are proposed for listing as threatened or endangered under CESA. The definition of a "take" under CESA ("hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill") only applies to direct impact to individuals, and does not extend to habitat impacts or harassment. CDFW may issue an Incidental Take Permit under CESA to authorize take if it is incidental to otherwise lawful activity and if specific criteria are met. Take of these species is also authorized if the geographic area is covered by a Natural Community Conservation Plan (NCCP), as long as the NCCP covers that activity.

Fully Protected Species and Designated Rare Plant Species. This category includes specific plant and wildlife species that are designated in California Fish and Game Code (CFGC) as protected even if not listed under CESA or the ESA. Fully Protected Species includes specific lists of birds, mammals, reptiles, amphibians, and fish designated in CFGC. Fully protected species may not be taken or possessed at any time. No licenses or permits may be issued for take of fully protected species, except for necessary scientific research and conservation purposes. The definition of "take" is the same under the California Fish and Game Code and the CESA. By law, CDFW may not issue an Incidental Take Permit for Fully Protected Species. Under the California Native Plant Protection Act (NPPA), CDFW has listed 64 "rare" or "endangered" plant species, and prevents "take", with few exceptions, of these species. CDFW may authorize take of species protected by the NPPA through the Incidental Take Permit process, or under a NCCP.

Special Protections for Nesting Birds and Bats. The federal Bald and Golden Eagle Protection Act provides relatively broad protections to both of North America's eagle species (bald [*Haliaeetus leucocephalus*] and golden eagle [*Aquila chrysaetos*)] that in some regards are similar to those provided by the ESA. In addition to regulations for special-status species, most native birds in the United States, including non-status species, have baseline legal protections under the Migratory Bird Treaty Act of 1918 and CFGC, i.e., sections 3503, 3503.5 and 3513. Under these laws/codes, the intentional harm or collection of adult birds as well as the intentional collection or destruction of active nests, eggs, and young is illegal. For bat species, the Western Bat Working Group (WBWG) designates conservation status for species of bats, and those with a high or medium-high priority are typically given special consideration under CEQA.

Essential Fish Habitat. The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) provides for conservation and management of fishery resources in the U.S., administered by NMFS. This Act establishes a national program intended to prevent overfishing, rebuild overfished stocks, ensure conservation, and facilitate long-term protection through the establishment of Essential Fish Habitat (EFH). EFH consists of aquatic areas that contain habitat essential to the long-term survival and health of fisheries, which may include the water column, certain bottom types, vegetation (e.g. eelgrass (*Zostera* spp.)), or complex structures such as oyster beds. Any federal agency that authorizes, funds, or undertakes action that may adversely affect EFH is required to consult with NMFS.

Species of Special Concern, Movement Corridors, and Other Special Status Species under CEQA. To address additional species protections afforded under CEQA, CDFW has developed a list of special species as "a general term that refers to all of the taxa the CNDDB is interested in tracking, regardless of their legal or protection status." This list includes lists developed by other organizations, including for example, the Audubon Watch List Species, the Bureau of Land Management Sensitive Species, and USFWS Birds of Special Concern. Plant species on the California Native Plant Society (CNPS) Rare and Endangered Plant Inventory (Inventory) with California Rare Plant Ranks (Rank) of 1, 2, and 3 are also considered special-status plant species and must be considered under CEQA. Rank 4 species are typically only afforded protection under CEQA when such species are particularly unique to the locale (e.g., range limit, low abundance/low frequency, limited habitat) or are otherwise considered locally rare. Additionally, any species listed as sensitive within local plans, policies and ordinances are likewise considered sensitive. Movement and migratory corridors for native wildlife (including aquatic corridors) as well as wildlife nursery sites are given special consideration under CEQA.

Local Regulatory Setting

County of Santa Clara Tree Ordinance. The County of Santa Clara Tree Preservation and Removal Ordinance (County Code, §C16.1 to §C16.17) serves to protect all trees having a trunk that measures 37.7 inches or more in circumference (12 inches in diameter) at the height of 4.5 feet above the ground or immediately below the lowest branch, whichever is lower, or in the case of multi trunk trees a trunk size of 75.4 inches in circumference or more (24 inches or more in diameter). In addition, any tree that because of its history, girth, height, species or other unique quality, is considered significant to the community or recommended by the historic commission can be designated as a heritage tree and, therefore, deemed protected and preserved.

Santa Clara County requires that a replanting or revegetation plan be submitted for all trees to be removed (County Code, §C16.7 (e)). If the trees to be removed are native species, then replacement by the same species is requested if feasible. For non-native species, the County Planning Department may determine the species for planting. All replacement tree plantings must use at least five-gallon stock.

METHODS

Available resources and reference materials were reviewed to evaluate potential for special-status species in the Study Area, including available aerial photographs of the sites (Google Earth 2020) and a review of databases and background literature. A site survey was not conducted and the review was restricted to a desktop assessment. These resources included:

- Contemporary aerial photographs (Google Earth 2020)
- California Natural Diversity Database (CNDDB, CDFW 2020)
- California Soil Resources Laboratory (CSRL) online soil viewer (CSRL 2020)
- California Native Plant Society Electronic Inventory (CNPS 2020a)
- Consortium of California Herbaria (CCH 2020)
- National Wetlands Inventory (USFWS 2020a)
- California Aquatic Resources Inventory (SFEI 2020)
- USFWS Information for Planning and Conservation Database (USFWS 2020b)
- eBird Online Database (eBird 2020)
- CDFW Publication, California Bird Species of Special Concern in California (Shuford and Gardali 2008)
- CDFW and University of California Press publication California Amphibian and Reptile Species of Special Concern (Thomson et al. 2016)
- A Field Guide to Western Reptiles and Amphibians (Stebbins 2003)
- A Manual of California Vegetation, 2nd Edition (Sawyer et al. 2009)
- A Manual of California Vegetation Online (CNPS 2020b)
- Preliminary Descriptions of the Terrestrial Natural Communities (Holland 1986)
- Approved Jurisdictional Delineation, Stevens Creek Quarry (LSA 2017)

Database searches (i.e., CNDDB, CNPS) focused on the Cupertino, Palo Alto, Mountain View, Milpitas, Mindego Hill, San Jose West, Big Basin, Castle Rock Ridge, and Los Gatos 7.5-minute quadrangles (U.S. Geological Survey [USGS] 2018). Figures 3 and 4 in Appendix A contain occurrences of special-status species documented in the CNDDB within a 5-mile radius of the Study Area. This analysis was performed to a level of detail necessary to understand what types of biological constraints may be associated with the Study Area. The conclusions of this report are based on conditions at the time of the analysis and regulatory policies and practices in place at the time the report was prepared; changes that may occur in the future with regard to conditions, policies, or practices could affect the conclusions presented in this study.

RESULTS

Based on the desktop review, the Study Area contains eight unique biological communities, five of which are considered sensitive by federal, state or local jurisdiction.

The majority of the Study Area consists of non-sensitive biological communities and developed land cover including the activities mining and processing areas, stormwater containment, equipment storage areas, office complex, and roads. Developed areas are often bordered by the next most prevalent non-sensitive biological community, chaparral, which is dominated by species such as California sagebrush (*Artemisia californica*) and coyote brush (*Baccharis pilularis*). Other non-sensitive biological communities within the Study Area include annual grassland.

The five sensitive biological communities present along the edges of the Study Area include California bay forest, oak woodland, cattail marsh, open water (ponds), and drainages.

Sensitive Communities

Sensitive biological communities within the Study Area include oak woodland, California bay forest, cattail marsh, drainages, and open water. Oak woodland is found along portions of the northern boundaries on ridgetops or the upper portions of steep slopes within the Study Area and is co-dominated by coast live oak (*Quercus agrifolia*), blue oak (*Quercus douglasii*), and leather oak (*Quercus durata*). Oak woodland is considered a sensitive community by Santa Clara County.

California bay forest is found along the southern boundaries on north and east facing slopes within the Study Area. This biological community was dominated by California bay (*Umbellularia californica*) intermixed with big-leaf maple (*Acer macrophyllum*), coast live oak, and western sycamore (*Platanus racemosa*). California bay forest is considered a sensitive community by CDFW.

Cattail marsh is present along the north and west edge of the westernmost pond in the Study Area. Cattail marsh is dominated by cattail species (*Typha* sp.) with other species such as rabbitfoot grass (*Polypogon monspeliensis*) and narrow leaf willow (*Salix exigua*). In addition to the cattail marsh, other aquatic features; open water ponds and drainages are present. Open water ponds are man-made and utilized as settling ponds for mining operations. These features are typically inundated year-round, and are highly disturbed due to regular dredging activities and surrounding vegetation maintained via herbicide applications. Drainages are also present within the Study Area, some previously manipulated to facilitate mining activities and others unaltered. Drainages both manipulated and un-manipulated are present in the southern portion of the Study Area. While all of the cattail marsh is considered potentially jurisdictional by the Corps, RWQCB, and CDFW, some of the settling ponds and anthropogenically altered drainages are only potentially jurisdictional by the RWQCB and CDFW, and not the Corps (LSA 2017).

Special-status Plant Species

A total of 81 special-status plant species have been documented in the *Cupertino* and eight surrounding USGS 7.5 minute quadrangles. Appendix B describes these species' regulatory status, habitat requirements, and potential to occur within the Study Area. Of the species documented in the vicinity, 75 are unlikely or have no potential to occur within the Study Area due to one or more of the following reasons:

- Specific edaphic conditions, such as serpentine or volcanic soils, are absent;
- Specific hydrologic conditions, such as riverine or tidal waters, are absent;
- Common associated plant species and vegetation communities are absent;
- The Study Area is above/below the documented elevation range of the species;
- Lack of a viable seed bank due to historic and contemporary soil alterations;
- Non-native species competition; or
- Regular disturbance (e.g., mining operations) of the Study Area

A total of 4 of the 81 special-status plant species have moderate or high potential to occur in the Study Area, a brief description of each species and potential to occur in the Study Area is found below.

Santa Clara red ribbons (*Clarkia concinna* ssp. *automixa*) CRPR 4.3. Moderate Potential. Santa Clara red ribbons is an annual herb in the evening primrose family (Onagraceae) that blooms April through July. It typically occurs on slopes and near intermittent streams in chaparral and cismontane woodland at elevation range 270 to 4,500 feet (CNPS 2020a). Known associated species include coast live oak, slender wild oat (*Avena fatua*), sticky monkey flower (*Mimulus aurantiacus*), poison oak (*Toxicodendron diversilobum*), buckwheat (*Eriogonum nudum*), and woolly sunflower (*Eriophyllum confertiflorum*).

There are multiple CNDDB occurrences west and northwest of the Study Area in similar habitats, therefore Santa Clara red ribbons has moderate potential to occur in the chaparral, forest, and woodland biological communities (CDFW 2020b).

Western leatherwood (*Dirca occidentalis*), CRPR 1B. High Potential. Western leatherwood is a deciduous shrub in the mezereum family (Thymelaeaceae) that blooms from January to April, but is typically identifiable via vegetative structures into late summer and/or early fall. It typically occurs on brushy, mesic slopes in partial shade in broadleaf upland forest, chaparral, closed-cone coniferous forest, cismontane woodland, North Coast coniferous forest, riparian forest, and riparian woodland habitat at elevations range from 165 to 1285 feet (CDFW 2020b, CNPS 2020, Hickman 1993). Observed associated species include coast live oak, California bay, Pacific madrone (*Arbutus menziesii*), poison oak, coyote brush, yerba buena (*Satureja douglasii*), sword fern (*Polystichum munitum*), and Pacific sanicle (*Sanicula crassicaulis*), (CDFW 2020b).

The nearest CNNDB occurrence is just south of the Study Area near the Stevens Creek Reservoir within the Pichetti Ranch Regional Open Space, and was last observed in 2010. Western leatherwood has high potential to occur in the chaparral, California bay forest, and woodland biological communities within the Study Area.

Arcuate bush mallow (*Malacothamnus arcuatus*) 1B.2. Moderate Potential. Arcuate bush mallow is a shrub in the mallow family (Malvaceae) that blooms from April through September. It typically occurs on gravelly alluvium within chaparral, cismontane woodland, valley and foothill grasslands. Observed associated species include California sagebrush (*Artemisia californica*), coyote bush, poison oak (*Toxicodendron diversilobum*), and toyon (*Heteromeles arbutifolia*).

The nearest CNDDB occurrence is roughly 2.3 miles northwest of the Study Area and was last observed in 2018 in the Rancho San Antonio Open Space. Arcuate bush mallow has moderate potential to occur within the chaparral woodlands on the soils derived from alluvium present within the Study Area.

White-flowered rein orchid (*Piperia candida*) CRPR 1B. Moderate Potential. White-flowered rein orchid is a perennial forb in the orchid family (Orchidaceae) that blooms from May to September. It typically occurs on forest duff, mossy banks, rock outcrops, and muskegs in North Coast coniferous forest, lower montane coniferous forest, and broadleaf upland forest habitat at elevations ranging from 95 to 4300 feet (CDFW 2020b, CNPS 2020a). Soil survey data at known locations suggest that this species is typically located on slightly acid (pH 6.5) very gravelly loams derived from sedimentary rock (CDFW 2020b, CSRL 2020). Observed associated species include Douglas fir (*Pseudotsuga menziesii*), tanoak (*Lithocarpus densiflorus*), coyote brush sticky monkey, poison oak, ocean spray (*Holodiscus discolor*), coast wild cucumber (*Marah fabaceus*), Torrey's onion grass (*Melica torreyana*), Italian rye grass, and goldback fern (*Pentagramma triangularis*) (CDFW 2020b).

The nearest CNDDB occurrence is roughly five miles northwest of the Study Area and was last observed in 1992 along Lost Creek Trail in the Los Trancos Open Space Preserve (CDFW 2020b). Other occurrences from 2019 are within similar habitat in the *Big Basin* quad (CNPS 2020a). White-flowered rein orchid has moderate potential to occur along drainages within the understory of forest and woodlands within the Study Area.

Special-status Wildlife Species

A total of 53 special-status wildlife species have been documented in the *Cupertino* and eight surrounding USGS 7.5 minute quadrangles. Appendix B describes these species' regulatory status, habitat requirements, and potential to occur within the Study Area. Of the species documented in the vicinity, 44 are unlikely or have no potential to occur within the Study Area due to one or more of the following reasons:

- Aquatic habitats (e.g., brackish waters or estuaries) necessary to support the special-status wildlife species are not present in the Study Area;
- Vegetation types (e.g., conifer forest, marsh) that provide nesting and/or foraging resources necessary support the special-status wildlife species are not present in the Study Area;
- Physical structures and vegetation (e.g., mines, old-growth conifers, cliffs, alkaline flats) necessary to provide nesting, cover, and/or foraging habitat to support the special-status wildlife species are not present in the Study Area;
- The Study Area is outside (e.g., north of, west of) of the special-status wildlife species documented local range (including the nesting/breeding range for birds).

In addition to the aforementioned reasons why species are absent, a documented occurrence of California tiger salamander (*Ambystoma californiense*) on the Permanente Quarry Property approximately 1 mile north of the Study Area has been reviewed and found to have no potential. The validity of this occurrence is questioned (Jennings pers. comm.) due to the age of the reported occurrence (from 1893) and likely misidentification. Therefore, this species was also considered absent.

All special-status wildlife species assessed as having moderate or high potential to occur within the Study Area are discussed below and include: pallid bat (*Antrozous pallidus*), hoary bat (*Lasiurus cinereus*), San Francisco dusky footed woodrat (*Neotoma fuscipes annectens*), yellow warbler (*Setophaga petechia brewsteri*), western pond turtle (*Actinemys marmorata*), Santa Cruz black salamander (*Aneides flavipunctatus niger*), California giant salamander (*Dicamptodon ensatus*), California red-legged frog (CRLF; *Rana draytonii*), and red-bellied newt (*Taricha rivularis).*

Pallid bat (*Antrozous pallidus*). CDFW Species of Special Concern, WBWG High Priority. Moderate Potential. The pallid bat is broadly distributed throughout much of western North America and typically occurs in association with open, rocky areas. Occupied habitats are highly variable and range from deserts to forests in lowland areas, and include higher-elevation forests. Roosting may occur singly or in groups of up to hundreds of individuals. Roosts must offer protection from high temperatures and are typically in rock crevices, mines, caves, or tree hollows; manmade structures are also used, including buildings (both vacant and occupied) and bridges. Pallid bats are primarily insectivorous, feeding on large prey that is usually taken on the ground but sometimes in flight (WBWG 2020). The Study Area contains trees which may provide suitable roosting habitat by this species.

Hoary bat (*Lasiurus cinereus*), WBWG Medium Priority. Moderate Potential. Hoary bats are highly associated with forested habitats in the western United States, particularly in the Pacific Northwest. They are a solitary species and roost primarily in foliage of both coniferous and deciduous trees, near the ends of branches, usually at the edge of a clearing. Roosts are typically 10 to 30 feet above the ground. They have also been documented roosting in caves, beneath rock ledges, in woodpecker holes, in grey squirrel nests, under driftwood, and clinging to the side of buildings, though this behavior is not typical. Hoary bats are thought to be highly migratory, however, wintering sites and migratory routes have not been well documented. This species tolerates a wide range of temperatures and has been captured at air temperatures between 0 and 22 degrees Celsius. Hoary bats probably mate in the fall, with delayed implantation leading to birth in May through July. They usually emerge late in the evening to forage, typically from just over one hour after sunset to after midnight. This species reportedly has a strong preference for moths, but is also known to eat beetles, flies, grasshoppers, termites, dragonflies, and wasps (WBWG 2020). The Study Area contains trees which may provide suitable roosting habitat by this species.

San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*), CDFW Species of Special Concern. High Potential. This subspecies of the dusky-footed woodrat occurs in the Coast Ranges between San Francisco Bay and the Salinas River (Matocq 2003). Occupied habitats are variable and include forest, woodland, riparian areas, and chaparral. Woodrats feed on woody plants, but will also consume fungi, grasses, flowers and acorns. Foraging occurs on the ground and in bushes and trees. This species constructs robust stick houses/structures in areas with moderate cover and a well-developed understory containing woody debris. Breeding takes place from December to September. Individuals are active year-round, and generally nocturnal. The Study Area contains suitable woodland habitat and may support this species.

(Brewster's) Yellow warbler (*Setophaga petechia brewsteri*), CDFW Species of Special Concern. Moderate Potential. The yellow warbler is a neotropical migrant bird that is widespread in North America, but has declined throughout much of its California breeding range. The Brewster's (*brewsteri*) subspecies is a summer resident and represents the vast majority of yellow warblers that breed in California. West of the Central Valley, typical yellow warbler breeding habitat consists of dense riparian vegetation along watercourses, including wet meadows, with willow growth especially being favored (Shuford and Gardali 2008). Insects comprise the majority of the diet. The Study Area contain streams and riparian vegetation that may support this species.

Western pond turtle (*Actinemys marmorata*), CDFW Species of Special Concern. Moderate Potential. The western pond turtle (WPT) is the only native freshwater turtle in California. This turtle is uncommon to common in suitable aquatic habitat throughout California, west of the Sierra-Cascade crest and Transverse Ranges. WPT inhabits annual and perennial aquatic habitats, such as coastal lagoons, lakes, ponds, marshes, rivers, and streams from sea level to 5,500 feet in elevation. Pond turtles also occupies man-made habitats such as stock ponds, wastewater storage, percolation ponds, canals, and reservoirs. This species requires low-flowing or stagnant freshwater aquatic habitat with suitable basking structures, including rocks, logs, algal mats, mud banks, and sand. Warm, shallow, nutrient-rich waters are ideal as they support prey items, which include aquatic invertebrates and occasionally fish, carrion, and vegetation. Turtles require suitable aquatic habitat for most of the year; however, WPT often occupies creeks, rivers, and coastal lagoons that become seasonally unsuitable. To escape periods of high water flow, high salinity, or prolonged dry conditions, WPT may move upstream and/or take refuge in vegetated, upland habitat for up to four months (Rathbun et al. 2002). Although upland habitat is utilized for refuging and nesting, this species preferentially utilizes aquatic and riparian corridors for movement and dispersal. Detention ponds lacking vegetated banks and emergent vegetation are not suitable for this species. In addition, the Study Area does not provide friable soils for nesting. However, aquatic habitat is present within the Study Area and no significant barriers to dispersal are present. As such, this species may occasionally occur within or disperse through streams or manmade ponds with vegetated banks within the Study Area.

Santa Cruz black salamander (*Aneides flavipunctatus niger*), CDFW Species of Special Concern. Moderate Potential. Climbing salamanders of the genus *Aneides* frequent damp woodlands and are usually found hiding under various debris (i.e. bark, woodrat nests, logs). The Santa Cruz black salamander exists south of the San Francisco Bay and was only recently recognized as a separate and protected species. They are a black salamander, 2-4 inches long from snout to vent, some with pale spots (Stebbins and McGinnis 2012). Santa Cruz black salamander is highly sedentary, preferring to stay hidden under riparian debris. Prey items include millipedes, spiders, and other insects (Stebbins and McGinnis 2012). The creeks and forested habitat along the southern extent of the Study Area may provide suitable habitat for this species. The majority of the Study Area is disturbed and unvegetated and is not suitable for this species.

California giant salamander (*Dicamptodon ensatus*). CDFW Species of Special Concern. High Potential. The California giant salamander is endemic to the north-central California Coast Ranges, and occurs in two discrete areas north and south of San Francisco Bay respectively. This species primarily occupies moist coniferous and mixed forests, but is also found along streams in coastal woodland and chaparral areas. Adults are largely terrestrial and fossorial, but similar to other fossorial amphibians, can be active at or near the surface in wet conditions such as high humidity or rain events (Thomson et al. 2016). Discoveries of this species at burrows are restricted to wet, shaded along streams, stream banks, and moist road cuts, and only above ground during fall and winter rain events (Fellers et al 2010, Thomson et al 2016). Observations of this species underground come from work in streams and individuals were always within refugia in proximity to creek or spring features (Feller et al 2010). Breeding occurs in cold, permanent or semi-permanent streams, often in headwater reaches. Larvae typically remain aquatic for over a year before metamorphosing (Thomson et al. 2016). Some larvae never undergo metamorphosis, and become reproductively mature while remaining aquatic. Prey consists of a variety of invertebrates and small vertebrates. This species has been documented upstream of the Study Area in Montebello Creek, which flows into Swiss Creek. (CDFW 2020). The creeks and forested habitat along the southern extent of the Study Area may provide suitable habitat for this species.

California red-legged frog (*Rana draytonii*), Federal Threatened Species, CDFW Species of Special Concern. Moderate Potential. The California red-legged frog is dependent on suitable aquatic, estivation, and upland habitat. During periods of wet weather, starting with the first rainfall in late fall, red-legged frogs disperse away from their estivation sites to seek suitable breeding habitat. Aquatic and breeding habitat is characterized by dense, shrubby, riparian vegetation and deep, still or slow-moving water. Breeding occurs between late November and late April. California red-legged frogs aestivate (period of inactivity) during the dry months in small mammal burrows, moist leaf litter, incised stream channels, and large cracks in the bottom of dried ponds. CRLF have been documented within 0.5 miles of the Study Area as recently as 2017 (CDFW 2020). Ponded areas within the Study Area may provide suitable habitat for the species.

Red-bellied newt (*Taricha rivularis*). CDFW Species of Special Concern. Moderate Potential. The red-bellied newt is endemic to the California Coast Ranges from southern Sonoma County through central Humboldt County. Cool coastal forests (typically coniferous) provide typical habitat, though this species also occupies hardwood forests. Similar to other newts, adults are primarily terrestrial but shift annually between terrestrial and aquatic (breeding) phases. Breeding occurs during the spring in mountain streams, usually with moderate to high flow and rocky substrates; ponds are only rarely used (Thomson et al. 2016). Although this species often shows fidelity to certain stream reaches, adults are capable of moving a mile or more from year to year (Thomson et al. 2016). An isolated population of this species exists in Santa Clara County over 2 miles west of the Study Area. This species has not been documented in Swiss Creek or its tributaries. However, given the proximity to a known population and the presence of stream habitat, this species has moderate potential to occur within the Study Area.

Critical Habitat and Wildlife Corridors

The Study Area does not contain any designated Critical Habitat.

The Study Area is classified as some of the least permeable landscapes (less conducive to wildlife movement) in the Essential Connectivity Areas mapped within the BIOS system (CDFW 2014). The undeveloped portions of the Santa Cruz Mountains lie to the south and west of the Study Area and provide more suitable habitat to facilitate movement of wildlife. Wildlife may occasionally traverse through the Study Area. However, given the disturbed nature of the site and because it does not link areas of core habitat, the Study Area does not serve as a wildlife corridor.

Please do not hesitate to contact our office should you have any questions, comments, or concerns.

Sincerely,

Kari Dupler
Senior Biologist
WRA, Inc.

Appendices:

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Appendix A – Figures

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Sources: National Geographic, WRA | Prepared By: JSChuster, 12/8/2020

Figure 1. Study Area Regional Location Map

Stevens Creek Quarry
Biological Constraints
Cupertino, Santa Clara County, California

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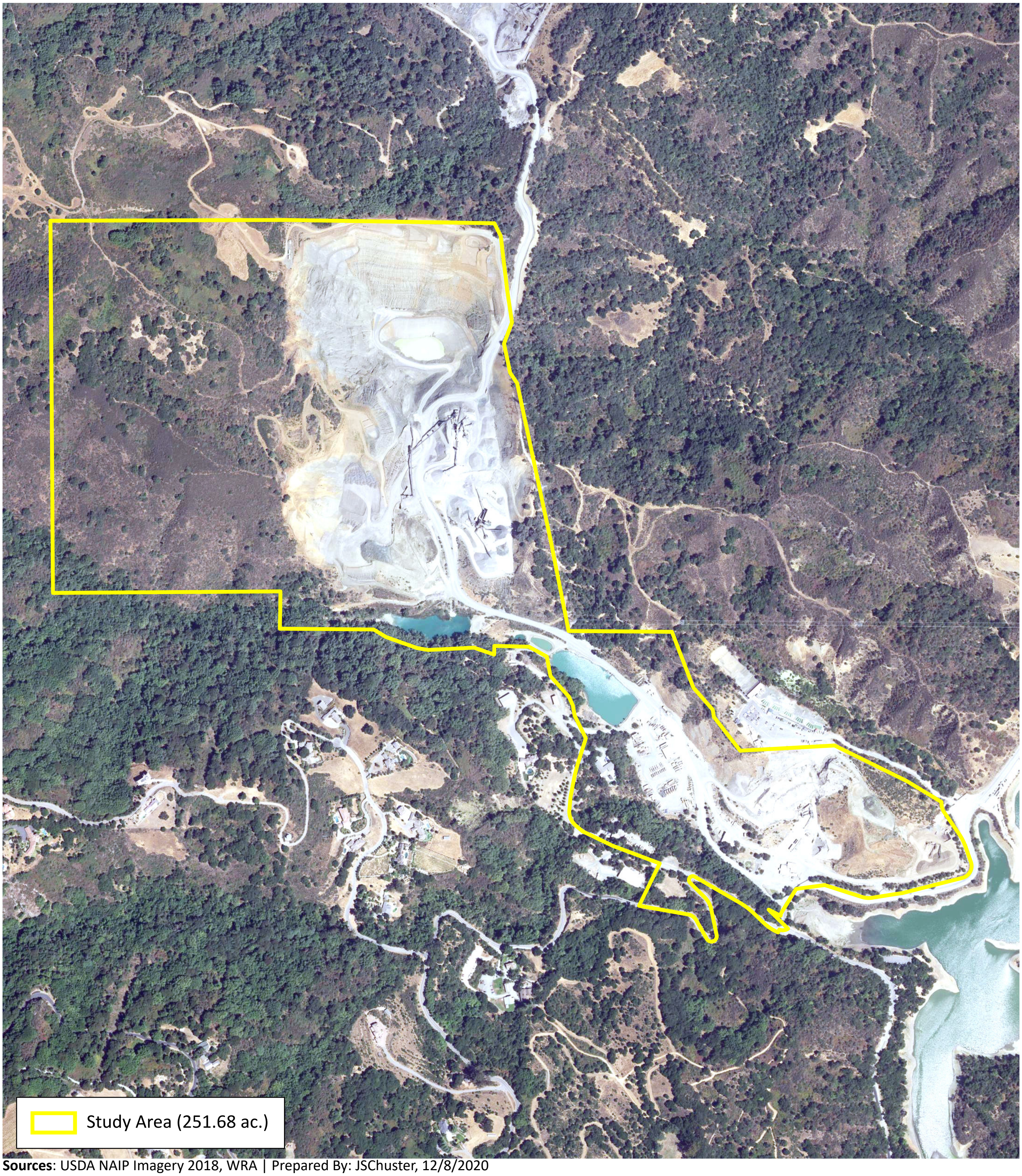

Sources: USDA NAIP Imagery 2018, WRA | Prepared By: JSChuster, 12/8/2020

Figure 2. Study Area Overview

Stevens Creek Quarry
Biological Constraints
Cupertino, Santa Clara County, California

0 500 1,000 Feet

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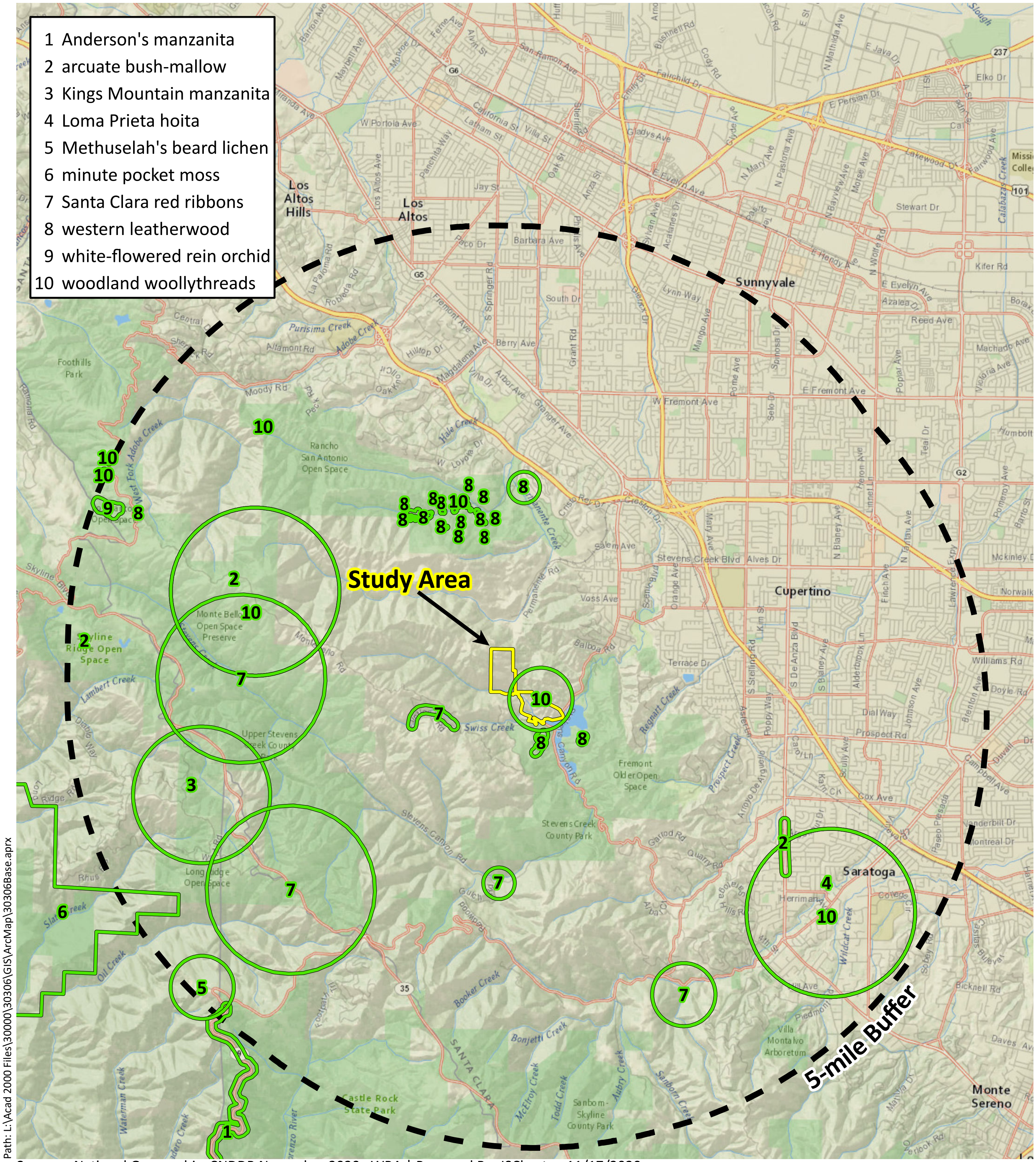

Sources: National Geographic, CNDDB November 2020, WRA | Prepared By: JSChuster, 11/17/2020

Figure 3. Special-Status Plant Species Documented within 5-miles of the Study Area

Stevens Creek Quarry
Biological Constraints
Cupertino, Santa Clara County, California

0 1 2 Miles

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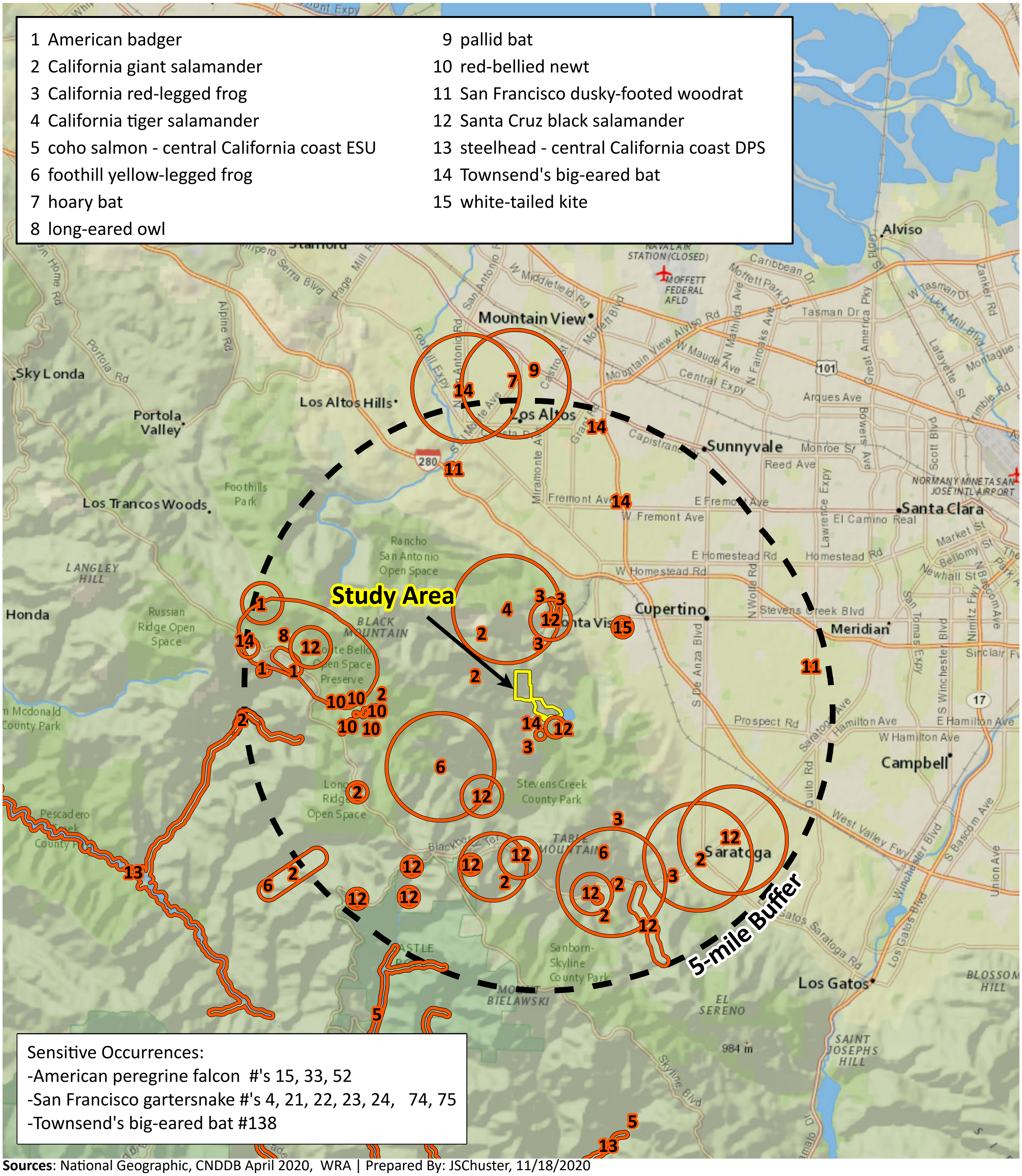

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Sources: National Geographic, CNDDB April 2020, WRA | Prepared By: JSChuster, 11/18/2020

Figure 4. Special-Status Wildlife Species Documented within 5-miles of the Study Area

Stevens Creek Quarry
Biological Constraints
Cupertino, Santa Clara County, California

0 1 2 Miles

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Appendix B – Special-status Species Potentials Table

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Appendix B. Potential for special-status plant and wildlife species to occur in the Study Area. List compiled from the California Department of Fish and Wildlife (CDFW) Natural Diversity Database (CDFW 2020B), U.S. Fish and Wildlife Service (USFWS) Species Lists (USFWS 2020), and California Native Plant Society (CNPS) Electronic Inventory (CNPS 2020b) searches of the Cupertino and surrounding eight USGS 7.5' quadrangles.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
PLANTS				
San Mateo thorn-mint *Acanthomintha duttonii*	FE, SE, Rank 1B.1	Chaparral, valley and foothill grassland. Elevation ranges from 160 to 985 feet (50 to 300 meters). Blooms Apr-Jun.	**Unlikely.** The Study Area does not contain any valley or foothill grasslands. While chaparral is present, this species is seriously threatened by development, non-native plants and vehicles. Due to the proximity of chaparral habitat to the mining activities, this species is unlikely to be present. There are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Franciscan onion *Allium peninsulare* var. *franciscanum*	Rank 1B.2	Cismontane woodland, valley and foothill grassland. Elevation ranges from 170 to 1000 feet (52 to 305 meters). Blooms (Apr)May-Jun.	**Unlikely.** The Study Area does not contain any valley or foothill grasslands. While cismontane woodland is present, this species is threatened by development, non-native plants and vehicles. Due to the proximity of cismontane woodland habitat to the mining activities, this species is unlikely to be present. There are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
bent-flowered fiddleneck *Amsinckia lunaris*	Rank 1B.2	Coastal bluff scrub, cismontane woodland, valley and foothill grassland. Elevation ranges from 5 to 1640 feet (3 to 500 meters). Blooms Mar-Jun.	**Unlikely.** The Study Area does not contain any coastal bluff scrub, valley or foothill grasslands. While cismontane woodland is present, this species is threatened by development and mining. Due to the proximity of cismontane woodland habitat to the mining activities, this species is unlikely to be present. There are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
California androsace *Androsace elongata* ssp. *acuta*	Rank 4.2	Chaparral, cismontane woodland, coastal scrub, meadows and seeps, pinyon and juniper woodland, valley and foothill grassland. Elevation ranges from 490 to 4280 feet (150 to 1305 meters). Blooms Mar-Jun.	**Unlikely.** The Study Area does not contain any coastal scrub, meadows, seeps, pinyon or juniper woodland, valley or foothill grasslands. While chaparral is present, this species is threatened by non-native plants. Due to the proximity of chaparral habitat to the mining activities, this species is unlikely to be present. There are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
slender silver moss *Anomobryum julaceum*	Rank 4.2	Broadleafed upland forest, lower montane coniferous forest, north coast coniferous forest. Elevation ranges from 325 to 3280 feet (100 to 1000 meters).	**Unlikely.** The Study Area does not contain any acidic substrates with a broadleafed upland forest, lower montane coniferous forest, or north coast coniferous forest overstory. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
coast rockcress *Arabis blepharophylla*	Rank 4.3	Broadleafed upland forest, coastal bluff scrub, coastal prairie, coastal scrub. Elevation ranges from 5 to 3610 feet (3 to 1100 meters). Blooms Feb-May.	**No Potential.** The Study Area does not contain any coastal bluff scrub, coastal prairie, or coastal scrub. While broadleafed upland forest is present, this species is threatened by competition, and due to the proximity to the mining operations, broadleafed upland forest within the Study Area contain an abundance of non-native species in the understory. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Anderson's manzanita *Arctostaphylos andersonii*	Rank 1B.2	Broadleafed upland forest, chaparral, north coast coniferous forest. Elevation ranges from 195 to 2495 feet (60 to 760 meters). Blooms Nov-May.	**Unlikely.** While the Study Area does not contain any north coast coniferous forest, both broadleafed upland forest and chaparral are present. However this species is mostly associated with open sites with redwoods, which the Study Area lacks. There is a CNDDB occurrence from 2013 approximately 5 miles southwest of the Study Area (CDFW 2020b).	No further recommendations for this species.
Schreiber's manzanita *Arctostaphylos glutinosa*	Rank 1B.2	Closed-cone coniferous forest, chaparral. Elevation ranges from 555 to 2245 feet (170 to 685 meters). Blooms (Nov)Mar-Apr.	**Unlikely.** The Study Area does not contain closed-cone coniferous forest. While chaparral is present, this species is threatened by road development. Due to the proximity of chaparral habitat to the mining activities, this species is unlikely to be present. There are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
Ohlone manzanita *Arctostaphylos ohloneana*	Rank 1B.1	Closed-cone coniferous forest, coastal scrub. Elevation ranges from 1475 to 1740 feet (450 to 530 meters). Blooms Feb-Mar.	**Unlikely.** The Study Area does not contain any closed cone coniferous forest or coastal scrub. There are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Kings Mountain manzanita *Arctostaphylos regismontana*	Rank 1B.2	Broadleafed upland forest, chaparral, north coast coniferous forest. Elevation ranges from 1000 to 2395 feet (305 to 730 meters). Blooms Dec-Apr.	**Unlikely.** The Study Area does not contain any coastal bluff scrub, coastal prairie, or coastal scrub. While broadleafed upland forest is present, this species is threatened by competition, and due to the proximity to the mining operations, broadleafed upland forest within the Study Area contain an abundance of non-native species in the understory. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Bonny Doon manzanita *Arctostaphylos silvicola*	Rank 1B.2	Closed-cone coniferous forest, chaparral, lower montane coniferous forest. Elevation ranges from 390 to 1970 feet (120 to 600 meters). Blooms Jan-Mar.	**Unlikely.** The Study Area does not contain any closed-cone coniferous forest or lower montane coniferous forest. While chaparral is present, this species is threatened by mining and urbanization. Due to the proximity of chaparral habitat to the mining activities, this species is unlikely to be present. There are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
alkali milk-vetch *Astragalus tener* var. *tener*	Rank 1B.2	Playas, valley and foothill grassland (adobe clay), vernal pools. Elevation ranges from 0 to 195 feet (1 to 60 meters). Blooms Mar-Jun.	**No Potential.** The Study Area does not contain playas, valley or foothill grasslands on adobe clay, or vernal pools. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
brittlescale *Atriplex depressa*	Rank 1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland, vernal pools. Elevation ranges from 0 to 1050 feet (1 to 320 meters). Blooms Apr-Oct.	**Unlikely.** The Study Area does not contain any chenopod scrub, meadows, seeps, plays, valley or foothill grasslands, or vernal pools. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
lesser saltscale *Atriplex minuscula*	Rank 1B.1	Chenopod scrub, playas, valley and foothill grassland. Elevation ranges from 45 to 655 feet (15 to 200 meters). Blooms May-Oct.	**Unlikely.** The Study Area does not contain any chenopod scrub, playas, valley or foothill grasslands. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Brewer's calandrinia *Calandrinia breweri*	Rank 4.2	Chaparral, coastal scrub. Elevation ranges from 30 to 4005 feet (10 to 1220 meters). Blooms (Jan)Mar-Jun.	**Unlikely.** The Study Area does not contain any coastal scrub. While chaparral is present this species is threatened by urbanization. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
Santa Cruz Mountains pussypaws *Calyptridium parryi* var. *hesseae*	Rank 1B.1	Chaparral, cismontane woodland. Elevation ranges from 1000 to 5020 feet (305 to 1530 meters). Blooms May-Aug.	**No Potential.** While chaparral and cismontane woodland is present this species is threatened by development, non-native plants, and mining. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Congdon's tarplant *Centromadia parryi* ssp. *congdonii*	Rank 1B.1	Valley and foothill grassland (alkaline). Elevation ranges from 0 to 755 feet (0 to 230 meters). Blooms May-Oct(Nov).	**Low Potential.** Although Congdon's tarplant has been observed in disturbed habitats, the Study Area does not contain any alkaline valley or foothill grasslands. There are no nearby CNDDB occurrences for this species (CDFW 2020).	No further recommendations for this species.
Point Reyes bird's-beak *Chloropyron maritimum* ssp. *palustre*	Rank 1B.2	Marshes and swamps (coastal salt). Elevation ranges from 0 to 35 feet (0 to 10 meters). Blooms Jun-Oct.	**Unlikely.** The Study Area does not contain any marshes. There are no nearby CNDDB occurrences for this species (CDFW 2020).	No further recommendations for this species.
Ben Lomond spineflower *Chorizanthe pungens* var. *hartwegiana*	FE, Rank 1B.1	Lower montane coniferous forest (maritime ponderosa pine sandhills). Elevation ranges from 295 to 2000 feet (90 to 610 meters). Blooms Apr-Jul.	**Unlikely.** The Study Area does contain any lower montane coniferous forest specifically maritime ponderosa pine sandhills. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
robust spineflower *Chorizanthe robusta* var. *robusta*	FE, Rank 1B.1	Chaparral (maritime), cismontane woodland (openings), coastal dunes, coastal scrub. Elevation ranges from 5 to 985 feet (3 to 300 meters). Blooms Apr-Sep.	**Unlikely.** The Study Area does contain any maritime chaparral, coastal dunes, or coastal scrubs. While cismontane woodland is present this species is threated by development, mining and non-native plants. Due to the cismontane woodland proximity to mining operations this species is unlikely to be present. There are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Mt. Hamilton fountain thistle *Cirsium fontinale* var. *campylon*	Rank 1B.2	Chaparral, cismontane woodland, valley and foothill grassland. Elevation ranges from 325 to 2920 feet (100 to 890 meters). Blooms (Feb)Apr-Oct.	**Unlikely.** The Study Area does not contain any valley or foothill grasslands. While chaparral and cismontane woodland is present this species is threated by foot by urbanization, trampling, and non-native plants. . Due to the suitable habitat proximity to mining operations this species is unlikely to be present. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Crystal Springs fountain thistle *Cirsium fontinale* var. *fontinale*	FE, SE, Rank 1B.1	Chaparral (openings), cismontane woodland, meadows and seeps, valley and foothill grassland. Elevation ranges from 145 to 575 feet (45 to 175 meters). Blooms (Apr)May-Oct.	**Unlikely.** The Study Area does not contain any valley or foothill grasslands, or meadows or seeps. While chaparral and cismontane woodland is present this species is seriously threated by foot traffic, road maintenance, and non-native plants. Due to the suitable habitat proximity to mining operations this species is unlikely to be present.	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
			Additionally, there are no nearby CNDDB occurrences for this species (CDFW 2020b).	
lost thistle *Cirsium praeteriens*	Rank 1A	!unkno. Elevation ranges from 0 to 330 feet (0 to 100 meters). Blooms Jun-Jul.	**No Potential.** There are no recent documentations of this species since 1901 (CDFW 2020b).	No further recommendations for this species.
Brewer's clarkia *Clarkia breweri*	Rank 4.2	Chaparral, cismontane woodland, coastal scrub. Elevation ranges from 705 to 3660 feet (215 to 1115 meters). Blooms Apr-Jun.	**Unlikely.** The Study Area does not contain any coastal scrub. While chaparral and cismontane woodland are present this species is often found on serpentine which is not present as well as being threatened by construction. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally, there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
Santa Clara red ribbons *Clarkia concinna* spp. *automixa*	Rank 4.3	Chaparral, cismontane woodland. Elevation ranges from 295 to 4920 feet (90 to 1500 meters). Blooms (Apr)May-Jun(Jul).	**Moderate Potential.** The Study Area contains chaparral and cismontane woodland. This species is also found on slopes near drainages, which are both present within Study Area. Additionally, there are multiple CNDDB occurrences within 5 miles of the Study Area (CDFW 2020b).	Protocol level surveys during this species blooming period are recommended.
Lewis' clarkia *Clarkia lewisii*	Rank 4.3	Broadleafed upland forest, closed-cone coniferous forest, chaparral, cismontane woodland, coastal scrub. Elevation ranges from 95 to 3920 feet (30 to 1195 meters). Blooms May-Jul.	**Unlikely.** The Study Area does not contain any closed-cone coniferous forest or coastal scrub. While broadleafed upland forest, cismontane woodland, and chaparral are present this species is threatened by non-native plants. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally, there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
round-headed Chinese-houses *Collinsia corymbosa*	Rank 1B.2	Coastal dunes. Elevation ranges from 0 to 65 feet (0 to 20 meters). Blooms Apr-Jun.	**No Potential.** The Study Area does not contain any coastal dunes.	No further recommendations for this species.
San Francisco collinsia *Collinsia multicolor* *Collinsia multicolor*	Rank 1B.2	Closed-cone coniferous forest, coastal scrub. Elevation ranges from 95 to 820 feet (30 to 250 meters). Blooms (Feb)Mar-May.	**No Potential.** The Study Area does not contain any closed-coniferous forest or coastal scrub. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
clustered lady's-slipper *Cypripedium fasciculatum*	Rank 4.2	Lower montane coniferous forest, north coast coniferous forest. Elevation ranges from 325 to 7990 feet (100 to 2435 meters). Blooms Mar-Aug.	**No Potential.** The Study Area does not contain any coniferous forest. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020).	No further recommendations for this species.
western leatherwood *Dirca occidentalis*	Rank 1B.2	Broadleafed upland forest, closed-cone coniferous forest, chaparral, cismontane woodland, north coast coniferous forest, riparian forest, riparian woodland. Elevation ranges from 80 to 1395 feet (25 to 425 meters). Blooms Jan-Mar(Apr).	**High Potential.** The Study Area does not contain any coniferous forest, riparian forest or woodlands. However broadleafed upland forest, cismontane woodland and chaparral is present. Additionally there are multiple CNDDB occurrences within 5 miles of the Study Area (CDFW 2020b).	Protocol level surveys during this species blooming period are recommended.
Santa Clara Valley dudleya *Dudleya abramsii* ssp. *setchellii*	FE, Rank 1B.1	Cismontane woodland, valley and foothill grassland. Elevation ranges from 195 to 1495 feet (60 to 455 meters). Blooms Apr-Oct.	**Unlikely.** The Study Area does not contain any valley or foothill grasslands. While cismontane woodland is present this species is threatened by urbanization, development, vehicles, and non-native plants. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
Ben Lomond buckwheat *Eriogonum nudum* var. *decurrens*	Rank 1B.1	Chaparral, cismontane woodland, lower montane coniferous forest (maritime ponderosa pine sandhills). Elevation ranges from 160 to 2625 feet (50 to 800 meters). Blooms Jun-Oct.	**Unlikely.** This species is known from ponderosa pine sandhills in Santa Cruz County which the Study Area does not contain. While chaparral and cismontane woodland is present this species is threatened by development. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
San Mateo woolly sunflower *Eriophyllum latilobum*	FE, SE, Rank 1B.1	Cismontane woodland (often serpentine, on roadcuts), coastal scrub, lower montane coniferous forest. Elevation ranges from 145 to 1085 feet (45 to 330 meters). Blooms May-Jun.	**Unlikely.** The Study Area does not contain any lower montane coniferous forest or coastal scrub. While cismontane woodland is present this species is threated by development, erosion, and road maintenance. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Hoover's button-celery *Eryngium aristulatum* var. *hooveri*	Rank 1B.1	Vernal pools. Elevation ranges from 5 to 150 feet (3 to 45 meters). Blooms (Jun)Jul(Aug).	**No Potential.** The Study Area does not contain any vernal pools.	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
Jepson's coyote thistle *Eryngium jepsonii*	Rank 1B.2	Valley and foothill grassland, vernal pools. Elevation ranges from 5 to 985 feet (3 to 300 meters). Blooms Apr-Aug.	**Unlikely.** The Study Area does not contain any valley or foothill grasslands, or vernal pools. Additionally this species is threatened by development and therefore due to the proximity to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
San Joaquin spearscale *Extriplex joaquinana*	Rank 1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland. Elevation ranges from 0 to 2740 feet (1 to 835 meters). Blooms Apr-Oct.	**No Potential.** This species is known to be present in alkaline conditions in chenopod scrub, meadows and seeps, playas, valley and foothill grassland which the Study Area does not contain. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
minute pocket moss *Fissidens pauperculus*	Rank 1B.2	North coast coniferous forest (damp coastal soil). Elevation ranges from 30 to 3360 feet (10 to 1024 meters).	**Unlikely.** The Study Area does not contain north coast coniferous forest on damp coastal soils. While there are multiple CNDDB occurrences within 5 miles of the Study Area, these occurrences are present with coastal conditions which as described above the Study Area does not contain (CDFW 2020b).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
fragrant fritillary *Fritillaria liliacea*	Rank 1B.2	Cismontane woodland, coastal prairie, coastal scrub, valley and foothill grassland. Elevation ranges from 5 to 1345 feet (3 to 410 meters). Blooms Feb-Apr.	**Unlikely.** The Study Area does not contain any coastal prairie, coastal scrub, and valley or foothill grasslands. While cismontane woodland is present this species is threated by urbanization, non-native plants, and foot traffic. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
phlox-leaf serpentine bedstraw *Galium andrewsii* ssp. *gatense*	Rank 4.2	Chaparral, cismontane woodland, lower montane coniferous forest. Elevation ranges from 490 to 4755 feet (150 to 1450 meters). Blooms Apr-Jul.	**Unlikely.** The Study Area does not contain any lower montane coniferous forest. While chaparral and cismontane woodland is present this species is found on serpentine soils which the Study Area does not contain. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
Toren's Grimmia *Grimmia torenii*	Rank 1B.3	Chaparral, cismontane woodland, lower montane coniferous forest. Elevation ranges from 1065 to 3805 feet (325 to 1160 meters).	**Unlikely.** The Study Area does not contain any lower montane coniferous forest. While chaparral and cismontane woodland is present, due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
vaginulate grimmia *Grimmia vaginulata*	Rank 1B.1	Chaparral (openings). Elevation ranges from 2245 to 2245 feet (685 to 685 meters).	**No Potential.** While chaparral is present, due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
short-leaved evax *Hesperevax sparsiflora* var. *brevifolia*	Rank 1B.2	Coastal bluff scrub (sandy), coastal dunes, coastal prairie. Elevation ranges from 0 to 705 feet (0 to 215 meters). Blooms Mar-Jun.	**No Potential.** The Study Area does not contain any sandy coastal bluff scrubs, coastal dunes, or coastal prairie.	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
Santa Cruz cypress *Hesperocyparis abramsiana* var. *abramsiana*	FT, SE, Rank 1B.2	Closed-cone coniferous forest, chaparral, lower montane coniferous forest. Elevation ranges from 915 to 2625 feet (280 to 800 meters).	**Unlikely.** The Study Area does not contain any closed-cone coniferous forest or lower montane coniferous forest. While chaparral is present this species is threatened by development. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Butano Ridge cypress *Hesperocyparis abramsiana* var. *butanoensis*	FT, SE, Rank 1B.2	Closed-cone coniferous forest, chaparral, lower montane coniferous forest. Elevation ranges from 1310 to 1610 feet (400 to 490 meters). Blooms Oct.	**Unlikely.** The Study Area does not contain any closed-cone coniferous forest or lower montane coniferous forest. While chaparral is present this species is threatened by alteration of fire regimes and usually found on sandstone. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Marin western flax *Hesperolinon congestum*	FT, ST, Rank 1B.1	Chaparral, valley and foothill grassland. Elevation ranges from 15 to 1215 feet (5 to 370 meters). Blooms Apr-Jul.	**Unlikely.** The Study Area does not contain any valley or foothill grasslands. While chaparral is present this species is threatened by development, non-native plants, and foot traffic. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
Loma Prieta hoita *Hoita strobilina*	Rank 1B.1	Chaparral, cismontane woodland, riparian woodland. Elevation ranges from 95 to 2820 feet (30 to 860 meters). Blooms May-Jul(Aug-Oct).	**Unlikely.** The Study Area does not contain any riparian woodland. While cismontane woodland and chaparral are present this species is threatened by foot traffic and urbanization. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. While there is a CNDDB occurrence within 5 miles of the Study Area this occurrence is from 1913 and on serpentine soil, which the Study Area does not contain (CDFW 2020b).	No further recommendations for this species.
coast iris *Iris longipetala*	Rank 4.2	Coastal prairie, lower montane coniferous forest, meadows and seeps. Elevation ranges from 0 to 1970 feet (0 to 600 meters). Blooms Mar-May.	**Unlikely.** The Study Area does not contain coastal prairie, lower montane coniferous forest, meadows or seeps. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species
Contra Costa goldfields *Lasthenia conugens*	FE, Rank 1B.1	Cismontane woodland, playas (alkaline), valley and foothill grassland, vernal pools. Elevation ranges from 0 to 1540 feet (0 to 470 meters). Blooms Mar-Jun.	**No Potential.** The Study Area does not contain any playas, valley or foothill grasslands, or vernal pools. While cismontane woodland is present this species is threated by development, habitat alteration, hydrological alterations, and non-native plants. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
			nearby CNDDB occurrences for this species (CDFW 2020b).	
legenere *Legenere limosa*	Rank 1B.1	Vernal pools. Elevation ranges from 0 to 2885 feet (1 to 880 meters). Blooms Apr-Jun.	**No Potential.** The Study Area does not contain any vernal pools.	No further recommendations for this species.
serpentine leptosiphon *Leptosiphon ambiguus*	Rank 4.2	Cismontane woodland, coastal scrub, valley and foothill grassland. Elevation ranges from 390 to 3705 feet (120 to 1130 meters). Blooms Mar-Jun.	**Unlikely.** The Study Area does not contain any coastal scrub, valley or foothill grasslands. While cismontane woodland is present this species is threatened by non-native plants and habitat alteration. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
woolly-headed Lessingia *Lessingia hololeuca*	Rank 3	Broadleafed upland forest, coastal scrub, lower montane coniferous forest, valley and foothill grassland. Elevation ranges from 45 to 1000 feet (15 to 305 meters). Blooms Jun-Oct.	**No Potential.** The Study Area does not contain any coastal scrub, lower montane coniferous forest, and valley or foothill grasslands. While broadleafed upland forest is present this species is threatened by non-native plants. Due to the proximity	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
			of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	
smooth Lessingia *Lessingia micradenia* var. *glabrata*	Rank 1B.2	Chaparral, cismontane woodland, valley and foothill grassland. Elevation ranges from 390 to 1380 feet (120 to 420 meters). Blooms (Apr-Jun)Jul-Nov.	**Unlikely.** The Study Area does not contain any valley or foothill grasslands. While chaparral and cismontane woodland is present this species is known for serpentine conditions in addition to being threatened by development and vehicles. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
arcuate bush-mallow *Malacothamnus arcuatus*	Rank 1B.2	Chaparral, cismontane woodland. Elevation ranges from 45 to 1165 feet (15 to 355 meters). Blooms Apr-Sep.	**Moderate Potential.** The Study Area contains chaparral and cismontane woodland as well gravelly alluvium soils. Additionally there is a nearby CNDDB occurrence within 5 miles of the Study Area.	Protocol level surveys during this species blooming period are recommended.
Davidson's bush-mallow *Malacothamnus davidsonii*	Rank 1B.2	Chaparral, cismontane woodland, coastal scrub, riparian woodland. Elevation ranges from 605 to 3740 feet (185 to 1140 meters). Blooms Jun-Jan.	**Unlikely.** The Study Area does not contain any coastal scrub or riparian woodland. While chaparral or cismontane woodland is present this species is known for sandy washes as well as being threatened by development and erosion. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
			nearby CNDDB occurrences for this species (CDFW 2020b).	
Hall's bush-mallow *Malacothamnus hallii*	Rank 1B.2	Chaparral, coastal scrub. Elevation ranges from 30 to 2495 feet (10 to 760 meters). Blooms (Apr)May-Sep(Oct).	**Unlikely.** The Study Area does not contain any coastal scrub. While chaparral is present this species is threatened by development and non-native plants. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Mt. Diablo cottonweed *Micropus amphibolus*	Rank 3.2	Broadleafed upland forest, chaparral, cismontane woodland, valley and foothill grassland. Elevation ranges from 145 to 2705 feet (45 to 825 meters). Blooms Mar-May.	**Unlikely.** The Study Area does not contain any valley or foothill grasslands. While broadleafed upland forest, chaparral, and cismontane woodland is present, due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
woodland woollythreads *Monolopia gracilens*	Rank 1B.2	Broadleafed upland forest (openings), chaparral (openings), cismontane woodland, north coast coniferous forest (openings), valley and foothill grassland. Elevation ranges from 325 to 3935 feet (100 to 1200 meters). Blooms (Feb)Mar-Jul.	**Unlikely.** The Study Area does not contain any north coast coniferous forest, valley or foothill grasslands. Previous sightings of this species are from 1956. It is assumed extirpated from this area.	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
prostrate vernal pool navarretia *Navarretia prostrata*	Rank 1B.1	Coastal scrub, meadows and seeps, valley and foothill grassland (alkaline), vernal pools. Elevation ranges from 5 to 3970 feet (3 to 1210 meters). Blooms Apr-Jul.	**Unlikely.** The Study Area does not contain any coastal scrub, meadows, seeps, valley or foothill grasslands on alkaline soils, or vernal pools. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species
Dudley's lousewort *Pedicularis dudleyi*	SR, Rank 1B.2	Chaparral (maritime), cismontane woodland, north coast coniferous forest, valley and foothill grassland. Elevation ranges from 195 to 2955 feet (60 to 900 meters). Blooms Apr-Jun.	**Unlikely.** The Study Area does not contain any maritime chaparral, north coast coniferous forest, and valley or foothill grasslands. While cismontane woodland is present this species is threatened by foot traffic and erosion. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Santa Cruz Mountains beardtongue *Penstemon rattanii* var. *kleei*	Rank 1B.2	Chaparral, lower montane coniferous forest, north coast coniferous forest. Elevation ranges from 1310 to 3610 feet (400 to 1100 meters). Blooms May-Jun.	**Unlikely.** The Study Area does not contain any lower montane coniferous forest and north coast coniferous forest. While chaparral is present due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
white-rayed pentachaeta *Pentachaeta bellidiflora*	FE, SE, Rank 1B.1	Cismontane woodland, valley and foothill grassland (often serpentine). Elevation ranges from 110 to 2035 feet (35 to 620 meters). Blooms Mar-May.	**Unlikely.** The Study Area does not contain valley or foothill grasslands. While cismontane woodland is present this species is threatened by development. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
white-flowered rein orchid *Piperia candida*	Rank 1B.2	Broadleafed upland forest, lower montane coniferous forest, north coast coniferous forest. Elevation ranges from 95 to 4300 feet (30 to 1310 meters). Blooms (Mar)May-Sep.	**Moderate Potential.** The Study Area does not contain any lower montane coniferous forest or north coast coniferous forest. However broadleafed upland forest is present in addition to there being a CNDDB occurrence species last observed in 1992 approximately 5 miles northwest of the Study Area. While this species is threatened by development, it has potential to occur within the natural drainages within forests and woodlands within the Study Area (CDFW 2020b).	Protocol level surveys during this species blooming period are recommended.
Choris' popcornflower *Plagiobothrys chorisianus* var. *chorisianus*	Rank 1B.2	Chaparral, coastal prairie, coastal scrub. Elevation ranges from 5 to 525 feet (3 to 160 meters). Blooms Mar-Jun.	**Unlikely.** The Study Area does not contain any coastal prairie or coastal scrub. While chaparral is present this species is threatened development, foot traffic, and non-native plants. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
Hickman's popcornflower *Plagiobothrys chorisianus* var. *hickmanii*	Rank 4.2	Closed-cone coniferous forest, chaparral, coastal scrub, marshes and swamps, vernal pools. Elevation ranges from 45 to 605 feet (15 to 185 meters). Blooms Apr-Jun.	**Unlikely.** The Study Area does not contain any closed-cone coniferous forest, coastal scrub, marshes, or vernal pools. While chaparral is present this species is threatened development, foot traffic, and non-native plants. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
hairless popcornflower *Plagiobothrys glaber*	Rank 1A	Meadows and seeps (alkaline), marshes and swamps (coastal salt). Elevation ranges from 45 to 590 feet (15 to 180 meters). Blooms Mar-May.	**No Potential.** The Study Area does not contain any alkaline meadows or seeps, or coastal salt marshes. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
California alkali grass *Puccinellia simplex*	Rank 1B.2	Chenopod scrub, meadows and seeps, valley and foothill grassland, vernal pools. Elevation ranges from 5 to 3050 feet (2 to 930 meters). Blooms Mar-May.	**No Potential.** The Study Area does not contain any chenopod scrub, meadows, seeps, valley or foothill grasslands, or vernal pools. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Lobb's aquatic buttercup *Ranunculus lobbii*	Rank 4.2	Cismontane woodland, north coast coniferous forest, valley and foothill grassland, vernal pools. Elevation ranges from 45 to 1540 feet (15 to 470 meters). Blooms Feb-May.	**Unlikely.** The Study Area does not contain any north coast coniferous forest, valley or foothill grasslands, or vernal pools. While cismontane woodland is present this species is threatened by habitat alteration and development. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
			occurrences for this species (CDFW 2020b).	
rock sanicle *Sanicula saxatilis*	SR, Rank 1B.2	Broadleafed upland forest, chaparral, valley and foothill grassland. Elevation ranges from 2030 to 3855 feet (620 to 1175 meters). Blooms Apr-May.	**Unlikely.** The Study Area does not contain any valley or foothill grasslands. While broadleafed upland forest or chaparral this species is threatened by development and possibly foot traffic. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
chaparral ragwort *Senecio aphanactis*	Rank 2B.2	Chaparral, cismontane woodland, coastal scrub. Elevation ranges from 45 to 2625 feet (15 to 800 meters). Blooms Jan-Apr(May).	**Unlikely.** The Study Area does not contain any coastal scrub. While chaparral and cismontane woodland is present this species is found on alkaline flats not present. Additionally this species is threatened by development therefore due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
San Francisco campion *Silene verecunda* ssp. *verecunda*	Rank 1B.2	Coastal bluff scrub, chaparral, coastal prairie, coastal scrub, valley and foothill grassland. Elevation ranges from 95 to 2115 feet (30 to 645 meters). Blooms (Feb)Mar-Jun(Aug).	**Unlikely.** The Study Area does not contain any coastal bluff scrub, coastal prairie, and valley or foothill grasslands. While chaparral is present this species is threatened by development and non-native plants. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Santa Cruz microseris *Stebbinsoseris decipiens*	Rank 1B.2	Broadleafed upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, valley and foothill grassland. Elevation ranges from 30 to 1640 feet (10 to 500 meters). Blooms Apr-May.	**Unlikely.** The Study Area does not contain any closed-cone coniferous forest, coastal prairie, coastal scrub, and valley or foothill grasslands. While chaparral and broadleafed upland forest is present due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
Metcalf Canyon jewelflower *Streptanthus albidus* ssp. *albidus*	FE, Rank 1B.1	Valley and foothill grassland (serpentine). Elevation ranges from 145 to 2625 feet (45 to 800 meters). Blooms Apr-Jul.	**No Potential.** The Study Area does not contain any valley or foothill grasslands on serpentine.	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
most beautiful jewelflower *Streptanthus albidus* ssp. *peramoenus*	Rank 1B.2	Chaparral, cismontane woodland, valley and foothill grassland. Elevation ranges from 310 to 3280 feet (95 to 1000 meters). Blooms (Mar)Apr-Sep(Oct).	**Unlikely.** The Study Area does not contain any valley or foothill grasslands. While chaparral and cismontane woodland is present this species is threatened by development and non-native plants. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
slender-leaved pondweed *Stuckenia filiformis* ssp. *alpina*	Rank 2B.2	Marshes and swamps (assorted shallow freshwater). Elevation ranges from 980 to 7055 feet (300 to 2150 meters). Blooms May-Jul.	**Unlikely.** While freshwater habitat is present within the Study Area, it has been heavily impacted by mining activities and therefore is not suitable habitat for this species.	No further recommendations for this species.
California seablite *Suaeda californica*	FE, Rank 1B.1	Marshes and swamps (coastal salt). Elevation ranges from 0 to 50 feet (0 to 15 meters). Blooms Jul-Oct.	**No Potential.** The Study Area does not contain any marshes.	No further recommendations for this species.
two-fork clover *Trifolium amoenum*	FE, Rank 1B.1	Coastal bluff scrub, valley and foothill grassland (sometimes serpentine). Elevation ranges from 15 to 1360 feet (5 to 415 meters). Blooms Apr-Jun.	**Unlikely.** The Study Area does not contain any coastal bluff scrub or valley or foothill grasslands.	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
Santa Cruz clover *Trifolium buckwestiorum*	Rank 1B.1	Broadleafed upland forest, cismontane woodland, coastal prairie. Elevation ranges from 340 to 2000 feet (105 to 610 meters). Blooms Apr-Oct.	**Unlikely.** The Study Area does not contain any coastal prairie. While cismontane woodland and broadleafed upland forest is present this species is threatened by land clearing and non-native plants. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
saline clover *Trifolium hydrophilum*	Rank 1B.2	Marshes and swamps, valley and foothill grassland (mesic, alkaline), vernal pools. Elevation ranges from 0 to 985 feet (0 to 300 meters). Blooms Apr-Jun.	**Unlikely.** The Study Area does not contain any mesic alkaline valley or foothill grasslands, or vernal pools. Aquatic habitat within the Study Area has been heavily impacted by mining activities and therefore is not suitable habitat for this species.	No further recommendations for this species.
Pacific Grove clover *Trifolium polyodon*	SR, Rank 1B.1	Closed-cone coniferous forest, coastal prairie, meadows and seeps, valley and foothill grassland. Elevation ranges from 15 to 1395 feet (5 to 425 meters). Blooms Apr-Jun(Jul).	**Unlikely.** The Study Area does not contain any closed-cone coniferous forest, coastal prairie, meadows, seeps, and valley or foothill grasslands. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.
caper-fruited tropidocarpum *Tropidocarpum capparideum*	Rank 1B.1	Valley and foothill grassland (alkaline hills). Elevation ranges from 0 to 1495 feet (1 to 455 meters). Blooms Mar-Apr.	**Unlikely.** The Study Area does not contain any valley or foothill grasslands on alkaline hills. Additionally there are no nearby CNDDB occurrences for this species (CDFW 2020b).	No further recommendations for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
Methuselah's beard lichen *Usnea longissima*	Rank 4.2	Broadleafed upland forest, north coast coniferous forest. Elevation ranges from 160 to 4790 feet (50 to 1460 meters).	**Unlikely.** The Study Area does not contain any north coast coniferous forest. While broadleafed upland forest is present this species is threatened by development. Due to the proximity of suitable habitat to mining operations this species is unlikely to occur. While there is a CNDDB occurrences for this species nearby the Study Area from 1995, it's considered extirpated (CDFW 2020b).	No further recommendations for this species.
WILDLIFE				
Mammals				
pallid bat *Antrozous pallidus*	SSC, WBWG High	Occupies a variety of habitats at low elevation including grasslands, shrublands, woodlands, and forests. Most common in open, dry habitats with rocky areas for roosting.	**Moderate Potential.** The Study Area contains large trees which may provide suitable roosting habitat by this species.	Pre-construction surveys for bat roosts should be conducted prior to work or vegetation removal within 100 feet of any large trees (>16 inches DBH). See summary and recommendations section for further details.
Townsend's big-eared bat *Corynorhinus townsendii*	SSC, WBWG High	Primarily found in rural settings in a wide variety of habitats including oak woodlands and mixed coniferous-deciduous forest. Day roosts highly associated with caves and mines. Building roost sites must be cave like. Very sensitive to human disturbance.	**Unlikely.** The Study Area is composed of primarily an active quarry site with regular disturbance and a dynamic landscape. Due to the requirements of this species for large caves, or mine shafts for roosting the species is unlikely to be found within the quarry. However, the species may occur in more natural settings surrounding the Study Area where caves or large crevices in rocky outcrops exist.	No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
hoary bat *Lasiurus cinereus*	WBWG Medium	Prefers open forested habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths.	**Moderate Potential.** The Study Area contains trees which may provide suitable roosting habitat by this species.	Pre-construction surveys for bat roosts should be conducted prior to work or vegetation removal within 100 feet of any large trees (>16 inches DBH). See summary and recommendations section for further details.
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	SSC	Typically occurs in forest habitats of moderate canopy and moderate to dense understory, especially redwood. Also found in chaparral habitats.	**High Potential.** The species is known to occur in woodlands in the vicinity of the Study Area. The Study Area contains woodland and chapparal and is likely to support this species.	Within 30 days prior to initial ground disturbance in woodland or scrub/chaparral communities, a pre-construction survey for active woodrat stick nests should be conducted. See summary and recommendations section for further details.
salt marsh harvest mouse *Reithrodontomys raviventris*	FE, SE, CFP	Endemic to emergent salt and brackish wetlands of the San Francisco Bay Estuary. Pickleweed marshes are primary habitat; also occurs in various other wetland communities with dense vegetation. Does not burrow, builds loosely organized nests. Requires higher areas for flood escape.	**No Potential.** No suitable tidal marsh habitat is present within or adjacent to the Study Area.	No further actions are recommended for this species.
salt-marsh wandering shrew *Sorex vagrans halicoetes*	SSC	Salt marshes of the south arm of San Francisco Bay. Medium high marsh 6 to 8 feet above sea level where abundant driftwood is scattered among *Salicornia*.	**No Potential.** No suitable tidal marsh habitat is present within or adjacent to the Study Area.	No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
American badger *Taxidea taxus*	SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable, uncultivated soils. Prey on burrowing rodents.	**No Potential.** The Study Area is geomorphically composed of a limestone ridge which does not provide friable soils suitable for badger denning.	No further actions are recommended for this species.
Birds				
tricolored blackbird *Agelaius tricolor*	SSC, ST	Usually nests over or near freshwater in dense cattails, tules, or thickets of willow, blackberry, wild rose or other tall herbs. Nesting area must be large enough to support about 50 pairs.	**Unlikely.** Suitable freshwater marsh vegetation is not present in ponds or along the creek to support a colony of this species.	No further actions are recommended for this species.
golden eagle *Aquila chrysaetos*	CFP, BGEPA	Year-round resident in rolling foothills with open grasslands, scattered trees, and cliff-walled canyons.	**Unlikely.** There are no unvegetated cliffs or tall trees in otherwise open areas that are suitable to support nesting golden eagles within the Study Area. Additionally, foraging opportunities are scarce as the majority of the Study Area is either active quarry, development, or forest.	No further actions are recommended for this species.
grasshopper sparrow *Ammodramus savannarum*	SSC	Summer resident. Breeds in open grasslands in lowlands and foothills, generally with low- to moderate-height grasses and scattered shrubs. Well-hidden nests are placed on the ground.	**No Potential.** The Study Area does not contain any expanses of grassland to support nesting or foraging by this species.	No further discussion of this species is required.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
short-eared owl *Asio flammeus*	SSC	Occurs year-round, but primarily as a winter visitor; breeding very restricted in most of California. Found in open, treeless areas (e.g., marshes, grasslands) with elevated sites for foraging perches and dense herbaceous vegetation for roosting and nesting. Preys mostly on small mammals, particularly voles.	**No Potential**. The Study Area does not contain open grassland or marsh to support this species. The Study Area is outside of this species typical breeding range.	No further actions are recommended for this species.
long-eared owl *Asio otus*	SSC	Occurs year-round in California. Nests in trees in a variety of woodland habitats, including oak and riparian, as well as tree groves. Requires adjacent open land with rodents for foraging, and the presence of old nests of larger birds (hawks, crows, magpies) for breeding.	**Unlikely.** The Study Area contains forested habitat. However, the majority of the Study Area is active quarry and does not provide open foraging habitat for this species.	No further actions are recommended for this species.
burrowing owl *Athene cunicularia*	SSC	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	**No potential.** The Study Area is geomorphically composed of a limestone ridge which does not provide friable soils suitable for burrowing mammals. Areas that are not currently under quarry operation are forest and scrub habitat that are not suitable for this species.	No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
marbled murrelet *Brachyramphus marmoratus*	FT, SE	Predominantly coastal marine. Nests in old-growth coniferous forests up to 30 miles inland along the Pacific coast, from Eureka to Oregon border, and in Santa Cruz/San Mateo Counties. Nests are highly cryptic, and typically located on platform-like branches of mature redwoods and Douglas firs. Forages on marine invertebrates and small fishes.	**No Potential.** There is no coastal old-growth redwood or fir forest habitat within the Study Area to support nesting by the species.	No further actions are recommended for this species.
Swainson's hawk *Buteo swainsoni*	ST	Summer resident in California’s Central Valley and limited portions of the southern California interior. Nests in tree groves and isolated trees in riparian and agricultural areas, including near buildings. Forages in grasslands and scrub habitats as well as agricultural fields, especially alfalfa. Preys on arthropods year-round as well as smaller vertebrates during the breeding season.	**No Potential.** The Study Area does not contain open grassland or agricultural areas to support foraging by this species. In addition, this species is a rare breeder in Santa Clara County, with recent nesting occurrences restricted to Coyote Valley.	No further actions are recommended for this species.
western snowy plover *Charadrius alexandrinus nivosus*	FT, SSC	Federal listing applies only to the Pacific coastal population. Found on sandy beaches, salt pond levees, and shores of large alkali lakes. Requires sandy, gravelly, or friable soils for nesting.	**No Potential.** There are no sandy beach or alkali flat habitat within the Study Area. There are no documented occurrences within 5 miles of the Study Area (CDFW 2020b).	No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
northern harrier *Circus cyaneus*	SSC	Coastal salt and freshwater marsh. Nest and forage in grasslands, from salt grass in desert sink to mountain cienagas. Nests on ground in shrubby vegetation, usually at marsh edge.	**No Potential.** Open grassland habitat is not present within the Study Area to support nesting or foraging. No marsh habitat is present to be used by this species.	No further actions are recommended for this species.
western yellow-billed cuckoo *Coccyzus americanus occidentalis*	FT, SE	Summer resident, breeding in dense riparian forests and jungles, typically with early successional vegetation present. Utilizes densely-foliaged deciduous trees and shrubs. Eats mostly caterpillars. Current breeding distribution within California very restricted.	**No Potential.** The Study Area is outside of the current breeding distribution for this species.	No further actions are recommended for this species.
yellow rail *Coturnicops noveboracensis*	SSC	Summer resident in eastern Sierra Nevada in Mono County, breeding in shallow freshwater marshes and wet meadows with dense vegetation. Also a rare winter visitor along the coast and other portions of the state. Extremely cryptic.	**No Potential.** The Study Area does not contain freshwater marsh or wet meadow to support this species. The species has not been documented within 5 miles of the Study Area (CDFW 2020b).	No further actions are recommended for this species.
white-tailed kite *Elanus leucurus*	CFP	Year-long resident of coastal and valley lowlands. Preys on small diurnal mammals and occasional birds, insects, reptiles, and amphibians.	**Unlikely.** No grassland occurs within or directly adjacent to the Study Area to support foraging by this species. This species may occasionally fly over the Study Area.	No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
southwestern willow flycatcher *Empidonax traillii extimus*	FE, SE	Summer resident. Breeds in dense riparian forest and woodlands, usually in floodplain-like environments with standing or slow-moving water. Vegetative microhabitats used for nesting variable, and include willows and cottonwood.	**No Potential.** The Study Area is outside of this species range.	No further actions are recommended for this species.
American peregrine falcon *Falco peregrinus*	CFP	Resident and winter visitor to region. Occurs near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures. Nest consists of a scrape on a depression or ledge in an open site.	**Unlikely**. This species has been observed in the vicinity. However, no tall cliffs or man-made structures are present to support nesting.	No further actions are recommended for this species.
San Francisco (saltmarsh) common yellowthroat *Geothlypis trichas sinuosa*	SSC	Resident of San Francisco bay region fresh and salt-water marshes. Requires thick, continuous cover down to water surface for foraging, tall grasses, tule patches, willows for nesting.	**No Potential**. No suitable marsh habitat is present to support this species.	No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
bald eagle *Haliaeetus leucocephalus*	SE, CFP, BGEPA	Frequents ocean shores, lake margins, and rivers for both nesting and wintering. Requires abundant fish and adjacent snags or other perches. Nests in large, old-growth, or dominant live tree with open branch-work.	**Unlikely.** The species had not been documented nesting in the vicinity. This species is occasionally observed at Stevens Creek Reservoir and may fly over the Study Area. However, the Study Area is primarily developed and disturbed through quarry operations and does not provide large dominant trees or an abundance of fish to support this species.	No further actions are recommended for this species.
California black rail *Laterallus jamaicensis coturniculus*	ST, CFP	Year-round resident in marshes (saline to freshwater) with dense vegetation within four inches of the ground. Prefers larger, undisturbed marshes that have an extensive upper zone and are close to a major water source. Extremely secretive and cryptic.	**No Potential.** The Study Area does not contain marsh habitat with dense emergent vegetation to support nesting by this species.	No further actions are recommended for this species.
Alameda song sparrow *Melospiza melodia pusillula*	SSC	Year-round resident in tidal-influenced marshes along the eastern and southern portions of San Francisco Bay.	**No Potential.** The Study Area does not contain tidal salt-marsh habitat.	No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
Bryant's savannah sparrow *Passerculus sandwichensis alaudinus*	SSC	Year-round resident associated with the coastal fog belt, primarily between Humboldt and northern Monterey Counties. Occupies low tidally influenced habitats and adjacent areas; often found where wetland communities merge into grassland. May also occur in drier grasslands. Nests near the ground in taller vegetation, including along roads, levees, and canals.	**No Potential.** The Study Area does not contain any expanses of grassland to support nesting or foraging by this species.	No further actions are recommended for this species
purple martin *Progne subis*	SSC	Summer resident. Inhabits woodlands and low elevation coniferous forests. Nests in old woodpecker cavities and man-made structures. Nest is often located in tall, isolated tree or snag.	**Unlikely.** While oak woodland with potential to support nesting by this species is present, this species is not known to nest within this portion of Santa Clara County (Bousman 2007). Therefore, the species is unlikely to be present.	No further actions are recommended for this species
California Ridgway's (clapper) rail *Rallus obsoletus (longirostris) obsoletus*	FE, SE, CFP	Associated with tidal salt marsh and brackish marshes supporting emergent vegetation, upland refugia, and incised tidal channels.	**No Potential.** The Study Area does not contain tidal marsh to support this species.	No further actions are recommended for this species
black skimmer *Rynchops niger*	SSC	Found primarily in southern California; South San Francisco Bay has a small resident population. Nests colonially on gravel bars, low islets, and sandy beaches	**No Potential.** There are no sandy beaches, or gravel bars present within the Study Area to support nesting.	No further actions are recommended for this species

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
(Brester's) yellow warbler *Setophaga (= Dendroica) petechia brewsteri*	SSC	Summer resident throughout much of California. Breeds in riparian vegetation close to water, including streams and wet meadows. Microhabitat used for nesting variable, but dense willow growth is typical. Occurs widely on migration.	**Moderate Potential.** The Study Area contains streams and riparian vegetation that may support this species.	Perform ground disturbance and vegetation removal outside of the breeding bird season (Sep 1 – Jan 31). If project activities occur within the breeding bird season (Feb 1 – Aug 31), perform preconstruction breeding bird survey within 14 days start of work. Any active nests will be protected by work windows or exclusion buffers. See summary and recommendations section for further details.
California least tern *Sterna antillarum browni*	FE, SE, CFP	Nests along the coast from San Francisco bay south to northern Baja California. Colonial breeder on bare or sparsely vegetated, flat substrates: sand beaches, alkali flats, landfills, or paved areas.	**No Potential.** There are no sandy beaches, gravel bars or salt ponds within the Study Area to support nesting by this species. There are no documented occurrences within 5 miles of the Study Area (CDFW 2020b).	No further actions are recommended for this species.
least bell's vireo *Vireo bellii pusillus*	FE, SE	Summer resident. Breeds in riparian habitat along perennial or intermittent rivers and creeks; prefers a multi-tiered canopy with dense early successional vegetation in the understory. Willows, mulefat and other understory species are typically used for nesting.	**No Potential.** The Study Area is outside the known distribution for this species (Bousman 2007).	No further actions are recommended for this species.
Reptiles and Amphibians				

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
western pond turtle *Actinemys [Emys] marmorata*	SSC	Occurs in perennial ponds, lakes, rivers and streams with suitable basking habitat (mud banks, mats of floating vegetation, partially submerged logs) and submerged shelter.	**Moderate Potential.** Detention ponds lacking vegetated banks and emergent vegetation are not suitable for this species. In addition, the Study Area does not provide friable soils for nesting. However, this species may occasionally occur within or disperse through streams or manmade ponds with vegetated banks within the Study Area	Recommended measures include preconstruction surveys, a Worker Environmental Awareness Program, and/or a biological monitor during initial ground disturbance. See summary and recommendations section for further details.
California tiger salamander *Ambystoma californiense*	FT, ST	Populations in Santa Barbara and Sonoma counties currently listed as endangered; threatened in remainder of range. Inhabits grassland, oak woodland, ruderal and seasonal pool habitats. Adults are fossorial and utilize mammal burrows and other subterranean refugia. Breeding occurs primarily in vernal pools and other seasonal water features.	**No Potential.** The last documented occurrence within 5 miles of the Study Area was in 1893 (CDFW 2020B). In addition, the noted individual is likely misidentified (Jennings per comm). Therefore the species likely never was present in the area and as such has no potential.	No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
Santa Cruz black salamander *Aneides flavipunctatus niger*	SSC	Climbing salamanders of the genus *Aneides* frequent damp woodlands and are usually found hiding under various debris (i.e. bark, woodrat nests, logs). The Santa Cruz black salamander exists south of the San Francisco Bay and was only recently recognized as a separate and protected species. Santa Cruz black salamander is highly sedentary, preferring to stay hidden under riparian debris. Prey items include millipedes, spiders, and other insects (Stebbins and McGinnis 2012).	**Moderate Potential.** The creeks and forested habitat along the southern extent of the Study Area may provide suitable habitat for this species. The majority of the Study Area is disturbed and unvegetated and is not suitable for this species.	Recommended measures include preconstruction surveys, a Worker Environmental Awareness Program, and/or a biological monitor during initial ground disturbance. See summary and recommendations section for further details.
silvery legless lizard *Anniella pulchra pulchra*	SSC	Fossorial species, inhabiting sandy or loose loamy soils under relatively sparse vegetation. Suitable habitat includes dunes, stream terraces, and scrub and chaparral. Adequate soil moisture is essential.	**No Potential.** The Study Area does not contain loose sandy soils to support this species. There are no documented occurrences within 5 miles of the Study Area (CDFW 2020B).	No further actions are recommended for this species.
California giant salamander *Dicamptodon ensatus*	SSC	Occurs in the north-central Coast Ranges. Moist coniferous and mixed forests are typical habitat; also uses woodland and chaparral. Adults are terrestrial and fossorial, breeding in cold, permanent or semi-permanent streams. Larvae usually remain aquatic for over a year.	**High Potential.** This species has been documented upstream of the Study Area in Montebello Creek (CDFW 2020B). The creeks and forested habitat along the southern extent of the Study Area may provide suitable habitat for this species.	Recommended measures include preconstruction surveys, a Worker Environmental Awareness Program, and/or a biological monitor during initial ground disturbance. See summary and recommendations section for further details.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
foothill yellow-legged frog *Rana boylii*	SSC	Found in or adjacent to rocky streams in a variety of habitats. Prefers partly-shaded, shallow streams and riffles with a rocky substrate; requires at least some cobble-sized substrate for egg-laying. Needs at least 15 weeks to attain metamorphosis. Feeds on both aquatic and terrestrial invertebrates.	**Unlikely**. One occurrence of this species is known in the Steven's Creek watershed approximately 2 linear miles from the Study Area and is dated from 1939 (CDFW 2020B). However, streams within the Study Area are heavily shaded, or culverted and highly modified making it unlikely to support the species.	No further actions are recommended for this species.
California red-legged frog (CRLF) *Rana draytonii*	FT, SSC	Associated with quiet perennial to intermittent ponds, stream pools, and wetlands with adjacent upland habitat containing refugia. Prefers shorelines with extensive vegetation. Documented to disperse through upland habitats after rains.	**High Potential.** CRLF have been documented within 0.5 miles of the Study Area as recently as 2017 (CDFW 2020B). Ponded areas within the Study Area may provide suitable habitat.	Recommended measures include preconstruction surveys, a Worker Environmental Awareness Program, and/or a biological monitor during initial ground disturbance. See summary and recommendations section for further details.
red-bellied newt *Taricha rivularis*	SSC	Inhabits coastal forests from southern Sonoma County northward, with an isolated population in Santa Clara County. Redwood forest provides typical habitat, though other forest types (e.g., hardwood) are also occupied. Adults are terrestrial and fossorial. Breeding occurs in streams, usually with relatively strong flow.	**Moderate Potential.** An isolated population of this species exists in Santa Clara County over 2 miles west of the Study Area (CDFW 2020B). This species has not been documented in Swiss Creek or its tributaries. However, given the proximity to a known population and the presence of stream habitat, this species has Moderate Potential to occur within the Study Area.	Recommended measures include preconstruction surveys, a Worker Environmental Awareness Program, and/or a biological monitor during initial ground disturbance. See summary and recommendations section for further details.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
San Francisco garter snake *Thamnophis sirtalis tetrataenia*	FE, SE, CFP	Vicinity of freshwater marshes, ponds and slow moving streams in San Mateo County and extreme northern Santa Cruz County. Prefers dense cover and water depths of at least one foot. Upland areas near water are also very important.	**Unlikely.** Santa Clara County is outside the accepted range of this sub-species. The nearest documented occurrence is 8 miles west of the Study Area (USFWS 2006).	No further actions are recommended for this species.
Fish				
Green sturgeon *Acipenser medirostris*	FT	Green Sturgeon spawn in the Sacramento and Klamath Rivers. Requires water temperatures between 8-14 degrees celsius to spawn. Preferred spawning substrate is large cobble, but can range from clean sand to bedrock.	**No Potential.** Study Area is outside of the present distribution range of Green Sturgeon.	No further actions are recommended for this species
tidewater goby *Eucyclogobius newberryi*	FE, SSC	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River. Found in shallow lagoons and lower stream reaches; requires fairly still but not stagnant water and high oxygen levels.	**No Potential.** Study Area is outside of the present distribution range of tidewater goby.	No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
Delta smelt *Hypomesus transpacificus*	FT, SE	Lives in the Sacramento-San Joaquin estuary in areas where salt and freshwater systems meet. Occurs seasonally in Suisun Bay, Carquinez Strait and San Pablo Bay. Seldom found at salinities > 10 ppt; most often at salinities < 2 ppt.	**No Potential.** The Study Area is outside of the present distribution range of Delta smelt.	No further actions are recommended for this species.
Coho salmon - Central CA Coast ESU *Oncorhynchus kisutch*	FE, SE	Federal listing includes populations between Punta Gorda and San Lorenzo River. State listing includes populations south of San Francisco Bay only. Occurs inland and in coastal marine waters. Requires beds of loose, silt-free, coarse gravel for spawning. Also needs cover, cool water and sufficient dissolved oxygen.	**No Potential.** The Study Area is outside of the present distribution range of this species.	No further actions are recommended for this species.
steelhead, Central California Coast ESU *Oncorhynchus mykiss irideus*	FT	Occurs from the Russian River south to Soquel Creek and Pajaro River. Also in San Francisco and San Pablo Bay Basins. Adults migrate upstream to spawn in cool, clear, well-oxygenated streams. Juveniles remain in fresh water for 1 or more years before migrating downstream to the ocean.	**No Potential.** Stevens Creek Dam is a complete barrier to upstream migration and precludes the passage of returning adult steelhead.	No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
longfin smelt *Spirinchus thaleichthys*	FC, ST	Found in open waters of estuaries, mostly in the middle or bottom of the water column. This species prefers salinities of 15 to 30 ppt, but can be found in completely freshwater to almost pure seawater.	**No Potential.** The Study Area is outside of the present distribution range of longfin smelt.	No further actions are recommended for this species.
Invertebrates				
Crotch bumblebee *Bombus crotchii*	SC	Range largely restricted to California, favoring grassland and scrub habitats. Typical of bumble bees, nests are usually constructed underground.	**Unlikely**. The Study Area is outside of this species known current distribution. There are no recent documented occurrences of this species in the vicinity of the Study Area (CDFW 2020B).	No further actions are recommended for this species.
western bumblebee *Bombus occidentalis*	SC	Once widespread in the western United States and Canada, populations of this insect have drastically declined in recent decades. Pollinates a variety of wild flowering plants and crops. Nests in the ground, usually in association with small mammal burrows with sunny aspects. Current populations are thought to be restricted to high elevation sights in the Sierras with scattered occurrences on the northern California coast (Xerces, 2018).	**Unlikely**. The Study Area is outside of this species known current distribution. There are no recent documented occurrences of this species in the vicinity of the Study Area (CDFW 2020B).	No further actions are recommended for this species.

SPECIES	STATUS*	HABITAT	POTENTIAL FOR OCCURRENCE**	RECOMMENDATIONS
San Bruno elfin butterfly *Callophrys mossii bayensis*	FE	Limited to the vicinity of San Bruno Mountain, San Mateo County. Colonies are located on in rocky outcrops and cliffs in coastal scrub habitat on steep, north-facing slopes within the fog belt. Species range is tied to the distribution of the larval host plant, Sedum spathulifolium.	**No Potential.** The Study Area is outside of this species known current distribution.	No further actions are recommended for this species.
Bay checkerspot butterfly *Euphydryas editha bayensis*	FT	Restricted to native grasslands on outcrops of serpentine soil in the vicinity of San Francisco Bay. *Plantago erecta* is the primary host plant; *Orthocarpus densiflorus* and *O. purpurscens* are the secondary host plants.	**No Potential.** Suitable serpentine soil habitat is not present in the Study Area. The Study Area is not within one of the few known ranges for this species.	No further actions are recommended for this species.
vernal pool tadpole shrimp *Lepidurus packardi*	FE	Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water. Pools commonly found in grass bottomed swales of unplowed grasslands. Some pools are mud-bottomed and highly turbid.	**No Potential.** Only one occurrence of this species has been recorded in the vicinity of the Study Area in the CNDDB, and is located on the eastern side of San Francisco Bay more than 13 miles from the Study Area (CDFW 2020B). Additionally, no vernal pools or other suitable habitat is present to support this species. No grass bottomed swales or other typical habitat is present within the Study Area.	No further actions are recommended for this species.

*** Key to status codes:**

CFP	CDFW Fully Protected
BGEPA	Bald and Golden Eagle Protection Act

FC	Federal Candidate for listing
FE	Federal Endangered
FT	Federal Threatened
SC	State Candidate for listing
SE	State Endangered
SSC	California Department of Fish and Wildlife Species of Special Concern
ST	State Threatened
WBWG	Western Bat Working Group Medium or High Priority Species
Rank 1A	California Native Plant Society (CNPS) Rank 1A: Plants presumed extirpated in California and rare or extinct elsewhere
Rank 1B.1	California Native Plant Society (CNPS) Rank 1B.1: Plants rare, threatened or endangered in California and elsewhere (seriously threatened in California)
Rank 1B.2	California Native Plant Society (CNPS) Rank 1B.2: Plants rare, threatened, or endangered in California and elsewhere(moderately threatened in California)
Rank 2B.2	California Native Plant Society (CNPS) Rank 2B.2: Plants rare, threatened, or endangered in California, but more common elsewhere (moderately threatened in California)
Rank 4.3	California Rare Plant Rank 4.3: Plants of Limited Distribution - A Watch List (not very threatened in California)

****Potential species occurrence definitions:**
Present. Species was observed on the site during site visits or has been recorded (i.e. CNDDB, other reports) on the site recently.

High Potential. All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.

Moderate Potential. Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.

Unlikely. Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species has a low probability of being found on the site.

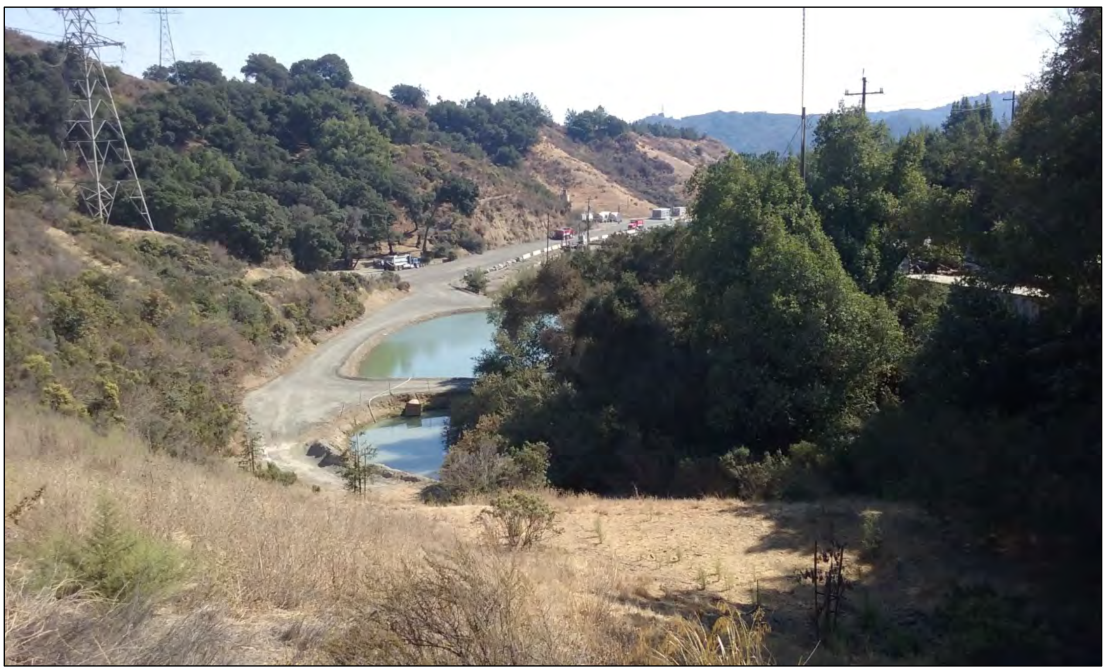
No Potential. Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).

DRAFT

APPROVED JURISDICTIONAL DELINEATION

STEVENS CREEK QUARRY

SANTA CLARA COUNTY, CALIFORNIA



LSA

November 2017

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DRAFT

APPROVED JURISDICTIONAL DELINEATION

STEVENS CREEK QUARRY
SANTA CLARA COUNTY, CALIFORNIA

Prepared for:

Stevens Creek Quarry, Inc.
12100 Stevens Canyon Road
Cupertino, California 95014

Prepared by:

LSA
201 Creekside Ridge Court, Suite 250
Roseville, California 95678
916.772.7450

Project No. MIT1701

LSA

November 2017

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1.0 INTRODUCTION

This report, prepared by LSA on behalf of the Stevens Creek Quarry, Inc., presents the results of a delineation of potential waters of the United States (U.S.) for the Stevens Creek Quarry Site (review area). Potential regulated waters in the review area include areas meeting the United States Army Corps of Engineers (USACE) criteria for wetlands and/or other waters of the U.S. subject to regulation under Section 404 of the Clean Water Act (CWA). Included herein are a description of the review area, an explanation of the methods used during the delineation, and a discussion of the results.

The findings and conclusions presented in this report, including the location and extent of wetlands and other waters subject to regulation under Section 404 of the CWA, represent the professional opinion of LSA. These findings and conclusions should be considered preliminary until verified by the USACE.

The review area totals 167.05 acres (ac) and is located in Santa Clara County, approximately 1.8 miles (mi) southwest of the City of Cupertino adjacent to Stevens Canyon Road. Topography is primarily steep slopes with flat, graded terraces in canyons; the elevation ranges from approximately 550 feet (ft) to 1,000 ft above mean sea level (Figures 1 and 2).

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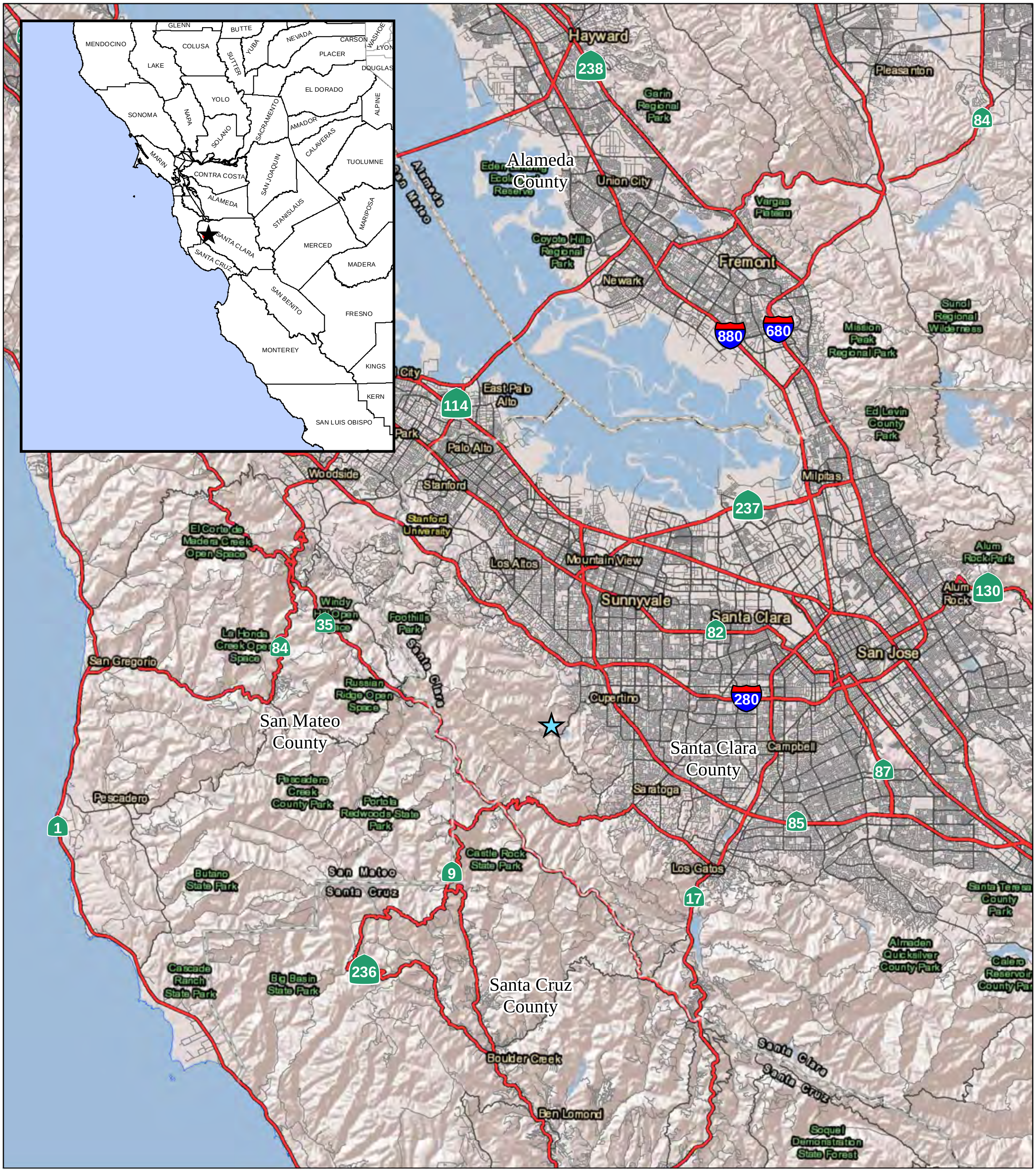

LSA

LEGEND

☆ Review Area

N

0 2.5 5
MILES

SOURCE: ESRI Imagery (4/2008)

FIGURE 1

Steven's Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Regional Location

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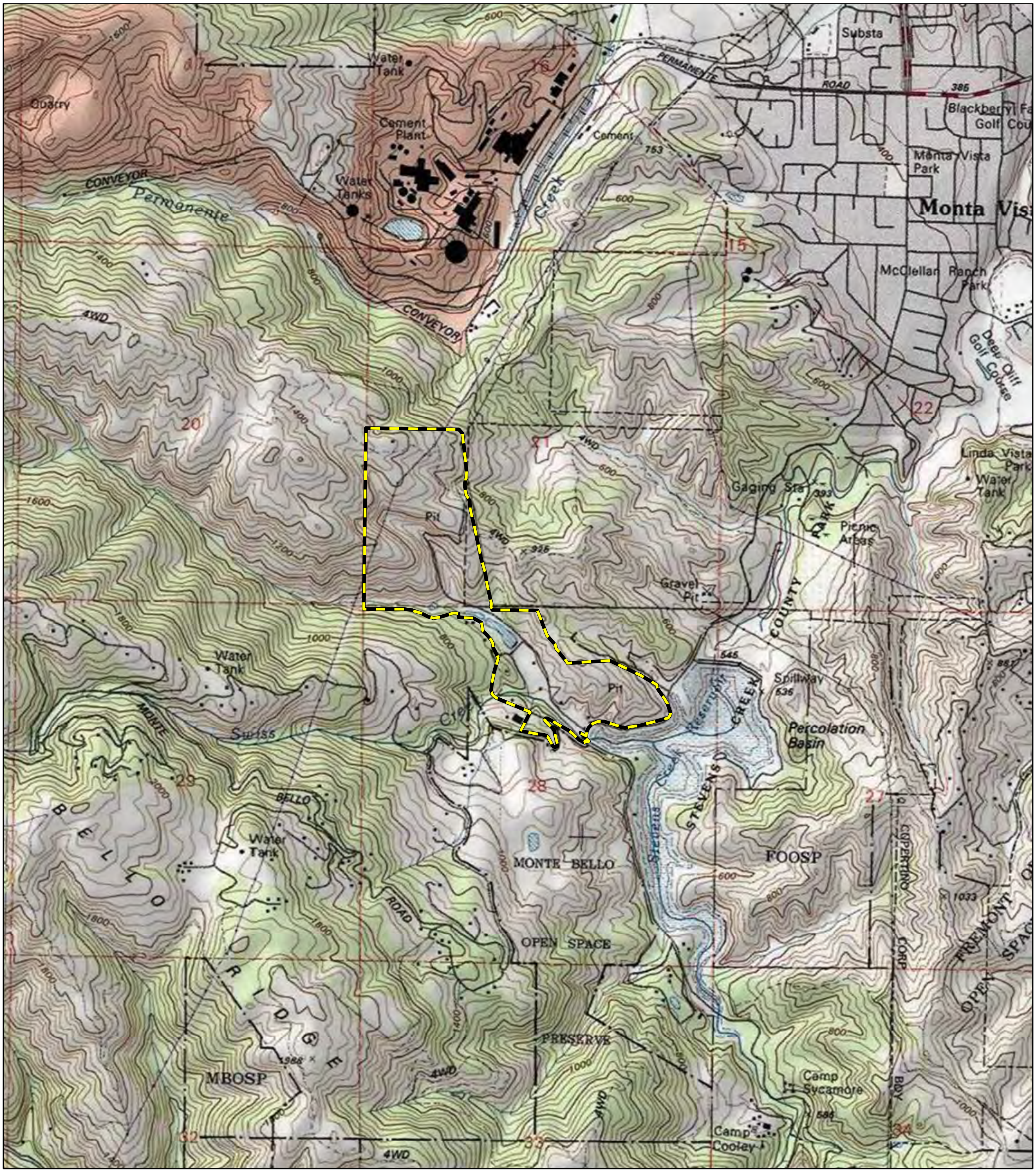

LSA

LEGEND

Review Area - (167.05 ac)

FIGURE 2

N

0 1000 2000
FEET

Steven's Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Review Area Vicinity on Topographic Base

SOURCE: USGS 7.5-minute quadrangle Cupertino (1991)

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2.0 ENVIRONMENTAL SETTING

The review area is located in the central portion of the California Coastal Range. Topography in the region consists of canyons and valleys with steep slopes in the costal range as well as flatter, more developed terrain of cities in the foothills. The predominant habitats in the region are chaparral and oak woodlands, generally occurring on ridgetops and south and west facing slopes, and California bay forest, which generally occurs in valley bottoms and on north and east facing slopes. Primary land uses in the vicinity are open space and urban with smaller areas of mining operations.

2.1 CLIMATE

The climate in the review area is strongly affected by coastal influences. The average total annual precipitation is approximately 6.28 inches (Western Regional Climate Center, 2017), most of which falls between November and April. There is normally less than 0.01 inch of rain between June and September. The average winter temperature is 54 degrees Fahrenheit (ºF) and the average winter low temperature is 40ºF. The average summer temperature is 64.7ºF and the average summer high temperature is 77ºF.

2.2 HYDROLOGY

Hydrology on the western side of the Coast range generally flows directly into the Pacific Ocean, while flows on the eastern side of the Coast Range generally drain into San Francisco Bay. Within the regional watershed a collection of tributaries collect runoff from adjacent slopes and flow north, northeast into San Francisco Bay. Three tributaries provide the majority of flows within the review area: an unnamed intermittent stream, Swiss Creek, and Montebello Creek (Figure 3). The unnamed intermittent stream originates northwest of the review area and flows to the southeast, draining into Swiss Creek. Swiss Creek originates west of the review area and flows generally east, draining into Steven's Creek Reservoir located approximately 100 ft east of the review area. Montebello Creek originates south of the review area and flows north draining into Swiss Creek. A variety of intermittent and ephemeral drainages are also present in the review area and drain runoff from ravines and other landforms into the watershed. Water from Steven's Creek Reservoir supplies Steven's Creek, which flows generally north for approximately 10.75 mi and drains into San Francisco Bay.

Historic aerial photos (the earliest of which is from 1948) substantiate the predominant flow patterns in the review area from west to southeast for the unnamed intermittent stream, from west to east-southeast for Swiss Creek, and from south to north for Montebello Creek (www.historicaerials.com/viewer). Subsequent photos (1953, 1956, and 1960) show the beginnings of the mining operation and the installation of several settling ponds in the unnamed intermittent stream. Aerial photos after 1960 show further development of the settling ponds and expansion of the mining operation up to present day. Flows in Swiss Creek and Montebello Creek have not been significantly altered as a result of mining operations.

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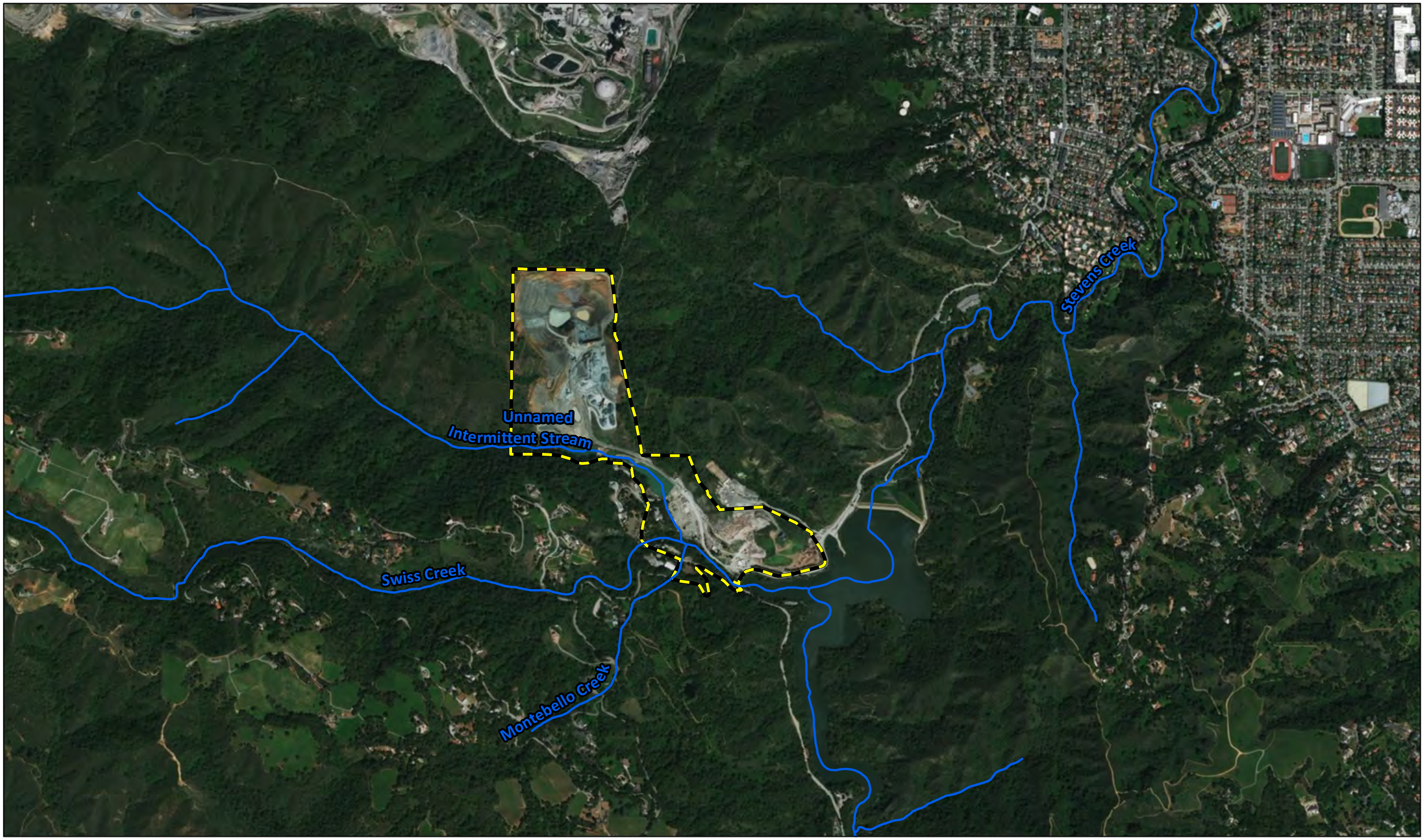

LSA

LEGEND

Review Area - (167.05 ac)

Streams and Creeks

0 1000 2000

FEET

SOURCE: NAIP Aerial Imagery (5/2016)

FIGURE 3

Steven's Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Regional Watershed

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2.3 SOILS

The review area contains the following soil types shown in Table 1 (also shown in Figure 4):

Table 1: NRCS Soil Types in the Review Area

Map Unit	Soil Series	Location	Drainage Class	Source	Temperature	Geographic Association
115	Pits, mine	–	–	–	–	–
321	Merbeth-Literr complex, 30 to 65 percent slopes	Hills of dissected terraces	Well-drained	Alluvium from mixed rock sources	60 to 62ºF	Literr soils (mollic epipedons)
520	Mouser-Maymen complex, 30 to 75 percent slopes	Summits and side slopes of mountains and hills	Well-drained	Residuum weathered from sandstone, mudstone, and greenstone	57ºF	Maymen soils (shallow, somewhat excessively drained, found on mountains)
569	Katykat-Sanikara complex, 8 to 30 percent slopes	Side slopes and summits of mountains and foothills	Well-drained	Residuum weathered from sandstone and mudstone of the Franciscan formation	57ºF	Sanikara soils (shallow to a lithic contact)
570	Footpath-Mouser complex, 50 to 75 percent slopes	Hills, mountain slopes, and summits	Well-drained	Residuum weathered from greenstone	55 to 59ºF	Mouser soils (deep and very deep)
576	Sanikara-Footpath complex, 30 to 75 percent slopes	Hills, mountain slopes, and summits	Well-drained	Residuum weathered from sandstone and greenstone	57ºF	Footpath soils (moderately deep to a paralithic contact)

Further description of the soil types in the review area is provided below. None of the soil types in the review area are considered hydric soils (NRCS Soil Survey Santa Clara Area, California, Western Part).

2.3.1 Pits, mine

These areas are characterized by mining activities which have disturbed and/or removed the soil.

2.3.2 Merbeth-Literr complex, 30 to 65 percent slopes

The Merbeth-series soil consists of very deep, well-drained soils formed in old alluvium from mixed rock sources. These soils are on hills of dissected terraces. Soil temperatures range from 60 to 62ºF and are dry from about June 15 to October 15 (about 120 days). This series is geographically associated with Literr soils, which have mollic epipedons.

LEGEND

Review Area - (167.05 ac)

NRCS Soil Classification

115 - Pits, mine

321 - Merbeth-Literr complex, 30 to 65 percent slopes

520 - Mouser-Maymen complex, 30 to 75 percent slopes

569 - Katykat-Sanikara complex, 8 to 30 percent slopes

570 - Footpath-Mouser complex, 50 to 75 percent slopes

576 - Sanikara-Footpath complex, 30 to 75 percent slopes

W - Water

0 250 500

FEET

SOURCE: Basemap - NAIP Aerial Imagery (5/2016); Mapping - NRCS Soil Survey of Western Santa Clara County (2009)

FIGURE 4

Steven's Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

NRCS Soil Classifications

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2.3.3 Mouser-Maymen complex, 30 to 75 percent slopes

The Mouser-series soils consist of deep and very deep, well-drained soils that formed in residuum weathered from sandstone, mudstone, and greenstone. They are on summits and side slopes of mountains and hills. Mean annual temperature is about 57ºF and are usually moist in between November and May, and have a xeric moisture regime. This series is geographically associated with Maymen soils, which are shallow, somewhat excessively drained soils found on mountains.

2.3.4 Katykat-Sanikara complex, 8 to 30 percent slopes

The Katykat series soils formed in residuum weathered from sandstone and mudstone of the Franciscan formation and are found on side slopes and summits of mountains and foothills. They are geographically associated with Sanikara soils, which are shallow to a lithic contact. The climate is subhumid, mesothermal with warm dry summers and cool moist winters. These soils are well drained, moderately permeable, with medium to rapid runoff. The mean annual soil temperature is about 57ºF.

2.3.5 Footpath-Mouser complex, 50 to 75 percent slopes

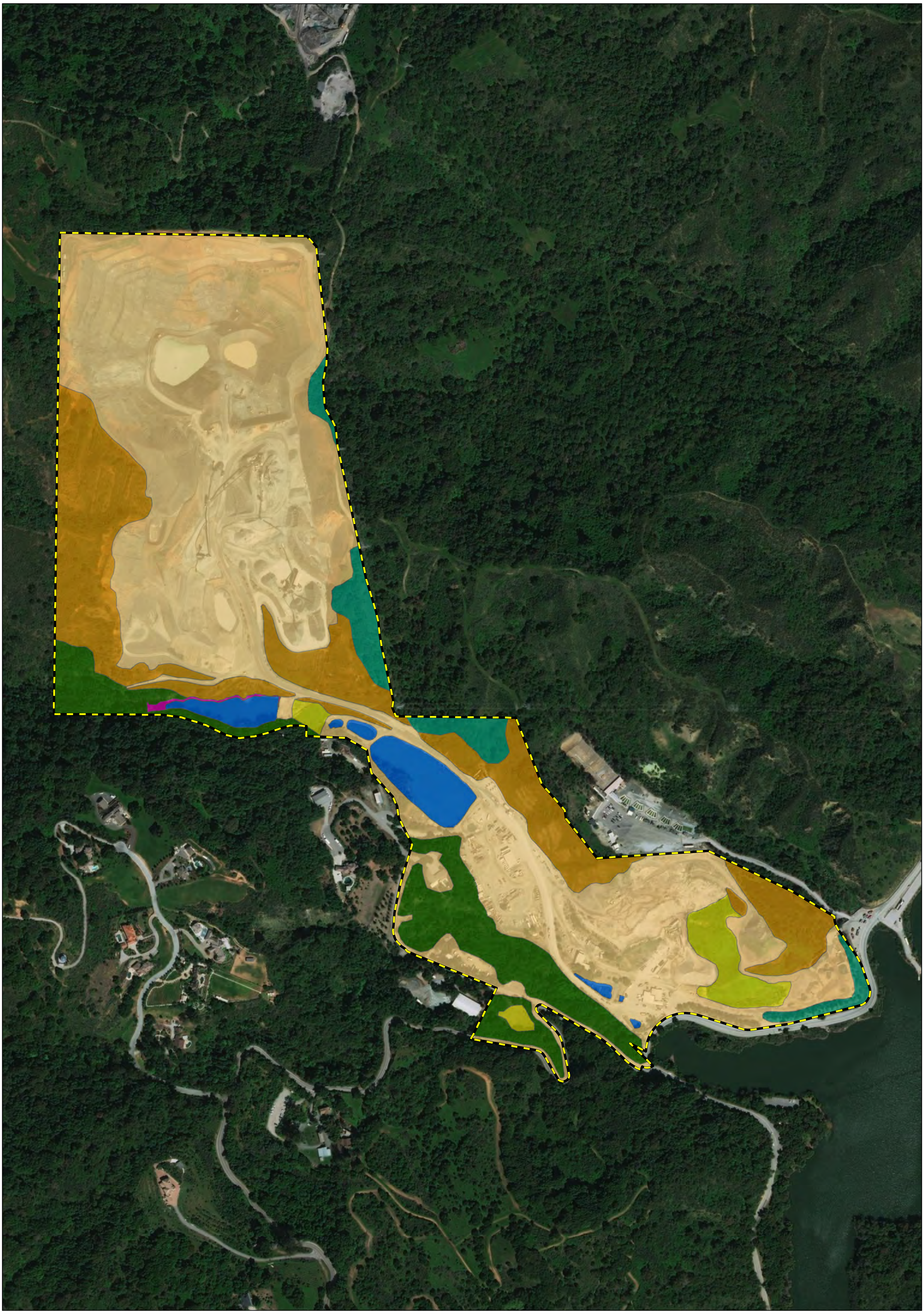
The Footpath-series soils consist of moderately deep to a paralithic contact, well drained soils that formed in residuum weathered from greenstone. These soils are found on hills, mountain slopes, and summits. The climate is subhumid, mesothermal with warm, dry summers and cool moist winters. Mean annual soil temperatures range from 55 to 59ºF. This series is geographically associated with Mouser soils, which are deep and very deep soils.

2.3.6 Sanikara-Footpath complex, 30 to 75 percent slopes

The Sanikara-series soil consists of very shallow and shallow to lithic contact, well-drained soils formed in residuum weathered from sandstone and greenstone. They are on hills, mountain slopes, and summits. The mean annual temperature is about 57ºF. This series is geographically associated with Footpath soils, which are moderately deep to a paralithic contact.

2.4 PLANT COMMUNITIES / LAND USES

Vegetation communities observed in the review area were classified based on descriptions in "*A Manual of California Vegetation: Second Edition*" by Sawyer, Keeler-Wolf, and Evans (2008). A total of six natural plant communities were identified, comprising approximately 61.21 ac of the 167.05 ac review area. These natural communities include annual grassland, California bay forest, oak woodland, chaparral, cattail marsh, and open water. The remaining 105.84 ac are devoted to developed land uses (Figure 5). Plant communities and land uses are described below and summarized in Table 2.



LSA

LEGEND

Review Area - (167.05 ac)

Plant Communities / Land Uses - (167.05 ac)

Annual grassland - (4.59 ac)

California bay forest - (15.20 ac)

Oak woodland - (6.20 ac)

Chaparral - (29.26 ac)

Cattail marsh - (0.27 ac)

Open water - (5.69 ac)

Developed - (105.84 ac)

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SOURCE: Basemap - NAIP Aerial Imagery (5/2016); Mapping - LSA (2017)

I:\MIT1701\GIS\Reports\JD\Fig5_Habitats.mxd (3/21/2018)

FIGURE 5

Steven's Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Plant Communities / Land Uses

Table 2: Summary of Plant Communities/Land Uses in the Review Area (acres)

Type	Total
Plant Communities	
Annual Grassland	4.59
California Bay Forest	15.20
Oak Woodland	6.20
Chaparral	29.26
Cattail Marsh	0.27
Open Water	5.69
Plant Communities Subtotal	***61.21***
Land Uses	
Developed	105.84
Land Uses Subtotal	***105.84***
Total	***167.05***

2.4.1 Annual Grasslands

Within the review area, the annual grassland community is dominated by foxtail chess (*Bromus madritensis*) with wild oats (*Avena fatua*), grassy tarweed (*Madia gracilis*), yellow starthistle (*Centaurea solstitialis*) and many other grasses and herbs present in smaller numbers. Small areas of ruderal vegetation and barren or disturbed areas are included in this category. This community is located in highly disturbed or managed areas within the review area. Annual grasslands within the review area total 4.59 ac.

2.4.2 California Bay Forest

The California bay forest community is dominated by California bay (*Umbellularia californica*) intermixed with big-leaf maple (*Acer macrophyllum*), coast live oak (*Quercus agrifolia*), and western sycamore (*Platanus racemosa*). Understory is typically composed of California wood fern (*Dryopteris arguta*), California blackberry (*Rubus ursinus*), and poison oak (*Toxicodendron diversilobum*). This community is primarily located on north and east facing slopes in the southern half of the review area, typically around ponds and creeks. California Bay Forest in the review area totals 15.20 ac.

2.4.3 Oak Woodlands

The oak woodland community is dominated by Coast live oak, blue oak (*Quercus douglasii*), and leatheroak (*Quercus durata*) with an understory of annual grasses, black mustard (*Brassica nigra*), and/or poison oak. This community is typically located on ridgetops or the upper portions of steep slopes within the review area. Oak woodlands within the review area total 6.20 ac.

2.4.4 Chaparral

The chaparral community is co-dominated by California sagebrush (*Artemisia californica*) and coyote brush (*Baccharis pilularis*). Poison oak and foxtail chess are also present in smaller numbers. This community is primarily located on steep south and west facing slopes and is the most common natural community in the review area. Chaparral within the review area totals 29.26 ac.

2.4.5 Cattail Marsh

This cattail marsh community is dominated by cattail species (*Typha sp.*), but narrow-leaved willow saplings (*Salix exigua*) and rabbitsfoot grass (*Polypogon monspeliensis*) are also present. Cattail marsh occurs along the north and west edges of the westernmost pond in the review area. A recent landslide has covered much of this community with a large amount of sediment which has temporarily obscured or denuded the area of vegetation. However, cattails are expected to naturally reestablish. The landslide occurred in a densely vegetated canyon unaffected by mining activities near the western edge of the review area, and is a common natural occurrence in terrain with such steep topography. The affected area begins approximately 150 ft upslope of the cattail marsh community and covers an area approximately 20 to 40 ft wide. Natural hydrological processes have dispersed sediments within the intermittent stream channel to obscure natural vegetation. Cattail marsh within the review area totals 0.27 ac.

2.4.6 Open Water

Aquatic open water features within the review area include a series of ponds following the historic path of the unnamed intermittent stream, starting in the west and extending generally southeast through the review area. A total of seven man-made ponds, which are used as settling ponds for the mining operation, occur along this drainage. Based on aerial photo review and the subsequent site visit all of the subject ponds have been located at the site for years and in most cases for decades. These features are typically inundated year-round, are highly disturbed due to dredging activities, and associated vegetation is maintained with herbicide applications. Open water within the review area totals 5.69 ac.

2.4.7 Developed Areas

Developed areas include the mining pits, equipment storage areas, office complex, and roads. Developed lands within the review area total 105.84 ac.

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3.0 REGULATORY BACKGROUND

The discharge of dredged or fill material into streams, lakes, and other bodies of water, including wetlands, are often regulated by the USACE under Section 404 of the CWA. The USACE also regulates activities in navigable waters under Section 10 of the Rivers and Harbors Act. The basis of USACE jurisdiction over various waters is described in the following sections.

3.1 SECTION 404

Under Section 404 of the CWA, the USACE regulates the discharge of dredged or fill material into waters of the U.S., including wetlands.

3.1.1 Definition of Waters of the U.S.

In the USACE/EPA CWA regulation (33 CFR 328.3(a)), the term "waters of the U.S." is defined as follows:

1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
2. All interstate waters including interstate wetlands;
3. All other waters such as interstate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters: (i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or (ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (iii) Which are used or could be used for industrial purpose by industries in interstate commerce;
4. All impoundments of waters otherwise defined as waters of the U.S. under the definition;
5. Tributaries of waters identified in paragraphs (1)-(4) of this section;
6. The territorial seas;
7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (1)-(6) of this section.

Based on this definition, the USACE will assert jurisdiction over the following waters as outlined in the Jurisdictional Determination Form Instructional Guidebook (May 2007):

1. Traditional Navigable Waters (TNW) and adjacent wetlands.
2. Relatively Permanent Waters (RPW) that flow directly or indirectly into TNW.
3. Non-Relatively Permanent Waters (Non-RPW) that flow directly or indirectly into TNW (with significant nexus determination).
4. Wetlands directly abutting an RPW that flows directly or indirectly into a TNW.

5. Wetlands adjacent to by not directly abutting an RPW that flows directly or indirectly into a TNW (with significant nexus determination).
6. Wetlands adjacent to non-RPWs that flow directly or indirectly into a TNW (with significant nexus determination). A significant nexus evaluation includes:
    a. An assessment of the flow characteristics and functions of the tributary, itself, in combination with the functions performed by any wetlands adjacent to the tributary to determine if they have more than an insubstantial or speculative effect on the chemical, physical, and/or biological integrity of TNWs.
    b. A consideration of hydrologic factors such as volume, duration, and frequency of flow, including consideration of certain physical characteristics of the tributary; proximity to the TNW; size of the watershed; average annual rainfall; and average annual winter snow pack.
    c. A consideration of ecologic factors such as the ability of the tributary and its adjacent wetlands (if any) to carry pollutants and flood waters to TNWs; the ability of the tributary and its adjacent wetlands (if any) to provide aquatic habitat that supports biota of a TNW; the ability for adjacent wetlands to trap and filter pollutants or store flood waters; and the ability to maintain water quality.

3.1.2 Wetlands

The USACE and EPA defines wetlands as follows:

"*Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions.*"

In order to satisfy the USACE wetland definition, an area must possess three wetland characteristics: hydrophytic vegetation, hydric soils, and wetland hydrology. Each characteristic has a specific definition and criteria that must be satisfied in order for that particular wetland characteristic to be met. Several parameters (indicators) may be analyzed to determine whether the criteria are satisfied. Conversely, if an area lacks one of the three characteristics under normal circumstances, the area is non-wetland.

3.1.3 Non-Wetland Waters

Non-wetland waters essentially include any body of water, not otherwise exempted, that displays an ordinary high water mark (OHWM).

3.1.4 Isolated Waters

As discussed above, USACE regulatory jurisdiction under Section 404 is founded on the connection between a water body and a TNW. This connection may be direct, through a tributary system linking a stream channel with a TNW, or may be indirect, through a nexus identified in the USACE regulations.

3.1.5 Man-Made Waters

The preamble to USACE regulations (Preamble Section 328.3 Definitions) states that the USACE does not generally consider the following waters to be waters of the U.S. The USACE does, however, reserve the right to regulate these waters on a case-by-case basis.

- Non-tidal drainage and irrigation ditches excavated on dry land.
- Artificially irrigated areas that would revert to upland if the irrigation ceased.
- Artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.
- Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.
- Water filled depressions created in dry land incidental to construction activity and pits excavated in dry land for purposes of obtaining fill, sand or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the U.S.

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4.0 METHODS

A delineation of all aquatic features in the review area was conducted on October 13, 2017, by LSA biologists Mike Trueblood and Anna Van Zuuk. Current and historical photos were also reviewed prior to the field investigation. Although the review area is substantially larger than 5 acres, based on the initial aerial photo review, the location and density of the potential aquatic features on the Project Site did not warrant methodologies for "large areas" which consist of extensive transect data.

All aquatic features in the review area were delineated in accordance with the 1987 Corps of Engineers Wetlands Delineation Manual and the 2008 Regional Supplement – Arid West Region. A total of 22 formal observation points were described in the field. At each point, a pit was dug and soils and hydrology examined; vegetation was also characterized at each data point. Copies of the field data forms are attached (Appendix A).

Aquatic features were located in the field using a GPS unit with sub-meter accuracy. All data was entered into a GIS database to calculate the extent of the mapped features in the review area and to produce the final mapping. Final mapping was completed using color aerial photos, dated May 2016, at a scale of 1 inch = 200 ft.

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5.0 DELINEATION RESULTS

A total of 6.94 ac of potential jurisdictional waters were mapped in the review area, consisting of approximately 0.36 ac of potential wetlands and 6.58 ac of non-wetland waters. Areas potentially meeting USACE criteria for wetlands in the review area include four adjacent wetlands: three along the margins of the settling ponds and one along Montebello Creek and an isolated wetland at the edge of the equipment staging area. Potential non-wetland waters in the review area include: seven settling ponds, the channels of three natural drainages, and three manipulated drainages. Potential jurisdictional waters are shown in Figure 6 and summarized in Table 3. Representative photos are also provided in Appendix C.

Table 3: Summary of Potential Jurisdictional Waters in the Review Area (acres)

Type	Total
Wetlands	
Settling Ponds	0.32
Natural Drainages	0.01
Isolated Depression	0.03
Wetlands Subtotal	***0.36***
Non-Wetland Waters	
Settling Ponds	5.92
Natural Drainages	0.59
Manipulated Drainages	0.07
Non-Wetland Waters Subtotal	***6.58***
Total	***6.94***

A comprehensive discussion of the delineation results is provided below. Potential wetlands in the review area are characterized by data points 4, 4a, 5 – 8, and 10. Wetland data forms are provided in Appendix A.

Areas that were sampled and determined to be non-wetland waters include the settling ponds, the channels of the natural drainages, and the manipulated drainages. These features were characterized by data points 1, 1a, 2, 2a, 3, 3a, 4b, 4c, 5a – 8a, 9, 9a, 10a, and 11.

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LSA

LEGEND

Review Area - (167.05 ac)

Culverts

Wetlands

Isolated Depression

Natural Drainage - Creek - Wetland

Settling Pond - Wetland

Non-Wetland Waters

Natural Drainage - Creek

Natural Drainage - Stream

Manipulated Drainage - Ephemeral

Manipulated Drainage - Intermittent

Settling Pond

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FIGURE 6

Steven's Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Potential Jurisdictional Waters of the U.S.

SOURCE: Basemap - NAIP Aerial Imagery (5/2016); Mapping - LSA (2017)

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5.1 SETTLING PONDS

A total of seven settling ponds occur within the review area. Four of these are located in a linear direction southeast of the main quarry operation. These four ponds are manmade and are impoundments of water originating in the unnamed intermittent stream and empty into Swiss Creek to the southeast. The three remaining settling ponds are located around the quarry office, parking area, and quarry road. These ponds are manmade features that collect runoff from slopes and developed areas during storm events.

A landslide occurred on the slopes above the western-most settling pond in the winter of 2016, eliminating or obscuring natural vegetation and soil conditions and depositing a thick layer of sediment. For areas affected by this natural disturbance, consistent with problematic vegetation and soil conditions observed at data points 3, 3a, 4a, and 4c, the data points were considered to be within a wetland only if they exhibited two of the three wetland indicators – hydrophytic vegetation, hydric soil, and/or hydrology. Where applicable, vegetation was extrapolated from nearby, undisturbed vegetation as well as identification of seedlings colonizing the disturbed soil. This is consistent with the 2008 Regional Supplement – Arid West Region guideline for problematic vegetation and problematic hydric soils.

The settling ponds in the review area contained areas of wetlands and non-wetland waters.

5.1.1 Vegetation

Data collection points 4, 4a, 5, 6, and 7 were taken on the margins of settling ponds within the review area. The margins were dominated by a variety of hydrophytic vegetation including cattails – OBL, broadleaf cattail (*Typha latifolia*) – OBL, California bay – FAC, Gooding's black willow (*Salix gooddingii*) – FACW, and tall flatsedge (*Cyperus eragrostis*) – FACW. Other hydrophytic vegetation present but not dominant included willows (*Salix sp.*) – FACW, cottonbatting plant (*Pseudognaphalium stramineum*) – FAC, canarygrass (*Phalaris sp.*) – FAC, fringed willowherb (*Epilobium ciliatum*) – FACW, rabbitsfoot grass – FACW, curly dock (*Rumex crispus*) – FAC, and common knotweed (*Persicaria lapathifolia*) – FACW. Since the margins of the settling ponds supported a variety of dominant hydrophytic species according to the USACE, the vegetation criterion for wetlands was met.

5.1.2 Soils

Indicators for hydric soils were observed at data points 4, 4a, 5, 6, and 7. Data point 4 consisted of a layer with a Munsell moist color of 5GY 1/4 to 2 inches, followed by a layer of coarse sand of indeterminate color to 11 inches. Data point 4a contained two layers of coarse sand, 1 to 3 inches with a Munsell moist color of 10YR 3/4 and a subsequent layer to 6 inches with a Munsell moist color of 10YR 3/2, followed by a layer of gleyed soil with a Munsell moist color of 10Y 2.5/1 to 14 inches. Data point 5 of a layer with a Munsell moist color of 10G 4/1 to 4 inches, followed by a layer of coarse sand with a Munsell moist color of 10YR 3/4 to 11 inches. Data point 6 contained a layer of clay to 1 inch with a Munsell moist color of 10YR 3/4, a layer with a Munsell moist color of 5Y 3/2 to 5 inches, and a layer to 12 inches with a Munsell moist color of 5BG 4/1. Data point 7 consisted of a layer to 14 inches with a Munsell moist color of 10Y 3/1. Data points 4a, 5, and 7 meet the requirements of the Sandy Gleyed Matrix indicator for hydric soils while data points 4 and 6 meet the requirements of the Loamy Gleyed Matrix indicator for hydric soils. These soils meet the USACE hydric soils criterion for wetlands.

5.1.3 Hydrology

Hydrology indicators identified included saturation, high water table, surface soil cracks, and water-stained leaves, which are primary indicators for hydrology and thus meet the minimum USACE criterion for wetlands.

5.1.4 Paired Upland Data Points

Corresponding upland data points were taken to help determine the upland/wetland boundary (data points 4b, 4c, 5a, 6a, and 7a). Typical conditions observed included vegetation consisting of poison oak – FACU, foxtail chess – UPL, and coyote brush – UPL; soil profiles with a Munsell Moist color in the matrix of 10YR or 2.5Y; and lack of any hydrology indicators.

5.2 NATURAL DRAINAGES

Two creeks and one stream occur within the review area: Swiss Creek, Montebello Creek, and an unnamed intermittent stream. For purposes of this report, creeks and streams are defined as naturally occurring drainage features that convey intermittent flows. Swiss Creek originates west of the review area and enters the review area through a culvert under a private driveway. Montebello Creek originates south of the review area and enters the review area under Montebello Road though a culvert, flowing north until it joins Swiss Creek. The unnamed intermittent stream originates northwest of the review area and enters the review area along the western edge. This stream flows southeast and joins Swiss Creek in the southern portion of the review area.

Natural drainages within the review area were extremely rocky and largely unvegetated. Data points 1, 2, 9, and 10 were considered to be within a wetland only if they exhibited two of the three wetland indicators – hydrophytic vegetation, hydric soil, and/or hydrology. Where applicable, points were located in areas with vegetation present and soils loose enough to dig a pit. This is consistent with the 2008 Regional Supplement – Arid West Region guidelines for problematic vegetation and problematic hydric soils. If a point was determined to be a non-wetland point, the area was considered to be non-wetland waters due to the presence of an OHWM. Please refer to representative photos in Appendix C.

The natural drainages in the review area contained areas of wetlands and non-wetland waters.

5.2.1 Vegetation

Data collection points 1, 2, 9, and 10 were taken on the margins of an unnamed intermittent stream, Swiss Creek, and Montebello Creek, respectively, within the review area. These areas were dominated by a variety of hydrophytic vegetation, including California bay – FAC, California blackberry (*Rubus ursinus*) – FAC, and watercress (*Nasturtium officinale*) – OBL. Other hydrophytic vegetation observed included California spikenard (*Aralia californica*) – FACW, California wood fern (*Dryopteris arguta*) – FACW, (*Adiantum jordanii*) – FAC, big leaf maple (*Acer macrophyllum*), shortspike hedgenettle (*Stachys pycnantha*) – FACW, bog yellowcress (*Rorippa palustris*) – OBL, rabbitsfoot grass – FACW and common knotweed – FACW. Since the margins of the natural drainages contain a variety of hydrophytic species according to the USACE, the vegetation criterion for wetlands was met.

5.2.2 Soils

Indicators for hydric soils were observed at data point 10. Data point 10 consisted of a layer of coarse sand to 6 inches with a Munsell moist color of 2.5Y 3/3, after which a restrictive layer of ricer rock was encountered. Presence of a restrictive layer meets the USACE hydric soils criterion for wetlands.

Data points 1, 2, and 9 consisted of a layer to 12, 14, and 11 inches, respectively, of unstratified sand mixed with large cobbles. For points 1 and 9 color was indeterminate, however data point 2 had a Munsell moist color of 10YR 3/4. These soils do not meet the USACE hydric soils criterion for wetlands.

5.2.3 Hydrology

Hydrology indicators identified included surface water, high water table, and water-stained leaves, which are primary indicators for hydrology, as well as drift deposits (riverine), which is a secondary indicator for hydrology and thus meets the minimum USACE hydrology criterion for wetlands.

5.2.4 Paired Upland Data Points

Corresponding upland data points were taken to help determine the upland/wetland boundary (data points 1a, 2a, 9a, and 10a). Typical vegetation included California bay – FAC, poison oak – FACU, Torrey's melic (*Melica torreyana*) – UPL, foxtail chess – UPL, and Pink honeysuckle (*Lonicera hispidula*) – FACU. Sandy loam soils with a Munsell Moist color of 10YR 2/2 or 10YR with a value of 3 and lack of any hydrology indicators were also common.

5.3 MANIPULATED DRAINAGES

Manipulated drainages occur within the review area, consisting of intermittent and ephemeral drainages; both of these drainage types flow seasonally. Intermittent drainages are supported by water from quarry operations and generally convey flows throughout the rainy season into the summer months. Ephemeral drainages only convey flows during and shortly after rain events.

The first intermittent drainage is a concrete spillway that drains water from the largest settling pond into Swiss Creek. The second intermittent drainage is a short rock wash that drains water from the settling ponds by the mining office into Swiss Creek. No data points were included for these features in this category since topography was too steep to allow access. The ephemeral ditch is a concrete-lined drainage on the northeastern edge of the complex parking/storage area, which drains a natural ravine into a culvert that empties into a settling pond.

The intermittent and ephemeral drainages in the review area contained only non-wetland waters. Determinations of jurisdiction for these features are based on the presence of an OHWM. This is consistent with the 2008 Regional Supplement – Arid West Region guidelines for problematic vegetation and problematic hydric soils.

5.3.1 Vegetation

Data collection point 11 was taken within the channel of an ephemeral drainage within the review area. This feature was dominated by coyote brush – UPL and foxtail chess – UPL. Since no hydrophytic species were observed, this feature does not meet the vegetation criterion for wetlands.

5.3.2 Soils

Soils were not evaluated since the channel of this feature is lined with concrete. Therefore, soils were not used in the wetland determination. This is consistent with the 2008 Regional Supplement – Arid West Region guidelines for problematic soils.

5.3.3 Hydrology

No hydrology indicators were identified; therefore this feature does not meet the hydrology criterion for wetlands.

5.4 ISOLATED DEPRESSION

The isolated depression is a shallow basin located southeast of the largest settling pond in the center of the review area. This feature is surrounded by gravel roads used by the quarry operation and is in the process of being filled. The isolated depression in the review area contained only wetlands.

5.4.1 Vegetation

Data collection point 8 was taken on the margins of and isolated depressional feature within the review area. This depression was dominated by broadleaf cattail – OBL, with other hydrophytic vegetation such as fringed willowherb – FACW, curly dock – FAC, tall flatsedge – FACW, and tule (*Schoenoplectus acutus* var. *occidentalis*) – OBL. Since this isolated wetland contains a variety of hydrophytic species according to the USACE, the vegetation criterion for wetlands was met.

5.4.2 Soils

Soils observed at data point 8 consisted of a layer with a Munsell moist color of 2.5Y 3/1 to 14 inches, which does not meet the requirements of any USACE hydric soils criterion. However, this is a partially abandoned settling pond that is in the process of being filled in and regraded, therefore the presence of hydric soils can be inferred based on presence of hydrophytic vegetation, evidence of hydrology, and general position in the landscape. This is consistent with the 2008 Regional Supplement – Arid West Region guideline for problematic hydric soils.

5.4.3 Hydrology

Hydrology indicators identified included high water table and saturation, which are primary indicators for hydrology and thus meet the minimum USACE criterion for wetlands.

5.4.4 Paired Upland Data Points

A corresponding upland data point was taken to help determine the upland/wetland boundary (data points 8a). Vegetation included sharp point fluellin (*Kickxia elatine*) – UPL, foxtail chess – UPL, grassy tarweed – UPL, black mustard – UPL, and Italian thistle (*Carduus pycnocephalus*) – UPL. Soils consisted of a sandy clay with a Munsell Moist color of 2.5Y 3/2 and lacked hydrology indicators.

6.0 SECTION 404 JURISDICTIONAL DETERMINATION

A total of 6.59 ac are considered waters of the U.S. and under the CWA, consisting of four settling ponds and adjacent wetlands, three natural drainage features, and two manipulated drainages. A total of 0.35 ac were determined not to be subject to regulation under Section 404 of the CWA, consisting of one isolated depression, three settling ponds, and one manipulated drainage. A detailed summary of Section 404 and non-Section 404 waters is provided in Table 4 below and shown in Figures 7 and 8.

Table 4: Detailed Summary of Section 404 Waters and Non-Section 404 Waters in the Review Area (acres)

Type	Section 404 Waters	Non-Section 404 Waters	Total
Wetlands			
Settling Ponds	0.32	0.00	0.32
Natural Drainages	0.01	0.00	0.01
Isolated Depression	0.00	0.03	0.03
Wetlands Subtotal	***0.33***	***0.03***	***0.36***
Non-Wetland Waters			
Settling Ponds	5.65	0.27	5.92
Natural Drainages	0.59	0.00	0.59
Manipulated Drainages	0.02	0.05	0.07
Non-Wetland Waters Subtotal	***6.26***	***0.32***	***6.58***
Total	**6.59**	**0.03**	**6.94**

Also refer to the Approved Jurisdictional Delineation (JD) Form (Appendix B) and representative photos (Appendix C).

6.1 SETTLING PONDS

There are seven settling ponds within the review area, four of which were determined to be tributary waters. The first settling pond, RPW-1, is the northern and western-most pond. Successive ponds (RPW-2, RPW-3, and RPW-4) occur one after the other southeast of RPW-1. All four ponds are connected through a series of culverts before emptying into a concrete spillway that conveys waters into Swiss Creek, an intermittent creek tributary to Stevens Creek Reservoir, which is a TNW.

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LSA

LEGEND

Review Area - (167.05 ac)

Culverts

Jurisdictional Waters of the U.S. - (6.59 ac)

Non-404 Waters - (0.35 ac)

N

0 250 500

FEET

FIGURE 7

Steven's Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Overview of Waters of the U.S.

SOURCE: Basemap - NAIP Aerial Imagery (5/2016); Mapping - LSA (2017)

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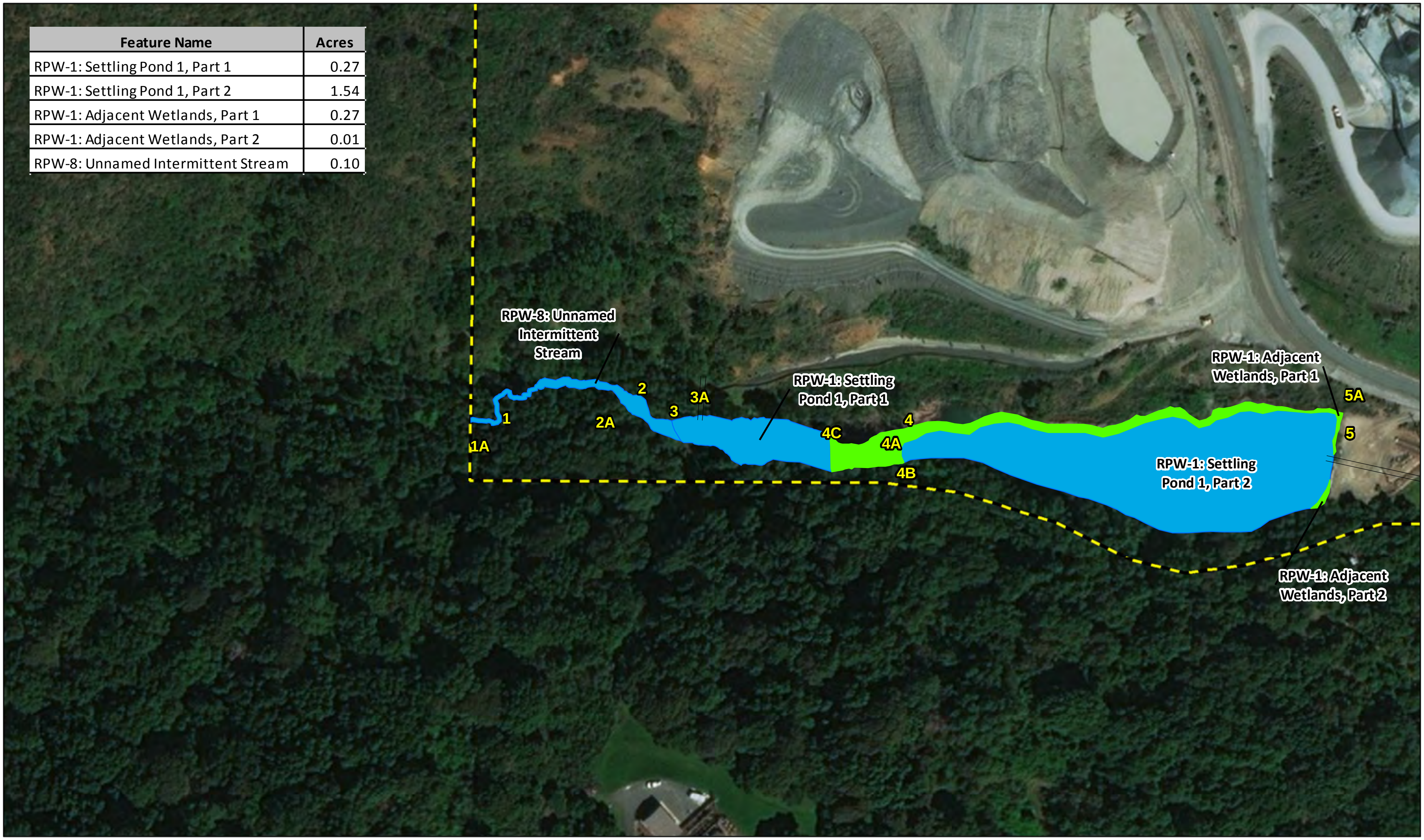

Feature Name	Acres
RPW-1: Settling Pond 1, Part 1	0.27
RPW-1: Settling Pond 1, Part 2	1.54
RPW-1: Adjacent Wetlands, Part 1	0.27
RPW-1: Adjacent Wetlands, Part 2	0.01
RPW-8: Unnamed Intermittent Stream	0.10

LSA

LEGEND

Review Area - (167.05 ac)

Data Points

Culverts

Jurisdictional Waters of the U.S. - (6.59 ac)

Wetlands - (0.33 ac)

Non-Wetland Waters - (6.26 ac)

Non-404 Waters - (0.35 ac)

Wetlands - (0.03 ac)

Non-Wetland Waters - (0.32 ac)

N

0 100 200

FEET

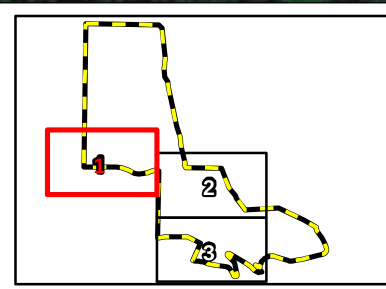

FIGURE 8

Page 1 of 3

Steven's Creek Quarry

Santa Clara County, California

LSA Project No. MIT1701

Detail View of Waters of the U.S.

SOURCE: Basemap - NAIP Aerial Imagery (5/2016); Mapping - LSA (2017)

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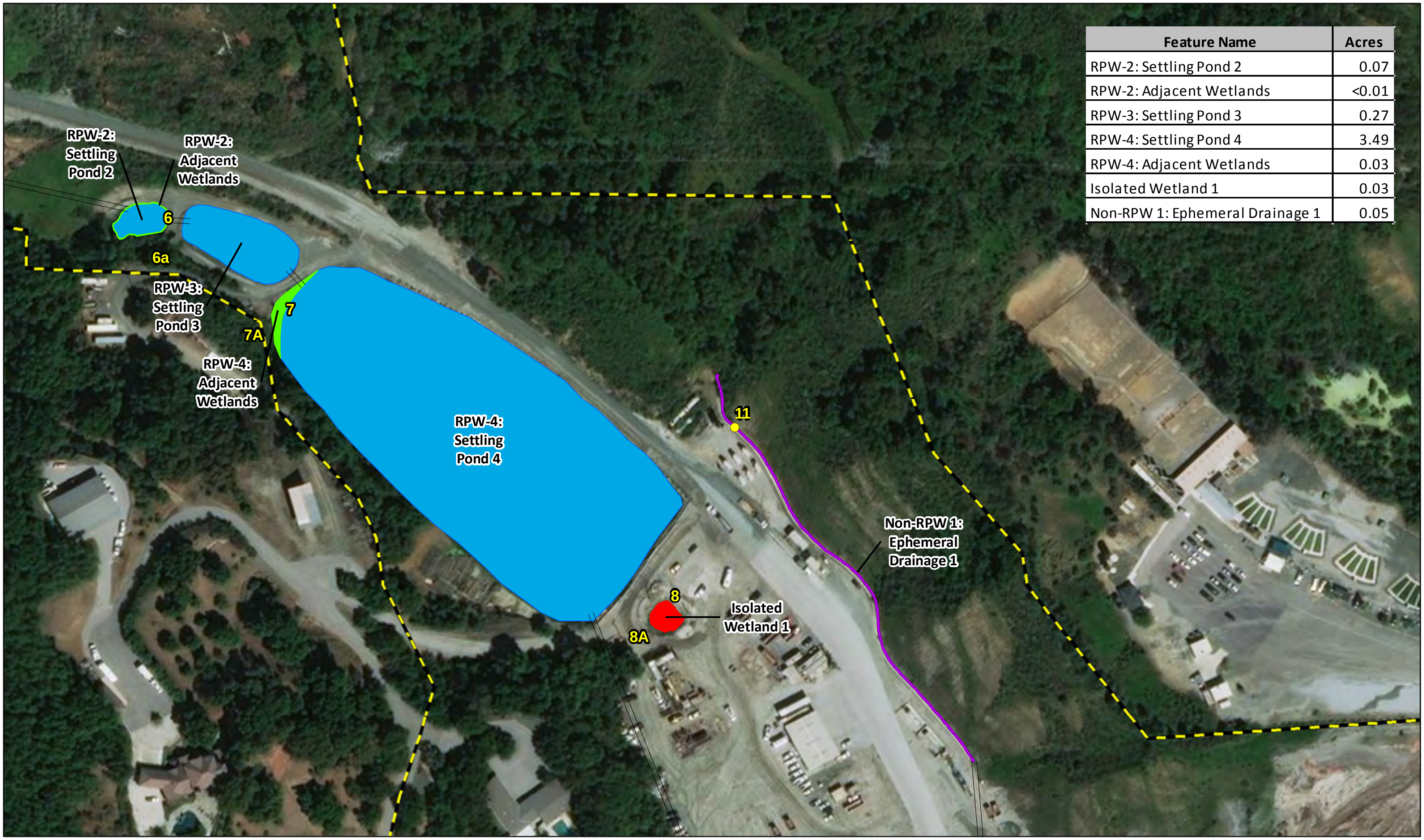

Feature Name	Acres
RPW-2: Settling Pond 2	0.07
RPW-2: Adjacent Wetlands	<0.01
RPW-3: Settling Pond 3	0.27
RPW-4: Settling Pond 4	3.49
RPW-4: Adjacent Wetlands	0.03
Isolated Wetland 1	0.03
Non-RPW 1: Ephemeral Drainage 1	0.05

LSA

LEGEND

Review Area - (167.05 ac)

Data Points

Culverts

Jurisdictional Waters of the U.S. - (6.59 ac)

Wetlands - (0.33 ac)

Non-Wetland Waters - (6.26 ac)

Non-404 Waters - (0.35 ac)

Wetlands - (0.03 ac)

Non-Wetland Waters - (0.32 ac)

0 100 200

FEET

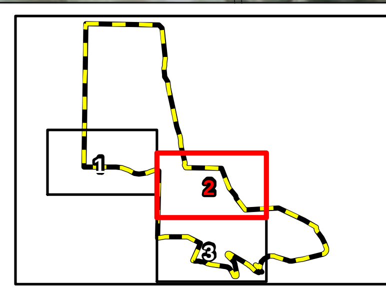

FIGURE 8

Page 2 of 3

Steven's Creek Quarry

Santa Clara County, California

LSA Project No. MIT1701

Detail View of Waters of the U.S.

SOURCE: Basemap - NAIP Aerial Imagery (5/2016); Mapping - LSA (2017)

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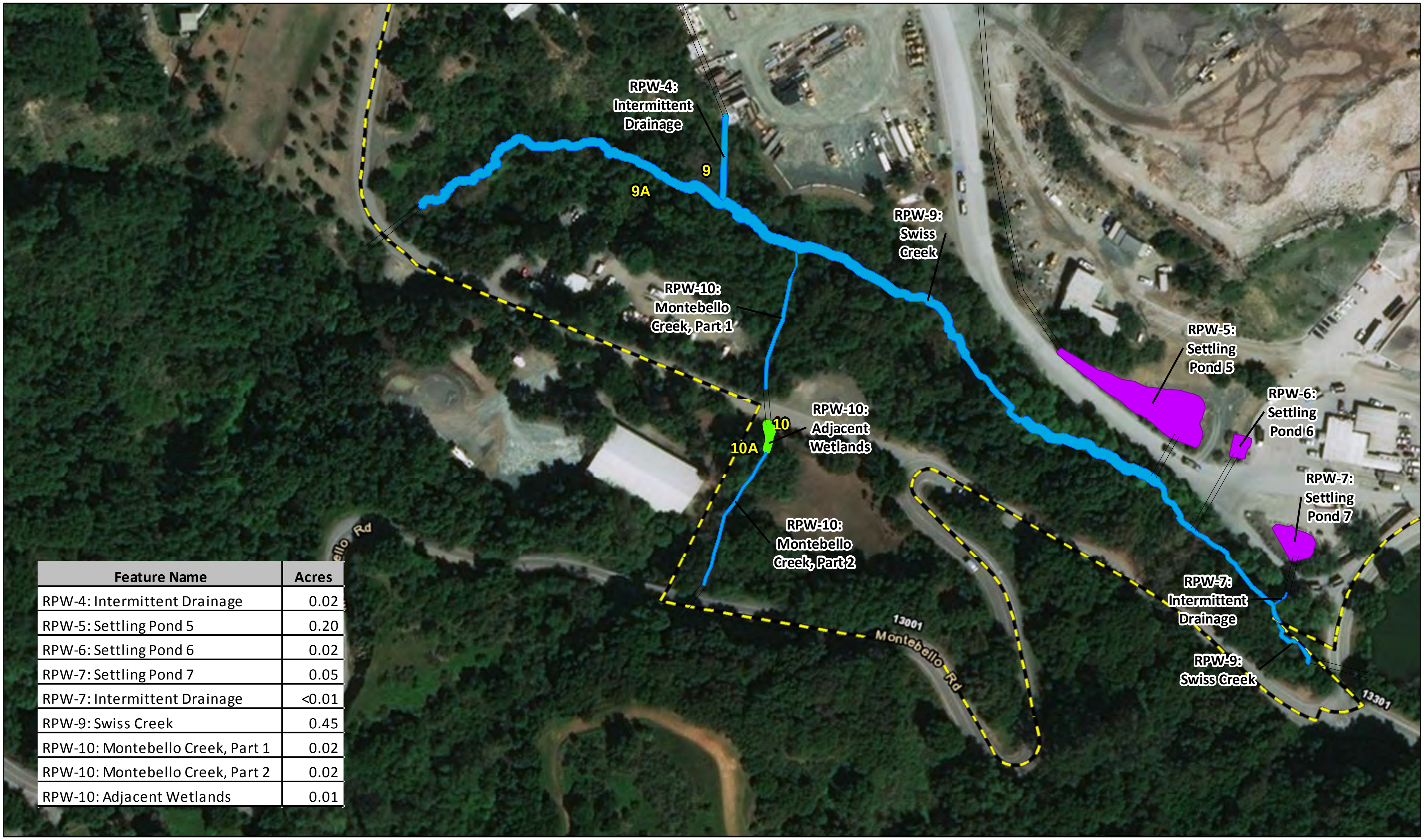

Feature Name	Acres
RPW-4: Intermittent Drainage	0.02
RPW-5: Settling Pond 5	0.20
RPW-6: Settling Pond 6	0.02
RPW-7: Settling Pond 7	0.05
RPW-7: Intermittent Drainage	<0.01
RPW-9: Swiss Creek	0.45
RPW-10: Montebello Creek, Part 1	0.02
RPW-10: Montebello Creek, Part 2	0.02
RPW-10: Adjacent Wetlands	0.01

LSA

N

0 100 200
FEET

LEGEND

Review Area - (167.05 ac)

Data Points

Culverts

Jurisdictional Waters of the U.S. - (6.59 ac)

Wetlands - (0.33 ac)

Non-Wetland Waters - (6.26 ac)

Non-404 Waters - (0.35 ac)

Wetlands - (0.03 ac)

Non-Wetland Waters - (0.32 ac)

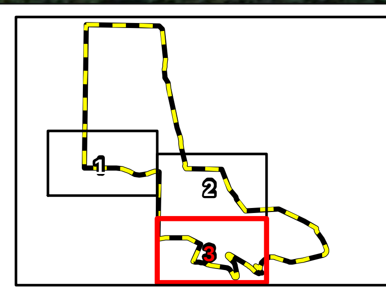

FIGURE 8
Page 3 of 3

Steven's Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Detail View of Waters of the U.S.

SOURCE: Basemap - NAIP Aerial Imagery (5/2016); Mapping - LSA (2017)

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Therefore, these settling ponds were determined to be waters of the U.S., and subject to USACE regulation under Section 404 of the CWA.

Wetlands adjacent to RPW-1, RPW-2, and RPW-4 directly abut waters which flow indirectly into a TNW, and are therefore determined to be waters of the U.S. and subject to USACE regulation under Section 404 of the CWA.

The remaining three settling ponds (RPW-5, RPW-6, and RPW-7) occur west and south of the quarry office complex, in the southern portion of the review area. RPW-5 is separated into several small basins by berms, which overflow into each other during high flow events. The lowest basin drains through a culvert into Swiss Creek only during extraordinary flood years. RPW-6 and RPW-7 are small, isolated ponds that collected runoff from the roads and office parking area during storm events. These features also drain through culverts into Swiss Creek during extraordinary flood years Based on the lack of normal connectivity to a TNW these features do not demonstrate a significant nexus and are not considered waters of the U.S., and therefore would not be regulated under Section 404 of the CWA.

6.2 NATURAL DRAINAGES

One unnamed intermittent stream and two creeks are present in the review area. The unnamed intermittent stream (RPW-8) enters the review area on the western edge and conveys seasonal flows into RPW-1. Since RPW-8 flows indirectly into a TNW it is therefore determined to be waters of the U.S., and subject to USACE regulation under Section 404 of the CWA.

Swiss Creek (RPW-9) flows from the southwest edge of the review area to the southeast, draining into Steven's Creek Reservoir. This creek flows continuously except in drought years, and is directly tributary to a TNW. Therefore RPW-9 is determined to be waters of the U.S. and subject to USACE regulation under Section 404 of the CWA.

Montebello Creek (RPW-10) conveys continuous flows to the north, draining into RPW-9 which in turn drains into Stevens Creek Reservoir. Since RPW-10 is a secondary tributary to a TNW it is therefore determined to be waters of the U.S. and subject to USACE regulation under Section 404 of the CWA.

Wetlands adjacent to RPW-10 directly abut waters which flow indirectly into a TNW, and are therefore determined to be waters of the U.S. and subject to USACE regulation under Section 404 of the CWA.

6.3 MANIPULATED DRAINAGES

There are two intermittent drainages and one ephemeral drainage within the review area. The ephemeral drainage (Non-RPW 1) is a concrete-lined drainage on the northeastern edge of the complex parking/storage area, which drains a natural ravine into a culvert that empties into a RPW-5. Since water from Non-RPW 1 fails to demonstrate normal connectivity to a TNW, it is therefore does not demonstrate a significant nexus and would not be subject to USACE regulation under Section 404 of the CWA.

The first intermittent drainage is a concrete spillway that drains water from RPW-4 into RPW-9. The second intermittent drainage is a short rock wash that drains water from RPW-7 into RPW-9. These features convey water seasonally, indirectly into a TNW. Therefore both intermittent drainages are determined to be waters of the U.S. and subject to USACE regulation under Section 404 of the CWA.

6.4 ISOLATED DEPRESSION

The isolated depression south of RPW-4 does not flow or have connection to any other waters within the review area and is in the process of being filled. Based on the lack of connectivity to a TNW this feature does not demonstrate a significant nexus and is not considered waters of the U.S., and would not be regulated under Section 404 of the CWA.

7.0 CONCLUSION

A total of 6.94 ac of wetlands and non-wetland waters were mapped in the review area, of which 6.59 ac were determined to be Section 404 waters, and 0.35 ac were determined to be non-Section 404 waters. This information is summarized below in Table 5.

Table 5: Summary of Waters of the U.S. in the Review Area (acres)

Type	Section 404 Waters	Non-Section 404 Waters	Total
Wetlands	0.33	0.03	0.36
Non-Wetland Waters	6.26	0.32	6.58
Total	**6.59**	**0.35**	**6.94**

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APPENDIX A

WETLAND DATA FORMS

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVEN'S CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 1

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ✓	Is the Sampled Area within a Wetland?	Yes ______ No ✓
Hydric Soil Present?	Yes ✓ No ✓		
Wetland Hydrology Present?	Yes ✓ No ______		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1. UMBELLULARIA CALIFORNICA	85	Y	FAC
2.			
3.			
4.			
	85	= Total Cover	
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: ______)			
1. RUBUS URSINUS	38	Y	FAC
2. TOXICODENDRON DIVERSILOBUM	22	Y	FACU
3. ARALIA CALIFORNICA	15	N	FACW
4. SYMPHORICARPOS MOLLIS	7	N	FACU
5. DRYOPTERIS ARGUTA	5	N	FACW
6. ADIANTUM JORDANII	1	N	FAC
7.			
8.			
	88	= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12"	INDETERMINATE	100	—	—	—	—	SAND	PROBLEMATIC
12-14"	WATER	100	—	—	—	—	—	—

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes ___ No ✓

Remarks: UNSTRATIFIED. ROCKS, GRAVEL, & COARSE SAND. UNABLE TO DETERMINE COLOR. IN AN AREA (BEND) WHERE STREAM HAS ERODED BANK (ROAD SLIGHTLY UPSLOPE).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ✓ Sediment Deposits (B2) (**Nonriverine**)
- ✓ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): ______
Water Table Present? Yes ✓ No ___ Depth (inches): >12"
Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVENS CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 1A

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______
Hydric Soil Present?	Yes ______	No ✓
Wetland Hydrology Present?	Yes ______	No ✓

Is the Sampled Area within a Wetland? Yes ______ No ✓

Remarks:
UPLAND POINT.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1. QUERCUS AGRIFOLIA	10	N	UPL
2. UMBELLULARIA CALIFORNICA	80	Y	FAC
3.			
4.			
	90	= Total Cover	
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: ______)			
1. RUBUS URSINUS	20	Y	FAC
2. TOXICODENDRON DIVERSILOBUM	7	N	FACU
3. LYSIMACHIA LATIFOLIA	2	N	FAC
4. LONICERA HISPIDULA	15	Y	FACU
5. DRYOPTERIS ARGUTA	5	N	FACW
6. MAIANTHEMUM RACEMOSUM	3	N	FAC
7.			
8.			
	52	= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: 1A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-13"	10 YR 2/2	100	—	—	—	—	SANDY LOAM	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No ✓

Remarks: EROSION FROM HILLSIDE. ADJACENT TO ROAD.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVEN'S CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 2

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ✓	**Is the Sampled Area within a Wetland?**	**Yes** ______ **No** ✓
Hydric Soil Present?	Yes ✓	No ✓		
Wetland Hydrology Present?	Yes ✓	No ______		

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1. UMBELLULARIA CALIFORNICA	90	Y	FAC
2.			
3.			
4.			
	90	= Total Cover	
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: ______)			
1. RUBUS URSINUS	15	Y	FAC
2. TOXICODENDRON DIVERSILOBUM	5	N	FACU
3. DRYOPTERIS ARGUTA	1	N	FACW
4. ARALIA CALIFORNICA	3	N	FACW
5.			
6.			
7.			
8.			
	24	= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 76 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	______	x 1 =	______
FACW species	______	x 2 =	______
FAC species	______	x 3 =	______
FACU species	______	x 4 =	______
UPL species	______	x 5 =	______
Column Totals:	______ (A)		______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-14"	10YR 3/4	100	—	—	—	—	SAND	PROBLEMATIC

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes ___ No ✓

Remarks: UNSTRATIFIED. MIX OF ROCKS, COARSE SAND, & SILT. PROBABLY SLOUGH OFF OF HILLSIDE. STREAM IS ERODING INTO BANK.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): ——
Water Table Present? Yes ✓ No ___ Depth (inches): >14"
Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): >1"

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVENS CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 2A

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ____

Landform (hillslope, terrace, etc.): ____ Local relief (concave, convex, none): ____ Slope (%): ____

Subregion (LRR): ____ Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____
Hydric Soil Present?	Yes ____	No ✓
Wetland Hydrology Present?	Yes ____	No ✓

Is the Sampled Area within a Wetland? Yes ____ No ✓

Remarks: UPLAND POINT.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1. UMBELLULARIA CALIFORNICA	95	Y	FAC
2.			
3.			
4.			
	95	= Total Cover	
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: ____)			
1. DRYOPTERIS ARGUTA	12	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	12	= Total Cover	
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____ % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ✓ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

SOIL

Sampling Point: 2A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-13"	10 YR 2/2	100	—	—	—	—	LOAM	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______

Water Table Present? Yes ___ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVEN'S CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 3

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ____

Landform (hillslope, terrace, etc.): ____ Local relief (concave, convex, none): ____ Slope (%): ____

Subregion (LRR): ____ Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓
Hydric Soil Present?	Yes ~~✓~~	No ✓
Wetland Hydrology Present?	Yes ✓	No ____

Is the Sampled Area within a Wetland? Yes ____ No ✓

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1. UMBELLULARIA CALIFORNICA	25	Y	FAC
2.			
3.			
4.			
= Total Cover	25		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ____)			
1. PSEUDOGNAPHALIUM STRAMINEUM	4	N	FAC
2. POLYPOGON MONSPELIENSIS	3	N	FACW
3. MADIA GRACILIS?	2	N	UPL
4. SONCHUS SP.	5	N	FACU
5. PHALARIS SP.	1	N	FAC
6. LYSIMACHIA ARVENSIS	1	N	FAC
7.			
8.			
= Total Cover	16		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 84 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	3	x 2 = 6
FAC species	31	x 3 = 93
FACU species	5	x 4 = 20
UPL species	2	x 5 = 10
Column Totals:	41 (A)	129 (B)

Prevalence Index = B/A = 3.15

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks: GERANIUM PURPUREUM?

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-16"	10YR 3/6	100	—	—	—	—	SAND	PROBLEMATIC

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No ✓

Remarks: PROBABLY FILL FROM LANDSLIDE.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): —

Water Table Present? Yes ___ No ✓ Depth (inches): >16"

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 78"

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVEN'S CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 3A

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______	No ✓
Hydric Soil Present?	Yes ______	No ✓
Wetland Hydrology Present?	Yes ______	No ✓

Is the Sampled Area within a Wetland? Yes ______ No ✓

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. UMBELLULARIA CALIFORNICA	80	Y	FAC
2.			
3.			
4.			
	80	= Total Cover	
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: ______)			
1. RUBUS URSINUS	30	Y	FAC
2. TOXICODENDRON DIVERSILOBUM	7	N	FACU
3. TORILIS ARVENSIS	7	N	UPL
4.			
5.			
6.			
7.			
8.			
	44	= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	110	x 3 = 330
FACU species	7	x 4 = 28
UPL species	7	x 5 = 35
Column Totals:	124 (A)	393 (B)

Prevalence Index = B/A = 3.17

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No ✓

Remarks:

SOIL

Sampling Point: 3A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12"	10 YR 3/3	100	—	—	—	—	LOAMY SAND	LANDSLIDE

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ______

Water Table Present? Yes ___ No ___ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ______

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVEN'S CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/18/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 4

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ✓, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______
Hydric Soil Present?	Yes ✓	No ______
Wetland Hydrology Present?	Yes ✓	No ______

Is the Sampled Area within a Wetland? Yes ✓ No ______

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1. UMBELLULARIA CALIFORNICA	10	Y	FAC
2.			
3.			
4.			
	10	= Total Cover	
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: ______)			
1. TYPHA SP.	80	Y	OBL
2. SALIX SP.	6	N	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	86	= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust 4

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ______	x 1 = ______
FACW species ______	x 2 = ______
FAC species ______	x 3 = ______
FACU species ______	x 4 = ______
UPL species ______	x 5 = ______
Column Totals: ______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2"	5GY 1/4	100	—	—	—	—	SILTY LOAM	ORGANIC MATTER, SILT
2-11"	NO COLOR	100	—	—	—	—	SAND	COARSE
11-13"	WATER	100	—	—	—	—	—	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ✓ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

TOP 2" GLEYED (SOIL) → LAYER OF COARSE SAND → WATER TABLE.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ✓ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): —

Water Table Present? Yes ✓ No ___ Depth (inches): 711"

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 71"

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVENS CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 4A

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ~~✓~~	No ✓
Hydric Soil Present?	Yes ✓	No ___
Wetland Hydrology Present?	Yes ✓	No ___

Is the Sampled Area within a Wetland? Yes ✓ No ___

Remarks: SLIDE FILL FROM WINTER SETTLED AT LOCATION.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ______ (A)

Total Number of Dominant Species Across All Strata: ______ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ______ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks: NO VEGETATION DUE TO RECENT SOIL FILL SETTLEMENT (DISCHARGED FROM HILLSIDE). DID NOT USE CRITERION.

SOIL

Sampling Point: 4A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3"	10 YR 3/4	100	—	—	—	—	COARSE SAND	
3-6"	10 YR 3/2	100	—	—	—	—	COARSE SAND	
6-14"	10 Y 2.5/1	100	—	—	—	—	SAND	GLEYED

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- __ Stratified Layers (A5) (**LRR C**)
- __ 1 cm Muck (A9) (**LRR D**)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- ✓ Sandy Gleyed Matrix (S4)
- __ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1)
- __ Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3)
- __ Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)
- __ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- __ 1 cm Muck (A9) (**LRR C**)
- __ 2 cm Muck (A10) (**LRR B**)
- __ Reduced Vertic (F18)
- __ Red Parent Material (TF2)
- __ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- __ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- __ Water Marks (B1) (**Nonriverine**)
- __ Sediment Deposits (B2) (**Nonriverine**)
- __ Drift Deposits (B3) (**Nonriverine**)
- __ Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Water-Stained Leaves (B9)
- __ Salt Crust (B11)
- __ Biotic Crust (B12)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Tilled Soils (C6)
- __ Thin Muck Surface (C7)
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water Marks (B1) (**Riverine**)
- __ Sediment Deposits (B2) (**Riverine**)
- __ Drift Deposits (B3) (**Riverine**)
- __ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Crayfish Burrows (C8)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): —

Water Table Present? Yes ✓ No ____ Depth (inches): >11"

Saturation Present? (includes capillary fringe) Yes ✓ No ____ Depth (inches): >6"

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVENS CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017
Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 4B
Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______
Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______
Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: ______ NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______
Hydric Soil Present?	Yes ______	No ✓
Wetland Hydrology Present?	Yes ______	No ✓

Is the Sampled Area within a Wetland? Yes ______ No ✓

Remarks: UPLAND POINT.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. UMBELLULARIA CALIFORNICA	60	Y	FAC
2.			
3.			
4.			
= Total Cover	60		
Sapling/Shrub Stratum (Plot size: ______)			
1. RUBUS URSINUS	25	Y	FAC
2. DRYOPTERIS ARGUTA	20	Y	FACW
3.			
4.			
5.			
= Total Cover	45		
Herb Stratum (Plot size: ______)			
1. TOXICODENDRON DIVERSILOBUM	20	Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover	20		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: 4B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12"	10YR 2/2	100	—	—	—	—	SILTY LOAM	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): —
Water Table Present? Yes ___ No ✓ Depth (inches): >12"
Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): >12"

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVENS CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 4C

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ✓, Soil ✓, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______	No ✓	
Hydric Soil Present?	Yes ______	No ✓	Is the Sampled Area within a Wetland? Yes ______ No ✓
Wetland Hydrology Present?	Yes ______	No ✓	

Remarks: WETLAND/NON-WETLAND WATERS BOUNDARY.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ______ (A)

Total Number of Dominant Species Across All Strata: ______ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ______ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No ______

Remarks: NO VEGETATION DUE TO FILL FROM RECENT LANDSLIDE. VEGETATION CRITERION NOT USED.

SOIL

Sampling Point: 4C

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12"	10 YR 3/4	100	—	—	—	—	SILTY SAND	COBBLY, COARSE

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): —

Water Table Present? Yes ___ No ✓ Depth (inches): >12"

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): >12"

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVENS CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 5

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	**Is the Sampled Area within a Wetland?** Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. TYPHA SP.	55	Y	OBL
2. SONCHUS OLERACEUS	3	N	UPL
3. PSEUDOGNAPHALIUM STRAMINEUM	1	N	FAC
4. PHALARIS SP.	8	N	FAC
5. BACCHARIS PILULARIS (SEEDLINGS)	2	N	UPL
6.			
7.			
8.			
= Total Cover	69		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 51 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4"	10G 4/1	100	—	—	—	—	CLAY	SO STICKY! GLEY
4-11"	10YR 3/4	100	—	—	—	—	SANDY CLAY	COARSE SAND

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ✓ Sandy Mucky Mineral (S1)
- ✓ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ✓ Drift Deposits (B3) (**Nonriverine**)
- ✓ Surface Soil Cracks (B6)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ______ Depth (inches): —

Water Table Present? Yes ✓ No ______ Depth (inches): >11"

Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): >1"

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVEN'S CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 5a

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______	No ✓	**Is the Sampled Area within a Wetland?** Yes ______ No ✓
Hydric Soil Present?	Yes ______	No ✓	
Wetland Hydrology Present?	Yes ______	No ✓	

Remarks: upland data point

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1. Baccharis pilularis	50	Y	UPL
2. Artemisia ~~sp.~~ CALIFORNICA	30	Y	UPL
3.			
4.			
5.			
= Total Cover	80		
Herb Stratum (Plot size: ______)			
1. Brassica nigra	10	Y	UPL
2. Avena fatua	5	N	UPL
3. Bromus madritensis	5	N	UPL
4.			
5.			
6.			
7.			
8.			
= Total Cover	20		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No ✓

Remarks:

SOIL

Sampling Point: S5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-10"	10YR3/4	100	—	—	—	—		Sandy clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): —

Water Table Present? Yes ___ No ✓ Depth (inches): >10"

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): >10"

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVENS CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 6

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ______	Is the Sampled Area within a Wetland?	Yes ✓ No ______
Hydric Soil Present?	Yes ✓ No ______		
Wetland Hydrology Present?	Yes ✓ No ______		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. SALIX GOODDINGII	70	Y	FACW
2.			
3.			
4.			
= Total Cover	70		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. EPILOBIUM CILIATUM	5	N	FACW
2. PSEUDOGNAPHALIUM STRAMINEUM	12	Y	FAC
3. POLYPOGON MONSPELIENSIS	7	N	FACW
4.			
5.			
6.			
7.			
8.			
= Total Cover	24		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 76 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-1"	10YR3/4	100	—	—	—	—	CLAY	SURFACE, VERY RED
1-5"	5Y 3/2	100	—	—	—	—	CLAY	YELLOW
5-12"	5BG 4/1	100	—	—	—	—	CLAY	GLEY

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ✓ Loamy Mucky Mineral (F1)
- ✓ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________________

Depth (inches): ______________________

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): —

Water Table Present? Yes ✓ No _____ Depth (inches): >12"

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): >5"

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVENS CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/18/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 6A

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______	No ✓
Hydric Soil Present?	Yes ______	No ✓
Wetland Hydrology Present?	Yes ______	No ✓

Is the Sampled Area within a Wetland? Yes ______ No ✓

Remarks: UPLAND POINT.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1. QUERCUS AGRIFOLIA	30	Y	UPL
2. UMBELLULARIA CALIFORNICA	30	Y	FAC
3.			
4.			
	60	= Total Cover	
Sapling/Shrub Stratum (Plot size: ______)			
1. TOXICODENDRON DIVERSILOBUM	80	Y	FACU
2.			
3.			
4.			
5.			
	80	= Total Cover	
Herb Stratum (Plot size: ______)			
1. CARDUUS PYCNOCEPHALUS	1	N	UPL
2. BROMUS MADRITENSIS	5	N	UPL
3.			
4.			
5.			
6.			
7.			
8.			
	6	= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No ✓

Remarks:

SOIL

Sampling Point: 6A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-10"	2.5Y 4/2	100	—	—	—	—	SANDY SILTY LOAM	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): —

Water Table Present? Yes ______ No ✓ Depth (inches): >10"

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): >10"

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVENS CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 7

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	Is the Sampled Area within a Wetland? Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1. BACCHARIS PILULARIS	10	Y	UPL
2.			
3.			
4.			
5.			
= Total Cover	10		
Herb Stratum (Plot size: ______)			
1. TYPHA LATIFOLIA	10	Y	OBL
2. CYPERUS ERAGROSTIS	5	Y	FACW
3. RUMEX CRISPUS	1	N	FAC
4. PERSICARIA LAPATHIFOLIA	1	N	FACW
5.			
6.			
7.			
8.			
= Total Cover	17		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 73 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: HERBICIDE TREATED/MAINTAINED.

SOIL

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-14"	10Y 3/1	100	—	—	—	—	SANDY SILTY CLAY LOAM	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Stratified Layers (A5) (**LRR C**)
- [ ] 1 cm Muck (A9) (**LRR D**)
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [x] Sandy Mucky Mineral (S1)
- [x] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Loamy Mucky Mineral (F1)
- [ ] Loamy Gleyed Matrix (F2)
- [ ] Depleted Matrix (F3)
- [ ] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)
- [ ] Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- [ ] 1 cm Muck (A9) (**LRR C**)
- [ ] 2 cm Muck (A10) (**LRR B**)
- [ ] Reduced Vertic (F18)
- [ ] Red Parent Material (TF2)
- [ ] Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ____

Depth (inches): ____

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1) (**Nonriverine**)
- [ ] Sediment Deposits (B2) (**Nonriverine**)
- [ ] Drift Deposits (B3) (**Nonriverine**)
- [ ] Surface Soil Cracks (B6)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Salt Crust (B11)
- [ ] Biotic Crust (B12)
- [ ] Aquatic Invertebrates (B13)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- [ ] Water Marks (B1) (**Riverine**)
- [ ] Sediment Deposits (B2) (**Riverine**)
- [ ] Drift Deposits (B3) (**Riverine**)
- [ ] Drainage Patterns (B10)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		✓	—
Water Table Present?	✓		10"
Saturation Present? (includes capillary fringe)	✓		76"

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVEN'S CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 7A

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______	No ✓	Is the Sampled Area within a Wetland? Yes ______ No ✓
Hydric Soil Present?	Yes ______	No ✓	
Wetland Hydrology Present?	Yes ______	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1. BACCHARIS PILULARIS	40	Y	UPL
2.			
3.			
4.			
5.			
= Total Cover	40		
Herb Stratum (Plot size: ______)			
1. CENTAUREA SOLSTITIALIS	35	Y	UPL
2. MADIA GRACILIS?	25	Y	UPL
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover	60		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No ✓

Remarks:

SOIL

Sampling Point: 7A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-10"	2.5Y 8/3	100	—	—	—	—	SILTY CLAY	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): —

Water Table Present? Yes ___ No ✓ Depth (inches): >10"

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): >10"

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVEN'S CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/18/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 8

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ✓, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ______	Is the Sampled Area within a Wetland? Yes ✓ No ______
Hydric Soil Present?	Yes ✓ No ______	
Wetland Hydrology Present?	Yes ✓ No ______	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. Typha latifolia	100	Y	OBL
2. Schoenoplectus acutus occidentalis	5	N	OBL
3. Cyperus eragrostis	5	N	FACW
4. EPILOBIUM CILIATUM	5	N	FACW
5. RUMEX CRISPUS	3	N	FAC
6.			
7.			
8.			
= Total Cover	110		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum ______ % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0–14"	2.5Y 3/1	100						clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ✓ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

Partially abandoned settling pond isolated. Process of filling and regrading.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ✓ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): —

Water Table Present? Yes ✓ No ___ Depth (inches): 7"

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 1"

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVEN'S CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 8A

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No ✓
Hydric Soil Present?	Yes ___	No ✓
Wetland Hydrology Present?	Yes ___	No ✓

Is the Sampled Area within a Wetland? Yes ___ No ✓

Remarks: UPLAND POINT.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. KICKXIA ELATINE	10	Y	UPL
2. BROMUS MADRITENSIS	2	N	UPL
3. MADIA GRACILIS?	5	N	UPL
4. BRASSICA NIGRA	3	N	UPL
5. CARDUUS PYCNOCEPHALUS	5	N	UPL
6.			
7.			
8.			
= Total Cover	25		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 75 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks:

SOIL

Sampling Point: 8A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-9"	2.5Y 3/2	100	—	—	—	—	SANDY CLAY	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): —

Water Table Present? Yes ______ No ✓ Depth (inches): >9"

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): >9"

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVEN'S CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 9

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	Is the Sampled Area within a Wetland? Yes ___ No ✓
Hydric Soil Present?	Yes ___ No ✓	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. UMBELLULARIA CALIFORNICA	95	Y	FAC
2. ACER MACROPHYLLUM	12	N	FAC
3.			
4.			
= Total Cover	107		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. SOLANUM AMERICANUM	2	N	FACU
2. STACHYS PYCNANTHA	2	N	FACW
3. RORIPPA PALUSTRIS	1	N	OBL
4.			
5.			
6.			
7.			
8.			
= Total Cover	5		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 95 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-11"	NO COLOR	100					SAND	ROCKY, LOTS OF COBBLES

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ✓ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No ______ Depth (inches): ______________

Water Table Present? Yes ______ No ______ Depth (inches): ______________

Saturation Present? (includes capillary fringe) Yes ______ No ______ Depth (inches): ______________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVEN'S CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 9A

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ______ No ✓		Is the Sampled Area within a Wetland? Yes ______ No ✓
Hydric Soil Present? Yes ______ No ✓		
Wetland Hydrology Present? Yes ______ No ✓		

Remarks: Upland data point

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1. UMBELLULARIA CALIFORNICA	95	Y	FAC
2.			
3.			
4.			
= Total Cover	95		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. MELICA TORREYANA	60	Y	UPL
2. RUBUS URSINUS	5	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover	65		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 35 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	100	x 3 =	300
FACU species	0	x 4 =	0
UPL species	60	x 5 =	300
Column Totals:	160 (A)		600 (B)

Prevalence Index = B/A = 3.75

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No ✓

Remarks:

SOIL

Sampling Point: 9A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-13"	10YR 3/1	100	—	—	—	—		Sandy Loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): —
Water Table Present? Yes ______ No ✓ Depth (inches): >13"
Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): >13"

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVEN'S CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 10

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ______	Is the Sampled Area within a Wetland? Yes ✓ No ______
Hydric Soil Present?	Yes ✓ No ______	
Wetland Hydrology Present?	Yes ✓ No ______	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1. UMBELLULARIA CALIFORNICA	20	Y	FAC
2.			
3.			
4.			
	20	= Total Cover	
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: ______)			
1. NASTURTIUM OFFICINALE	55	Y	OBL
2. POLYPOGON MONSPELIENSIS	6	N	FACW
3. PERSICARIA LAPATHIFOLIA	3	N	FACW
4.			
5.			
6.			
7.			
8.			
	64	= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 36 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks:

SOIL

Sampling Point: 10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6"	2.5Y 3/3	100					SAND	COARSE SAND, COBBLES

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: RIVER ROCK COBBLE

Depth (inches): 6"

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check **all** that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ______ Depth (inches): 1-2"

Water Table Present? Yes ✓ No ______ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVEN'S CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 10A

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______	No ✓
Hydric Soil Present?	Yes ______	No ✓
Wetland Hydrology Present?	Yes ______	No ✓

Is the Sampled Area within a Wetland? Yes ______ No ✓

Remarks: UPLAND DATA POINT

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ______)			
1. ERIGERON CANADENSIS	12	Y	FACU
2. BROMUS MADRITENSIS	3	N	UPL
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover	15		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 85 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No ✓

Remarks:

SOIL

Sampling Point: 10A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-9"	10YR 3/3	100					SANDY LOAM	LARGE COBBLES, GRAVEL

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ______

Water Table Present? Yes ______ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: STEVEN'S CREEK QUARRY City/County: CUPERTINO Sampling Date: 10/13/2017

Applicant/Owner: MITCHELL CHADWICK LLC State: CA Sampling Point: 11

Investigator(s): A. VAN ZUUK, M. TRUEBLOOD Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): ______

Subregion (LRR): ______ Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: ______ NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No ✓
Hydric Soil Present?	Yes ___	No ✓
Wetland Hydrology Present?	Yes ___	No ✓

Is the Sampled Area within a Wetland? Yes ___ No ✓

Remarks:
NON-WETLAND WATERS

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: ______)			
1. BACCHARIS PILULARIS	15	Y	UPL
2.			
3.			
4.			
5.			
	15	= Total Cover	
Herb Stratum (Plot size: ______)			
1. BROMUS MADRITENSIS	10	Y	UPL
2. MADIA GRACILIS?	5	N	UPL
3.			
4.			
5.			
6.			
7.			
8.			
	15	= Total Cover	
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 85 % Cover of Biotic Crust ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks:

SOIL

Sampling Point: 11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: CONCRETE
Depth (inches): SURFACE

Hydric Soil Present? Yes ____ No ✓

Remarks:
UNABLE TO DIG PIT – DRAINAGE LINED WITH CONCRETE. ADJACENT TO PARKING/ STORAGE AREA.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:
Surface Water Present? Yes ____ No ✓ Depth (inches): ____
Water Table Present? Yes ____ No ✓ Depth (inches): ____
Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): ____

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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APPENDIX B

APPROVED JURISDICTIONAL DELINEATION FORM

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

Stevens Creek Quarry

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD):

B. DISTRICT OFFICE, FILE NAME, AND NUMBER:

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: CA County/parish/borough: Santa Clara City: Cupertino
Center coordinates of site (lat/long in degree decimal format): Lat. 37.301341, Long. -122.089994.
Universal Transverse Mercator: 580649.02 (easting), 4128690.10 (northing), Zone 10
Name of nearest waterbody: Swiss Creek, Montebello Creek

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Stevens Creek Reservoir
Name of watershed or Hydrologic Unit Code (HUC): HUC: 18050003, California Region / San Francisco Bay Subunit
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date:
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
      ☐ TNWs, including territorial seas
      ☐ Wetlands adjacent to TNWs
      ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
      ☒ Non-RPWs that flow directly or indirectly into TNWs
      ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
      ☐ Impoundments of jurisdictional waters
      ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
      Non-wetland waters: 6.58 acres.
      Wetlands: 0.33 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **1987 Delineation Manual**
      Elevation of established OHWM (if known): .

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☒ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: **One isolated wetland was determined to be not jurisdictional since it has no connectivity to TNWs or other**

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

nexus to interstate waters. Based on SWANCC these features have no value for interstate commerce and are considered not jurisdictional.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: .

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

RPW-1 (See attached map) –RPW-1 consists of a settling pond and adjacent wetlands that flows southeast into RPW-2.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) General Area Conditions:
   Watershed size: **1500 acres**
   Drainage area: **1500 acres**
   Average annual rainfall: **6.28 inches**
   Average annual snowfall: **0.00 inches**

   (ii) Physical Characteristics:
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☒ Tributary flows through **1** tributaries before entering TNW.

   Project waters are **1 (or less)** river miles from TNW.
   Project waters are **1 (or less)** river miles from RPW.

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

Project waters are **1 (or less)** aerial (straight) miles from TNW.
Project waters are **1 (or less)** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: **N/A**.

Identify flow route to TNW[5]: **Flows southeast 310 ft into RPW-2, then flows southeast into RPW-3, then southeast into RPW-4. From RPW-4 flows 0.1 mi into Swiss Creek, then 0.23 mi into Stevens Creek Reservoir.**
Tributary stream order, if known: **Secondary**.

(b) General Tributary Characteristics (check all that apply):
Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☒ Manipulated (man-altered). Explain: **Feature is a settling pond created by daming an unnamed intermittent stream.**

Tributary properties with respect to top of bank (estimate):
Average width: **110 feet.**
Average depth: **Unknown**.
Average side slopes: **4:1 (or greater).**

Primary tributary substrate composition (check all that apply):

☒ Silts	☒ Sands	☐ Concrete
☐ Cobbles	☐ Gravel	☒ Muck
☐ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: **Sloughing banks. Landslide during the winter of 2016/2017 filled in western portion of feature. Banks otherwise appear to be stable.**
Presence of run/riffle/pool complexes. Explain: **Flows tend to move slowly through the study area.**
Tributary geometry: **Relatively straight**
Tributary gradient (approximate average slope): **50 %**

(c) Flow:
Tributary provides for: **Seasonal flow**
Estimate average number of flow events in review area/year: **20 (or greater)**
Describe flow regime: **Feature conveys flows originating in RPW-8 and surrounding slopes. Conveys flows nearly year-round.**
Other information on duration and volume: **N/A**.

Surface flow is: **Confined.** Characteristics: .

Subsurface flow: **Unknown**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☐ the presence of litter and debris
☒ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☐ the presence of wrack line
☐ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☒ sediment deposition	☒ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.
[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

☐ physical markings/characteristics ☐ vegetation lines/changes in vegetation types.
☐ tidal gauges
☐ other (list):

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: **Water is cloudy with fine sediments.**
Identify specific pollutants, if known: **Unknown**.

(iv) Biological Characteristics. Channel supports (check all that apply):
☐ Riparian corridor. Characteristics (type, average width): .
☐ Wetland fringe. Characteristics: .
☐ Habitat for:
☐ Federally Listed species. Explain findings: .
☐ Fish/spawn areas. Explain findings: .
☐ Other environmentally-sensitive species. Explain findings: .
☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW
All wetland(s) being considered in the cumulative analysis: **2**
Approximately (0.28) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)
Yes	0.27		
Yes	0.01		

Summarize overall biological, chemical and physical functions being performed: **Typha wetlands present on northern, western, and eastern edges of settling pond, approximately 10 feet in width, directly abuting RPW-1. Tributary connectivity via culverts**.

RPW-2 (See attached map) –**RPW-2 consists of a settling pond and adjacent wetlands that flow southwest into RPW-3.**

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: **1500 acres**
Drainage area: **1500 acres**
Average annual rainfall: **6.28 inches**
Average annual snowfall: **0.00 inches**

(ii) Physical Characteristics:
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☒ Tributary flows through **1** tributary before entering TNW.

Project waters are **1 (or less)** river miles from TNW.
Project waters are **1 (or less)** river miles from RPW.
Project waters are **1 (or less)** aerial (straight) miles from TNW.
Project waters are **1 (or less)** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: **N/A**.

Identify flow route to TNW[8]: **Flows 30 feet east into RPW-3 in the review area, then flows southeast into RPW-4. From RPW-4 flows 0.1 mi into Swiss Creek, then 0.23 mi into Stevens Creek Reservoir.**
Tributary stream order, if known: **Second**.

(b) General Tributary Characteristics (check all that apply):
Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☒ Manipulated (man-altered). Explain: **Feature is a settling pond created by daming an unnamed intermittent stream.**

[8] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

Tributary properties with respect to top of bank (estimate):
Average width: **33 feet**.
Average depth: **Unknown**.
Average side slopes: **2:1.**

Primary tributary substrate composition (check all that apply):

☒ Silts ☒ Sands ☐ Concrete
☐ Cobbles ☒ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: **Banks appear to be stable.**
Presence of run/riffle/pool complexes. Explain: **Flows tend to move slowly through the review area.**
Tributary geometry: **Relatively straight**
Tributary gradient (approximate average slope): **2 %**

(c) Flow:
Tributary provides for: **Seasonal flow**
Estimate average number of flow events in review area/year: **20 (or greater)**
Describe flow regime: **Feature conveys flows originating in RPW-8, upstream settling ponds, and surrounding slopes. Conveys flows nearly year-round.**
Other information on duration and volume: **N/A**.

Surface flow is: **Confined.** Characteristics: .

Subsurface flow: **Unknown**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[9] (check all indicators that apply):
☐ clear, natural line impressed on the bank
☒ changes in the character of soil
☐ shelving
☐ vegetation matted down, bent, or absent
☐ leaf litter disturbed or washed away
☐ sediment deposition
☐ water staining
☐ other (list):
☐ the presence of litter and debris
☐ destruction of terrestrial vegetation
☐ the presence of wrack line
☐ sediment sorting
☐ scour
☒ multiple observed or predicted flow events
☐ abrupt change in plant community
☐ Discontinuous OHWM.[10] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
☐ High Tide Line indicated by:
☐ oil or scum line along shore objects
☐ fine shell or debris deposits (foreshore)
☐ physical markings/characteristics
☐ tidal gauges
☐ other (list):
☐ Mean High Water Mark indicated by:
☐ survey to available datum;
☐ physical markings;
☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: **Water is cloudy with fine sediments.**
Identify specific pollutants, if known: **Unknown**.

(iv) Biological Characteristics. Channel supports (check all that apply):
☐ Riparian corridor. Characteristics (type, average width): .
☐ Wetland fringe. Characteristics: .
☐ Habitat for:
☐ Federally Listed species. Explain findings: .
☐ Fish/spawn areas. Explain findings: .

[9]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[10]Ibid.

☐ Other environmentally-sensitive species. Explain findings: .
☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

All wetland(s) being considered in the cumulative analysis: **1**
Approximately (<0.01) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)
Yes	<0.01		

Summarize overall biological, chemical and physical functions being performed: **Seasonal wetland directly abutting RPW-2. Tributary connectivity via culverts.**

RPW-3 (See attached map) –**RPW-3 consists of a settling pond that flows southeast into RPW-4.**

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:

Watershed size: **1500 acres**
Drainage area: **1500 acres**
Average annual rainfall: **6.28 inches**
Average annual snowfall: **0.00 inches**

(ii) Physical Characteristics:

(a) Relationship with TNW:

☐ Tributary flows directly into TNW.
☒ Tributary flows through **1** tributaries before entering TNW.

Project waters are **1 (or less)** river miles from TNW.
Project waters are **1 (or less)** river miles from RPW.
Project waters are **1 (or less)** aerial (straight) miles from TNW.
Project waters are **1 (or less)** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: **N/A**.

Identify flow route to TNW[11]: **Flows southeast 32 feet into RPW-4. From RPW-4 flows 0.1 mi into Swiss Creek, then 0.23 mi into Stevens Creek Reservoir.**
Tributary stream order, if known: Second.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☒ Manipulated (man-altered). Explain: **Feature is a settling pond created by daming an unnamed intermittent stream.**

Tributary properties with respect to top of bank (estimate):
Average width: **66 feet.**
Average depth: **Unknown**.
Average side slopes: **2:1.**

Primary tributary substrate composition (check all that apply):

☒ Silts ☒ Sands ☐ Concrete
☒ Cobbles ☒ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: **Banks appear to be stable.**
Presence of run/riffle/pool complexes. Explain: **Flows tend to move slowly through the review area.**
Tributary geometry: **Relatively straight**
Tributary gradient (approximate average slope): **2 %**

(c) Flow:

[11] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

Tributary provides for: **Seasonal flow**
Estimate average number of flow events in review area/year: **20 (or greater)**
Describe flow regime: **Feature conveys flows originating in RPW-8, upstream settling ponds, and surrounding slopes. Conveys flows nearly year-round.**
Other information on duration and volume: **N/A**.

Surface flow is: **Confined.** Characteristics: .

Subsurface flow: **Unknown**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[12] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☐ the presence of litter and debris
☒ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☐ the presence of wrack line
☐ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☒ sediment deposition	☒ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☐ Discontinuous OHWM.[13] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: **Water is cloudy with fine sediments.**
Identify specific pollutants, if known: **Unknown**.

(iv) Biological Characteristics. Channel supports (check all that apply):
☐ Riparian corridor. Characteristics (type, average width): .
☐ Wetland fringe. Characteristics: .
☐ Habitat for:
☐ Federally Listed species. Explain findings: .
☐ Fish/spawn areas. Explain findings: .
☐ Other environmentally-sensitive species. Explain findings: .
☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW
All wetland(s) being considered in the cumulative analysis: **Pick List**
Approximately (0.00) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: **No wetlands occur adjacent to RPW-3. Area is managed via herbicide treatments and dredging.**

[12]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[13]Ibid.

RPW-4 (See attached map) –RPW-4 consists of a settling pond and adjacent wetlands that flows south, southeast into RPW-9.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: **1500 acres**
Drainage area: **1500 acres**
Average annual rainfall: **6.28 inches**
Average annual snowfall: **0.00 inches**

(ii) Physical Characteristics:
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☒ Tributary flows through **1** tributaries before entering TNW.

Project waters are **1 (or less)** river miles from TNW.
Project waters are **1 (or less)** river miles from RPW.
Project waters are **1 (or less)** aerial (straight) miles from TNW.
Project waters are **1 (or less)** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: **N/A**.

Identify flow route to TNW[14]: **Flows southeast through a culvert approximately 518 feet, then drops into an intermittent drainage (concrete spillway) flowing south for 120 feet, joining RPW-9. RPW-9 flows 0.23 mi southeast into Stevens Creek Reservoir.**
Tributary stream order, if known: **Second**.

(b) General Tributary Characteristics (check all that apply):
Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☒ Manipulated (man-altered). Explain: **Feature is a settling pond created by daming an unnamed intermittent stream.**

Tributary properties with respect to top of bank (estimate):
Average width: **198 feet**.
Average depth: **Unknown**.
Average side slopes: **2:1.**

Primary tributary substrate composition (check all that apply):
☒ Silts ☒ Sands ☐ Concrete
☒ Cobbles ☒ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: **Banks appear to be stable.**
Presence of run/riffle/pool complexes. Explain: Flows tend to move slowly through the study area.
Tributary geometry: **Relatively straight**
Tributary gradient (approximate average slope): **2 %**

(c) Flow:
Tributary provides for: **Seasonal flow**
Estimate average number of flow events in review area/year: **20 (or greater)**
Describe flow regime: **Feature conveys flows originating in RPW-8, upstream settling ponds, and surrounding slopes. Conveys flows nearly year-round.**
Other information on duration and volume: **N/A**.

Surface flow is: **Confined.** Characteristics: .

Subsurface flow: **Unknown**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[15] (check all indicators that apply):

[14] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

☐ clear, natural line impressed on the bank
☒ changes in the character of soil
☐ shelving
☐ vegetation matted down, bent, or absent
☐ leaf litter disturbed or washed away
☒ sediment deposition
☐ water staining
☐ other (list):
☐ the presence of litter and debris
☐ destruction of terrestrial vegetation
☐ the presence of wrack line
☐ sediment sorting
☐ scour
☒ multiple observed or predicted flow events
☐ abrupt change in plant community

☐ Discontinuous OHWM.[16] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:
- ☐ oil or scum line along shore objects
- ☐ fine shell or debris deposits (foreshore)
- ☐ physical markings/characteristics
- ☐ tidal gauges
- ☐ other (list):

☐ Mean High Water Mark indicated by:
- ☐ survey to available datum;
- ☐ physical markings;
- ☒ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: **Water is cloudy with fine sediments.**

Identify specific pollutants, if known: **Unknown**.

(iv) Biological Characteristics. Channel supports (check all that apply):

☐ Riparian corridor. Characteristics (type, average width): .
☐ Wetland fringe. Characteristics: .
☐ Habitat for:
- ☐ Federally Listed species. Explain findings: .
- ☐ Fish/spawn areas. Explain findings: .
- ☐ Other environmentally-sensitive species. Explain findings: .
- ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

All wetland(s) being considered in the cumulative analysis: **1**
Approximately (0.03) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)
Yes	0.03		

Summarize overall biological, chemical and physical functions being performed: **Wetlands present on northwestern edge of settling pond, directly abuting RPW-4. Feature managed via herbicide treatments and dredging. Tributary connectivity via culverts.**

RPW-5 (See attached map) –RPW-5 consists of a series of small, damed basins that flow south into RPW-9.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:

Watershed size: **1500 acres**
Drainage area: **1500 acres**
Average annual rainfall: **6.28 inches**
Average annual snowfall: **0.00 inches**

(ii) Physical Characteristics:

(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☒ Tributary flows through **1** tributaries before entering TNW.

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[15]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[16]Ibid.

Project waters are **1 (or less)** river miles from TNW.
Project waters are **1 (or less)** river miles from RPW.
Project waters are **1 (or less)** aerial (straight) miles from TNW.
Project waters are **1 (or less)** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: **N/A**.

Identify flow route to TNW[17]: **Flows southwest 57 ft into RPW-9, then flows southeast 0.09 mi into Stevens Creek Reservoir.**
Tributary stream order, if known: **Second**.

(b) General Tributary Characteristics (check all that apply):

Tributary is:
☐ Natural
☒ Artificial (man-made). Explain: **Feature is a settling pond that was created in uplands which flows indirectly into a TNW**.
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: **35 feet**.
Average depth: **Unknown**.
Average side slopes: **4:1 (or greater).**

Primary tributary substrate composition (check all that apply):
☒ Silts ☒ Sands ☐ Concrete
☒ Cobbles ☒ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: **Banks appear to be stable**.
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Relatively straight**
Tributary gradient (approximate average slope): **50 %**

(c) Flow:
Tributary provides for: **Ephemeral flow**
Estimate average number of flow events in review area/year: **6-10**
Describe flow regime: **Feature collects surface runoff from surrounding hillsides; conveys ephemeral flows during storm events.**
Other information on duration and volume: **N/A**.

Surface flow is: **Confined.** Characteristics: .

Subsurface flow: **Unknown**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[18] (check all indicators that apply):
☐ clear, natural line impressed on the bank ☐ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☐ shelving ☐ the presence of wrack line
☐ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour
☒ sediment deposition ☒ multiple observed or predicted flow events
☒ water staining ☐ abrupt change in plant community
☐ other (list):
☐ Discontinuous OHWM.[19] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
☐ High Tide Line indicated by: ☐ Mean High Water Mark indicated by:

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[17] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.
[18] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[19] Ibid.

☐ oil or scum line along shore objects
☐ fine shell or debris deposits (foreshore)
☐ physical markings/characteristics
☐ tidal gauges
☐ other (list):
☐ survey to available datum;
☐ physical markings;
☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: **Water in lowest basin is cloudy with fine sediments**.
Identify specific pollutants, if known: **Unknown**.

(iv) Biological Characteristics. Channel supports (check all that apply):
☐ Riparian corridor. Characteristics (type, average width): .
☐ Wetland fringe. Characteristics: .
☐ Habitat for:
☐ Federally Listed species. Explain findings: .
☐ Fish/spawn areas. Explain findings: .
☐ Other environmentally-sensitive species. Explain findings: .
☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW
All wetland(s) being considered in the cumulative analysis: **Pick List**
Approximately (0.00) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: Typha wetlands present on northern, western, and eastern edges of settling pond, approximately 10 feet in width, directly abuting RPW-1. Tributary connectivity via culverts.

RPW-6 (See attached map) –RPW-6 consists of a settling pond that flows southwest into RPW-9.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: **1500 acres**
Drainage area: **1500 acres**
Average annual rainfall: **6.28 inches**
Average annual snowfall: **0.00 inches**

(ii) Physical Characteristics:
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☒ Tributary flows through **1** tributaries before entering TNW.

Project waters are **1 (or less)** river miles from TNW.
Project waters are **1 (or less)** river miles from RPW.
Project waters are **1 (or less)** aerial (straight) miles from TNW.
Project waters are **1 (or less)** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: **N/A**.

Identify flow route to TNW[20]: **Flows southwest approximately 123 ft into RPW-9, then flows southeast 360 feet into Stevens Creek Reservoir.**
Tributary stream order, if known: **Second**.

(b) General Tributary Characteristics (check all that apply):
Tributary is:
☐ Natural
☒ Artificial (man-made). Explain: **Feature is a settling pond that was created in uplands which flows indirectly into a TNW**.
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):

[20] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

Average width: **24 feet**.
Average depth: **Unknown**.
Average side slopes: **4:1 (or greater).**

Primary tributary substrate composition (check all that apply):

☒ Silts ☒ Sands ☐ Concrete
☒ Cobbles ☒ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: **Banks appear to be stable**.
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Relatively straight**
Tributary gradient (approximate average slope): **50 %**

(c) Flow:
Tributary provides for: **Ephemeral flow**
Estimate average number of flow events in review area/year: **6-10**
Describe flow regime: **Feature collects surface runoff from parking area and surrounding hillsides; conveys ephemeral flows during storm events.**
Other information on duration and volume: **N/A**.

Surface flow is: **Confined.** Characteristics: .

Subsurface flow: **Unknown**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[21] (check all indicators that apply):

☐ clear, natural line impressed on the bank ☐ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☐ shelving ☐ the presence of wrack line
☐ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour
☒ sediment deposition ☒ multiple observed or predicted flow events
☒ water staining ☐ abrupt change in plant community
☐ other (list):

☐ Discontinuous OHWM.[22] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by: ☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects ☐ survey to available datum;
☐ fine shell or debris deposits (foreshore) ☐ physical markings;
☐ physical markings/characteristics ☐ vegetation lines/changes in vegetation types.
☐ tidal gauges
☐ other (list):

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: **Water is cloudy with fine sediments**.
Identify specific pollutants, if known: **Unknown**.

(iv) Biological Characteristics. Channel supports (check all that apply):
☐ Riparian corridor. Characteristics (type, average width): .
☐ Wetland fringe. Characteristics: .
☐ Habitat for:
☐ Federally Listed species. Explain findings: .
☐ Fish/spawn areas. Explain findings: .
☐ Other environmentally-sensitive species. Explain findings: .
☐ Aquatic/wildlife diversity. Explain findings: .

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[21]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[22]Ibid.

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

All wetland(s) being considered in the cumulative analysis: **Pick List**
Approximately (0.00) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: **No wetlands present within or adjacent to feature. Tributary connectivity via culverts**.

RPW-7 (See attached map) –**RPW-7 consists of a settling pond that flows south into RPW-9.**

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:

Watershed size: **1500 acres**
Drainage area: **1500 acres**
Average annual rainfall: **6.28 inches**
Average annual snowfall: **0.00 inches**

(ii) Physical Characteristics:

(a) Relationship with TNW:

☐ Tributary flows directly into TNW.
☒ Tributary flows through **1** tributaries before entering TNW.

Project waters are **1 (or less)** river miles from TNW.
Project waters are **1 (or less)** river miles from RPW.
Project waters are **1 (or less)** aerial (straight) miles from TNW.
Project waters are **1 (or less)** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: **N/A**.

Identify flow route to TNW[23]: **Flows south 53 feet into a rock drainage, then an additional 25 ft into RPW-9. RPW-9 flows southeast 200 ft into Stevens Creek Reservoir**.
Tributary stream order, if known: **Second**.

(b) General Tributary Characteristics (check all that apply):

Tributary is:
☐ Natural
☒ Artificial (man-made). Explain: **Feature is a settling pond that was created in uplands which flows indirectly into a TNW**.
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: **28 feet**.
Average depth: **Unknown**.
Average side slopes: **4:1 (or greater).**

Primary tributary substrate composition (check all that apply):

☒ Silts ☒ Sands ☐ Concrete
☒ Cobbles ☒ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: **Banks appear to be stable**.
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Relatively straight**
Tributary gradient (approximate average slope): **50 %**

(c) Flow:

Tributary provides for: **Ephemeral flow**
Estimate average number of flow events in review area/year: **6-10**

[23] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

Describe flow regime: **Feature collects surface runoff from parking area and surrounding hillsides; conveys ephemeral flows during storm events.**
Other information on duration and volume: **N/A**.

Surface flow is: **Confined.** Characteristics: .

Subsurface flow: **Unknown**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[24] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☐ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☐ the presence of wrack line
☐ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☒ sediment deposition	☒ multiple observed or predicted flow events
☒ water staining	☐ abrupt change in plant community
☐ other (list):	

☐ Discontinuous OHWM.[25] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: **Water is cloudy with fine sediments**.
Identify specific pollutants, if known: **Unknown**.

(iv) Biological Characteristics. Channel supports (check all that apply):
☐ Riparian corridor. Characteristics (type, average width): .
☐ Wetland fringe. Characteristics: .
☐ Habitat for:
☐ Federally Listed species. Explain findings: .
☐ Fish/spawn areas. Explain findings: .
☐ Other environmentally-sensitive species. Explain findings: .
☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW
All wetland(s) being considered in the cumulative analysis: **Pick List**
Approximately (0.00) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: **No wetlands present within or adjacent to feature. Tributary connectivity via culverts**.

[24]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[25]Ibid.

RPW-8 (See attached map) –RPW-8 consists of an unnamed intermittent stream that flows east into RPW-1.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: **1500 acres**
Drainage area: **1500 acres**
Average annual rainfall: **6.28 inches**
Average annual snowfall: **0.00 inches**

(ii) Physical Characteristics:
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☒ Tributary flows through **1** tributaries before entering TNW.

Project waters are **1 (or less)** river miles from TNW.
Project waters are **1 (or less)** river miles from RPW.
Project waters are **1 (or less)** aerial (straight) miles from TNW.
Project waters are **1 (or less)** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: **N/A**.

Identify flow route to TNW[26]: **Flows directly into RPW-1, then successively into RPWs 2-4. From RPW-4 flows 0.1 mi into Swiss Creek, then 0.23 mi into Stevens Creek Reservoir**.
Tributary stream order, if known: **Second**.

(b) General Tributary Characteristics (check all that apply):
Tributary is: ☒ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: **16 feet**.
Average depth: **Unknown**.
Average side slopes: **4:1 (or greater).**

Primary tributary substrate composition (check all that apply):

☐ Silts	☒ Sands	☐ Concrete
☒ Cobbles	☐ Gravel	☐ Muck
☒ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: **Highly eroding banks in some areas**.
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Meandering**
Tributary gradient (approximate average slope): 50 %

(c) Flow:
Tributary provides for: **Seasonal flow**
Estimate average number of flow events in review area/year: **20 (or greater)**
Describe flow regime: **Tributary collects runoff from surrounding hillsides; conveys seasonal flows**.
Other information on duration and volume: **N/A**.

Surface flow is: **Confined.** Characteristics: .

Subsurface flow: **Unknown**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[27] (check all indicators that apply):

[26] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.
[27] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

☐ clear, natural line impressed on the bank
☐ changes in the character of soil
☐ shelving
☒ vegetation matted down, bent, or absent
☒ leaf litter disturbed or washed away
☒ sediment deposition
☐ water staining
☐ other (list):
☐ the presence of litter and debris
☐ destruction of terrestrial vegetation
☐ the presence of wrack line
☐ sediment sorting
☐ scour
☒ multiple observed or predicted flow events
☐ abrupt change in plant community

☐ Discontinuous OHWM.[28] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:
☐ oil or scum line along shore objects
☐ fine shell or debris deposits (foreshore)
☐ physical markings/characteristics
☐ tidal gauges
☐ other (list):

☐ Mean High Water Mark indicated by:
☐ survey to available datum;
☐ physical markings;
☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: **Water is generally clear**.

Identify specific pollutants, if known: **Unknown**.

(iv) Biological Characteristics. Channel supports (check all that apply):

☒ Riparian corridor. Characteristics (type, average width): California bay dominated, with *Rubus ursinus*, *Aralia californica*, and *Acer macrophyllum*.

☐ Wetland fringe. Characteristics: .

☒ Habitat for:

☐ Federally Listed species. Explain findings: .

☐ Fish/spawn areas. Explain findings: .

☒ Other environmentally-sensitive species. Explain findings: **Shady, rocky stream corridor with small areas of ponding supports Foothill Yellow-legged frog, a species of concern and candidate for Threatened status in California. Species was observed during field surveys**.

☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately (0.00) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

<u>Directly abuts? (Y/N)</u> <u>Size (in acres)</u> <u>Directly abuts? (Y/N)</u> <u>Size (in acres)</u>

Summarize overall biological, chemical and physical functions being performed: **No wetlands present along stream channel; too rocky**.

RPW-9 (See attached map) –RPW-9 consists of Swiss Creek, which flows generally southeast into Stevens Creek Reservoir.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:

Watershed size: **1500 acres**
Drainage area: **1500 acres**
Average annual rainfall: **6.28 inches**
Average annual snowfall: **0.00 inches**

(ii) Physical Characteristics:

(a) <u>Relationship with TNW:</u>

☒ Tributary flows directly into TNW.
☐ Tributary flows through **0** tributaries before entering TNW.

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[28]Ibid.

Project waters are **1 (or less)** river miles from TNW.
Project waters are **1 (or less)** river miles from RPW.
Project waters are **1 (or less)** aerial (straight) miles from TNW.
Project waters are **1 (or less)** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: **N/A**.

Identify flow route to TNW[29]: **Flows generally southeast 0.34 mi into Stevens Creek Reservoir**.
Tributary stream order, if known: **First**.

(b) General Tributary Characteristics (check all that apply):
Tributary is:
☒ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: **11 feet**.
Average depth: **Unknown**.
Average side slopes: **4:1 (or greater).**

Primary tributary substrate composition (check all that apply):
☐ Silts ☒ Sands ☐ Concrete
☒ Cobbles ☐ Gravel ☐ Muck
☒ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: **Banks appear to be stable**.
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Meandering**
Tributary gradient (approximate average slope): **50 %**

(c) Flow:
Tributary provides for: **Seasonal flow**
Estimate average number of flow events in review area/year: **20 (or greater)**
Describe flow regime: **Tributary collects runoff from surrounding hillsides; conveys seasonal flows**.
Other information on duration and volume: **N/A**.

Surface flow is: **Confined.** Characteristics: .

Subsurface flow: **Unknown**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[30] (check all indicators that apply):
☐ clear, natural line impressed on the bank
☐ changes in the character of soil
☐ shelving
☒ vegetation matted down, bent, or absent
☐ leaf litter disturbed or washed away
☒ sediment deposition
☒ water staining
☐ other (list):
☐ the presence of litter and debris
☐ destruction of terrestrial vegetation
☐ the presence of wrack line
☐ sediment sorting
☐ scour
☒ multiple observed or predicted flow events
☐ abrupt change in plant community
☐ Discontinuous OHWM.[31] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
☐ High Tide Line indicated by:
☐ oil or scum line along shore objects
☐ fine shell or debris deposits (foreshore)
☐ physical markings/characteristics
☐ tidal gauges
☐ Mean High Water Mark indicated by:
☐ survey to available datum;
☐ physical markings;
☐ vegetation lines/changes in vegetation types.

[29] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.
[30] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[31] Ibid.

☐ other (list):

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: **Water is generally clear**.
Identify specific pollutants, if known: **Unknown**.

(iv) Biological Characteristics. Channel supports (check all that apply):
☒ Riparian corridor. Characteristics (type, average width): California bay dominated, with *Rubus ursinus*, *Plantanus racemose*, and *Acer macrophyllum*.
☐ Wetland fringe. Characteristics: .
☒ Habitat for:
☐ Federally Listed species. Explain findings: .
☐ Fish/spawn areas. Explain findings: .
☒ Other environmentally-sensitive species. Explain findings: **Shady, rocky creek corridor with small areas of ponding supports Foothill Yellow-legged frog, a species of concern and candidate for Threatened status in California. Species was observed during field surveys**.
☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW
All wetland(s) being considered in the cumulative analysis: **Pick List**
Approximately (0.00) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: **No wetlands present along stream channel; too rocky**.

RPW-10 (See attached map) –RPW-10 consists of Montebello Creek and adjacent wetlands that flow north into RPW-9.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: **1500 acres**
Drainage area: **1500 acres**
Average annual rainfall: **6.28 inches**
Average annual snowfall: **0.00 inches**

(ii) Physical Characteristics:
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☒ Tributary flows through **1** tributaries before entering TNW.

Project waters are **1 (or less)** river miles from TNW.
Project waters are **1 (or less)** river miles from RPW.
Project waters are **1 (or less)** aerial (straight) miles from TNW.
Project waters are **1 (or less)** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: **N/A**.

Identify flow route to TNW[32]: **Flows north 550 feet into RPW-9, then flows southeast 0.21 mi into Stevens Creek Reservoir**.
Tributary stream order, if known: **Secondary**.

(b) General Tributary Characteristics (check all that apply):
Tributary is: ☒ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: **4 feet**.
Average depth: **Unknown**.

[32] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

Average side slopes: **4:1 (or greater).**

Primary tributary substrate composition (check all that apply):

☐ Silts ☒ Sands ☐ Concrete
☒ Cobbles ☒ Gravel ☐ Muck
☒ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: **Banks highly incised, eroding**.
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Relatively straight**
Tributary gradient (approximate average slope): **35 %**

(c) Flow:
Tributary provides for: **Seasonal flow**
Estimate average number of flow events in review area/year: **20 (or greater)**
Describe flow regime: **Tributary collects runoff from surrounding hillsides; conveys seasonal flows**.
Other information on duration and volume: **N/A**.

Surface flow is: **Confined.** Characteristics: .

Subsurface flow: **Unknown**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☒ Bed and banks
☒ OHWM[33] (check all indicators that apply):
☐ clear, natural line impressed on the bank ☐ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☐ shelving ☐ the presence of wrack line
☒ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour
☒ sediment deposition ☒ multiple observed or predicted flow events
☒ water staining ☐ abrupt change in plant community
☐ other (list):
☐ Discontinuous OHWM.[34] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
☐ High Tide Line indicated by: ☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects ☐ survey to available datum;
☐ fine shell or debris deposits (foreshore) ☐ physical markings;
☐ physical markings/characteristics ☐ vegetation lines/changes in vegetation types.
☐ tidal gauges
☐ other (list):

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: **Water is generally clear**.
Identify specific pollutants, if known: **Unknown**.

(iv) Biological Characteristics. Channel supports (check all that apply):
☐ Riparian corridor. Characteristics (type, average width): .
☐ Wetland fringe. Characteristics: .
☒ Habitat for:
☐ Federally Listed species. Explain findings: .
☐ Fish/spawn areas. Explain findings: .
☒ Other environmentally-sensitive species. Explain findings: **Shady, rocky creek corridor with small areas of ponding could provide habitat for Foothill Yellow-legged frog, a species of concern and candidate for Threatened status in California**.
☐ Aquatic/wildlife diversity. Explain findings: .

[33]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[34]Ibid.

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

All wetland(s) being considered in the cumulative analysis: **1**
Approximately (0.01) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)
Yes	0.01		

Summarize overall biological, chemical and physical functions being performed: **Wetlands present within and adjacent to RPW-10, approximately 10 feet in width. Tributary connectivity via culverts**.

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: **Non-RPW-1 is an ephemeral drainage that conveys seasonal flows indirectly into a TNW. Therefore, Non-RPW-1 has the capacity to convey pollutants to TNWs, thus providing a significant nexus**.

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: **N/A**.

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: **N/A**.

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   ☒ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: **All RPWs in the review area have either continuous or intermittent "seasonal" flows with areas of ponding**.

Provide estimates for jurisdictional waters in the review area (check all that apply):
☒ Tributary waters: **RPW-9: 1,790** linear feet **7 - 16** width (ft), **0.45** acres.
☒ Other non-wetland waters: **RPW-1: 940** linear feet **33 - 188** width (ft), **1.81** acres.
RPW-2: 80 linear feet **23 - 44** width (ft), **0.07** acres.
RPW-3: 174 linear feet **50 - 82** width (ft), **0.27** acres.
RPW-4: 640 linear feet **117 - 280** width (ft), **3.49** acres.
RPW-5: 243 linear feet **8 - 62** width (ft), **0.20** acres.
RPW-6: 32 linear feet **22 - 26** width (ft), **0.02** acres.
RPW-7: 69 linear feet **12 - 45** width (ft), **0.05** acres.
RPW-8: 375 linear feet **5 - 28** width (ft), **0.10** acres.
RPW-10: 550 linear feet **3 - 5** width (ft), **0.04** acres.

Identify type(s) of waters: **Settling ponds (impoundments of jurisdictional waters), streams, and creeks**.

3. Non-RPWs[35] that flow directly or indirectly into TNWs.
☒ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: acres.

☒ Other non-wetland waters: **Non-RPW-1: 1,316** linear feet **3** width (ft), **0.05** acres.
Identify type(s) of waters: **Ephemeral drainage.**

4. Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **.**

☒ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **Wetlands occur along the margins of RPW-1, RPW-2, RPW-4, and RPW-10.**

Provide acreage estimates for jurisdictional wetlands in the review area: **0.33** acres**.**

5. Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. Impoundments of jurisdictional waters.[36]
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☒ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

[35]See Footnote # 3.
[36] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[37]

☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
  ☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☒ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: **The isolated wetland was excavated in and drains only uplands, and has no connection to TNWs.**
☐ Other: (explain, if not covered above): **.**

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: . List type of aquatic resource: .
☐ Wetlands: .

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: . List type of aquatic resource: .
☒ Wetlands: **0.03** acres. List type of aquatic resource: **Man-made basin created in and draining only uplands without direct or indirect connection to a TNW**.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  ☐ Office concurs with data sheets/delineation report.
  ☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☒ U.S. Geological Survey Hydrologic Atlas: .
  ☐ USGS NHD data.
  ☒ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name: Cupertino, 1:24,000.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: Santa Clara County, Western Part.
☐ National wetlands inventory map(s). Cite name: .
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☒ Aerial (Name & Date): NAIP (6/2016).
  or ☐ Other (Name & Date): .
☐ Previous determination(s). File no. and date of response letter: .

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[37] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

- ☐ Applicable/supporting case law: .
- ☐ Applicable/supporting scientific literature: .
- ☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

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APPENDIX C

REPRESENTATIVE PHOTOS


Data Point 1


Data Point 1A


Data Point 2


Data Point 2A

LSA

APPENDIX C

Stevens Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Representative Photos

SOURCE: LSA (10/17).

Data Point 3

Data Point 3A

Data Point 4

Data Point 4A

LSA

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Stevens Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Representative Photos

SOURCE: LSA (10/17).

Data Point 4B

Data Point 4C

Data Point 5

Data Point 5A

LSA

APPENDIX C

Stevens Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Representative Photos

SOURCE: LSA (10/17).

Data Point 6

Data Point 6A

Data Point 7

Data Point 7A

LSA

Stevens Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Representative Photos

SOURCE: LSA (10/17).

Data Point 8

Data Point 8A

Data Point 9

Data Point 9A

LSA

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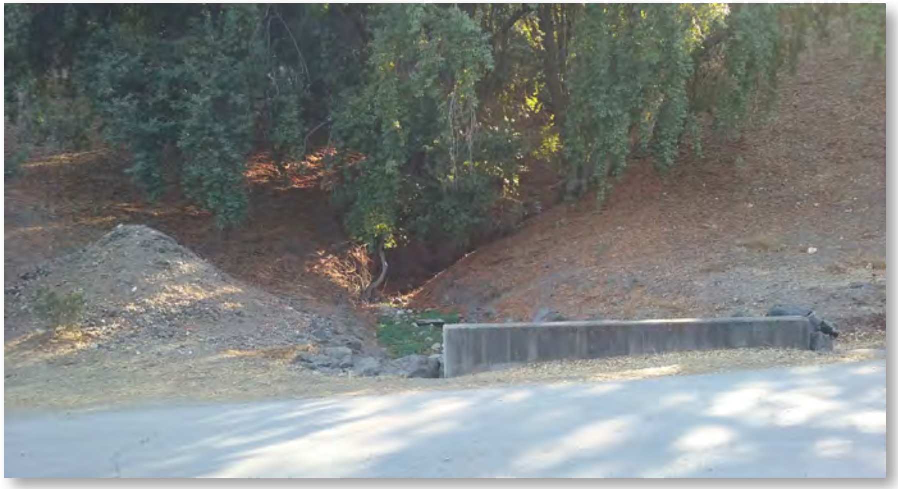
Stevens Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Representative Photos

SOURCE: LSA (10/17).

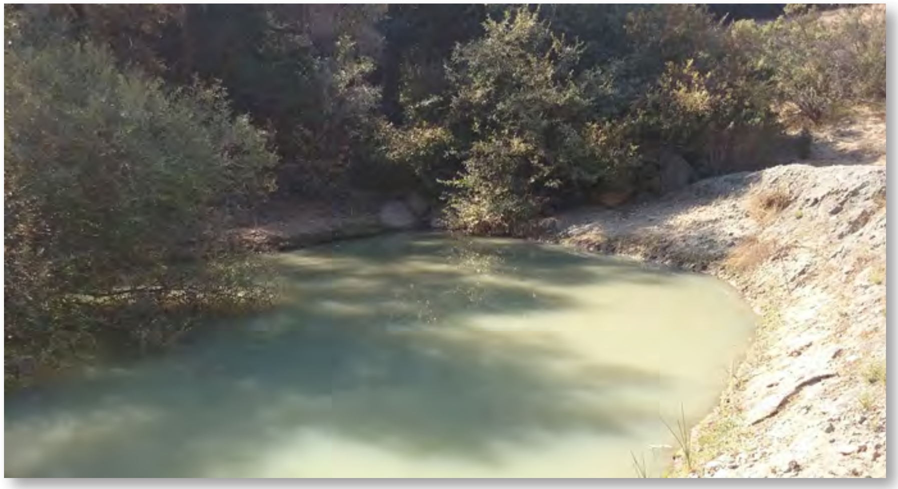
I:\MIT1701\Indd\RepPhotos_03.21.18.indd (3/21/18).

Data Point 10



Data Point 10A

RPW-1, First settling pond looking east, towards dam.



RPW-2, Second settling pond looking west.

LSA

APPENDIX C

Stevens Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Representative Photos

SOURCE: LSA (10/17).

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RPW-4, Intermittent drainage. Concrete spillway draining settling ponds into RPW-9.

RPW-3, Third settling pond looking northwest. Culverts drain RPW-2 into RPW-3 seasonally.

RPW-4, Fourth settling pond looking northwest from dam.

LSA

Stevens Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Representative Photos

SOURCE: LSA (10/17).

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Non-RPW-1, Concrete lined ephermeral drainage looking southeast.

Isolated wetland southeast of RPW-4, no significant nexus to TNWs.

RPW-5, Small dammed basins cascading into settling pond, looking northwest.

RPW-6, Small settling pond at edge of quarry office parking area, looking north.

LSA

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Stevens Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Representative Photos

SOURCE: LSA (10/17).

I:\MIT1701\Indd\RepPhotos_03.21.18.indd (3/21/18).

RPW-9, Upper extent of Swiss Creek within review area.

RPW-7, Settling pond near quarry office, looking northeast.

RPW-8, Unnamed intermittent stream looking west.

LSA

APPENDIX C

Stevens Creek Quarry
Santa Clara County, California
LSA Project No. MIT1701

Representative Photos

SOURCE: LSA (10/17).

I:\MIT1701\Indd\RepPhotos_03.21.18.indd (3/21/18).

RPW-10, Montebello Creek joining Swiss Creek.

LSA

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Stevens Creek Quarry

Santa Clara County, California

LSA Project No. MIT1701

Representative Photos

SOURCE: LSA (10/17).

I:\MIT1701\Indd\RepPhotos_03.21.18.indd (3/21/18).

INDUSTRIAL ACTIVITIES STORMWATER POLLUTION PREVENTION PLAN

for

Stevens Creek Quarry, Inc.

Facility Address:

12100 Stevens Canyon Road
Cupertino, California 95014

Waste Discharge Identification (WDID):

2 43I006687

Exceedance Response Action (ERA) Status:

Baseline for Oil & Grease, Copper, and Selenium
Level 1 for pH, Aluminum, and Magnesium
Level 2 for TSS, Nitrate + Nitrite, and Iron

Legally Responsible Person (LRP):

Stevens Creek Quarry, Inc.
12100 Stevens Canyon Road
Jason Voss
408-253-2512

SWPPP Prepared by:

Geosyntec Consultants
1111 Broadway, Floor 6
Oakland, CA 94607

SWPPP Preparation Date

December 4, 2020

TABLE OF CONTENTS

Legally Responsible Person

Approval and Certification of the Stormwater Pollution Prevention Plan

Facility Name: Stevens Creek Quarry, Inc.

Waste Discharge Identification (WDID): 2 431006687

"I certify under penalty of law that this document and all Attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Legally Responsible Person or Approved Signatory	12-7-2020 Date
Jason Voss Name of Legally Responsible Person or Approved Signatory	408-640-6160 Telephone Number

Amendment Log

Facility Name: Stevens Creek Quarry, Inc.

Waste Discharge Identification (WDID): 2 43I006687

Amendment No.	Date	Page and Section No.	Requested By	Brief Description of Amendment; include reason for change, site location, and BMP modifications.	Prepared and Approved By
Initial Preparation	June 23, 2015	Entire Document	Stevens Creek Quarry	The SWPPP was updated to comply with General Permit (Order No. 2014-0057-DWQ) effective on July 1, 2015.	Freeman Associated and Triad/ Holmes Associates
Revision 1	July 11, 2016	SWPPP Section 1 and Site Maps 3a and 3b	Stevens Creek Quarry	Revision to SWPPP Section 1 to add BMPs in new areas of facility; Updated Site Maps 3a and 3b.	Freeman Associated and Triad/ Holmes Associates
Revision 2	August 1, 2017	Figure 3a-5b, Table 4, Pages 6, 7, 11	SF Bay RWQCB	The SWPPP was updated in response to a May 30, 2017 Letter from the SF Bay SF Bay RWQCB.	Geosyntec Consultants
Revision 3	July 16, 2018	Figure 3a-5b, Table 4, Pages 7 and 11, Appendix B, Sections 7.5 &13.6	SF Bay RWQCB	The SWPPP was updated in response to an April 2, 2018 Letter from the SF Bay SF Bay RWQCB.	Geosyntec Consultants

Amendment No.	Date	Page and Section No.	Requested By	Brief Description of Amendment; include reason for change, site location, and BMP modifications.	Prepared and Approved By
Revision 4	November 30, 2018	Entire Document using CASQA SWPPP Template Section 2.1.5 (Pages 22-23), Section 5.6.1 (Pages 74-76), Section 5.6.2 (Pages 76-80), Section 5.6.6 (Pages 90-98), Appendix F	SF Bay RWQCB	The SWPPP was updated to put the existing SWPPP in the CASQA SWPPP template and in response to a November 2, 2018 Letter from the SF Bay SF Bay RWQCB.	Geosyntec Consultants
Revision 5	September 3, 2019	Section 1.4 (Table 1.1) (Page 6), Section 1.6 (Pages 6-7), Section 1.9, (Pages 10-11), Section 2.1.2 (Page 14), Section 2.1.4 (Pages 18-19), Section 2.1.5 (Pages 23-26), Section 2.3 (Table 2.3) (Page 29) Section 3.1.5 (Table 3.3) (Page 47), Section 4.2 (Pages 68-71), Section 5.6 (Pages 78-82), Section 5.7 (Page 83), Appendix A, Appendix D	Within 90 Days of RY2018-2019 Annual Evaluation on June 6, 2019	The SWPPP was updated within 90 days of the RY2018-2019 Annual Evaluation on June 6, 2019.	Geosyntec Consultants

Revision 6	November 15, 2019	Section 1.6 (Page 12), Section 2.1.3.1 (Page 23), Section 2.1.4 (Page 25), Table 2.1 (Page 29), Section 2.1.5 (Page 30), Table 2.3 (Page 35), Section 3.1.1 (Page 45), Section 3.1.2 (Page 46), Section 3.1.3 (Page 47), Section 3.1.5 (Page 53), Table 3.3 (Page 54), Section 3.1.6 (Page 57), Section 3.1.6.3 (Page 59), Table 3.5 (Page 64), Table 3.6 (Page 66), Section 4.2 (Page 77), Table 5.6 (Page 90), Table 5.7 (Page 91), Table 5.8 (Page 92), Appendix A, Appendix F, Appendix G, Appendix H	SF Bay RWQCB	The SWPPP was updated in response to an October 11, 2019 Notice of Violation from the SF Bay RWQCB.	Geosyntec Consultants

Amendment No.	Date	Page and Section No.	Requested By	Brief Description of Amendment; include reason for change, site location, and BMP modifications.	Prepared and Approved By
Revision 7	February 14, 2020	Table 3.6 (Page 66-75), Table 5.6 (Page 90), Table 5.8 (Page 92)	SF Bay RWQCB	The SWPPP was updated to add total aluminum to list of monitored parameters and update the BMP Table.	Geosyntec Consultants
Revision 8	December 4, 2020	Section 1.9 (Pages 15-18) Section 2.1.4 (Pages 26-30) Section 2.1.6 (new) (Pages 34-35) Table 2.3 (Page 36)	Within 30 days of significant site changes.	The SWPPP was updated to describe a change in drainage area delineation, the addition of two new sediment traps, and an update to the description of potential pollutant sources.	Geosyntec Consultants

1. SWPPP REQUIREMENTS

1.1 Introduction

The Stevens Creek Quarry, Inc. Cupertino Quarry is located at 12100 Stevens Canyon Road in Cupertino, California and comprises approximately 160 acres. Of the 160 total acres, the mining limit comprises 145 acres and industrial activities occur within 111 acres. The property is owned and operated by Stevens Creek Quarry, Inc (SCQ). The facility location is shown on the Site Maps in Appendix A.

This Stormwater Pollution Prevention Plan (SWPPP) is designed to comply with California's General Permit for Stormwater Discharges Associated with Industrial Activities (General Permit) Order No. 2014-0057-DWQ (NPDES No. CAS000001) issued by the State Water Resources Control Board (State Water Board). This SWPPP has been prepared following the SWPPP Template provided on the California Stormwater Quality Association Stormwater *Best Management Practice Handbook Portal: Industrial and Commercial* (CASQA 2014). In accordance with the General Permit, Section X.A, this SWPPP contains the following required elements:

- Facility Name and Contact Information;
- Site Maps;
- List of Significant Industrial Materials;
- Description of Potential Pollution Sources;
- Assessment of Potential Pollutant Sources;
- Minimum BMPs;
- Advanced BMPs, if applicable;
- Monitoring Implementation Plan (MIP);
- Annual Comprehensive Facility Compliance Evaluation (Annual Evaluation); and
- Date that SWPPP was Initially Prepared and the Date of Each SWPPP Amendment, if Applicable.

1.2 Permit Registration Documents

Required Permit Registration Documents (PRDs) were submitted to the State Water Board via the Stormwater Multi Application and Report Tracking System (SMARTS) by the Legally Responsible Person (LRP), or authorized personnel (i.e., Approved Signatory) under the direction of the LRP. The project-specific PRDs include:

- Notice of Intent (NOI);
- Signed Certification Statement (LRP Certification is provided electronically with SMARTS PRD submittal);
- Site Maps;
- SWPPP;
- Annual Fee.

The Site Maps can be found in Appendix A. A copy of the submitted PRDs are also kept in Appendix B of the SWPPP along with the Waste Discharge Identification (WDID) confirmation. The SWPPP was uploaded into SMARTS without a copy of the Industrial General Permit. In the event of future significant changes to the facility layout, the Discharger will certify and submit new PRDs via SMARTS.

1.3 SWPPP Availability and Implementation

The SWPPP is available on-site to all employees during hours of operation (see Section 2.5 for the Operations Schedule) and will be made available upon request by a State or Municipal inspector. The SWPPP (initial preparation) was implemented on July 1, 2015.

1.4 Pollution Prevention Team

Facility staff that have been designated as Pollution Prevention Team members are listed below in Table 1.1., along with their responsibilities and duties. A list of alternate team members is also provided and will perform SWPPP activities when regular members of the Pollution Prevention Team are absent or unavailable. This table will be updated as needed when there are changes to staff and staff responsibilities. All team members will be trained to perform the duties assigned to them. Employee training logs are provided in Appendix C.

QISPs identified for the project are identified in Appendix D. The QISPs will have primary responsibility for providing training to the appropriate team members assigned to perform the activities required in this SWPPP.

Table 1.1: Pollution Prevention Team

Name	Title	Phone Number	Responsibilities and Duties
Jason Voss	Operations Manager	408-640-6160	Legally Responsible Person; Responsible for SCQ Cupertino operations, including SWPPP implementation and compliance. Directs and oversees all sampling, field observations, reporting, SWPPP updates, and management of stormwater data. Inspects BMP implementation.
Julio Cazares	Safety Manager	408-603-6134	Approved Signatory / Duly Authorized Representative; Oversees and performs stormwater sampling, field observations, and management of stormwater data. Inspects BMP implementation.
Elai Fresco	QISP, Geosyntec Consultants	510-285-2684	Revises and assists in the implementation of the SWPPP drafts the Level 1 and Level 2 reports, trains SCQ staff, assists with monitoring and reporting.
Lisa Welsh	QISP, Geosyntec Consultants	510-285-2660	Revises and assists in the implementation of the SWPPP drafts the Level 1 and Level 2 reports, trains SCQ staff, assists with monitoring and reporting.
Neftali Romero	QISP, Geosyntec Consultants	510-285-2734	Revises and assists in the implementation of the SWPPP drafts the Level 1 and Level 2 reports, trains SCQ staff, assists with monitoring and reporting.

1.5 Duly Authorized Representatives

The Duly Authorized Representative is responsible for SWPPP implementation and has the authority to sign PRDs and is listed below in Table 1.2. Written authorizations from the LRP for this individual is provided in Appendix D.

Table 1.2: Duly Authorized Representatives

Name	Title	Phone Number
Julio Cazares	Safety Manager	408-603-6134

1.6 Permits and Governing Documents

In addition to the General Permit, the following documents have been taken into account while preparing this SWPPP:

- Level 1 ERA Report (for Iron and Nitrate/Nitrite), December 24, 2016;
- Revised Level 1 Report (for Iron and Nitrate/Nitrite), August 1, 2017;
- Level 1 ERA Report (for TSS), December 27, 2017;
- Level 2 ERA Action Plan (for Iron and Nitrate/Nitrite), December 29, 2017;
- Level 2 ERA Action Plan (for TSS), December 31, 2018;
- Level 2 ERA Technical Report (for Iron and Nitrate/Nitrite), July 1, 2019;
- San Francisco Bay Regional Water Quality Control Board (RWQCB) enforcement documents dated May 30, 2017, December 12, 2017, April 2, 2018, August 24, 2018, November 8, and March 15, 2019, and October 11, 2019;
- Basin Plan requirements;
- TMDL Requirements;
- Spill Prevention Control and Countermeasures Plan;
- Hazardous Material Business Plan;
- Hazardous Waste Regulations and Permits;
- Air Quality Regulations and Permits; and

- Clean Water Act Section 401 Water Quality Certifications and 404 Permits.

1.7 <u>SWPPP Amendments</u>

This SWPPP will be amended or revised as needed. A list of amendments (Amendment Log) is included in the front of this SWPPP (page 2), and amendment certifications are included in Appendix E. The Amendment Log will include the date of initial preparation and the date of each amendment. The SWPPP should be revised when:

- There is a General Permit violation;
- There is a reduction or increase in the total industrial area exposed to stormwater;
- BMPs do not meet the objectives of reducing or eliminating pollutants in stormwater discharges;
- There is a change in industrial operations which may affect the discharge of pollutants to surface waters, groundwater(s), or a municipal separate storm sewer system (MS4);
- There is a change to the parties responsible for implementing the SWPPP; or
- Otherwise deemed necessary by the QISP.

The following items will be included in each amendment:

- Who requested the amendment;
- The location of proposed change;
- The reason for change;
- The original BMP(s) proposed, if any; and
- The new BMP(s) proposed.

Amendments will be logged at the front of the SWPPP and certification kept in Appendix E. The SWPPP text will be revised replaced, and/or hand annotated as necessary to properly convey the amendment. SWPPP amendments must be certified and submitted by the LRP or their designated Duly Authorized Representative via SMARTS within 30 days whenever the SWPPP contains significant revisions. With the exception of significant revisions, SWPPP changes will be certified and uploaded to SMARTS once every three (3) months in the reporting year.

1.8 Retention of Records

Paper or electronic records of documents required by this SWPPP will be retained for a minimum of five (5) years from the date generated or date submitted, whichever is later, for the following items:

- Employee Training Records;
- BMP Implementation Records;
- Spill and Clean-up Related Records;
- Records of Sampling and Analysis Information:
  - The date, exact location, and time of sampling or measurement;
  - The date(s) analyses were performed;
  - The individual(s) that performed the analyses;
  - The analytical techniques or methods used; and
  - The results of such analyses;
- Records of Visual Observations:
  - The date;
  - The industrial areas/drainage areas of the facility observed during the inspection (Location);
  - The approximate time of the observation;
  - Presence and probable source of observed pollutants; and
  - Name of the individual(s) that conducted the observations;
- Response to the observations including identification of SWPPP revisions if needed.
- Level 1 ERA Reports;
- Level 2 ERA Action Plans;
- Level 2 ERA Technical Reports; and
- Annual Reports from SMARTS (checklist and any explanations).

Copies of these records will be available for review by the Water Board staff at the facility during scheduled facility operating hours. Upon written request by the United States Environmental Protection Agency (USEPA) or the local MS4, Dischargers will provide paper or electronic copies of requested records to the Water Boards, USEPA, or local MS4 within ten (10) working days from receipt of the request.

1.9 Exceedance Response Actions (ERAs)

If a General Permit NAL exceedance occurs in a given reporting year, a Level 1 ERA Evaluation and a Level 1 ERA Report will be required in the following year, or, if in a subsequent year, a Level 2 ERA Action Plan and a Level 2 ERA Report will be required in accordance with the General Permit. The results of either of the ERA reports may require that the SWPPP be amended.

The facility shall perform sampling, analysis and reporting in accordance with the requirements of the General Permit and shall compare the results to the two types of NAL values in Appendix J to determine whether either type of NAL has been exceeded for each applicable parameter. The two types of potential NAL exceedances are as follows:

- Annual NAL exceedance: The facility shall determine the average concentration for each parameter using the results of all the sampling and analytical results for the entire facility for the reporting year (i.e., all "effluent" data). The facility shall compare the average concentration for each parameter to the corresponding annual NAL values in the Table in Appendix J. An annual NAL exceedance occurs when the average of all the analytical results for a parameter from samples taken within a reporting year exceeds the annual NAL value for that parameter listed in Appendix J; and,
- Instantaneous maximum NAL exceedance: The facility shall compare all sampling and analytical results from each distinct sample (individual or combined as authorized) to the corresponding instantaneous maximum NAL values in Appendix J. An instantaneous maximum NAL exceedance occurs when two (2) or more analytical results from samples taken for any single parameter within a reporting year exceed the instantaneous maximum NAL value (for TSS and oil & grease) or are outside of the instantaneous maximum NAL range for pH.

1.9.1 Baseline Status

Stevens Creek Quarry is currently in Baseline status for oil & grease, copper, and selenium for RY 2020-2021.

1.9.2 Level 1 Status

The facility's Baseline status for any given parameter shall change to Level 1 status if sampling results indicate an NAL exceedance for that same parameter. The facility is currently in Level 1 status for pH, total aluminum, and total magnesium for RY 2020-2021, as described below.

- Total Iron and Nitrate & Nitrite: Based on the sampling results collected during Reporting Year (RY) 2015-2016 (July 1, 2015 to June 30, 2016), the facility entered Level 1 status for total iron as well as nitrate & nitrite as nitrogen on July 1, 2016. The Level 1 ERA Evaluation was conducted on June 23, 2016, and the findings were documented in the Level 1 ERA Report, which was submitted to the State Water Board via SMARTS on December 24, 2016. On May 30, 2017, the San Francisco Bay Regional Water Quality Control Board required a revision to the Level 1 ERA Report, which was completed and submitted via SMARTS on August 1, 2017. The facility moved on to Level 2 for total iron and nitrate + nitrite, as described below.
- Total Aluminum and Total Magnesium: Based on the sampling results collected during RY 2019-2020 (July 1, 2019 to June 30, 2020), the facility entered Level 1 status for total aluminum as well as total magnesium on July 1, 2020. A Level 1 ERA Evaluation was conducted on September 30, 2020, and a Level 1 ERA Report is in development as of December 2020.
- TSS: Based on the sampling results collected during the RY2016-2017 (July 1, 2016 to June 30, 2017), the facility entered Level 1 status for total suspended solids (TSS) on July 1, 2017. A Level 1 ERA Report was submitted to the State Water Board via SMARTS on December 28, 2017. The facility moved on to Level 2 for TSS, as described below.
- pH: Based on the sampling results collected during the RY2018-2019 (July 1, 2018 to June 30, 2019), the facility entered Level 1 status for pH on July 1, 2019. 3 samples within the NAL limits were collected in RY2019-2020 (July 1, 2019 to June 31, 2020); therefore, the facility remains in Level 1 status as of December 2020.

1.9.3 Level 2 Status

The facility's Level 1 status for any given parameter shall change to Level 2 status if sampling results indicate an NAL exceedance for that same parameter while the facility is in Level 1 status. Level 2 status will commence on July 1 following the reporting year during which the NAL exceedance(s) occurred. The facility is currently in Level 2 status for total iron, nitrate & nitrite as nitrogen, and TSS for RY 2019-2020, as described below.

- Total Iron and Nitrate & Nitrite: Based on the results of samples collected during the RY2016-2017 (July 1, 2016 – June 30, 2017), the facility entered Level 2 status for total iron and nitrate + nitrite on July 1, 2017. A Level 2 ERA Action Plan was submitted to the State Water Board via SMARTS on December 29, 2017. Based on the results of samples collected during the RY2017-2018 (July 1, 2017 - June 30, 2018), the Quarry remained in Level 2 status for these parameters on July 1, 2018.

A 6-month extension request for the Level 2 ERA Technical Report for total iron and nitrate + nitrite was submitted via SMARTS on December 31, 2018, which changed the submission date of the Level 2 ERA Technical Report to July 1, 2019. The Level 2 ERA Technical Report was submitted via SMARTS on July 1, 2019, that documented the Quarry's progress towards full implementation of structural BMPs. Based on the results of samples collected during the RY2018-2019 and RY 2019-2020, the facility remains in Level 2.

- TSS: Based on the results of samples collected during the RY2017-2018 (July 1, 2017 to June 30, 2018), the facility entered Level 2 status for TSS on July 1, 2018. The facility submitted its Level 2 ERA Action Plan for TSS to SMARTS on December 31, 2018. Based on the results of samples collected during the RY2018-2019 (July 1, 2018 - June 30, 2019), the facility remains in Level 2 status for TSS on July 1, 2019. The facility submitted a Level 2 ERA Technical Report for TSS to SMARTS on January 1, 2020.

1.10 Annual Comprehensive Facility Compliance Evaluation

The General Permit (Section XV) requires the facility to conduct one Annual Comprehensive Facility Compliance Evaluation (Annual Evaluation) for each reporting year (July 1 to June 30). Annual Evaluations will be conducted at least eight (8) months and not more than sixteen (16) months after the previous Annual Evaluation. The planned window for conducting the Annual Evaluation is between April and June of each year. The SWPPP will be revised, as appropriate based on the results of the Annual Evaluation, and the revisions will be implemented within 90 days of the Annual Evaluation.

At a minimum, Annual Evaluations will consist of the following:

- A review of all sampling, visual observation, and inspection and monitoring records and sampling and analysis results conducted during the previous reporting year;
- A visual inspection of all areas of industrial activity and associated potential pollutant sources for evidence of, or the potential for, pollutants entering the stormwater conveyance system;
- A visual inspection of all drainage areas previously identified as having no exposure to industrial activities and materials in accordance with the definitions in Section XVII;
- A visual inspection of equipment needed to implement the BMPs;
- A visual inspection of any BMPs;
- A review and effectiveness assessment of all BMPs for each area of industrial activity and associated potential pollutant sources to determine if the BMPs are properly designed,

implemented, and are effective in reducing and preventing pollutants in industrial stormwater discharges and authorized NSWDs; and

- An assessment of any other factors needed to comply with the Annual Reporting requirements in General Permit Section XVI.B.

1.11 Annual Report

The Annual Report will be prepared, certified, and electronically submitted no later than July 15 following each reporting year using the standardized format and checklists in SMARTS based on the reporting requirements identified in Section XVI of the General Permit. Annual reports will be submitted in SMARTS and in accordance with information required by the on-line forms.

Geosyntec Consultants will assist the Legally Responsible Person, Jason Voss, with the preparation and submittal of the Annual Report via SMARTS before July 15 each year. A copy of the annual report should be included in the SWPPP. Geosyntec Consultants will also maintain copies of the Annual Reports.

1.12 Termination and Changes to General Permit Coverage

When any of the following conditions occur, termination of coverage under the General Permit will be requested by certifying and submitting a Notice of Termination (NOT) via SMARTS:

- Operation of the facility has been transferred to another entity;
- The facility has ceased operations, completed closure activities, and removed all industrial related pollutant generating sources;
- The facility's operations have changed and are no longer subject to the General Permit.

The SWPPP and all the provisions of the General Permit will be complied with until a valid NOT is received and accepted by the State Water Board.

If ownership changes, the new owner of the facility will be notified of the General Permit and regulatory requirements for permit coverage.

2. FACILITY INFORMATION

This section provides site specific details for the industrial operations, the pollutant source assessment, identification of non-stormwater discharges (NSWDs), and the Site Maps for this SWPPP.

2.1 Facility Description

This section discusses the facility location, facility operations, existing conditions, drainage details, contributing sources of stormwater run-off, geology, and groundwater.

2.1.1 Facility Location

The facility comprises approximately 160 acres (145 acres within the mining limit line, and 111 acres of industrial activities) and is located at 12100 Stevens Canyon Road, in Cupertino, California. The facility is accessible from Highway 85 to the east and Interstate 280 from the north. The facility is located approximately 15 miles east of the City of San Jose, approximately 45 miles south of the City of San Francisco, and is approximately 11 miles south of San Francisco Bay. The facility is located at 37.29583°N, 122.084°W and is identified on the Site Maps in Appendix A.

The facility discharges to Stevens Creek Reservoir, which is listed for Category 5A water quality impairment on the most recent 303(d)-list for chlordane, dieldrin, mercury, and PCBs. Category 5A means that Stevens Creek Reservoir has water segments where standards are not met and a TMDL is required, but not yet completed, for at least one of the pollutants being listed for the segment.

2.1.2 Facility Operations

The SICs for the facility are the following:

- 1429 – Crushed and Broken Stone, Not Elsewhere Classified;
- 1442 – Construction Sand and Gravel;
- 3272 – Concrete Products, Except Block and Brick; and
- 4212 – Local Trucking Without Storage.

As required by the State Water Board, operations at the facility were required to enroll under the General Permit.

Operations at the facility consist of all activities required to run a Rock Plant, Sand Plant, Topsoil Plant, and the Recycling Plant for broken concrete and asphalt. The facility has three operating levels: The Lower Quarry Floor, the Middle Quarry Floor, and the Upper Quarry Floor. The Lower Quarry Floor contains the main office, Recycle Processing Plant, and City of Cupertino's Garden Waste Recycle Center. The Middle Quarry Floor contains the Quarry Truck Shop, RV Trucking Company, Fueling Center, and some excavation activities. The Upper Quarry Floor contains excavation of rock and sand.

The Garden Waste Recycle Center is operated by the City of Cupertino. The City of Cupertino does not generate compost on site, but instead stockpiles and distributes compost during the dry season, typically March 20 to October 15. To avoid exposure to rainfall the recycling center closes every year at the start of the rainy season and any other time when conditions at the center are muddy or rainy.

The specific industrial activities at the facility include the following:

- Processing Rock:

  Rock is processed for sale onsite at the Rock Plant located on the Upper Quarry Floor. Equipment used in the harvesting of rock includes front end loaders, bulldozers, and graders.

- Excavating Rock and Sand:

  The excavation of rock and sand primarily occurs on the Upper Quarry Floor and the Middle Quarry Floor.

- Crushing Rock:

  Rock crushing and screening operations produce base rock, drain rock, road sub base, and fill material. Rock is crushed, screened, and sorted by size before conveyance to the appropriate stockpile. The Rock Plant process produces approximately 8,000 tons of material per day.

- Processing Sand:

  Sand is processed for sale. The equipment used to load the sand is a front-end loader. The Sand Plant processes the sand and is the only operation that uses water in its operation. Water from the Upper Quarry Floor Pit/Pond, Former Sediment Pond No. 4, Sediment Trap No. 3, and other small ponds is pumped to size and clean sand and rock. The Sand Plant process produces approximately 1,600 tons of material per day.

- Processing Water Residual:

Water residuals from the Sand Plant go through a filer press that produces a clay cake, which is resold as a levee fill product. The finished clay cake is a solid product with a moisture content of about 20 percent. Water excreted from the cake filtration process goes back into the closed loop system. All processed water from the Sand Plant is retained at within the closed loop system. No process water is discharged from the Sand Plant.

- Dust Control:

  A water truck is used to apply water for dust control in the Sand Plant area and the Recycling Area for asphalt and concrete, which is obtained from Sediment Pond No. 5 and Former Sediment Pond No. 4. During loading from the stockpile into customer's trucks the material is wetted down to reduce dust.

- Recycling Area for Asphalt and Concrete:

  Recycled concrete and asphalt are stockpiled at the facility until it is processed at the onsite Recycle Plant. The Recycle Plant does not use water as part of its processing operations. Broken asphalt and concrete are crushed and screened to produce road base, drain rock, and manufactured sand. The Recycle Plant process produces approximately 2,500 tons of material per day.

- Harvesting Metal from the Recycling Asphalt and Concrete Process:

  Metals, such as reinforcing bars from the recycled concrete, are removed by hand and immediately placed into a high side end dump trailer that is emptied by the facility about twice every week when the Recycle Plant is operating.

- Processing Incoming Industrial Material:

  The incoming industrial materials brought to the facility include broken concrete and asphalt. The materials are monitored by the operator's "Load Checking Program," to ensure that hazardous wastes are not brought to the facility.

- Fueling Equipment and Large Vehicles:

  Mobile equipment and plants are fueled onsite by a Mobile Fuel Truck. Larger vehicles and earth-moving equipment are refueled at the fueling station on the Middle Quarry Floor. The fueling station on the Middle Quarry floor has two diesel tanks, 10,000-gallons and 12,000-gallons, each set into a secondary containment structure.

- Handling and Storing Materials:

  Stockpiled materials are transferred from stockpiles to customer trucks by front end loaders. The finished products from the Rock Plant, Sand Plant, and Recycle Plant are stockpiled in areas to minimized run-on.

- Removing Sediment:

  To remove sediment in earthen drainage ditches and check dams, a CAT 247 Skidsteer is used to work in tight areas and reduce disturbance of the adjacent terrain.

2.1.3 Existing Conditions

The three Quarry floors of the facility consist of quarry-related buildings, and non-quarry related buildings. The property is bisected by Rattlesnake Creek, Swiss Creek, and No Named Tributary.

2.1.3.1 Erodible Surfaces

The surface of the operation areas is unpaved; however, because it is treated with an aggregate cover and compacted by the daily operation of heavy earth-moving equipment traveling across it, the likelihood to erode is minimized. The stockpiles and excavated slopes do have the potential to erode. Measures are taken to reduce erosion and sedimentation by implementing BMPs such as the following:

- Diverting surface water away from the stockpiles and tops of cut slopes;
- During the rainy season, straw wattles will be installed around the base of topsoil stockpiles, regardless of the size and condition of the topsoil stockpiles;
- During the rainy season, topsoil stockpiles will be tarped at all times except during active use;
- Regrading and compacting areas with deep and wide erosion rills; and/or
- Disallowing customer traffic on unpaved roads at the secondary entrance on the Lower Quarry Floor during the rainy season.
- Throughout the year, aggregate will regularly be applied to unpaved roads, including the main haul road and the unpaved road between the Topsoil Plant and the offices, to protect the surface from erosion and degradation from customer vehicle traffic.
- During the rainy season, aggregate will be applied based on daily inspection of road conditions.

- Certain inactive slopes that do not have established vegetation will be hydroseeded prior to the rainy season, where feasible. In the fall of 2019, approximately a 2-acre slope east of the Rock Processing Plant was hydroseeded.
- During the rainy season, the unpaved road between the Topsoil Plant entrance location and the Garden Waste Recycle Center will be closed to customer vehicle traffic.
- If deficiencies are observed, staff will notify the Pollution Prevention Team, who will then direct and implement corrective actions within 72 hours of identification.

2.1.3.2 Buildings and Structures

Quarry-related buildings and structures include module office trailers, modular office buildings with toilet facilities, rock, sand and recycle processing equipment and structures, numerous storage sheds, and aboveground fuel tanks in a sealed concrete containment structure. Several small buildings on a secondary access road between the Lower and Middle Quarry Floors include a maintenance building and several storage buildings.

Non-quarry related buildings and structures, such as the Garden Waste Recycle Center and the RV Trucking Company, are found within the Mining Limit Line. The Garden Waste Recycle Center occupies an open area adjacent to Stevens Canyon Road and is owned by the City of Cupertino. The Garden Waste Cycling Center stores and sells compost during the dry season, typically from March 20 to October 15, and is closed during the rainy season. The Garden Waste Center includes a small office trailer, a shed, and three-sided concrete bunkers. The shed and the three-sided concrete bunkers are used to store compost, imported by the City of Cupertino, while sold compost is loaded into the consumer's vehicle.

The RV Trucking Company on the Middle Quarry Floor includes four separate buildings: The Truck Maintenance Shop, New Oil Shed, Used Oil Shed, and Plant Maintenance Shop. The Quarry Tractor Shop includes several buildings used for storage of materials and servicing of equipment. Additionally, an above-ground storage tank containing water from a natural spring is used to supply water to residence structures outside the quarry and is found uphill to the north of Rattlesnake Creek and northwest of Former Sediment Pond 1.

All industrial activity areas are described as 100% pervious hillsides and are directly exposed to precipitation and stormwater runoff. Existing BMPs at this facility are described in Section 3.

2.1.3.3 Jurisdictional Delineation

In 2018, a Jurisdictional Delineation in accordance with the 1987 US Army Corps of Engineers Wetland Delineation Manual determined that Former Sediment Ponds No. 1, No. 2, No. 3, and No. 4

are Waters of the United States. The Jurisdictional Delineation resulted in new monitoring locations at the site and identified any discharge to Rattlesnake Creek or Swiss creek as discharge points to Water of the United States. The culvert outfall structures at Former Sediment Pond No. 1 and No. 2 have been defined as Outfall No. 5 (OF-5) and Outfall No. 6 (OF-6), respectively (see Figure 3a). Former Discharge Point No. 1 has since been moved from the weir outfall structures at Former Sediment Pond No. 4 to the culvert outfall structure at Outfall No. 1 (OF-1), see Figure 3a.

The new monitoring locations have been identified for sampling of receiving waters and background testing for iron and nitrate & nitrite as nitrogen (see Figure 3a). The two background monitoring locations are found on Rattlesnake Creek and Swiss Creek before flow enters the property line. The two receiving water monitoring locations have been assigned to the weir outfall structures at Former Sediment Pond No. 4 and the culvert outfall structure that directs flow under Stevens Canyon Road (see Figure 3).

Sediment Pond 5, Sediment Pond 6, and all sediment traps are not considered Waters of the United States. The facility has contracted with Bay Area Geotechnical Group (BAGG) Engineering to design and build a new settling pond in the Middle Quarry Floor.

2.1.4 Description of Drainage Areas and Existing Drainage

The facility is divided into seven (7) drainage areas: Drainage Area No. 1, Drainage Area No. 2, Drainage Area No. 3, Drainage Area No. 4, Drainage Area No. 5, Drainage Area No. 6, and Drainage Area 7 (Pit Pond drainage area), as shown on the Site Maps in Appendix A. The Site Maps show the facility layout, including the general site topography, storm drainage system, drainage inlets, and discharge locations with their respective drainage areas.

In general, the site is bisected by Rattlesnake Creek and is surrounded by mountainous terrain that is heavily vegetated with varying slopes. Swiss Creek meanders around the southern edge of the Quarry and receives flow from Rattlesnake Creek, No Name Tributary, and Montebello Road, it then flows through a culvert that passes under Stevens Canyon Road and discharges into Stevens Creek Reservoir. The elevation of the facility ranges from approximately 1270 feet above mean sea level (msl) at the top ridge of the Upper Quarry Floor to approximately 550 feet above msl near Outfall No. 4 (OF-4). Surface drainage at the facility generally flows southeast towards Stevens Creek Reservoir. Stormwater is conveyed through culverts, french drains, concrete swales, and drainage ditches to sediment traps, sediment ponds, and an onsite stormwater storage tank.

Discharge from Former Sediment Pond No. 1 in Rattlesnake Creek is controlled by two weirs that flow into two 30-inch culverts which drain into Former Sediment Ponds No. 2, No. 3 and No. 4

located at the north end of the Middle Quarry Floor in Rattlesnake Creek. Former Sediment Pond No. 4 flows over a controlled weir into a by-pass pipe that discharges into Swiss Creek.

Detailed descriptions of the seven drainage areas are provided below.

Drainage Area No. 1

Drainage Area No. 1 is approximately 16 acres and includes the Sand and Rock Plant area (see Figure 3b). Drainage Area No. 1 is sloped toward Sediment Pond No. 5 and Rattlesnake Creek. The area has designated stockpile locations that change due to the industrial activities at the Rock Plant and the Sand Plant. A silt fence is used for erosion control west of Sediment Pond No. 5. Water is conveyed to Sediment Pond No. 5 through drainage ditches, a concrete swale, and culverts. Water in Sediment Pond No. 5 is retained by a riser and conveyed through a culvert to Former Sediment Pond No. 1 on Rattlesnake Creek (see Figure 3a and Figure 3b). Sizing calculations for Sediment Pond No. 5 are found in Appendix F. Overflow eventually discharges at Receiving Water No. 1 (RW-1) to Rattlesnake Creek.

Drainage Area No. 2

Drainage Area No. 2 is approximately 43 acres and receives water from the Middle Quarry Floor where the Voss Trucking, fueling area, and fueling tanks are located. Drainage Area No. 2 includes a metal stormwater storage tank, Sediment Trap No. 1 and Sediment Trap No. 4. Slopes of Drainage Area No. 2 are generally flat and with some areas sloped to the southwest. Water is conveyed through drainage ditches, concrete swales, culverts, and sheet flow to Sediment Trap No.1, to the metal stormwater storage tank, or to Sediment Trap No. 4. Once the metal stormwater storage tank is full, stormwater is conveyed through a culvert and concrete swale to Sediment Trap No. 1. Sediment Trap No. 1 has a series of rock check dams and water control baffles to slow down the flow and capture sediment. Surface water runoff from the Quarry Truck Shop (maintenance area) at the south end of the Middle Quarry Floor is directed into a concrete lined swale to a drop inlet that flows through a culvert into Sediment Trap No. 1. Water from Sediment Trap No. 1 is conveyed through a culvert to Outfall No. 2 (OF-2), which discharges to Swiss Creek.

Water from Former Sediment Pond No. 4 is not conveyed to Outfall No. 2 (OF-2) but is controlled by a weir that contains a clean water bypass under the Middle Quarry Floor to Swiss Creek. Overflow eventually discharges at receiving water No. 2 (RW-2) at the weir of the clean water bypass location.

Drainage Area No. 3

Drainage Area No. 3 includes the office buildings, scale house, scale, Recycle Plant, and quarry maintenance storage. The drainage area is approximately 9 acres and slopes southwest towards Swiss Creek. Runoff from the Recycle Plant stockpile is conveyed through a French drain into Sediment Trap 7, then conveyed along with other Drainage Area No. 3 runoff through a drainage ditch, or culvert into Sediment Trap No. 2, at the Entry Drive. Water from Sediment Trap No. 2 discharges to Outfall No. 3 (OF-3) through a standpipe. The stand pipe is surrounded by rock material to impede and help collect sediment before the stormwater reaches Swiss Creek.

Drainage Area No. 4

Drainage Area No. 4 is approximately 11.2 acres and comprises the eastern portion of the Lower Quarry Floor. Runoff from the City's Garden Waste Recycle Center and the Topsoil Plant are contained on-site by small berms across the driveways and a large 8-foot berm parallel to the property line along Stevens Canyon Road. Stormwater is collected in Sediment Pond No. 7, drainage ditches, concrete lined swales, french drains, swales with check dams, culverts, drop inlets, an underground stormwater storage tank by the Office, and an open concrete drainage box with check dams.

Sediment Pond No. 7 was constructed in September 2019 and has an approximate drainage area of 2.7 acres, which includes the Garden Waste Recycle Center and most of the Topsoil Plant area (see site maps in Appendix A and sizing calculations in Appendix F). Outflow from the sediment pond is conveyed into the existing drainage ditch parallel to the road, which eventually discharges into Sediment Trap No. 3 and Outfall No. 4.

In September 2019, base rock and ¼ chip rock were added to the road by the Topsoil Plant. Rock begins from the offices where asphalt meets unpaved road, all the way to the corner, next to the topsoil stockpile. The topsoil area was completely re-graded, so water will no longer flow across the road where customer trucks travel.

Water is eventually conveyed into Sediment Trap No. 3 and discharged through a culvert to Outfall No. 4 (OF-4). To reduce the discharge from Sediment Trap No. 3, in between rain events, water is pumped and transported to the Sand Plant and/or Pit Pond. If Sediment Trap No. 3 discharges during a rain event, samples are taken at Outfall No. 4 (OF-4). However, if water is discharged from Sediment Trap No. 3 without a rain event, samples are taken within the sediment trap and at Outfall No. 4 (OF-4) to verify whether the water meets the numeric action limits prior to discharge. Water form Sediment Trap No. 3 is also used for dust control onsite.

Drainage Area No. 5

Drainage area No. 5 is approximately 21.4 -acres. Former Sediment Pond No. 6 previously collected water in this area, but was removed in 2018 due to mining operations in the area. The area was regraded to direct all flow towards the Pit Pond in the Upper Quarry Floor.

Drainage Area No. 6

Drainage Area No. 6 is approximately 4.7 acres and collects runoff from the roads on the Upper Quarry Floor. Runoff from the east side of the Upper Quarry Floor in the Sand Plant area is directed into drainage ditches, swales, drop inlets, and culverts, a concrete swale, and eventually into Sediment Trap No. 6, which discharges through a culvert into Former Sediment Pond No. 2 on Rattlesnake Creek, at Outfall No. 6 (OF-6) as shown on Figures 3a and 3b.

Drainage Area No. 7

Drainage Area No. 7 is approximately 78 acres. The slopes of the Drainage Area No. 7 are the steepest within the facility and change frequently due to active mining activities within the area. The area contains one sediment trap (Sediment Trap No. 4), which collects surface runoff from the access roads on the north hillside (Figure 3b) and the Radio Tower. Flow from Sediment Trap No. 4 is conveyed into the Pit Pond through a culvert that outfalls into an open space on the southeast side of the drainage area. The majority of surface runoff from the excavated hillsides sheet flows into the Pit Pond. Surface runoff from the access roads sheet flows into a drainage ditch which eventually goes into the Pit Pond. Two springs on the south east side of the drainage area have been identified and eventually flow into the Pit Pond. The Pit Pond is thought to slowly infiltrate and does not have any outfall structures.

Table 2.1: Facility Stormwater Runoff Routing and Contributing Pollutant Activities.

Area No.	Description	Drainage Route(s) & Outfall	Activities That May Contribute Pollutants	Potential Pollutant(s)
Quarry-Related Contributing Activities				
1	Upper Quarry Floor (0% impervious)	• Pit/Pond collects stormwater from the steep slopes on the Upper Quarry Floor, and the roads. • Sediment Pond No. 5 collect runoff and primarily direct it into Former Sediment Pond No. 1 (Rattlesnake Creek). • Rattlesnake Creek flows into Former Sediment Pond No. 1 on Upper Quarry Floor which flows through a culvert to a series of sediment ponds on the Middle Quarry Floor.	• Rock extraction and processing. • Sand extraction and processing. • Portable toilets.	• Sediment • Petroleum hydrocarbons • Oil and grease • Human waste • Disinfectants from chemical toilets
2	Middle Quarry Floor (6.25% impervious)	• Rattlesnake Creek flows through Former Sediment Pond No.1 on the Upper Quarry Floor then flows into Former Sediment Ponds Nos.2, 3, and 4 then into a bypass pipe under the Middle Quarry Floor. • Sediment Trap No. 5 collects storm water and discharges into Former Sediment Pond No. 4. • Outfall No. 1 (OF-1) discharges into Former Sed. Pond No. 1. • Runoff from the central and lower section of the Middle Quarry Floor is directed to a metal stormwater storage tank which flows through culverts and into Sediment Trap No. 1 on the Lower Quarry Floor.	• Vehicle and equipment parking. • Bone yard (storage of miscellaneous parts without fuel/oil). • Diesel Fueling Area. • Quarry Truck Shop & Storage Buildings. • RV Trucking & Trailer/Sheds. • Stockpiling • Portable toilets.	• Sediment • Petroleum hydrocarbons • Oil and grease • Solvents • Diesel • Antifreeze • Human waste • Disinfectants from chemical toilets
3	Lower Quarry Floor (12.76 % impervious)	• Runoff in Sediment Trap No. 1 primarily comes from the Middle Quarry Floor area. This Trap discharges into Outfall No. 2 (OF-2) to Swiss Creek. • Runoff from the area of the Recycle Plant is collected in concrete lined drainage ditches that flow into Sediment Trap No. 2 which discharges into Outfall No. 3 (OF-3) to Swiss Creek. • Runoff near the Topsoil Plant is collected in Sediment Pond No. 7, which is in series with Sediment Trap No. 3. Runoff from the area around the Office and the middle of the Lower Quarry Floor is collected in an underground stormwater storage tank or earth drainage swales with rock check dams and wattles at drop inlets that flows through an open concrete drainage box with check dams and into Sediment Trap No. 3 that discharges into Outfall No. 4 (OF-4) at Swiss Creek.	• Stockpiling (recycle, aggregates & topsoil). • Rock processing. • Recycle processing. • City's Garden Waste Center (only open 3/20 to 10/15). • Portable toilets.	• Sediment • Petroleum hydrocarbons • Oil and grease • Nitrates, nitrites • Human waste • Disinfectants from chemical toilets
Notes: *See Figures 3a, 3b, for site locations and see Figures 4a and 4b for potential pollutants.* ***Reference names:*** *Sediment Trap No. 1 is below the Quarry Truck Shop; Sediment Trap No. 2 is at the Entry Drive; Sediment Trap No. 3 is across from the Scale; Sediment Trap No. 4 is at the northern end of the Middle Quarry Floor across from Former Sediment Pond 4.*				

2.1.5 Facility Operation Improvements and Modifications - RY2018-2019

This section summarizes the improvements and modifications that were implemented at the facility throughout RY 2018-2019.

Facility-wide soil and erosion control BMPs were implemented, including placement of straw wattles, clean-out of storm drain inlets of sediment, and build-up of the gravel check dams prior to the 2018-2019 rain season. The City of Cupertino compost area closed its operations in mid-October 2017. On October 27, 2018, the facility swept the compost area and installed straw wattles.

In the Fall of 2018, the facility changed the drainage areas in the Upper Quarry Floor area to direct runoff from Former Sediment Pond 6, Drainage Area No.1, and Drainage Area No.5 to the Pit Pond. The area north of Former Sediment Pond 6 and north of the Rock Plant has been regraded to direct all flow towards the Pit Pond, which infiltrates and does not discharge off-site. These changes increased the drainage area of the Pit Pond by approximately 5.5 acres. The corresponding decreases to the drainage areas of Outfall Nos. 1 and 5 are approximately 1.5 and 4.5 acres, respectively. Sediment Pond 5 now receives less runoff, since the entire 4.5-acre reduction in the drainage area is located above Sediment Pond 5.

Sediment Pond 5 was cleaned out of accumulated sediment during dry weather from July 20, 2018 to September 26, 2018. The facility installed a permanent floating 300 GPM well pump in Sediment Pond 5 to pump water to the Pit Pond in the Upper Quarry Floor. The intent was to reduce stormwater flow at Outfall 1 (OF-1), as well as to manage the water level in Sediment Pond 5 in between storm events to have capacity to retain stormwater onsite.

During RY2018-19, stormwater retained in both Sediment Pond 5 (in Drainage Area No. 1) and Sediment Trap 1 (in Drainage Area No. 2) was pumped and transported to the Pit/Pond in the Upper Quarry Floor. There is no outfall structure in the Pit/Pond area. Water from the Pit/Pond area is retained and removed only through infiltration and evaporation. The capacity of the Pit/Pond is on the order of 300 acre-feet.

For Sediment Pond 5, the 300 GPM floating pump was used to transfer water directly to the Pit/Pond. The capacity of Sediment Pond 5 is approximately 6.8 acre-feet, as stated in the Level 2 ERA Technical Report for Total Suspended Solids, submitted on December 31, 2018. At Sediment Trap 1, water was transferred to the Pit/Pond via water trucks.

The result of this pumping was that OF-1, which is located downgradient of Sediment Pond 5, did not discharge any contained stormwater during RY2018-2019, and OF-2, which is located downgradient of Sediment Trap 1, ceased discharging after February 4, 2019.

The facility plans to continue pumping operations in RY 2019-2020, such that stormwater is retained in both Sediment Pond 5 (in Drainage Area No. 1) and Sediment Trap 1 (in Drainage Area No. 2) will be pumped and transported to the Pit/Pond in the Upper Quarry Floor. The goal is to minimize or eliminate discharge from Sediment Pond 5 through OF-1 and Sediment Trap 1 through OF-2. Additionally, the facility plans to investigate the installation of a mechanical enhanced evaporation system for the Pit/Pond to maximize retention capacity.

A summary of the additional BMPs implemented during RY 2018-2019 is shown in Table 2.2 below.

Table 2.2: Additional BMPs Implemented During RY 2018-2019

Parameter with NAL Exceedance	Additional BMPs Implemented in RY 2018-2019	Date Implemented
TSS	• Installed straw wattles in Drainage Area 4 at the base of the stockpiles.	Completed December 2018
Iron	• Consolidated equipment in the Maintenance/Storage and Voss Trucking areas.	Completed in Fall 2018 prior to the rainy season and again in Spring 2019.
	• Removed or disposed of unused equipment or materials.	
	• To the extent possible, stored metal equipment on pallets off the ground and tarped equipment prior to rain event.	
• Iron, • NO_2 + NO_3	• Modified the drainage area in the Upper Quarry Floor to direct runoff from Former Sediment Pond No. 6, Drainage Area No.1, and Drainage Area No.5 to the Pit Pond, which has the capacity to infiltrate the additional volume without discharging. The changes increased the drainage area of the Pit Pond by approximately 5.5 acres, while the reducing the drainage areas of OF-01 and OF-05 by approximately 1.5 acres and 4.5 acres, respectively. Sediment Pond 5 now receives less runoff, since the entire reduction in the drainage area is located above Sediment Pond 5.	Completed in Fall 2018 prior to the rainy season.
	• Installed a permanent floating 300 gallon per minute well pump in Sediment Pond 5 to pump water to the Pit Pond in the Upper Quarry Floor. The intent is to reduce stormwater flow at discharge point OF-01, as well as to manage the water level in	

Parameter with NAL Exceedance	Additional BMPs Implemented in RY 2018-2019	Date Implemented
	Sediment Pond 5 in between storm events to have capacity to retain stormwater onsite.	
	• Implemented large diameter straw wattles at all stockpile locations to reduce sediment mobilization.	
	• Added coconut jute netting to slopes or fiber rolls at the top of slopes above drain inlets (DIs) where erosion is occurring.	
	• Cleaned out and expanded the capacity of the sediment traps to the extent feasible to increase residence time.	Completed in Fall 2018 prior to the rainy season and as needed throughout the rainy season.
	• Cleaned out sediment from storm drain system including all DIs and accumulated sediment in sediment ponds	
	• Refreshed rock in unpaved areas around Quarry prior to start of rainy season.	
	• Refreshed rock check dams around Quarry.	

The facility contracted BAGG Engineering (A.K.A. Bay Area Geotechnical Group) to design, engineer, and build a new settling pond in the Middle Quarry Floor. The new sediment basin will be located to the northeast of Sediment Pond 4. The two water tanks at the current location will be relocated.

A geotechnical investigation of the proposed site commenced on December 21, 2018, and a draft report was developed on April 17, 2019. The report was submitted to Santa Clara County on May 31, 2019. The facility is awaiting approval from the County prior to beginning construction. The report was sent to the San Francisco Bay RWQCB on June 6, 2019, and the facility is awaiting comment. Construction of the new sediment basin is anticipated to be completed by facility personnel and could begin in Spring 2020, pending approval.

The draft report states that a new sediment basin can be feasibly constructed with 2:1 (horizontal: vertical) side slope gradients and have an estimated capacity of 4.4 acre-feet. Per IGP Section X.H.6.a.i (Design Storm Standards for Treatment Control BMPs), this new sediment basin would have the capacity to treat the volume of runoff produced from an 85th percentile, 24-hour storm event falling on the entirety of Drainage Areas 1 and 6 and a portion of Drainage Area 2 upgradient of the proposed sediment basin.

There may be additional capacity to treat the entirety of Drainage Area 5 but monitoring data from OF-5 indicates a much lower sediment load than other areas (average TSS concentration from RY2018-2019 was 38.7 mg/L). As of now, there is no plan to treat Drainage Area 5 using this new proposed sediment basin.

At this point, the exact configuration of the proposed basin and its inlet and outlet structures has not been designed, so a precise estimate of the sediment removal rate is not available.

The new sediment basin as designed by BAGG represents the best location for a new large, single basin to capture as much stormwater runoff as possible. However, the topology and layout of the Lower Quarry Floor is not conducive to another large sediment basin. The facility has identified significant portions of Drainage Areas 3 and 4 that could be treated with smaller sediment basins. In Drainage Area 3, a new small sediment basin could treat most of the Recycle Plant and some of its associated stockpiles. The exact location of the basin in Drainage Area 3 is currently being investigated by the facility.

In Drainage Area 4, Sediment Pond No. 7 was constructed in September 2019, in accordance with IGP Section X.H.6.a.i, to treat the 85th percentile 24-hour storm event (see Appendix F).

The new sediment basin on the Middle Quarry Floor will move into preliminary construction phases, pending approval by Santa Clara County and the San Francisco Bay RWCQB.

2.1.6 Facility Operation Improvements and Modifications - RY2019-2020

This section summarizes the improvements and modifications that were implemented at the facility throughout RY 2019-2020.

In the summer of 2020, Drainage Area 1 was significantly regraded, reducing the size of Drainage Area 1 by approximately 5 acres and correspondingly increasing the size of Drainage Area 7 by the same amount. The Rock Plant was moved south to remain within Drainage Area 1.

In the summer of 2020, a new roof was constructed over shelves containing equipment parts in the Middle Quarry Floor.

In the summer of 2020, a new sediment trap (Sediment Trap No. 6) was constructed just upstream of OF-6 in the Upper Quarry Floor. Previously, there was no sediment trap or pond, or any opportunity for sediment to settle prior to discharge to OF-6.

In the fall of 2020, a new sediment trap (Sediment Trap No. 7) was constructed adjacent to the Recycle Plant in the Lower Quarry Floor. A French drain tributary to the sediment trap collects runoff from the Recycle Plant stockpile and minimize surface runoff through the Recycle Plant itself. Sediment Trap No. 7 discharges into existing drainage infrastructure and ultimately to Sediment Pond No. 2 and OF-3.

2.1.7 Stormwater Run-On from Offsite Areas

The stormwater drainage area contributing to run-on from offsite areas is estimated to be approximately 39.3 acres (13.6-acres from Drainage Area No. 5 and 25.7-acres from Drainage Area No. 2).

The General Permit requires that BMPs be implemented to direct offsite and non-industrial run-on away from industrial areas and erodible surfaces. The following BMPs will be implemented to meet this requirement: berms, drainage ditches, drop inlets, sediment traps, silt fences, check dams, and straw wattles. These BMPs will be located along the quarry roads and throughout the facility as required. The offsite drainage areas and associated stormwater conveyance facilities or BMPs are shown on Figures 3a and 3b in Appendix A.

2.1.8 Geology and Groundwater

The facility is an open pit mine and it is underlain by Hydrologic Group C soils (NRCS WSS, 2018). Groundwater has been observed to daylight at the facility through natural springs located on exposed slopes, as well as through groundwater seepage into sediment traps. The two northernmost springs, designated Spring No.1 and Spring No.2, have been observed to discharge only at very low rates (i.e., challenging to fill laboratory sample bottles within a reasonable time). Therefore, their potential contribution to stormwater runoff quality is considered negligible. Sample collection is currently not recommended at these locations. The southernmost spring, designated Spring No.3, has a more significant discharge that is collected by a french drain that connects to SCQ's stormwater conveyance system and ultimately discharges at Outfall No. 5 (OF-5) (see Figure 3a and 3b). On June 28, the discharge at Spring No. 3 was measured at 2 gallons per minute using a 5-gallon bucket and stopwatch. The water from the third spring is self-contained in a low spot on the far western edge of the quarry.

Groundwater has been observed to seep into sediment traps Nos. 1, 2, and 3 at SCQ (see Figure 3a). Groundwater flow into these basins may have the potential to significantly impact stormwater runoff quality and quantity. Sediment trap No. 3 has been observed to have the fastest rate of groundwater influx. The Spring No. 4 is on the cut slope above the Pit Pond and typically is a moist area on the cut slopes. Due to the locations of these springs it is not feasible to keep these native waters separated from the industrial activity.

2.2 Operations Schedule

The facility operates five days of the week from the hours of 6:30 am to 3:30 pm. Industrial activities during this time period consist of excavating rock and sand, crushing rock, processing rock and sand, processing water residual, dust control, recycling asphalt and concrete, harvesting metal from the recycling asphalt and concrete process, processing incoming industrial material, and removing sediment.

If industrial activities are temporarily suspended for ten (10) or more consecutive calendar days during a reporting year, BMPs that are necessary to achieve compliance with this General Permit during the temporary suspension of the industrial activity will be identified and incorporated into the SWPPP.

2.3 Pollutant Source Assessment

This section presents a list of all industrial materials and potential pollutant sources at the facility. It identifies specific pollutants associated with these sources and pollutant sources that are most susceptible to stormwater exposure. A summary of significant spills and leaks that have occurred onsite is also provided.

2.3.1 Description of Potential Pollutant Sources

Table 2.3 includes a list of industrial activities and associated materials that are anticipated to be used onsite. These activities and associated materials will or could potentially contribute pollutants to stormwater runoff. The anticipated activities and associated pollutants provided in Table 2.3 are the basis for selecting the BMPs for the facility as described in Section 3. Locations of all material stockpiles, storage areas, anticipated pollutants, and associated BMPs are show on the Site Maps in Appendix A.

Table 2.3: Industrial Activities and Associated Materials

Significant Material	Location Where the Materials Are Stored, Handled, Received, Or Shipped	Significant Quantities Regularly Present At Facility
Broken Concrete & Asphalt	Incoming materials are stockpiled at east end of the pad (see Figures 3 & 5).	Typically, about 80,000 tons
Rock	Extracted from slopes at Upper Quarry Floor area (see Figures 3b & 4b).	Typically, about 10,000 tons

Significant Material	Location Where the Materials Are Stored, Handled, Received, Or Shipped	Significant Quantities Regularly Present At Facility
Sand	Upper Quarry Floor area (see Figures 3b & 4b).	Typically, about 15,000 tons
Rock Product Stockpile	Stockpiled products are at the north east end of the Upper Quarry Floor (see Figures 3b and 4b).	Typically, about 20,000 tons
Sand Product Stockpile	Stockpiled products are at the south east end of the Upper Quarry Floor (see Figures 3b and 4b).	Typically, about 20,000 tons
Recycled Rock Product Stockpile	Stockpiled products at the northwest end of Lower Quarry Floor (see Figures 3a and 4a).	Typically, about 20,000 tons
Diesel	Fuel Center on Middle Quarry Floor, and on Service Truck and Mobile Fuel Truck. Also, in small generators on equipment at Rock Plant and by Scale/Office (see Figures 3a, 3b, 4a & 4b).	1,500-gallon tank on Mobile Fuel Truck, The Fuel Center includes a 10,000-gallon and 12,000-gallon tank. 50-gallon generator at Rock Plant, 50-gallon generator at Recycle Plant and 80-gallon generator by Office/Scale.
Anti-Freeze	RV Trucking & Quarry Tractor Shop, Mobile Fuel Truck (see Figures 3a & 4a).	300 gallons at RV Trucking, 150 gallons new and 107 gallons used at Quarry Tractor Shop, 1,500-gallon tank on Service Truck.
Oils	RV Trucking & Quarry Tractor Shop, & Mobile Fuel Truck (see Figures 3a & 4a).	550 gallons at RV Trucking, 555 gallons at Quarry Tractor Shop, and 200 gallons total in four 50-gallons drums on Mobile Fuel Truck.
Waste Oil	RV Trucking & Quarry Tractor Shop, & Mobile Fuel Truck (see Figures 3a & 4a).	600 gallons at RV Trucking, 570 gallons at Quarry Tractor Shop, 200 gallons on Mobile Fuel Truck.
Grease	RV Trucking & Quarry Tractor Shop, & Mobile Fuel Truck (see Figures 3a & 4a).	110 gallons at RV Trucking, 275 gallons at Quarry Tractor Shop, 400-pound drum on Mobile Fuel Truck.
Waste Solids	RV Trucking & Quarry Tractor Shop (see Figures 3a & 4a).	165 gallons at RV Trucking, 275 gallons at Quarry Tractor Shop.
Radiator Coolant	RV Trucking (see Figures 3a &4a)	138 gallons at RV Trucking.
Lubricant	Quarry Tractor Shop (see Figures 3a & 4a).	750 gallons at Quarry Tractor Shop.
Scrap Metals, Rebar	At Recycle Plant on Lower Quarry Floor; scrap metals & rebar are immediately place into a Dumpster with cover located in the middle of the pad (see Figures 3a & 4a).	20 – 40 cubic yards depending on demand; routinely removed every 1.5 to 2 weeks.
Chemicals in portable toilets	13 portable toilets: On the Lower Quarry Floor there are 6: 1 by Office/Scale House & Garden Center; & 2 by Recycle	Portable toilets are serviced twice a week by Legacy Sanitation. Each portable toilet contains approximately 50 gallons. All

Significant Material	Location Where the Materials Are Stored, Handled, Received, Or Shipped	Significant Quantities Regularly Present At Facility
	Plant & across from office. On the Middle Quarry Floor there are 5: 1 by the Quarry Truck Shop, RV Trucking, Fuel Center, Scale House and near the haul road across from Former Pond No.4. On the Upper Quarry Floor there are 2: 1 by the Rock Plant & the Sand Plant. They are in areas set back from vehicular traffic (see Figures 3a & 4a).	portable toilets are placed within secondary containment.
Aluminum Sulfate	Stored in Middle Quarry Floor. Periodically applied to the Pit/Pond, which internally drains with no discharge.	Approximately 3,000 liters.
Notes: All tanks are placed within secondary containment. Smaller generator tanks are double-walled.		

2.3.1.1 Contamination Sources

Existing sources of contamination at the facility include:

- Stockpiles;
- Processing areas;
- Vehicles;
- Equipment parking;
- Access roads;
- Portable toilets;
- Erodible surfaces;
- Earth moving vehicles;
- Mobile service trucks carrying diesel, oil, waste oil, grease, and anti-freeze;
- Human waste and disinfectants from portable chemical toilets;
- Boneyard - parts storage area;
- Batteries with sulfuric acid;
- Off-site track out from quarry haul trucks; and
- Mining activities.

2.3.2 Dust and Particulate Generating Activities

Some industrial activities generate dust or particulates. Material handling equipment (i.e. conveyors, crushers, screen, and mobile equipment) may be sources of fugitive dust. The quantity of dust and particulates that may settle within the facility is highly dependent upon various emission control devices, production and ambient conditions. However, the facility has an Air Permit from BAAQMD and they utilize BMPs to reduce dust and particulate emissions through the use of foggers at transfer points on the processing equipment, sweeping/vacuuming of paved roads, and a water truck spraying paved and unpaved roads and stockpiles. Water trucks use water pumped from on-site sediment traps and ponds, as well as the former sediment ponds located in Rattlesnake Creek.

2.3.3 Significant Spills and Leaks

The potential for spills or leaks could occur where equipment is parked and where equipment is serviced. However, the likelihood for a spill or leak is minimal because major service is performed in-doors and all products are stored in secondary containers. Table 2.3 includes a list of industrial materials where spills and leaks have potential to occur, and includes material characteristics, quantities, locations, and containers. Spills and leaks will be prevented by implementing the BMPs described in Section 3.

No spills or leaks have been reported or observed in the last 5 years at the facility.

2.4 Identification of Non-Stormwater Discharges (NSWDs)

Non-stormwater discharges (NSWDs) consist of discharges which do not originate from precipitation events. The General Permit provides allowances for specified NSWDs provided they:

- Do not cause erosion;
- Do not carry other pollutants;
- Are not prohibited by the local MS4; and
- Do not require a separate NPDES Permit from the Regional Water Board.

NSWDs into storm drainage systems or waterways, which are not authorized under the General Permit and listed in the SWPPP, or authorized under a separate NPDES permit, are prohibited.

Non-stormwater discharges that are authorized at this facility include the following, see Table 2.4:

- Groundwater;
- Natural Springs - Two springs on the north west section of the Upper Quarry Floor which seep out of the cut slope. The water from the third spring is self-contained in a low spot on the far western edge of the quarry. The fourth spring is on the cut slope above the Pit Pond and typically is a moist area on the cut slopes. Due to the locations of these springs it is not feasible to keep these native waters separated from the industrial activity.

These authorized NSWDs will be managed with the stormwater and non-stormwater BMPs described in Section 3 of this SWPPP. These BMPs are implemented to:

- Reduce or prevent the contact of authorized NSWDs with materials or equipment that are potential sources of pollutants;
- Reduce, to the extent practicable, the flow or volume of authorized NSWDs;
- Ensure that authorized NSWDs do not contain quantities of pollutants that cause or contribute to an exceedance of a water quality standards; and
- Reduce or prevent discharges of pollutants in authorized NSWDs in a manner that reflects best industry practice considering technological availability and economic practicability and achievability.

Monthly visual observations will be conducted according to the General Permit (Section XI.A.1) for NSWDs and sources to ensure adequate BMP implementation and effectiveness. Monthly visual observations include observations for evidence of unauthorized NSWDs.

Activities at the facility that may result in unauthorized non-stormwater discharges include:

- During a Regional Water Board inspection on November 4, 2016, the potential for non-stormwater discharges from the rock washing process in the Upper Quarry Floor was identified.
- Stockpiles of finished sand and rock contain some residual water that occasionally seeps from the bottom of the stockpiles.
- Excessive dust control water spraying throughout the facility.

Steps will be taken, including the implementation of appropriate BMPs as defined in Section 3, to ensure that unauthorized NSWDs are eliminated, controlled, disposed off-site, or treated on-site.

The following NSWDs discharges are authorized by the General Permit:

1. Fire Hydrants Flushing;
2. Potable Water Sources related to the operation, maintenance, or testing of potable water systems;
3. Drinking fountain water;
4. Atmospheric condensates including refrigeration, air conditioning and compressor condensate;
5. Irrigation drainage;
6. Landscape watering;
7. Spring water;
8. Groundwater;
9. Foundation or footing drainage; and
10. Sea water infiltration where the sea waters are discharged back into the sea water source.

Table 2.4: Non-Storm Water Discharges Identified

Source No.	Description	Method & Date	Reviewer	Corrective Action Required
1	Spring water from two springs create a damp soil surface on the cut slope at the northwest end of Upper Quarry Floor. (Drainage area is approximately 0.5 acres)	Dry weather observation - April 2015	Jason Voss	None (natural ground water flow)
2	Spring water collects in small self-contained low point in Upper Quarry Floor area west of Sediment Pond No. 5. (Drainage area is approximately 3.5 acres)	Dry weather observation - April 2015	Jason Voss	None (natural ground water flow)
3	Water from spring seeps out of cut slope above Quarry Pit Pond at northwest end of Upper Quarry Floor. (Drainage area is approximately 5.9 acres)	Dry weather observation - April 2015	Jason Voss	None (natural ground water flow)

2.5 Site Maps

The facility Site Maps are provided in Appendix A and include all information required by the General Permit. The maps include information regarding the facility boundary and stormwater drainage areas, nearby water bodies, locations of stormwater collection and conveyance systems including outfalls, locations and descriptions of all industrial activities and materials, and locations and descriptions of all structural control measures.

A summary of all information provided in the Site Maps is provided in Table 2.5 below.

Table 2.5: Required Site Map(s) Information Checklist

Included on Site Map(s)? Yes/No/ NA	Required Element
✓	The facility boundary
✓	Stormwater drainage areas within the facility boundary
✓	Portions of any drainage area impacted by discharges from surrounding areas
✓	Flow direction of each drainage area
✓	On-facility surface water bodies
	Areas of soil erosion
✓	Locations of nearby water bodies (such as rivers, lakes, wetlands, etc.)
✓	Locations of municipal storm drain inlets that may receive the facility's industrial stormwater discharges and authorized NSWDs
✓	Locations of stormwater collection and conveyance systems and associated points of discharge, and direction of flow
✓	Any structural control measures (that affect industrial stormwater discharges, authorized NSWDs, and run-on)
✓	All impervious areas of the facility, including paved areas, buildings, covered storage areas, or other roofed structures
✓	Locations where materials are directly exposed to precipitation
NA	Locations where significant spills or leaks (Section X.G.1.d of the General Permit) have occurred
✓	Areas of industrial activity subject to the General Permit
✓	All storage areas and storage tanks

Included on Site Map(s)? Yes/No/ NA	Required Element
✓	Shipping and receiving areas
✓	Fueling areas
✓	Vehicle and equipment storage/maintenance areas
✓	Material handling and processing areas
✓	Waste treatment and disposal areas
✓	Dust or particulate generating areas
✓	Cleaning and material reuse areas
✓	Any other areas of industrial activity which may have potential pollutant sources

3. BEST MANAGEMENT PRACTICES

3.1 Minimum BMPs

All minimum BMPs that are required by the General Permit and necessary to meet the facility conditions will be implemented. Guidance for BMP implementation is provided in the CASQA Stormwater BMP Handbook Portal: Industrial and Commercial Fact Sheets and the relevant fact sheets are included in Appendix G. Sections 3.1.1 through 3.1.5 list the requirements for each of these minimum BMPs. Minimum BMPs will be implemented for additional targeted industrial activities, equipment, and materials as necessary. If any of the required minimum BMPs are applicable but cannot be implemented, an explanation and alternative approach will be provided in the following sections.

Table 3.1 provides a list of the five minimum General Permit BMP elements that are included in the relevant BMP fact sheets and indicates which BMPs are implemented at the facility. Employee Training, described in Section 3.1.6, and Quality Assurance and Record Keeping, described in Section 3.1.7, are additional minimum BMPs that will be implemented. As required by the General Permit, a summary of all implemented BMPs is included in Section 3.3. The schedule for BMP implementation and the requirements for inspection and maintenance are contained in Section 4.

Table 3.1: Minimum BMPs

CASQA Fact Sheet Number	CASQA BMP Fact Sheet Name	Addresses Minimum General Permit BMP Requirements					BMP to be Implemented?		
		Good Housekeeping	Preventative Maintenance	Spill and Leak Prevention and Response	Material Handling and Waste Management	Erosion and Sediment Control	YES	NO	Not Applicable
SC-10	Non-Stormwater Discharges	✓		✓			✓		
SC-11	Spill Prevention, Control, and Cleanup			✓			✓		
SC-20	Vehicle and Equipment Fueling	✓	✓	✓	✓		✓		
SC-21	Vehicle and Equipment Cleaning	✓	✓	✓	✓		✓		
SC-22	Vehicle and Equipment Maintenance and Repair	✓	✓	✓	✓		✓		
SC-30	Outdoor Loading and Unloading	✓		✓	✓		✓		
SC-31	Outdoor Liquid Container Storage	✓	✓	✓	✓		✓		
SC-32	Outdoor Equipment Operations	✓	✓	✓	✓		✓		
SC-33	Outdoor Storage of Raw Materials	✓	✓	✓		✓	✓		
SC-34	Waste Handling and Disposal	✓	✓	✓	✓		✓		
SC-35	Safer Alternative Products								✓

CASQA Fact Sheet Number	CASQA BMP Fact Sheet Name	Addresses Minimum General Permit BMP Requirements					BMP to be Implemented?		
		Good Housekeeping	Preventative Maintenance	Spill and Leak Prevention and Response	Material Handling and Waste Management	Erosion and Sediment Control	YES	NO	Not Applicable
SC-40	Contaminated or Erodible Surfaces					✓	✓		
SC-41	Building and Grounds Maintenance	✓		✓	✓		✓		
SC-42	Building Repair, Remodeling, and Construction	✓		✓	✓	✓	✓		
SC-43	Parking Area Maintenance	✓	✓	✓			✓		
SC-44	Drainage System Maintenance	✓	✓	✓			✓		

3.1.1 Good Housekeeping

The following good housekeeping measures will be implemented in accordance with the General Permit (Section X.H.1.a):

- Observe all outdoor areas associated with industrial activity including stormwater discharge locations, drainage areas, conveyance systems, waste handling/disposal areas, and perimeter areas impacted by off-facility materials or stormwater run-on to determine housekeeping needs. Any identified debris, waste, spills, tracked materials, or leaked materials will be cleaned and disposed of properly;
- Minimize or prevent material tracking;
- Minimize dust generated from industrial materials or activities;
- Ensure that all facility areas impacted by rinse/wash waters are cleaned as soon as possible;
- Cover all stored industrial materials that can be readily mobilized by contact with stormwater;
- Contain all stored non-solid industrial materials or wastes (e.g., particulates, powders, shredded paper, etc.) that can be transported or dispersed via by the wind or contact with stormwater;
- Prevent disposal of any rinse/wash waters or industrial materials into the stormwater conveyance system;
- Minimize stormwater discharges from non-industrial areas (e.g., stormwater flows from employee parking area) that contact industrial areas of the facility; and
- Minimize authorized NSWDs from non-industrial areas (e.g., potable water, fire hydrant testing, etc.) that contact industrial areas of the facility.

Specifically, the facility utilizes the following good housekeeping practices to address site specific matters:

- Closing the secondary gate to limit truck traffic on unpaved roads on Lower Quarry Floor;
- Limit off-site track out by:
    - Use of paved driving surface from approach to scale to Stevens Canyon Road, regular street sweeping of egress, scale house area, and frontage along Stevens Canyon Road;

- The Quarry owns its own street sweeping company and over a dozen street sweeping vehicles, which are operated by Quarry staff throughout the year. The paved areas around the offices, the Quarry entrance/exit, and the portion of Stevens Canyon Road just outside of the Quarry are swept continuously or at least several hours per day, depending on weather and road conditions. Roads are constantly checked for track out, and all Quarry employees are aware of watching for track out.

- Paved areas around the offices, the Quarry entrance/exit, and the portion of Stevens Canyon Road just outside the Quarry are monitored throughout each day to determine if additional sweeping is necessary. If deficiencies are observed, staff will notify the Pollution Prevention Team, who will then direct and implement additional street sweeping immediately upon identification.

- Boneyard is limited to surplus components and parts; nothing with fuel, oil and grease. In the winter the steel racks will be covered with a tarp;
- Use of water truck to spray unpaved and paved roads and parking areas, as well as stockpiles;
- All heavy earth moving equipment requiring major rebuilding are repaired at the Quarry Truck Shop and the Mobile Fuel Truck.

BMPs to be implemented are summarized in Table 3.1 and the BMP fact sheets are included in Appendix G.

3.1.2 Preventative Maintenance

The following preventative maintenance measures will be implemented in accordance with the General Permit (Section X.H.1.b):

- Identify all equipment and systems used outdoors that may spill or leak pollutants;
- Observe the identified equipment and systems to detect leaks, or identify conditions that may result in the development of leaks;
- Establish an appropriate schedule for maintenance of identified equipment and systems; and
- Establish procedures for prompt maintenance and repair of equipment, and maintenance of systems when conditions exist that may result in the development of spills or leaks.

Specifically, the facility utilizes the following preventative maintenance measures to address site specific matters:

- Routine inspections and maintenance of drainage facilities;
- Visual inspections of drainage inlets and other infrastructure will occur after each rain event;
- The vac trailer will be used after storms, and during if needed;
- Installation and expansion, as needed, of drainage facilities, such as drainage ditches, concrete lined swales, culverts, drop inlets, sediment ponds, sediment traps, earth berms, check dams, stand pipes surrounded with rock material, french drains, inlet protection drain guards in select locations, storm water storage tanks, wattles, fiber rolls, water control baffles, concrete boxes;
- Wattles are replaced on an as needed bases, based on inspection of the existing wattles. Additional wattle locations are assessed, and added as needed;
- Sediment traps are inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events, with appropriate maintenance performed if deficiencies are observed;
- Restriction of activities during wet weather;
- Use of foggers on processing equipment; and
- Vehicle and equipment parking areas, parked or unpaved are regularly inspected;

Specific preventative maintenance BMPs to be implemented at the facility are provided in Table 3.1 and the BMP fact sheets are included in Appendix G.

3.1.3 Spill and Leak Prevention and Response

The following spill and leak prevention and response measures will be implemented in accordance with the General Permit (Section X.H.1.c):

- Establish procedures and/or controls to minimize spills and leaks;
- Develop and implement spill and leak response procedures to prevent industrial materials from discharging through the stormwater conveyance system. Spilled or leaked industrial materials will be cleaned promptly and disposed of properly;
- Identify and describe all necessary and appropriate spill and leak response equipment, locations of spill and leak response equipment, and spill or leak response equipment maintenance procedures; and
- Identify and train appropriate spill and leak response personnel.

Specifically, the facility utilizes the following measures to address site specific spill and leak prevention and response:

- Spill Prevention Kit at the RV Trucking- Truck Maintenance Shop, Quarry Tractor Shop – Buildings # 1, 2 and 3 includes: super sorbent shaker carton, Hazmat socks, Poly-vinyl chloride (PVC) gloves, disposable suits with hoods and boots, universal green sorbent pads, goggles, disposable bags with ties, roll of caution tape, corn cob fractions, respirator, and Emergency Response Guide Book stored in a 30-gallon blue plastic drum.
- Spill Prevention Kit at the Mobile Fuel Truck.
- The Quarry Operations Manager and or the Truck Shop Foreman and the RV Trucking Shop Foreman are responsible for overseeing spill and leak clean up.
- Procedures are established to ensure draining of engine fluids is done without spillage.
- The Mobile Fuel Truck is emptied daily.
- All vehicles for RV Trucking are serviced on paved area at back of shop.
- Drums and containers are stored either inside or in secondary containment structures, they are labeled and stored inside, when feasible, to prevent unauthorized access.
- Aboveground fuel tanks are placed within secondary containment and regularly inspected; any accumulated rain water is disposed of appropriately, and auto shutoffs are used to prevent overfilling and spillage.
- Vehicle fueling area has gravel surface.
- Portable chemical toilet is regularly maintained and is situated in an area away from vehicular traffic and environmentally sensitive areas. All portable toilets have secondary containment.
- The facility has a Spill Prevention Control and Countermeasure Plan (SPCCC) that is in conformance with Title 40, Code of Federal Regulations, Part 112 (40CFR112).
- Petroleum storage and prevention of releases also falls under the California Aboveground Petroleum Storage Act (APSA) as amended through 1995 or later, based upon the facility being subject to 40 CFR 112. Based on APSA petroleum aboveground storage tanks (ASTs) are registered with the State; periodic inspections are conducted to assure compliance with 40CFR112, an Annual Tank

Facility Statement is filed, and annual fees paid to the Santa Clara County, Hazardous Materials Compliance Division.

- The size criteria for inclusion of a facility with ASTs containing oil products under 40 CFR 112 is:
    - Have a total aggregate AST capacity which exceeds 1,320 gallons.
    - Underground storage that exceed 42,000 gallons.
- Tier I Facility: If facilities with 10,000 gallons or less and a single AST with a capacity less than 5,000 gallons; and with not having a discharge to navigable waters over 1,000 gallons subject to the rule in the last three years prior to Plan certification; nor 2 discharges of oil to navigable waters each exceeding 42 gallons within any 12 month period: then they will qualify as a Tier I Qualified Facility and the operator can prepare a self-certified SPCC.
- Tier II Facility: If facilities with 10,000 gallons or less, and with a single AST with a capacity that is greater than 5,000 gallons; and with not having a discharge to navigable waters over 1,000 gallons subject to the rule in the last three years prior to Plan certification; nor 2 discharges of oil to navigable waters each exceeding 42 gallons within any 12 month period: they will qualify as a Tier II Qualified Facility and the operator can prepare a self-certified SPCC.
- Facilities with an aggregate of over 10,000 gallons of aboveground oil storage must have a full Spill Prevention Control and Countermeasure Plan (SPCC plan).

If spills do occur, the site has adequate supply of spill kits at all service areas and include:

Spill Kit Material	**Count**
13, 4-pound super sorbent shaker carton	1
3"x 4' hazmat socks	15
PVC gloves	2
Disposable suits with hoods and boots	2
Universal green sorbent pads	100
Goggles	2
Disposable bags w/ties	8
Roll of caution tape	1
20 pounds Cob fractions	1
Respirator	1
Emergency Response Guide Book	1
30-gallon blue poly drum	1

Specific spill and leak prevention and response BMPs to be implemented at the facility is provided in Table 3.1 and the BMP fact sheets are included in Appendix G. A summary of the spill prevention and response measures is shown in Table 3.2.

Table 3.2: Spill Prevention & Response Measures (IGP – Section X.1.c)

Spill Prevention and Response Measure	Description
Hazardous Materials Business Plan	A Hazardous Materials Business Plan pursuant to Chapter 6.95 of the California Health and Safety Code has been or is being prepared for this facility. The plan will contain a hazardous materials inventory and emergency response procedures.
Spill Prevention Control and Countermeasure Plan	The Spill Prevention Control and Countermeasure Plan, pursuant to Section 311 of the Federal Clean Water Act specifies appropriate containment for aboveground tanks and effective spill prevention procedures.
Secondary Containment	Aboveground tanks and other containers of products or waste have secondary containment and are inspected daily. Spilled material in the containment is promptly cleaned up and disposed of properly.
Employee Training	Employees who work with chemical and petroleum materials are trained in the proper use, handling, storage, and disposal practices. Employees are also trained in proper spill response procedures.
Spill Containment and Cleanup Equipment	A supply of spill containment and cleanup equipment is kept onsite for prompt responses. Available equipment includes: personal protective equipment (rubber gloves, googles, disposable suits/ hoods & boots), spill kit with clean up materials and absorbent materials, and empty UN-approved 55-gallon drum.
Regular Inspections of Hazardous Materials and Wastes Storage Areas	Employees who regularly work with chemical and petroleum products and wastes are instructed to inspect storage areas regularly and to initiate corrective measures, if needed.
Locate hazardous materials storage locations away from storm drain inlets and drainage ways	Chemical and petroleum material storage areas are located away from storm drain inlets or other storm water drainage ways to minimize the possibility that spills would be discharged into the storm drainage system.
Notification procedures in case of spill emergency	Employees are instructed to notify the facility manager, as soon as practical, of any spills. The facility manager will notify agencies listed in the emergency response plan, as required.
List of contractors to assist in spill response	A list of names and phone numbers of the nearest emergency response contractors have been compiled and are available in the facility office, each processing plant, maintenance shop and RV Trucking. The plant manager is authorized to retain the services of contractors to contain and cleanup spills.
Material Safety Data Sheets (MSDS)	MSDSs of the hazardous materials present at the facility are kept at the Truck Shop, RV Trucking Service Area and at the Environmental & Safety Manager's offices. All MSDSs are kept current.

3.1.4 Material Handling and Waste Management

The following material handling and waste management measures will be implemented in accordance with the General Permit (Section X.H.1.d):

- Prevent or minimize handling of industrial materials or wastes that can be readily mobilized by contact with stormwater during a storm event;
- Contain all stored non-solid industrial materials or wastes (e.g., particulates, powders, shredded paper, etc.) that can be transported or dispersed by the wind or contact with stormwater during handling;
- Cover industrial waste disposal containers and industrial material storage containers that contain industrial materials when not in use;
- Divert run-on and stormwater generated from within the facility away from all stockpiled materials;
- Clean all spills of industrial materials or wastes that occur during handling in accordance with the spill response procedures (Section X.H.1.c); and
- Observe and clean as appropriate, any outdoor material or waste handling equipment or containers that can be contaminated by contact with industrial materials or wastes.

Specifically, the facility utilizes the following measures to address site specific material handling and waste management:

- Hazardous waste materials (waste oils, lubricants, solvents) are stored in accordance with applicable Federal, State and local regulations and codes. The containers are clearly labeled, placed in secondary containers, routinely inspected, and stored inside in a secure location until they are recycled.
- Hazardous materials inventory is kept to a minimum, where possible. Material safety data sheets are kept onsite, and inventory is minimized where possible.
- Loaded material is compacted to be below the running board; many newer trucks have automated covers; and drivers are encouraged to tarp truck bed before departure;
- Limited handling of aggregate materials;
- Batteries are stored inside, near cleanup materials, and they are routinely recycled;
- Company vehicle brakes (pickup trucks) are only serviced off-site;

- Dumpsters with lids are monitored and emptied promptly;
- Air compressors are located above drip pans and seals are regularly inspected and maintained;
- Handling of broken concrete and asphalt and processed recycle materials shall be limited.

Specific material handling and waste management BMPs to be implemented at the facility is provided in Table 3.1 and the BMP fact sheets are included in Appendix G.

3.1.5 Erosion and Sediment Controls

The following erosion and sediment control measures will be implemented in accordance with the General Permit (Section X.H.1.e):

- Implement effective wind erosion controls;
- Provide effective stabilization for all disturbed soils and other erodible areas prior to a forecasted storm event;
- Maintain effective perimeter controls and stabilize all site entrances and exits to sufficiently control discharges of erodible materials from discharging or being tracked off the site;
- Divert run-on and stormwater generated from within the facility away from all erodible materials; and
- If sediment basins are implemented, ensure compliance with the design storm standards in Section X.H.6. of the General Permit.

Specifically, the facility utilizes the following measures to address site specific erosion and sediment control:

- Base rock and ¼ chip rock were added to the road by the Topsoil Plant. This road will be inspected daily and rock will be reapplied, if needed. ¼ chip rock will be added and maintained during the rainy season;
- The topsoil area was completely re-graded, so water will no longer flow across the road where customer trucks travel;
- Gravel is reapplied to the haul road as frequently as once a week during rainy season, and it is inspected daily;
- Application of coconut jute netting or other erosion control mesh to steep, exposed slopes in proximity to drop inlets;

- Hydroseeding of inactive slopes prior to the rainy season, where feasible;
- Drop inlets, at certain locations, are surrounded by sand bags to facilitate settlement of sediments;
- Detention of runoff in sediment ponds and sediment traps;
- Tarping topsoil stockpiles during the rainy season;
- Industrial activities are restricted during wet weather;
- Use of CAT 247 Skidsteer to clean out earthen drainage ditches and check dams;
- Use of a vacuum truck, newly obtained by SCQ in the fall of 2019, to clean out drop inlets and underground drainage infrastructure; and
- Use of foggers on processing equipment.

Specific erosion and sediment control BMPs to be implemented at the facility are provided in Table 3.1 and the BMP fact sheets are included in Appendix G. The following Table 3.3, Sedimentation & Erosion Control Measures, identifies the measures implemented at the quarry.

Table 3.3: Sedimentation & Erosion Control Measures (IGP- Section X.G.1.f & X.H.1.e)

Control Measure	**Description**
Management of stormwater at the facility	Activities are restricted during wet weather. Throughout the site, storm water is directed into drainage ditches, concrete lined swales, French drains, rock check dams, straw wattles, concrete lined box with check dams, drop inlets, drop inlets with liners, a bypass pipe, and culverts to minimize the volume of water that may be exposed to industrial activity. Topsoil stockpiles are covered with tarps in the rainy season. Sediment ponds, sediment traps, and storm water storage tanks retain the diverted water, so sediments can settle out before discharging.
Placement of obstacles to intercept run-off from steep terrain	Straw bales, wattles, and/or rip rap may be used to intercept run-off from steep terrain and prevent high water velocities that could cause erosion. Coconut jute netting and other erosion control mesh has been applied to steep, exposed slopes near drop inlets.
Protection of drainage ditches	Drainage ditches are either earth ditches or concrete lined swales. In areas with steep slopes or high volume of water check dams are place into the earth drainage ditches. In additions energy dissipating rip-rap and other devices to prevent erosion.

Control Measure	Description
Protection of discharge points	Storm water discharge points are constructed with energy dissipating discharge aprons made of concrete structures, and/or rocks used as energy dissipaters
Culvert and Bypass Pipe design	Culverts under roadways or through embankments and the bypass pipe are sized to accommodate a 24 hour 100-year storm and aligned to minimize abrupt changes in direction in the flow path. The culvert under Stevens Canyon Road is owned by the local jurisdiction.
Sediment trap and basin design	Sediment ponds 5 and 7 were sized to accommodate the 24-hour, 85th percentile storm event (see calculations in Appendix F). Sediment traps 1, 2, and 3 predate the IGP and were constructed based on available space (see calculations in Appendix F).
Slope of Quarry Floors sloped to drain	Each quarry floor operations area is sloped to drain toward a drainage features that flows to drop inlets.
Grade road to inside bank	Roads cut into hillsides are graded to drain toward the inside bank, such that run-off from the roads is prevented from running directly downhill with a steep gradient. Road cuts along the perimeter of the site are graded to drain toward the quarry operation.
Wind Controls: - Water truck - Foggers - Truck Loading	During hours of operation the stockpiles and unpaved roads are sprayed with water by the water truck to control for dust. In addition, there are foggers at key points on the portable processing plants to wet down the product. Loaded material is compacted to be below the running board; many newer trucks have automated covers; and drivers are encouraged to tarp truck bed before departure
Protection of unpaved roads	Aggregate surface course is applied to the top of unpaved roads to protect the surface from erosion and degradation from customer vehicle traffic. Aggregate is applied daily or as needed, based on daily inspection of road conditions, during the rainy season. The unpaved road between the Topsoil Plant facility entrance location and the Garden Waste Recycle Center is closed to customer vehicle traffic during the wet season.
Paved road and parking areas around Office & Scale House and paved exit and entrance to Quarry operation	Paved access roads and paved parking areas direct storm water into drop inlets or other drainage features.
Partial storm water detention (delayed surface discharge)	Approximately 95 percent of the storm water run-off from the facility is directed into the Pit Pond, Sediment Pond No. 5, Former Sediment Pond No.2, Metal Stormwater Storage Tank, or to sediment traps that allow sediment to settle prior to discharge. A permanent floating 300 gallon per minute well pump was installed in Sediment Pond 5 to pump water to the Pit Pond in the Upper Quarry Floor. The intent is to reduce stormwater flow at discharge point OF-01, as well as to manage the water level in Sediment Pond 5 in between storm events to have capacity to retain stormwater onsite.

Control Measure	Description
Filtration/settling of sediments from stormwater in drainage ways	The following devices are placed in drainage channels to filter sediment and or retain storm water to allow sediments to settle: drop inlets, inlets protection drain guard used in select locations, sand bags, check dams, stand pipes surrounded by rock material and/or wattles. Fiber rolls or wattles are places around the base of the topsoil recycle stockpile to manage sediments, during rainy season as needed. Topsoil stockpiles are tarped during the rainy season. Sediment ponds, sediment traps; and stormwater storage tanks are used to facilitate settlement of sediments in the storm water.
Hydroseeding	Certain inactive slopes that do not have established vegetation will behydroseeded prior to the rainy season, where feasible. In the fall of 2019, approximately a 2-acres slope east of the Rock Processing Plant was hydroseeded.
Tracking Control	The Quarry owns its own street sweeping company and over a dozen street sweeping vehicles, which are operated by Quarry staff throughout the year. Paved areas around the offices, the Quarry entrance/exit, and the portion of Stevens Canyon Road just outside of the Quarry are swept continuously or at least several hours per day, depending on weather and road conditions. Roads are constantly checked for track out, and all Quarry employees are aware of watching for track out. Paved areas around the offices, the Quarry entrance/exit, and the portion of Stevens Canyon Road just outside the Quarry are monitored throughout each day to determine if additional sweeping is necessary. If deficiencies are observed, staff will notify the Pollution Prevention Team, who will then direct and implement additional street sweeping immediately upon identification.

3.1.6 Employee Training Program

An employee training program will be implemented in accordance with the following requirements in the General Permit (Section X.H.1.f):

- Ensure that all team members implementing the various compliance activities of this SWPPP are properly trained in topics including but not limited to: BMP implementation, BMP effectiveness evaluations, visual observations, and monitoring activities;
- Prepare or acquire appropriate training manuals or training materials;
- Identify which personnel need to be trained, their responsibilities, and the type of training they will receive;
- Provide a training schedule; and
- Maintain documentation of all completed training classes and the personnel that received training in the SWPPP.

The Pollution Prevention Team will be trained in implementing the various compliance activities specified in this SWPPP, and documentation of training activities is retained in SWPPP Appendix C. To promote stormwater management awareness specific for this facility, refresher training will be provided annually. A designated employee shall be trained to perform the inspections of storm water conveyances, discharge points (aka Outfalls), and sources of potential pollutants at specified frequencies to identify potential discharges of contaminated run-off.

Task specific training for all employees engaged in activities that have the potential to cause stormwater pollution will be conducted when new employees are hired, and refresher training will be provided annually.

Annual Training will be performed by the Quarry Operations Manager or consultants, both of whom are QISPs who have attended and satisfactorily completed the State Water Board-sponsored or approved QISP training courses. The Quarry Operations Manager will be responsible for providing information during training sessions and subsequently completing the training logs shown in Appendix C, which identifies the site-specific stormwater topics covered as well as the names of site personnel who attended the meeting. Each team member will be trained in the specific role they are responsible to undertake.

Awareness and knowledge of storm water pollution is a key element of the SWPPP. All employees working in the active work area receive storm water training. The Quarry Operations Manager will review the SWPPP annually and report any changes to Geosyntec Consultants for needed updates. However, any significant changes to the SWPPP and recent lab work will be reported immediately so that these changes can be submitted to SMARTs within 30 days. All training will be documented with a sign-in sheet, and a refresher course will be given annually. New employees go through an orientation about Company policies, safety procedures, and an on-site training at their specific work area.

Training includes:

- Information about NPDES permit requirements and potential penalties for violations;
- Instruction on storm water conveyance systems used at the site;
- Review of the sources of potential pollutants at the site; and the effects these pollutants can have on the receiving surface waters;
- Review of the 7 minimum BMPs, advanced BMPs, and specific BMPs used at the site, and each employee's individual responsibilities for maintaining the effectiveness of the BMPs; and
- Review of current Level 1 and/or Level 2 statuses.

3.1.6.1 Staff Training for Good Housekeeping

The SWPPP employee training program is intended to increase employee awareness of how their daily work activities and work areas contribute pollutants to storm water discharges, and to suggest ways that their work habits could be modified to reduce the amount of pollutants that could wash away in storm water.

3.1.6.2 Staff Training for Spill Prevention and Response

- Inspecting storage areas to ensure that hazardous materials containers are in good condition;
- Looking for stains and drips from equipment; sheen on puddles or oil-stained soil; locating the source of such contamination and taking corrective actions;
- Transferring contents of leaky containers to new containers or packing them safely in larger containers (checking the MSDS for materials compatibility);

- Keeping a spill kit available, and maintaining supplies of absorbent materials, neutralizing agents, drums or trash cans, brooms, and shovels where significant amounts of materials are used in the hazardous materials storage areas, service areas and fueling areas;
- Methods for cleaning up minor spills (generally, less than one gallon); and to notify Quarry Operations Manager, Quarry Tractor Shop Foreman and/or RV Trucking Shop Foreman of all spills, and to recognize conditions that require the assistance of emergency response agencies or contractors; and
- Never washing down a spill with water.

3.1.6.3 Staff Training on Preventative Maintenance

Designated employees are instructed on preventative maintenance and the frequency in which they should be performed. These tasks shall include:

- Sediment traps and ponds at a minimum will be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events, with appropriate maintenance performed if deficiencies are observed; and
- Prior to the beginning of the rainy season, sediment traps and ponds will be dredged regardless of observed deficiencies.

3.1.6.4 Staff Training for Materials Handling Procedures

The employee training for materials handling procedures shall include:

- Checking all fuel pumps and dispensing systems for leaks;
- Always staying next to the Mobile Fuel Truck when fueling equipment or vehicles;
- Only allowing properly trained staff to handle hazardous materials; and
- Making sure that containers are compatible with the items stored.

3.1.7 Quality Assurance and Record Keeping

The following quality assurance and record keeping activities will be performed in accordance with the requirements in the General Permit (Section X.H.1.g):

- Develop and implement management procedures to ensure that appropriate staff implements all elements of the SWPPP, including the Monitoring Implementation Plan (SWPPP Section 5);
- Develop a method of tracking and recording the implementation of BMPs identified in the SWPPP; and
- Maintain the BMP implementation records, training records, and records related to any spills and clean-up related response activities for a minimum of five (5) years as required in the General Permit (Section XXI.J.4).

BMPs will be implemented according to the schedule and procedures presented in SWPPP Section 4. BMPs will be implemented by properly trained team members as documented in Appendix C.

Visual observations will be performed as described in SWPPP Section 5.5. Potential pollutant sources and BMPs will be inspected during visual observations, and new BMPs will be implemented as needed. Records of visual observations of BMP implementation will be retained in Appendix H.

Paper or electronic records of documents required by this SWPPP will be retained for a minimum of five (5) years from the date generated or date submitted, whichever is later, for the following items:

- Employee Training Records;
- BMP Implementation Records;
- Spill and Clean-up Related Records;
- Records of Monitoring Information
    - The date, exact location, and time of sampling or measurement;
    - The date(s) analyses were performed;
    - The individual(s) that performed the analyses;
    - The analytical techniques or methods used; and
    - The results of such analyses;
- Level 1 ERA Reports;
- Level 2 ERA Action Plan;
- Level 2 ERA Technical Report; and

- Annual Reports.

3.2 Advanced BMPs

Advanced BMPs will be utilized at the facility when and if it is found that the existing minimum BMPS and Good Housekeeping practices are not sufficient to reduce the potential pollutants in the storm water discharges.

The advanced BMPs might include:

- Exposure minimization BMPs
- Stormwater containment and discharge reduction BMPs
- Treatment control BMPs
- Other advanced BMPs

Advanced BMPs for this SWPPP include:

- The Metal Stormwater Storage Tank,
- Sediment Traps Nos. 1, 2, and 3, and
- Sediment Ponds Nos. 4, 5 and 7.

3.2.1 Stormwater Containment and Discharge Reduction BMPs

Stormwater containment and discharge reduction BMPs include BMPs that divert, reuse, contain, or reduce the volume of stormwater runoff. Specific stormwater containment and discharge reduction BMPs to be implemented at the facility are provided in Table 3.4 and the BMP fact sheets are included in Appendix G.

Table 3.4: Stormwater Containment and Discharge Reduction BMPs

CASQA Fact Sheet Number	CASQA BMP Factsheet Name	Meets Advanced BMP Requirement	BMP Used		BMP Location, Runoff Sources, and Potential Pollutants
			YES	NO	
TC-10	Infiltration Trench	✓			
TC-11	Infiltration Basin	✓			
TC-12	Harvest and Reuse	✓			
TC-20	Wet Pond	✓	✓		Sediment Ponds Nos. 4, 5, and 7
TC-21	Constructed Wetland	✓			
TC-22	Extended Detention Basin	✓			
TC-30	Vegetated Swale				
TC-31	Vegetated Buffer Strip				
TC-32	Bioretention	✓			
TC-40	Media Filter				
TC-50	Water Quality Inlet				
TC-60	Multiple Systems	✓			
MP-20	Biotreatment				
MP-40	Stormwater Filter				
MP-50	Wet Vault				
MP-51	Gravity Separator				
MP-52	Drain Inlet Insert				

Alternate BMPs Used:	**If used, state reason:**
Metal Stormwater Storage Tank	Control discharge to Discharge Point No. 2

3.2.2 Treatment Control BMPs

Treatment control BMPs include one or more mechanical, chemical, biologic, physical, or any other treatment process technology and is sized to meet the treatment control design storm standard. Pond No. 5 is the only treatment control BMP on site. The facility is required to investigate treatment BMPs that will target the TSS (for specific drainage areas), iron, and nitrate & nitrite as nitrogen for the Level 2 requirements. The implemented BMPs are provided in Table 3.5 and the BMP fact sheets are included in Appendix G.

Table 3.5: Treatment Control BMPs

CASQA Fact Sheet Number	CASQA BMP Factsheet Name	Addresses O&M for Advanced BMPs	BMP Used		BMP Location, Runoff Sources, and Potential Pollutants
			YES	NO	
TC-10	Infiltration Trench	✓			
TC-11	Infiltration Basin	✓			
TC-12	Harvest and Reuse				
TC-20	Wet Pond	✓	✓		Sediment Pond Nos. 4, 5, and 7; Sediment Traps Nos. 1, 2, 3, 4, 5, 6, and 7.
TC-21	Constructed Wetland	✓			
TC-22	Extended Detention Basin	✓			
TC-30	Vegetated Swale	✓			
TC-31	Vegetated Buffer Strip	✓			
TC-32	Bioretention	✓			
TC-40	Media Filter	✓			
TC-50	Water Quality Inlet	✓			
TC-60	Multiple Systems	✓			
MP-20	Biotreatment	✓			
MP-40	Stormwater Filter	✓			
MP-50	Wet Vault	✓			
MP-51	Gravity Separator	✓			
MP-52	Drain Inlet Insert	✓			

Alternate BMPs Used:	**If Used, State Reason:**
None.	

3.3 BMP Summary Table

Table 3.6 summarizes the industrial activities, materials, pollutant sources, potential pollutants, and BMPs being implemented to prevent discharge of pollutants in stormwater runoff. Descriptions of the specific BMPs being implemented were provided in previous subsections. Implementation and maintenance of BMPs is described in Section 4.

Table 3.6: BMP Summary Table

Source No.	Industrial Activity Area	Associated Industrial Pollutant Source Description	Industrial Potential Pollutants	Frequency of BMP Implementation	Implemented BMPs	CASQA BMP Fact Sheet Number	Expected BMP Effectiveness
1	Upper, Middle and Lower Quarry Floors	Aggregate Product Stockpiles (including crushed recycle concrete/asphalt)	Sediment and Sediment-Bound Metals, pH	Year Round - On-going	Run-off retained in sediment pond, sediment traps, stormwater tanks, drop inlets, inlet protection drain guards in select location, check dams, and straw wattles.	TC-20, SE-3, SE-5, SE-10	Remove sediment from runoff.
				Year Round – On-going	Stabilize slopes adjacent to drop inlets using coconut jute mesh and/or hydroseeding.	EC-4, EC-7	Reduce sediment load near inlets.
				Year Round - On-going	Drainage features constructed to facilitate collection and treatment of drainage.	SC-44	Reduce amount of sediments in runoff.
				Year Round - On-going	Sediment Pond and Traps with increased capacity to increase holding capacity and detention time.	SE-2, SE-3	Increase holding time of stormwater thereby increasing time for sediments to settle out.
				Year Round, Daily as Needed	Water Truck to maintain pile moisture.	WM-3	Help control amount of air borne dust particles.

Source No.	Industrial Activity Area	Associated Industrial Pollutant Source Description	Industrial Potential Pollutants	Frequency of BMP Implementation	Implemented BMPs	CASQA BMP Fact Sheet Number	Expected BMP Effectiveness
2	Upper, Middle and Lower Quarry Floors	Aggregate and Material Processing; and Mining and Recycle Areas	Sediment and Sediment-Bound Metals, pH, Petroleum hydrocarbons	Year Round	Reduce spillage.	SC-30	Limited handling of loose rock material to reduce amount of sediments in runoff.
				Year Round, Daily	Run-off retained in sediment traps, sediment ponds, stormwater tanks, check dams, straw wattles, drop inlets, inlet protection drain guards in select location.	TC-20, SE-3, SE-5, SE-10	Reduce amount of sediments in runoff.
				Year Round – On-going	Stabilize slopes adjacent to drop inlets using coconut jute mesh and/or hydroseeding.	EC-4, EC-7	Reduce sediment load near inlets.
				Year Round, Daily	Drainage features constructed and sized to facilitate collection and treatment of drainage.	SC-44	Reduce amount of sediments in runoff. Increase holding time of storm water thereby increasing time for sediments to settle out.
				As Needed	Excess lubrication leaked from bearings from heavy equipment is limited by use of drip, spill kits, and routine maintenance.	SC-11	Immediate on-site maintenance as well as the use of drip pans and absorbents will limit amount of pollutants that could potential contaminate storm water.
				Year Round, As Needed	Foggers are used at all source locations (i.e. screens) on processing plants.	WM-3	Reduce amount of pollutants that could contaminate storm water. Reduce amount of air borne particulates.
				Year Round, Daily	Process equipment and area cleanup is routine.	SC-32	Reduce sediments and other potential contaminants.
				As Needed	Water Truck to maintain moisture on unpaved roads and material piles.	N/A	Help control amount of air borne dust particles.
				Year Round, Daily	Conform to air quality permit.	N/A	Reduce emissions and stay current with standards.
				Year Round	Limit handling of materials.	WM-1	Reduce the amount of sediments, and dust particulates and emissions from equipment.
				As Needed	Drip pans used where feasible.	SC-11	Avoid contamination of ground surface and possibility of a spill; reduce exposure to storm water.
				Year Round, Daily	Equipment regularly inspected.	SC-11	Prevent spillage of potential pollutants.
				As Needed	Leaks repaired or liquids drained.	SC-11	Avoid contamination of ground surface and possibility of a spill; reduce exposure to storm water.

Source No.	Industrial Activity Area	Associated Industrial Pollutant Source Description	Industrial Potential Pollutants	Frequency of BMP Implementation	Implemented BMPs	CASQA BMP Fact Sheet Number	Expected BMP Effectiveness
3	Lower Quarry Floor – Recycle Processing Area	Recycle concrete and asphalt paving, rubble, and other inert aggregate related construction materials	Sediment and Sediment-Bound Metals, pH Petroleum hydrocarbons	Year Round - On-going	Know source and document delivery	WM-1	Avoid delivery of contaminated materials.
				Year Round - On-going	Post criteria for receiving recyclable material	WM-1	Avoid delivery of contaminated materials.
				Year Round - On-going	Run-off retained in sediment traps, sediment ponds, stormwater tanks, check dams, straw wattles, drop inlets, inlet protection drain guards in select location.	TC-20, SE-3, SE-5, SE-10	Allow settlement of sediments prior to discharge off-site.
				Year Round – On-going	Stabilize slopes adjacent to drop inlets using coconut jute mesh and/or hydroseeding.	EC-4, EC-7	Reduce sediment load near inlets.
				Year Round - On-going	Drainage features constructed and sized to facilitate collection and treatment of drainage.	SC-44	Reduce amount of sediments in runoff.
				Year Round - On-going	Employ air quality controls such as using foggers on processing equipment.	N/A	Reduce amount of air borne particulates.
				Year Round – Daily Collection, & Weekly Removal/Disposal as needed	Rebar in recycle material is immediately collected and placed into a dumpster with a lid; and removed and disposed off-site by the facility.	WM-1	Reduce waste on-site and recycle properly. Avoid exposure to storm water & reduce amount of pollutants that could contaminate storm water.
4	Upper Quarry Floor	Hillside Mining	Sediment and Sediment-Bound Metals	Year Round, As Needed	Consider seasonal impact on mining areas and restrict activities during wet weather and windy conditions.	SC-32	Limit amount of sediments exposed to rainfall. Use water truck to wet down work areas.
				Year Round, As Needed	Run-off treated in sediment traps, sediment ponds, stormwater tanks, check dams, straw wattles, drop inlets, inlet protection drain guards in select location.	TC-20, SE-3, SE-5, SE-10	Reduce amount of sediments in runoff.
				Year Round – On-going	Stabilize slopes adjacent to drop inlets using coconut jute mesh and/or hydroseeding.	EC-4, EC-7	Reduce sediment load near inlets.
				As Needed	Drainage features constructed and sized to facilitate collection and treatment of drainage.	SC-44	Reduce amount of sediments in runoff.
				Year Round, On-going	Construct and maintain energy dissipation at Sediment Pond 5.	TC-20	Reduce sediment load in Sediment Pond 5.
				Year Round, On-going	Employ fugitive emission air quality controls.	N/A	Reduce emissions.

Source No.	Industrial Activity Area	Associated Industrial Pollutant Source Description	Industrial Potential Pollutants	Frequency of BMP Implementation	Implemented BMPs	CASQA BMP Fact Sheet Number	Expected BMP Effectiveness
5	Upper , Middle and Lower Quarry Floor	Aggregate Handling	Sediment and Sediment-Bound Metals	Daily & As Needed	Process equipment and area cleanup is routine.	SC-32	Reduce sediments and other potential contaminants.
				Year Round, On-going	Conform to air quality permit.	N/A	Reduce emissions and stay current with standards.
				Daily, As Needed	Limit handling of materials.	WM-1	Reduce the amount of sediments, and dust particulates and emissions from equipment.
6	Middle Quarry Floor	Boneyard	Sediment and Sediment-Bound Metals, Petroleum hydrocarbons, Oil & Grease, Antifreeze, Acids, Metals	Daily, As Needed	Surplus storage minimized.	WM-1	Reduce amount of spare part storage to reduce risk for equipment failure and contamination.
7	Middle Quarry Floor	Vehicle/Equipment Maintenance	Petroleum Hydrocarbons, Sulfuric Acid, Lead, Oil, Grease, Anti-freeze, solvents	Daily, As Needed	Vehicle/equipment maintenance performed in designated location at RV Trucking Service Area: outdoor paved area at back of shop.	SC-22	Reduce exposure to storm water and ease of clean-up of spills.
				Daily, As Needed	All Quarry heavy earthmoving equipment is rebuilt inside Quarry Tractor Shop.	SC-11, SC-20, SC-21, SC-22	Avoid exposure to storm water and ease of clean-up of spills.
				Daily, As Needed	All Quarry heavy earthmoving equipment is maintained by the Mobile Fuel Truck which follows BMPs: drip pans, spill kits, empty drum, auto-shut off valve for fuel pump, alarm overflow preventer; & company policies.	SC-11, SC-20, SC-21, SC-22	Avoid contamination of ground surface and possibility of a spill; reduce exposure to storm water. Facilitate proper cleanup of spills.
				Daily, As Needed	All Quarry vehicles (not just heavy Earth moving equipment) are serviced at the Quarry Tractor Shop.	SC-11, SC-20, SC-21, SC-22	Avoid exposure to storm water and possibility of a spill.
				Daily, As Needed	Some outdoor maintenance areas are paved.	N/A	Facilitates clean-up of spills, eliminates contamination of ground surface, and reduce exposure to storm water.
				On-going, Daily	Clearly labeled drums and containers placed in convenient locations.	WM-1	Eliminate contact with storm water.
				Year Round	No Oil changes are done outside during the rain	SC-32	Eliminates contact with storm water.
				Daily, As Needed	Waste receptacles monitored and arrangements for pickups made promptly.	WM-6	Eliminate contact with storm water.
				As Needed	Waste oil, waste anti-freeze, spent solvents, filters and batteries are recycled.	WM-6	Eliminate contact with storm water.
				On-going, As Needed	Procedures established to ensure draining of engine fluids and transfer to waste containers without spillage Drip pans placed under vehicles/equipment when draining fluids and transferred to waste containers without spillage.	SC-11, WM-6	Eliminate contact with storm water and contamination of ground surface.
				Year Round	Employees instructed on proper cleanup procedures for minor spills.	SC-11	Ensures proper cleanup of spills.
				Year Round	Area equipped with spill kits to cleanup spills and empty drums.	SC-11	Facilitate proper cleanup of spills.

Source No.	Industrial Activity Area	Associated Industrial Pollutant Source Description	Industrial Potential Pollutants	Frequency of BMP Implementation	Implemented BMPs	CASQA BMP Fact Sheet Number	Expected BMP Effectiveness
				Year round	Proper Security measures implanted to prevent vandalism.	SC-41	Eliminate spillage during vandalism.
8	Middle Quarry Floor	Air Compressor	Petroleum Hydrocarbons	Daily	Drip pan under compressors.	SC-11	Eliminates contact with storm water and contamination of ground surface.
				Daily	Seals regularly inspected and maintained.	SC-11	Prevent spillage of potential pollutants.
				Year round, On-going	Compressors are kept indoors.	WM-1	Eliminate contact with storm water.
9	Middle Quarry Floor	Battery storage area (new and discharged batteries)	Sulfuric Acid, Lead	Year round, On-going	Batteries stored inside building.	WM-1	Eliminates contact with storm water and possible spillage of battery acids outdoors.
				Year round, On-going	Batteries stored on pallets in some places.	WM-1	Keep materials dry and off the ground.
				Year round, As Needed	Used batteries are removed by Recycler.	WM-6	Insures proper disposal of used batteries.
				Year round, On-going	Area equipped with dry spill cleanup equipment.	SC-11	Facilitate proper cleanup of spills.
				Year round, On-going	Signs posted to warn employees of a strong acid, and to specify containment/cleanup procedures in case of spill.	WM-6	Prevent improper handling of material. Promote awareness; ensure proper handling, and proper response to emergency response if release occurs.
10	Middle Quarry Floor	Lubricant Storage	Petroleum Hydrocarbons	Year round, On-going	All lubricant containers are clearly labeled.	WM-1	Promote awareness; and ensure proper clean up methodology.
				Year round, On-going	All lubricant materials containers closed.	WM-1	Avoid contact with storm water.
				Year round, On-going	Lubricant materials stored in designated areas only.	WM-1	Limited area where potential pollutants could be released.
				Year round, On-going	Lubricant material storage areas secured to prevent unauthorized access.	WM-1	Controlled access to limit vandalism and release of materials to also limit exposure to storm water.
				Year round, On-going	Lubricant material storage maintained in accordance with applicable Federal, State and local regulations and codes.	WM-1	Keep material in controlled area, and out of contact with storm water. Comply with regulatory requirements.
				Year Round, Daily	Condition of containers and area inspected regularly	WM-1	Prevent accidental release.
				Year round, As Needed	Leaking or deteriorated containers placed in new containers.	WM-6	Prevent accidental release.
				Year round, On-going	Lubricant material kept indoors and undercover.	WM-1	Prevent vandalism and accidental release. Prevent exposure to storm water.
				Year round, On-going	Materials safety data sheets kept at the facility for all hazardous materials. Lubricant materials inventory minimized where practical.	WM-1	Promote awareness; ensure proper handling, and proper response to emergency response if release occurs. Reduce the potential impacts if accidental release should occur.
				Year round, On-going	Secondary containment and storage tank covered to prevent rain contact.	SC-31	Reduce the potential impacts if accidental release should occur.
				Year round, On-going	Sign posted to identify storage area. Signs posted to instruct employees that all hazardous materials spills must be cleaned up promptly, specify procedures for cleanup, and require notification of supervisor	WM-1	Promote awareness; and ensures proper cleanup.
				Year round, On-going	Spill cleanup equipment clearly labels and stored where accessible.	SC-11	Facilitate cleanup of spills.

Source No.	Industrial Activity Area	Associated Industrial Pollutant Source Description	Industrial Potential Pollutants	Frequency of BMP Implementation	Implemented BMPs	CASQA BMP Fact Sheet Number	Expected BMP Effectiveness
				Year round, On-going	Proper security measures implemented to prevent vandalism.	SC-41	Eliminate spillage during vandalism.
11	Middle Quarry Floor	Aboveground Storage Tanks and Fueling area	Petroleum Hydrocarbons	Year round, On-going	Tank has secondary containment to prevent release of fuel even with total tank failure	SC-31	Prevents exposure to stormwater runoff and contamination of ground surface. Facilitate cleanup of spilled materials.
				Year round, On-going, As Needed	Accumulated rain water in the containment area disposed of in accordance with local, State, and Federal regulations if any evidence of fuel were detected on the water	SC-31	Facilitate cleanup of spilled materials.
				Year round, On-going	Storage tank fueling has auto shut off to prevent overfilling.	SC-31	Prevents accidental spills.
				Year round, On-going	Vehicle fueling area is paved.	SC-11	Prevents contamination of ground surface, and facilitate cleanup of spills.
				Year round, On-going	Sign posted to instruct employees that all fuel spills must be cleaned up promptly, specify procedures for cleanup, and require notification of supervisor	SC-11	Promotes awareness; and ensures proper cleanup.
				Year round, On-going	Sign posted to instruct employees to not leave filling hose unattended during fueling	SC-11	Preventing accidental spills.
				Year round, On-going	Spill cleanup equipment clearly labeled and stored near fuel pumps in the main shop area.	SC-11	Facilitate cleanup of spills.
				Year round, On-going	Proper security measures implemented to prevent vandalism.	SC-41	Eliminate spillage during vandalism.

Source No.	Industrial Activity Area	Associated Industrial Pollutant Source Description	Industrial Potential Pollutants	Frequency of BMP Implementation	Implemented BMPs	CASQA BMP Fact Sheet Number	Expected BMP Effectiveness
12	Middle Quarry Floor	Hazardous Materials Storage Area: Lube oil, Solvents, Batteries, Antifreeze	Petroleum Hydrocarbons, Solvents, Acids, Bases, Antifreeze, Heavy Metals, Pesticides	Year round, On-going	All hazardous material containers clearly labeled.	WM-6	Promote awareness; and ensures proper cleanup.
				Year round, On-going	All hazardous materials containers closed.	WM-6	Avoid contact with storm water.
				Year round, On-going	Flammable materials stored inside designated flammable cabinets.	WM-6	Prevent accidental fires; ensure proper handling; keep materials under control.
				Year round, On-going	Hazardous materials stored in designated areas only.	WM-6	Limited area where potential pollutants could be released.
				Year round, On-going	Hazardous material storage areas secured to prevent unauthorized access.	WM-6	Keep material in controlled area.
				Year round, On-going	Hazardous material storage maintained in accordance with Federal, State, and local regulations and codes.	WM-6	Keep material under control and out of contact with storm water.
				Year round, On-going, Daily	Container conditions are routinely inspected and resolved.	WM-6	Keep material under control.
				Year round, On-going, As Needed	Leaking or deteriorated containers placed in new containers.	WM-6	Keep material under control and out of contact with storm water.
				Year round, On-going	Hazardous materials kept indoors or undercover.	WM-6	Keep material under control and out of contact with storm water.
				Year round, On-going	Material safety data sheets kept at facility for all hazardous materials	WM-6	Promote awareness.
				Year round, On-going	Hazardous materials inventory minimized where practical.	WM-6	Reduce the potential impacts from unnecessary storage of materials.
				Year round, As Needed	Secondary containment and storage tank covered to prevent rain contact.	WM-6	Keep material under control and out of contact with storm water.
				Year round, On-going, As Needed	Sign posted to instruct employees that all hazardous material spills must be cleaned up promptly, specify procedures for cleanup, and require notification of supervisor.	SC-11	Promote awareness.
				Year round, On-going	Spill cleanup equipment (i.e. spill kits, drums and rags) stored where accessible.	SC-11	Facilitate cleanup of spills.
				Year round, On-going	Proper security measures implemented to prevent vandalism.	SC-41	Eliminate spillage during vandalism.

Source No.	Industrial Activity Area	Associated Industrial Pollutant Source Description	Industrial Potential Pollutants	Frequency of BMP Implementation	Implemented BMPs	CASQA BMP Fact Sheet Number	Expected BMP Effectiveness
13	Middle Quarry Floor	Hazardous Materials Waste Storage (Examples; Used Oil Filters, Drain/Waste Oil, Discharged Batteries, Used Antifreeze, Fluorescent Lamps, Spent Solvent)	Petroleum Hydrocarbons, Solvents, Acids, Bases, Antifreeze, Heavy Metals, Pesticides	Year round, On-going	All hazardous waste containers clearly labeled.	WM-6	Promote awareness.
				Year round, On-going	All hazardous waste containers closed.	WM-6	Keep materials from contact with storm water.
				Year round, On-going	Hazardous waste stored in designated areas only.	WM-6	Limited area where potential pollutants could be released and facilitates cleanup.
				Year round, On-going	Hazardous waste storage secured to prevent unauthorized access.	WM-6	Keep material in controlled area.
				Year round, On-going	Hazardous waste storage maintained in accordance with applicable Federal, State, and local regulations and codes.	WM-6	Keep material under control and out of contact with storm water.
				Year round, On-going, Daily	Routine inspections of containers and area.	WM-6	Keep material under control.
				Year round, On-going, As Needed	Leaking or deteriorated containers placed in new containers.	WM-6	Keep materials from contact with storm water.
				Year round, On-going, As Needed	Remove and dispose of properly all hazardous wastes in accordance with applicable regulations.	WM-6	Keep materials from contact with storm water.
				Year round, On-going	Signs posted to identify storage areas	WM-6	Promote awareness, Keep material under control.
				Year round, On-going	Hazardous waste kept mostly indoors or undercover.	WM-6	Keep material out of contact with storm water or keeps material contained.
				Year round, On-going	Secondary containment and storage tank covered to prevent rain contact.	WM-6	Keep material under control and out of contact with storm water.
				Year round, On-going, As Needed	Accumulated rain water in the containment area disposed of in accordance with local, State and Federal regulations if any evidence of contamination were detected in or on the water.	WM-6	Keep material under control and out of contact with storm water.
				Year round, On-going	Spill cleanup equipment (rags) clearly labeled and stored where accessible.	SC-11	Facilitate cleanup of spills.
				Year round, On-going	Proper security measures (locked gate) implemented to prevent vandalism.	SC-41	Eliminate spills during vandalism.
				Year round, As Needed	Used oil filters are drained and stored in approved container.	WM-6	Eliminate contact with storm water.
14	Lower Quarry Floor	Dumpster with Lid	Rebar	Year round, On-going	Dumpster with lid used to keep out rain water and prevent debris from blowing away.	SC-34	Eliminate contact with storm water.

Source No.	Industrial Activity Area	Associated Industrial Pollutant Source Description	Industrial Potential Pollutants	Frequency of BMP Implementation	Implemented BMPs	CASQA BMP Fact Sheet Number	Expected BMP Effectiveness
15	Middle and Lower Quarry Floors	Paved Vehicle/ Equipment Parking or Outdoor Storage Areas	Petroleum Hydrocarbons, Oil & Grease, Anti-freeze, Metals (i.e. Iron, Copper, Aluminum, etc.), Sediment	Year Round, Daily	Vehicle/equipment regularly inspected.	SC-43	Eliminate collection of contaminants.
				Year Round, On-going	Storm water is directed into metal storage tank before discharging into a Sediment Ponds. In some area's runoff is directed to flow over exposed level ground surface to promote percolation.	SE-3	Reduces sediments in storm water.
				Year Round, Daily, As Needed	Leaks from vehicle/equipment promptly repaired once discovered.	SC-11	Eliminate leakage of contaminants and exposure to storm water.
				Year Round, Daily, As Needed	Drip pans and absorbent materials used temporarily to collect leakage until repaired.	SC-11	Eliminate leakage of contaminants and exposure to storm water.
				Year Round, Daily, As Needed	Excess lubrication leaked from bearings from heavy equipment is limited by use of drip, spill kits, and routine maintenance.	SC-11	Immediate on-site maintenance as well as the use of drip pans and drysocks will limit amount of pollutants that could potential contaminate storm water.
16	Upper, Middle and Lower Quarry Floors	Unpaved Vehicle / Equipment Parking or Outside Storage Areas	Petroleum Hydrocarbons, Oil & Grease, Anti-freeze, Metals (i.e. Iron, Copper, Aluminum, etc.), Sediment and Sediment-Bound Metals	Daily	Vehicles/equipment regularly inspected.	SC-43	Eliminate collection of contaminants.
				Year Round	Most runoff is directed over flat ground surface to promote percolation prior to entering the on-site drainage system.	N/A	Reduces possible contaminants and amount of storm water run-off entering the drainage system.
				Daily, As Needed	Leaks from vehicles/equipment promptly repaired once discovered.	SC-11	Eliminate leakage of contaminants and exposure to storm water.
				Daily, As Needed	Drip pans used temporarily to collect leakage until repaired.	SC-11	Eliminate leakage of contaminants and exposure to storm water.

Source No.	Industrial Activity Area	Associated Industrial Pollutant Source Description	Industrial Potential Pollutants	Frequency of BMP Implementation	Implemented BMPs	CASQA BMP Fact Sheet Number	Expected BMP Effectiveness
17	Upper, Middle and Lower Quarry Floors	Storm water collection and on-site containments in Sediment Ponds, Sediment Traps and Metal Storm Water Tanks	Sediment and Sediment-Bound Metals, Petroleum Hydrocarbons, pH, Metals (i.e. Iron, Copper, Aluminum, etc.)	Year Round, Daily Use	Impede flow velocity to drop out sediments (drop inlets, standpipes with rock materials at base, check dams, wattles, concrete box with check dams, sediment traps and sediment ponds, and Stormwater storage tanks.	TC-20, SE-3, SE-4, SE-10	Facilitate sediments to settle out of storm water.
				Year Round, Daily Use	Collect and store some runoff for reuse on site (water tanks) for dust control.	TC-12	Reduce the amount of storm water run-off entering the drainage system .
				Year Round, Daily Use	Raise spillover points at drainage inlets to promote drop out of sediments (also after drying collect and recycle sediments).	SE-10	Facilitate sediments to settle out of storm water .
				Year Round, Daily Use	Use sediment traps, sediment ponds, concrete box with check dams, Stormwater storage tanks, drop inlets, and inlet protection drain guards in select locations.	TC-20, SE-3, SE-5, SE-10	Facilitate sediments to settle out of storm water .
				Year Round, Daily Use, as Needed	Water Truck	N/A	Help control amount of air borne dust particles.
18	Lower Quarry Floor – Egress	Off-Site Track Out	Sediment and Sediment-Bound Metals, Petroleum Hydrocarbons, pH	Year Round	Pave ingress and egress areas used by commercial traffic.	SC-40	Limit airborne dust, and reduce sediments leaving the site.
				Daily, as needed	Regularly sweep ingress, egress, scale house areas, scale and driveway.	SE-7	Limit airborne dust, and reduce sediments leaving the site.
19	Upper, Middle and Lower Quarry Floors – Portable Toilets	Portable Chemical Toilets (Portable Toilet)	Human Waste and Disinfectants (Toilet Chemicals)	Daily, As Needed	Regularly maintained and pumped out at regular intervals.	WM-9	Reduce the risk of the portable toilet from overflowing.
				Year Round, On-going	Placed in areas away from high vehicular traffic areas and environmentally sensitive areas. All portable toilets have secondary containment.	WM-9	Reduce the risk of the portable chemical toilet from being knocked over.
20	Lower Quarry Floor	Garden Waste Recycle Center	Compost	Year round, On-going	Compost stored within 3-sided concrete bunker. Cover with tarp before forecast rain events. Garden Waste Center only operational during spring and summer months. When not operating there are not any compost stockpiles from October 18 to March 19.	SC-33	Eliminate contact with storm water.
					Quarry staff oversee or perform compost loading to prevent spillage.	SC-30	Reduce risk of compost leaving the storage bunker.

4. BMP IMPLEMENTATION

4.1 BMP Implementation Schedule

The schedule for implementing all minimum and advanced BMPs is presented in Table 4.1. BMPs will be implemented as necessary to reduce or prevent transport of industrial pollutants in stormwater runoff. Slight modifications to this schedule may be necessary to achieve this goal. Person responsible for implementing BMPs is the operations manager and the safety manager. Records of BMP implementation will be included in Appendix H.

Table 4.1 BMP Implementation Schedule

BMP Description	Implementation Duration
Good Housekeeping	Daily
Preventative Maintenance	Daily
Spill Response	As needed
Material Handling and Waste Management	Daily
Storm Drainage System Inspection and Maintenance	Annually (Sept 1st – Oct 1st) & Weekly during the wet season (Oct 1st – May 30th) and after each major rain events
Inspect all equipment and vehicles for leaking fluids	Daily
Street Sweeping	Daily, multiple times as needed
Vehicle Fueling	Daily, as needed
Vehicle Maintenance	As needed
Non-Storm Water Discharge	On-going
Employee Training	On-going

4.2 BMP Inspection and Maintenance

The General Permit requires, at a minimum, monthly observations of BMPs, along with inspections during sampling events. Monthly observations will be conducted during daylight hours of scheduled facility operating hours and on days without precipitation. A BMP observation checklist must be filled out for and maintained on-site with the SWPPP. The observation checklist includes the necessary information as discussed in Section 5.5. A blank observation checklist can be found in Appendix I and completed checklists will be kept in Appendix H or in an accompanying file/binder that is referenced in the SWPPP and readily accessible on site.

BMPs will be maintained regularly to ensure proper and effective functionality. If necessary, corrective actions will be implemented within 72 hours of identified deficiencies and associated amendments to the SWPPP will be prepared and documented.

Specific guidance for maintenance, observation, and repair of advanced BMPs can be found in the BMP Factsheets in Appendix G.

Routine use and observation of processing equipment occurs daily, and maintenance on the equipment and processing plants is performed when needed. All major serving is conducted either inside the shop at RV Trucking or the Quarry Truck Shop. Small routine preventive maintenance is performed using a Mobile Fuel Truck as needed. Examples of preventive maintenance performed at this facility are listed below:

- Check seals on all equipment containing petroleum hydrocarbons or other pollutants, and replace as necessary;
- Check seal on all containers holding petroleum hydrocarbons, and replace as necessary;
- Check seal on gasoline or diesel fueling nozzle, and replace as necessary;
- Check accuracy of gauges that indicated liquid levels in storage tanks;
- Sediment traps and ponds at a minimum shall be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events, with appropriate maintenance performed if deficiencies are observed;
- Inspect unpaved roads to determine if additional aggregate surface course should be applied;

- Appropriate maintenance for sediment ponds, sediment traps, stormwater storage tanks, drainage ditches, swales, drop inlet and their protection drain guards must be performed if deficiencies are observed;
- Periodically remove sediment from sediment ponds, sediment traps, stormwater storage tanks, drainage ditches, swales, drop inlet and their protection drain guards to maintain capacity;
- Cover topsoil stockpiles with tarps during rainy season, except during active use;
- Inspect sand bags and wattles around edge of Sediment Trap No. 3 and at selected drop inlets; and
- Place wattles around the edge of topsoil piles at all times throughout the year, regardless of the size or condition of the piles.

Prior to the rainy season (October 1st) and after a rain event, the following BMPs will be inspected and cleaned out. The facility purchased a vacuum truck in fall 2019 to assist with cleanout of drop inlets and other drainage infrastructure.

- Drop inlets;
- Drainage ditches/swales;
- Check dams;
- Storm water storage tanks; and
- Outfalls No. 1 (OF-1), No. 2 (OF-2), No. 3 (OF-3), and No. 4, No. 5 (OF-5), and No. 6 (OF-6), RW-1, and RW-2.
- Inspect inactive slopes to determine of hydroseed application is warranted and feasible.

Sediment traps and ponds are dredged annually regardless of observed deficiencies.

During and after rain events, the following BMPs will be implemented:

- Schedule and pump out secondary containments that are outside (i.e. fueling station) and dispose of waste properly;
- Reapply aggregate surface course to unpaved roads as needed;
- Conduct street sweeping at the facility entrance/exit and on paved surfaces near the offices, and inspect these areas to determine if additional sweeping is needed;

Specific maintenance activities addressed in the Level 1 Exceedance Response Action (ERA) Report for Total Suspended Solids, dated December 2017 include:

- Coconut jute meshing or other erosion control measures should be applied to steep, exposed slopes, particularly in proximity to drop inlets.
- Check the integrity of the mesh and replace if needed. Observe for visible signs of erosion on steep slopes, particularly in proximity to drop inlets. Particular locations include, but are not limited to:
  - Along the road above Rattlesnake Creek;
  - Along the road above Former Sediment Pond 1;
  - Along the outer perimeter of the Sand Plant; and
  - Along the north road of Sediment Pond 5.
- Erosion control along the road from the offices toward the compost storage area is accomplished by allowing natural vegetation to reestablish. Check the slopes for establishment of vegetation and consider hydroseeding or other landscaping measures if slopes remain exposed.
- Ensure that all inlet structures are facing away from any nearby steep, exposed slopes. Particular locations include, but are not limited to:
  - The most upstream inlet in series going into Sediment Pond 5 along the road north of the Sediment Pond; and
  - The first, second, and third inlets along the road from the offices toward the Garden Waste Recycle Center.
- Inlet protection on all inlets should consist of fiber rolls with rock mulch on either side, modified as space allows. Check the integrity of the fiber rolls and rock mulch and replace if needed. Prior to the rainy season, clean out all drop inlets and replace all worn fiber rolls.
- Dredge all sediment ponds and traps as needed to maintain treatment capacity. On an ongoing basis, check for sediment accumulation to determine when to commence dredging.

Specific maintenance activities addressed in the Level 2 Exceedance Response Action (ERA) Report for iron and nitrite and nitrate as nitrogen, from December 2017:

- To the extent possible, store metal equipment on pallets off the ground and tarp equipment prior to rain events.

- Cease the use of all flocculant on-site. Check that no flocculant of any kind is stored or in use.

- Refresh rock in unpaved areas, and in rock check dams around the site prior to the start of the rainy season. Check rock for sediment accumulation.

Specific maintenance activities addressed in the Level 2 ERA Technical Report for iron and nitrite and nitrate as nitrogen, dated July 1, 2019:

- Consolidate equipment in the Maintenance/Storage and Voss Trucking areas.

- Remove or dispose unused equipment or materials.

- Store metal equipment on pallets off the ground and tarp equipment prior to rain event.

- Implement large diameter straw wattles at all stockpile locations to reduce sediment mobilization.

- Add coconut jute netting to slopes or fiber rolls at the top of slopes above DIs where erosion is occurring.

- Clean out sediment from storm drain system including all DIs and accumulated sediment in sediment ponds.

- Refresh rock in unpaved areas around facility prior to start of rainy season.

- Refresh rock check dams around facility.

- Continue pumping operations such that stormwater is retained in both Sediment Pond 5 (in Drainage Area No. 1) and Sediment Trap 1 (in Drainage Area No. 2) then pumped and transported to the Pit/Pond in the Upper Quarry Floor. The goal is to minimize or eliminate discharge from Sediment Pond 5 through OF-1 and Sediment Trap 1 through OF-2.

5. MONITORING IMPLEMENTATION PLAN

5.1 Purpose

This Monitoring Implementation Plan was developed to address the following objectives:

1. Identify the monitoring team;
2. Describe weather and rain event tracking procedures;
3. Describe discharge locations, visual observations procedures
4. Describe visual observation response procedures;
5. Describe sample collection and handling procedures;
6. Describe field instrumentation calibration instructions and intervals;
7. Provide justification for alternative discharge locations, Representative Sample Reduction (RSR), and Qualified Combined Samples (QCS), as applicable; and
8. Provide an example Chain of Custody form to be used when handling and shipping water quality samples to the laboratory.

5.2 Weather and Rain Event Tracking

Stormwater sampling and visual observations will be conducted during Qualified Storm Events (QSEs). A QSE is defined as any precipitation event that produces a discharge for at least one drainage area and is preceded by 48 hours with no discharge from any drainage area. Weather and precipitation forecasts will be tracked to identify potential QSEs.

When targeting a QSE for stormwater sampling, the appropriate team member will weekly consult the National Oceanographic and Atmospheric Administration (NOAA) for weather forecasts. These forecasts can be obtained at http://www.srh.noaa.gov/. If weekly forecasts indicate potential for significant precipitation, the weather forecast will be closely monitored during the 48 hours preceding the event. Weather reports with precipitation data should be printed and maintained with the SWPPP in MIP Attachment 1 “Weather Reports” to document precipitation totals and antecedent conditions.

5.3 Monitoring Locations

Monitoring locations are shown on the Site Maps in Appendix A. Monitoring locations are described in Section 5.6.

Whenever changes in facility operations might affect the appropriateness of sampling locations, the sampling locations will be revised accordingly. All such revisions will be implemented as soon as feasible and the SWPPP amended.

5.4 Sample Collection and Visual Observation Exceptions

Safety practices for sample collection will be in accordance with the safety protocols of the facility. A summary of the safety requirements that apply to sampling personnel is provided below.

- During dangerous weather conditions such as flooding and electrical storms, samples or visual observations are not required.
- Samples or visual observations are not required outside of business hours (business hours are presented in Section 2.2).

If monitoring (visual observations or sample collection) of the site is unsafe because of the dangerous conditions noted above then the appropriate team member will document the conditions for why an exception to performing the monitoring was necessary. The exception documentation will be filed in MIP Attachment 2 "Monitoring Records."

5.5 Visual Observation Procedures

Visual monitoring includes observations of drainage areas, BMPs, and discharge locations.

- Observations of BMPs are required to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended.
- Observations of the drainage areas are required to identify any spills, leaks, uncontrolled pollutant sources, and non-stormwater discharges.
- Observations of discharge locations are required to identify the presence of visible pollutants in stormwater discharged from the facility.

Visual observations will be performed at least once every calendar month during dry conditions. Visual observations will also be performed during stormwater sampling events when discharge is occurring.

5.5.1 Monthly Visual Observations

Monthly visual observations are necessary to document the presence of and to identify the source of any pollutants and non-stormwater flows. These should consist of observations of the outdoor facility operations, BMPs, and NSWD observations.

These inspections shall be recorded on the appropriate inspection form:

- Monthly Visual Inspection Form- 1
- Monthly Visual Inspection Form- 2: Routing Maintenance
- Monthly Visual Inspection Form- 3: Erosion Controls

In the event that monthly visual observations are not performed, an explanation must be provided in the annual report.

5.5.1.1 Outdoor Facility Operations Observations

Observe potential sources of industrial pollutants including industrial equipment and storage areas, and outdoor industrial activities. Record observations of:

- Spills or leaks; and
- Uncontrolled pollutant sources

5.5.1.2 BMP Observations

Observe BMPs to identify and record:

- BMPs that are properly implemented;
- BMPs that need maintenance to operate effectively;
- BMPs that have failed; or
- BMPs that could fail to operate as intended.

5.5.1.3 Non-Stormwater Discharge Observations

Observe each drainage area for the presence of or indications of prior unauthorized and authorized non-stormwater discharges. Record:

- Presence or evidence of any non-stormwater discharge (authorized or unauthorized);

- Pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.); and
- Source of discharge.

For authorized non-stormwater discharges, also document whether BMPs are in place and are functioning to prevent contact with materials or equipment that could introduce pollutants

5.5.2 Sampling Event Visual Observations

Sampling event visual observations evaluate the general appearance of the stormwater as an indicator of potential pollutants. These observations will be conducted at the same time sampling occurs at the discharge locations identified in Section 5.6.2. At each discharge location where a sample is obtained, record observations of:

- Floating and suspended materials;
- Oil and grease;
- Discoloration;
- Turbidity;
- Odors; and
- Trash.

When pollutants are observed in the discharged stormwater, follow-up observations of the drainage area will be conducted to identify the probable source of the pollutants.

In the event that a discharge location is not visually observed during the sampling event, the location of the discharge and reasoning for not obtaining observations must be recorded.

5.5.3 Visual Monitoring Procedures

Visual monitoring will be conducted by the facility operator and the safety manager. The names and contact numbers of the site visual monitoring personnel are listed below, and their training qualifications are provided in Appendix C.

Assigned inspector: Jason Voss	Contact phone: 408-640-6160
Alternate inspector: Julio Cazares	Contact phone: 408-603-6134

Visual observations will be documented on the *Visual Observation Log* (see MIP Attachment 3 “Example Forms”). Visual observations will be supplemented with a site-specific BMP inspection checklist. Photographs used to document observations will be referenced on the *Visual Observation Log* and maintained with the Monitoring Records in Attachment 2.

The completed logs and checklists will be kept in MIP Attachment 2 “Monitoring Records.”

5.5.4 Visual Monitoring Follow-Up and Reporting

Correction of deficiencies identified by the observations, including required repairs or maintenance of BMPs, will be initiated and completed as soon as possible. Response actions will include the following:

- Report observations to the Pollution Prevention Team Leader or designated individual;
- Identify and implement appropriate response actions;
- Determine if SWPPP update is needed;
- Verify completion of response actions; and
- Document response actions.

If identified deficiencies require design changes, including additional BMPs, the implementation of changes will be completed as soon as possible, and the SWPPP will be amended to reflect the changes.

BMP deficiencies identified in site observation reports and correction of deficiencies will be tracked on the *BMP Observation Checklist* and will be retained in Appendix I.

Results of visual monitoring must be summarized and reported in the Annual Report.

5.5.5 Visual Monitoring Locations

The observations identified in Sections 5.5.1 and 5.5.2 will be conducted at the locations identified in this section.

Visual monitoring locations are shown on the Site Maps in SWPPP Appendix A.

There are seven drainage areas onsite. Drainage areas are shown on the Site Maps in Appendix A and are identified in Table 5.1.

Table 5.1: Facility Drainage Areas

Location Identifier	Drainage Area Name
1	Drainage Area No. 1
2	Drainage Area No. 2
3	Drainage Area No. 3
4	Drainage Area No. 4
5	Drainage Area No. 5
6	Drainage Area No. 6
Pit Pond	Drainage Area No. 7 (Pit Pond)

There are 6 discharge locations onsite. Site stormwater discharge locations are shown on the Site Maps in Appendix A and Table 5.2 identifies each stormwater discharge location.

Table 5.2: Stormwater Discharge Locations

Location Identifier	Associated Drainage Area	Discharge Location
OF-1	Drainage Area No. 1	Former Sediment Pond No. 1 (Rattlesnake Creek)
OF-2	Drainage Area No. 2	Swiss Creek
OF-3	Drainage Area No. 3	Swiss Creek
OF-4	Drainage Area No. 4	Swiss Creek
OF-5	Drainage Area No. 5	Rattlesnake Creek
OF-6	Drainage Area No. 6	Former Sediment Pond No. 2 (Rattlesnake Creek)

There is one stormwater storage or containment area onsite. The stormwater storage or containment area is shown on the Site Maps in Appendix A and Table 5.3 identifies the stormwater storage or containment area by location.

Table 5.3: Stormwater Storage and Containment Areas

Location Identifier	Description of Containment (Note Drainage Area in which the containment is Located)
Metal Stormwater Tank	Drainage Area No. 2

5.6 Sampling and Analysis Procedures

This section describes the methods and procedures that will be followed for stormwater sampling and analysis. It contains information for sampling schedule, sampling locations, monitoring preparation, analytical constituents, sample collection, sample analysis, and data evaluation and reporting.

5.6.1 Routine Industrial General Permit Monitoring

Stormwater samples at each discharge location will be collected and analyzed from two (2) QSEs within the first half of each reporting year (July 1 to December 31), and two (2) QSEs within the second half of each reporting year (January 1 to June 30).

A QSE is a precipitation event that:

- Produces a discharge for at least one drainage area; and
- Is preceded by 48 hours with no discharge from any drainage area.

5.6.1.1 Sampling Schedule

As part of the routine IGP, the facility is responsible for a total of six (6) sampling locations. Samples for the 6 locations shall be taken within 4-hours of the start of a rain event or at the start of the facility operation if the QSE occurs within the previous 12-hour period. The number of storm events needed to meet the routine IGP requirements are shown in Table 5.4.

Table 5.4: Routine IGP Sampling Schedule

Sample Location Number	Routine Sampling
OF-1	4 Storms
OF-2	4 Storms
OF-3	4 Storms
OF-4	4 Storms
OF-5	4 Storms
OF-6	4 Storms

5.6.1.2 Sampling Locations

Sampling locations include all locations where stormwater is discharged from the site. Discharge locations are shown on the Site Maps in Appendix A and are included in Table 5.5. A total of six discharge locations have been identified on the project site for the collection of stormwater runoff samples.

Table 5.5: Sample Locations for QSE

Sample Location Number	Sample Location Description	Sample Location Latitude and Longitude
OF-1	Culvert that discharges to Former Sediment Pond No. 1 representing runoff from the Upper Quarry conveyed through Pond 5.	37°18'3.4"N, 122°5'31.9"W
OF-2	Culvert that discharges to Rattlesnake Creek representing runoff from Middle Quarry conveyed through Sediment Trap No.1	37°17'46.5"N, 122°5'6.9"W
OF-3	Culvert that discharges to Swiss Creek representing runoff from Recycle Plant area conveyed through Sediment Trap No.2	37°17'46.1"N, 122°5'6.6"W
OF-4	Culvert that discharges to Swiss Creek representing runoff from Lower Quarry area conveyed through Sediment Trap No.3	37°17'44.8"N, 122°5'5.1"W
OF-5	Culvert that discharges to Swiss Creek representing runoff from road between upper quarry and creek	37°18'3.4"N, 122°5'40.6"W
OF-6	Culvert that discharges to Former Sediment Pond No. 2 representing runoff from Upper Quarry Sand Plant area discharged to former sediment pond No.2	37°18'2.4"N, 122°5'25.5"W

5.6.2 Monitoring Preparation

Samples on the project site will be collected by the following sampling personnel:

Name/Telephone Number:	Jason Voss/408-640-6160
Alternate(s)/Telephone Number:	Julio Cazares /408-603-6134

An adequate stock of monitoring supplies and equipment for sampling will be available onsite prior to a sampling event. Monitoring supplies and equipment will be stored in a cool temperature environment that will not come into contact with rain or direct sunlight. Sampling personnel will be available to collect samples in accordance with the sampling schedule. Supplies maintained at the facility will include, but are not limited to: clean powder-free nitrile gloves; sample collection equipment; coolers; appropriate number and volume of sample containers; identification labels; re-sealable storage bags; paper towels; personal rain gear; ice; and *Sampling Field Log Sheets* and Chain of Custody (CoC) forms, which are provided in MIP Attachment 3 “Example Forms.”

5.6.3 Analytical Constituents

Table 5.6 identifies the constituents required for sampling and analysis.

Table 5.6: Analytical Constituents for Routine Monitoring

Constituent	Reason
pH[1,2]	Basic Required Constituent
Total Suspended Solids[1] (TSS)	Basic Required Constituent
Oil and grease	Basic Required Constituent
Nitrate & Nitrite as Nitrogen[1]	Pollutant Source Assessment Constituent
Iron[1]	Pollutant Source Assessment Constituent
Copper, Total	Requirement per the October 11, 2019 NOV
Magnesium, Total	Requirement per the October 11, 2019 NOV
Selenium	Requirement per the October 11, 2019 NOV
Aluminum, Total	Requirement per an RWQCB email dated January 15, 2020
Notes: 1. Analytes that exceeded Industrial Stormwater General Permit numeric action levels. 2. Field measurements	

5.6.4 Sample Collection

Samples of discharge will be collected at the designated sampling locations shown on the Site Maps in Appendix A. Samples from each discharge location will be collected within four hours of:

- The start of the discharge; or
- The start of facility operations if the QSE occurs within the previous 12-hour period.

Sample collection is required during scheduled facility operating hours and when sampling conditions are safe.

Grab samples will be collected and preserved in accordance with the methods identified in Table 5.8, "Sample Collection and Analysis" provided in Section 5.6.5. Only team members properly trained in water quality sampling will collect samples.

The facility is subject to Subchapter N ELGs mandating pH analysis and has entered Level 1 Status for pH. Grab samples will be collected and analyzed for pH using a calibrated portable instrument of pH. The pH analysis will be performed as soon as practicable, but no later than 15 minutes after sample collection. Instrument calibration requirements and manufacturer information in MIP Attachment 4 "Field Meter Instructions".

Samples from different discharge locations will not be combined or composited prior to shipment to the analytical laboratory. Sample collection and handling requirements are described in Section 5.8.

5.6.5 Sample Analysis

Samples will be analyzed by the laboratory as detailed in Table 5.7. Samples will be analyzed using the analytical methods identified in Table 5.8.

Table 5.7: Laboratory Details

Laboratory Name:	ACCUTEST Laboratories
Street Address:	2105 Lundy Avenue
City, State Zip:	San Jose, CA 95131
Telephone Number:	408-588-0200
Point of Contact:	Elvin Kumar
ELAP Certification Number:	ANAB L2229

Samples will be delivered to the laboratory by:

Facility Personnel	☒	Yes	☐	No
Picked up by Laboratory Courier	☐	Yes	☐	No
Shipped	☐	Yes	☐	No

Table 5.8: Sample Collection and Analysis

Constituent	Analytical Method	Annual NAL	Instantaneous Maximum NAL	Reporting Units
Total suspended solids	SM[a] 2540-D	100	400	mg/L
Oil and grease	EPA 1664A	15	25	mg/L
Iron	EPA[b] 200.8	1.0	N/A	mg/L
Nitrate + Nitrite (as N)	SM[a] 4500-NO3-E	0.68	N/A	mg/L
pH[3]	Methods in accordance with 40 Code of Federal Regulations 136 for testing storm water or use a calibrated portable instrument for temperature	N/A	Less than 6.0, greater than 9.0	pH units
Copper, Total	EPA 200.8	0.0332	N/A	mg/L
Magnesium, Total	EPA 200.8	0.064	N/A	mg/L
Selenium, Total	EPA 200.8	0.005	N/A	mg/L
Aluminum, Total	EPA 200.8	0.75	N/A	mg/L

Notes:

1. SM- Standard Method for the Examination of Water and Wastewater, 18th Edition.
2. U.S. EPA Test Methods
3. Source: National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Industrial Activities, April 1, 2014

5.6.6 Data Evaluation and Reporting

The designated member of the Pollution Prevention Team will complete an evaluation of the water quality sample analytical results.

All sampling and analytical results for all samples will be submitted via SMARTS within 30 days of obtaining all results for each sampling event.

The method detection limit will be provided when an analytical result from samples taken is reported by the laboratory as a “non-detect” or less than the method detection limit. A value of zero will not be reported.

Analytical results that are reported by the laboratory as below the minimum level (often referred to as the reporting limit) but above the method detection limit will be provided.

Reported analytical results will be averaged automatically by SMARTS at the end of the reporting year. For any calculations required by the General Permit a value of zero shall be used, all effluent sampling analytical results that are reported by the laboratory as “non-detect” or less than the Method Detection Limit (MDL).

5.7 Training of Sampling Personnel

Sampling personnel will be trained to collect, maintain, and ship samples in accordance with the General Permit and this SWPPP. Training records of designated sampling personnel are provided in Appendix C.

The stormwater sampler has received the following stormwater sampling training:

Name	Training
Jason Voss	Grab sampling
Julio Cazares	Grab sampling

5.8 Sample Collection and Handling

5.8.1 Sample Collection

Samples will be collected at the designated sampling locations shown on the Site Map(s) and listed in the preceding sections. Samples will be collected, maintained and shipped in accordance with the requirements in the following sections.

Grab samples will be collected and preserved in accordance with the methods identified in preceding sections.

To maintain sample integrity and prevent cross-contamination, sample collection personnel will follow the protocols below.

- Collect samples (for laboratory analysis) only in analytical laboratory-provided sample containers;
- Wear clean, powder-free nitrile gloves when collecting samples;
- Change gloves whenever something not known to be clean has been touched;
- Change gloves between sites;
- Decontaminate all equipment (e.g. bucket, tubing) prior to sample collection using a trisodium phosphate water wash, distilled water rinse, and final rinse with distilled water. (Dispose of wash and rinse water appropriately, i.e., do not discharge to storm drain or receiving water). Do not decontaminate laboratory provided sample containers;
- Do not smoke during sampling events;
- Never sample near a running vehicle;
- Do not park vehicles in the immediate sample collection area (even non-running vehicles);
- Do not eat or drink during sample collection; and
- Do not breathe, sneeze, or cough in the direction of an open sample container.

The most important aspect of grab sampling is to collect a sample that represents the entire runoff stream. Typically, samples are collected by dipping the collection container in the runoff flow paths and streams as noted below.

- For small streams and flow paths, simply dip the bottle facing upstream until full.

- For larger stream that can be safely accessed, collect a sample in the middle of the flow stream by directly dipping the mouth of the bottle. Once again making sure that the opening of the bottle is facing upstream as to avoid any contamination by the sampler.
- For larger streams that cannot be safely waded, pole-samplers may be needed to safely access the representative flow.
- Avoid collecting samples from ponded, sluggish or stagnant water.
- Avoid collecting samples directly downstream from a bridge as the samples can be affected by the bridge structure or runoff from the road surface.
- Do not stand upstream of the sampling point within the flow path.

Note, that depending upon the specific analytical test, some containers may contain preservatives. These containers should **never** be dipped into the stream but filled indirectly from the collection container.

5.8.2 Sample Handling

Field pH measurements must be conducted immediately. Do not store pH samples for later measurement.

Samples for laboratory analysis must be handled as follows. Immediately following sample collection:

- Cap sample containers;
- Complete sample container labels;
- Sealed containers in a re-sealable storage bag;
- Place sample containers into an ice-chilled cooler;
- Document sample information on the *Sampling Field Log Sheet*; and
- Complete the CoC.

All samples for laboratory analysis must be maintained between 0-6 degrees Celsius during delivery to the laboratory. Samples must be kept on ice, or refrigerated, from sample collection through delivery to the laboratory. Place samples to be shipped inside coolers with ice. Make sure the sample bottles are well packaged to prevent breakage and secure cooler lids with packaging tape.

Ship samples that will be laboratory analyzed to the analytical laboratory right away. Hold times are measured from the time the sample is collected to the time the sample is analyzed. The General Permit requires that samples be received by the analytical laboratory within 48 hours of the physical sampling (unless required sooner by the analytical laboratory).

5.8.3 Sample Documentation Procedures

All original data documented on sample bottle identification labels, *Sampling Log*, and CoCs will be recorded using waterproof ink. If an error is made on a document, sampling personnel will make corrections by lining through the error and entering the correct information. The erroneous information will not be obliterated. All corrections will be initialed and dated.

Duplicate samples will be identified consistent with the numbering system for other samples to prevent the laboratory from identifying duplicate samples. Duplicate samples will be identified in the Sampling Log.

Sample documentation procedures include the following:

<u>Sample Bottle Identification Labels:</u> Sampling personnel will attach an identification label to each sample bottle. Sample identification will uniquely identify each sample location.

<u>Field Log Sheets:</u> Sampling personnel will complete the *Effluent Sampling Field Log Sheet* and *Receiving Water Sampling Field Log Sheet* for each sampling event, as appropriate.

<u>Chain of Custody:</u> Sampling personnel will complete the CoC for each sampling event for which samples are collected for laboratory analysis. The sampler will sign the CoC when the sample(s) is turned over to the testing laboratory or courier.

5.9 <u>Quality Assurance and Quality Control</u>

An effective Quality Assurance and Quality Control (QA/QC) plan will be implemented as part of the IMP to ensure that analytical data can be used with confidence. QA/QC procedures to be initiated include the following:

- Field logs;
- Clean sampling techniques;

- CoCs;
- QA/QC Samples; and
- Data verification.

Each of these procedures is discussed in more detail in the following sections.

5.9.1 Field Logs

The purpose of field logs is to record sampling information and field observations during monitoring that may explain any uncharacteristic analytical results. Sampling information to be included in the field log include the date and time of water quality sample collection, sampling personnel, sample container identification numbers, and types of samples that were collected. Field observations should be noted in the field log for any abnormalities at the sampling location (color, odor, BMPs, etc.). Field measurements for pH and turbidity should also be recorded in the field log. A Visual Inspection Field Log, an Effluent Sampling Field Log Sheet, and a Receiving water Sampling Field Log Sheet are included in MIP Attachment 3 “Example Forms”.

5.9.2 Clean Sampling Techniques

Clean sampling techniques involve the use of certified clean containers for sample collection and clean powder-free nitrile gloves during sample collection and handling. As discussed in Section 6.8, adoption of a clean sampling approach will minimize the chance of field contamination and questionable data results.

5.9.3 Chain of Custody

The sample CoC is an important documentation step that tracks samples from collection through analysis to ensure the validity of the sample. Sample CoC procedures include the following:

- Proper labeling of samples;
- Use of CoC forms for all samples; and
- Prompt sample delivery to the analytical laboratory.

Analytical laboratories usually provide CoC forms to be filled out for sample containers. An example CoC is included in MIP Attachment 3 “Example Forms”.

5.9.4 QA/QC Samples

QA/QC samples provide an indication of the accuracy and precision of the sample collection; sample handling; field measurements; and analytical laboratory methods. The following types of QA/QC will be conducted for this project:

☒ Field Duplicates at a frequency of 5 percent or 1 duplicate minimum per sampling event
(Required for all sampling plans with field measurements or laboratory analysis)

☒ Field Blanks at a frequency required by method, if applicable.
(Only required if sampling method calls for field blanks)

☒ Travel Blanks at a frequency required by method, if applicable
(Required for sampling plans that include VOC laboratory analysis)

5.9.4.1 Field Duplicates

Field duplicates provide verification of laboratory or field analysis and sample collection. Duplicate samples will be collected, handled, and analyzed using the same protocols as primary samples. The sample location where field duplicates are collected will be randomly selected from the discharge locations. Duplicate samples will be collected immediately after the primary sample has been collected. Duplicate samples must be collected in the same manner and as close in time as possible to the original sample. Duplicate samples will not influence any evaluations or conclusion.

5.9.4.2 Equipment Blanks

Equipment blanks provide verification that equipment has not introduced a pollutant into the sample. Equipment blanks are typically collected when:

- New equipment is used;
- Equipment that has been cleaned after use at a contaminated site;
- Equipment that is not dedicated for surface water sampling is used; or
- Whenever a new lot of filters is used when sampling metals.

5.9.4.3 Field Blanks

Field blanks assess potential sample contamination levels that occur during field sampling activities. De-ionized water field blanks are taken to the field, transferred to the appropriate container, and treated the same as the corresponding sample type during the course of a sampling event.

5.9.4.4 Travel Blanks

Travel blanks assess the potential for cross-contamination of volatile constituents between sample containers during shipment from the field to the laboratory. De-ionized water blanks are taken along for the trip and held unopened in the same cooler with the VOC samples.

5.9.5 Data Verification

After results are received from the analytical laboratory, the facility will verify the data to ensure that it is complete, accurate, and the appropriate QA/QC requirements were met. Data must be verified as soon as the data reports are received. Data verification will include:

- Check the CoC and laboratory reports. Make sure all requested analyses were performed and all samples are accounted for in the reports.
- Check laboratory reports to make sure hold times were met and that the reporting levels meet or are lower than the reporting levels agreed to in the contract.
- Check data for outlier values and follow up with the laboratory. *Occasionally typographical errors, unit reporting errors, or incomplete results are reported and should be easily detected. These errors need to be identified, clarified, and corrected quickly by the laboratory. Especially note data that is an order of magnitude or more different than similar locations, or is inconsistent with previous data from the same location.*
- Check laboratory QA/QC results. USEPA establishes QA/QC checks and acceptable criteria for laboratory analyses. These data are typically reported along with the sample results. Evaluate the reported QA/QC data to check for contamination (method, field, and equipment blanks), precision (laboratory matrix spike duplicates), and accuracy (matrix spikes and laboratory control samples). When QA/QC checks are outside acceptable ranges, the laboratory must flag the data, and usually provides an explanation of the potential impact to the sample results.
- Check the data set for outlier values and accordingly, confirm results and re-analyze samples where appropriate. Sample re-analysis should only be undertaken when it appears that some part of the QA/QC resulted in a value out

of the accepted range. Sample results may not be discounted unless the analytical laboratory identifies the required QA/QC criteria were not met and confirms this in writing.

Field data including pH measurements and visual observations must be verified as soon as the Visual Observation and Sampling Logs are received, typically at the end of the monitoring event. Field data verification will include:

- Check logs to make sure all required measurements were completed and appropriately documented;
- Check reported values that appear out of the typical range or inconsistent; *Follow-up immediately to identify potential reporting or equipment problems, if appropriate, recalibrate equipment after sampling;*
- Verify equipment calibrations;
- Review observations noted on the logs; and
- Review notations of any errors and actions taken to correct the equipment or recording errors.

5.10 Records Retention

Records of stormwater monitoring information and copies of reports (including Annual Reports) must be retained for a period of at least five (5) years from date of submittal or longer if required by the Regional Water Board.

Results of visual observations, field measurements, and laboratory analyses must be kept in the SWPPP along with CoCs, and other documentation related to the monitoring.

Records to be retained include:

- The date, place, and time of inspections, sampling, visual observations, and/or measurements, including precipitation;
- The individual(s) who performed the inspections, sampling, visual observation, and/or field measurements;
- The date and approximate time of field measurements and laboratory analyses;
- The individual(s) who performed the laboratory analyses;
- A summary of all analytical results, the method detection limits and reporting limits, and the analytical techniques or methods used;

- Weather reports;
- QA/QC records and results;
- Calibration records;
- Visual observation and sample collection exception records; and
- The records of any corrective actions and follow-up activities that resulted from analytical results, visual observations, or inspections.

6. REFERENCES

State Water Resources Control Board (2014). Order 2014-0057-DWQ, NPDES General Permit No. CAS000001: National Pollutant Discharges Elimination System (NPDES) California General Permit for Storm Water Discharge Associated with Industrial Activities. Available on-line at:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/industrial.shtml.

State Water Resources Control Board (2016) Inspection Report, Stevens Creek Quarry, Inc. WDID 2 43I006687

San Francisco Bay Regional Water Quality Control Board (2017) Notice of Violation and Water Code Section 13267 Requirement for Technical Report, Stevens Creek Quarry, Inc., Cupertino, Santa Clara County

San Francisco Bay Regional Water Quality Control Board (2017) Failure to meet requirements in May 30, 2017, Notice of Violation and Water Code Section 13267 Requirement for Technical Report

San Francisco Bay Regional Water Quality Control Board (2018) Notice of Violation and Water Code Section 13267 Requirement for Technical Report

San Francisco Bay Regional Water Quality Control Board (2018) Technical Report Order Per Water Code Section 13267, Stevens Creek Quarry, Inc., Santa Clara County

MIP Attachment 1:
Weather Reports

MIP Attachment 2:
Monitoring Records

MIP Attachment 3:
Example Forms

VISUAL OBSERVATION LOG – MONTHLY	
Date and Time of Inspection:	Report Date:
Facility Name:	
Weather	
Antecedent Conditions (last 48 hours):	Current Weather:
NSWD Observations	
Were any authorized non-stormwater discharges observed?	Yes ☐ No ☐
Were any **<u>unauthorized</u>** non-stormwater discharges observed?	Yes ☐ No ☐
If yes to either, identify source:	
Outdoor Industrial Equipment and Storage Area Observations	
Complete Monthly BMP Inspection Report	Yes ☐ No ☐
Drainage Area 1:	Were any deficiencies or any other potential source of industrial pollutants observed? Yes ☐ No ☐
Drainage Area 2:	Were any deficiencies or any other potential source of industrial pollutants observed? Yes ☐ No ☐
Drainage Area 3:	Were any deficiencies or any other potential source of industrial pollutants observed? Yes ☐ No ☐
If yes to any, describe:	

Exception Documentation (Explanation required if inspection could not be conducted).	
Inspector Information	
Inspector Name:	Inspector Title:

VISUAL OBSERVATION LOG – MONTHLY	
Signature:	Date:

VISUAL OBSERVATION LOG – SAMPLING EVENTS			
Date and Time of Inspection:		Report Date:	
Facility Name:			
Weather			
Antecedent Conditions (last 48 hours):		Weather:	
Precipitation Total:		Predicted % chance of rain:	
Estimate storm beginning: ______________________ (date and time)	Estimate storm duration:_________ (hours)	Estimate time since last storm: ________ (days or hours)	Rain gauge reading: _______ (inches)
Sampling Event Observations			
Observations: If yes identify location and observe drainage area to identify probable cause			
Odors	Yes ☐ No ☐		
Floating material	Yes ☐ No ☐		
Suspended Material	Yes ☐ No ☐		
Sheen	Yes ☐ No ☐		
Discolorations	Yes ☐ No ☐		
Turbidity	Yes ☐ No ☐		
NSWD Observations			
Were any authorized non-stormwater discharges observed?		Yes ☐ No ☐	
Were any **unauthorized** non-stormwater discharges observed?		Yes ☐ No ☐	
If yes to either, identify source			
Drainage Area Observations			
Drainage Area		**Deficiencies Noted**	

<table>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td colspan="2">Exception Documentation
(Explanation required if inspection could not be conducted).</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2">Inspector Information</td></tr>
<tr><td>Inspector Name:</td><td>Inspector Title:</td></tr>
<tr><td>Signature:</td><td>Date:</td></tr>
</table>

SAMPLING LOG

Facility Name:	Date:	Time Start:

Sampler Name:

Field Meter Calibration

pH Meter ID No./Description:

Calibration Date/Time:

Field pH Measurements

Discharge Location Identifier	pH	Time

Samples Collected

Discharge Location Identifier	Constituent	Time
	Oil and Grease	
	Total Suspended Solids	

Additional Sampling Notes:

Time End:

CHAIN-OF-CUSTODY **DATE:** **Lab ID:**

DESTINATION LAB:								REQUESTED ANALYSIS					Notes:
	ATTN:												
ADDRESS:													
Office Phone:													
Cell Phone:													
SAMPLED BY:													
Contact:													
	Facility Name												
Client Sample ID	**Sample Date**	**Sample Time**	**Sample Matrix**	**Container**									
				#	**Type**	**Pres.**							

SENDER COMMENTS:	**RELINQUISHED BY**	
	Signature:	
	Print:	
	Company:	
	Date:	TIME:
LABORATORY COMMENTS:	**RECEIVED BY**	
	Signature:	
	Print:	
	Company:	
	Date:	TIME:

MIP Attachment 4:
Field Meter Instructions

MIP Attachment 5:
Other Regulatory Documents

APPENDIX A
Site Maps

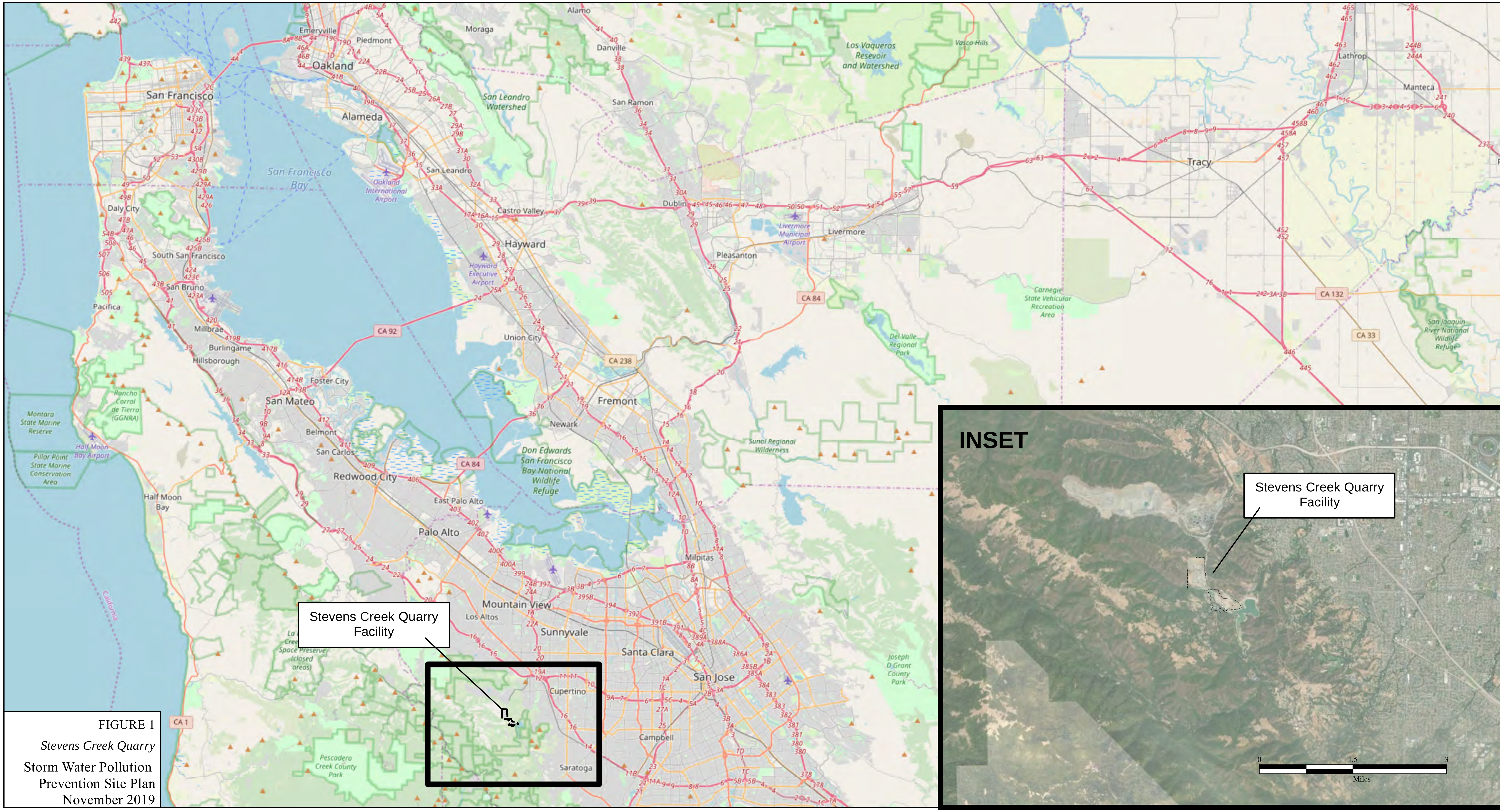


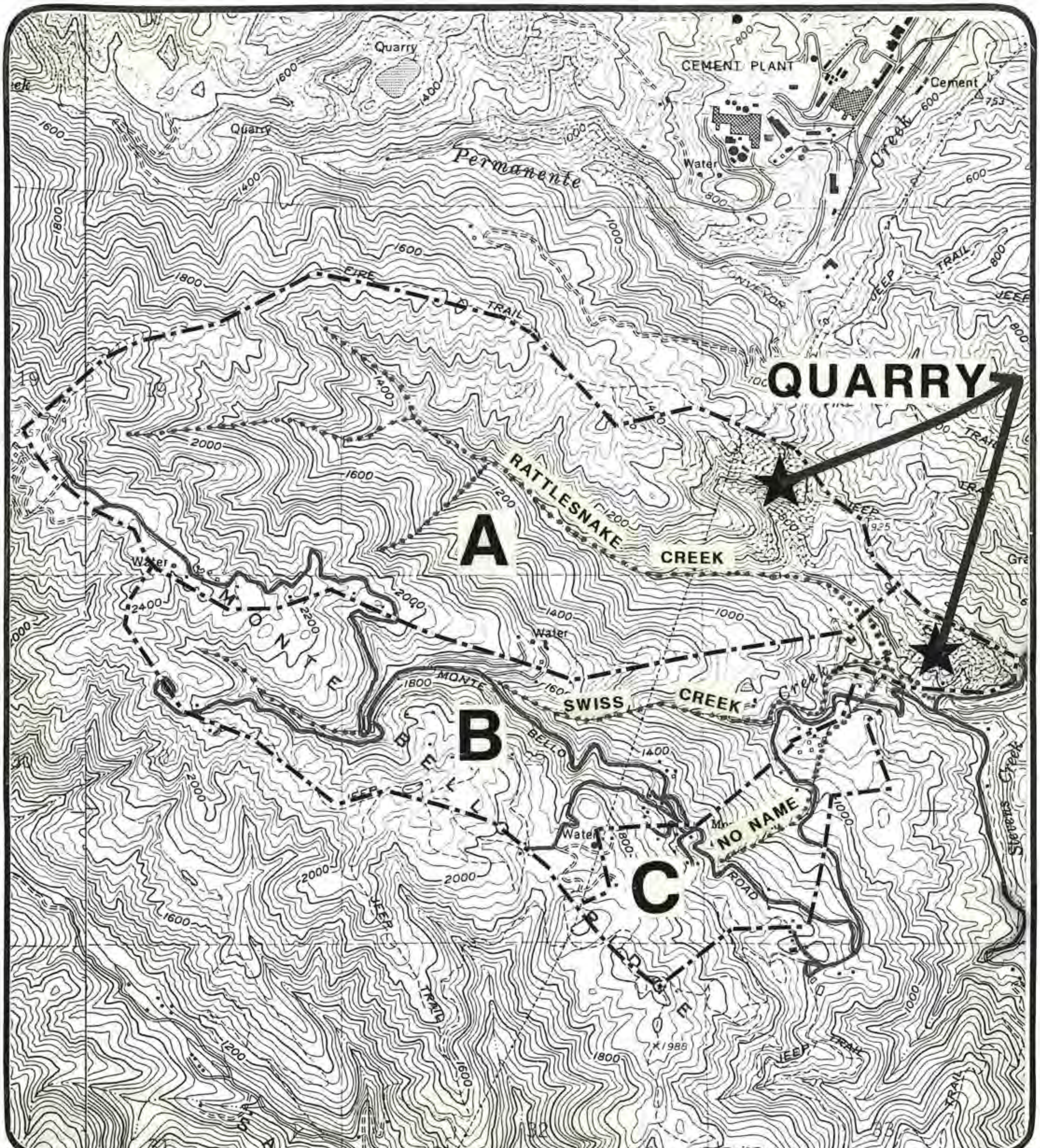
FIGURE 1
Stevens Creek Quarry
Storm Water Pollution Prevention Site Plan
November 2019

LEGEND

Property Line

N

0 5 10
Miles



DRAINAGE BASIN PLAN

SCALE 0 2000

DRAINAGE BASIN
A RATTLESNAKE CREEK
B SWISS CREEK
C NO NAME TRIBUTARY

CREEK

LSA

Figure 2
November 2011

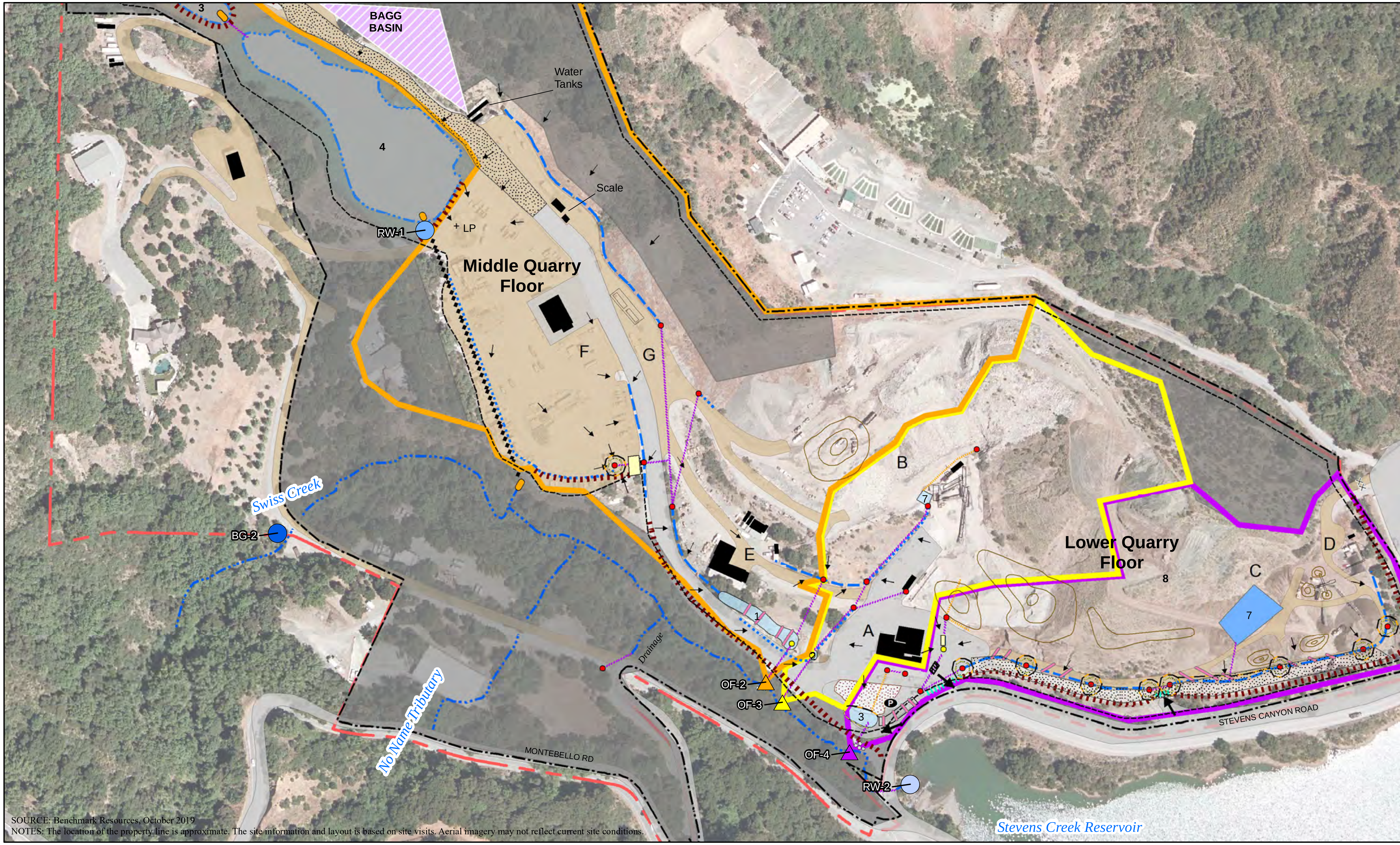


FIGURE 3a
Layout of Lower and Middle Quarry Floor
Stevens Creek Quarry
December 2020

LEGEND

- A Office, Scale House, Scale
- B Recycle Plant
- C Topsoil Plant
- D Garden Waste Recycle Center
- E Quarry Maintenance/Storage
- F Voss Trucking
- G Fueling Area and Fuel Tanks

Property Line; Ingress/Egress; Building; Structure; Paved Road; Gravel Road; Unpaved Road; Gravel/Rock Surface; Non-Industrial Areas; Stockpile; Earth Berm; Paved Berm; xxxx Gate; Creek; Drainage Ditch; Concrete Swale; Direction of Flow; Sediment Trap and ID Number; Former Sediment Pond and Number; Future Sediment Pond (Approximate Location); Metal Stormwater Tank; Drop Inlet; Stand Pipe; Weir; Low Point; Bypass Pipe; Culvert; French Drain; Grate; Portable Toilet; Check Dam; Coir Wattles; Rock Lining; 4x8 Rock

Drainage Areas
2
3
4

Monitoring Locations
OF-2 OF-3 OF-4 BG-2 RW-1 RW-2

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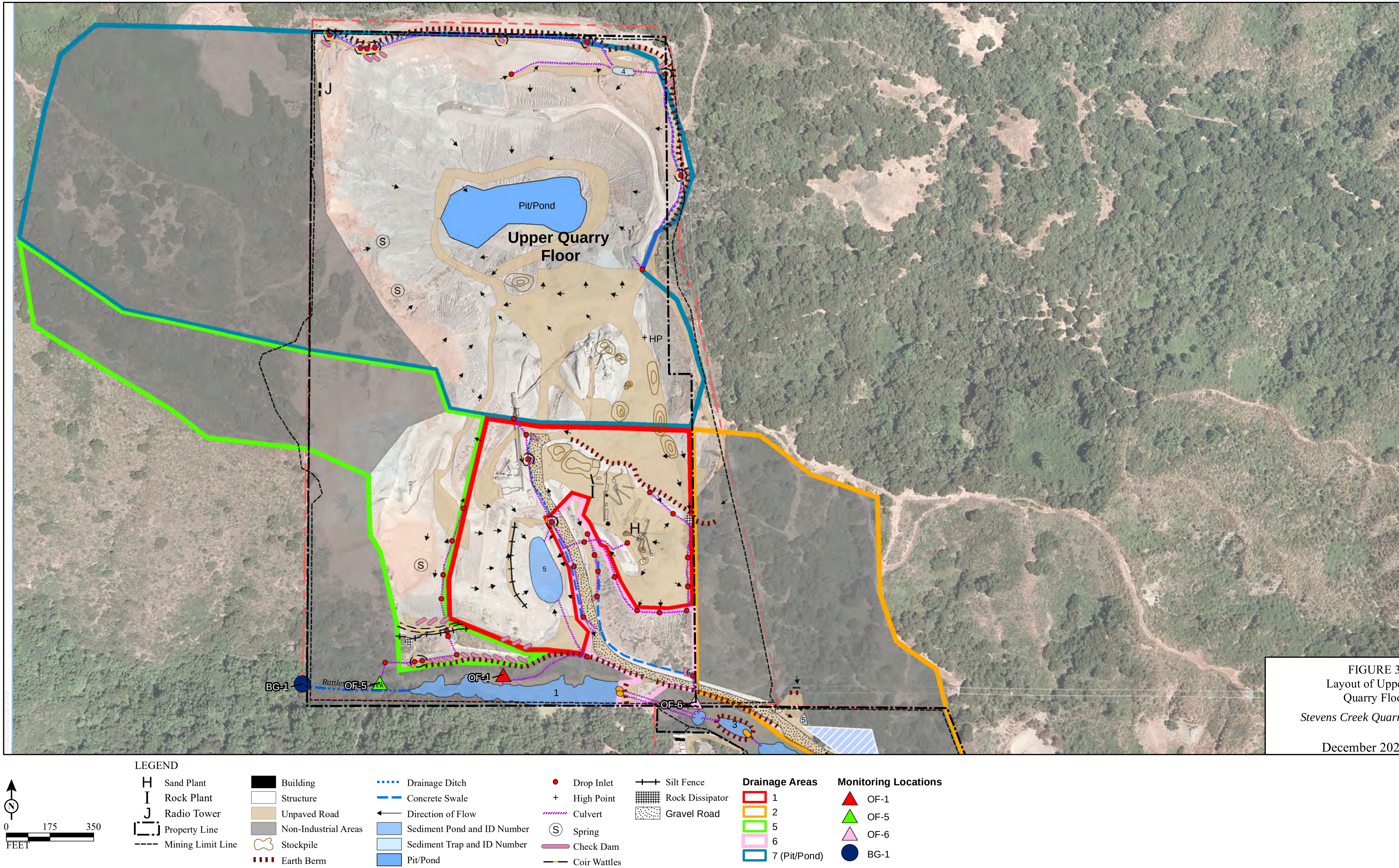

FIGURE 3b
Layout of Upper Quarry Floor

Stevens Creek Quarry

December 2020

SOURCE: Benchmark Resources, October 2019

NOTES: The location of the property line is approximate. The site information and layout is based on site visits. Aerial imagery may not reflect current site conditions.

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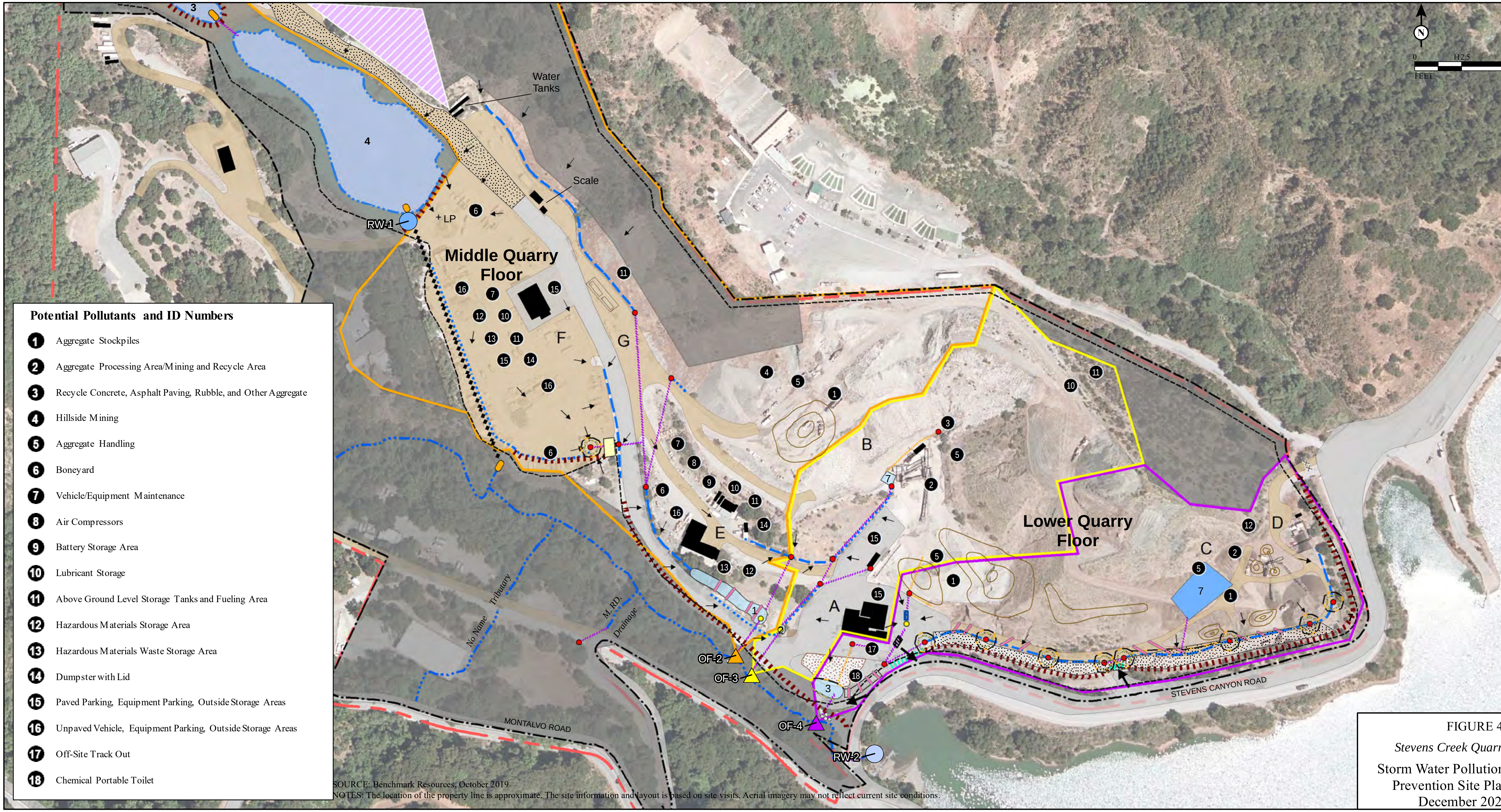

FIGURE 4a

Stevens Creek Quarry

Storm Water Pollution Prevention Site Plan

December 2020

LEGEND

- A Office, Scale House, Scale
- B Recycle Plant
- C Topsoil Plant
- D Garden Waste Recycle Center
- E Quarry Maintenance/Storage
- F Voss Trucking
- G Fueling Area and Fuel Tanks

Property Line; Mining Limit Line; Ingress/Egress; Building; Structure; Paved Road; Unpaved Road; Gravel/Rock Surface; Non-Industrial Areas; Stockpile; Earth Berm; Paved Berm; Gate; Creek; Drainage Ditch; Concrete Swale; Direction of Flow; Sediment Trap; Sediment Pond; Rattlesnake Creek Pond; Planned New Sediment Pond (Approximate); Concrete Drainage Box; Metal Stormwater Tank; Drop Inlet; Stand Pipe; Weir; Check Dam; Low Point; Bypass Pipe; Culvert; French Drain; Grate; Portable Toilet; Check Dam; Rock Berm; Coir Wattles; Silt Fence; Rock Dissipator; Rock Lining; 4x8 Rock; Gravel Road

Drainage Areas

- 2
- 3
- 4

Monitoring Locations

- OF-2
- OF-3
- OF-4
- RW-1
- RW-2

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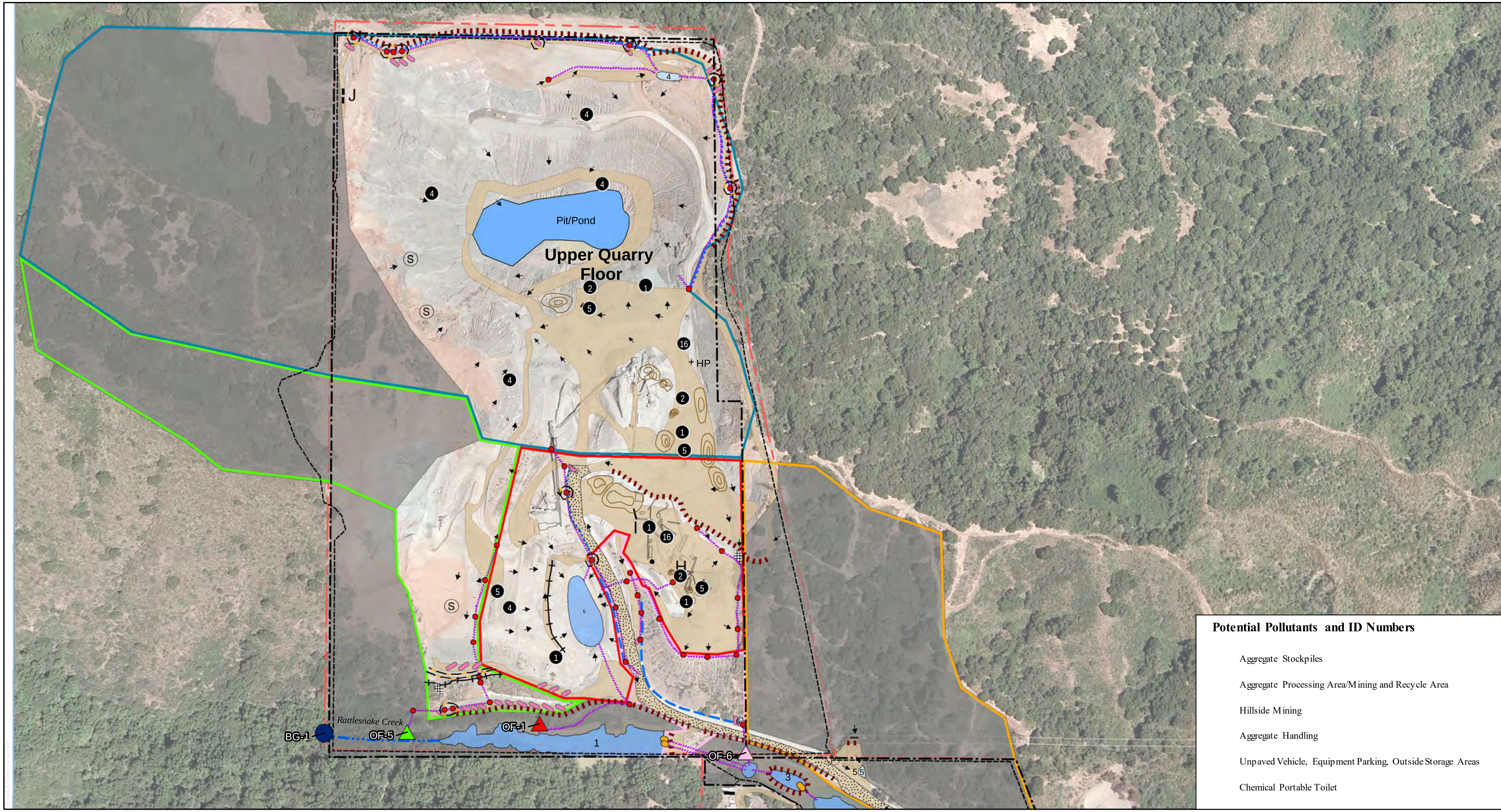


FIGURE 4b

LEGEND

- H Sand Plant
- I Rock Plant
- J Radio Tower
- Property Line
- Mining Limit Line
- Building
- Structure
- Unpaved Road
- Non-Industrial Areas
- Stockpile
- Earth Berm
- Drainage Ditch
- Concrete Swale
- Direction of Flow
- Sediment Pond and ID Number
- Pit/Pond
- Drop Inlet
- High Point
- Culvert
- Future Culvert
- Spring
- Check Dam
- Rock Berm
- Coir Wattles
- Silt Fence
- Rock Dissipator
- Gravel Road

Drainage Areas

- 1
- 2
- 5
- 6
- 7 (Pit/Pond)

Monitoring Locations

- OF-1
- OF-5
- OF-6
- BG-1

N

0 150 300

FEET

Stevens Creek Quarry

Storm Water Pollution Prevention Site Plan

December 2020

SOURCE: Benchmark Resources, October 2019

NOTES: The location of the property line is approximate. The site information and layout is based on site visits. Aerial imagery may not reflect current site conditions.

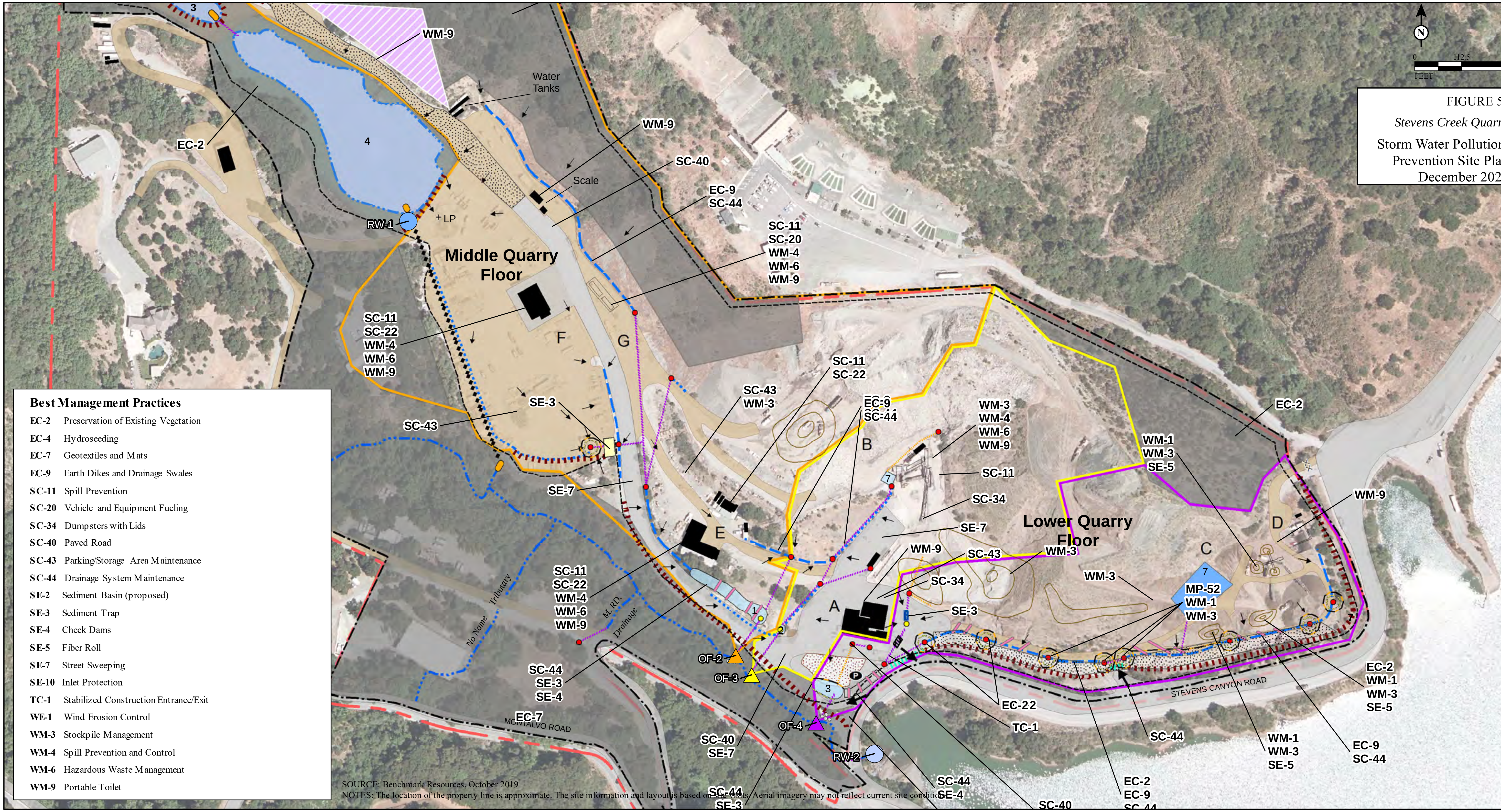
C:\Local GIS\Stevens Creek Quarry\Project\SWPPP Update Nov 2020\Figure 4b.mxd (12/3/2020)

FIGURE 5a

Stevens Creek Quarry

Storm Water Pollution Prevention Site Plan

December 2020



Best Management Practices

EC-2	Preservation of Existing Vegetation
EC-4	Hydroseeding
EC-7	Geotextiles and Mats
EC-9	Earth Dikes and Drainage Swales
SC-11	Spill Prevention
SC-20	Vehicle and Equipment Fueling
SC-34	Dumpsters with Lids
SC-40	Paved Road
SC-43	Parking/Storage Area Maintenance
SC-44	Drainage System Maintenance
SE-2	Sediment Basin (proposed)
SE-3	Sediment Trap
SE-4	Check Dams
SE-5	Fiber Roll
SE-7	Street Sweeping
SE-10	Inlet Protection
TC-1	Stabilized Construction Entrance/Exit
WE-1	Wind Erosion Control
WM-3	Stockpile Management
WM-4	Spill Prevention and Control
WM-6	Hazardous Waste Management
WM-9	Portable Toilet

LEGEND

- A Office, Scale House, Scale
- B Recycle Plant
- C Topsoil Plant
- D Garden Waste Recycle Center
- E Quarry Maintenance/Storage
- F Voss Trucking
- G Fueling Area and Fuel Tanks

- Property Line
- Mining Limit Line
- Ingress/Egress
- Building
- Structure
- Paved Road
- Unpaved Road
- Gravel/Rock Surface
- Non-Industrial Areas
- Stockpile
- Earth Berm
- Paved Berm
- XXXX Gate
- Creek
- Drainage Ditch
- Concrete Swale
- Direction of Flow
- Sediment Trap
- Sediment Pond
- Rattlesnake Creek Pond
- Planned New Sediment Pond (Approximate)
- Concrete Drainage Box
- Metal Stormwater Tank
- Drop Inlet
- Stand Pipe
- Weir
- Check Dam
- Low Point
- Bypass Pipe
- Culvert
- French Drain
- Grate
- Portable Toilet
- Check Dam
- Rock Berm
- Coir Wattles
- Silt Fence
- Rock Dissipator
- Rock Lining
- 4x8 Rock
- Gravel Road

Drainage Areas

- 2
- 3
- 4

Monitoring Locations

- OF-2
- OF-3
- OF-4
- RW-1
- RW-2

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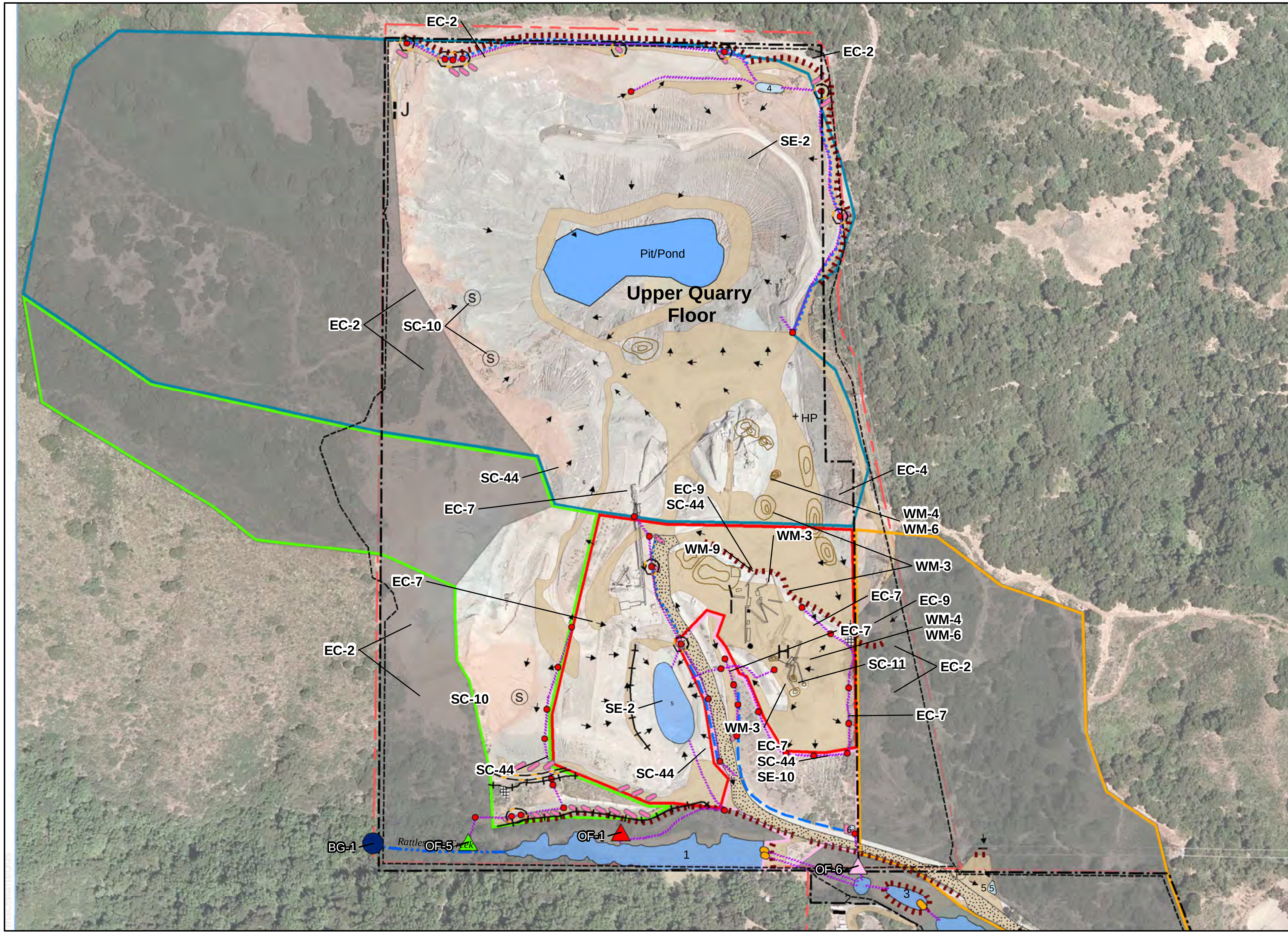


Best Management Practices

EC-2	Preservation of Existing Vegetation
EC-4	Hydroseeding
EC-7	Geotextiles and Mats
EC-9	Earth Dikes and Drainage Swales
SC-10	Non-Stormwater Discharges
SC-11	Spill Prevention
SC-34	Dumpsters with Lids
SC-44	Drainage System Maintenance
SE-2	Sediment Basin
SE-10	Inlet Protection
WM-3	Stockpile Management
WM-4	Spill Prevention and Control
WM-6	Hazardous Waste Management
WM-9	Portable Toilet

LEGEND

H Sand Plant
I Rock Plant
J Radio Tower
Property Line
Mining Limit Line
Building
Structure
Unpaved Road
Non-Industrial Areas
Stockpile
Earth Berm
Drainage Ditch
Concrete Swale
Direction of Flow
Sediment Pond and ID Number
Pit/Pond
Drop Inlet
High Point
Culvert
Future Culvert
Spring
Check Dam
Rock Berm
Coir Wattles
Silt Fence
Rock Dissipator

Drainage Areas
1
2
5
6
7 (Pit/Pond)

Monitoring Locations
OF-1
OF-5
OF-6
BG-1

N
0 150 300
FEET

FIGURE 5b

Stevens Creek Quarry

Storm Water Pollution Prevention Site Plan

December 2020

SOURCE: Benchmark Resources, October 2019

NOTES: The location of the property line is approximate. The site information and layout is based on site visits. Aerial imagery may not reflect current site conditions.

C:\Local GIS\Stevens Creek Quarry\Project\SWPPP Update Nov 2020\Figure 5b.mxd (12/3/2020)

APPENDIX B
Permit Registration Documents

Permit Registration Documents included in this Appendix

Y/N	PERMIT REGISTRATION DOCUMENT
Y	Notice of Intent[1]
Y	Certification
N	Copy of Annual Fee Receipt[2]
Y	Site Map(s), see Appendix A

Notes:
1. The WDID number for Stevens Creek Quarry, Cupertino, was assigned when the NOI was submitted to the State Water Resources Control Board.
2. To view a copy of the annual fee receipt please submit a request to Stevens Creek Quarry, Inc.

State Water Resources Control Board

NOTICE OF INTENT

GENERAL PERMIT TO DISCHARGE STORM WATER
ASSOCIATED WITH INDUSTRIAL ACTIVITY (WQ ORDER No. 2014-0057-DWQ)
(Excluding Construction Activities)

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

WDID: 2 43I006687 Status: Active

Operator Information

Type: Private Business

Name: Stevens Creek Quarry Inc
Address: 12100 Stevens Canyon Rd
Address 2:
City/State/Zip: Cupertino CA 95014
Federal Tax ID:

Contact Name: Jason Voss
Title:
Phone Number: 408-253-2512
Email Address: jvoss@scqinc.com

Facility Information

Level:

Contact Name: Jason Voss
Title:
Site Name: Stevens Creek Quarry
Address: 12100 Stevens Canyon Rd
City/State/Zip: Cupertino CA 95014
Site Phone #: 408-253-2512
County: Santa Clara
Email Address: jvoss@scqinc.com
Latitude: 37.29869 Longitude: -122.07901
Site Size: 162 Acres
Industrial Area Exposed to Storm Water:
Percent of Site Impervious (Including Rooftops): %

SIC Code Information

1. 1429 Crushed and Broken Stone, NEC
2. 4212 Local Trucking Without Storage
3. 3272 Concrete Products, Except Block and Brick

Additional Information

Receiving Water: Swiss Creek Flow: Directly
Storm Drain System:
Compliance Group:

RWQCB Jurisdiction: Region 2 - San Francisco Bay
Phone: 510-622-2300 Email: r2_stormwater@waterboards.ca.gov

Certification

Name: Jason Voss Date: February 27, 2015
Title: Quarry Operations Manager

State of California
State Water Resources Control Board

NOTICE OF INTENT

FOR GENERAL PERMIT TO DISCHARGE STORM WATER ASSOCIATED WITH INDUSTRIAL ACTIVITY IN SANTA CLARA COUNTY TO SOUTH SAN FRANCISCO BAY OR ITS TRIBUTARIES

San Francisco Bay Regional Water Quality Control Board Order No. 92-011

MARK ONLY ONE ITEM	1. [X] Existing Facility 2. [ ] New Facility	3. [ ] Change of Information WDID #

I. OWNER/OPERATOR

Name: Stevens Creek Quarry Inc.	A. Owner/Operator Type: (Check one) 1. [ ] City 2. [ ] County 3. [ ] State 4. [ ] Federal 5. [ ] Special District 6. [ ] Government Combo 7. [X] Private
Mailing Address: 12100 Stevens Canyon Rd.	
City: Cupertino	State: Ca. Zip: 95014- Phone: (408 253 2512
Contact Person: Tom McKenzie	B. 1. [ ] Owner 2. [ ] Operator 3. [X] Owner/Operator

II. FACILITY/SITE INFORMATION

Facility Name: Stevens Creek Quarry Inc.	County: Santa Clara
Street Address: 12100 Stevens Canyon Rd.	Contact Person: Tom McKenzie
City: Cupertino	State: CA Zip: 95014- Phone: (408)253 2512

Parcel Number(s) (If more than 4 apply to facility, enter additional numbers in SECTION IX. A):

A. 351-18-36 B. 351-10-19 C. 351-10-20 D. ______

III. BILLING ADDRESS

Send Billing Statements To: A. [X] Owner/Operator B. [ ] Facility C. [ ] Other (Specify in SECTION IX. B)

IV. RECEIVING WATER INFORMATION

A. Does your facility's storm water discharge directly to: (Check one)

1. [ ] Storm drain system

Owner of storm drain system: (Name) ______

2 [X] Directly to waters of U.S. (e.g., river, lake, creek, ocean)

3. [ ] Indirectly to waters of U.S.

B. Name of closest receiving water:

Stevens Creek

V. INDUSTRIAL INFORMATION

A. SIC Code(s): 1. 1442 2. 1611 3. 4212 4. ____	B. Type of Business: Quarry, Construction, Trucking

C. Industrial activities at facility: (Check all that apply)

1. [ ] Manufacturing 2. [X] Vehicle Maintenance 3 [ ] Hazardous Waste Treatment, Storage, or Disposal Facility (RCRA Subtitle C)
4 [X] Material Storage 5 [X] Vehicle Storage 6 [ ] Material Handling 7. [ ] Wastewater Treatment
8 [ ] Power Generation 9 [ ] Recycling 10 [ ] Landfill 99 [ ] Other ______

VI. MATERIAL HANDLING/MANAGEMENT PRACTICES

A. Types of materials handled and/or stored outdoors: (Check all that apply)

1.☐ Solvents 2.☐ Scrap Metal 3.☐ Petroleum Products 4.☐ Plating Products
5.☐ Pesticides 6.☐ Hazardous Wastes 7.☐ Paints 8.☐ Wood Treating Products
99.☐ Other (Please list)

B. Identify existing management practices employed to reduce pollutants in industrial storm water discharges: (Check all that apply)

1.☐ Oil/Water Separator 2.☐ Containment 3.☐ Berms 4.☐ Leachate Collection
5.☐ Overhead Coverage 6.☐ Recycling 7.☐ Retention Facilities 8.☐ Chemical Treatment
99.☐ Other (Please list)

VII. FACILITY INFORMATION

A. Total size of site: (Check one)	B. Percent of site impervious: (including rooftops)
162 ☒ Acres ☐ Sq. Ft.	1 %

VIII. REGULATORY STATUS (Check all that apply)

A. ☐ Regulated by Storm water Effluent Guidelines (40 CFR Subchapter N)	B. ☐ Waste Discharge Requirements (Order Number)	C. ☐ NPDES Permit CA
D. ☐ RCRA Permit Number	E. ☐ Regulated by California Code of Regulations Article 6, Chapter 15 (Feedlots).	

IX. COMMENTS (Enter additional information for SECTIONS II AND III)

A. Additional Parcel Numbers:

B. Billing Information: (Enter Name and Address)

X. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment." In addition, I certify that the provisions of the permit, including the development and implementation of a Storm Water Pollution Prevention Plan and a Monitoring Program Plan, will be complied with.

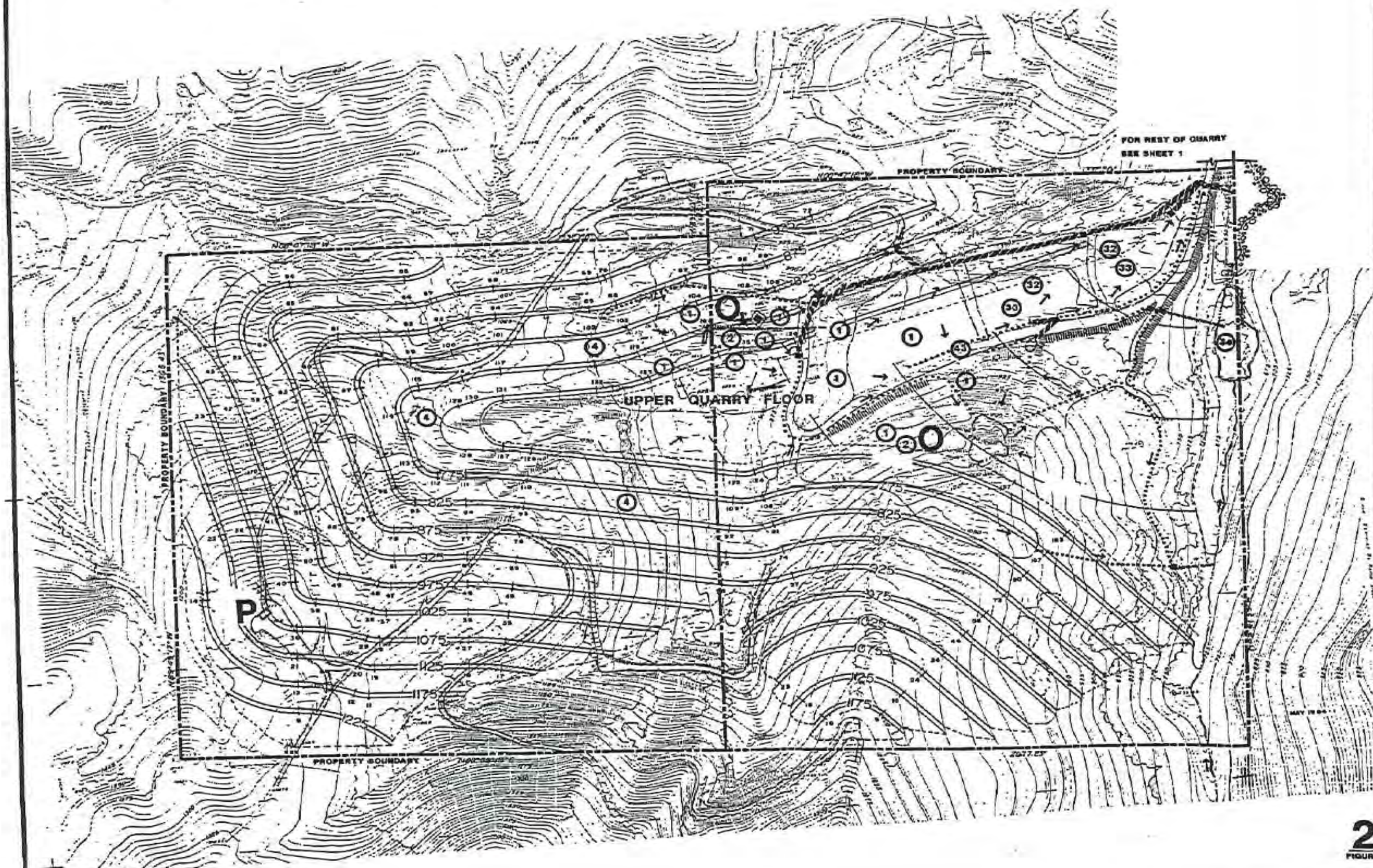
Printed Name: Tom Mckenzie

Signature: Tom McKenzie Date: 04/29/92

Title: Manager

STATE USE ONLY

WDID:	Regional Board Office:	Date Permit Issued:	
NPDES Permit Number: CA	Order Number:	Fee Amount Received: $	Date NOI Received:



2
FIGURE

STEVENS CREEK

QUARRY

SITE PLAN

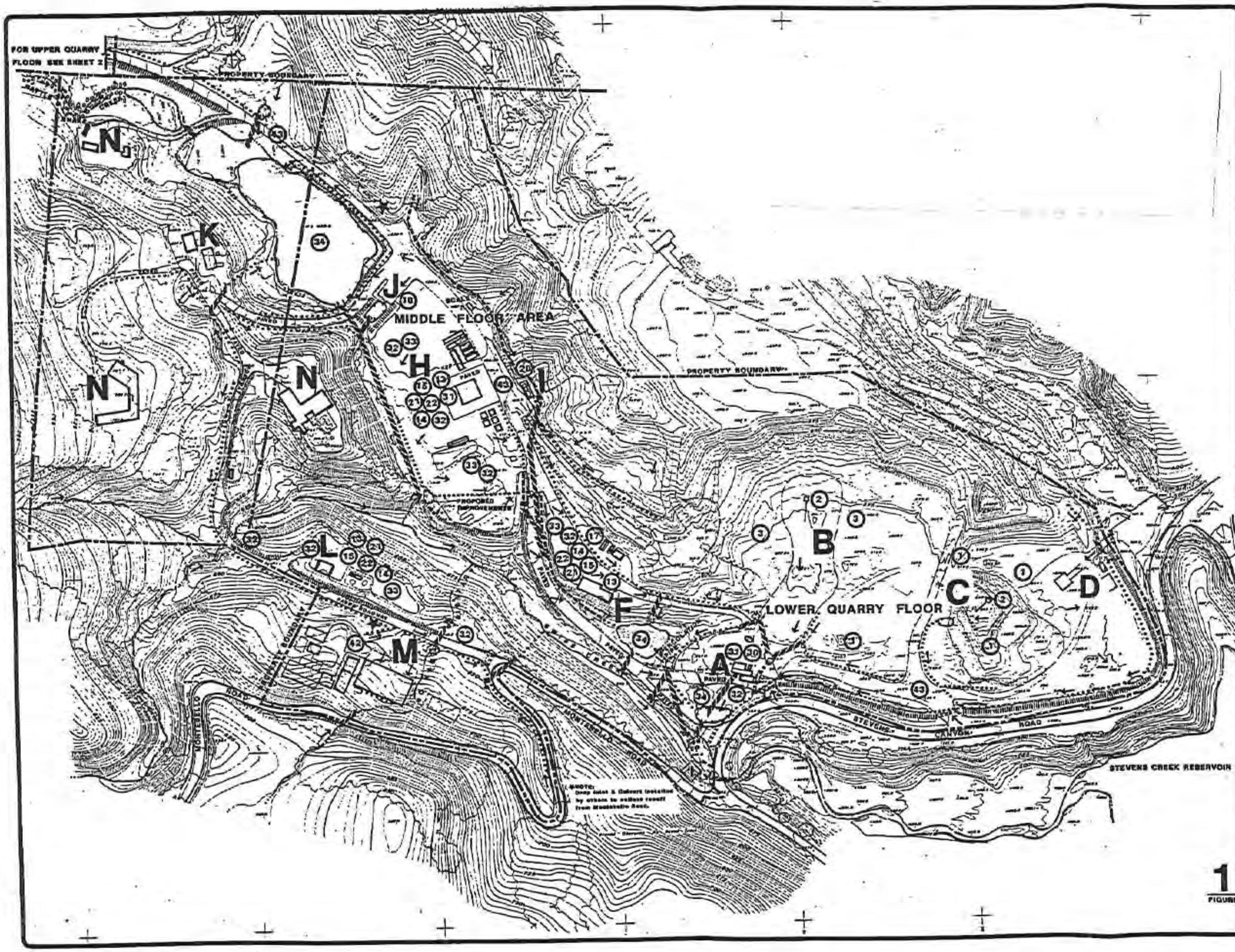
- O ROCK PLANT
- P RADIO STATION
- ★ WATER TANK
- xxxx GATE
- ROADWAY
- SEDIMENT POND
- ---- DRAINAGE DITCH
- ■ DROP INLET
- → DIRECTION OF FLOW
- CULVERT OR POLY PIPE
- CREEK
- ◈ SILO (LIME OR DRY CEMENT STORAGE)
- (12) SOURCE NUMBER (REFER TO TABLE 8-3 IN SWPPP)
- ENERGY DISSIPATOR

NOTE:
A Perimeter Fence Goes Around The Entire Site.

SCALE
0 100 200

MALCOLM CARPENTER ASSOCIATES
CITY AND REGIONAL PLANNERS

9/00



STEVENS CREEK

QUARRY

SITE PLAN

A OFFICE, SCALE HOUSE, SCALE
B RECYCLE PLANT
C TOPSOIL PLANT
D GARDEN WASTE RECYCLE CENTER

F QUARRY MAINTENANCE/STORAGE

H VOSS TRUCKING
I FUELING AREA & FUEL TANKS
J TRUCK BED SPRAY AREA
K HAY STORAGE
L BROOM SERVICE
M UPPER STABLE
N RESIDENCES
★ WATER TANK
FENCE
GATE
ROADWAY
BERM
SEDIMENT POND
SILT TRAP
DRAINAGE DITCH/SWALE
PAVED SWALE
→ DIRECTION OF FLOW
CULVERT OR POLY PIPE
DROP INLET
CREEK
ENERGY DISSIPATOR
OUTFALL NUMBER
(12) SOURCE NUMBER (REFER TO TABLE 4-1 IN SWPPP)

NOTE:
A Perimeter Fence Goes Around The Entire Site.

SCALE
0 100 200

MALCOLM CARPENTER ASSOCIATES
CITY AND REGIONAL PLANNERS

9/00

APPENDIX C
Training Reporting Form

TRAINED TEAM MEMBER LOG
Stormwater Management Training Log and Documentation

Facility Name: Stevens Creek Quarry, Inc.

WDID #: 2 43I006687

Stormwater Management Topic: (check as appropriate)

- ☐ Good Housekeeping
- ☐ Preventative Maintenance
- ☐ Spill and Leak Prevention and Response
- ☐ Material Handling and Waste Management
- ☐ Erosion and Sediment Controls
- ☐ Quality Assurance and Record Keeping
- ☐ Advanced BMPs
- ☐ Visual Monitoring
- ☐ Stormwater Sampling and Analysis

Specific Training Objective: ____________________

Location: ____________________ Date: ____________________

Instructor: ____________________ Telephone: ____________________

Course Length (hours): __________

Attendee Roster

(Attach additional forms if necessary)

Name	Company	Phone

APPENDIX D
Responsible Parties

AUTHORIZATION OF DULY AUTHORIZED REPRESENTATIVES

Facility Name: Stevens Creek Quarry, Inc.

WDID #: 2 43I006687

Name of Personnel	Project Role	Company	Signature	Date
Julio Cazares	Safety Manager	Stevens Creek Quarry, Inc.		8-29-19

LRP's Signature

8-29-19
Date

Jason Voss, Operations Manager
LRP Name and Title

408-640-6160
Telephone Number

IDENTIFICATION OF QISP

Facility Name: Stevens Creek Quarry, Inc.

WDID #: 2 43I006687

The following are QISPs associated with this project:

Name of Personnel (1)	Company	Date QISP Became Certified
Elai Fresco	Geosyntec Consultants	July 27, 2017
Lisa Welsh	Geosyntec Consultants	July 3, 2018
Neftali Romero	Geosyntec Consultants	September 22, 2019

(1) If additional QISPs are required, add additional lines and include information here

APPENDIX E
SWPPP Amendment Certifications

SWPPP AMENDMENT NO. 8

Project Name: Stevens Creek Quarry, Inc.

Project Number: LA0563A

Legally Responsible Person's Certification of the Stormwater Pollution Prevention Plan Amendment

"This Stormwater Pollution Prevention Plan and attachments were prepared under my direction to meet the requirements of the California Industrial General Permit (SWRCB Order No. 2014-0057-DWQ)."

	12-7-2020
LRP's Signature	Date
Jason Voss	Operations Manager
LRP Name	LRP Title
Stevens Creek Quarry, Inc.	408-640-6160
Title and Affiliation	Telephone
12100 Stevens Creek Canyon Road, Cupertino CA 95014	JVoss@scqinc.com
Address	Email

APPENDIX F
Calculations

Sediment Pond 5 Volume[1]

Bottom surface area:	6,900	Square feet
Top surface area:	19,000	Square feet
Vertical depth (excluding freeboard):	20	Feet
Volume:	259,000	Cubic feet
	5.95	Acre-feet

Design Volume = C * P * A
Where:

C=	Runoff Coefficient	Unitless
P =	85th Percentile, 24-hour Rainfall Depth	Feet
A =	Tributary Drainage Area	Acres

Tributary Drainage Area		
Area	**Size (acres)**	**Runoff Coefficient**[2]
Quarry floor areas	7.7	0.6
Mined slope areas	11.1	0.4
Composite Runoff Coefficient, C =	0.48	Unitless
Total Area, A =	18.8	Acres

Inputs		
C	0.48	Unitless
P[3]	0.09	Feet
A	18.8	Acres

Output		
Design Volume =	0.79	Acre-feet

Volume of Sediment Pond 5 =	5.95	Acre-feet
	5.95 >> 0.79	
Effective Factor of Safety =	7.6	Unitless

Notes:
1: Basin volume determined from approximate, conservative field calculations.
2. Runoff coefficients are conservatively estiamted based on field visits and aerial imagery.

3: The 85th Percentile, 24-hour Rainfall Depth is determined from historical anlaysis of the nearby Black Mountain NOAA rainfall gauge (station USC00040850). This depth should be considered as a conservative estimate, since the gauge elevation is at a significantly higher elevation than the quarry facility.

Sediment Pond 7 Volume[1]

Bottom surface area:	774	Square feet
Top surface area:	2,730	Square feet
Vertical depth (excluding freeboard):	6.5	Feet
Volume:	11,388	Cubic feet
	0.26	Acre-feet

Design Volume = C * P * A
Where:

C=	Runoff Coefficient	Unitless
P =	85th Percentile, 24-hour Rainfall Depth	Feet
A =	Tributary Drainage Area	Acres

Tributary Drainage Area		
Area	**Size (acres)**	**Runoff Coefficient[2]**
Lower quarry floor	1.5	0.6
Inactive vegetated slope areas	1.2	0.4
Composite Runoff Coefficient, C =	0.51	Unitless
Total Area, A =	2.7	Acres

Inputs		
C	0.51	Unitless
P[3]	0.09	Feet
A	2.7	Acres

Output		
Design Volume =	0.12	Acre-feet

Volume of Sediment Pond 7 =	0.26	Acre-feet
	0.26 > 0.12	
Effective Factor of Safety =	2.2	Unitless

Notes:
1: Basin volume determined from approximate, conservative field calculations.
2. Runoff coefficients are conservatively estiamted based on field visits and aerial imagery.

3: The 85th Percentile, 24-hour Rainfall Depth is determined from historical anlaysis of the nearby Black Mountain NOAA rainfall gauge (station USC00040850). This depth should be considered as a conservative estimate, since the gauge elevation is at a significantly higher elevation than the quarry facility.

Sediment Trap 1 Volume[1]

Bottom surface area:	3,000	Square feet
Top surface area:	6,000	Square feet
Vertical depth (excluding freeboard):	5.0	Feet
Volume:	22,500	Cubic feet
	0.52	Acre-feet

Design Volume = C * P * A
Where:

C=	Runoff Coefficient	Unitless
P =	85th Percentile, 24-hour Rainfall Depth	Feet
A =	Tributary Drainage Area	Acres

Tributary Drainage Area		
Area	**Size (acres)**	**Runoff Coefficient[2]**
Middle quarry floor	18	0.6
Active stockpile slope areas	4.00	0.8
Inactive vegetated slope areas	21.00	0.4
Composite Runoff Coefficient, C =	0.52	Unitless
Total Area, A =	43.0	Acres

Inputs		
C	0.52	Unitless
P[3]	0.09	Feet
A	43.0	Acres

Output		
Design Volume =	1.94	Acre-feet

Volume of Sediment Trap 1 =	0.52	Acre-feet
	0.52 < 1.94	
Effective Factor of Safety =	0.3	Unitless

Notes:

1: Basin volume determined from approximate, conservative field calculations. Sediment Trap 1 was constructed based on available space, before the effective date of the IGP.
2. Runoff coefficients are conservatively estiamted based on field visits and aerial imagery.

3: The 85th Percentile, 24-hour Rainfall Depth is determined from historical anlaysis of the nearby Black Mountain NOAA rainfall gauge (station USC00040850). This depth should be considered as a conservative estimate, since the gauge elevation is at a significantly higher elevation than the quarry facility.

Sediment Trap 2 Volume[1]

Bottom surface area:	300	Square feet
Top surface area:	600	Square feet
Vertical depth (excluding freeboard):	4.5	Feet
Volume:	2,025	Cubic feet
	0.05	Acre-feet

Design Volume = C * P * A
Where:

C=	Runoff Coefficient	Unitless
P =	85th Percentile, 24-hour Rainfall Depth	Feet
A =	Tributary Drainage Area	Acres

Tributary Drainage Area		
Area	**Size (acres)**	**Runoff Coefficient**[2]
Paved lower quarry floor	1.9	0.85
Inactive vegetated slope areas	3.50	0.4
Active stockpile slope areas	3.60	0.8
Composite Runoff Coefficient, C =	0.66	Unitless
Total Area, A =	9.0	Acres

Inputs		
C	0.66	Unitless
P[3]	0.09	Feet
A	9.0	Acres

Output		
Design Volume =	0.51	Acre-feet

Volume of Sediment Trap 2 =	0.05	Acre-feet
	0.05 < 0.51	
Effective Factor of Safety =	0.1	Unitless

Notes:

1: Basin volume determined from approximate, conservative field calculations. Sediment Trap 1 was constructed based on available space, before the effective date of the IGP.
2. Runoff coefficients are conservatively estiamted based on field visits and aerial imagery.

3: The 85th Percentile, 24-hour Rainfall Depth is determined from historical anlaysis of the nearby Black Mountain NOAA rainfall gauge (station USC00040850). This depth should be considered as a conservative estimate, since the gauge elevation is at a significantly higher elevation than the quarry facility.

Sediment Trap 3 Volume[1]

Bottom surface area:	1,750	Square feet
Top surface area:	2,500	Square feet
Vertical depth (excluding freeboard):	4.5	Feet
Volume:	9,563	Cubic feet
	0.22	Acre-feet

Design Volume = C * P * A
Where:

C=	Runoff Coefficient	Unitless
P =	85th Percentile, 24-hour Rainfall Depth	Feet
A =	Tributary Drainage Area	Acres

Tributary Drainage Area[2]		
Area	**Size (acres)**	**Runoff Coefficient**[2]
Paved lower quarry floor	1	0.85
Unpaved lower quarry floor	3.50	0.6
Inactive vegetated slope areas	6.70	0.4
Composite Runoff Coefficient, C =	0.50	Unitless
Total Area, A =	11.2	Acres

Inputs		
C	0.50	Unitless
P[3]	0.09	Feet
A	11.2	Acres

Output		
Design Volume =	0.49	Acre-feet

Volume of Sediment Trap 3 =	0.22	Acre-feet
	0.22 < 0.49	
Effective Factor of Safety =	0.4	Unitless

Notes:

1: Basin volume determined from approximate, conservative field calculations. Sediment Trap 1 was constructed based on available space, before the effective date of the IGP.
2. Runoff coefficients are conservatively estiamted based on field visits and aerial imagery.

3: The 85th Percentile, 24-hour Rainfall Depth is determined from historical anlaysis of the nearby Black Mountain NOAA rainfall gauge (station USC00040850). This depth should be considered as a conservative estimate, since the gauge elevation is at a significantly higher elevation than the quarry facility.

APPENDIX G
CASQA Stormwater BMP Handbook Portal: Industrial and Commercial Fact Sheets

CASQA Stormwater BMP Handbook Portal: Industrial and Commercial Fact Sheets

Link: [BMP Handbook]

California Stormwater Quality Association

Stormwater Best Management Practice

Handbook

Construction

Copyright Statement

Acknowledgements

The Stormwater Best Management Practice Handbooks are products of the California Stormwater Quality Association (CASQA). The handbooks were originally published in 1993 by the California Stormwater Quality Task Force (SWQTF), the predecessor of CASQA. As part of this project, the original handbooks have been updated to reflect the current state of stormwater quality management practices and to make the handbook accessible via the Internet at www.cabmphandbooks.com.

CASQA is a nonprofit public benefit corporation and is not organized for private gain of any person. It is organized under the Nonprofit Public Benefit Corporation Law of California for charitable and educational purposes. The specific purpose of CASQA is to assist those entities charged with stormwater quality management responsibilities with the development and implementation of stormwater quality goals and programs. CASQA serves its members through various educational, technical, and scientific initiatives. The publication of the Stormwater Best Management Practice Handbooks is one of CASQA's educational and technical initiatives.

This project was funded through contributions from public agencies throughout California, whose support made the handbooks possible. Contributing agencies include:

State Agencies

California Department of Transportation

California State Water Resources

Control Board

County Agencies

Alameda County

Contra Costa County

Los Angeles County

Marin County

Orange County

Sacramento County

Santa Barbara County

Santa Clara County

San Diego County

San Mateo County

Municipalities

City of Bakersfield

City of Carmel

City of Fairfield

City of Lodi

City of Long Beach

City of Modesto

City of Monterey

City of Sacramento

City of San Diego

City of Santa Rosa

City of Stockton

City of Visalia

City of Watsonville

City of Woodland

Siskiyou County

Special Districts

Fresno Metropolitan Flood Control District

Port of San Diego

Riverside County Flood Control and Water Conservation District

San Bernardino County Flood Control District

Vallejo Sanitation and Flood Control District

Ventura County Flood Control District

The development of the Stormwater Best Management Practice Handbooks was guided by a Steering Committee, a Technical Advisory Committee, and the CASQA BMP Workgroup. The Steering Committee provided CASQA's direction to the Consultant. The Steering Committee included representatives from Phase I communities, special districts, regulatory agencies, and consulting. The Technical Advisory Committee and BMP Workgroup reviewed draft work products and provided comments to the Steering Committee. The Technical Advisory Committee included representatives from Phase I communities, Phase II communities, regulatory agencies (water quality and health), academia, industry, transportation, and consulting. The quality of the handbooks is a result of the diverse expertise and experience of the committees and the workgroup.

Steering Committee

Scott Taylor, Committee Chair, RBF Consulting

Bruce Fujimoto, California State Water Resources Control Board

Naresh Varma, San Bernardino County Flood Control District

Karen Ashby, Orange County Public Facilities and Resources Department

Steve Stump, Riverside County Flood Control and Water Conservation District

Bill Busath, City of Sacramento

Mark Wills, Riverside County Flood Control and Water Conservation District

Melinda Marks, Fresno Metropolitan Flood Control District

Technical Advisory Committee

Scott Taylor, Committee Chair, RBF Consulting

John Johnston, California State University Sacramento Faculty Member

Karen Henry, City of San Diego

Jennifer Gonzalez, City of Monterey

Xavier Swamikannu, Los Angeles Regional Water Quality Control Board

Tim Piasky, Building Industry Association and Associated General Contractors

Marco Metzger, California Department of Health Services

Dan Barber, Concrete Industries

Jerry Marcotte, California Department of Transportation

U.S. Environmental Protection Agency

The County of San Bernardino and San Bernardino County Flood Control District, under the direction of Naresh Varma, Chief, Environmental Management Division, provided financial and contract management services on behalf of the California Stormwater Quality Task Force and the California Stormwater Quality Association for the update and revision of the Stormwater Best Management Practice Handbooks.

The Stormwater Best Management Practice Handbooks were prepared by the Camp Dresser & McKee Inc. (CDM) and Larry Walker Associates (LWA) team. The CDM-LWA team was led by Jeff Endicott, CDM Officer-in-Charge and Project Manager, and Mack Walker, LWA Project Manager. The handbook team included the following consultants and individuals:

Consultant Team

Camp Dresser & McKee Inc.

Jeff Endicott, P.E., Officer-in-Charge and Handbook Project Manager

Janelle Rogers, Ph.D., P.E. (WA) Assistant Project Manger

Don Schroeder, P.E.

Luis Leon, P.E.

Stephen Liao, P.E.

Brendan Boyd

Tracy Gaudino

Basheera Raheem-Streetz

Larry Walker Associates

Mack Walker, P.E., Handbook Project Manager

Heather Kirschmann

Erich Simon

Dean Messer, Ph.D.

Catalyst

Tom Richman, ASLA, AICP

Mike Barrett, Ph.D., P.E. (TX)

Geoff Brosseau

Gary Minton, Ph.D., P.E. (WA)

Disclaimer

The California Stormwater Quality Handbooks are intended to provide a range of general information about stormwater quality best management practices (BMPs) and related issues. Due to the multitude of applications of BMPs, the Handbooks do not address site-specific applications. Therefore, users of the Handbooks must seek advice of a stormwater quality professional to determine the applicability of the information provided for any general use or site-specific application. Users of the Handbooks assume all liability directly or indirectly arising from use of the Handbooks.

The mention of commercial products, their source, or their use in connection with material reported in the Handbooks is not to be construed as either an actual or implied endorsement, recommendation, or warranty of such product.

This disclaimer is applicable whether information from the Handbooks is obtained in hard copy form or downloaded from the Internet.

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Appendices

Section 1
Introduction

Stormwater runoff is part of the natural hydrologic process. However, human activities such as urbanization and construction can impact stormwater runoff. Construction activities can alter natural drainage patterns and affect runoff water quality, adding pollutants to rivers, lakes, and streams as well as coastal bays and estuaries, and ultimately, the ocean. Urban runoff is a significant source of water pollution, causing possible declines in fisheries, restrictions on swimming, and limiting our ability to enjoy many of the other benefits that water resources provide (USEPA, 1992). Urban runoff in this context includes all flows discharged from urban land uses into stormwater conveyance systems and receiving waters and includes both dry weather non-stormwater sources (e.g., runoff from landscape irrigation, etc.) and wet weather stormwater runoff. In this handbook, urban runoff and stormwater runoff are used interchangeably.

For many years, the effort to control the discharge of stormwater focused on quantity (e.g., drainage, flood control) and, to a limited extent, on quality of the stormwater (e.g., sediment and erosion control). However, in recent years awareness of the need to improve water quality has increased. With this awareness federal, state, and local programs have been established to pursue the ultimate goal of reducing pollutants contained in stormwater discharges to our waterways. The emphasis of these programs is to promote the concept and the practice of preventing pollution at the source, before it can cause environmental problems (USEPA, 1992). However, where further controls are needed, treatment of polluted runoff may be required.

1.1 Handbook Purpose and Scope

The purpose of this handbook is to provide general guidance for selecting and implementing Best Management Practices (BMPs) that will eliminate or reduce the discharge of pollutants from construction sites to waters of the state. This handbook also provides guidance on developing and implementing Stormwater Pollution Prevention Plans (SWPPPs) that document the selection and implementation of BMPs for a particular construction project.

This handbook provides the framework for an informed selection of BMPs, and developments and implementation of a site-specific SWPPP. However, due to the diversity in climate, receiving waters, construction site conditions, and local requirements across California, this handbook does not dictate the use of specific BMPs and therefore cannot guarantee compliance with NPDES permit requirements or local requirements specific to the user's site.

1.1.1 Users of the Handbook

This handbook provides guidance suitable for use by a wide range of individuals involved in construction site water pollution control. Each user of the handbook is responsible for working within their capabilities obtained through training and experience, and for seeking the advice and consultation of appropriate experts at all times

The target audience for this handbook includes: developers, including their planners and engineers; contractors, including their engineers, estimators, superintendents, foremen, tradesmen, and subcontractors; municipal agencies, including their engineers, municipal inspectors, building inspectors, permit counter staff, code enforcement officers, and construction staff; Regulatory agencies, including permit staff and enforcement staff, and the general public with an interest in stormwater pollution control.

1.1.2 Organization of the Handbook

The handbook is organized to assist the user in developing and implementing a stormwater program for construction sites to reduce potential impacts of both stormwater and nonstormwater discharges on receiving waters. The handbook consists of the following sections:

California Stormwater BMP Handbook - Construction

Section 1
Introduction
This section provides a general review of the sources and impacts of construction activity stormwater discharges and provides an overview of the federal, state, and local programs regulating stormwater discharges.

Section 2
Stormwater Pollution Prevention Planning for Construction *This section describes how to prepare and implement a SWPPP for a construction project. It covers minimum requirements, construction activity assessment, BMP selection, and stormwater control planning. A SWPPP template is provided to facilitate SWPPP development and review by providing easy data entry and consistency in SWPPP documents.*

Section 3
Erosion and Sediment Control BMPs
This Section provides an overview of BMPs for erosion, sediment, wind, and tracking control.

Section 4
Non-Stormwater Management and Materials Management BMPs
This Section provides an overview of BMPs for nonstormwater management and materials management including waste materials and material stockpiles.

Section 5
Glossary and List of Acronyms
This section identifies terms and abbreviations used in the handbooks.

Appendix A
General Permit *This Appendix contains a copy of the construction General Permit for application to most construction activities in the state.*

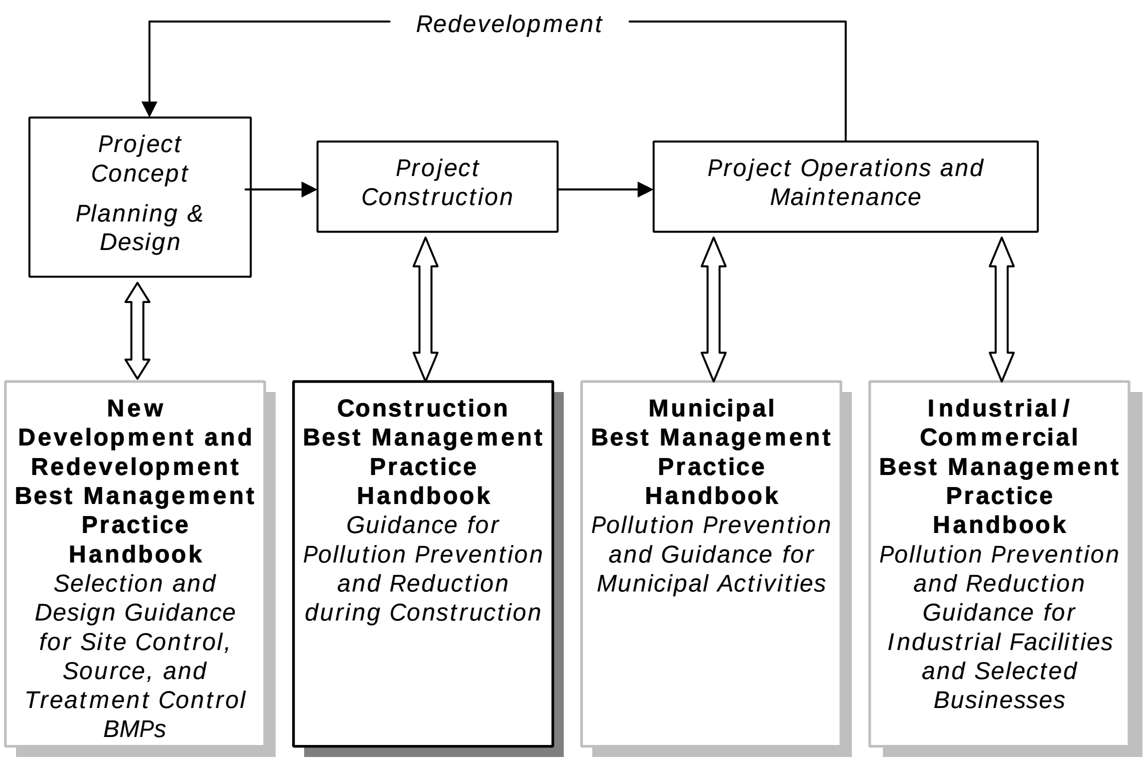
Appendix B
SWPPP Template
This Appendix provides the SWPPP Template that was developed as an assistance tool for SWPPP preparation and review. The template contains elements required by the General Permit.

Appendix C
Construction Storm Water Sampling and Analysis Guidance Document
This Appendix contains a copy of the California Stormwater Quality Task Force's Construction Storm Water Sampling and Analysis Guidance Document

1.1.3 Relationship to other Handbooks

This handbook is one of four handbooks that have been developed by the California Stormwater Quality Association (CASQA) to address BMP selection. Collectively, the four handbooks address BMP selection throughout the life of a project – from planning and design – through construction – and into operation and maintenance. Individually, each handbook is geared to a specific target audience during one stage of the life of a project. This handbook, the Construction Handbook, addresses selection and implementation of BMPs to eliminate or to reduce the discharge of pollutants associated with construction activity.

Project Lifecycle



For a comprehensive understanding of stormwater pollution control throughout the life cycle of a project, it is recommended that the reader obtain and become familiar with all four handbooks. Typically, municipal stormwater program managers, regulators, environmental organizations, and stormwater quality professionals will have an interest in all four handbooks. For a focused understanding of stormwater pollution control during a single phase of the project life cycle, a reader may obtain, and become familiar with, the handbook associated with the appropriate phase. Typically, contractors, construction inspectors, industrial site operators, commercial site operators, some regulators and some municipal staff may have an interest in a single handbook.

1.2 Construction Sites and their Impacts on Water Quality

1.2.1 Pollutants Associated with Construction Activities

Stormwater runoff naturally contains numerous constituents. However, urbanized and urban activities such as construction increase constituent concentrations to levels that impact water quality. Pollutants associated with stormwater include sediment, nutrients, bacteria and viruses, oil and grease, metals, organics, pesticides, gross pollutants (floatables), and miscellaneous waste Some constituents can also affect the pH of stormwater. Stormwater runoff can also be highly attractive to vector organisms, particularly mosquitoes, which can impact public health and become a legal liability. Stormwater pollutants are described in Table 1-1.

Excessive erosion and sedimentation are perhaps the most visible water quality impacts due to construction activities. Other less visible impacts are associated with off-site discharge of pollutants such as metals, nutrients, soil additives, pesticides, construction chemicals, and other construction waste. The magnitude of stormwater impacts depends on construction activities, climatic conditions, and site conditions. Development of a comprehensive SWPPP requires a basic understanding of the impacts, pollutant sources and other contributing factors, as well as BMPs to eliminate or reduce these impacts.

Table 1-1 Pollutant Impacts on Water Quality

Sediment is a common component of stormwater, and can be a pollutant. Sediment can be detrimental to aquatic life (primary producers, benthic invertebrates, and fish) by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. Sediment can transport other pollutants that are attached to it including nutrients, trace metals, and hydrocarbons. Sediment is the primary component of total suspended solids (TSS), a common water quality analytical parameter.	**Sediment**
Nutrients including nitrogen and phosphorous are the major plant nutrients used for fertilizing landscapes, and are often found in stormwater. These nutrients can result in excessive or accelerated growth of vegetation, such as algae, resulting in impaired use of water in lakes and other sources of water supply. For example, nutrients have led to a loss of water clarity in Lake Tahoe. In addition, un-ionized ammonia (one of the nitrogen forms) can be toxic to fish.	**Nutrients**
Bacteria and viruses are common contaminants of stormwater. For separate storm drain systems, sources of these contaminants include animal excrement and sanitary sewer overflow. High levels of indicator bacteria in stormwater have led to the closure of beaches, lakes, and rivers to contact recreation such as swimming.	**Bacteria and viruses**
Oil and grease includes a wide array of hydrocarbon compounds, some of which are toxic to aquatic organisms at low concentrations. Sources of oil and grease include leakage, spills, cleaning and sloughing associated with vehicle and equipment engines and suspensions, leaking and breaks in hydraulic systems, restaurants and waste oil disposal.	**Oil and Grease**
Metals including lead, zinc, cadmium, copper, chromium, and nickel are commonly found in stormwater. Many of the artificial surfaces of the urban environment (e.g., galvanized metal, paint, automobiles, or preserved wood) contain metals, which enter stormwater as the surfaces corrode, flake, dissolve, decay, or leach. Over half the trace metal load carried in stormwater is associated with sediments. Metals are of concern because they are toxic to aquatic organisms, can bioaccumulate (accumulate to toxic levels in aquatic animals such as fish), and have the potential to contaminate drinking water supplies.	**Metals**
Organics may be found in stormwater in low concentrations. Often synthetic organic compounds (adhesives, cleaners, sealants, solvents, etc.) are widely applied and may be improperly stored and disposed. In addition, deliberate dumping of these chemicals into storm drains and inlets causes environmental harm to waterways.	**Organics**
Pesticides (including herbicides, fungicides, rodenticides, and insecticides) have been repeatedly detected in stormwater at toxic levels, even when pesticides have been applied in accordance with label instructions. As pesticide use has increased, so too have concerns about adverse effects of pesticides on the environment and human health. Accumulation of these compounds in simple aquatic organisms, such as plankton, provides an avenue for biomagnification through the food web, potentially resulting in elevated levels of toxins in organisms that feed on them, such as fish and birds.	**Pesticides**
Gross Pollutants (trash, debris, and floatables) may include heavy metals, pesticides, and bacteria in stormwater. Typically resulting from an urban environment, industrial sites and construction sites, trash and floatables may create an aesthetic "eye sore" in waterways. Gross pollutants also include plant debris (such as leaves and lawn-clippings from landscape maintenance), animal excrement, street litter, and other organic matter. Such substances may harbor bacteria, viruses, vectors, and depress the dissolved oxygen levels in streams, lakes, and estuaries sometimes causing fish kills.	**Gross Pollutants**
Vector production (e.g., mosquitoes, flies, and rodents) is frequently associated with sheltered habitats and standing water. Unless designed and maintained properly, standing water may occur in treatment control BMPs for 72 hours or more, thus providing a source for vector habitat and reproduction (Metzger, 2002).	**Vector Production**

1.2.2 Erosion and Sedimentation

Soil erosion is the process by which soil particles are removed from the land surface by wind, water, or gravity. Most natural erosion occurs at slow rates; however, the rate of erosion increases when land is cleared or altered and left unprotected. Construction sites, if unprotected, can erode at rates in excess of one hundred times the natural background rate of erosion.

Sediment resulting from excessive erosion is a pollutant. Sedimentation is defined as the settling out of particles transported by water. Sedimentation occurs when the velocity of water is slowed sufficiently allow suspended soil particles to settle. Larger particles, such as gravel and sand, settle more rapidly than fine particles such as silt and clay. Effective sediment control begins with proper erosion control, which minimizes the availability of particles for settling downstream.

Erosion from Rainfall Impact

The impact of raindrops on bare soil can cause erosion. On undisturbed soil protected by vegetation or other cover, the erosion is minimal. Construction activities increase the amount of exposed and disturbed soil, which increases erosion potential from rainfall.

Sheet Erosion

After rainfall strikes the ground, it flows in a thin layer for a short distance. The distance of sheet flow depends on slope, soil roughness, type of vegetative cover, and rainfall intensity. Erosion due to sheet flow on undisturbed soils is minimal and greater on soils disturbed by construction. However, sheet flows are capable of transporting soil particles dislodged by the impact of raindrops onto bare soil, and thus cannot be ignored.

Rill and Gully Erosion

As runoff accumulates, it concentrates in rivulets that cut grooves (rills) into the soil surface. Rills generally run parallel to one another and to the slope of the soil surface. If left unchecked, several rills may join together to form a gully. Rills are small enough to be stepped across, whereas a gully requires added effort to be traversed. The rate of rill erosion can easily be one hundred times greater than that of sheet flow, and the rate of gully erosion can easily be one hundred times greater than rill erosion. Due to the significant amount of sediment generated by rill and gully erosion, these types of erosion must be given top priority for elimination, reduction, and control. Rills and gullies form sooner on exposed soils than on vegetated soils.

Stream and Channel Erosion

In general, one or more of the following factors that may occur during construction can change the hydrology of the area to affect erosion of the banks and bottoms of natural drainage channels:

- Clearing the soil and re-contouring the site during construction may increase the volume and rate of runoff leaving the site.
- Replacing pervious natural ground with impervious cover such as buildings and pavement further increases runoff.
- Detention basins used to capture sediment extend the duration of flows leaving the site.

Control of erosion in streams and channels downstream of the construction site as a result of construction activities is a complex issue and is usually best addressed by local agencies through a comprehensive drainage master plan. Where these plans are available, the local drainage-planning agency may specify specific BMP requirements applicable to construction projects, which in turn must be incorporated into the SWPPP. Where these plans are not available, the goal of the SWPPP should be to minimize the difference between the predevelopment, construction, and post-construction hydrographs, and to minimize increases in sediment discharges. In some situations, local agencies may require developers of large projects to conduct a study of the specific impacts related to development of the project. This will most likely be the case where municipal permits include new development and redevelopment provisions such as Standard Urban Stormwater Mitigation Plans (SUSMPs).

Wind Erosion

Dust is defined as solid particles or particulate matters which are predominately large enough to eventually settle out from the air but small enough to remain temporarily suspended in the air for an extended period of time. Dust from a construction site originates from rock and soil surfaces, material storage piles and construction materials. It is generated by earthwork, demolition, traffic on unpaved surfaces, and strong winds. See Table 1-2.

Table 1-2 Examples of Dust Sources at Construction Sites

Vehicle and Equipment Use	Exposed Areas	Contractor Activities
Vehicle and equipment entering and leaving the project site Vehicle and equipment movement and use within the project site Sediment tracking off-site Temporary parking lots and staging areas On-site construction traffic	Areas of exposed soil that have been cleared and grubbed Areas of exposed soil that have been excavated, filled, compacted, or graded Construction staging areas Vehicle and equipment storage and service areas Material processing areas and transfer points. Construction roads Construction sites, bare ground areas Spilled materials Construction stockpiles Soil and debris piles	Land clearing and grubbing Earthwork including soil excavation, filling, soil compaction, rough grading, and final grading Drilling and blasting Materials handling, including material stockpiling, transfer, and processing Batch dropping, dumping Conveyor transfer and stacking Material transferring Crushing, milling and screening operations Demolition and debris disposal Tilling

1.2.3 Other Pollutants

Table 1-3 Other Construction Activity Pollutants

Construction Activity	Pollutants

Erosion and sedimentation discharges are perhaps the most visible and significant source of pollutants associated with construction sites. However, pollutants such as nutrients, bacteria, viruses, oil, grease, metals, organics, pesticides, gross pollutants, and vectors must always be considered, as they can be associated with both acute and chronic problems in receiving waters. Table 1-3 presents a matrix that identifies the most common source of these other pollutants at construction sites.

	Sediment	**Nutrients**	**Trace Metals**	**Pesticides**	**Oil, Grease, Fuels**	**Other Toxic Chemicals**	**Miscellaneous Waste**
Construction Practices							
Dewatering Operations	X					X	
Paving Operations	X			X	X	X	X
Structure Construction/Painting			X			X	X
Material Management							
Material Delivery and Storage	X	X	X	X	X	X	
Material Use		X	X	X	X	X	
Waste Management							
Solid Waste	X	X					X
Hazardous Waste						X	
Contaminated Spills	X					X	
Concrete Waste							X
Sanitary/Septic Waste							X
Vehicle/Equipment Management						X	X
Vehicle/Equipment Fueling						X	X
Vehicle/Equipment Maintenance						X	X

1.2.4 Impacts of Erosion and Sedimentation, and Other Pollutants

The impacts due to erosion and sedimentation can be placed in three categories:

- Degradation of aquatic and riparian ecosystems
- Pollutant transport
- Erosion of land and sedimentation within waterways and public facilities (i.e. storm drains).

Sediment can be detrimental to aquatic life (primary producers, benthic invertebrates, and fish) by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. In addition, sediment particles can transport other pollutants that are attached to them including nutrients, trace metals, and hydrocarbons. Sediment particles such as silts and clays are the primary components of total suspended solids (TSS), a common water quality analytical parameter.

In addition to impacts directly associated with sedimentation, various pollutants can also be transported along with sediment particles leaving construction sites. Such pollutants include metals, nutrients, conventional pollutants, pesticides, and coliform. These pollutants often originate from organic components, plant residues, and nutrient elements within soils on the construction site, and are thus mobilized by erosion and later deposited downstream during sedimentation. Alternatively, these other pollutants may be generated independent of erosion and because of their nature can have significant detrimental affects to receiving waters.

Construction activity may cause increased erosion and sedimentation within waterways and public facilities. Some construction activity will increase impervious area and/or change drainage patterns, resulting in increased runoff volumes and rates, which have the potential to erode downstream watercourses. Other construction activities such as grading may increase erosion from the construction site by disturbing and exposing the soil. The eroded soil particles from the construction site may flow downstream and fill drainage systems, reservoirs, and harbors.

In order to control the impact of erosion, sedimentation, and other pollutants on receiving waters, the *State Water Resources Control Board (SWRCB) Order No. 99-08-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Stormwater Runoff Associated with Construction Activity (General Permit)* requires the implementation of BMPs to eliminate or reduce the discharge of pollutants in stormwater discharges, and prohibits the discharge of nonstormwater from the construction site as these non-stormwater discharges are likely to carry pollutants to receiving waters. The General Permit recognizes that discharges of nonstormwater may be necessary for the completion of certain construction projects. Such discharges include, but are not limited to:

- Irrigation of vegetative erosion control measures
- Pipe flushing and testing

- Street cleaning, and

- Dewatering

Such discharges are authorized by this General Permit as long as they (a) do comply with Section A.9 of the General Permit, (b) do not cause or contribute to violation of any water quality standard, (c) do not violate any other provision of the General Permit, (d) do not require a non-stormwater permit as issued by some RWQCBs, and (e) are not prohibited by a Basin Plan. If a non-stormwater discharge is subject to a separate permit adopted by a RWQCB, the discharge must additionally be authorized by the RWQCB.

1.3 Regulatory Programs

The need to protect our environment has resulted in a number of laws and subsequent regulations and programs. In the following sections, various federal, state, and local programs are discussed in relationship to the control of pollutants in stormwater. The programs are expected to change over the next several years and the user is advised to contact state and local officials for further information.

1.3.1 Federal NPDES Programs

In 1972, the Federal Water Pollution Control Act (also referred to as the Clean Water Act [CWA]) was amended to provide that the discharge of pollutants to waters of the United States from any point source is unlawful unless the discharge is in compliance with an NPDES permit. The 1987 amendments to the CWA added Section 402(p), which establishes a framework for regulating municipal and industrial stormwater discharges, including discharges associated with construction activities, under the NPDES Program.

On November 16, 1990, the U.S. Environmental Protection Agency (USEPA) published final regulations that establish stormwater permit application requirements. The regulations, also known as Phase I of the NPDES program, provide that discharges of stormwater to waters of the Unites States from construction projects that encompass five or more acres of soil disturbance are effectively prohibited unless the discharge complies with an NPDES Permit.

Phase II of the NPDES program expands the requirements by requiring operators of small MS4s in urbanized areas and small construction sites to be covered under an NPDES permit, and to implement programs and practices to control polluted stormwater runoff. The program applies to:

- Operators of small MS4s located in “urbanized areas” as delineated by the Bureau of the Census. A “small” MS4 is any MS4 not already covered by the Phase I NPDES stormwater program.

- Small construction sites with a soil disturbance equal to or greater than one and less than five acres of land or part of a larger common plan of development which disturbs more than one acre.

1.3.2 State NPDES Programs

In California, the NPDES stormwater permitting program is administered by the State Water Resources Control Board (SWRCB) through its nine Regional Water Quality Control Boards (RWQCBs). The SWRCB has established a construction General Permit that can be applied to most construction activities in the state. Construction permittees may choose to obtain individual NPDES permits instead of obtaining coverage under the General Permit, but this can be an expensive and complicated process, and its use should generally be limited to very large construction projects that discharge to critical receiving waters. Because individual permits are rare and would likely follow the General Permit to a large extent, this Handbook is structured around the General Permit.

In California, owners of construction projects may obtain NPDES permit coverage by filing a Notice of Intent (NOI) to be covered under the *State Water Resources Control Board (SWRCB) Order No. 99-08-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Stormwater Runoff Associated with Construction Activity (General Permit)* and subsequent adopted modifications.

The primary objectives of the General Permit are to:

- Reduce erosion
- Minimize or eliminate sediment in stormwater discharges
- Prevent materials used at a construction site from contacting stormwater
- Implement a sampling and analysis program if stormwater is exposed to construction materials.
- Eliminate unauthorized non-stormwater discharges from the construction sites
- Implement appropriate measures to reduce potential impacts on waterways both during and after construction of projects
- Establish maintenance commitments on post-construction pollution control measures

Failure to comply with the General Permit may result in significant fines for each violation and possible imprisonment.

Who must comply with the Construction General Permit?

- The General Permit applies to stormwater discharges associated with construction activity which disturbs one acre or greater of soil.
- The owner of the land is responsible for compliance.

Who does not need to seek coverage under the Construction General Permit?

- Projects on Tribal Lands, in the Lake Tahoe Hydrologic Unit, the San Jacinto Watershed, covered by an individual NPDES Permit for stormwater discharges, and landfill construction that is subject to the General Industrial Permit.

- Activities to maintain the original line, grade, and hydraulic function of a facility, and emergency activities, do not require coverage under the General Permit. However, reasonable pollution control during these activities may still be required under other state and local regulations and ordinances.

- Construction activities meeting all three of the following criteria do not require coverage under the General Permit; (1) result in soil disturbances of less than one acre, (2) are not part of a larger common plan of development that disturbs one or more acres of soil, and (3) do not constitute a threat to water quality.

How to comply with Construction General Permit

- Submit a Notice of Intent (NOI) and pay fees prior to the beginning of construction. Allow ten working days for processing the NOI and issuing the WDID number. A copy of the General Permit (SWQ 99-08) and the NOI can be found at http://www.swrcb.ca.gov/stormwtr/construction.html or in Appendix A.

- Prepare the SWPPP before construction begins. The SWPPP describes:

  - The project location, site features, and materials/activities that may result in the off-site discharge of pollutants during construction.

  - Controls to be implemented during construction - BMPs selected to control erosion, the discharge of sediment, and other pollutant sources.

  - An inspection and maintenance program for BMPs.

  - A sampling and analysis plan for sediment discharges to impaired water bodies as well as a plan to sample for non-visible pollutants.

  - Post construction controls – BMPs to prevent or control pollutants in runoff after construction is complete, including long-term maintenance.

- Keep the SWPPP on the site; implement it during construction and revise it as needed to reflect all phases of construction.

- Submit Notice of Termination (NOT) when construction is complete and conditions of termination listed in the NOT have been satisfied. A copy of the NOT can be found at http://www.swrcb.ca.gov/stormwtr/construction.html or at Attachment P in Appendix B.

1.3.3 Municipal NPDES Programs

Phase I Municipal Stormwater Program and municipal NPDES Permits cover and regulate municipalities with populations of over 100,000, drainage systems interconnected with these municipalities' systems, or municipalities determined to be significant contributors of pollutants. In California, most of the major urbanized counties have already obtained NPDES stormwater permits.

Municipalities with NPDES stormwater permits for their own municipal separate storm sewer system (MS4s) are responsible for developing a management program for public and private construction activities in their jurisdiction. Each program addresses appropriate planning and construction procedures; ensures the implementation, inspection, and monitoring of construction sites which discharge stormwater into their systems; and provides for education and training for construction site operators.

Phase II of the Stormwater Program will regulate municipalities with populations less than 100,000, including urbanized areas (areas with a population of 50,000 and density greater than 1,000 people per square mile), cities, and county areas designated by the state based on sitespecific criteria, and various state and federal facilities. Each designated entity must submit a Notice of Intent (NOI) along with a copy of its Stormwater Management Program. The Phase II Stormwater Management Program must address six minimum control measures, including the following measures related to construction activities:

- Illicit Discharge Detection and Elimination - Developing and implementing a plan to detect and eliminate illicit discharges to the storm drain system including illicit connections and illegal dumping.

- Construction Site Stormwater Runoff Control - Developing, implementing, and enforcing an erosion and sediment control program for construction activities that disturb one or more acres of land.

- Post Construction Stormwater Management in New Development and Redevelopment - Developing, implementing, and enforcing a program to address discharges of stormwater runoff from new and redevelopment areas.

While Phase I and Phase II programs for construction sites vary throughout the state, the programs have many similarities, including the requirement for construction sites to comply with the General Permit. For specific information on local program requirements, construction site owners must contact the municipal stormwater program coordinator in the jurisdiction where the project will be constructed.

1.4 Definitions

Many of the most common terms related to stormwater quality control are defined in the Glossary (see Section 5). Throughout the handbook, the user will find references to the following terms:

NPDES General Permit for Stormwater Discharges. NPDES is an acronym for National Pollutant Discharge Elimination System. NPDES is the national program for administering and regulating Sections 307, 318, 402, and 405 of the Clean Water Act (CWA). In California, the State Water Resources Control Board (SWRCB) has issued a General Permit for stormwater discharges associated with industrial activities (see Appendix A).

Notice of Intent (NOI) is a formal notice to the SWRCB submitted by the owner/operators of existing industrial facilities. The NOI provides information on the permittee, location of discharge, type of discharge and certifies that the permittee will comply with conditions of the Industrial General Permit. The NOI is not a permit application and does not require approval.

Sediment includes particles of sand, clay, silt, and other substances that settle at the bottom of a body of water. Sediment can come from the erosion of soil or from the decomposition of plants and animals. Wind, water, and ice often carry these particles great distances.

Stormwater Pollution Prevention Plan (SWPPP) is a written plan that documents the series of phases and activities that, first, characterizes your site, and then, prompts the implementers to select and carry out actions which reduce pollutants in stormwater discharges.

Stormwater Pollution Control Plan (SWPCP) is a less formal plan than the SWPPP that addresses the implementation of BMPs at facilities and businesses not covered by a General Permit but that have the potential to discharge pollutants.

Best Management Practices (BMP) is defined as any program, technology, process, siting criteria, operating method, measure, or device, which controls, prevents, removes, or reduces pollution.

Source Control BMP*s* are operational practices that prevent pollution by reducing potential pollutants at the source.

Treatment Control BMP*s* are methods of treatment to remove pollutants from stormwater.

1.5 References

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Section 2
Stormwater Pollution Prevention Plan

2.1 Introduction

This section describes the preparation and implementation of a stormwater pollution prevention plan (SWPPP) for a construction project. A SWPPP must be prepared before construction begins, ideally during the project planning and design phases. This is because much of the information required by the SWPPP is already part of the project design documentation, and because the design may need to be modified to incorporate controls during construction and post-construction. It may be completed at the end of the design phase or at the initiation of the construction phase prior to any activity with the potential to cause water pollution.

Implementation of the SWPPP begins when construction begins, typically before the initial clearing, grubbing, and grading operations, since these activities can usually increase erosion potential on the site. During construction, the SWPPP should be referred to frequently, and amended by the owner and contractors as changes occur in construction operations, which could have significant effects on the potential for discharge of pollutants.

2.2 Minimum Requirements

2.2.1 Sites Subject to General Permit Coverage

A construction project is subject to the General Permit[1] if it disturbs one acre or more of soil, or the project results in the disturbance of less than one acre but is part of a larger common plan of development or sale of one or more acres. Construction sites that result in soil disturbance of one acre or greater will require the preparation and implementation of a SWPPP meeting the requirements of the General Permit.

2.2.2 Other Sites

Construction projects with a disturbed area of less than one acre are not covered under the General Permit at this time and therefore are not required by the SWRQCB to develop a SWPPP. However, the local municipality or Regional Water Quality Control Board (RWQCB) may require the development of a SWPPP for all projects that require a grading permit or if it is determined that the project poses a significant water quality risk threat. The owner should contact local authorities to determine local requirements.

2.3 Assess Construction Site and Planned Activities

The planning phase is the source of much of the information needed for the SWPPP. The basis for stormwater pollution control decisions is also made at this phase via the normal review process with the local municipality. Information to be collected includes contractor activities, disturbed areas and erosion potential, and site history.

[1] State Water Resources Control Board (SWRCB) Order No. 99-08-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Stormwater Runoff Associated with Construction Activity (General Permit).

2.3.1 Contractor Activities

Information about contractor activities is required for the selection of proper BMPs. Details that should be recorded include:

- Equipment storage, cleaning and maintenance areas and activities
- Points of ingress and egress to the construction site
- Material loading, unloading, and storage practices and areas, including construction materials, building materials and waste materials.
- Materials, equipment, or vehicles that may come in contact with stormwater

2.3.2 Disturbed Areas and Erosion Potential

The physical condition of the site and adjacent areas should be reviewed. A project layout showing what is being constructed, limits of construction, project schedule, and existing features should be developed. Site characteristics including drainage patterns, soils, vegetation, surface water bodies, and steep or unstable slopes should be noted. A hydrology report, soils report, and a grading/drainage plan should be prepared. Physical conditions at the site will change as construction progresses. The SWPPP must be amended to address conditions as activities change at the site.

The hydrology reports should assess information such as drainage areas and patterns, rainfall information and expected run-on and runoff volumes and flow rates, etc. A soil report will identify soil constraints, design criteria, and soil stability. Both of these reports are used in the preparation of the preliminary grading and drainage plan. The grading and drainage plan should identify areas of cut and fill, slope during and after grading, protection of existing vegetation, and areas of soil disturbance. They also form the technical basis for selection of erosion and sediment control BMPs.

2.3.3 Site History

Existing site characteristics such as vegetation, environmental features, and areas of historic contamination (natural and/or industrial or agricultural) should also be recorded on the project layout. Soil laboratory analysis may be required should prior contamination be suspected. The selection and implementation of construction BMPs will be affected by what existing features need to be protected or mitigated during construction.

2.4 Identify and Select BMPs

The owner, the owner's design consultant, or the contractor, may select BMPs at the discretion of the owner. The contract between the owner and contractor should specify the responsibilities of the owner and contractor with regards to stormwater pollution control during construction. Owners must be aware that regardless of the contractual agreement between the owner and contractor with respect to BMP selection and SWPPP implementation, the owner is ultimately responsible for compliance with the General Permit.

A guide to selecting BMPs for construction activities is presented in the following sections. BMPs are generally selected in a three-step process:

- Define BMP Objectives
- Identify BMP category
- Select appropriate BMPs

2.4.1 Define BMPs Objectives

Selection and implementation of BMPs is based on the pollution risks associated with the construction activity. The pollution prevention objectives of BMPs are defined based on a review of information gathered during the assessment of the site and planned activities (Section 2.3). Once defined, BMP objectives are developed and BMPs selected. The BMP objectives for construction projects are as follows:

- Control of Erosion, and Discharge of Sediment:
  - Minimize Disturbed Areas: Only clear land which will be actively under construction in the near term (e.g., within the next 6-12 months), minimize new land disturbance during the rainy season, and avoid clearing and disturbing sensitive areas (e.g., steep slopes and natural watercourses) and other areas where site improvements will not be constructed.
  - Stabilize Disturbed Areas: Provide temporary stabilization of disturbed soils whenever active construction is not occurring on a portion of the site. Provide permanent stabilization during finish grade and landscape the site.
  - Protect Slopes and Channels: Safely convey runoff from the top of the slope and stabilize disturbed slopes as quickly as possible. Avoid disturbing natural channels. Stabilize temporary and permanent channel crossings as quickly as possible and ensure that increases in runoff velocity caused by the project do not erode the channel.
  - Control Site Perimeter: Delineate site perimeter to prevent disturbing areas outside the project limits. Divert upstream run-on safely around or through the construction project. Local codes usually state that such diversions must not cause downstream property damage, or be diverted into another watershed. Runoff from the project site should be free of excessive sediment and other constituents. Control tracking at points of ingress to and egress from the project site.
  - Retain Sediment: Retain sediment-laden waters from disturbed, active areas within the site.
- Manage Non-Stormwater Discharges and Materials:
  - Practice Good Housekeeping: Perform activities in a manner to keep potential pollutants from coming into contact with stormwater or being transported off site to eliminate or avoid exposure.

- Contain Materials and Wastes: Store construction, building, and waste materials in designated areas, protected from rainfall and contact with stormwater runoff. Dispose of all construction waste in designated areas, and keep stormwater from flowing onto or off of these areas. Prevent spills and clean up spilled materials.

2.4.2 Identify BMP Categories

Once the BMP objectives are defined, identify the category of BMP best suited to meet each objective. The particular BMP selected from each category depends on specific site conditions, construction activities, and cost considerations.

There are six BMP categories available for selection. They are:

- Erosion Control (EC)
- Sediment Control (SE)
- Wind Erosion Control (WE)
- Tracking Control (TR)
- Non Stormwater Management (NS)
- Waste Management and Materials Pollution Control (WM)

BMPs for contractor activities are listed in the TR, NS, and WM categories. BMPs for erosion and sediment control are listed in the EC, SE, WE, and TR categories.

2.4.3 Select BMPs

BMPs for Erosion and Sediment Control

BMPs for erosion and sediment control are selected to meet the BMP objectives based on specific site conditions, construction activities, and cost. Various BMPs may be needed at different times during construction since activities are constantly changing site conditions.

Selection of erosion control BMPs should be based on minimizing disturbed areas, stabilizing disturbed areas, and protecting slopes and channels. Selection of sediment control BMPs should be based on retaining sediment on-site and controlling the site perimeter. Erosion and sediment control BMPs are listed in the EC, SE, WE, and TR categories, which are presented in Section 3.

BMPs for Contractor Activities

Certain contractor activities may cause pollution if not properly managed. BMPs should be selected based on the contractor activities information collected in the SWPPP. The materials and BMP objectives for contractor activities are practicing good housekeeping and containing materials and waste. BMPs for contractor activities are selected from the TR, NS and WM categories, which are presented in Sections 3 (TR) and 4 (NS, WM). Several considerations for selecting a BMP for contractor activities include:

- Is it expected to rain? Selection of a BMP is different for the rainy season versus the dry season. What activities can be postponed or re-scheduled until after the rains or performed during the dry season.

- How much water is being used? The more water used and wastewater generated, the more likely that pollutants transported by this water will reach the drainage system or be transported off site.

- What are the site conditions? BMPs may differ depending on whether the activity is conducted on a slope or flat ground near a drainage structure or watercourse. Conducting activities away from certain sensitive areas will reduce the cost and inconvenience of implementing BMPs.

- What about accidents? Controls for common activities should be established, and preparations should be made to allow for quick response to accidents or spills. In the event of a spill or exposure of construction compounds, what are the contingency plans for sampling the contaminated stormwater? Can the analysis be done in the field or should laboratory analysis be required? Are sample bottles available on-site, appropriate test strips, etc?

2.5 Stormwater Pollution Prevention Plans

2.5.1 SWPPP Preparation

The General Permit requires that the owner prepare a SWPPP for projects that will create one acre or more of soil disturbance. The General Permit also requires that the SWPPP applies to all areas that are directly related to the construction activity, including but not limited to staging areas, storage yards, material borrow areas, and access roads, etc. In some cases, the owner may enter into agreements with the contractor or stormwater quality professionals for preparation and implementation of the SWPPP. However, owners must be aware that regardless of the contractual agreement between the owner and contractor with respect to BMP selections and SWPPP implementation, the owner is ultimately responsible for compliance with the General Permit. It is highly recommended that the owner and contractor jointly review the SWPPP during its development or during a pre-construction conference.

The SWPPP is a document that addresses water pollution control during construction. The SWPPP must be prepared and available on the project site before the project owner, developer, or contractor begins any activity with the potential to cause water pollution. The SWPPP must be available on site at all times and must be implemented year-round throughout the duration of the construction project.

The SWPPP must be completed before any construction activity starts. No construction activity having the potential to cause water pollution shall be performed until the SWPPP has been completed, certified, and appropriate BMPs have been implemented. Construction activities that will not threaten water quality, such as traffic control, may proceed without a complete SWPPP if allowed by the local agency and the RWQCB.

The SWPPP should be directed at personnel on the construction project (e.g., supervisor, foreman, and inspectors). The SWPPP should provide specific guidance on actions to be taken by these personnel and should be presented in a format that accommodates day-to-day use (e.g., loose leaf, pullout sections, and checklists).

The SWPPP should provide a simple narrative and diagram that locates the construction site, identifies potential pollutant sources on site, and shows the location of the BMPs to be used to minimize erosion and sedimentation during construction. It should also describe measures which eliminate or reduce pollution of stormwater runoff by any chemicals and materials used during the construction process. The level of detail will vary with the intensity, size, and type of construction.

2.5.2 SWPPP Template

An electronic SWPPP template has been developed and is included in Appendix A of this handbook as an assistance tool. The template contains the elements required by the General Permit, but local agencies may develop their own SWPPP template or require an alternative format. It is important to note that a SWPPP does not need to match the template provided. The template SWPPP is provided as a guidance document that was developed to:

- Provide easy data entry during SWPPP preparation (instructions and examples can be viewed in the template while the SWPPP is being prepared)

- Provide consistency in SWPPP content and format, thus making the SWPPP review process more efficient

An electronic copy of the SWPPP template (Microsoft Word® 2000) can be downloaded from the California Stormwater BMP Handbook web site at "www.cabmphandbooks.com." Due to the SWPPP template objectives for consistency in SWPPP content and format, the SWPPP template's underlying structure cannot be modified by the user.

2.6 SWPPP Implementation

2.6.1 Staff Training

Training is imperative to the success of the BMPs identified in the SWPPP. Adequate training is required if these BMPs are to be installed and maintained properly. These BMPs will fail if not properly installed and maintained. Thus, only trained personnel should be assigned these responsibilities. A construction stormwater pollution prevention training program should be held for all construction personnel. A good program will include:

- SWPPP Preparation Training. This training is geared towards owners, engineers, contractors, and water quality professionals involved in preparation and certification of SWPPPs. The training must cover all aspects of construction site water pollution control, including, SWPPP documentation and BMP selection.

- SWPPP Implementation Training. This training is geared towards owners, contractors, superintendents, foremen, and key staff designated in the SWPPP as being responsible for certifications, inspections, monitoring, and project oversight. The first training element must familiarize the individuals with the content and organization of the SWPPP, pollution control objectives, responsibilities for pollution control, BMPs, inspection procedures, and monitoring procedures. The second training element must focus on the SWPPP for the particular project site for which the individual is responsible, including site-specific responsibilities, BMPs, and other measures.

④ BMP Implementation Training. This training is geared towards owners, contractors, superintendents, foremen, tradesmen, laborers, and for other staff that work on the construction site including subcontractors. The training should cover responsibilities for BMP implementation, how to implement BMPs, general good housekeeping, and protection of BMPs in place.

Construction water pollution control training typically includes off-site and on-site training. Off-site training is most appropriate for SWPPP Preparation training with instruction provided by trade associations, colleges, Regional Boards, County, or other water quality professionals. SWPPP Implementation training can be conducted through a combination of off-site training for the general subjects, and on-site training for a site specific SWPPP, with instruction provided by trade associations, colleges, Regional Boards, Counties, water quality professionals, and experienced owner and contractor superintendents. BMP implementation training is usually conducted on the project site with instruction provided by experienced owner and contractors' superintendents and foremen.

Subcontractor employees can impact water quality and potentially jeopardize compliance with the General Permit, thus subcontractor staff must also receive appropriate training. The owner may wish to contractually require that subcontractors employ trained staff.

2.6.2 Site Inspections

The General Permit requires inspections before and after a storm event, and once each 24-hour period during extended storm events, to identify BMP effectiveness and implement repairs or BMP changes as soon as feasible. At the onset of a construction project (e.g., clearing, grubbing, or earth movement) it may be more appropriate to perform inspection of the BMPs on a regular basis instead of just before and after a storm. This will allow sufficient time for any corrections or improvements to be made before the storm. An inspector should be identified in the SWPPP. Inspection can usually be performed as part of a regular oversight and inspection of the project site.

According to the General Permit, a tracking or follow-up procedure must follow an inspection that identifies deficiencies in the BMPs. The result of the inspection and assessment must be written. Include the date of the inspection, weather information, the person(s) who performed the inspection, observations, descriptions of inadequate BMPs, and the corrective actions that were taken, such as BMPs that were fixed or additional BMPs that were implemented. Inspection records must be retained for three years from the date they were generated. It is highly recommended that records be retained for at least three years following the date coverage is terminated under the General Permit; even longer retention of records is recommended where sites have been subject to enforcement actions or are involved in litigation regarding issues covered by the permit.

2.6.3 BMP Monitoring

The type of BMP monitoring depends on which BMP is implemented. In the case of contractor activity BMPs, the monitoring consists of visual inspection to ensure that the BMP was implemented and maintained according to the SWPPP. Such inspection would include:

- Looking for evidence of spills and resulting clean-up procedures (e.g., supplies of spill cleanup materials)
- Verifying adequacy of trash receptacles
- Verifying waste disposal practices (e.g., recycle vs. hazardous waste bins)
- Examining integrity and use of containment structures
- Verifying use of employee education programs for the various activities
- Noting the location of activity (e.g., outdoor vs. indoor, concrete vs. grass)
- BMPs for any chemicals or fuels not addressed in the SWPPP must be developed

In the case of erosion and sediment control BMPs, the monitoring program should consist of regular inspection to determine the following:

- Are erosion and sediment control BMPs installed properly? The SWPPP BMPs should include details or references to allow for the proper construction of structural or vegetative erosion and sediment control devices. The inspector should ensure that these systems are installed according to the SWPPP in the proper locations
- Are the BMPs effective? The effectiveness of the BMP would be based on the presence of sediment behind or within control devices, the presence of sediment downstream of the site, and signs of erosion in stabilized areas after a storm event.
- Have drainage patterns changed? If the site has undergone significant grading operations, resulting in a change of drainage patterns, adjustment to the BMPs will likely be required to address this change. The inspector shall determine the extent of changes to the drainage pattern and the necessity for additional or reconfigured BMPs.
- Are areas stabilized as quickly as possible after completion of construction activities in an area? Disturbed active and inactive construction areas (inactive construction areas may be defined as areas in which no construction activity will occur for a period of 30 days or longer) should be stabilized as soon as practical. If construction, climatological, or other site conditions do not allow stabilization, the SWPPP should define alternative approaches.

- Are the BMPs properly maintained? Maintenance of erosion and sediment control BMPs is critical. Erosion controls should be installed as soon as practical after an area becomes inactive, and before the onset of rain. The capacity of sediment controls must be restored prior to the next rain event.

2.6.4 BMP Maintenance
The inspector should inspect the site on a regular basis, during and after any storm generating runoff to determine maintenance requirements and general condition of the installed system. The local agency may also inspect the site on a routine basis to assess the maintenance performed on the systems. All maintenance related to a storm event should be completed within 48 hours of the storm event. The following maintenance tasks should be performed on a regular basis:

- Removal of sediment from barriers and sedimentation devices
- Replacement or repair of worn or damaged silt fence fabrics
- Replacement or repair of damaged structural controls
- Repair of damaged soil stabilization measures.
- Other control maintenance as defined in each BMP fact sheet.

2.6.5 Stormwater Pollution Control Documentation
Records of inspections, compliance certifications, and non-compliance reporting are to be retained for at least three years by the owner. It is suggested that records of incidents such as spills or other releases be kept. Analyzing a history of this information can provide insight into modifying the BMPs. Photographs should also be kept.

Also, keep a record of maintenance activities or any other BMPs that are of an action nature. Activity based BMPs such as Good Housekeeping must be documented in each inspection; often, this documentation is the only evidence that the BMPs have been implemented.

Section 3
Erosion and Sediment Control BMPs

3.1 Erosion Control

Erosion control is any source control practice that protects the soil surface and prevents soil particles from being detached by rainfall, flowing water, or wind. Erosion control is also referred to as soil stabilization. Erosion control consists of preparing the soil surface and implementing one or more of the BMPs shown in Table 3-1, to disturbed soil areas.

Table 3-1	Erosion Control BMPs
BMP#	**BMP Name**
EC-1	Scheduling
EC-2	Preservation of Existing Vegetation
EC-3	Hydraulic Mulch
EC-4	Hydroseeding
EC-5	Soil Binders
EC-6	Straw Mulch
EC-7	Geotextiles & Mats
EC-8	Wood Mulching
EC-9	Earth Dikes and Drainage Swales
EC-10	Velocity Dissipation Devices
EC-11	Slope Drains
EC-12	Streambank Stabilization
EC-13	Polyacrylamide

All inactive soil-disturbed areas on the project site, and most active areas prior to the onset of rain, must be protected from erosion. Soil disturbed areas may include relatively flat areas as well as slopes. Typically, steep slopes and large exposed areas require the most robust erosion controls; flatter slopes and smaller areas still require protection, but less costly materials may be appropriate for these areas, allowing savings to be directed to the more robust BMPs for steep slopes and large exposed areas. To be effective, erosion control BMPs must be implemented at slopes and disturbed areas to protect them from concentrated flows.

Some erosion control BMPs can be used effectively to temporarily prevent erosion by concentrated flows. These BMPs, used alone or in combination, prevent erosion by intercepting, diverting, conveying, and discharging concentrated flows in a manner that prevents soil detachment and transport. Temporary concentrated flow conveyance controls may be required to direct run-on around or through the project in a non-erodible fashion. Temporary concentrated flow conveyance controls include the following BMPs:

- EC-9, Earth Dikes and Drainage Swales
- EC-10, Velocity Dissipation Devices
- EC-11, Slope Drains

3.2 Sediment Control

Sediment control is any practice that traps soil particles after they have been detached and moved by rain, flowing water, or wind. Sediment control measures are usually passive systems that rely on filtering or settling the particles out of the water or wind that is transporting them.

Sediment control practices include the BMPs listed in Table 3-2.

Table 3-2 Temporary Sediment Control BMPs

BMP#	BMP Name
SE-1	Silt Fence
SE-2	Sediment Basin
SE-3	Sediment Trap
SE-4	Check Dam
SE-5	Fiber Rolls
SE-6	Gravel Bag Berm
SE-7	Street Sweeping and Vacuuming
SE-8	Sandbag Barrier
SE-9	Straw Bale Barrier
SE-10	Storm Drain Inlet Protection
SE-11	Chemical Treatment

Sediment control BMPs include those practices that intercept and slow or detain the flow of stormwater to allow sediment to settle and be trapped. Sediment control practices can consist of installing linear sediment barriers (such as silt fence, sandbag barrier, and straw bale barrier); providing fiber rolls, gravel bag berms, or check dams to break up slope length or flow; or constructing a sediment trap or sediment basin. Linear sediment barriers are typically placed below the toe of exposed and erodible slopes, down-slope of exposed soil areas, around soil stockpiles, and at other appropriate locations along the site perimeter.

A few BMPs may control both sediment and erosion, for example, fiber rolls and sand bag barriers. The authors of this handbook have classified these BMPs as either erosion control (EC) or sediment control (SC) based on the authors opinion on the BMPs most common and effective use.

Sediment control BMPs are most effective when used in conjunction with erosion control BMPs. The combination of erosion control and sediment control is usually the most effective means to prevent sediment from leaving the project site and potentially entering storm drains or receiving waters. Under most conditions, the General Permit requires that the discharger implement an effective combination of erosion and sediment controls.

Under limited circumstances, sediment control, alone may be appropriate. For example, applying erosion control BMPs to an area where excavation, filling, compaction, or grading is currently under way may not be feasible when storms come unexpectedly. Use of sediment controls by establishing perimeter control on these areas may be appropriate and allowable under the General Permit provided the following conditions are met.

- Weather monitoring is under way.
- Inactive soil-disturbed areas have been protected with an effective combination of erosion and sediment controls.

- An adequate supply of sediment control materials are stored on-site and there are sufficient forces of labor and equipment available to implement sediment controls on the active area prior to the onset of rain.

- The SWPPP adequately describes the methods to protect active areas.

3.3 Wind Erosion Control

Wind erosion control consists of applying water or other dust palliatives to prevent or alleviate dust nuisance. Wind erosion control best management practices (BMPs) are shown in Table 3-3.

Table 3-3 Wind Erosion Control BMPs

BMP#	BMP Name
WE-1	Wind Erosion Control

Other BMPs that are sometimes applied to disturbed soil areas in order to control wind erosion are BMPs EC-2 through EC-7, shown in Section 3.1 of this Manual. Be advised that many of the dust palliatives may contain compounds that have an unknown effect on stormwater. A sampling and analysis protocol to test for stormwater contamination from exposure to such compounds is required in the SWPPP.

3.4 Tracking Control BMPs

Tracking control consists of preventing or reducing the tracking of sediment off-site by vehicles leaving the construction area. Tracking control best management practices (BMPs) are shown in Table 3-4.

Table 3-4 Temporary Tracking Control BMPs

BMP #	BMP Name
TR-1	Stabilized Construction Entrance/ Exit
TR-2	Stabilized Construction Roadway
TR-3	Entrance/Outlet Tire Wash

Attention to control of tracking sediment off site is highly recommended, as dirty streets and roads near a construction site create a nuisance to the public and generate constituent complaints to elected officials and regulators. These complaints often result in immediate inspections and regulatory actions.

3.5 Erosion and Sediment Control BMP Fact Sheet Format

A BMP fact sheet is a short document that gives all the information about a particular BMP. Typically, each fact sheet contains the information outlined in Figure 3-1. Completed fact sheets for each of the above activities are provided in Section 3.6.

The fact sheets also contain side bar presentations with information on BMP objectives, targeted constituents, removal effectiveness, and potential alternatives.

EC-xx Example Fact Sheet

Description and Purpose

Suitable Applications

Limitations

Implementation

Costs

Inspection and Maintenance

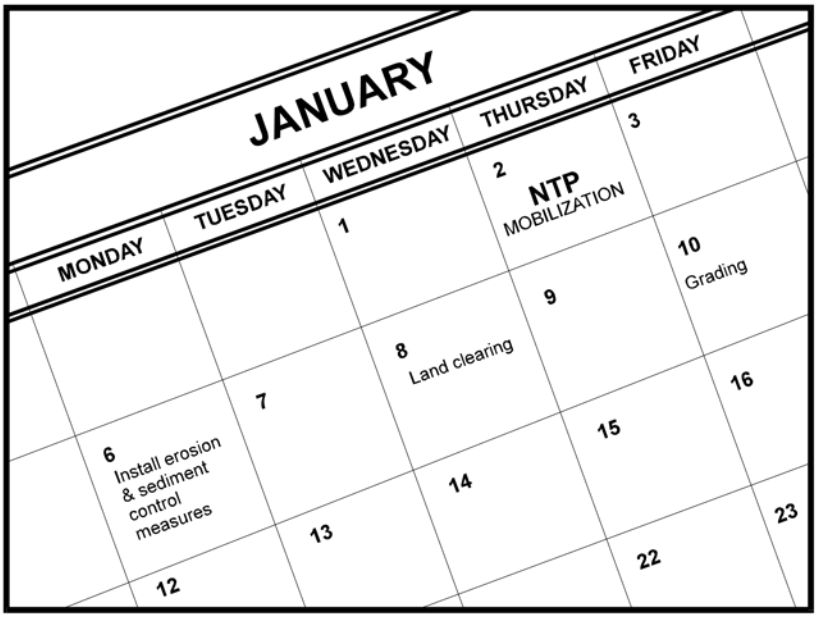
References

Figure 3-1
Example Fact Sheet

3.6 BMP Fact Sheets

BMP fact sheets for erosion, sediment, wind, and tracking controls follow. The BMP fact sheets are individually page numbered and are suitable for photocopying and inclusion in SWPPPs. Fresh copies of the fact sheets can be individually downloaded from the California Stormwater BMP Handbook web site at www.cabmphandbooks.com.

Scheduling EC-1



Objectives

EC	Erosion Control	☑
SE	Sediment Control	☒
TR	Tracking Control	☒
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment ▭
Nutrients
Trash Metals
Bacteria
Oil and Grease
Organics

Potential Alternatives

None

Description and Purpose

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Suitable Applications

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project especially during rainy season. Use of other, more costly yet less effective, erosion and sediment control BMPs may often be reduced through proper construction sequencing.

Limitations

- Environmental constraints such as nesting season prohibitions reduce the full capabilities of this BMP.

Implementation

- Avoid rainy periods. Schedule major grading operations during dry months when practical. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means or to install sediment trapping devices.

- Plan the project and develop a schedule showing each phase of construction. Clearly show how the rainy season relates to soil

disturbing and re-stabilization activities. Incorporate the construction schedule into the SWPPP.

- Include on the schedule, details on the rainy season implementation and deployment of:

  - Erosion control BMPs
  - Sediment control BMPs
  - Tracking control BMPs
  - Wind erosion control BMPs
  - Non-stormwater BMPs
  - Waste management and materials pollution control BMPs

- Include dates for activities that may require non-stormwater discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, pavement cleaning, etc.

- Work out the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, foundation pouring utilities installation, etc., to minimize the active construction area during the rainy season.

  - Sequence trenching activities so that most open portions are closed before new trenching begins.
  - Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
  - Schedule establishment of permanent vegetation during appropriate planting time for specified vegetation.

- Non-active areas should be stabilized as soon as practical after the cessation of soil disturbing activities or one day prior to the onset of precipitation.

- Monitor the weather forecast for rainfall.

- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment treatment controls on all disturbed areas prior to the onset of rain.

- Be prepared year round to deploy erosion control and sediment control BMPs. Erosion may be caused during dry seasons by un-seasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year round, and retain and maintain rainy season sediment trapping devices in operational condition.

- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.

Costs

Construction scheduling to reduce erosion may increase other construction costs due to reduced economies of scale in performing site grading. The cost effectiveness of scheduling techniques should be compared with the other less effective erosion and sedimentation controls to achieve a cost effective balance.

Inspection and Maintenance

- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.

- Amend the schedule when changes are warranted.

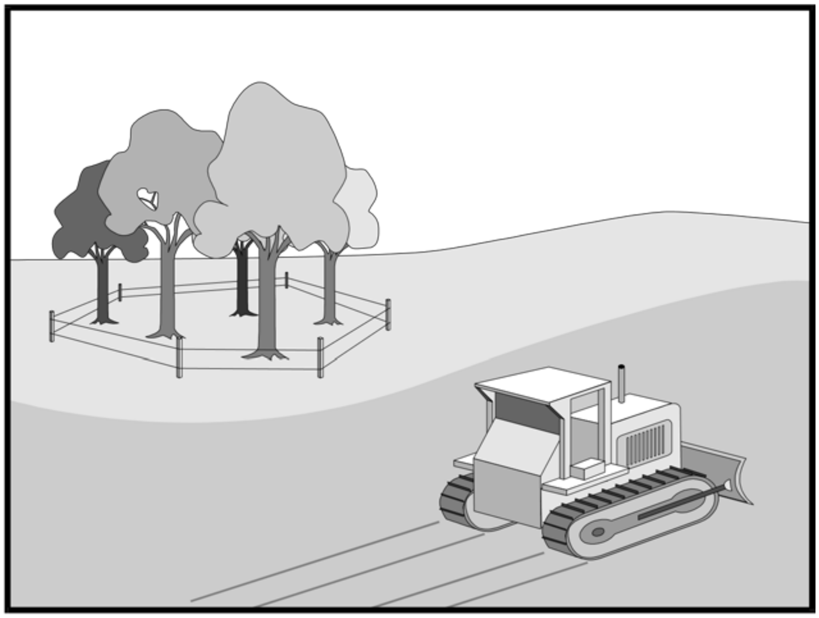
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

References

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities Developing Pollution Prevention Plans and Best Management Practices (EPA 832-R-92-005), U.S. Environmental Protection Agency, Office of Water, September 1992.

Preservation Of Existing Vegetation EC-2



Objectives

EC	Erosion Control
SE	Sediment Control
TR	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

Sediment

Nutrients

Trash

Metals

Bacteria

Oil and Grease

Organics

Potential Alternatives

None

Description and Purpose

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion.

Suitable Applications

Preservation of existing vegetation is suitable for use on most projects. Large project sites often provide the greatest opportunity for use of this BMP. Suitable applications include the following:

- Areas within the site where no construction activity occurs, or occurs at a later date. This BMP is especially suitable to multi year projects where grading can be phased.

- Areas where natural vegetation exists and is designated for preservation. Such areas often include steep slopes, watercourse, and building sites in wooded areas.

- Areas where local, state, and federal government require preservation, such as vernal pools, wetlands, marshes, certain oak trees, etc. These areas are usually designated on the plans, or in the specifications, permits, or environmental documents.

- Where vegetation designated for ultimate removal can be temporarily preserved and be utilized for erosion control and sediment control.

EC-2 Preservation Of Existing Vegetation

Limitations

- Requires forward planning by the owner/developer, contractor, and design staff.
- Limited opportunities for use when project plans do not incorporate existing vegetation into the site design.
- For sites with diverse topography, it is often difficult and expensive to save existing trees while grading the site satisfactory for the planned development.

Implementation

The best way to prevent erosion is to not disturb the land. In order to reduce the impacts of new development and redevelopment, projects may be designed to avoid disturbing land in sensitive areas of the site (e.g., natural watercourses, steep slopes), and to incorporate unique or desirable existing vegetation into the site's landscaping plan. Clearly marking and leaving a buffer area around these unique areas during construction will help to preserve these areas as well as take advantage of natural erosion prevention and sediment trapping.

Existing vegetation to be preserved on the site must be protected from mechanical and other injury while the land is being developed. The purpose of protecting existing vegetation is to ensure the survival of desirable vegetation for shade, beautification, and erosion control. Mature vegetation has extensive root systems that help to hold soil in place, thus reducing erosion. In addition, vegetation helps keep soil from drying rapidly and becoming susceptible to erosion. To effectively save existing vegetation, no disturbances of any kind should be allowed within a defined area around the vegetation. For trees, no construction activity should occur within the drip line of the tree.

Timing

- Provide for preservation of existing vegetation prior to the commencement of clearing and grubbing operations or other soil disturbing activities in areas where no construction activity is planned or will occur at a later date.

Design and Layout

- Mark areas to be preserved with temporary fencing. Include sufficient setback to protect roots.
  - Orange colored plastic mesh fencing works well.
  - Use appropriate fence posts and adequate post spacing and depth to completely support the fence in an upright position.
- Locate temporary roadways, stockpiles, and layout areas to avoid stands of trees, shrubs, and grass.

- Consider the impact of grade changes to existing vegetation and the root zone.
- Maintain existing irrigation systems where feasible. Temporary irrigation may be required.
- Instruct employees and subcontractors to honor protective devices. Prohibit heavy equipment, vehicular traffic, or storage of construction materials within the protected area.

Costs

There is little cost associated with preserving existing vegetation if properly planned during the project design, and these costs may be offset by aesthetic benefits that enhance property values. During construction, the cost for preserving existing vegetation will likely be less than the cost of applying erosion and sediment controls to the disturbed area. Replacing vegetation inadvertently destroyed during construction can be extremely expensive, sometimes in excess of $10,000 per tree.

Inspection and Maintenance

During construction, the limits of disturbance should remain clearly marked at all times. Irrigation or maintenance of existing vegetation should be described in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below should be followed:

- Verify that protective measures remain in place. Restore damaged protection measures immediately.
- Serious tree injuries shall be attended to by an arborist.
- Damage to the crown, trunk, or root system of a retained tree shall be repaired immediately.
- Trench as far from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When trenching or tunneling near or under trees to be retained, place tunnels at least 18 in. below the ground surface, and not below the tree center to minimize impact on the roots.
- Do not leave tree roots exposed to air. Cover exposed roots with soil as soon as possible. If soil covering is not practical, protect exposed roots with wet burlap or peat moss until the tunnel or trench is ready for backfill.
- Cleanly remove the ends of damaged roots with a smooth cut.
- Fill trenches and tunnels as soon as possible. Careful filling and tamping will eliminate air spaces in the soil, which can damage roots.
- If bark damage occurs, cut back all loosened bark into the undamaged area, with the cut tapered at the top and bottom and drainage provided at the base of the wood. Limit cutting the undamaged area as much as possible.

- Aerate soil that has been compacted over a trees root zone by punching holes 12 in. deep with an iron bar, and moving the bar back and forth until the soil is loosened. Place holes 18 in. apart throughout the area of compacted soil under the tree crown.

- Fertilization

  - Fertilize stressed or damaged broadleaf trees to aid recovery.

  - Fertilize trees in the late fall or early spring.

  - Apply fertilizer to the soil over the feeder roots and in accordance with label instructions, but never closer than 3 ft to the trunk. Increase the fertilized area by one-fourth of the crown area for conifers that have extended root systems.

- Retain protective measures until all other construction activity is complete to avoid damage during site cleanup and stabilization.

References

County of Sacramento Tree Preservation Ordinance, September 1981.

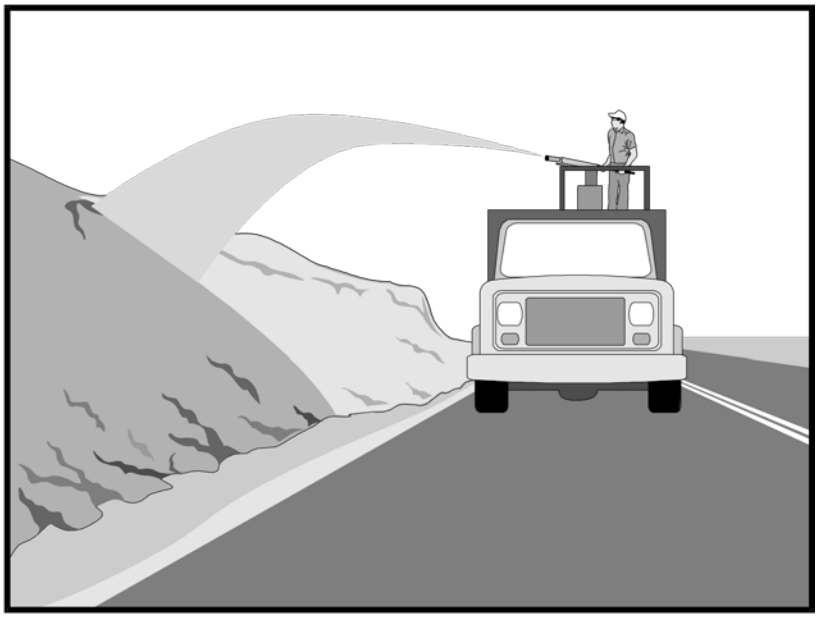
Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for The Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Hydraulic Mulch

EC-3



Objectives

EC	Erosion Control	▭
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	💻
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

▭ **Primary Objective**

💻 **Secondary Objective**

Targeted Constituents

Sediment	▭
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-4 Hydroseeding

EC-5 Soil Binders

EC-6 Straw Mulch

EC-7 Geotextiles and Mats

EC-8 Wood Mulching

Description and Purpose

Hydraulic mulch consists of applying a mixture of shredded wood fiber or a hydraulic matrix, and a stabilizing emulsion or tackifier with hydro-mulching equipment, which temporarily protects exposed soil from erosion by raindrop impact or wind.

Suitable Applications

Hydraulic mulch is suitable for soil disturbed areas requiring temporary protection until permanent stabilization is established, and disturbed areas that will be re-disturbed following an extended period of inactivity.

Limitations

Wood fiber hydraulic mulches are generally short lived and need 24 hours to dry before rainfall occurs to be effective. May require a second application in order to remain effective for an entire rainy season.

Implementation

- Prior to application, roughen embankment and fill areas by rolling with a crimping or punching type roller or by track walking. Track walking shall only be used where other methods are impractical.

- To be effective, hydraulic matrices require 24 hours to dry before rainfall occurs.

- Avoid mulch over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.

- Paper based hydraulic mulches alone shall not be used for erosion control.

Hydraulic Mulches

Wood fiber mulch can be applied alone or as a component of hydraulic matrices. Wood fiber applied alone is typically applied at the rate of 2,000 to 4,000 lb/acre. Wood fiber mulch is manufactured from wood or wood waste from lumber mills or from urban sources.

Hydraulic Matrices

Hydraulic matrices include a mixture of wood fiber and acrylic polymer or other tackifier as binder. Apply as a liquid slurry using a hydraulic application machine (i.e., hydro seeder) at the following minimum rates, or as specified by the manufacturer to achieve complete coverage of the target area: 2,000 to 4,000 lb/acre wood fiber mulch, and 5 to 10% (by weight) of tackifier (acrylic copolymer, guar, psyllium, etc.)

Bonded Fiber Matrix

Bonded fiber matrix (BFM) is a hydraulically applied system of fibers and adhesives that upon drying forms an erosion resistant blanket that promotes vegetation, and prevents soil erosion. BFMs are typically applied at rates from 3,000 lb/acre to 4,000 lb/acre based on the manufacturer's recommendation. A biodegradable BFM is composed of materials that are 100% biodegradable. The binder in the BFM should also be biodegradable and should not dissolve or disperse upon re-wetting. Typically, biodegradable BFMs should not be applied immediately before, during or immediately after rainfall if the soil is saturated. Depending on the product, BFMs typically require 12 to 24 hours to dry and become effective.

Costs

Average cost for installation of wood fiber mulch is $900/acre. Average cost for installation of BFM is $5,500/acre.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- Areas where erosion is evident shall be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.

- Maintain an unbroken, temporary mulched ground cover throughout the period of construction when the soils are not being reworked.

References

Controlling Erosion of Construction Sites Agricultural Information #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Sedimentation and Erosion Control, An Inventory of Current Practices Draft, US EPA, April 1990.

Soil Erosion by Water, Agriculture Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

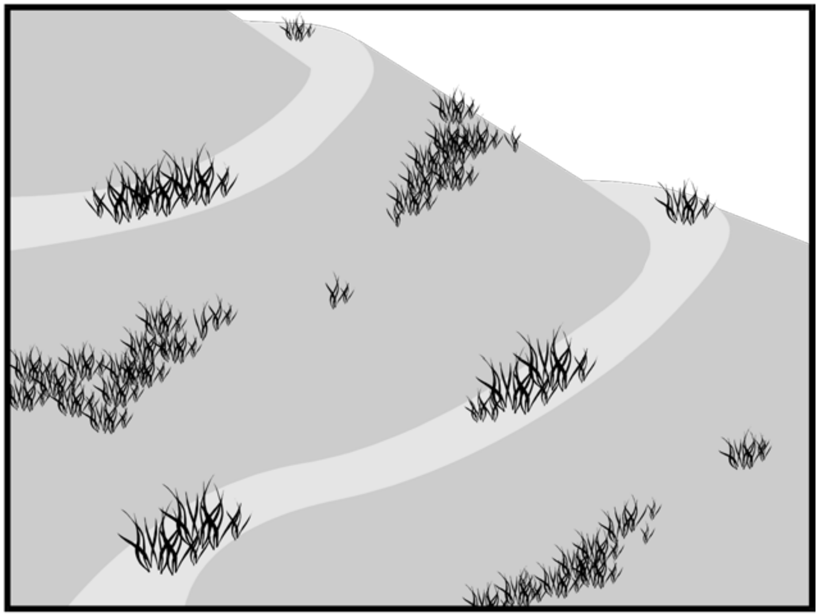
Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Hydroseeding EC-4



Objectives

EC	Erosion Control	Primary
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	Secondary
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

Sediment	Primary
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-5 Soil Binders

EC-6 Straw Mulch

EC-7 Geotextiles and Mats

EC-8 Wood Mulching

Description and Purpose

Hydroseeding typically consists of applying a mixture of wood fiber, seed, fertilizer, and stabilizing emulsion with hydromulch equipment, to temporarily protect exposed soils from erosion by water and wind.

Suitable Applications

Hydroseeding is suitable for soil disturbed areas requiring temporary protection until permanent stabilization is established, and disturbed areas that will be re-disturbed following an extended period of inactivity.

Limitations

- Hydroseeding may be used alone only when there is sufficient time in the season to ensure adequate vegetation establishment and coverage to provide adequate erosion control. Otherwise, hydroseeding must be used in conjunction with mulching (i.e., straw mulch).
- Steep slopes are difficult to protect with temporary seeding.
- Temporary seeding may not be appropriate in dry periods without supplemental irrigation.
- Temporary vegetation may have to be removed before permanent vegetation is applied.

- Temporary vegetation is not appropriate for short term inactivity.

EC-4 Hydroseeding

Implementation

In order to select appropriate hydroseeding mixtures, an evaluation of site conditions shall be performed with respect to:

- Soil conditions	- Maintenance requirements
- Site topography	- Sensitive adjacent areas
- Season and climate	- Water availability
- Vegetation types	- Plans for permanent vegetation

The local office of the U.S.D.A. Natural Resources Conservation Service (NRCS) is an excellent source of information on appropriate seed mixes.

The following steps shall be followed for implementation:

- Avoid use of hydroseeding in areas where the BMP would be incompatible with future earthwork activities and would have to be removed.

- Hydroseeding can be accomplished using a multiple step or one step process. The multiple step process ensures maximum direct contact of the seeds to soil. When the one step process is used to apply the mixture of fiber, seed, etc., the seed rate shall be increased to compensate for all seeds not having direct contact with the soil.

- Prior to application, roughen the area to be seeded with the furrows trending along the contours.

- Apply a straw mulch to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow.

- All seeds shall be in conformance with the California State Seed Law of the Department of Agriculture. Each seed bag shall be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. The container shall be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained. All legume seed shall be pellet inoculated. Inoculant sources shall be species specific and shall be applied at a rate of 2 lb of inoculant per 100 lb seed.

- Commercial fertilizer shall conform to the requirements of the California Food and Agricultural Code. Fertilizer shall be pelleted or granular form.

- Follow up applications shall be made as needed to cover weak spots and to maintain adequate soil protection.

- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.

Costs

Average cost for installation and maintenance may vary from as low as $300 per acre for flat slopes and stable soils, to $1600 per acre for moderate to steep slopes and/or erosive soils.

Hydroseeding		Installed Cost per Acre
High Density	Ornamentals	$400 - $1600
	Turf Species	$350
	Bunch Grasses	$300 - $1300
Fast Growing	Annual	$350 - $650
	Perennial	$300 - $800
Non-Competing	Native	$300 - $1600
	Non-Native	$400 - $500
Sterile	Cereal Grain	$500

Source: Caltrans Guidance for Soil Stabilization for Temporary Slopes, Nov. 1999

Inspection and Maintenance

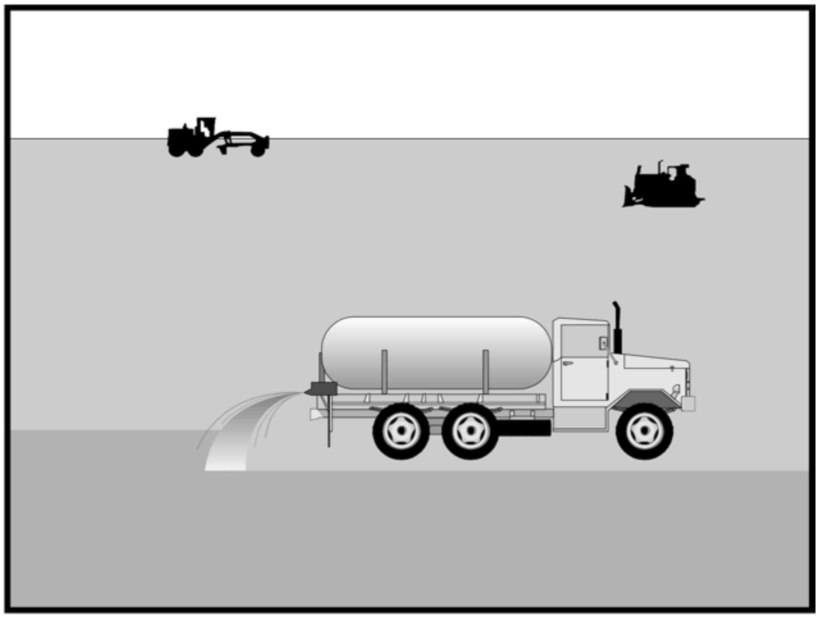
- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Areas where erosion is evident shall be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Where seeds fail to germinate, or they germinate and die, the area must be re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates.
- Irrigation systems, if applicable, should be inspected daily while in use to identify system malfunctions and line breaks. When line breaks are detected, the system must be shut down immediately and breaks repaired before the system is put back into operation.
- Irrigation systems shall be inspected for complete coverage and adjusted as needed to maintain complete coverage.

References

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Soil Binders EC-5



Objectives

EC	Erosion Control
SE	Sediment Control
TR	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

Sediment
Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics

Potential Alternatives

EC-3 Hydraulic Mulch
EC-4 Hydroseeding
EC-6 Straw Mulch
EC-7 Geotextiles and Mats
EC-8 Wood Mulching

Description and Purpose

Soil binders consist of applying and maintaining a soil stabilizer to exposed soil surfaces. Soil binders are materials applied to the soil surface to temporarily prevent water induced erosion of exposed soils on construction sites. Soil binders also prevent wind erosion.

Suitable Applications

Soil binders are typically applied to disturbed areas requiring short term temporary protection. Because soil binders can often be incorporated into the work, they are a good alternative to mulches in areas where grading activities will soon resume. Soil binders are also suitable for use on stockpiles.

Limitations

- Soil binders are temporary in nature and may need reapplication.

- Soil binders require a minimum curing time until fully effective, as prescribed by the manufacturer. Curing time may be 24 hours or longer. Soil binders may need reapplication after a storm event.

- Soil binders will generally experience spot failures during heavy rainfall events. If runoff penetrates the soil at the top of a slope treated with a soil binder, it is likely that the runoff will undercut the stabilized soil layer and discharge at a point further down slope.

- Soil binders do not hold up to pedestrian or vehicular traffic across treated areas.
- Soil binders may not penetrate soil surfaces made up primarily of silt and clay, particularly when compacted.
- Some soil binders may not perform well with low relative humidity. Under rainy conditions, some agents may become slippery or leach out of the soil.
- Soil binders may not cure if low temperatures occur within 24 hours of application.
- The water quality impacts of soil binders are relatively unknown and some may have water quality impacts due to their chemical makeup.
- A sampling and analysis plan must be incorporated into the SWPPP as soil binders could be a source of non-visible pollutants.

Implementation

General Considerations

- Regional soil types will dictate appropriate soil binders to be used.
- A soil binder must be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, economical, and should not stain paved or painted surfaces. Soil binders should not pollute stormwater.
- Some soil binders may not be compatible with existing vegetation.
- Performance of soil binders depends on temperature, humidity, and traffic across treated areas.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.

Selecting a Soil Binder

Properties of common soil binders used for erosion control are provided on Table 1 at the end of this BMP. Use Table 1 to select an appropriate soil binder. Refer to WE-1, Wind Erosion Control, for dust control soil binders.

Factors to consider when selecting a soil binder include the following:

- Suitability to situation - Consider where the soil binder will be applied, if it needs a high resistance to leaching or abrasion, and whether it needs to be compatible with any existing vegetation. Determine the length of time soil stabilization will be needed, and if the soil binder will be placed in an area where it will degrade rapidly. In general, slope steepness is not a discriminating factor for the listed soil binders.

- Soil types and surface materials - Fines and moisture content are key properties of surface materials. Consider a soil binder's ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials.

- Frequency of application - The frequency of application can be affected by subgrade conditions, surface type, climate, and maintenance schedule. Frequent applications could lead to high costs. Application frequency may be minimized if the soil binder has good penetration, low evaporation, and good longevity. Consider also that frequent application will require frequent equipment clean up.

Plant-Material Based (Short Lived) Binders

Guar: Guar is a non-toxic, biodegradable, natural galactomannan based hydrocolloid treated with dispersant agents for easy field mixing. It should be mixed with water at the rate of 11 to 15 lb per 1,000 gallons. Recommended minimum application rates are as follows:

Application Rates for Guar Soil Stabilizer

Slope (H:V):	Flat	4:1	3:1	2:1	1:1
lb/acre:	40	45	50	60	70

Psyllium: Psyllium is composed of the finely ground muciloid coating of plantago seeds that is applied as a dry powder or in a wet slurry to the surface of the soil. It dries to form a firm but rewettable membrane that binds soil particles together but permits germination and growth of seed. Psyllium requires 12 to 18 hours drying time. Application rates should be from 80 to 200 lb/acre, with enough water in solution to allow for a uniform slurry flow.

Starch: Starch is non-ionic, cold water soluble (pre-gelatinized) granular cornstarch. The material is mixed with water and applied at the rate of 150 lb/acre. Approximate drying time is 9 to 12 hours.

Plant-Material Based (Long Lived) Binders

Pitch and Rosin Emulsion: Generally, a non-ionic pitch and rosin emulsion has a minimum solids content of 48%. The rosin should be a minimum of 26% of the total solids content. The soil stabilizer should be non-corrosive, water dilutable emulsion that upon application cures to a water insoluble binding and cementing agent. For soil erosion control applications, the emulsion is diluted and should be applied as follows:

- For clayey soil: 5 parts water to 1 part emulsion

- For sandy soil: 10 parts water to 1 part emulsion

Application can be by water truck or hydraulic seeder with the emulsion and product mixture applied at the rate specified by the manufacturer.

Polymeric Emulsion Blend Binders

Acrylic Copolymers and Polymers: Polymeric soil stabilizers should consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55% solids. The polymeric compound should be handled and mixed in a manner that will not cause foaming or should contain an anti-foaming agent. The polymeric emulsion should not exceed its shelf life or expiration date; manufacturers should provide the expiration date. Polymeric soil stabilizer should be readily miscible in water, non-injurious to seed or animal life, non-flammable, should provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and should not re-emulsify when cured. The applied compound should air cure within a maximum of 36 to 48 hours. Liquid copolymer should be diluted at a rate of 10 parts water to 1 part polymer and the mixture applied to soil at a rate of 1,175 gallons/acre.

Liquid Polymers of Methacrylates and Acrylates: This material consists of a tackifier/sealer that is a liquid polymer of methacrylates and acrylates. It is an aqueous 100% acrylic emulsion blend of 40% solids by volume that is free from styrene, acetate, vinyl, ethoxylated surfactants or silicates. For soil stabilization applications, it is diluted with water in accordance with manufacturer's recommendations, and applied with a hydraulic seeder at the rate of 20 gallons/acre. Drying time is 12 to 18 hours after application.

Copolymers of Sodium Acrylates and Acrylamides: These materials are non-toxic, dry powders that are copolymers of sodium acrylate and acrylamide. They are mixed with water and applied to the soil surface for erosion control at rates that are determined by slope gradient:

Slope Gradient (H:V)	lb/acre
Flat to 5:1	3.0 – 5.0
5:1 to 3:1	5.0 – 10.0
2:2 to 1:1	10.0 – 20.0

Poly-Acrylamide and Copolymer of Acrylamide: Linear copolymer polyacrylamide is packaged as a dry flowable solid. When used as a stand alone stabilizer, it is diluted at a rate of 11lb/1,000 gal of water and applied at the rate of 5.0 lb/acre.

Hydro-Colloid Polymers: Hydro-Colloid Polymers are various combinations of dry flowable poly-acrylamides, copolymers and hydro-colloid polymers that are mixed with water and applied to the soil surface at rates of 55 to 60 lb/acre. Drying times are 0 to 4 hours.

Cementitious-Based Binders

Gypsum: This is a formulated gypsum based product that readily mixes with water and mulch to form a thin protective crust on the soil surface. It is composed of high purity gypsum that is ground, calcined and processed into calcium sulfate hemihydrate with a minimum purity of 86%. It is mixed in a hydraulic seeder and applied at rates 4,000 to 12,000 lb/acre. Drying time is 4 to 8 hours.

Applying Soil Binders

After selecting an appropriate soil binder, the untreated soil surface must be prepared before applying the soil binder. The untreated soil surface must contain sufficient moisture to assist the agent in achieving uniform distribution. In general, the following steps should be followed:

- Follow manufacturer's written recommendations for application rates, pre-wetting of application area, and cleaning of equipment after use.

- Prior to application, roughen embankment and fill areas.

- Consider the drying time for the selected soil binder and apply with sufficient time before anticipated rainfall. Soil binders should not be applied during or immediately before rainfall.

- Avoid over spray onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.

- Soil binders should not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the temperature is below 40°F during the curing period.

- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.

- Generally, soil binders require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure time.

- For liquid agents:

  - Crown or slope ground to avoid ponding.

  - Uniformly pre-wet ground at 0.03 to 0.3 gal/yd^2 or according to manufacturer's recommendations.

  - Apply solution under pressure. Overlap solution 6 to 12 in.

  - Allow treated area to cure for the time recommended by the manufacturer; typically at least 24 hours.

  - Apply second treatment before first treatment becomes ineffective, using 50% application rate.

  - In low humidities, reactivate chemicals by re-wetting with water at 0.1 to 0.2 gal/yd^2.

Costs

Costs vary according to the soil stabilizer selected for implementation. The following are approximate costs:

Soil Binder	Cost per Acre
Plant-Material Based (Short Lived) Binders	$400
Plant-Material Based (Long Lived) Binders	$1,200
Polymeric Emulsion Blend Binders	$400 (1)
Cementitious-Based Binders	$800

(1) $1,200 for Acrylic polymers and copolymers

Source: Caltrans Guidance for Soil Stabilization for Temporary Slopes, Nov. 1999

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- Areas where erosion is evident shall be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.

- Reapply the selected soil binder as needed to maintain effectiveness.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Sedimentation and Erosion Control, An Inventory of Current Practices Draft, US EPA, April 1990.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

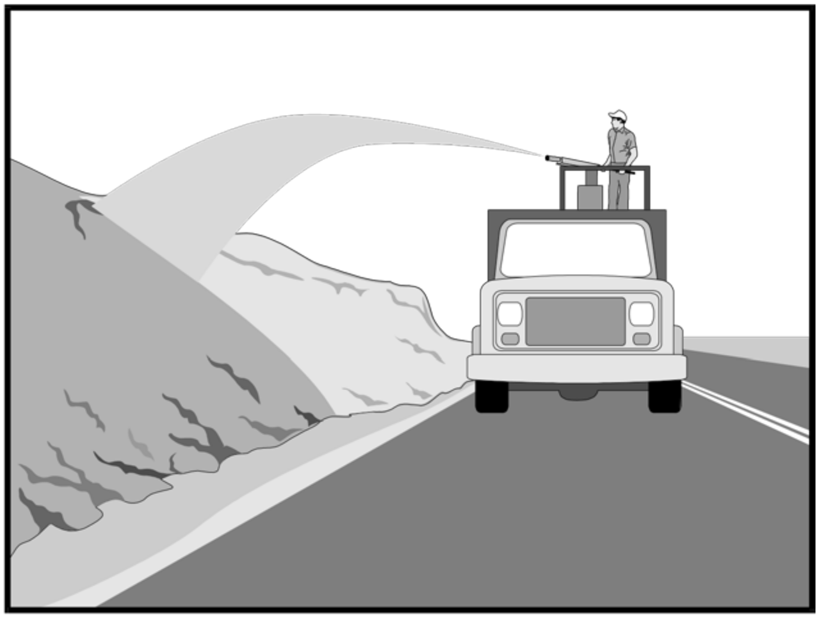
Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Table 1 Properties of Soil Binders for Erosion Control

Evaluation Criteria	Binder Type			
	Plant Material Based (Short Lived)	**Plant Material Based (Long Lived)**	**Polymeric Emulsion Blends**	**Cementitious-Based Binders**
Relative Cost	Low	Low	Low	Low
Resistance to Leaching	High	High	Low to Moderate	Moderate
Resistance to Abrasion	Moderate	Low	Moderate to High	Moderate to High
Longevity	Short to Medium	Medium	Medium to Long	Medium
Minimum Curing Time before Rain	9 to 18 hours	19 to 24 hours	0 to 24 hours	4 to 8 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Biodegradable	Biodegradable	Photodegradable/ Chemically Degradable	Photodegradable/ Chemically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher
Liquid/Powder	Powder	Liquid	Liquid/Powder	Powder
Surface Crusting	Yes, but dissolves on rewetting	Yes	Yes, but dissolves on rewetting	Yes
Clean Up	Water	Water	Water	Water
Erosion Control Application Rate	Varies (1)	Varies (1)	Varies (1)	4,000 to 12,000 lbs/acre

(1) See Implementation for specific rates.

Straw Mulch



Objectives

EC	Erosion Control	☑
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☐ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-4 Hydroseeding

EC-5 Soil Binders

EC-7 Geotextiles and Mats

EC-8 Wood Mulching

Description and Purpose

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or anchoring it with a tackifier stabilizing emulsion. Straw mulch protects the soil surface from the impact of rain drops, preventing soil particles from becoming dislodged.

Suitable Applications

Straw mulch is suitable for soil disturbed areas requiring temporary protection until permanent stabilization is established. Straw mulch is typically used for erosion control on disturbed areas until soils can be prepared for permanent vegetation. Straw mulch is also used in combination with temporary and/or permanent seeding strategies to enhance plant establishment.

Limitations

- Availability of straw and straw blowing equipment may be limited just prior to the rainy season and prior to storms due to high demand.
- There is a potential for introduction of weed seed and unwanted plant material.
- When straw blowers are used to apply straw mulch, the treatment areas must be within 150 ft of a road or surface capable of supporting trucks.
- Straw mulch applied by hand is more time intensive and potentially costly.

EC-6 Straw Mulch

- Wind may limit application of straw and blow straw into undesired locations.
- May have to be removed prior to permanent seeding or prior to further earthwork.
- "Punching" of straw does not work in sandy soils, necessitating the use of tackifiers.

Implementation

- Straw shall be derived from wheat, rice, or barley. Where required by the plans, specifications, permits, or environmental documents, native grass straw shall be used.
- A tackifier is the preferred method for anchoring straw mulch to the soil on slopes.
- Crimping, punch roller-type rollers, or track walking may also be used to incorporate straw mulch into the soil on slopes. Track walking shall only be used where other methods are impractical.
- Avoid placing straw onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.
- Straw mulch with tackifier shall not be applied during or immediately before rainfall.
- In San Diego, use of straw near wood framed home construction has been frowned on by the Fire Marshall.

Application Procedures

- Apply straw at a minimum rate of 4,000 lb/acre, either by machine or by hand distribution.
- Roughen embankments and fill rills before placing the straw mulch by rolling with a crimping or punching type roller or by track walking.
- Evenly distribute straw mulch on the soil surface.
- Anchor straw mulch to the soil surface by "punching" it into the soil mechanically (incorporating). Alternatively, use a tackifier to adhere straw fibers.
- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions, and longevity.
  - On small areas, a spade or shovel can be used to punch in straw mulch.
  - On slopes with soils that are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be "punched" into the ground using a knife blade roller or a straight bladed coulter, known commercially as a "crimper".

- On small areas and/or steep slopes, straw can also be held in place using plastic netting or jute. The netting shall be held in place using 11 gauge wire staples, geotextile pins or wooden stakes as described in EC-7, Geotextiles and Mats.

- A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier shall be selected based on longevity and ability to hold the fibers in place. A tackifier is

typically applied at a rate of 125 lb/acre. In windy conditions, the rates are typically 180 lb/acre.

Costs
Average annual cost for installation and maintenance (3-4 months useful life) is $2,500 per acre. Application by hand is more time intensive and potentially costly.

Inspection and Maintenance
- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.

- The key consideration in inspection and maintenance is that the straw needs to last long enough to achieve erosion control objectives.

- Maintain an unbroken, temporary mulched ground cover while disturbed soil areas are inactive. Repair any damaged ground cover and re-mulch exposed areas.

- Reapplication of straw mulch and tackifier may be required to maintain effective soil stabilization over disturbed areas and slopes.

References
Controlling Erosion of Construction Sites, Agricultural Information Bulletin #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Soil Erosion by Water, Agricultural Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Geotextiles and Mats EC-7

Objectives

Legend:

Primary Objective

Secondary Objective

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	3
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Targeted Constituents

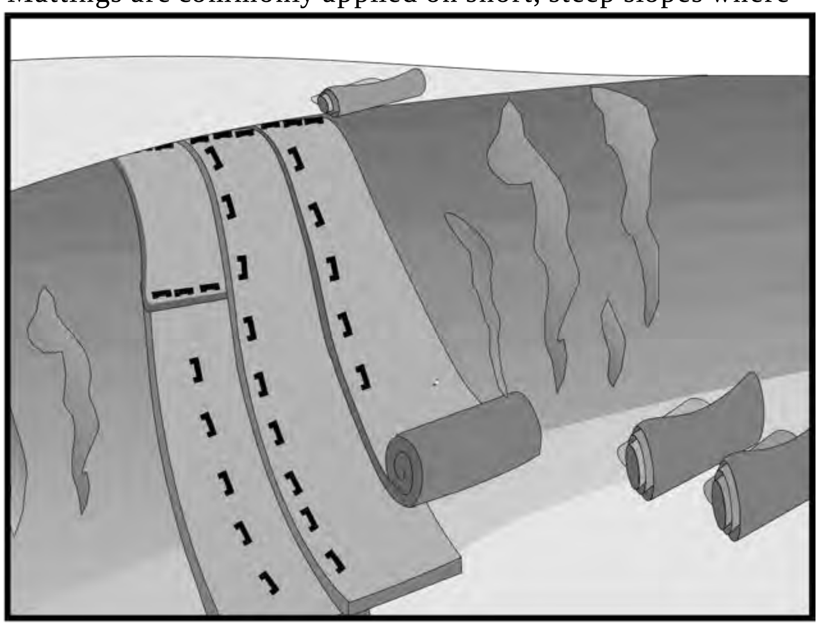
Sediment

Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics

Mattings of natural materials are used to cover the soil surface to reduce erosion from rainfall impact, hold soil in place, and absorb and hold moisture near the soil surface. Additionally, matting may be used to stabilize soils until vegetation is established.

Suitable Applications

Mattings are commonly applied on short, steep slopes where



erosion hazard is high and vegetation will be slow to establish.

Mattings are also used on stream banks where moving water at **Potential Alternatives** velocities between 3 ft/s and 6 ft/s are likely to wash out new EC-3 Hydraulic Mulch vegetation, and in areas where the soil surface is disturbed and EC-4 Hydroseeding where existing vegetation has been removed. Matting may also be used when seeding cannot occur (e.g., late season EC-5 Soil Binders construction

Description and Purpose

and/or the arrival of an early rain season). EC-6 Straw Mulch Erosion control matting should be considered when the soils EC-8 Wood Mulching are fine grained and potentially erosive. These measures should be considered in the following situations.

- Steep slopes, generally steeper than 3:1 (H:V)
- Slopes where the erosion potential is high
- Slopes and disturbed soils where mulch must be anchored
- Disturbed areas where plants are slow to develop
- Channels with flows exceeding 3.3 ft/s
- Channels to be vegetated
- Stockpiles
- Slopes adjacent to water bodies of Environmentally Sensitive Areas (ESAs)

Limitations

- Properly installed mattings provide excellent erosion control but do so at relatively high cost. This high cost typically limits the use of mattings to areas of concentrated channel flow and steep slopes.
- Mattings are more costly than other BMP practices, limiting their use to areas where other BMPs are ineffective (e.g. channels, steep slopes).
- Installation is critical and requires experienced contractors. The contractor should install the matting material in such a manner that continuous contact between the material and the soil occurs.
- Geotextiles and Mats may delay seed germination, due to reduction in soil temperature.
- Blankets and mats are generally not suitable for excessively rocky sites or areas where the final vegetation will be mowed (since staples and netting can catch in mowers).
- Blankets and mats must be removed and disposed of prior to application of permanent soil stabilization measures.
- Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.
- Plastic results in 100% runoff, which may cause serious erosion problems in the areas receiving the increased flow.
- The use of plastic should be limited to covering stockpiles or very small graded areas for short periods of time (such as through one imminent storm event) until alternative measures, such as seeding and mulching, may be installed.
- Geotextiles, mats, plastic covers, and erosion control covers have maximum flow rate limitations; consult the manufacturer for proper selection.

- Not suitable for areas that have heavy foot traffic (tripping hazard) – e.g., pad areas around buildings under construction.

Implementation

Material Selection

Organic matting materials have been found to be effective where re-vegetation will be provided by re-seeding. The choice of matting should be based on the size of area, side slopes, surface conditions such as hardness, moisture, weed growth, and availability of materials.

The following natural and synthetic mattings are commonly used:

Geotextiles

- Material should be a woven polypropylene fabric with minimum thickness of 0.06 in., minimum width of 12 ft and should have minimum tensile strength of 150 lbs (warp), 80 lbs (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric should be approximately 0.07 sec^{-1} in conformance with the requirements in ASTM Designation: D4491. The fabric should have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets must be secured in place with wire staples or sandbags and by keying into tops of slopes to prevent infiltration of surface waters under geotextile. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- Geotextiles may be reused if they are suitable for the use intended.

Plastic Covers

- Plastic sheeting should have a minimum thickness of 6 mils, and must be keyed in at the top of slope and firmly held in place with sandbags or other weights placed no more than 10 ft apart. Seams are typically taped or weighted down their entire length, and there should be at least a 12 in. to 24 in. overlap of all seams. Edges should be embedded a minimum of 6 in. in soil.

- All sheeting must be inspected periodically after installation and after significant rainstorms to check for erosion, undermining, and anchorage failure. Any failures must be repaired immediately. If washout or breakages occur, the material should be re-installed after repairing the damage to the slope. ***Erosion Control Blankets/Mats***

- Biodegradable rolled erosion control products (RECPs) are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. In order for an RECP to be considered 100% biodegradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable.

  - **Jute** is a natural fiber that is made into a yarn that is loosely woven into a biodegradable mesh. It is designed to be used in conjunction with vegetation and has longevity of approximately one year. The material is supplied in rolled strips, which should be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Excelsior** (curled wood fiber) blanket material should consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 6 in. or longer. The excelsior blanket should be of consistent thickness. The wood fiber must be evenly distributed over the entire area of the blanket. The top surface of the blanket should be covered with a photodegradable extruded plastic mesh. The blanket should be smolder resistant without the use of chemical additives and should be non-toxic and non-injurious to plant and animal life. Excelsior blankets should be furnished in rolled strips, a minimum of 48 in. wide, and should have an average weight of 0.8 lb/yd^2, ±10 percent, at the time of manufacture. Excelsior blankets must be secured in place with wire staples. Staples

should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- **Straw blanket** should be machine produced mats of straw with a lightweight biodegradable netting top layer. The straw should be attached to the netting with biodegradable thread or glue strips. The straw blanket should be of consistent thickness. The straw should be evenly distributed over the entire area of the blanket. Straw blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd^2. Straw blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- **Wood fiber blanket** is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured to the ground with Ushaped staples or stakes in accordance with manufacturers' recommendations.

- **Coconut fiber blanket** should be a machine produced mat of 100 percent coconut fiber with biodegradable netting on the top and bottom. The coconut fiber should be attached to the netting with biodegradable thread or glue strips. The coconut fiber blanket should be of consistent thickness. The coconut fiber should be evenly distributed over the entire area of the blanket. Coconut fiber blanket should be furnished in rolled strips with a minimum of 6.5 ft wide, a minimum of 80 ft. long and a minimum of 0.5 lb/yd^2. Coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- **Coconut fiber mesh** is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a biodegradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Straw coconut fiber blanket** should be machine produced mats of 70 percent straw and 30 percent coconut fiber with a biodegradable netting top layer and a biodegradable bottom net. The straw and coconut fiber should be attached to the netting with biodegradable thread or glue strips. The straw coconut fiber blanket should be of consistent thickness. The straw and coconut fiber should be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd^2. Straw coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- Non-biodegradable RECPs are typically composed of polypropylene, polyethylene, nylon or other synthetic fibers. In some cases, a combination of biodegradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically nonbiodegradable as well.

  - **Plastic netting** is a lightweight biaxially oriented netting designed for securing loose mulches like straw or paper to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which must be secured with Ushaped staples or stakes in accordance with manufacturers' recommendations.

  - **Plastic mesh** is an open weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than ¼ in. It is used with revegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Synthetic fiber with netting** is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be re-vegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Bonded synthetic fibers** consist of a three dimensional geomatrix nylon (or other synthetic) matting. Typically it has more than 90 percent open area, which facilitates root growth. It's tough root reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Combination synthetic and biodegradable RECPs** consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top and a high strength continuous filament geomatrix or net stitched to the bottom. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Site Preparation

- Proper site preparation is essential to ensure complete contact of the blanket or matting with the soil.

- Grade and shape the area of installation.

- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.

- Prepare seedbed by loosening 2 to 3 in. of topsoil.

Seeding

Seed the area before blanket installation for erosion control and revegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all check slots and other areas disturbed during installation must be re-seeded. Where soil filling is specified, seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Fertilize and seed in accordance with seeding specifications or other types of landscaping plans. When using jute matting on a seeded area, apply approximately half the seed before laying the mat and the remainder after laying the mat. The protective matting can be laid over areas where grass has been planted and the seedlings have emerged. Where vines or other ground covers are to be planted, lay the protective matting first and then plant through matting according to design of planting.

Check Slots

Check slots are made of glass fiber strips, excelsior matting strips or tight folded jute matting blanket or strips for use on steep, highly erodible watercourses. The check slots are placed in narrow trenches 6 to 12 in. deep across the channel and left flush with the soil surface. They are to cover the full cross section of designed flow.

Laying and Securing Matting

- Before laying the matting, all check slots should be installed and the friable seedbed made free from clods, rocks, and roots. The surface should be compacted and finished according to the requirements of the manufacturer’s recommendations.

- Mechanical or manual lay down equipment should be capable of handling full rolls of fabric and laying the fabric smoothly without wrinkles or folds. The equipment should meet the fabric manufacturer’s recommendations or equivalent standards.

Anchoring

- U-shaped wire staples, metal geotextile stake pins, or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.

- Wire staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- Metal stake pins should be 0.188 in. diameter steel with a 1.5 in. steel washer at the head of the pin, and 8 in. in length.

- Wire staples and metal stakes should be driven flush to the soil surface.

Installation on Slopes

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 6 in. deep by 6 in. wide trench. Backfill trench and tamp earth firmly.

- Unroll blanket down slope in the direction of water flow.

- Overlap the edges of adjacent parallel rolls 2 to 3 in. and staple every 3 ft.

- When blankets must be spliced, place blankets end over end (shingle style) with 6 in. overlap. Staple through overlapped area, approximately 12 in. apart.

- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.

- Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples should be placed down the center and staggered with the staples placed along the edges. Steep slopes, 1:1 (H:V) to 2:1 (H:V), require a minimum of 2 staples/yd^2. Moderate slopes, 2:1 (H:V) to 3:1 (H:V), require a minimum of 1 ½ staples/yd^2.

Installation in Channels

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Dig initial anchor trench 12 in. deep and 6 in. wide across the channel at the lower end of the project area.

- Excavate intermittent check slots, 6 in. deep and 6 in. wide across the channel at 25 to 30 ft intervals along the channels.

- Cut longitudinal channel anchor trenches 4 in. deep and 4 in. wide along each side of the installation to bury edges of matting, whenever possible extend matting 2 to 3 in. above the crest of the channel side slopes.

- Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 12 in. intervals. Note: matting will initially be upside down in anchor trench.

- In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 3 in.

- Secure these initial ends of mats with anchors at 12 in. intervals, backfill and compact soil.

- Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 3 in. overlap.

- Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 12 in. intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.

- Alternate method for non-critical installations: Place two rows of anchors on 6 in. centers at 25 to 30 ft. intervals in lieu of excavated check slots.

- Staple shingled lap spliced ends a minimum of 12 in. apart on 12 in. intervals.

- Place edges of outside mats in previously excavated longitudinal slots; anchor using prescribed staple pattern, backfill, and compact soil.

- Anchor, fill, and compact upstream end of mat in a 12 in. by 6 in. terminal trench.

- Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.

- Seed and fill turf reinforcement matting with soil, if specified.

Soil Filling (if specified for turf reinforcement)

- Always consult the manufacturer's recommendations for installation.

- Do not drive tracked or heavy equipment over mat.

- Avoid any traffic over matting if loose or wet soil conditions exist.

- Use shovels, rakes, or brooms for fine grading and touch up.

- Smooth out soil filling just exposing top netting of mat.

Temporary Soil Stabilization Removal

- Temporary soil stabilization removed from the site of the work must be disposed of if necessary.

Costs

Relatively high compared to other BMPs. Biodegradable materials: \$0.50 - \$0.57/yd^2. Permanent materials: \$3.00 - \$4.50/yd^2. Staples: \$0.04 - \$0.05/staple. Approximate costs for installed materials are shown below:

Rolled Erosion Control Products		**Installed Cost per Acre**
Biodegradable	Jute Mesh	\$6,500
	Curled Wood Fiber	\$10,500
	Straw	\$8,900
	Wood Fiber	\$8,900
	Coconut Fiber	\$13,000
	Coconut Fiber Mesh	\$31,200
	Straw Coconut Fiber	\$10,900
Non-Biodegradable	Plastic Netting	\$2,000
	Plastic Mesh	\$3,200
	Synthetic Fiber with Netting	\$34,800
	Bonded Synthetic Fibers	\$50,000
	Combination with Biodegradable	\$32,000

Source: Caltrans Guidance for Soil Stabilization for Temporary Slopes, Nov. 1999

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season, and at two-week intervals during the non-rainy season.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.

- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.

- Make sure matting is uniformly in contact with the soil.

- Check that all the lap joints are secure.

- Check that staples are flush with the ground.

- Check that disturbed areas are seeded.

References

Guides for Erosion and Sediment Controls in California, USDA Soils Conservation Service, January 1991.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

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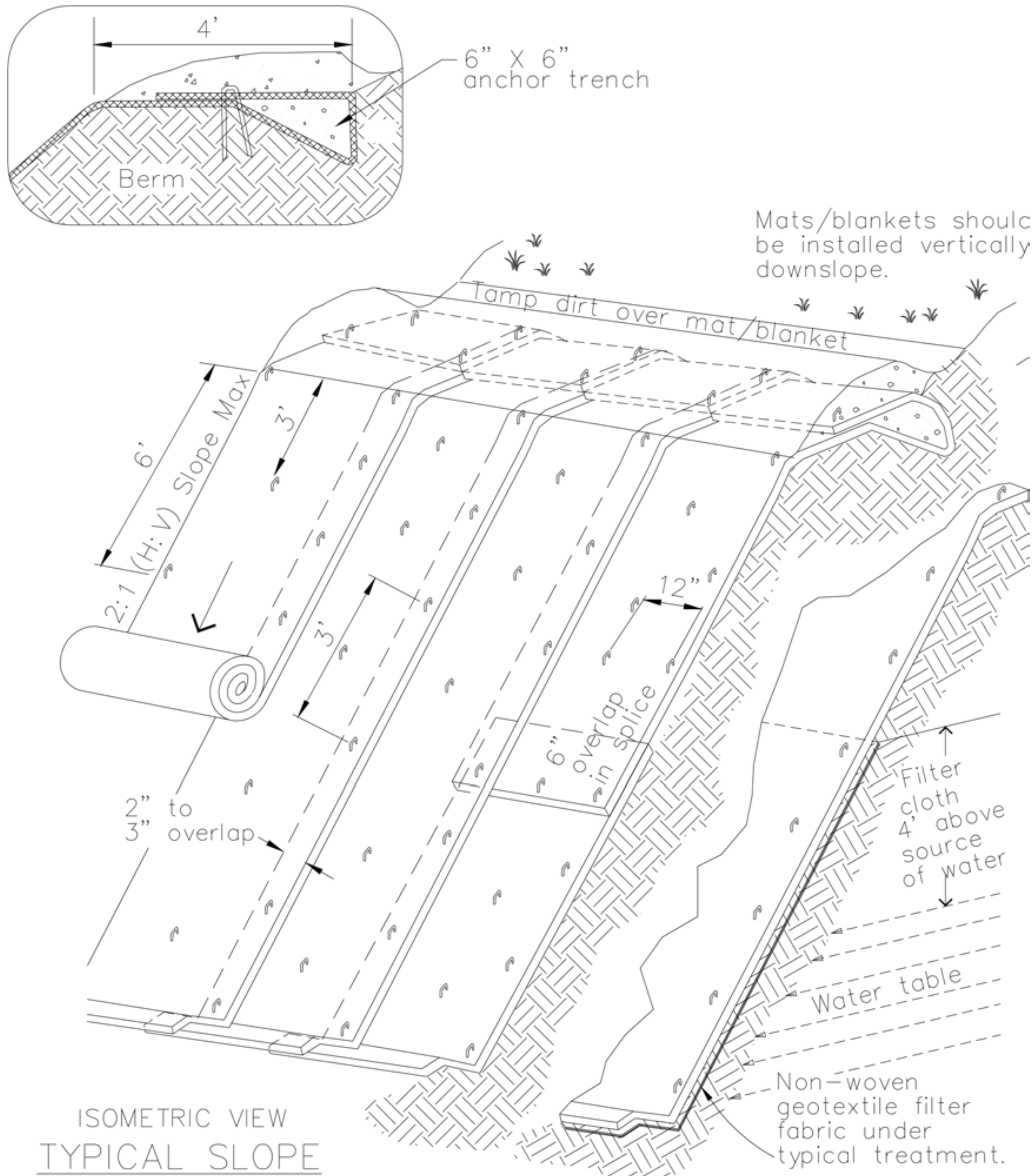


ISOMETRIC VIEW

TYPICAL SLOPE SOIL STABLIZATION

NTS

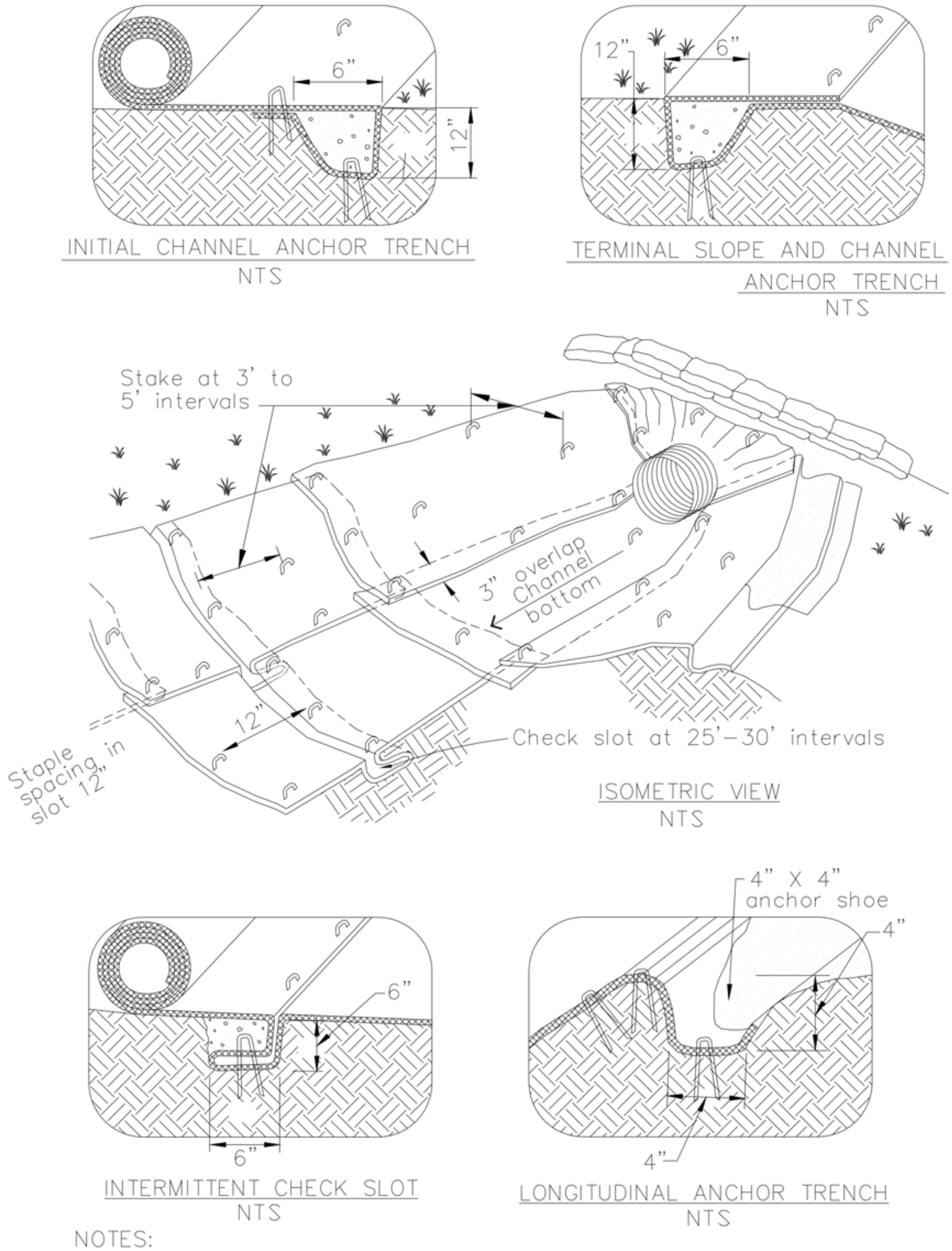
WET SLOPE LINING

NTS

NOTES:

1. Slope surface shall be free of rocks, clods, sticks and grass. Mats/blankets shall have good soil contact.
2. Lay blankets loosely and stake or staple to maintain direct contact with the soil. Do not stretch.
3. Install per manufacturer's recommendations

TYPICAL INSTALLATION DETAIL



NOTES:
1. Check slots to be constructed per manufacturers specifications.
2. Staking or stapling layout per manufacturers specifications.
3. Install per manufacturer's recommendations

TYPICAL INSTALLATION DETAIL

Wood Mulching

EC-8

Description and Purpose

Wood mulching consist of applying a mixture of shredded wood mulch, bark or compost to disturbed soils. The primary function of wood mulching is to reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

Suitable Applications

Wood mulching is suitable for disturbed soil areas requiring temporary protection until permanent stabilization is established.

Limitations

- Not suitable for use on slopes steeper than 3:1 (H:V). Best suited to flat areas or gentle slopes or 5:1 (H:V) or flatter.
- Wood mulch and compost may introduce unwanted species.
- Not suitable for areas exposed to concentrated flows.
- May need to be removed prior to further earthwork.

Implementation

Mulch Selection

There are many types of mulches. Selection of the appropriate type of mulch should be based on the type of application, site conditions, and compatibility with planned or future uses.

Application Procedures

Prior to application, after existing vegetation has been removed, roughen embankment and fill areas by rolling with a device such

Objectives

EC	Erosion Control	▭
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	💻
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

▭ **Primary Objective**

💻 **Secondary Objective**

Targeted Constituents

Sediment	▭
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-4 Hydroseeding

EC-5 Soil Binders

EC-6 Straw Mulch

EC-7 Geotextiles and Mats

EC-8 Wood Mulching

as a punching type roller or by track walking. The construction application procedures for mulches vary significantly depending upon the type of mulching method specified. Two methods are highlighted here:

- Green Material: This type of mulch is produced by the recycling of vegetation trimmings such as grass, shredded shrubs, and trees. Methods of application are generally by hand although pneumatic methods are available.
  - Green material can be used as a temporary ground cover with or without seeding.
  - The green material should be evenly distributed on site to a depth of not more than 2 in.
- Shredded Wood: Suitable for ground cover in ornamental or revegetated plantings.
  - Shredded wood/bark is conditionally suitable. See note under limitations.
  - Distribute by hand or use pneumatic methods.
  - Evenly distribute the mulch across the soil surface to a depth of 2 to 3 in.
- Avoid mulch placement onto roads, sidewalks, drainage channels, existing vegetation, etc.

Costs

Average annual cost for installation and maintenance (3-4 months useful life) is around $4,000 per acre, but cost can increase if the source is not close to the project site.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.
- Regardless of the mulching technique selected, the key consideration in inspection and maintenance is that the mulch needs to last long enough to achieve erosion control objectives. If the mulch is applied as a stand alone erosion control method over disturbed areas (without seed), it should last the length of time the site will remain barren or until final re-grading and revegetation.
- Where vegetation is not the ultimate cover, such as ornamental and landscape applications of bark or wood chips, inspection and maintenance should focus on longevity and integrity of the mulch.

- Reapply mulch when bare earth becomes visible.

References

Controlling Erosion of Construction Sites Agriculture Information Bulletin #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

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Sedimentation and Erosion Control, An Inventory of Current Practices Draft, U.S. EPA, April 1990.

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Earth Dikes and Drainage Swales EC-9

EC	Erosion Control
SE	Sediment Control
TR	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

An earth dike is a temporary berm or ridge of compacted soil used to divert runoff or channel water to a desired location. A drainage swale is a shaped and sloped depression in the soil surface used to convey runoff to a desired location. Earth dikes and drainage swales are used to divert off site runoff around the construction site, divert runoff from stabilized areas and disturbed areas, and direct runoff into sediment basins or traps.

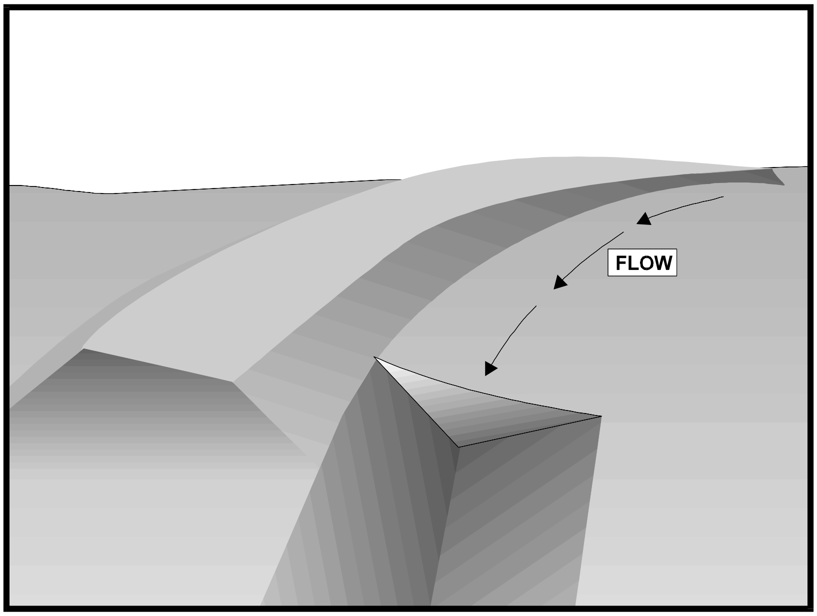
Sediment
Nutrients
Trash Metals
Bacteria
Oil and Grease
Organics

Suitable Applications

Earth dikes and drainage swales are suitable for use, individually or together, where runoff needs to be diverted from one area and conveyed to another.

Potential Alternatives

None



Objectives

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

Description and Purpose

- Earth dikes and drainage swales may be used:

  - To convey surface runoff down sloping land
  - To intercept and divert runoff to avoid sheet flow over sloped surfaces
  - To divert and direct runoff towards a stabilized watercourse, drainage pipe or channel
  - To intercept runoff from paved surfaces
  - Below steep grades where runoff begins to concentrate
  - Along roadways and facility improvements subject to flood drainage
  - At the top of slopes to divert runon from adjacent or undisturbed slopes
  - At bottom and mid slope locations to intercept sheet flow and convey concentrated flows
  - Divert sediment laden runoff into sediment basins or traps

Limitations

Dikes should not be used for drainage areas greater than 10 acres or along slopes greater than 10 percent. For larger areas more permanent drainage structures should be built. All drainage structures should be built in compliance with local municipal requirements.

- Earth dikes may create more disturbed area on site and become barriers to construction equipment.
- Earth dikes must be stabilized immediately, which adds cost and maintenance concerns.

- Diverted stormwater may cause downstream flood damage.
- Dikes should not be constructed of soils that may be easily eroded.
- Regrading the site to remove the dike may add additional cost.
- Temporary drains and swales or any other diversion of runoff should not adversely impact upstream or downstream properties.
- Temporary drains and swales must conform to local floodplain management requirements.
- Earth dikes/drainage swales are not suitable as sediment trapping devices.
- It may be necessary to use other soil stabilization and sediment controls such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales, and ditches.

Implementation

The temporary earth dike is a berm or ridge of compacted soil, located in such a manner as to divert stormwater to a sediment trapping device or a stabilized outlet, thereby reducing the potential for erosion and offsite sedimentation. Earth dikes can also be used to divert runoff from off site and from undisturbed areas away from disturbed areas and to divert sheet flows away from unprotected slopes.

An earth dike does not itself control erosion or remove sediment from runoff. A dike prevents erosion by directing runoff to an erosion control device such as a sediment trap or directing runoff away from an erodible area. Temporary diversion dikes should not adversely impact adjacent properties and must conform to local floodplain management regulations, and should not be used in areas with slopes steeper than 10%.

Slopes that are formed during cut and fill operations should be protected from erosion by runoff. A combination of a temporary drainage swale and an earth dike at the top of a slope can divert runoff to a location where it can be brought to the bottom of the slope (see EC-11, Slope Drains). A combination dike and swale is easily constructed by a single pass of a bulldozer or grader and compacted by a second pass of the tracks or wheels over the ridge. Diversion structures should be installed when the site is initially graded and remain in place until post construction BMPs are installed and the slopes are stabilized.

Diversion practices concentrate surface runoff, increasing its velocity and erosive force. Thus, the flow out of the drain or swale must be directed onto a stabilized area or into a grade stabilization structure. If significant erosion will occur, a swale should be stabilized using vegetation, chemical treatment, rock rip-rap, matting, or other physical means of stabilization. Any drain or swale that conveys sediment laden runoff must be diverted into a sediment basin or trap before it is discharged from the site.

General

- Care must be applied to correctly size and locate earth dikes, drainage swales. Excessively steep, unlined dikes, and swales are subject to erosion and gully formation.

- Conveyances should be stabilized.
- Use a lined ditch for high flow velocities.
- Select flow velocity based on careful evaluation of the risks due to erosion of the measure, soil types, overtopping, flow backups, washout, and drainage flow patterns for each project site.
- Compact any fills to prevent unequal settlement.
- Do not divert runoff onto other property without securing written authorization from the property owner.
- When possible, install and utilize permanent dikes, swales, and ditches early in the construction process.
- Provide stabilized outlets.

Earth Dikes

Temporary earth dikes are a practical, inexpensive BMP used to divert stormwater runoff. Temporary diversion dikes should be installed in the following manner:

- All dikes should be compacted by earth moving equipment.
- All dikes should have positive drainage to an outlet.
- All dikes should have 2:1 or flatter side slopes, 18 in. minimum height, and a minimum top width of 24 in. Wide top widths and flat slopes are usually needed at crossings for construction traffic.
- The outlet from the earth dike must function with a minimum of erosion. Runoff should be conveyed to a sediment trapping device such as a Sediment Trap (SE-3) or Sediment Basin (SE-2) when either the dike channel or the drainage area above the dike are not adequately stabilized.
- Temporary stabilization may be achieved using seed and mulching for slopes less than 5% and either rip-rap or sod for slopes in excess of 5%. In either case, stabilization of the earth dike should be completed immediately after construction or prior to the first rain.
- If riprap is used to stabilize the channel formed along the toe of the dike, the following typical specifications apply:

Channel Grade	Riprap Stabilization
0.5-1.0%	4 in. Rock
1.1-2.0%	6 in. Rock
2.1-4.0%	8 in. Rock
4.1-5.0%	8 in. -12 in. Riprap

- The stone riprap, recycled concrete, etc. used for stabilization should be pressed into the soil with construction equipment.
- Filter cloth may be used to cover dikes in use for long periods.
- Construction activity on the earth dike should be kept to a minimum.

Drainage Swales

Drainage swales are only effective if they are properly installed. Swales are more effective than dikes because they tend to be more stable. The combination of a swale with a dike on the downhill side is the most cost effective diversion.

Standard engineering design criteria for small open channel and closed conveyance systems should be used (see the local drainage design manual). Unless local drainage design criteria state otherwise, drainage swales should be designed as follows:

- No more than 5 acres may drain to a temporary drainage swale.
- Place drainage swales above or below, not on, a cut or fill slope.
- Swale bottom width should be at least 2 ft
- Depth of the swale should be at least 18 in.
- Side slopes should be 2:1 or flatter.
- Drainage or swales should be laid at a grade of at least 1 percent, but not more than 15 percent.
- The swale must not be overtopped by the peak discharge from a 10-year storm, irrespective of the design criteria stated above.
- Remove all trees, stumps, obstructions, and other objectionable material from the swale when it is built.
- Compact any fill material along the path of the swale.
- Stabilize all swales immediately. Seed and mulch swales at a slope of less than 5 percent, and use rip-rap or sod for swales with a slope between 5 and 15 percent. For temporary swales, geotextiles and mats (EC-7) may provide immediate stabilization.
- Irrigation may be required to establish sufficient vegetation to prevent erosion.
- Do not operate construction vehicles across a swale unless a stabilized crossing is provided.
- Permanent drainage facilities must be designed by a professional engineer (see the local drainage design criteria for proper design).
- At a minimum, the drainage swale should conform to predevelopment drainage patterns and capacities.
- Construct the drainage swale with a positive grade to a stabilized outlet.

- Provide erosion protection or energy dissipation measures if the flow out of the drainage swale can reach an erosive velocity.

Costs

- Cost ranges from $15 to $55 per ft for both earthwork and stabilization and depends on availability of material, site location, and access.

- Small dikes: $2.50 - $6.50/linear ft; Large dikes: $2.50/yd^3.

- The cost of a drainage swale increases with drainage area and slope. Typical swales for controlling internal erosion are inexpensive, as they are quickly formed during routine earthwork.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.

- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment and repair linings and embankments as needed.

- Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction

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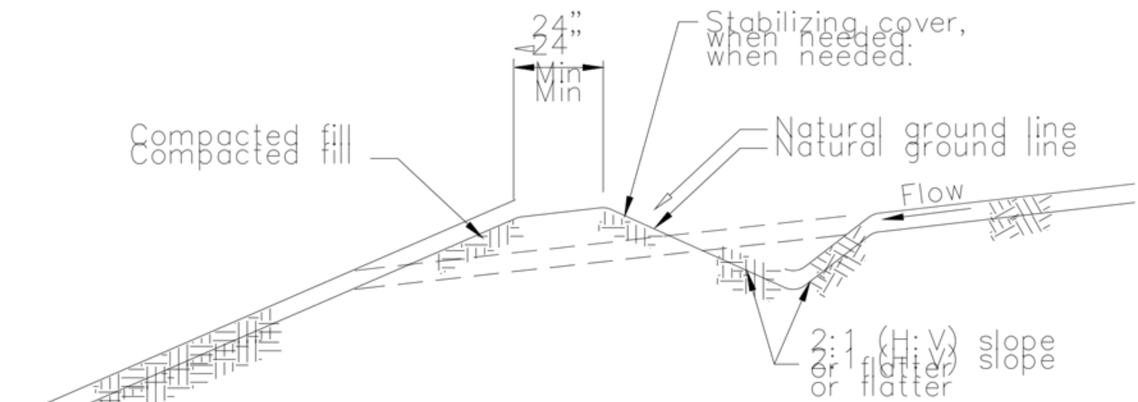
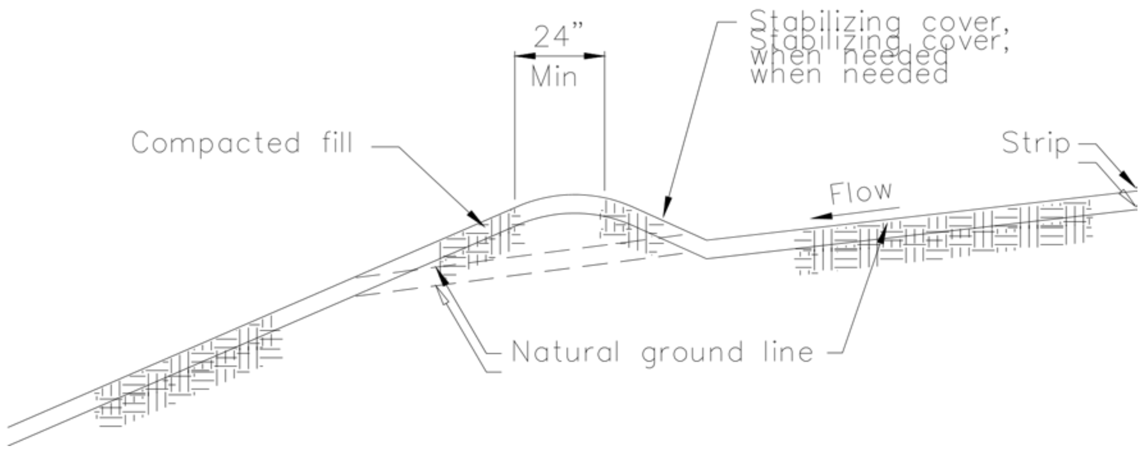


TYPICAL DRAINAGE SWALE

NOT TO SCALE

NOTES:

1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade.



TYPICAL EARTH DIKE

NOT TO SCALE

NOTES:

1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade.

Velocity Dissipation Devices EC-10

Objectives

EC	Erosion Control	▭
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

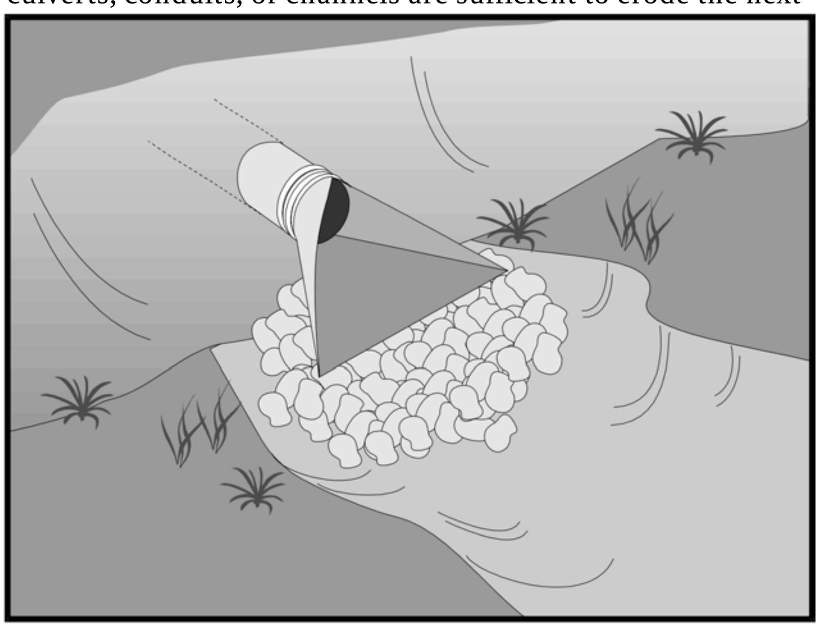
▭ **Primary Objective**

Secondary Objective

Targeted Constituents

Sediment	▭
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives



Description and Purpose

Outlet protection is a physical device composed of rock, grouted riprap, or concrete rubble, which is placed at the outlet of a pipe or channel to prevent scour of the soil caused by concentrated, high velocity flows.

Suitable Applications

Whenever discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach. This includes temporary diversion structures to divert runon during construction.

- These devices may be used at the following locations:
  - Outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits, or channels.
  - Outlets located at the bottom of mild to steep slopes.
  - Discharge outlets that carry continuous flows of water.
  - Outlets subject to short, intense flows of water, such as flash floods.
  - Points where lined conveyances discharge to unlined conveyances

Limitations

- Large storms or high flows can wash away the rock outlet protection and leave the area susceptible to erosion.

- Sediment captured by the rock outlet protection may be difficult to remove without removing the rock.
- Outlet protection may negatively impact the channel habitat.
- Grouted riprap may break up in areas of freeze and thaw.
- If there is not adequate drainage, and water builds up behind grouted riprap, it may cause the grouted riprap to break up due to the resulting hydrostatic pressure.

Implementation

General

Outlet protection is needed where discharge velocities and energies at the outlets of culverts, conduits or channels are sufficient to erode the immediate downstream reach. This practice protects the outlet from developing small eroded pools (plange pools), and protects against gully erosion resulting from scouring at a culvert mouth.

Design and Layout

As with most channel design projects, depth of flow, roughness, gradient, side slopes, discharge rate, and velocity should be considered in the outlet design. Compliance to local and state regulations should also be considered while working in environmentally sensitive streambeds. General recommendations for rock size and length of outlet protection mat are shown in the rock outlet protection figure in this BMP and should be considered minimums. The apron length and rock size gradation are determined using a combination of the discharge pipe diameter and estimate discharge rate: Select the longest apron length and largest rock size suggested by the pipe size and discharge rate. Where flows are conveyed in open channels such as ditches and swales, use the estimated discharge rate for selecting the apron length and rock size. Flows should be same as the culvert or channel design flow but never the less than the peak 5 year flow for temporary structures planned for one rainy season, or the 10 year peak flow for temporary structures planned for two or three rainy seasons.

- There are many types of energy dissipaters, with rock being the one that is represented in the attached figure.
- Best results are obtained when sound, durable, and angular rock is used.
- Install riprap, grouted riprap, or concrete apron at selected outlet. Riprap aprons are best suited for temporary use during construction. Grouted or wired tied rock riprap can minimize maintenance requirements.
- Rock outlet protection is usually less expensive and easier to install than concrete aprons or energy dissipaters. It also serves to trap sediment and reduce flow velocities.
- Carefully place riprap to avoid damaging the filter fabric.
  - Stone 4 in. to 6 in. may be carefully dumped onto filter fabric from a height not to exceed 12 in.
  - Stone 8 in. to 12 in. must be hand placed onto filter fabric, or the filter fabric may be covered with 4 in. of gravel and the 8 in. to 12 in. rock may be dumped from a height not to exceed 16 in.

  - Stone greater than 12 in. shall only be dumped onto filter fabric protected with a layer of gravel with a thickness equal to one half the D_{50} rock size, and the dump height limited to twice the depth of the gravel protection layer thickness.
- For proper operation of apron: Align apron with receiving stream and keep straight throughout its length. If a curve is needed to fit site conditions, place it in upper section of apron.
- Outlets on slopes steeper than 10 percent should have additional protection.

Costs

Costs are low if material is readily available. If material is imported, costs will be higher. Average installed cost is $150 per device.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Inspect BMPs subjected to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect apron for displacement of the riprap and damage to the underlying fabric. Repair fabric and replace riprap that has washed away. If riprap continues to wash away, consider using larger material.

- Inspect for scour beneath the riprap and around the outlet. Repair damage to slopes or underlying filter fabric immediately.

- Temporary devices should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction.

References

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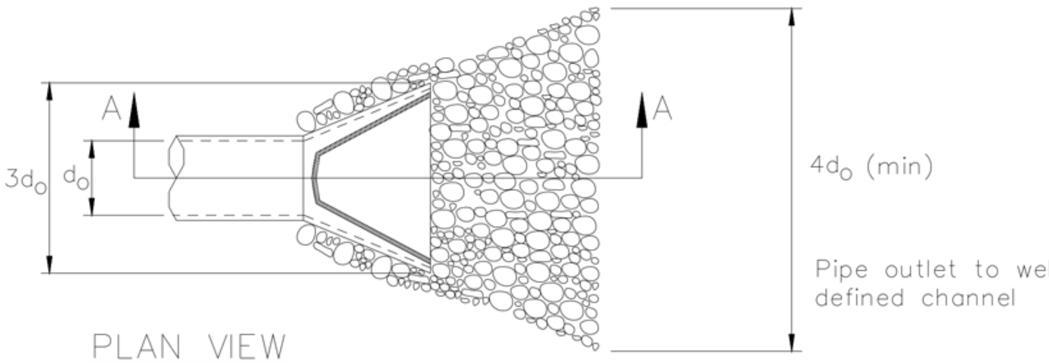
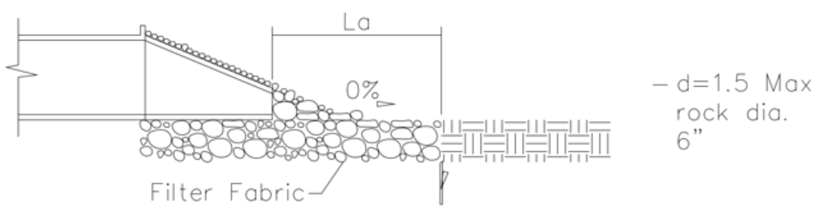
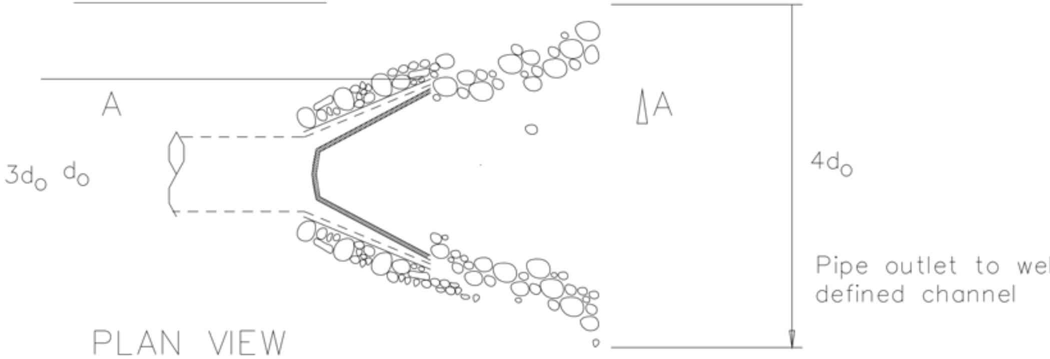


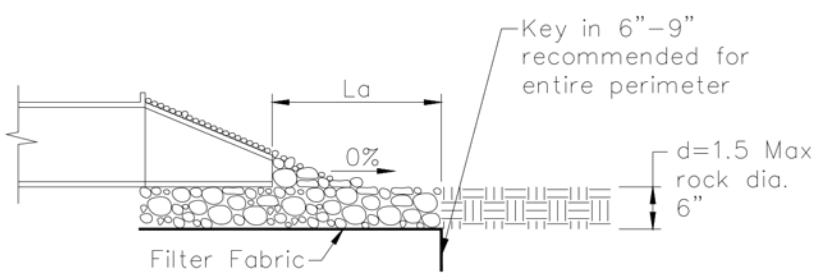
PLAN VIEW



SECTION A–A



PLAN VIEW

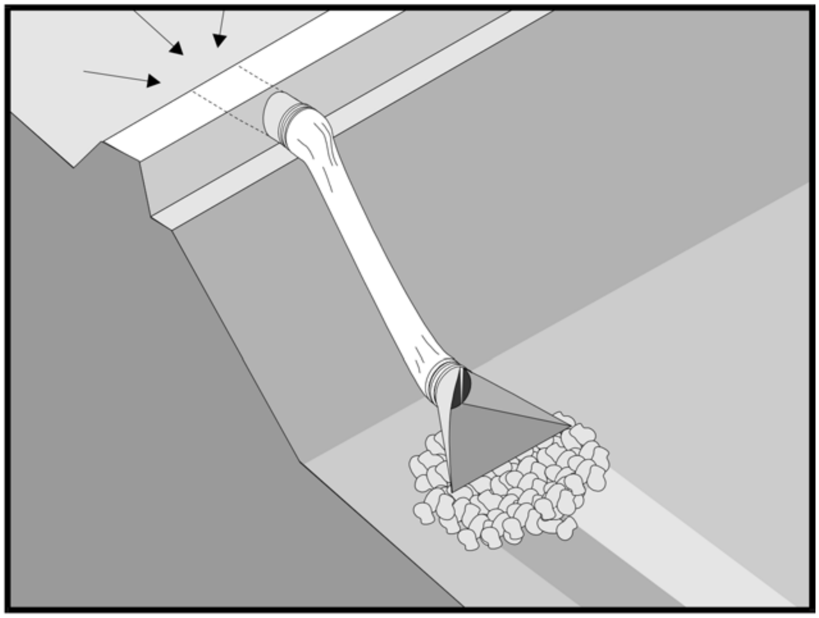


SECTION A–A

Pipe Diameter inches	Discharge ft^3/s	Apron Length, La ft	Rip Rap D_{50} Diameter Min inches
12	5 10	10 13	4 6
18	10 20 30 40	10 16 23 26	6 8 12 16
24	30 40 50 60	16 26 26 30	8 8 12 16

For larger or higher flows consult a Registered Civil Engineer
Source: USDA - SCS

Slope Drains EC-11



Objectives

EC	Erosion Control	▭
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

▭ **Primary Objective**

Secondary Objective

Description and Purpose

A slope drain is a pipe used to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device, or stabilized area. Slope drains are used with earth dikes and drainage ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes.

Suitable Applications

- Where concentrated flow of surface runoff must be conveyed down a slope in order to prevent erosion.
- Drainage for top of slope diversion dikes or swales.
- Drainage for top of cut and fill slopes where water can accumulate.
- Emergency spillway for a sediment basin.

Limitations

Installation is critical for effective use of the pipe slope drain to minimize potential gully erosion.

- Maximum drainage area per slope drain is 10 acres. (For large areas use a paved chute, rock lined channel, or additional pipes.)
- Severe erosion may result when slope drains fail by overtopping, piping, or pipe separation.

Targeted Constituents

Sediment ▭
Nutrients
Trash Metals
Bacteria
Oil and Grease
Organics

Potential Alternatives

EC-9 Earth Dike, Drainage Swales

- During large storms, pipe slope drains may become clogged or over charged, forcing water around the pipe and causing extreme slope erosion.

- If the sectional downdrain is not sized correctly, the runoff can spill over the drain sides causing gully erosion and potential failure of the structure.

④ Dissipation of high flow velocities at the pipe outlet is required to avoid downstream erosion.

Implementation

General

The slope drain is applicable for any construction site where concentrated surface runoff can accumulate and must be conveyed down the slope in order to prevent erosion. The slope drain is effective because it prevents the stormwater from flowing directly down the slope by confining all the runoff into an enclosed pipe or channel. Due to the time lag between grading slopes and installation of permanent stormwater collection systems and slope stabilization measures, temporary provisions to intercept runoff are sometimes necessary. Particularly in steep terrain, slope drains can protect unstabilized areas from erosion.

Installation

The slope drain may be a rigid pipe, such as corrugated metal, a flexible conduit, or a lined terrace drain with the inlet placed on the top of a slope and the outlet at the bottom of the slope. This BMP typically is used in combination with a diversion control, such as an earth dike or drainage swale at the top of the slope.

The following criteria must be considered when siting slope drains.

④ Permanent structures included in the project plans can often serve as construction BMPs if implemented early. However, the permanent structure must meet or exceed the criteria for the temporary structure.

④ Inlet structures must be securely entrenched and compacted to avoid severe gully erosion.

④ Slope drains must be securely anchored to the slope and must be adequately sized to carry the capacity of the design storm and associated forces.

④ Outlets must be stabilized with riprap, concrete or other type of energy dissipator, or directed into a stable sediment trap or basin. See EC-10, Velocity Dissipation Devices.

④ Debris racks are recommended at the inlet. Debris racks located several feet upstream of the inlet can usually be larger than racks at the inlet, and thus provide enhanced debris protection and less plugging.

- Safety racks are also recommended at the inlet and outlet of pipes where children or animals could become entrapped.
- Secure inlet and surround with dikes to prevent gully erosion and anchor pipe to slope.
- When using slope drains, limit drainage area to 10 acres per pipe. For larger areas, use a rock lined channel or a series of pipes.
- Size to convey at least the peak flow of a 10-year storm. The design storm is conservative due to the potential impact of system failures.
- Maximum slope generally limited to 2:1 (H:V) as energy dissipation below steeper slopes is difficult.
- Direct surface runoff to slope drains with interceptor dikes. See BMP EC-9, Earth Dikes and Drainage Swales. Top of interceptor dikes should be 12 in. higher than the top of the slope drain.
- Slope drains can be placed on or buried underneath the slope surface.
- Recommended materials include both metal and plastic pipe, either corrugated or smooth wall. Concrete pipe can also be used.
- When installing slope drains:
  - Install slope drains perpendicular to slope contours.
  - Compact soil around and under entrance, outlet, and along length of pipe.
  - Securely anchor and stabilize pipe and appurtenances into soil.
  - Check to ensure that pipe connections are watertight.
  - Protect area around inlet with filter cloth. Protect outlet with riprap or other energy dissipation device. For high energy discharges, reinforce riprap with concrete or use reinforced concrete device.
  - Protect outlet of slope drains using a flared end section when outlet discharges to a flexible energy dissipation device.
  - A flared end section installed at the inlet will improve flow into the slope drain and prevent erosion at the pipe entrance. Use a flared end section with a 6 in. minimum toe plate to help prevent undercutting. The flared section should slope towards the pipe inlet.

Design and Layout

The capacity for temporary drains should be sufficient to convey at least the peak runoff from a 10-year rainfall event. The pipe size may be computed using the Rational Method or a method established by the local municipality. Higher flows must be safely stored or routed to prevent any offsite concentration of flow and any erosion of the slope. The design storm is purposely conservative due to the potential impacts associated with system failures.

As a guide, temporary pipe slope drains should not be sized smaller than shown in the following table:

Minimum Pipe Diameter (Inches)	Maximum Drainage Area (Acres)
12	1.0
18	3.0
21	5.0
24	7.0
30	10.0

Larger drainage areas can be treated if the area can be subdivided into areas of 10 acres or less and each area is treated as a separate drainage. Drainage areas exceeding 10 acres must be designed by a Registered Civil Engineer and approved by the agency that issued the grading permit.

Materials:

Soil type, rainfall patterns, construction schedule, local requirements, and available supply are some of the factors to be considered when selecting materials. The following types of slope drains are commonly used:

- **Rigid Pipe:** This type of slope drain is also known as a pipe drop. The pipe usually consists of corrugated metal pipe or rigid plastic pipe. The pipe is placed on undisturbed or compacted soil and secured onto the slope surface or buried in a trench. Concrete thrust blocks must be used when warranted by the calculated thrust forces. Collars should be properly installed and secured with metal strappings or watertight collars.

- **Flexible Pipe**: The flexible pipe slope drain consists of a flexible tube of heavy-duty plastic, rubber, or composite material. The tube material is securely anchored onto the slope surface. The tube should be securely fastened to the metal inlet and outlet conduit sections with metal strappings or watertight collars.

- **Section Downdrains**: The section downdrain consists of pre-fabricated, section conduit of half round or third round material. The sectional downdrain performs similar to a flume or chute. The pipe must be placed on undisturbed or compacted soil and secured into the slope.

- **Concrete-lined Terrace Drain:** This is a concrete channel for draining water from a terrace on a slope to the next level. These drains are typically specified as permanent structures and, if installed early, can serve as slope drains during construction, which should be designed according to local drainage design criteria.

Costs

- Cost varies based on pipe selection and selected outlet protection.

Corrugated Steel Pipes, Per Foot	
Size	Supplied and Installed Cost (No Trenching Included)
12”	$19.60 per LF
15”	$22.00
18”	$26.00
24”	$32.00
30”	$50.00
PVC Pipes, Per Foot	
Size	Supplied and Installed Cost (No Trenching Included)
12”	$24.50
14”	$49.00
16”	$51.00
18”	$54.00
20”	$66.00
24”	$93.00
30”	$130.00

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- Inspect BMPs subjected to non-stormwater discharges daily while non-stormwater discharges occur.

- Inspect outlet for erosion and downstream scour. If eroded, repair damage and install additional energy dissipation measures. If downstream scour is occurring, it may be necessary to reduce flows being discharged into the channel unless other preventative measures are implemented.

- Insert inlet for clogging or undercutting. Remove debris from inlet to maintain flows. Repair undercutting at inlet and if needed, install flared section or rip rap around the inlet to prevent further undercutting.

- Inspect pipes for leakage. Repair leaks and restore damaged slopes.
- Inspect slope drainage for accumulations of debris and sediment.
- Remove built up sediment from entrances and outlets as required. Flush drains if necessary; capture and settle out sediment from discharge.
- Make sure water is not ponding onto inappropriate areas (e.g., active traffic lanes, material storage areas, etc.).
- Pipe anchors must be checked to ensure that the pipe remains anchored to the slope. Install additional anchors if pipe movement is detected.

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Draft – Sedimentation and Erosion Control, An Inventory of Current Practices, U.S.E.P.A., April 1990.

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National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

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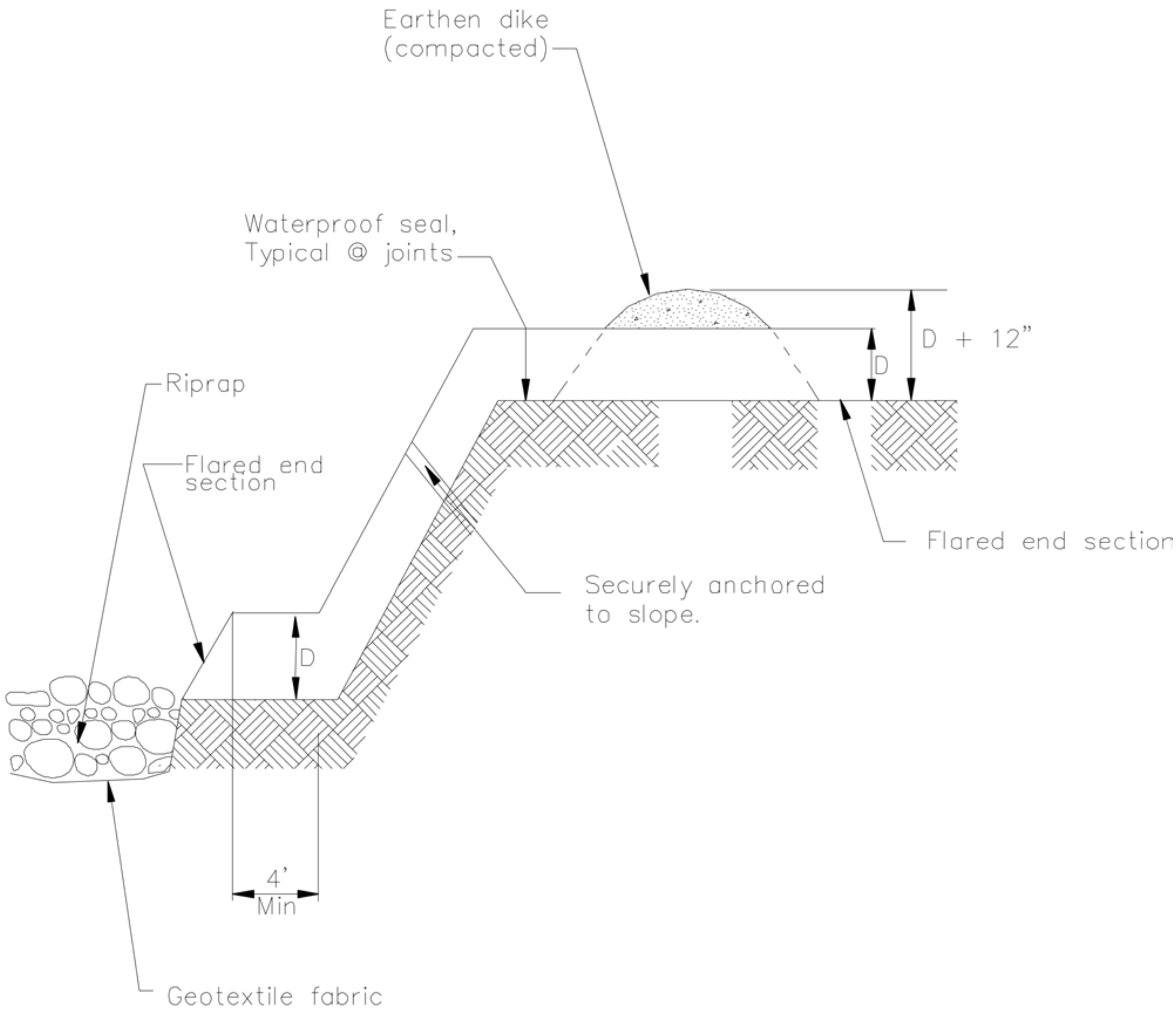

TYPICAL SLOPE DRAIN
NOT TO SCALE

Stream channels, streambanks, and associated riparian areas are dynamic and sensitive ecosystems that respond to changes in land use activity. Streambank and channel disturbance resulting from construction activities can increase the stream's sediment load, which can cause channel erosion or sedimentation and have adverse affects on the biotic system. BMPs can reduce the discharge of sediment and other pollutants to minimize the impact of construction activities on watercourses. Streams on the 303(d) list and listed for sediment may require numerous measures to prevent any

Description and Purpose

increases in sediment load to the stream.

Suitable Applications

These procedures typically apply to all construction projects that disturb or occur within stream channels and their associated riparian areas.

Limitations

Specific permit requirements or mitigation measures such as Regional Water Quality Control Board (RWQCB) 401 Certification, U.S. Army Corps of Engineers 404 permit and approval by California Department of Fish and Game supercede the guidance in this BMP.

④ If numerical based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required. Streams listed as 303(d) impaired for sediment, silt, or turbidity, are required to conduct sampling

Sediment
Nutrients
Trash Metals
Bacteria
Oil and Grease

Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

Organics

Potential Alternatives

Combination of erosion and sediment controls.

to verify that there is no net increase in sediment load due to construction activities.

Implementation

Planning

- Proper planning, design, and construction techniques can minimize impacts normally associated with in stream construction activities. Poor planning can adversely affect soil, fish, wildlife resources, land uses, or land users. Planning should take into account: scheduling; avoidance of in-stream construction; minimizing disturbance area and construction time period; using pre-disturbed areas; selecting crossing location; and selecting equipment.

Scheduling

- Construction activities should be scheduled according to the relative sensitivity of the environmental concerns and in accordance with EC-1, Scheduling. Scheduling considerations will be different when working near perennial streams vs. ephemeral streams and are as follows.

- When in-stream construction is conducted in a perennial stream, work should optimally be performed during the rainy season. This is because in the summer, any sediment-containing water that is discharged into the watercourse will cause a large change in both water clarity and water chemistry. During the rainy season, there is typically more and faster flowing water in the stream so discharges are diluted faster. However, should in-stream work be scheduled for summer, establishing an isolation area, or diverting the stream, will significantly decrease the amount of sediment stirred up by construction work. Construction work near perennial streams should optimally be performed during the dry season (see below).

- When working in or near ephemeral streams, work should be performed during the dry season. By their very nature, ephemeral streams are usually dry in the summer, and therefore, in-stream construction activities will not cause significant water quality problems.
  However, when tying up the site at the end of the project, wash any fines (see Washing Fines) that accumulated in the channel back into the bed material, to decrease pollution from the first rainstorm of the season.

- When working near ephemeral or perennial streams, erosion and sediment controls (see silt fences, straw bale barriers, etc.) should be implemented to keep sediment out of stream channel.

Minimize Disturbance

- Minimize disturbance through: selection of the narrowest crossing location; limiting the number of equipment trips across a stream during construction; and, minimizing the number and size of work areas (equipment staging areas and spoil storage areas). Place work areas at least 50 ft from stream channel. Field reconnaissance should be conducted during the planning stage to identify work areas.

Use of Pre-Disturbed Areas

- Locate project sites and work areas in areas disturbed by prior construction or other activity when possible.

Selection of Project Site

- Avoid steep and unstable banks, highly erodible or saturated soils, or highly fractured rock.

- Select project site that minimizes disturbance to aquatic species or habitat.

Equipment Selection

- Select equipment that reduces the amount of pressure exerted on the ground surface, and therefore, reduces erosion potential and/or use overhead or aerial access for transporting equipment across drainage channels. Use equipment that exerts ground pressures of less than 5 or 6 lb/in^2, where possible. Low ground pressure equipment includes: wide or high flotation tires (34 to 72 in. wide); dual tires; bogie axle systems; tracked machines; lightweight equipment; and, central tire inflation systems.

Streambank Stabilization *Preservation of Existing Vegetation*

- Preserve existing vegetation in accordance with EC-2, Preservation of Existing Vegetation. In a streambank environment, preservation of existing vegetation provides the following benefits.

Water Quality Protection

- Vegetated buffers on slopes trap sediment and promote groundwater recharge. The buffer width needed to maintain water quality ranges from 15 to 100 ft. On gradual slopes, most of the filtering occurs within the first 30 ft. Steeper slopes require a greater width of vegetative buffer to provide water quality benefits.

Streambank Stabilization

- The root system of riparian vegetation stabilizes streambanks by increasing tensile strength in the soil. The presence of vegetation modifies the moisture condition of slopes (infiltration, evapo transpiration, interception) and increases bank stability.

Riparian Habitat

- Buffers of diverse riparian vegetation provide food and shelter for riparian and aquatic organisms. Minimizing impacts to fisheries habitat is a major concern when working near streams and rivers. Riparian vegetation provides shade, shelter, organic matter (leaf detritus and large woody debris), and other nutrients that are necessary for fish and other aquatic organisms. Buffer widths for habitat concerns are typically wider than those recommended for water quality concerns (100 to 1500 ft).

- When working near watercourses, it is important to understand the work site's placement in the watershed. Riparian vegetation in headwater streams has a greater impact on overall water quality than vegetation in downstream reaches. Preserving existing vegetation upstream is necessary to maintain water quality, minimize bank failure, and maximize riparian habitat, downstream of the work site.

Limitations

- Local county and municipal ordinances regarding width, extent and type of vegetative buffer required may exceed the specifications provided here; these ordinances should be investigated prior to construction.

Streambank Stabilization Specific Installation

- As a general rule, the width of a buffer strip between a road and the stream is recommended to be 50 ft plus four times the percent slope of the land, measured between the road and the top of stream bank. ***Hydraulic Mulch***
- Apply hydraulic mulch on disturbed streambanks above mean high water level in accordance with EC-3, Hydraulic Mulch to provide temporary soil stabilization.

Limitations

- Do not place hydraulic mulch or tackifiers below the mean high water level, as these materials could wash into the channel and impact water quality or possibly cause eutrophication (eutrophication is an algal bloom caused by excessively high nutrient levels in the water).

Hydroseeding

- Hydroseed disturbed streambanks in accordance with EC-4, Hydroseeding.

Limitations

- Do not place tackifiers or fertilizers below the mean high water level, as these materials could wash into the channel and impact water quality or possibly cause eutrophication.

Soil Binders

- Apply soil binders to disturbed streambanks in accordance with EC-5, Soil Binders.

Limitations

- Do not place soil binders below the mean high water level. Soil binder must be environmentally benign and non-toxic to aquatic organisms.

Straw Mulch

- Apply straw mulch to disturbed streambanks in accordance with EC-6, Straw Mulch.

Limitations

- Do not place straw mulch below the mean high water level, as this material could wash into the channel and impact water quality or possibly cause eutrophication.

Geotextiles and Mats

- Install geotextiles and mats as described in EC-7, Geotextiles and Mats, to stabilize disturbed channels and streambanks. Not all applications should be in the channel, for example, certain geotextile netting may snag fish gills and are not appropriate in fish bearing streams.
  Geotextile fabrics that are not biodegradable are not appropriate for in stream use. Additionally, geotextile fabric or blankets placed in channels must be adequate to sustain anticipated hydraulic forces.

Earth Dikes, Drainage Swales, and Lined Ditches

- Convey, intercept, or divert runoff from disturbed streambanks using EC-9, Earth Dikes and Drainage Swales.

Limitations

- Do not place earth dikes in watercourses, as these structures are only suited for intercepting sheet flow, and should not be used to intercept concentrated flow.

- Appropriately sized velocity dissipation devices (EC-10) must be placed at outlets to minimize erosion and scour. ***Velocity Dissipation Devices***
- Place velocity dissipation devices at outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits or channels in accordance with EC-10, Velocity Dissipation Devices. ***Slope Drains***
- Use slope drains to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device or stabilized area in accordance with EC-11, Slope Drains.

  Limitations
- Appropriately sized outlet protection and velocity dissipation devices (EC-10) must be placed at outlets to minimize erosion and scour.

Streambank Sediment Control

Silt Fences

- Install silt fences in accordance with SE-1, Silt Fence, to control sediment. Silt fences should only be installed where sediment laden water can pond, thus allowing the sediment to settle out. ***Fiber Rolls***
- Install fiber rolls in accordance with SE-5, Fiber Rolls, along contour of slopes above the high water level to intercept runoff, reduce flow velocity, release the runoff as sheet flow and provide removal of sediment from the runoff. In a stream environment, fiber rolls should be used in conjunction with other sediment control methods such as SE-1, Silt Fence or SE-9 Straw Bale Barrier. Install silt fence, straw bale barrier, or other erosion control method along toe of slope above the high water level.

Gravel Bag Berm

- A gravel bag berm or barrier can be utilized to intercept and slow the flow of sediment laden sheet flow runoff in accordance with SE-6, Gravel Bag Berm. In a stream environment gravel bag barriers can allow sediment to settle from runoff before water leaves the construction site and can be used to isolate the work area from the live stream.

Limitations

- Gravel bag barriers are not recommended as a perimeter sediment control practice around streams. ***Straw Bale Barrier***
- Install straw bale barriers in accordance with SE-9, Straw Bale Barrier, to control sediment. Straw bale barriers should only be installed where sediment laden water can pond, thus allowing the sediment to settle out. Install a silt fence in accordance with SE-1, Silt Fence,

  on down slope side of straw bale barrier closest to stream channel to provide added sediment control.

Rock Filter

Description and Purpose

Rock filters are temporary erosion control barriers composed of rock that is anchored in place. Rock filters detain the sediment laden runoff, retain the sediment, and release the water as sheet flow at a reduced velocity. Typical rock filter installations are illustrated at the end of this BMP.

Applications

- Near the toe of slopes that may be subject to flow and rill erosion. *Limitations*
- Inappropriate for contributing drainage areas greater than 5 acres.
- Requires sufficient space for ponded water.
- Ineffective for diverting runoff because filters allow water to slowly seep through.
- Rock filter berms are difficult to remove when construction is complete.
- Unsuitable in developed areas or locations where aesthetics is a concern. *Specifications*
- Rock: open graded rock, 0.75 to 5 in. for concentrated flow applications.
- Woven wire sheathing: 1 in. diameter, hexagonal mesh, galvanized 20gauge (used with rock filters in areas of concentrated flow).
- In construction traffic areas, maximum rock berm heights should be 12 in. Berms should be constructed every 300 ft on slopes less than 5%, every 200 ft on slopes between 5% and 10%, and every 100 ft on slopes greater than 10%.

Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Reshape berms as needed and replace lost or dislodged rock, and filter fabric.

- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.

K-rail

Description and Purpose

This is temporary sediment control that uses K-rails to form the sediment deposition area, or to isolate the near bank construction area. Install K-rails at toe of slope in accordance with procedures described in NS-5, Clear Water Diversion.

Barriers are placed end to end in a pre-designed configuration and gravel filled bags are used at the toe of the barrier and at their abutting ends to seal and prevent movement of sediment beneath or through the barrier walls.

Appropriate Applications

- This technique is useful at the toe of embankments, cuts or fills slopes.

Limitations

- The K-rail method should not be used to dewater a project site, as the barrier is not watertight. *Implementation*

- Refer to NS-5, Clear Water Diversion, for implementation requirements.

Instream Construction Sediment Control

There are three different options currently available for reducing turbidity while working in a stream or river. The stream can be isolated from the area in which work is occurring by means of a water barrier, the stream can be diverted around the work site through a pipe or temporary channel, or one can employ construction practices that minimize sediment suspension.

Whatever technique is implemented, an important thing to remember is that dilution can sometimes be the solution. A probable "worst time" to release high TSS into a stream system might be when the stream is very low; summer low flow, for example. During these times, the flow may be low while the biological activity in the stream is very high. Conversely, the addition of high TSS or sediment during a big storm discharge might have a relatively low impact, because the stream is already turbid, and the stream energy is capable of transporting both suspended solids, and large quantities of bedload through the system. The optimum time to "pull" in-stream structures may be during the rising limb of a storm hydrograph.

Techniques to minimize Total Suspended Solids (TSS)

- **Padding** - Padding laid in the stream below the work site may trap some solids that are deposited in the stream during construction. After work is done, the padding is removed from the stream, and placed on the bank to assist in re-vegetation.

- **Clean, washed gravel** - Using clean, washed gravel decreases solid suspension, as there are fewer small particles deposited in the stream.

- **Excavation using a large bucket** - Each time a bucket of soil is placed in the stream, a portion is suspended. Approximately the same amount is suspended whether a small amount of soil is placed in the stream, or a large amount. Therefore, using a large excavator bucket instead of a small one, will reduce the total amount of soil that washes downstream.

- **Use of dozer for backfilling** - Using a dozer for backfilling instead of a backhoe follows the same principles – the fewer times soil is deposited in the stream, the less soil will be suspended.

- **Partial dewatering with a pump** - Partially dewatering a stream with a pump reduces the amount of water, and thus the amount of water that can suspend sediment.

***Washing Fines** Definition and Purpose*

- Washing fines is an “in-channel” sediment control method, which uses water, either from a water truck or hydrant, to wash stream fines that were brought to the surface of the channel bed during restoration, back into the interstitial spaces of the gravel and cobbles.

- The purpose of this technique is to reduce or eliminate the discharge of sediment from the channel bottom during the first seasonal flow. Sediment should not be allowed into stream channels; however, occasionally in-channel restoration work will involve moving or otherwise disturbing fines (sand and silt sized particles) that are already in the stream, usually below bankfull discharge elevation. Subsequent re-watering of the channel can result in a plume of turbidity and sedimentation.

- This technique washes the fines back into the channel bed. Bedload materials, including gravel cobbles, boulders and those fines, are naturally mobilized during higher storm flows. This technique is intended to delay the discharge until the fines would naturally be mobilized.

Appropriate Applications

- This technique should be used when construction work is required in channels. It is especially useful in intermittent or ephemeral streams in which work is performed “in the dry”, and which subsequently become re-watered.

Limitations

- The stream must have sufficient gravel and cobble substrate composition.

- The use of this technique requires consideration of time of year and timing of expected stream flows.

- The optimum time for the use of this technique is in the fall, prior to winter flows.

- Consultation with, and approval from the Department of Fish and Game and the Regional Water Quality Control Board may be required.

Implementation

- Apply sufficient water to wash fines, but not cause further erosion or runoff.
- Apply water slowly and evenly to prevent runoff and erosion.
- Consult with Department of Fish and Game and the Regional Water Quality Control Board for specific water quality requirements of applied water (e.g. chlorine).

Inspection and Maintenance

- None necessary

Costs

Cost may vary according to the combination of practices implemented.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect and repair equipment (for damaged hoses, fittings, and gaskets).

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

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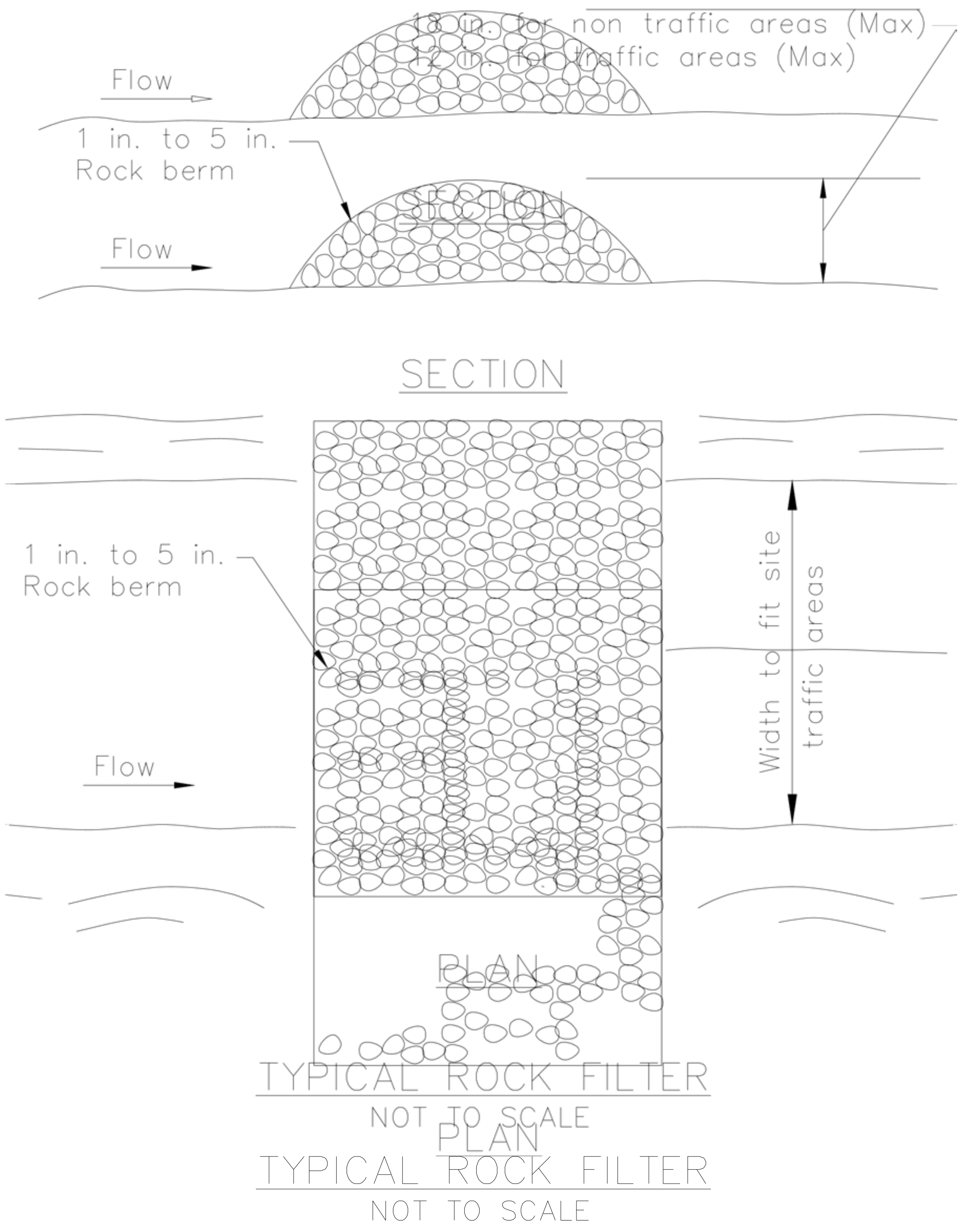
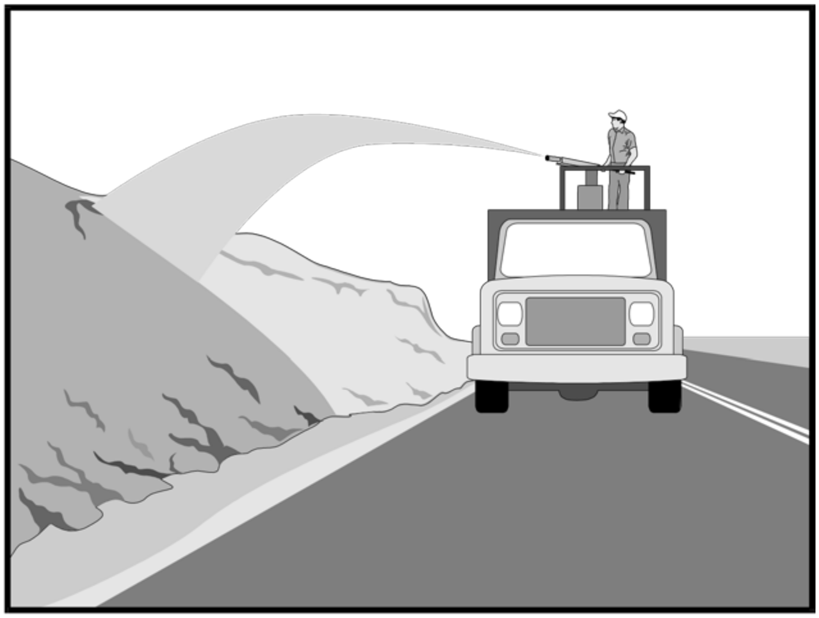

18 in. for non traffic areas (Max)
12 in. for traffic areas (Max)
Flow
1 in. to 5 in.
Rock berm
SECTION
Flow
SECTION
1 in. to 5 in.
Rock berm
Width to fit site
traffic areas
Flow
PLAN
TYPICAL ROCK FILTER
NOT TO SCALE
PLAN
TYPICAL ROCK FILTER
NOT TO SCALE



Objectives

EC	Erosion Control
SE	Sediment Control
TR	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

Legend:

Primary Objective

Secondary Objective

Description and Purpose

Targeted Constituents

Sediment

Nutrients
Trash Metals
Bacteria
Oil and Grease
Organics

Potential Alternatives

None

Polyacrylamide (PAM) is a chemical that can be applied to disturbed oils at construction sites to reduce erosion and improve settling of suspended sediment.

PAM increases the soil's available pore volume, thus increasing infiltration and reducing the quantity of stormwater runoff that can cause erosion. Suspended sediments from PAM treated soils exhibit increased flocculation over untreated soils. The increased flocculation aids in their deposition, thus reducing stormwater runoff turbidity and improving water quality.

Suitable Applications

PAM is suitable for use on disturbed soil areas that discharge to a sediment trap or sediment basin. PAM is typically used in conjunction with other BMPs to increase their performance.

PAM can be applied to the following areas:

④ Rough graded soils that will be inactive for a period of time.

④ Final graded soils before application of final stabilization (e.g., paving, planting, mulching).

- Temporary haul roads prior to placement of crushed rock surfacing.
- Compacted soil road base.
- Construction staging, materials storage, and layout areas.
- Soil stockpiles.
- Areas that will be mulched.

Limitations

- There is limited experience in California with use of PAM for erosion and sediment control.
- PAM shall not be directly applied to water or allowed to enter a water body.
- Do not use PAM on a slope that flows into a water body without passing through a sediment trap or sediment basin.
- PAM will work when applied to saturated soil but is not as effective as applications to dry or damp soil.
- Some PAMs are more toxic and carcinogenic than others. Only the most environmentally safe PAM products should be used.
- The specific PAM copolymer formulation must be anionic. **Cationic PAM shall not be used in any application because of known aquatic toxicity problems**. Only the highest drinking water grade PAM, certified for compliance with ANSI/NSF Standard 60 for drinking water treatment, will be used for soil applications.
- PAM designated for erosion and sediment control should be “water soluble” or “linear” or “non-cross linked”.
- A sampling and analysis plan must be incorporated into the SWPPP as PAM may be considered to be a source of non-visible pollutants.

Implementation

General

PAM shall be used in accordance with the following general guidance:

- Pam shall be used in conjunction with other BMPs and not in place of other BMPs, including both erosion controls and sediment controls.
- Stormwater runoff from PAM treated soils should pass through a sediment control BMP prior to discharging to surface waters.
  - When the total drainage area is greater than or equal to 5 acres, PAM treated areas shall drain to a sediment basin.

- Areas less than 5 acres shall drain to sediment control BMPs, such as a sediment trap, or a minimum of 3 check dams per acre. The total number of check dams used shall be maximized to achieve the greatest amount of settlement of sediment prior to discharging from the site. Each check dam shall be spaced evenly in the drainage channel. Through which stormwater flows are discharged off site.

- Do not add PAM to water discharging from site.

- On PAM treated sites, the use of silt fence and fiber rolls shall be maximized to limit the discharges of sediment to sediment traps and sediment basins.

- All areas not being actively worked one should be covered and protected from rainfall. PAM should not be the only cover BMP used.

- PAM can be applied to wet soil, but dry soil is preferred due to less sediment loss.

- Keep the granular PAM supply out of the sun. Granular PAM loses its effectiveness in three months after exposure to sunlight and air.

- Proper application and re-application plans are necessary to ensure total effectiveness of PAM usage.

- PAM, combined with water, is very slippery and can be a safety hazard. Care must be taken to prevent spills of PAM powder onto paved surfaces. During an application of PAM, prevent over spray from reaching pavement, as pavement will become slippery. If PAM powder gets on skin or clothing, wipe it off with a rough towel rather than washing with water this only makes cleanup messier and longer.

- Recent high interest in PAM has resulted in some entrepreneurial exploitation of the term "polymer". All PAMs are polymer, but not all polymers are PAM, and not all PAM products comply with ANSI/NSF Standard 60. PAM use shall be reviewed and approved by the local permitting authority.

- The PAM anionic charge density may vary from 2-30%; a value of 18% is typical. Studies conducted by the United States Department of Agriculture (USDA)/ Agricultural Research Service (ARS) demonstrated that soil stabilization was optimized by using very high molecular weight (12-15 mg/mole), highly anionic (>20% hydrolosis) PAM.

- PAM tackifiers are available and being used in place of guar and alpha plantago. Typically, PAM tackifiers should be used at a rate of no more than 0.5-1 lb per 1,000 gallons of water in hydro mulch machine. Some tackifier product instructions say to use at a rate of 3-5 lbs per acre, which can be too much. In addition, pump problems can occur at higher rates due to increased viscosity.

Preferred Application Method

PAM may be applied in dissolved form with water, or it may be applied in dry, granular, or powered form. The preferred application method is the dissolved form.

PAM is to be applied at a maximum rate of ½ pound PAM per 1000 gallons water per 1 acre of bare soil. Table 1 and Figure 1 can be used to determine the PAM and water application rate for a disturbed soil area. Higher concentrations of PAM **do not** provide any additional effectiveness.

Table 1 PAM and Water Application Rates

Disturbed Area (acre)	PAM (lbs)	Water (gallons)
0.50	0.25	500
1.00	0.50	1,000
1.50	0.75	1,500
2.00	1.00	2,000
2.50	1.25	2,500
3.00	1.50	3,000
3.50	1.75	3,500
4.00	2.00	4,000
4.50	2.25	4,500
5.00	2.50	5,000

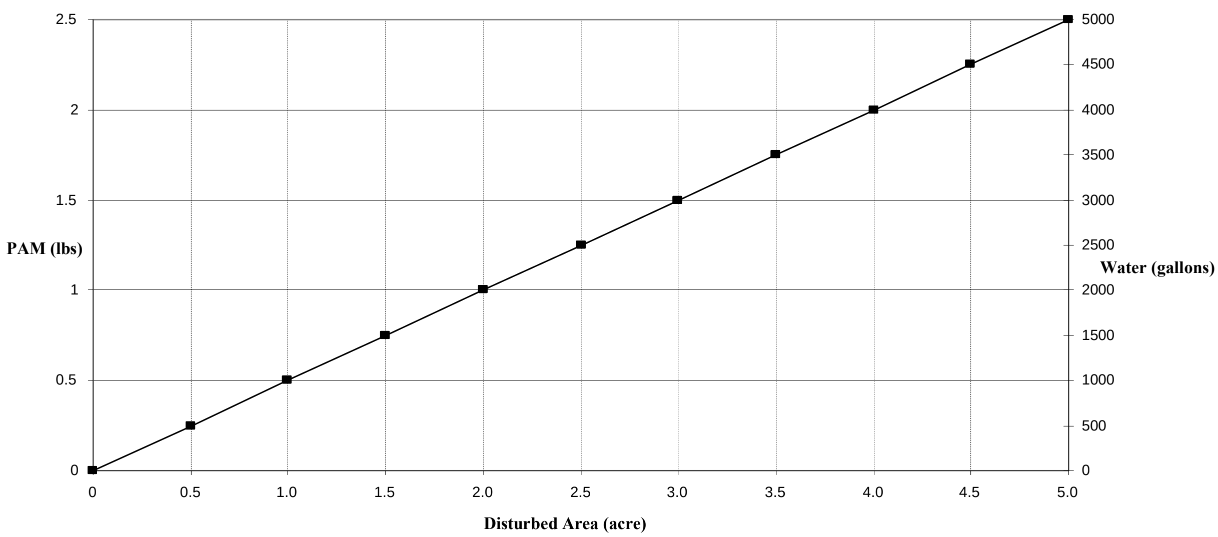


Figure 1 - PAM and Water Application Rates

④ Pre-measure the area where PAM is to be applied and calculate the amount of product and water necessary to provide coverage at the specified application rate (1/2 pound PAM/1000 gallons/acre).

- PAM has infinite solubility in water, but dissolves very slowly. Dissolve pre-measured dry granular PAM with a known quantity of clean water in a bucket several hours or overnight. Mechanical mixing will help dissolve the PAM. Always add PAM to water – not water to PAM.

- Pre-fill the water truck about 1/8 full with water. The water does not have to be potable, but it must have relatively low turbidity – in the range of 20 NTU or less.

- Add the dissolved PAM and water mixture to the truck.

- Fill the water truck to specified volume for the amount of PAM to be applied.

- Spray the PAM/water mixture onto dry soil until the soil surface is uniformly and completely wetted.

Alternate Application Method

PAM may also be applied as a powder at the rate of 5 lbs per acre. This must be applied on a day that is dry. For areas less than 5-10 acres, a hand held "organ grinder" fertilizer spreader set to the smallest setting will work. Tractor mounted spreaders will work for larger areas.

Costs

- PAM: $1.30 - $5.50/lb (material cost only).

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.

- PAM must be reapplied on actively worked areas after a 48-hour period if PAM is to remain effective.

- Reapplication is not required unless PAM treated soil is disturbed or unless turbidity levels show the need for an additional application.

- If PAM treated soil is left undisturbed a reapplication may be necessary after two months.

- More PAM applications may be required for steep slopes, silty and clayey soils (USDA Classification Type "C" and "D" soils), long grades, and high precipitation areas.

- When PAM is applied first to bare soil and then covered with straw, a reapplication may not be necessary for several months.

- Discharges from PAM treated areas must be monitored for non-visible pollutants.

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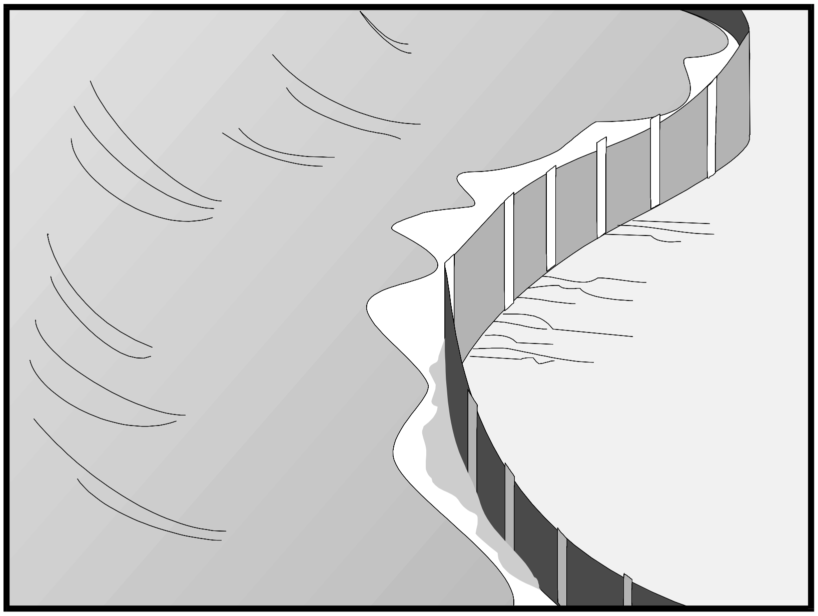
Silt Fence SE-1



Description and Purpose

A silt fence is made of a filter fabric that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains sediment-laden water, promoting sedimentation behind the fence.

Suitable Applications

Silt fences are suitable for perimeter control, placed below areas where sheet flows discharge from the site. They should also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion. Silt fences are generally ineffective in locations where the flow is concentrated and are only applicable for sheet or overland flows. Silt fences are most effective when used in combination with erosion controls. Suitable applications include:

- Along the perimeter of a project.
- Below the toe or down slope of exposed and erodible slopes.
- Along streams and channels.
- Around temporary spoil areas and stockpiles.
- Below other small cleared areas.

Objectives

EC	Erosion Control	Primary
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

Sediment	Primary
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-9 Straw Bale Barrier

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Limitations

- Do not use in streams, channels, drain inlets, or anywhere flow is concentrated.
- Do not use in locations where ponded water may cause flooding.
- Do not place fence on a slope, or across any contour line. If not installed at the same elevation throughout, silt fences will create erosion.
- Filter fences will create a temporary sedimentation pond on the upstream side of the fence and may cause temporary flooding. Fences not constructed on a level contour will be overtopped by concentrated flow resulting in failure of the filter fence.
- Improperly installed fences are subject to failure from undercutting, overlapping, or collapsing.
  - Not effective unless trenched and keyed in.
  - Not intended for use as mid-slope protection on slopes greater than 4:1 (H:V).
  - Do not allow water depth to exceed 1.5 ft at any point.

Implementation

General

A silt fence is a temporary sediment barrier consisting of filter fabric stretched across and attached to supporting posts, entrenched, and, depending upon the strength of fabric used, supported with plastic or wire mesh fence. Silt fences trap sediment by intercepting and detaining small amounts of sediment-laden runoff from disturbed areas in order to promote sedimentation behind the fence.

Silt fences are preferable to straw bale barriers in many cases. Laboratory work at the Virginia Highway and Transportation Research Council has shown that silt fences can trap a much higher percentage of suspended sediments than can straw bales. While the failure rate of silt fences is lower than that of straw bale barriers, there are many instances where silt fences have been improperly installed. The following layout and installation guidance can improve performance and should be followed:

- Use principally in areas where sheet flow occurs.
- Don't use in streams, channels, or anywhere flow is concentrated. Don’t use silt fences to divert flow.
- Don't use below slopes subject to creep, slumping, or landslides.
- Select filter fabric that retains 85% of soil by weight, based on sieve analysis, but that is not finer than an equivalent opening size of 70.
- Install along a level contour, so water does not pond more than 1.5 ft at any point along the silt fence.

- The maximum length of slope draining to any point along the silt fence should be 200 ft or less.

- The maximum slope perpendicular to the fence line should be 1:1.

- Provide sufficient room for runoff to pond behind the fence and to allow sediment removal equipment to pass between the silt fence and toes of slopes or other obstructions. About 1200 ft^2 of ponding area should be provided for every acre draining to the fence.

- Turn the ends of the filter fence uphill to prevent stormwater from flowing around the fence.

- Leave an undisturbed or stabilized area immediately down slope from the fence where feasible.

- Silt fences should remain in place until the disturbed area is permanently stabilized.

Design and Layout

Selection of a filter fabric is based on soil conditions at the construction site (which affect the equivalent opening size (EOS) fabric specification) and characteristics of the support fence (which affect the choice of tensile strength). The designer should specify a filter fabric that retains the soil found on the construction site yet that it has openings large enough to permit drainage and prevent clogging. The following criteria is recommended for selection of the equivalent opening size:

1. If 50 percent or less of the soil, by weight, will pass the U.S. Standard Sieve No. 200, select the EOS to retain 85 % of the soil. The EOS should not be finer than EOS 70.

2. For all other soil types, the EOS should be no larger than the openings in the U.S. Standard Sieve No. 70 except where direct discharge to a stream, lake, or wetland will occur, then the EOS should be no larger than Standard Sieve No. 100.

To reduce the chance of clogging, it is preferable to specify a fabric with openings as large as allowed by the criteria. No fabric should be specified with an EOS smaller than U.S. Standard Sieve No. 100. If 85% or more of a soil, by weight, passes through the openings in a No. 200 sieve, filter fabric should not be used. Most of the particles in such a soil would not be retained if the EOS was too large and they would clog the fabric quickly if the EOS were small enough to capture the soil.

The fence should be supported by a plastic or wire mesh if the fabric selected does not have sufficient strength and bursting strength characteristics for the planned application (as recommended by the fabric manufacturer). Filter fabric material should contain ultraviolet inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 °F to 120 °F.

- Layout in accordance with attached figures.

- For slopes steeper than 2:1 (H:V) and that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to install additional protection immediately adjacent to the bottom of the slope, prior to installing silt fence. Additional protection may be a chain link fence or a cable fence.

- For slopes adjacent to sensitive receiving waters or Environmentally Sensitive Areas (ESAs), silt fence should be used in conjunction with erosion control BMPs.

Materials

- Silt fence fabric should be woven polypropylene with a minimum width of 36 in. and a minimum tensile strength of 100 lb force. The fabric should conform to the requirements in ASTM designation D4632 and should have an integral reinforcement layer. The reinforcement layer should be a polypropylene, or equivalent, net provided by the manufacturer. The permittivity of the fabric should be between 0.1 sec^{-1} and 0.15 sec^{-1} in conformance with the requirements in ASTM designation D4491.

- Wood stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.

- Staples used to fasten the fence fabric to the stakes should be not less than 1.75 in. long and should be fabricated from 15 gauge or heavier wire. The wire used to fasten the tops of the stakes together when joining two sections of fence should be 9 gauge or heavier wire. Galvanizing of the fastening wire will not be required.

- There are new products that may use prefabricated plastic holders for the silt fence and use bar reinforcement instead of wood stakes. If bar reinforcement is used in lieu of wood stakes, use number four or greater bar. Provide end protection for any exposed bar reinforcement.

Installation Guidelines

Silt fences are to be constructed on a level contour. Sufficient area should exist behind the fence for ponding to occur without flooding or overtopping the fence.

- A trench should be excavated approximately 6 in. wide and 6 in. deep along the line the proposed silt fence.

- Bottom of the silt fence should be keyed-in a minimum of 12 in.

- Posts should be spaced a maximum of 6 ft apart and driven securely into the ground a minimum of 18 in. or 12 in. below the bottom of the trench.

- When standard strength filter fabric is used, a plastic or wire mesh support fence should be fastened securely to the upslope side of posts using heavy–duty wire staples at least 1 in. long. The mesh should extend into the trench. When extra-strength filter fabric and closer post spacing are used, the mesh support fence may be eliminated. Filter fabric should be purchased in a long roll, then cut to the length of the barrier. When joints are necessary, filter cloth should be spliced together only at a support post, with a minimum 6 in. overlap and both ends securely fastened to the post.

- The trench should be backfilled with compacted native material.

- Construct silt fences with a setback of at least 3 ft from the toe of a slope. Where a silt fence is determined to be not practicable due to specific site conditions, the silt fence may be constructed at the toe of the slope, but should be constructed as far from the toe of the slope as practicable. Silt fences close to the toe of the slope will be less effective and difficult to maintain.

- Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier; in no case should the reach exceed 500 ft.

Costs

- Average annual cost for installation and maintenance (assumes 6 month useful life): $7 per lineal foot ($850 per drainage acre). Range of cost is $3.50 - $9.10 per lineal foot.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- Repair undercut silt fences.

- Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months.

- Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed of, and replaced with new silt fence barriers.

- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.

- Silt fences should be left in place until the upstream area is permanently stabilized. Until then, the silt fence must be inspected and maintained.

- Holes, depressions, or other ground disturbance caused by the removal of the silt fences should be backfilled and repaired.

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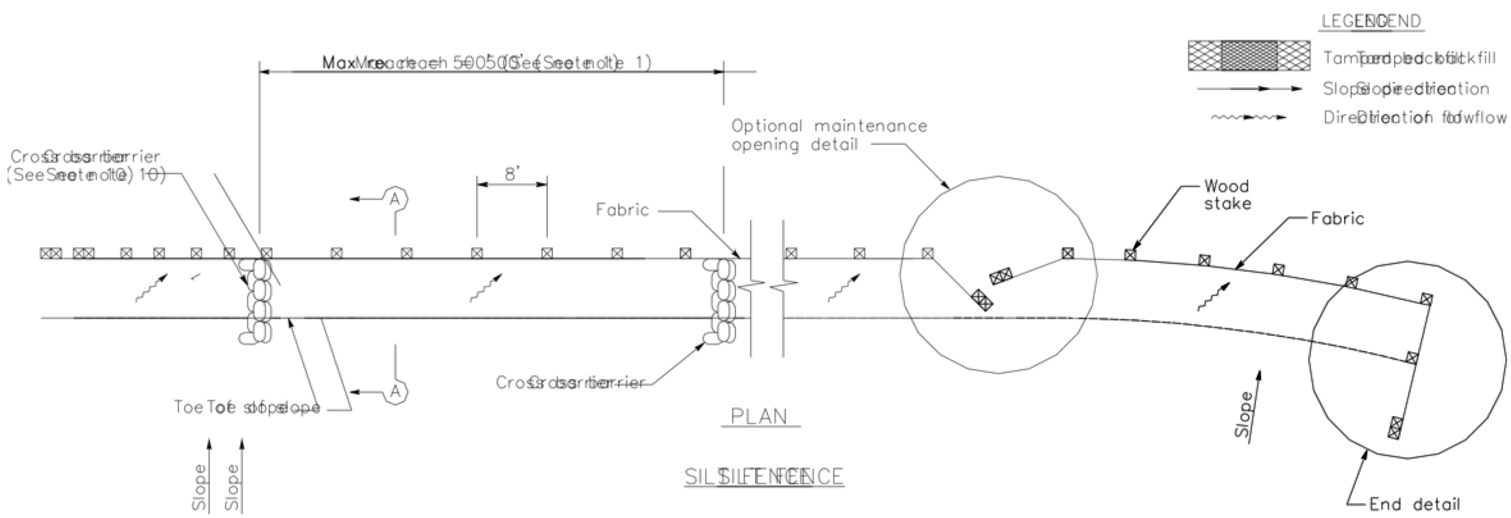
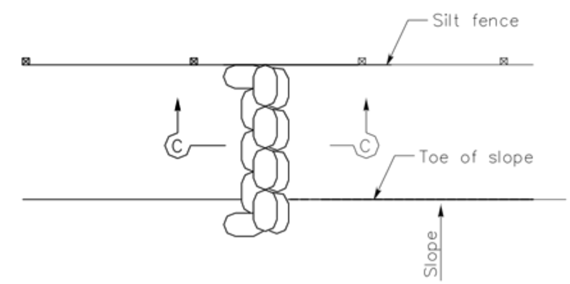


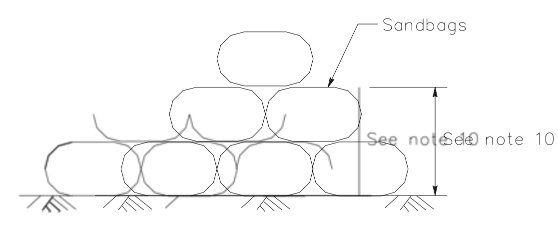
SILT FENCE

NOTES

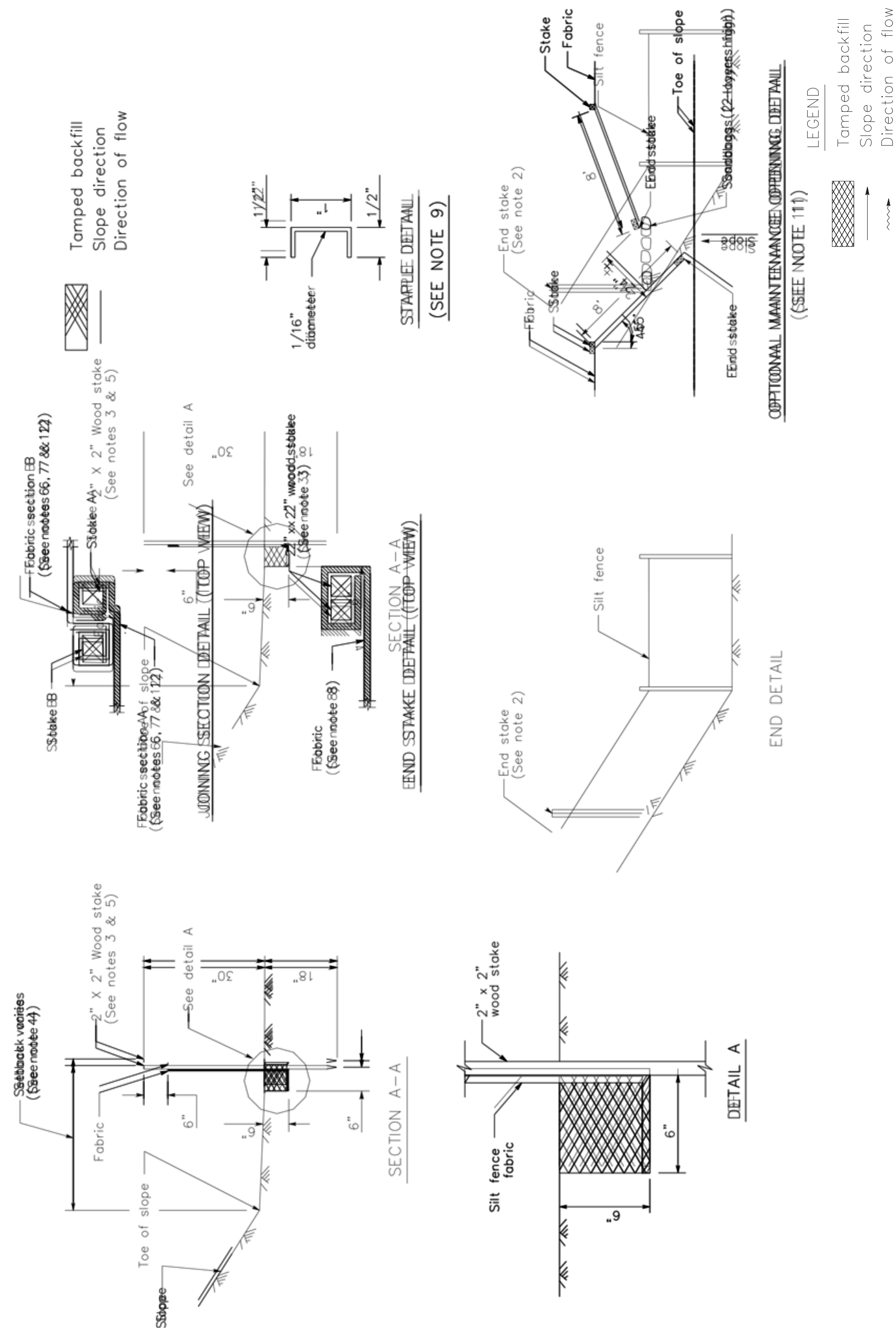
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the linear barrier, in no case shall the reach length exceed 500'.
2. The last 8'-0" of fence shall be turned up slope.
3. Stake dimensions are nominal.
4. Dimension may vary to fit field condition.
5. Stakes shall be spaced at 8'-0" maximum and shall be positioned on downstream side of fence.
6. Stakes to overlap and fence fabric to fold around each stake one full turn. Secure fabric to stake with 4 staples.
7. Stakes shall be driven tightly together to prevent potential flow-through of sediment at joint. The tops of the stakes shall be secured with wire.
8. For end stake, fence fabric shall be folded around two stakes one full turn and secured with 4 staples.
9. Minimum 4 staples per stake. Dimensions shown are typical.
10. Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
11. Maintenance openings shall be constructed in a manner to ensure sediment remains behind silt fence.
12. Joining sections shall not be placed at sump locations.
13. Sandbag rows and layers shall be offset to eliminate gaps.

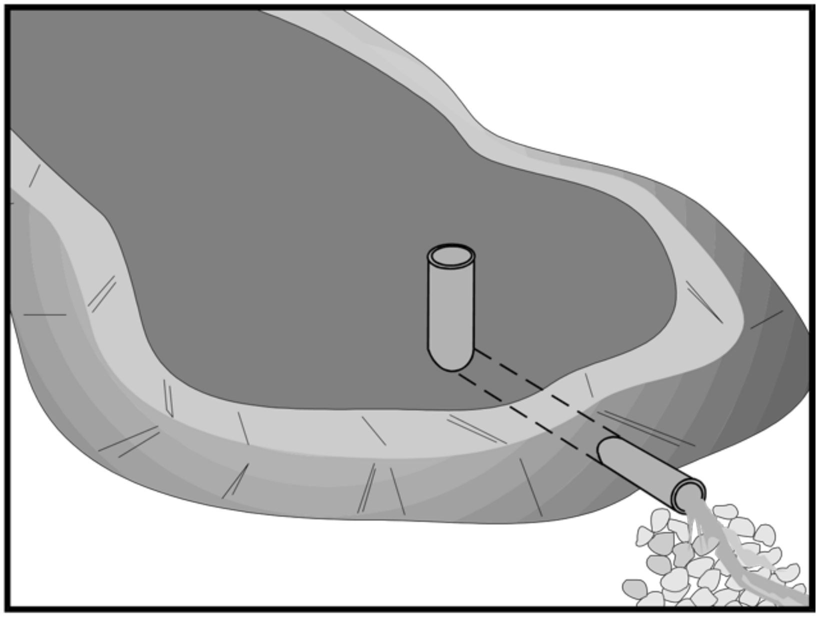


CROSS BARRIER DETAIL



SECTION C–C


Tamped backfill
Slope direction
Direction of flow
JOINING SECTION DETAIL (TOP VIEW)
END STAKE DETAIL (TOP VIEW)
SECTION A-A
STAPLE DETAIL
(SEE NOTE 9)
OPTIONAL MAINTENANCE OPENING DETAIL
(SEE NOTE 11)
LEGEND
END DETAIL
SECTION A-A
DETAIL A



Description and Purpose

A sediment basin is a temporary basin formed by excavation or by constructing an embankment so that sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is discharged.

Suitable Applications

Sediment basins may be suitable for use on larger projects with sufficient space for constructing the basin. Sediment basins should be considered for use:

- Where sediment-laden water may enter the drainage system or watercourses
- On construction projects with disturbed areas during the rainy season
- At the outlet of disturbed watersheds between 5 acres and 75 acres
- At the outlet of large disturbed watersheds, as necessary
- Where post construction detention basins are required
- In association with dikes, temporary channels, and pipes used to convey runoff from disturbed areas

Limitations

Sediment basins must be installed only within the property limits and where failure of the structure will not result in loss of life, damage to homes or buildings, or interruption of use or service of

Objectives

EC	Erosion Control
SE	Sediment Control
TR	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

- Sediment
- Nutrients
- Trash
- Metals
- Bacteria
- Oil and Grease
- Organics

Potential Alternatives

SE-3 Sediment Trap (for smaller areas)

public roads or utilities. In addition, sediment basins are attractive to children and can be very dangerous. Local ordinances regarding health and safety must be adhered to. If fencing of the basin is required, the type of fence and its location should be shown in the SWPPP and in the construction specifications.

- Generally, sediment basins are limited to drainage areas of 5 acres or more, but not appropriate for drainage areas greater than 75 acres.
- Sediment basins may become an "attractive nuisance" and care must be taken to adhere to all safety practices. If safety is a concern, basin may require protective fencing.
- Sediment basins designed according to this handbook are only practically effective in removing sediment down to about the medium silt size fraction. Sediment-laden runoff with smaller size fractions (fine silt and clay) may not be adequately treated unless chemical treatment is used in addition to the sediment basin.
- Sites with very fine sediments (fine silt and clay) may require longer detention times for effective sediment removal.
- Basins with a height of 25 ft or more or an impounding capacity of 50 ac-ft or more must obtain approval from Division of Safety of Dams.
- Standing water may cause mosquitoes or other pests to breed.
- Basins require large surface areas to permit settling of sediment. Size may be limited by the available area.

Implementation

General

A sediment basin is a controlled stormwater release structure formed by excavation or by construction of an embankment of compacted soil across a drainage way, or other suitable location. It is intended to trap sediment before it leaves the construction site. The basin is a temporary measure with a design life of 12 to 28 months in most cases and is to be maintained until the site area is permanently protected against erosion or a permanent detention basin is constructed.

Sediment basins are suitable for nearly all types of construction projects. Whenever possible, construct the sediment basins before clearing and grading work begins. Basins should be located at the stormwater outlet from the site but not in any natural or undisturbed stream. A typical application would include temporary dikes, pipes, and/or channels to divert runoff to the basin inlet.

Many development projects in California will be required by local ordinances to provide a stormwater detention basin for post-construction flood control, desilting, or stormwater pollution control. A temporary sediment basin may be constructed by rough grading the postconstruction control basins early in the project.

Sediment basins trap 70-80 % of the sediment that flows into them if designed according to this handbook. Therefore, they should be used in conjunction with erosion control practices such as temporary seeding, mulching, diversion dikes, etc., to reduce the amount of sediment flowing into the basin.

Planning

To improve the effectiveness of the basin, it should be located to intercept runoff from the largest possible amount of disturbed area. The best locations are generally low areas. Drainage into the basin can be improved by the use of earth dikes and drainage swales (see BMP EC-9). The basin must not be located in a stream but it should be located to trap sediment-laden runoff before it enters the stream. The basin should not be located where its failure would result in the loss of life or interruption of the use or service of public utilities or roads.

- Construct before clearing and grading work begins when feasible.
- Do not locate in a stream.
- Basin sites should be located where failure of the structure will not cause loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities.
- Large basins are subject to state and local dam safety requirements.
- Limit the contributing area to the sediment basin to only the runoff from the disturbed soil areas. Use temporary concentrated flow conveyance controls to divert runoff from undisturbed areas away from the sediment basin.
- The basin should be located: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where post-construction (permanent) detention basins will be constructed, and (3) where the basins can be maintained on a year-round basis to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area, and to maintain the basin to provide the required capacity.

Design

Sediment basins must be designed in accordance with Section A of the State of California NPDES General Permit for Stormwater Discharges Associated with Construction Activities (General Permit) where sediment basins are the only control measure proposed for the site. If there is insufficient area to construct a sediment basin in accordance with the General Permit requirements, then the alternate design standards specified herein may be used.

Sediment basins designed per the General Permit shall be designed as follows:

Option 1:

Pursuant to local ordinance for sediment basin design and maintenance, provided that the design efficiency is as protective or more protective of water quality than Option 3.

OR

Option 2:
Sediment basin(s), as measured from the bottom of the basin to the principal outlet, shall have at least a capacity equivalent to 3,600 cubic feet (133 yd^3) of storage per acre draining into the sediment basin. The length of the basin shall be more than twice the width of the basin. The length is determined by measuring the distance between the inlet and the outlet; and the depth must not be less than 3 ft nor greater than 5 ft for safety reasons and for maximum efficiency.

OR

Option 3:
Sediment basin(s) shall be designed using the standard equation:

$$As=1.2Q/Vs \qquad \text{(Eq. 1)}$$

Where:

As = Minimum surface area for trapping soil particles of a certain size

Vs = Settling velocity of the design particle size chosen

Q = C I A

Where

Q = Discharge rate measured in cubic feet per second

C = Runoff coefficient

I = Precipitation intensity for the 10-year, 6-hour rain event

A = Area draining into the sediment basin in acres

The design particle size shall be the smallest soil grain size determined by wet sieve analysis, or the fine silt sized (0.01 mm [or 0.0004 in.]) particle, and the *Vs* used shall be 100 percent of the calculated settling velocity.

The length is determined by measuring the distance between the inlet and the outlet; the length shall be more than twice the dimension as the width; the depth shall not be less than 3 ft nor greater than 5 ft for safety reasons and for maximum efficiency (2 ft of sediment storage, 2 ft of capacity). The basin(s) shall be located on the site where it can be maintained on a year-round basis and shall be maintained on a schedule to retain the 2 ft of capacity.

OR

Option 4:
The use of an equivalent surface area design or equation, provided that the design efficiency is as protective or more protective of water quality than Option 3.

Other design considerations are:

- The volume of the settling zone should be sized to capture runoff from a 2-year storm or other appropriate design storms specified by the local agency. A detention time of 24 to 40 hours should allow 70 to 80 % of sediment to settle.

- The basin volume consists of two zones:

  - A sediment storage zone at least 1 ft deep.

  - A settling zone at least 2 ft deep.

- The length to settling depth ratio (L/SD) should be less than 200.

- Sediment basins are best used in conjunction with erosion controls. Sediment basins that will be used as the only means of treatment, without upstream erosion and sediment controls, must be designed according to the four options required by the General Permit (see Options 1-4 above). Sediment basins that are used in conjunction with upstream erosion and sediment controls should be designed to have a capacity equivalent to 67 yd^3 of sediment storage per acre of contributory area.

- The length of the basin should be more than twice the width of the basin; the length should be determined by measuring the distance between the inlet and the outlet.

- The depth must be no less than 3 ft.

- Basins with an impounding levee greater than 4.5 ft tall, measured from the lowest point to the impounding area to the highest point of the levee, and basins capable of impounding more than 35,000 ft^3, should be designed by a Registered Civil Engineer. The design should include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the basin outlet and bypass structures.

- Basins should be designed to drain within 72 hours following storm events. If a basin fails to drain within 72 hours, it must be pumped dry.

- Sediment basins, regardless of size and storage volume, should include features to accommodate overflow or bypass flows that exceed the design storm event.

  - Include an emergency spillway to accommodate flows not carried by the principal spillway. The spillway should consist of an open channel (earthen or vegetated) over undisturbed material (not fill) or constructed of a non-erodible riprap.

  - The spillway control section, which is a level portion of the spillway channel at the highest elevation in the channel, should be a minimum of 20 ft in length.

- Rock or vegetation should be used to protect the basin inlet and slopes against erosion.

- A forebay, constructed upstream of the basin may be provided to remove debris and larger particles.

- The outflow from the sediment basin should be provided with velocity dissipation devices (see BMP EC-10) to prevent erosion and scouring of the embankment and channel.

- Basin inlets should be located to maximize travel distance to the basin outlet.

- The principal outlet should consist of a corrugated metal, high density polyethylene (HDPE), or reinforced concrete riser pipe with dewatering holes and an anti-vortex device and trash rack attached to the top of the riser, to prevent floating debris from flowing out of the basin or obstructing the system. This principal structure should be designed to accommodate the inflow design storm.

- A rock pile or rock-filled gabions can serve as alternatives to the debris screen; although the designer should be aware of the potential for extra maintenance involved should the pore spaces in the rock pile clog.

- The outlet structure should be placed on a firm, smooth foundation with the base securely anchored with concrete or other means to prevent floatation.

- Attach riser pipe (watertight connection) to a horizontal pipe (barrel). Provide anti-seep collars on the barrel.

- Cleanout level should be clearly marked on the riser pipe.

- Proper hydraulic design of the outlet is critical to achieving the desired performance of the basin. The outlet should be designed to drain the basin within 24 to 72 hours (also referred to as "drawdown time"). The 24-hour limit is specified to provide adequate settling time; the 72-hour limit is specified to mitigate vector control concerns.

- The two most common outlet problems that occur are: (1) the capacity of the outlet is too great resulting in only partial filling of the basin and drawdown time less than designed for; and (2) the outlet clogs because it is not adequately protected against trash and debris. To avoid these problems, the following outlet types are recommended for use: (1) a single orifice outlet with or without the protection of a riser pipe, and (2) perforated riser. Design guidance for single orifice and perforated riser outlets follow:

  - *Flow Control Using a Single Orifice At The Bottom Of The Basin (Figure 1)*: The outlet control orifice should be sized using the following equation:

$$a = \frac{2A(H - Ho)^{0.5}}{3600CT(2g)^{0.5}} = \frac{(7x10^{-5})A(H - Ho)^{0.5}}{CT} \qquad \text{(Eq. 2)}$$

where:

a = area of orifice (ft²)

A = surface area of the basin at mid elevation (ft²)

C = orifice coefficient

T = drawdown time of full basin (hrs)

g = gravity (32.2 ft/s²)

H = elevation when the basin is full (ft)

Ho = final elevation when basin is empty (ft)

With a drawdown time of 40 hours, the equation becomes:

$$a = \frac{(1.75x10^{-6})A(H - Ho)^{0.5}}{C} \quad \text{(Eq. 3) -}$$

Flow Control Using Multiple Orifices (see Figure2):

$$a_t = \frac{2A(h_{\max})}{3600CT(2g[h_{\max} - h_{centroid\ of\ orifices}])^{0.5}} \quad \text{(Eq. 4)}$$

With terms as described above except:

a_t = total area of orifices

h_{max} = maximum height from lowest orifice to the maximum water surface (ft)

$h_{centroid\ of\ orifices}$ = height from the lowest orifice to the centroid of the orifice configuration (ft)

Allocate the orifices evenly on two rows; separate the holes by 3x hole diameter vertically, and by 120 degrees horizontally (refer to Figure 2).

Because basins are not maintained for infiltration, water loss by infiltration should be disregarded when designing the hydraulic capacity of the outlet structure.

Care must be taken in the selection of "C"; 0.60 is most often recommended and used. However, based on actual tests, GKY (1989), "Outlet Hydraulics of Extended Detention Facilities for Northern Virginia Planning District Commission", recommends the following:

C = 0.66 for thin materials; where the thickness is equal to or less than the orifice diameter, or

C = 0.80 when the material is thicker than the orifice diameter

Installation

- Securely anchor and install an anti-seep collar on the outlet pipe/riser and provide an emergency spillway for passing major floods (see local flood control agency).

- Areas under embankments must be cleared and stripped of vegetation.

- Chain link fencing should be provided around each sediment basin to prevent unauthorized entry to the basin or if safety is a concern.

Costs

Average annual costs for installation and maintenance (2 year useful life) are:

- Basin less than 50,000 ft^3: Range, \$0.24 - \$1.58/ft^3. Average, \$0.73 per ft^3. \$400 - \$2,400, \$1,200 average per drainage acre.

- Basin size greater than 50,000 ft^3: Range, \$0.12 – \$0.48/ft^3. Average, \$0.36 per ft^3. \$200 - \$800, \$600 average per drainage acre.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- Examine basin banks for seepage and structural soundness.

- Check inlet and outlet structures and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.

- Check inlet and outlet area for erosion and stabilize if required.

- Check fencing for damage and repair as needed.

- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches onehalf the designated sediment storage volume. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed of at appropriate locations.

- Remove standing water from basin within 72 hours after accumulation.

- BMPs that require dewatering shall be continuously attended while dewatering takes place. Dewatering BMPs shall be implemented at all times during dewatering activities.

- To minimize vector production:

    - Remove accumulation of live and dead floating vegetation in basins during every inspection.

    - Remove excessive emergent and perimeter vegetation as needed or as advised by local or state vector control agencies.

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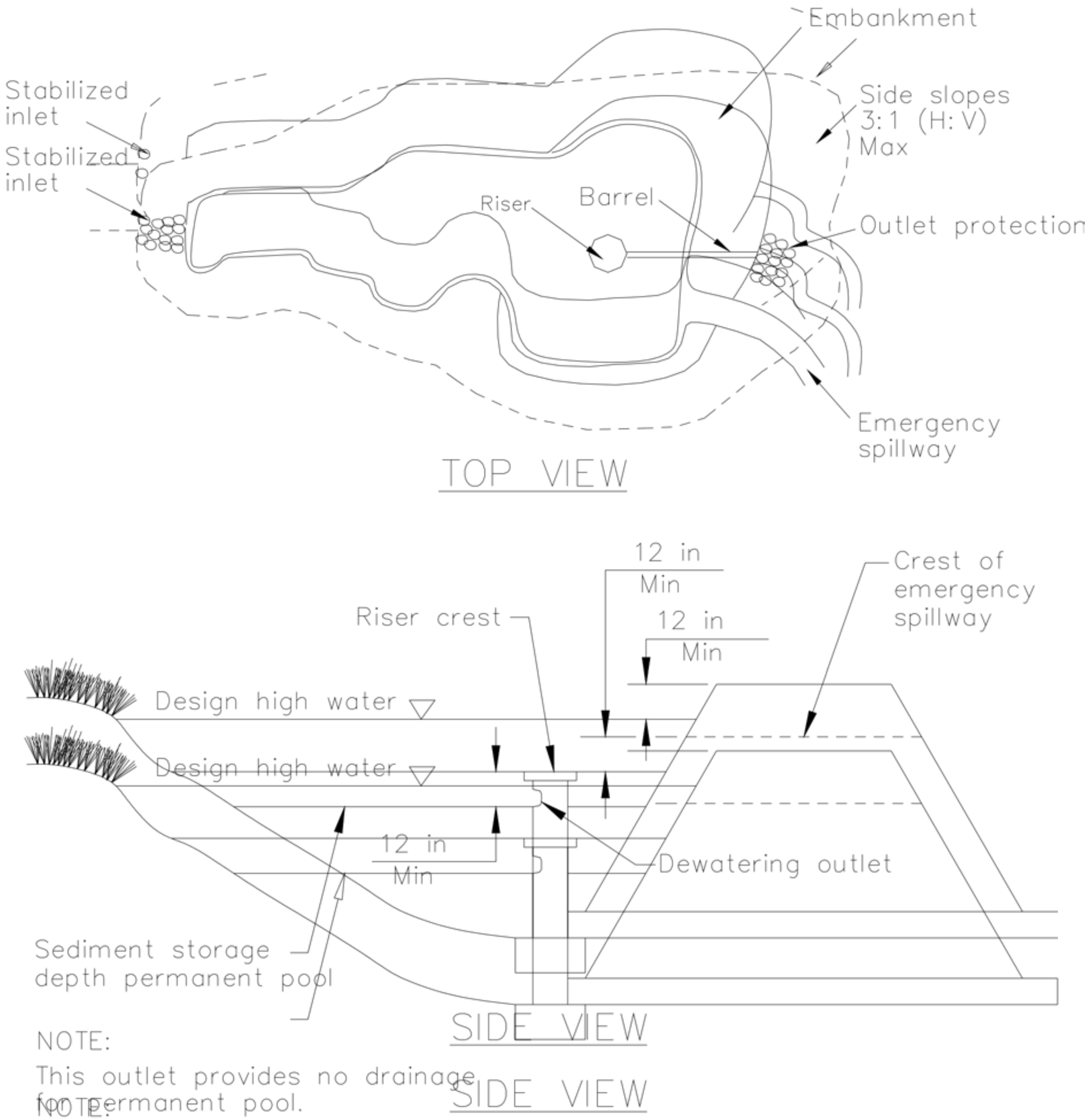


FIGURE 1: TYPICAL TEMPORARY SEDIMENT BASIN
SINGLE ORIFICE DESIGN
NOT TO SCALE

FIGURE 1: TYPICAL TEMPORARY SEDIMENT BASIN
SINGLE ORIFICE DESIGN
NOT TO SCALE

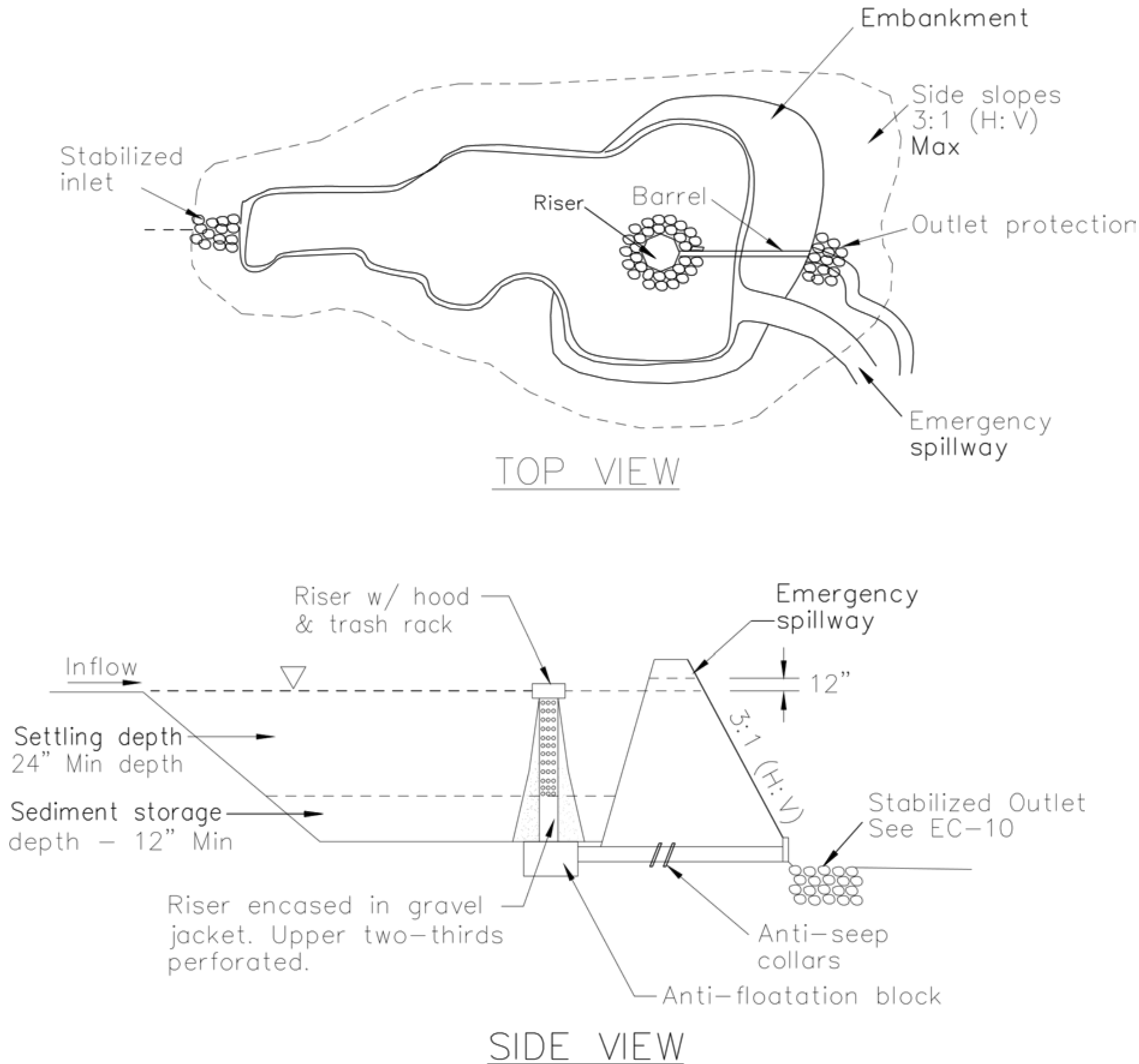


FIGURE 2: TYPICAL TEMPORARY SEDIMENT BASIN

MULTIPLE ORIFICE DESIGN

NOT TO SCALE

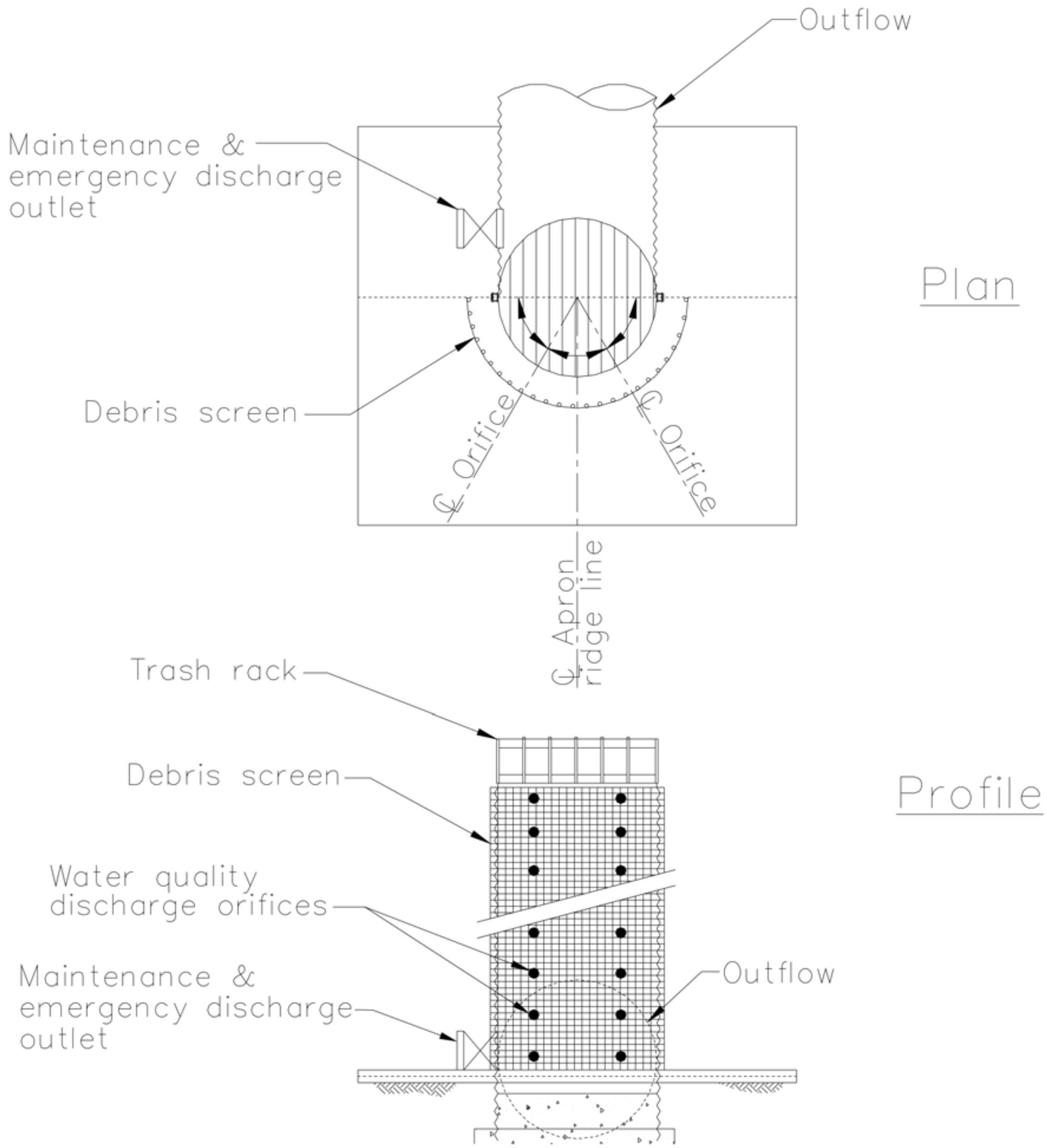
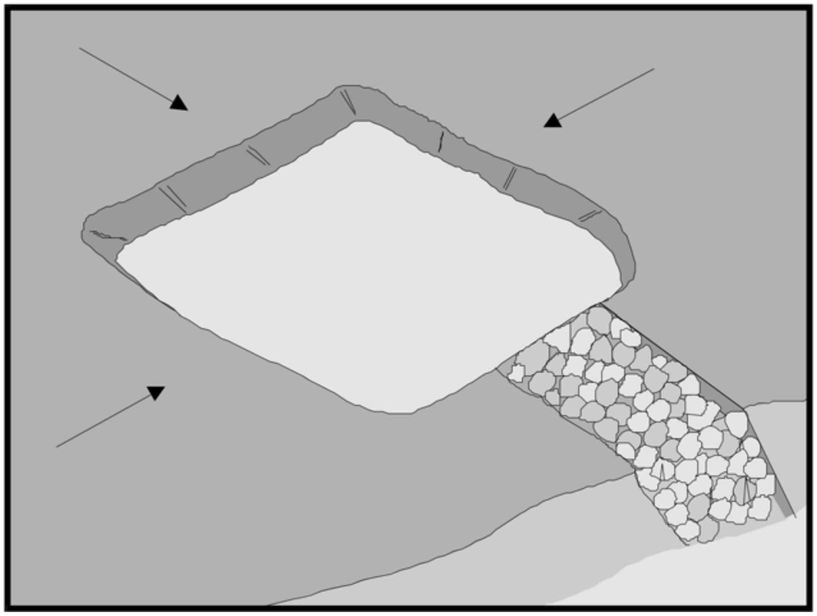


FIGURE 3: MULTIPLE ORIFICE OUTLET RISER

NOT TO SCALE

FIGURE 3: MULTIPLE ORIFICE OUTLET RISER

NOT TO SCALE



Objectives

EC	Erosion Control	
SE	Sediment Control	☑
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-2 Sediment Basin (for larger areas)

Description and Purpose

A sediment trap is a containment area where sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out or before the runoff is discharged. Sediment traps are formed by excavating or constructing an earthen embankment across a waterway or low drainage area.

Suitable Applications

Sediment traps should be considered for use:

- At the perimeter of the site at locations where sedimentladen runoff is discharged offsite.
- At multiple locations within the project site where sediment control is needed.
- Around or upslope from storm drain inlet protection measures.
- Sediment traps may be used on construction projects where the drainage area is less than 5 acres. Traps would be placed where sediment-laden stormwater may enter a storm drain or watercourse. SE-2, Sediment Basins, must be used for drainage areas greater than 5 acres.
- As a supplemental control, sediment traps provide additional protection for a water body or for reducing sediment before it enters a drainage system.

Limitations

- Requires large surface areas to permit infiltration and settling of sediment.
- Not appropriate for drainage areas greater than 5 acres.
- Only removes large and medium sized particles and requires upstream erosion control.
- Attractive and dangerous to children, requiring protective fencing.
- Conducive to vector production.
- Should not be located in live streams.

Implementation

Design

A sediment trap is a small temporary ponding area, usually with a gravel outlet, formed by excavation or by construction of an earthen embankment. Its purpose is to collect and store sediment from sites cleared or graded during construction. It is intended for use on small drainage areas with no unusual drainage features and projected for a quick build-out time. It should help in removing coarse sediment from runoff. The trap is a temporary measure with a design life of approximately six months to one year and is to be maintained until the site area is permanently protected against erosion by vegetation and/or structures.

Sediment traps should be used only for small drainage areas. If the contributing drainage area is greater than 5 acres, refer to SE-2, Sediment Basins, or subdivide the catchment area into smaller drainage basins.

Sediment usually must be removed from the trap after each rainfall event. The SWPPP should detail how this sediment is to be disposed of, such as in fill areas onsite, or removal to an approved offsite dump. Sediment traps used as perimeter controls should be installed before any land disturbance takes place in the drainage area.

Sediment traps are usually small enough that a failure of the structure would not result in a loss of life, damage to home or buildings, or interruption in the use of public roads or utilities. However, sediment traps are attractive to children and can be dangerous. The following recommendations should be implemented to reduce risks:

- Install continuous fencing around the sediment trap or pond. Consult local ordinances regarding requirements for maintaining health and safety.
- Restrict basin side slopes to 3:1 or flatter.

Sediment trap size depends on the type of soil, size of the drainage area, and desired sediment removal efficiency (see SE-2, Sediment Basin). As a rule of thumb, the larger the basin volume the greater the sediment removal efficiency. Sizing criteria are typically established under the local grading ordinance or equivalent. The runoff volume from a 2-year storm is a common design criteria for a sediment trap. The sizing criteria below assume that this runoff volume is 0.042 acre-ft/acre (0.5 in. of runoff). While the climatic, topographic, and soil type extremes make it difficult to establish a statewide standard, the following criteria should trap moderate to high amounts of sediment in most areas of California:

- Locate sediment traps as near as practical to areas producing the sediment.
- Trap should be situated according to the following criteria: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where failure would not cause loss of life or property damage, and (3) to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area.
- Trap should be sized to accommodate a settling zone and sediment storage zone with recommended minimum volumes of 67 yd^3/acre and 33 yd^3/acre of contributing drainage area, respectively, based on 0.5 in. of runoff volume over a 24-hour period. In many cases, the size of an individual trap is limited by available space. Multiple traps or additional volume may be required to accommodate specific rainfall, soil, and site conditions.
- Traps with an impounding levee greater than 4.5 ft tall, measured from the lowest point to the impounding area to the highest point of the levee, and traps capable of impounding more than 35,000 ft^3, should be designed by a Registered Civil Engineer. The design should include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the trap outlet and bypass structures.
- The outlet pipe or open spillway must be designed to convey anticipated peak flows.
- Use rock or vegetation to protect the trap outlets against erosion.
- Fencing should be provided to prevent unauthorized entry.

Installation

Sediment traps can be constructed by excavating a depression in the ground or creating an impoundment with a small embankment. Sediment traps should be installed outside the area being graded and should be built prior to the start of the grading activities or removal of vegetation. To minimize the area disturbed by them, sediment traps should be installed in natural depressions or in small swales or drainage ways. The following steps must be followed during installation:

- The area under the embankment must be cleared, grubbed, and stripped of any vegetation and root mat. The pool area should be cleared.
- The fill material for the embankment must be free of roots or other woody vegetation as well as oversized stones, rocks, organic material, or other objectionable material. The embankment may be compacted by traversing with equipment while it is being constructed.
- All cut-and-fill slopes should be 3:1 or flatter.
- When a riser is used, all pipe joints must be watertight.
- When a riser is used, at least the top two-thirds of the riser should be perforated with 0.5 in. diameter holes spaced 8 in. vertically and 10 to 12 in. horizontally. See SE-2, Sediment Basin.

- When an earth or stone outlet is used, the outlet crest elevation should be at least 1 ft below the top of the embankment.

- When crushed stone outlet is used, the crushed stone used in the outlet should meet AASHTO M43, size No. 2 or 24, or its equivalent such as MSHA No. 2. Gravel meeting the above gradation may be used if crushed stone is not available.

Costs

Average annual cost per installation and maintenance (18 month useful life) is $0.73 per ft^3 ($1,300 per drainage acre). Maintenance costs are approximately 20% of installation costs.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- Inspect outlet area for erosion and stabilize if required.

- Inspect trap banks for seepage and structural soundness, repair as needed.

- Inspect outlet structure and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.

- Inspect fencing for damage and repair as needed.

- Inspect the sediment trap for area of standing water during every visit. Corrective measures should be taken if the BMP does not dewater completely in 72 hours or less to prevent vector production.

- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the trap capacity. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed of at an appropriate location.

- Remove vegetation from the sediment trap when first detected to prevent pools of standing water and subsequent vector production.

- BMPs that require dewatering shall be continuously attended while dewatering takes place. Dewatering BMPs shall be implemented at all times during dewatering activities.

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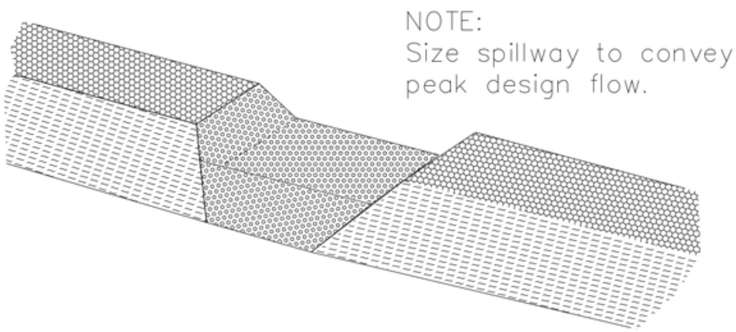
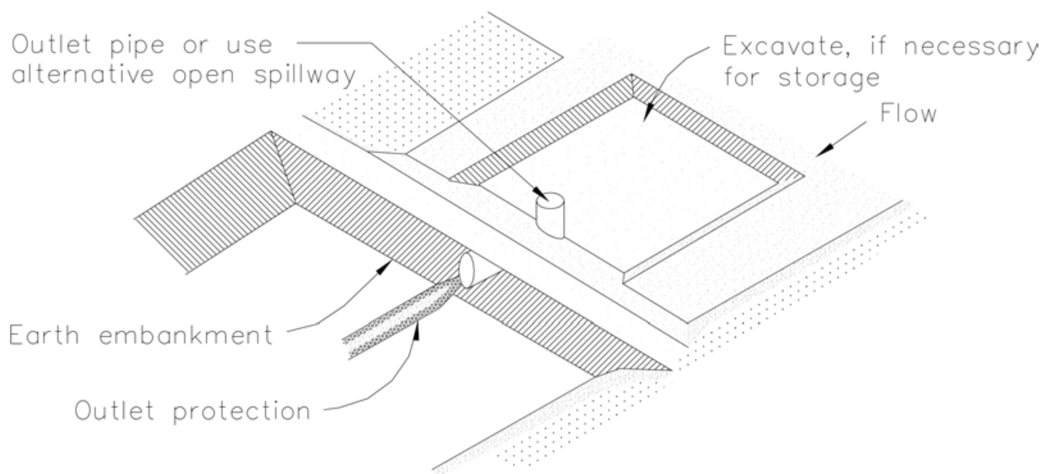
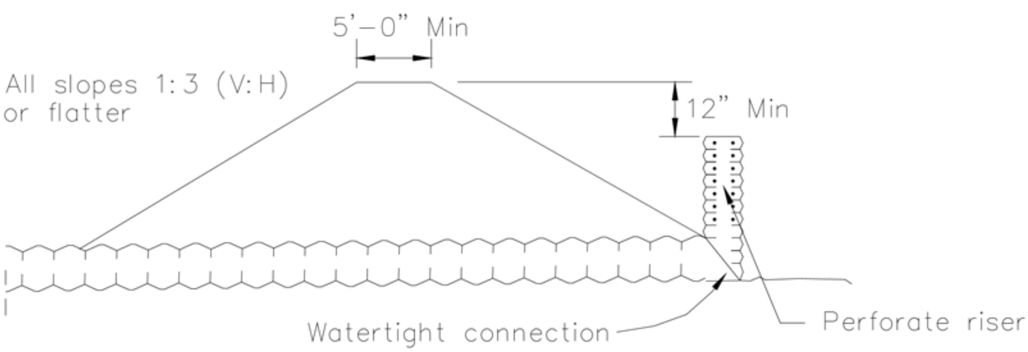


TYPICAL OPEN SPILLWAY

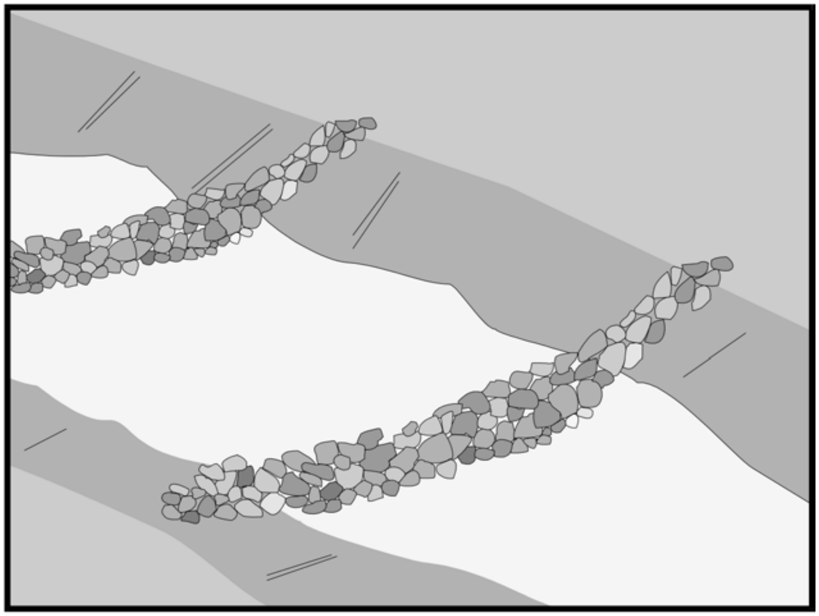




EMBANKMENT SECTION THRU RISER

TYPICAL SEDIMENT TRAP
NOT TO SCALE

Check Dams SE-4



Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

Primary Objective

Secondary Objective

Description and Purpose

A check dam is a small barrier constructed of rock, gravel bags, sandbags, fiber rolls, or reusable products, placed across a constructed swale or drainage ditch. Check dams reduce the effective slope of the channel, thereby reducing the velocity of flowing water, allowing sediment to settle and reducing erosion.

Suitable Applications

Check dams may be appropriate in the following situations:

④ To promote sedimentation behind the dam.

④ To prevent erosion by reducing the velocity of channel flow in small intermittent channels and temporary swales. ④ In small open channels that drain 10 acres or less.

④ In steep channels where stormwater runoff velocities exceed 5 ft/s.

④ During the establishment of grass linings in drainage ditches or channels.

④ In temporary ditches where the short length of service does not warrant establishment of erosion-resistant linings.

Limitations ④ Not to be used in live streams or in channels with extended base flows.

Targeted Constituents

Sediment
Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics

Potential Alternatives

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

- Not appropriate in channels that drain areas greater than 10 acres.

- Not appropriate in channels that are already grass-lined unless erosion is expected, as installation may damage vegetation.

- Require extensive maintenance following high velocity flows.

- Promotes sediment trapping which can be re-suspended during subsequent storms or removal of the check dam.

Implementation

General

Check dams reduce the effective slope and create small pools in swales and ditches that drain 10 acres or less. Reduced slopes reduce the velocity of stormwater flows, thus reducing erosion of the swale or ditch and promoting sedimentation. Use of check dams for sedimentation will likely result in little net removal of sediment because of the small detention time and probable scour during longer storms. Using a series of check dams will generally increase their effectiveness. A sediment trap (SE-3) may be placed immediately upstream of the check dam to increase sediment removal efficiency.

Design and Layout

Check dams work by decreasing the effective slope in ditches and swales. An important consequence of the reduced slope is a reduction in capacity of the ditch or swale. This reduction in capacity must be considered when using this BMP, as reduced capacity can result in overtopping of the ditch or swale and resultant consequences. In some cases, such as a “permanent” ditch or swale being constructed early and used as a “temporary” conveyance for construction flows, the ditch or swale may have sufficient capacity such that the temporary reduction in capacity due to check dams is acceptable. When check dams reduce capacities beyond acceptable limits, there are several options:

- Don’t use check dams. Consider alternative BMPs.

- Increase the size of the ditch or swale to restore capacity.

Maximum slope and velocity reduction is achieved when the toe of the upstream dam is at the same elevation as the top of the downstream dam. The center section of the dam should be lower than the edge sections so that the check dam will direct flows to the center of the ditch or swale.

Check dams are usually constructed of rock, gravel bags, sandbags, and fiber rolls. A number of products manufactured specifically for use as check dams are also being used, and some of these products can be removed and reused. Check dams can also be constructed of logs or lumber, and have the advantage of a longer lifespan when compared to gravel bags, sandbags, and fiber rolls. Straw bales can also be used for check dams and can work if correctly installed; but in practice, straw bale check dams have a high failure rate. Check dams should not be constructed from straw bales or silt fences, since concentrated flows quickly wash out these materials.

Rock check dams are usually constructed of 8 to 12 in. rock. The rock is placed either by hand or mechanically, but never just dumped into the channel. The dam must completely span the ditch

or swale to prevent washout. The rock used must be large enough to stay in place given the expected design flow through the channel.

Log check dams are usually constructed of 4 to 6 in. diameter logs. The logs should be embedded into the soil at least 18 in. Logs can be bolted or wired to vertical support logs that have been driven or buried into the soil.

Gravel bag and sandbag check dams are constructed by stacking bags across the ditch or swale, shaped as shown in the drawings at the end of this fact sheet.

Manufactured products should be installed in accordance with the manufacturer's instructions.

If grass is planted to stabilize the ditch or swale, the check dam should be removed when the grass has matured (unless the slope of the swales is greater than 4%).

The following guidance should be followed for the design and layout of check dams:

- Install the first check dam approximately 16 ft from the outfall device and at regular intervals based on slope gradient and soil type.
- Check dams should be placed at a distance and height to allow small pools to form between each check dam.
- Backwater from a downstream check dam should reach the toes of the upstream check dam.
- A sediment trap provided immediately upstream of the check dam will help capture sediment. Due to the potential for this sediment to be resuspended in subsequent storms, the sediment trap must be cleaned following each storm event.
- High flows (typically a 2-year storm or larger) should safely flow over the check dam without an increase in upstream flooding or damage to the check dam.
- Where grass is used to line ditches, check dams should be removed when grass has matured sufficiently to protect the ditch or swale.
- Gravel bags may be used as check dams with the following specifications:

Materials

Gravel bags used for check dams should conform to the requirements of SE-6, Gravel Bag Berms. Sandbags used for check dams should conform to SE-8, Sandbag Barrier. Fiber rolls used for check dams should conform to SE-5, Fiber Rolls. Straw bales used for check dams should conform to SE-9, Straw Bale Barrier.

Installation

- Rock should be placed individually by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage.

- Tightly abut bags and stack according to detail shown in the figure at the end of this section. Gravel bags and sandbags should not be stacked any higher than 3 ft.

- Fiber rolls and straw bales must be trenched in and firmly staked in place.

Costs

Cost consists of only installation costs if materials are readily available. If material must be imported, costs may increase. For material costs, see SE-5, SE-6, SE-8 and SE-9.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- Replace missing rock, bags, bales, etc. Replace bags or bales that have degraded or have become damaged.

- If the check dam is used as a sediment capture device, sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.

- If the check dam is used as a grade control structure, sediment removal is not required as long as the system continues to control the grade.

- Remove accumulated sediment prior to permanent seeding or soil stabilization.

- Remove check dam and accumulated sediment when check dams are no longer needed.

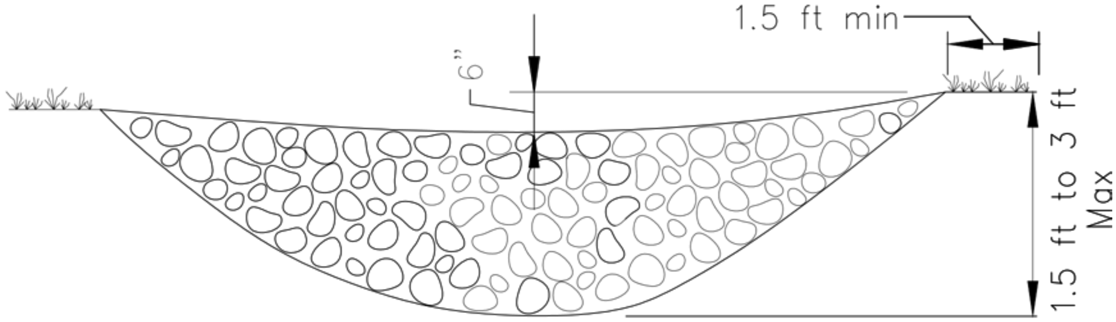
References

Draft – Sedimentation and Erosion Control, and Inventory of Current Practices, USEPA, April 1990.

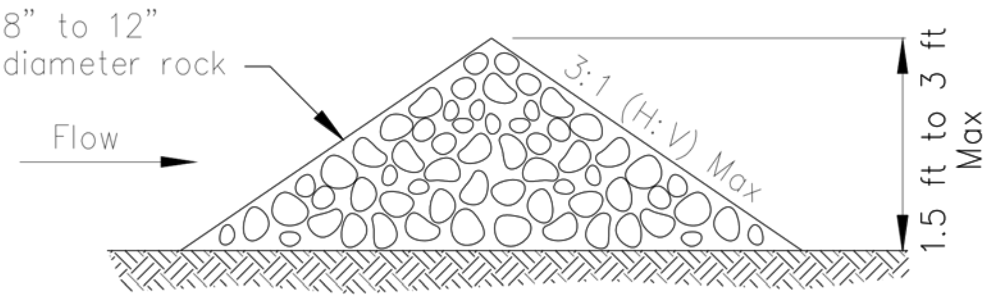
Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

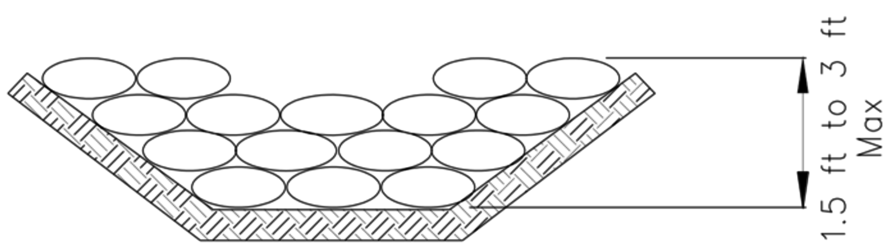


ELEVATION



TYPICAL ROCK CHECK DAM SECTION

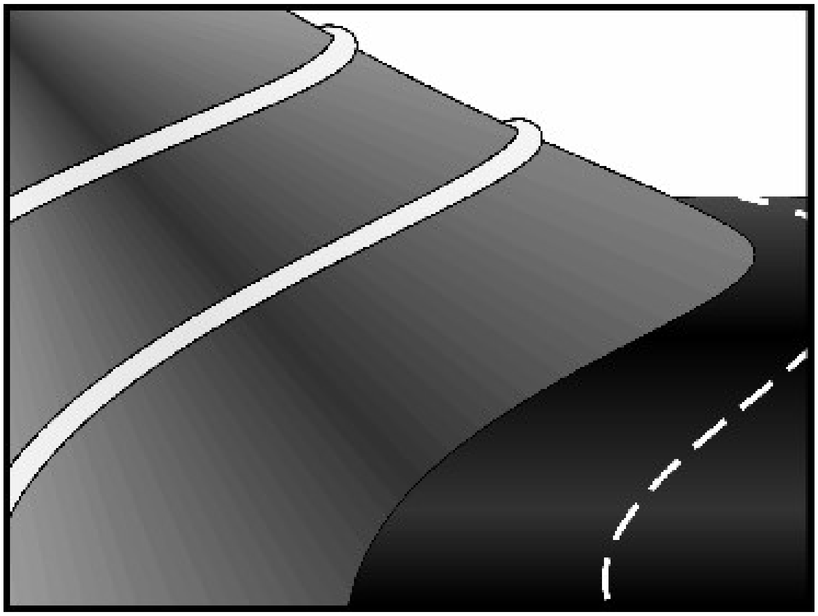
ROCK CHECK DAM
NOT TO SCALE



GRAVEL BAG CHECK DAM ELEVATION
NOT TO SCALE

GRAVEL BAG CHECK DAM ELEVATION
NOT TO SCALE

Fiber Rolls SE-5



Objectives

EC	Erosion Control
SE	Sediment Control
TR	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

Sediment
Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics

Potential Alternatives

SE-1 Silt Fence

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-9 Straw Bale Barrier

Description and Purpose

A fiber roll consists of straw, flax, or other similar materials bound into a tight tubular roll. When fiber rolls are placed at the toe and on the face of slopes, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff. By interrupting the length of a slope, fiber rolls can also reduce erosion.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
- At the end of a downward slope where it transitions to a steeper slope
- Along the perimeter of a project
- As check dams in unlined ditches
- Down-slope of exposed soil areas
- Around temporary stockpiles

Limitations

- Fiber rolls are not effective unless trenched

SE-5 Fiber Rolls

- Fiber rolls at the toe of slopes greater than 5:1 (H:V) should be a minimum of 20 in. diameter or installations achieving the same protection (i.e. stacked smaller diameter fiber rolls, etc.).

- Difficult to move once saturated.

- If not properly staked and trenched in, fiber rolls could be transported by high flows.

- Fiber rolls have a very limited sediment capture zone.

- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.

Implementation *Fiber Roll Materials*

- Fiber rolls should be either prefabricated rolls or rolled tubes of erosion control blanket.

Assembly of Field Rolled Fiber Roll

- Roll length of erosion control blanket into a tube of minimum 8 in. diameter.

- Bind roll at each end and every 4 ft along length of roll with jute-type twine.

Installation

- Locate fiber rolls on level contours spaced as follows:

  - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.

  - Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).

  - Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).

- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.

- Stake fiber rolls into a 2 to 4 in. deep trench with a width equal to the diameter of the fiber roll.

  - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.

  - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.

- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.

Removal

- Fiber rolls are typically left in place.

- If fiber rolls are removed, collect and dispose of sediment accumulation, and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

Costs

Material costs for fiber rolls range from $20 - $30 per 25 ft roll.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

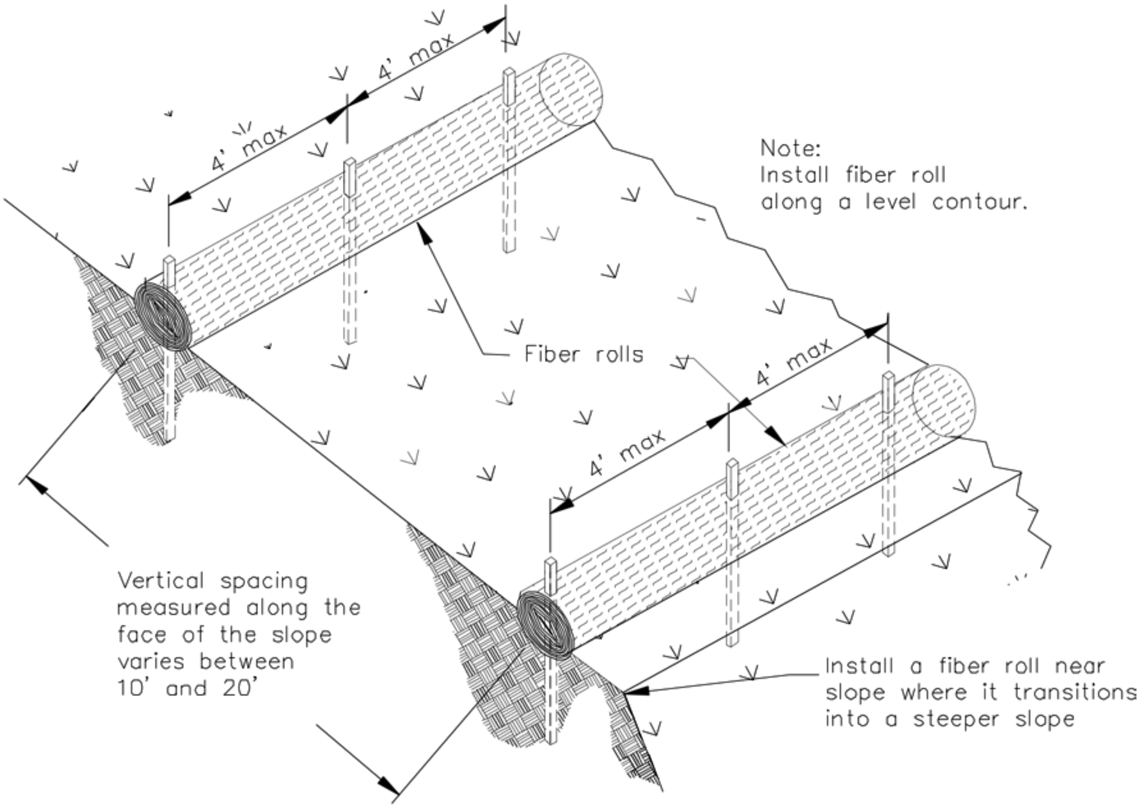
- Repair or replace split, torn, unraveling, or slumping fiber rolls.

- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-half the designated sediment storage depth, usually one-half the distance between the top of the fiber roll and the adjacent ground surface. Sediment removed during maintenance may be incorporated into earthwork on the site of disposed at an appropriate location.

- If fiber rolls are used for erosion control, such as in a mini check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.

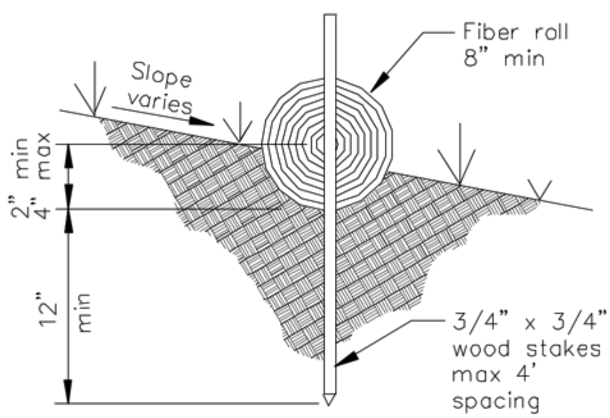
References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



TYPICAL FIBER ROLL INSTALLATION

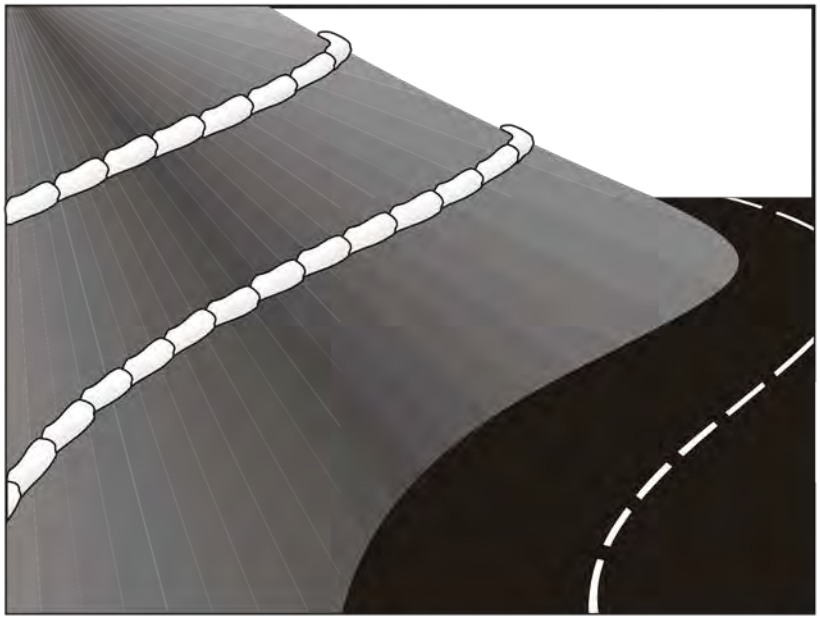
N.T.S.



ENTRENCHMENT DETAIL

N.T.S.

Gravel Bag Berm SE-6



Objectives

EC	Erosion Control	☒
SE	Sediment Control	☑
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

- Parallel to a roadway to keep sediment off paved areas
- Along streams and channels

④ As linear erosion control measure:

Sediment
Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics

Description and Purpose

A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flows, preventing erosion.

Suitable Applications

Gravel bag berms may be suitable:

④ As a linear sediment control measure:

- Below the toe of slopes and erodible slopes
- As sediment traps at culvert/pipe outlets
- Below other small cleared areas
- Along the perimeter of a site
- Down slope of exposed soil areas
- Around temporary stockpiles and spoil areas

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Roll

SE-8 Sandbag Barrier

SE-9 Straw Bale Barrier

SE-6 Gravel Bag Berm

- Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow

- At the top of slopes to divert runoff away from disturbed slopes

- As check dams across mildly sloped construction roads

Limitations

- Gravel berms may be difficult to remove.
- Removal problems limit their usefulness in landscaped areas.
- Gravel bag berm may not be appropriate for drainage areas greater than 5 acres.
- Runoff will pond upstream of the filter, possibly causing flooding if sufficient space does not exist.
- Degraded gravel bags may rupture when removed, spilling contents.
- Installation can be labor intensive.
- Berms may have limited durability for long-term projects.
- When used to detain concentrated flows, maintenance requirements increase.

Implementation

General

A gravel bag berm consists of a row of open graded gravel–filled bags placed on a level contour. When appropriately placed, a gravel bag berm intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. The open graded gravel in the bags is porous, which allows the ponded runoff to flow slowly through the bags, releasing the runoff as sheet flows. Gravel bag berms also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils. Gravel bag berms are similar to sand bag barriers, but are more porous.

Design and Layout

- Locate gravel bag berms on level contours.

  - Slopes between 20:1 and 2:1 (H:V): Gravel bags should be placed at a maximum interval of 50 ft (a closer spacing is more effective), with the first row near the slope toe.

  - Slopes 2:1 (H:V) or steeper: Gravel bags should be placed at a maximum interval of 25 ft (a closer spacing is more effective), with the first row placed the slope toe.

- Turn the ends of the gravel bag barriers up slope to prevent runoff from going around the berm.

- Allow sufficient space up slope from the gravel bag berm to allow ponding, and to provide room for sediment storage.

- For installation near the toe of the slope, consider moving the gravel bag barriers away from the slope toe to facilitate cleaning. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.

- Drainage area should not exceed 5 acres.

- In Non-Traffic Areas:

  - Height = 18 in. maximum

  - Top width = 24 in. minimum for three or more layer construction

  - Top width = 12 in. minimum for one or two layer construction

  - Side slopes = 2:1 or flatter

- In Construction Traffic Areas:

  - Height = 12 in. maximum

  - Top width = 24 in. minimum for three or more layer construction.

  - Top width = 12 in. minimum for one or two layer construction.

  - Side slopes = 2:1 or flatter.

- Butt ends of bags tightly

- On multiple row, or multiple layer construction, overlapp butt joints of adjacent row and row beneath.

- Use a pyramid approach when stacking bags.

Materials

- ***Bag Material:*** Bags should be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight of 4 ounces/yd^2, Mullen burst strength exceeding 300 lb/in^2 in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.

- ***Bag Size:*** Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.

- ***Fill Material:*** Fill material should be 0.5 to 1 in. Class 2 aggregate base, clean and free from clay, organic matter, and other deleterious material, or other suitable open graded, non-cohesive, porous gravel.

Costs

Gravel filter: Expensive, since off-site materials, hand construction, and demolition/removal are usually required. Material costs for gravel bags are average of \$2.50 per empty gravel bag. Gravel costs range from \$20-\$35 per yd^3.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.

- Reshape or replace gravel bags as needed.

- Repair washouts or other damage as needed.

- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.

- Remove gravel bag berms when no longer needed. Remove sediment accumulation and clean, re-grade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of.

References

Handbook of Steel Drainage and Highway Construction, American Iron and Steel Institute, 1983.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Pollution Plan Handbook, First Edition, State of California, Department of Transportation Division of New Technology, Materials and Research, October 1992.

Street Sweeping and Vacuuming SE-7

Objectives

EC	Erosion Control	
SE	Sediment Control	☒
TR	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents

- Visible sediment tracking should be swept or vacuumed on a daily basis.

Sediment	▤
Nutrients	
Trash	▤
Metals	
Bacteria	
Oil and Grease	▤
Organics	

Potential Alternatives

None

Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused, and perhaps save money.
- Inspect potential sediment tracking locations daily.

SE-7 Street Sweeping and Vacuuming

- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.

- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from $58/hour (3 yd^3 hopper) to $88/hour (9 yd^3 hopper), plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- When actively in use, points of ingress and egress must be inspected daily.

- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.

- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.

- Adjust brooms frequently; maximize efficiency of sweeping operations.

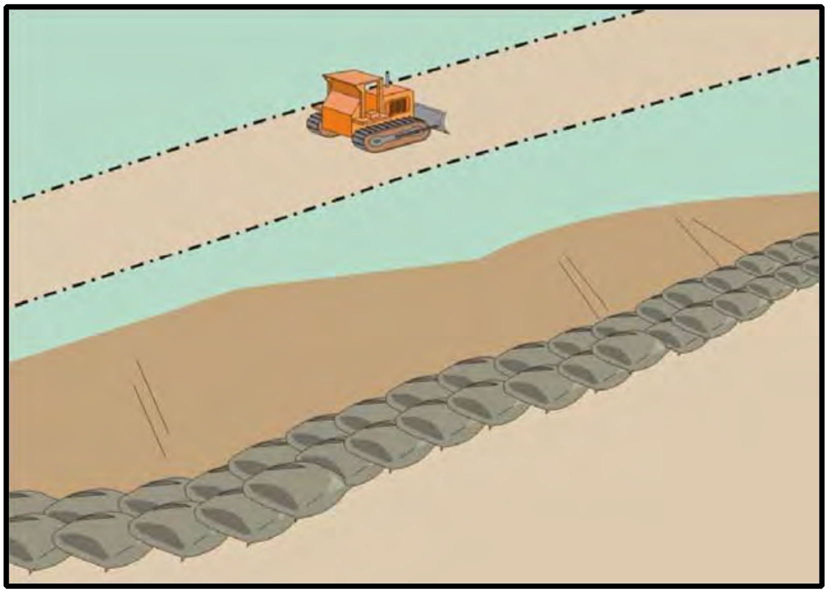
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Labor Surcharge and Equipment Rental Rates, State of California Department of Transportation (Caltrans), April 1, 2002 – March 31, 2003.

Sandbag Barrier SE-8



Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-9 Straw Bale Barrier

Description and Purpose

A sandbag barrier is a series of sand-filled bags placed on a level contour to intercept sheet flows. Sandbag barriers pond sheet flow runoff, allowing sediment to settle out.

Suitable Applications

Sandbag barriers may be suitable:

④ As a linear sediment control measure:

- Below the toe of slopes and erodible slopes
- As sediment traps at culvert/pipe outlets
- Below other small cleared areas
- Along the perimeter of a site
- Down slope of exposed soil areas
- Around temporary stockpiles and spoil areas
- Parallel to a roadway to keep sediment off paved areas
- Along streams and channels ④ As linear erosion control measure:

Sediment

- Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
- At the top of slopes to divert runoff away from disturbed slopes
- As check dams across mildly sloped construction roads

Limitations

- It is necessary to limit the drainage area upstream of the barrier to 5 acres.
- Degraded sandbags may rupture when removed, spilling sand.
- Installation can be labor intensive.
- Barriers may have limited durability for long-term projects.
- When used to detain concentrated flows, maintenance requirements increase.
- Burlap should not be used for sandbags.

Implementation

General

A sandbag barrier consists of a row of sand-filled bags placed on a level contour. When appropriately placed, a sandbag barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. While the sand-filled bags are porous, the fine sand tends to quickly plug with sediment, limiting the rate of flow through the barrier. If a porous barrier is desired, consider SE-1, Silt Fence, SE-5, Fiber Rolls, SE-6, Gravel Bag Berms, or SE-9, Straw Bale Barriers. Sandbag barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets which erode rills, and ultimately gullies, into disturbed, sloped soils. Sandbag barriers are similar to ground bag berms, but less porous.

Design and Layout

- Locate sandbag barriers on a level contour.
  - Slopes between 20:1 and 2:1 (H:V): Sandbags should be placed at a maximum interval of 50 ft (a closer spacing is more effective), with the first row near the slope toe.
  - Slopes 2:1 (H:V) or steeper: Sandbags should be placed at a maximum interval of 25 ft (a closer spacing is more effective), with the first row placed near the slope toe.
- Turn the ends of the sandbag barrier up slope to prevent runoff from going around the barrier.
- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, consider moving the barrier away from the slope toe to facilitate cleaning. To prevent flow behind the barrier, sandbags can be placed perpendicular to the barrier to serve as cross barriers.

- Drainage area should not exceed 5 acres.
- Stack sandbags at least three bags high.
- Butt ends of bags tightly.
- Overlapp butt joints of row beneath with each successive row.
- Use a pyramid approach when stacking bags.
- In non-traffic areas
  - Height = 18 in. maximum
  - Top width = 24 in. minimum for three or more layer construction
  - Side slope = 2:1 or flatter
- In construction traffic areas
  - Height = 12 in. maximum
  - Top width = 24 in. minimum for three or more layer construction.
  - Side slopes = 2:1 or flatter.

Materials

- ***Sandbag Material:*** Sandbag should be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight of 4 ounces/yd^2, Mullen burst strength exceeding 300 lb/in^2 in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355. Use of burlap may not acceptable in some jurisdictions.

- ***Sandbag Size:*** Each sand-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.

- ***Fill Material:*** All sandbag fill material should be non-cohesive, Class 1 or Class 2 permeable material free from clay and deleterious material.

Costs

Sandbag barriers are more costly, but typically have a longer useful life than other barriers. Empty sandbags cost $0.25 - $0.75. Average cost of fill material is $8 per yd^3. Pre-filled sandbags are more expensive at $1.50 - $2.00 per bag.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- Sandbags exposed to sunlight will need to be replaced every two to three months due to degradation of the bags.

- Reshape or replace sandbags as needed.

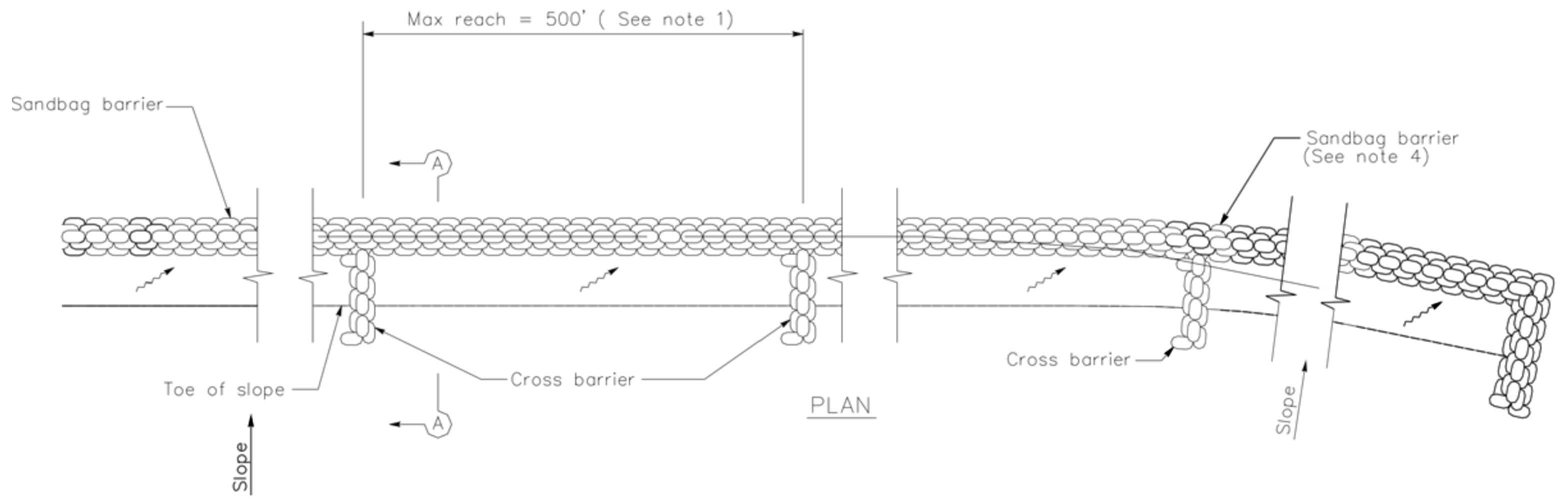
- Repair washouts or other damage as needed.

- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.

- Remove sandbags when no longer needed. Remove sediment accumulation, and clean, regrade, and stabilize the area.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

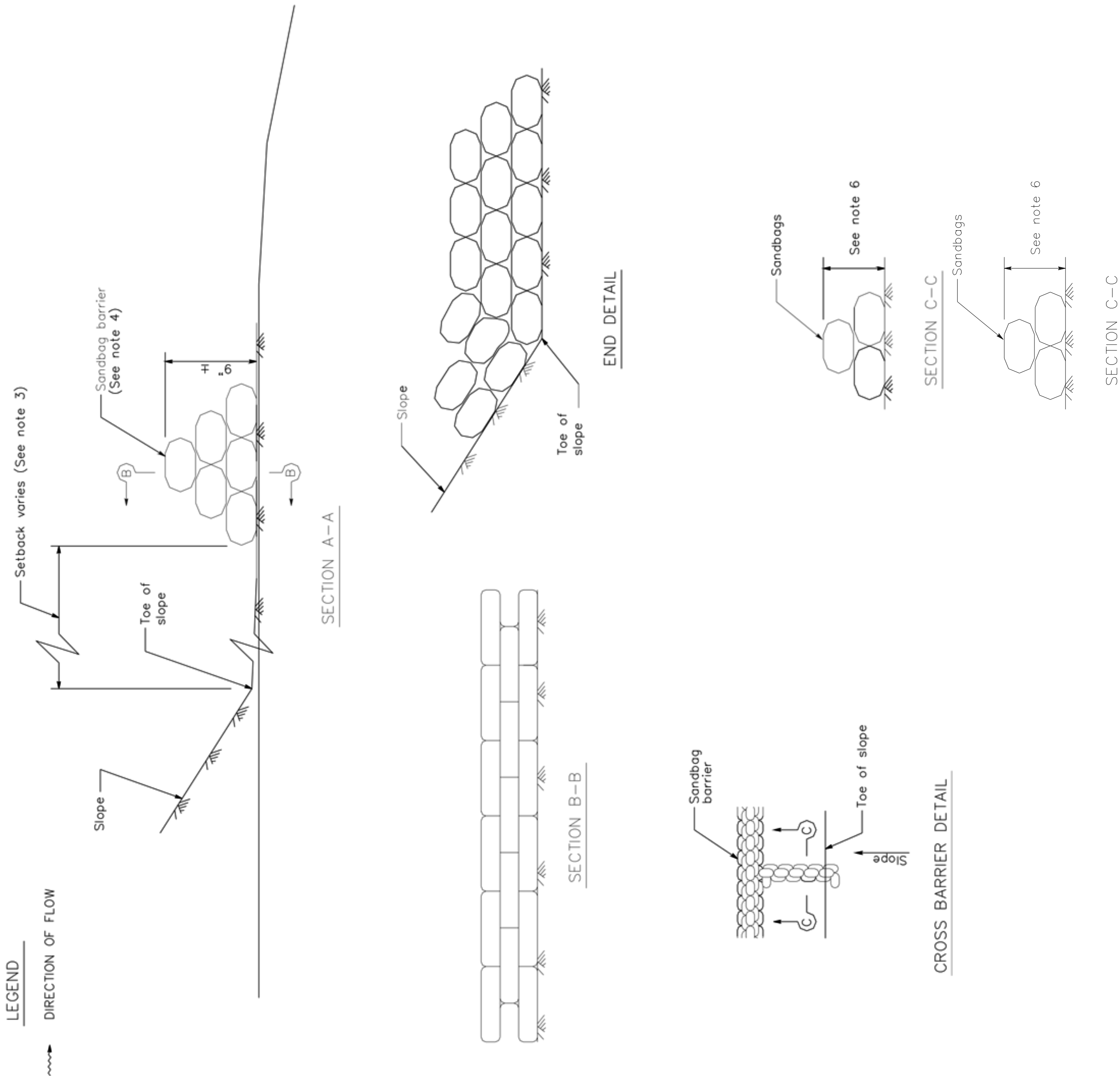


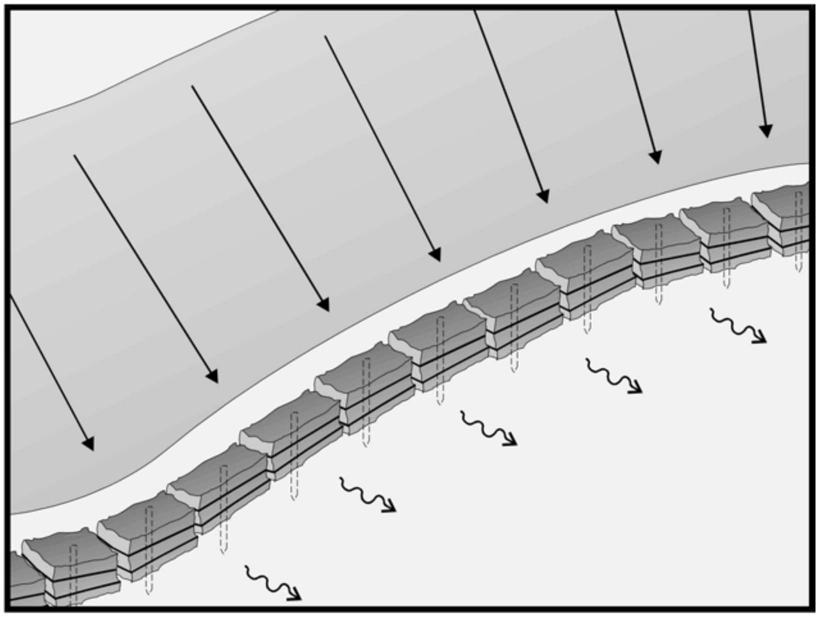
SANDBAG BARRIER

NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 500'.
2. Place sandbags tightly.
3. Dimension may vary to fit field condition.
4. Sandbag barrier shall be a minimum of 3 bags high.
5. The end of the barrier shall be turned up slope.
6. Cross barriers shall be a min of 1/2 and a max of 2/3 the height of the linear barrier.
7. Sandbag rows and layers shall be staggered to eliminate gaps.

SANDBAG BARRIER


Setback varies (See note 3)
Sandbag barrier (See note 4)
9" ±
Toe of slope
Slope
B
SECTION A-A
Slope
Toe of slope
END DETAIL
SECTION B-B
Sandbags
See note 6
SECTION C-C
Sandbags
See note 6
SECTION C-C
Sandbag barrier
Toe of slope
Slope
C
CROSS BARRIER DETAIL
LEGEND
DIRECTION OF FLOW



SE	Sediment Control	Primary
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

Primary Objective

Secondary Objective

Description and Purpose

A straw bale barrier is a series of straw bales placed on a level contour to intercept sheet flows. Straw bale barriers pond sheet- flow runoff, allowing sediment to settle out.

Suitable Applications

Straw bale barriers may be suitable:

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes
  - As sediment traps at culvert/pipe outlets
  - Below other small cleared areas
  - Along the perimeter of a site
  - Down slope of exposed soil areas
  - Around temporary stockpiles and spoil areas
  - Parallel to a roadway to keep sediment off paved areas
  - Along streams and channels

Targeted Constituents

Sediment	Primary
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

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CALIFORNIA STORMWATER QUALITY ASSOCIATION

Objectives

EC	Erosion Control	Secondary

- As linear erosion control measure:

- Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow

- At the top of slopes to divert runoff away from disturbed slopes

- As check dams across mildly sloped construction roads

Limitations

Straw bale barriers:

- Are not to be used for extended periods of time because they tend to rot and fall apart
- Are suitable only for sheet flow on slopes of 10 % or flatter
- Are not appropriate for large drainage areas, limit to one acre or less
- May require constant maintenance due to rotting
- Are not recommended for concentrated flow, inlet protection, channel flow, and live streams
- Cannot be made of bale bindings of jute or cotton
- Require labor-intensive installation and maintenance
- Cannot be used on paved surfaces
- Should not to be used for drain inlet protection
- Should not be used on lined ditches
- May introduce undesirable non-native plants to the area

Implementation

General

A straw bale barrier consists of a row of straw bales placed on a level contour. When appropriately placed, a straw bale barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. Straw bale barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils.

Straw bale barriers have not been as effective as expected due to improper use. These barriers have been placed in streams and drainage ways where runoff volumes and velocities have caused the barriers to wash out. In addition, failure to stake and entrench the straw bale has allowed undercutting and end flow. Use of straw bale barriers in accordance with this BMP should produce acceptable results.

Design and Layout

- Locate straw bale barriers on a level contour.

  - Slopes up to 10:1 (H:V): Straw bales should be placed at a maximum interval of 50 ft (a closer spacing is more effective), with the first row near the toe of slope.

- Slopes greater than 10:1 (H:V): Not recommended.

- Turn the ends of the straw bale barrier up slope to prevent runoff from going around the barrier.

- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.

- For installation near the toe of the slope, consider moving the barrier away from the slope toe to facilitate cleaning. To prevent flow behind the barrier, sand bags can be placed perpendicular to the barrier to serve as cross barriers.

- Drainage area should not exceed 1 acre, or 0.25 acre per 100 ft of barrier.

- Maximum flow path to the barrier should be limited to 100 ft.

- Straw bale barriers should consist of two parallel rows.

  - Butt ends of bales tightly

  - Stagger butt joints between front and back row

  - Each row of bales must be trenched in and firmly staked

- Straw bale barriers are limited in height to one bale laid on its side.

- Anchor bales with either two wood stakes or four bars driven through the bale and into the soil. Drive the first stake towards the butt joint with the adjacent bale to force the bales together.

- See attached figure for installation details.

Materials

- ***Straw Bale Size:*** Each straw bale should be a minimum of 14 in. wide, 18 in. in height, 36 in. in length and should have a minimum mass of 50 lbs. The straw bale should be composed entirely of vegetative matter, except for the binding material.

- ***Bale Bindings:*** Bales should be bound by steel wire, nylon or polypropylene string placed horizontally. Jute and cotton binding should not be used. Baling wire should be a minimum diameter of 14 gauge. Nylon or polypropylene string should be approximately 12 gauge in diameter with a breaking strength of 80 lbs force.

- ***Stakes:*** Wood stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake, or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable. Steel bar reinforcement should be equal to a #4 designation or greater. End protection should be provided for any exposed bar reinforcement.

Costs
Straw bales cost $5 - $7 each. Adequate labor should be budgeted for installation and maintenance.

Inspection and Maintenance

Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- Straw bales degrade, especially when exposed to moisture. Rotting bales will need to be replaced on a regular basis.

- Replace or repair damaged bales as needed.

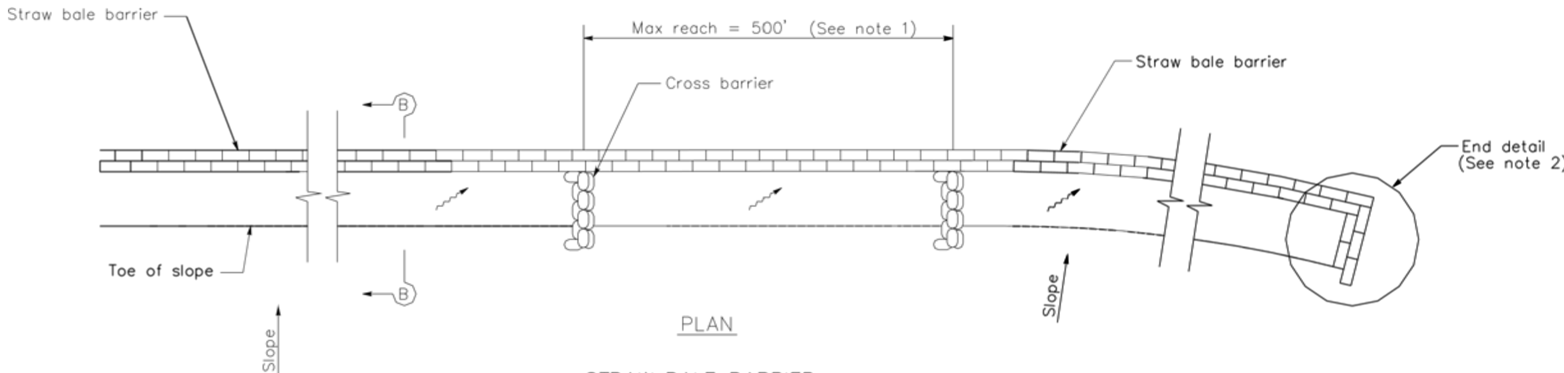
- Repair washouts or other damages as needed.

- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.

- Remove straw bales when no longer needed. Remove sediment accumulation, and clean, regrade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



PLAN

STRAW BALE BARRIER

NOTES

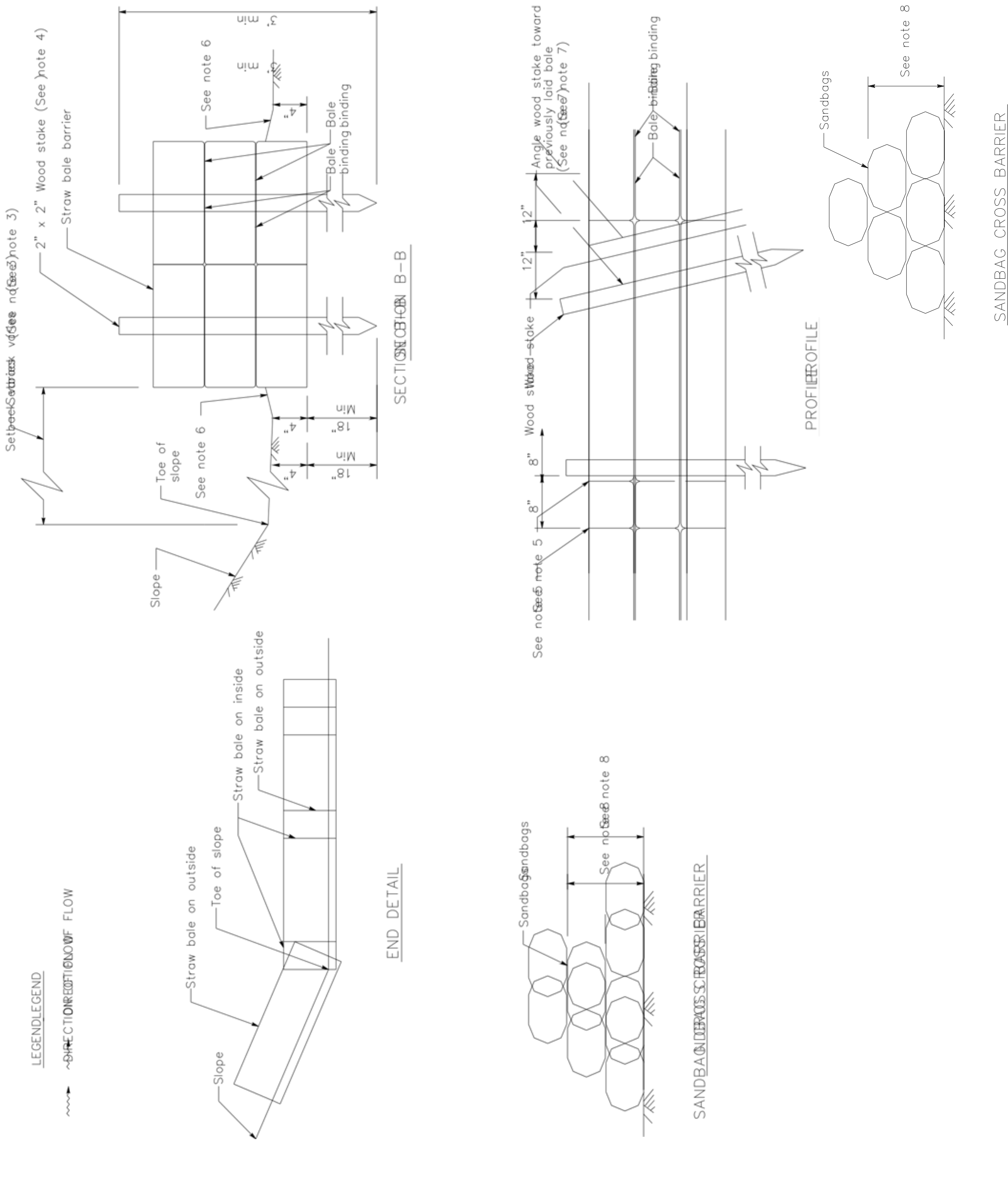
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 500'.
2. The end of barrier shall be turned up slope.
3. Dimension may vary to fit field condition.
4. Stake dimensions are nominal.
5. Place straw bales tightly together.
6. Tamp embedment spoils against sides of installed bales.
7. Drive angled wood stake before vertical stake to ensure tight abutment to adjacent bale.
8. Sandbag cross barriers should be a min of 1/2 and a max of 2/3 the height of the linear barrier.
9. Sandbag rows and layers should be offset to eliminate gaps.

LEGEND

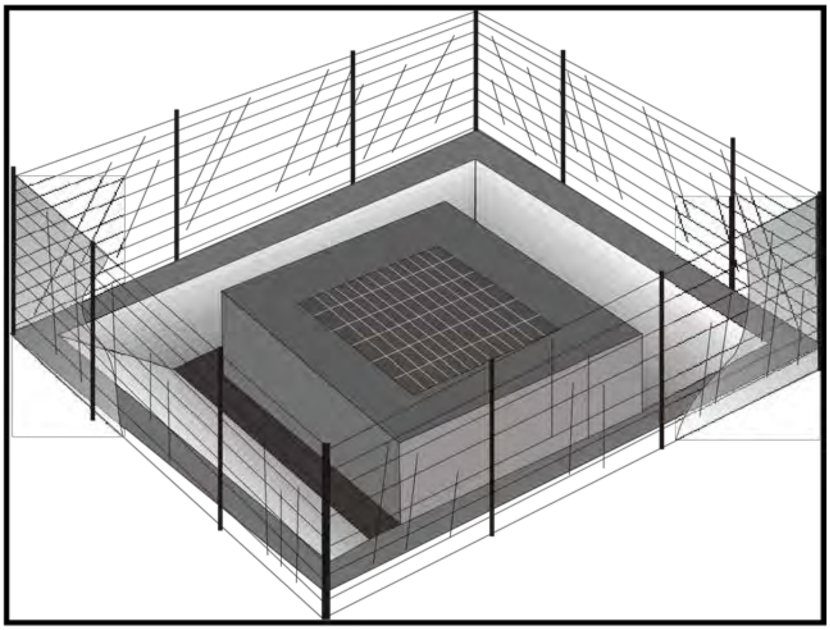
DIRECTION OF FLOW

LEGEND

DIRECTION OF FLOW


2" x 2" Wood stake (See note 4)
Straw bale barrier
Setback varies (See note 3)
Bale binding
See note 6
6" min
3" min
4"
18" Min
Toe of slope
Slope
SECTION B-B
Angle wood stake toward previously laid bale (See note 7)
Bale binding
12"
8"
Wood stake
See note 5
PROFILE
Sandbags
See note 8
SANDBAG CROSS BARRIER
Straw bale on inside
Straw bale on outside
Toe of slope
Slope
END DETAIL
LEGEND
DIRECTION OF FLOW
Sandbags
See note 8
SANDBAG CROSS BARRIER

Storm Drain Inlet Protection SE-10



Description and Purpose

Storm drain inlet protection consists of a sediment filter or an impounding area around or upstream of a storm drain, drop inlet, or curb inlet. Storm drain inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Some filter configurations also remove sediment by filtering, but usually the ponding action results in the greatest sediment reduction.

Suitable Applications

Every storm drain inlet receiving sediment-laden runoff should be protected.

Limitations

- Drainage area should not exceed 1 acre.
- Straw bales, while potentially effective, have not produced in practice satisfactory results, primarily due to improper installation.
- Requires an adequate area for water to pond without encroaching into portions of the roadway subject to traffic.
- Inlet protection usually requires other methods of temporary protection to prevent sediment-laden stormwater and non-stormwater discharges from entering the storm drain system.

Objectives

EC	Erosion Control
SE	Sediment Control
TR	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

Sediment
Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics

Potential Alternatives

SE-1 Silt Fence
SE-5 Fiber Rolls
SE-6 Gravel Bag Berm
SE-8 Sandbag Barrier
SE-9 Straw Bale Barrier

- Sediment removal may be difficult in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use other onsite sediment trapping techniques in conjunction with inlet protection.

- Frequent maintenance is required.

- For drainage areas larger than 1 acre, runoff should be routed to a sediment-trapping device designed for larger flows. See BMPs SE-2, Sediment Basin, and SE-3, Sediment Traps.

- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected, and overflow capability is needed.

Implementation

General

Large amounts of sediment may enter the storm drain system when storm drains are installed before the upslope drainage area is stabilized, or where construction is adjacent to an existing storm drain. In cases of extreme sediment loading, the storm drain itself may clog and lose a major portion of its capacity. To avoid these problems, it is necessary to prevent sediment from entering the system at the inlets.

Inlet control measures presented in this handbook should not be used for inlets draining more than one acre. Runoff from larger disturbed areas should be first routed through SE-2, Sediment Basin or SE-3, Sediment Trap. Different types of inlet protection are appropriate for different applications depending on site conditions and the type of inlet. Inlet protection methods not presented in this handbook should be approved by the local stormwater management agency.

Design and Layout

Identify existing and planned storm drain inlets that have the potential to receive sedimentladen surface runoff. Determine if storm drain inlet protection is needed and which method to use.

- Limit upstream drainage area to 1 acre maximum. For larger drainage areas, use SE-2, Sediment Basin, or SE-3, Sediment Trap, upstream of the inlet protection device.

- The key to successful and safe use of storm drain inlet protection devices is to know where runoff will pond or be diverted.

  - Determine the acceptable location and extent of ponding in the vicinity of the drain inlet. The acceptable location and extent of ponding will influence the type and design of the storm drain inlet protection device.

  - Determine the extent of potential runoff diversion caused by the storm drain inlet protection device. Runoff ponded by inlet protection devices may flow around the device and towards the next downstream inlet. In some cases, this is acceptable; in other cases, serious erosion or downstream property damage can be caused by these diversions. The possibility of runoff diversions will influence whether or not storm drain inlet protection is suitable; and, if suitable, the type and design of the device.

- The location and extent of ponding, and the extent of diversion, can usually be controlled through appropriate placement of the inlet protection device. In some cases, moving the inlet protection device a short distance upstream of the actual inlet can provide more efficient sediment control, limit ponding to desired areas, and prevent or control diversions.

- Four types of inlet protection are presented below. However, it is recognized that other effective methods and proprietary devices exist and may be selected.

  - Filter Fabric Fence: Appropriate for drainage basins with less than a 5% slope, sheet flows, and flows under 0.5 cfs.

  - Excavated Drop Inlet Sediment Trap: An excavated area around the inlet to trap sediment (SE-3).

  - Gravel bag barrier: Used to create a small sediment trap upstream of inlets on sloped, paved streets. Appropriate for sheet flow or when concentrated flow may exceed 0.5 cfs, and where overtopping is required to prevent flooding.

  - Block and Gravel Filter: Appropriate for flows greater than 0.5 cfs.

- Select the appropriate type of inlet protection and design as referred to or as described in this fact sheet.

- Provide area around the inlet for water to pond without flooding structures and property.

- Grates and spaces around all inlets should be sealed to prevent seepage of sediment-laden water.

- Excavate sediment sumps (where needed) 1 to 2 ft with 2:1 side slopes around the inlet.

Installation

- ***DI Protection Type 1 - Filter Fabric Fence -*** The filter fabric fence (Type 1) protection is shown in the attached figure. Similar to constructing a silt fence; see BMP SE-1, Silt Fence. Do not place filter fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced.

  1. Excavate a trench approximately 6 in. wide and 6 in. deep along the line of the silt fence inlet protection device.

  2. Place 2 in. by 2 in. wooden stakes around the perimeter of the inlet a maximum of 3 ft apart and drive them at least 18 in. into the ground or 12 in. below the bottom of the trench. The stakes must be at least 48 in.

  3. Lay fabric along bottom of trench, up side of trench, and then up stakes. See SE-1, Silt Fence, for details. The maximum silt fence height around the inlet is 24 in.

  4. Staple the filter fabric (for materials and specifications, see SE-1, Silt Fence) to wooden stakes. Use heavy-duty wire staples at least 1 in. in length.

  5. Backfill the trench with gravel or compacted earth all the way around.

- ***DI Protection Type 2 - Excavated Drop Inlet Sediment Trap -*** The excavated drop inlet sediment trap (Type 2) is shown in the attached figures. Install filter fabric fence in accordance with DI Protection Type 1. Size excavated trap to provide a minimum storage capacity calculated at the rate 67 yd^3/acre of drainage area.

- ***DI Protection Type 3 - Gravel bag -*** The gravel bag barrier (Type 3) is shown in the figures. Flow from a severe storm should not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with SE-6, Gravel Bag Berm. Gravel bags should be used due to their high permeability.

  1. Use sand bag made of geotextile fabric (not burlap) and fill with 0.75 in. rock or 0.25 in. pea gravel.

  2. Construct on gently sloping street.

  3. Leave room upstream of barrier for water to pond and sediment to settle.

  4. Place several layers of sand bags – overlapping the bags and packing them tightly together.

  5. Leave gap of one bag on the top row to serve as a spillway. Flow from a severe storm (e.g., 10 year storm) should not overtop the curb.

- ***DI Protection Type 4 – Block and Gravel Filter -*** The block and gravel filter (Type 4) is shown in the figures. Block and gravel filters are suitable for curb inlets commonly used in residential, commercial, and industrial construction.

  1. Place hardware cloth or comparable wire mesh with 0.5 in. openings over the drop inlet so that the wire extends a minimum of 1 ft beyond each side of the inlet structure. If more than one strip is necessary, overlap the strips. Place filter fabric over the wire mesh.

  2. Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, so that the open ends face outward, not upward. The ends of adjacent blocks should abut. The height of the barrier can be varied, depending on design needs, by stacking combinations of blocks that are 4 in., 8 in., and 12 in. wide. The row of blocks should be at least 12 in. but no greater than 24 in. high.

  3. Place wire mesh over the outside vertical face (open end) of the concrete blocks to prevent stone from being washed through the blocks. Use hardware cloth or comparable wire mesh with 0.5 in. opening.

  4. Pile washed stone against the wire mesh to the top of the blocks. Use 0.75 to 3 in.

Costs

- Average annual cost for installation and maintenance (one year useful life) is $200 per inlet.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- Filter Fabric Fences. If the fabric becomes clogged, torn, or degrades, it should be replaced. Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes.

- Gravel Filters. If the gravel becomes clogged with sediment, it must be carefully removed from the inlet and either cleaned or replaced. Since cleaning gravel at a construction site may be difficult, consider using the sediment-laden stone as fill material and put fresh stone around the inlet. Inspect bags for holes, gashes, and snags, and replace bags as needed. Check gravel bags for proper arrangement and displacement.

- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site ore disposed at an appropriate location.

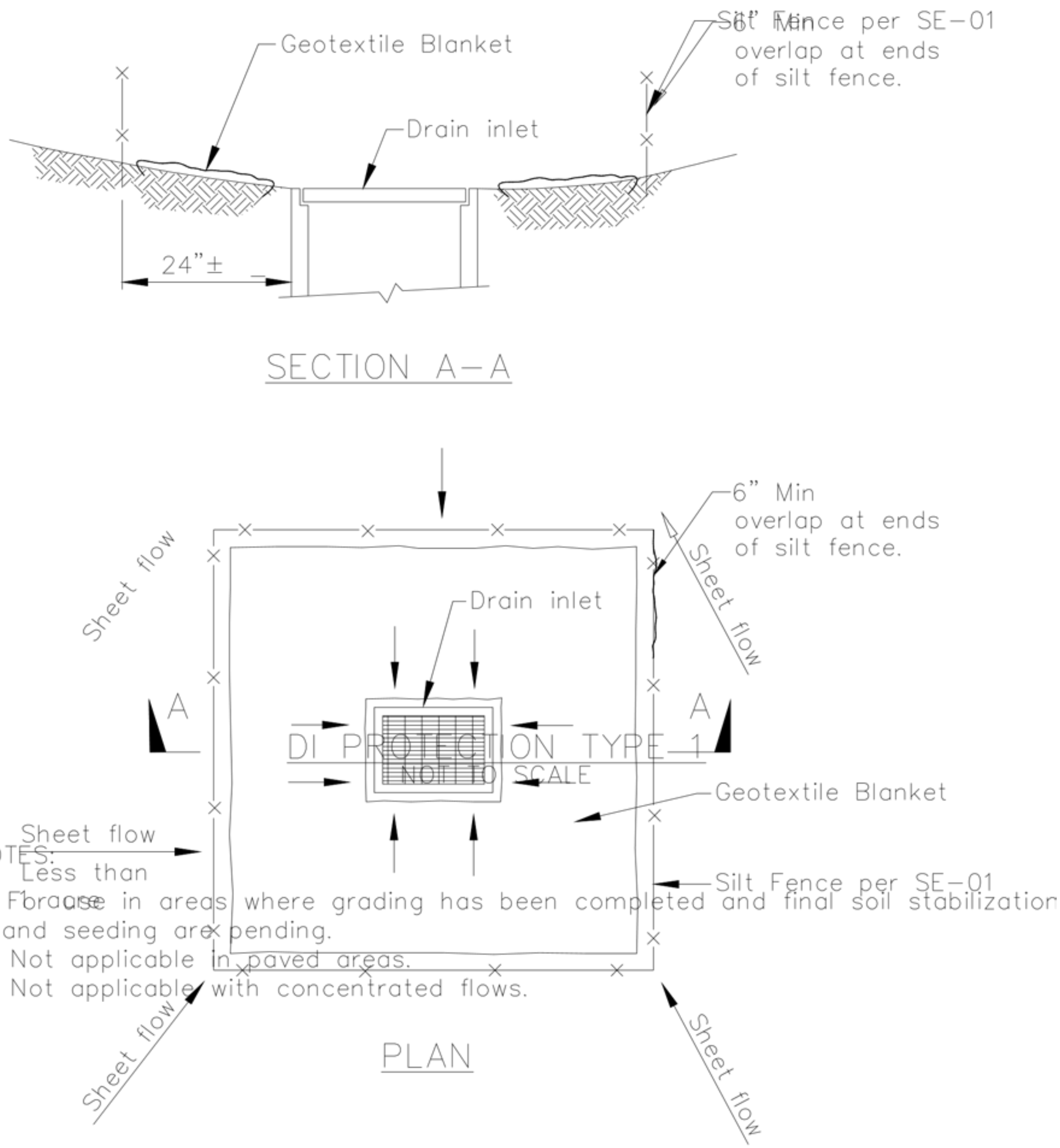
- Remove storm drain inlet protection once the drainage area is stabilized.

    - Clean and regrade area around the inlet and clean the inside of the storm drain inlet as it must be free of sediment and debris at the time of final inspection.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

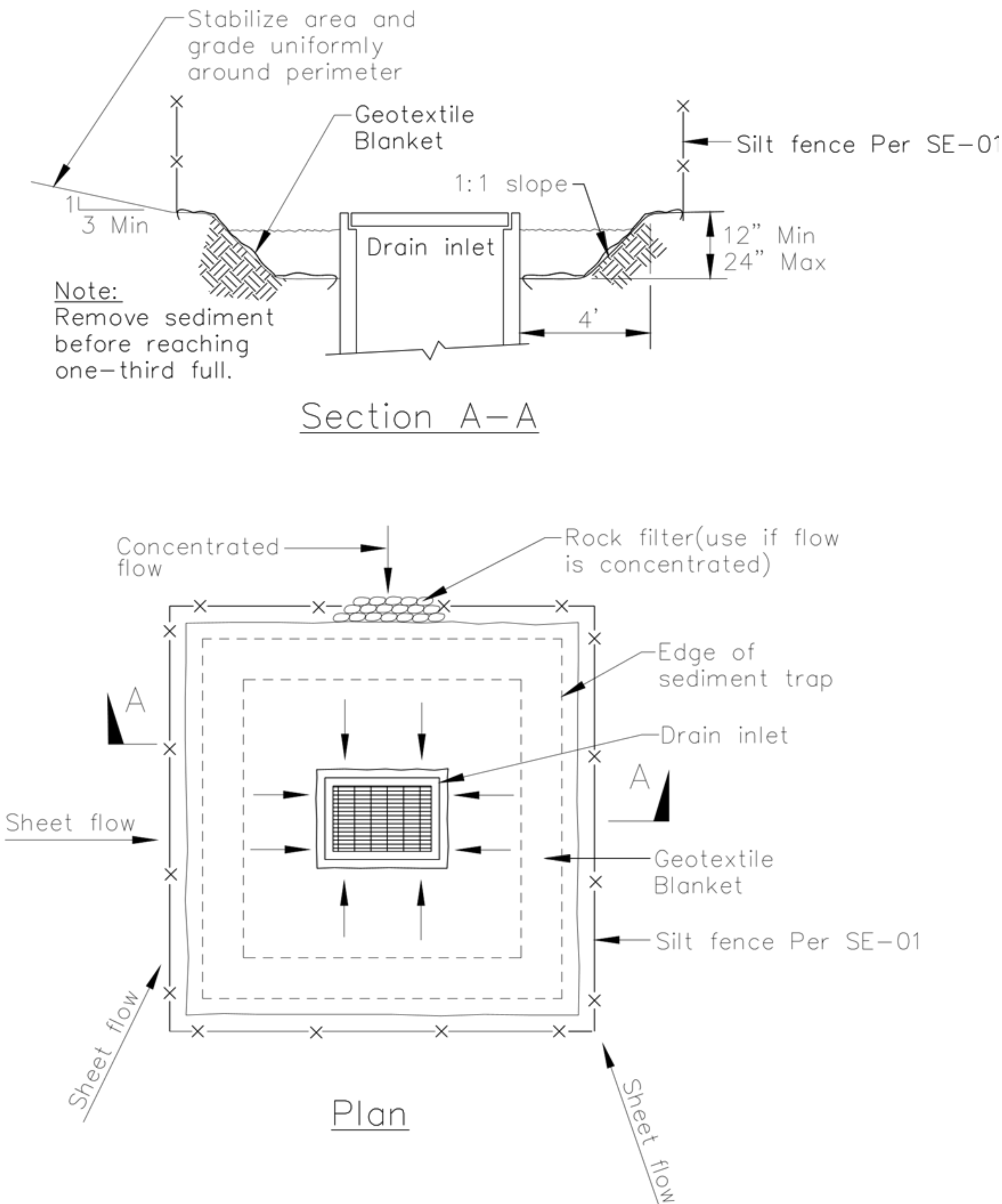
Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.



DI PROTECTION TYPE 1
NOT TO SCALE

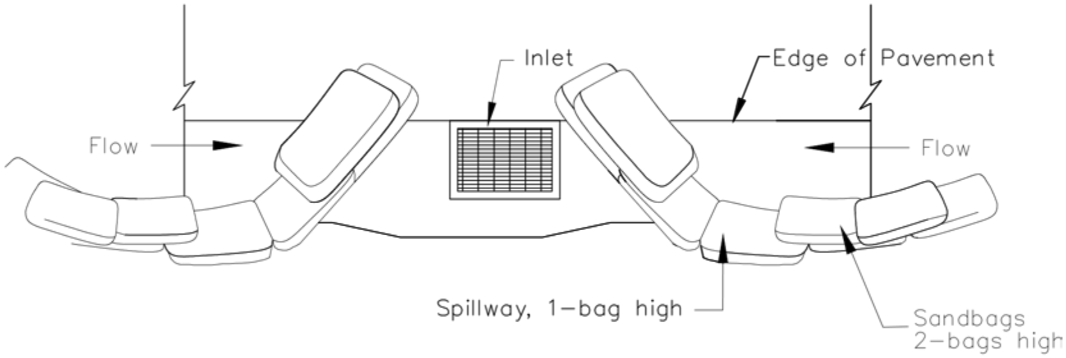
NOTES:

1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not a

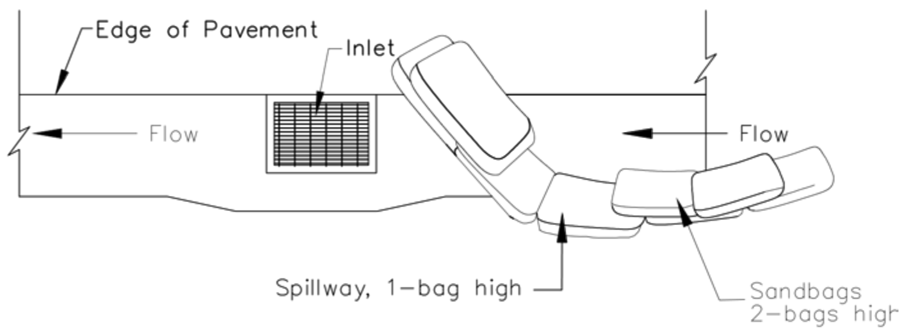


DI PROTECTION TYPE 2
NOT TO SCALE

Notes
1. For use in cleared and grubbed and in graded areas.
2. Shape basin so that longest inflow area faces longest length of trap.
3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.



TYPICAL PROTECTION FOR INLET ON SUMP

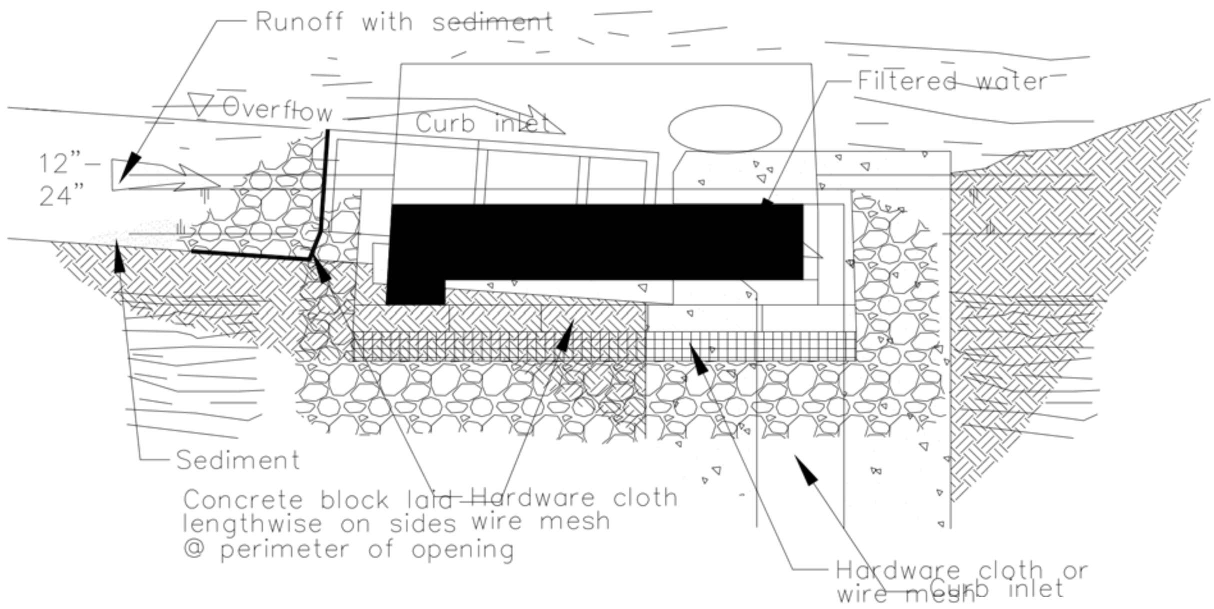


TYPICAL PROTECTION FOR INLET ON GRADE

NOTES:

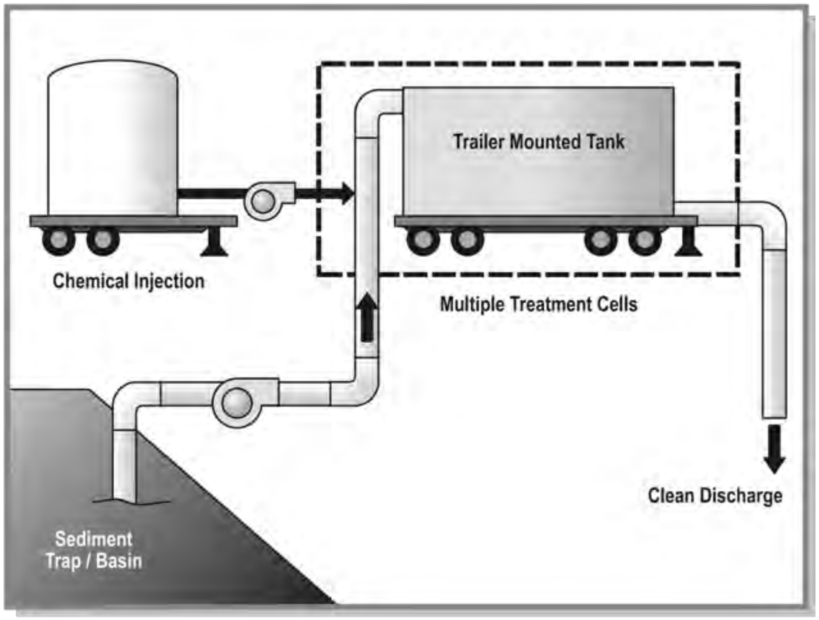
1. Intended for short–term use.
2. Use to inhibit non–storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed
5. Not applicable in areas with high silts and clays without filter fabric.

DI PROTECTION TYPE 3
NOT TO SCALE



DI PROTECTION – TYPE 4
NOT TO SCALE

DI PROTECTION – TYPE 4
NOT TO SCALE



Objectives

EC	Erosion Control
SE	Sediment Control
TR	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

Sediment	Primary
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Chemical treatment includes the application of chemicals to stormwater to aid in the reduction of turbidity caused by fine suspended sediment.

Suitable Applications

Chemical treatment can reliably provide exceptional reductions of turbidity and associated pollutants and should be considered where turbid discharges to sensitive wastes cannot be avoided using other BMPs. Typically, chemical use is limited to waters with numeric turbidity standards.

Limitations

The use of chemical treatment must have the advanced approval of the Regional Water Quality Control Board.

- Chemical Treatment of stormwater is relatively new and unproven technology in California.
- BMP has not been used often in California
- Petroleum based polymers should not be used
- Requires sediment basin or trailer mounted unit for chemical application

- Batch treatment required, flow through continuous treatment not allowed
- Requires large area
- Limited discharge rates depending on receiving water body
- Labor intensive operation and maintenance
- Requires monitoring for non-visible pollutants

Implementation

Turbidity is difficult to control once fine particles are suspended in stormwater runoff from a construction site. Sedimentation ponds are effective at removing larger particulate matter by gravity settling, but are ineffective at removing smaller particulates such as clay and fine silt. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm). Chemical treatment may be used to reduce the turbidity of stormwater runoff. Very high turbidities can be reduced to levels comparable to what is found in streams during dry weather.

Criteria for Chemical Treatment Product Use

Chemically treated stormwater discharged from construction sites must be non-toxic to aquatic organisms. The following protocol should be used to evaluate chemicals proposed for stormwater treatment at construction sites. Authorization to use a chemical in the field based on this protocol does not relieve the applicant from responsibility for meeting all discharge and receiving water criteria applicable to a site.

- Treatment chemicals must be approved by EPA for potable water use.
- Petroleum-based polymers are prohibited.
- Prior to authorization for field use, jar tests should be conducted to demonstrate that turbidity reduction necessary to meet the receiving water criteria could be achieved. Test conditions, including but not limited to raw water quality and jar test procedures, should be indicative of field conditions. Although these small-scale tests cannot be expected to reproduce performance under field conditions, they are indicative of treatment capability.
- Prior to authorization for field use, the chemically treated stormwater should be tested for aquatic toxicity. Applicable state or local Whole Effluent Toxicity Testing and Limits, should be used. Testing should use stormwater from the construction site at which the treatment chemical is proposed for use or a water solution using soil from the proposed site.
- The proposed maximum dosage should be at least a factor of five lower than the no observed effects concentration (NOEC).
- The approval of a proposed treatment chemical should be conditional, subject to full-scale bioassay monitoring of treated stormwater at the construction site where the proposed treatment chemical is to be used.

- Treatment chemicals that have already passed the above testing protocol do not need to be reevaluated. Contact the RWQCB for a list of treatment chemicals that may be approved for use.

Treatment System Design Considerations

The design and operation of a chemical treatment system should take into consideration the factors that determine optimum, cost-effective performance. It may not be possible to fully incorporate all of the classic concepts into the design because of practical limitations at construction sites. Nonetheless, it is important to recognize the following:

- The right chemical must be used at the right dosage. A dosage that is either too low or too high will not produce the lowest turbidity. There is an optimum dosage rate. This is a situation where the adage "adding more is always better" is not the case.

- The coagulant must be mixed rapidly into the water to insure proper dispersion.

- Experience has found that sufficient flocculation occurs in the pipe leading from the point of chemical addition to the settling or sediment basin.

- Since the volume of the basin is a determinant in the amount of energy per unit volume, the size of the energy input system can be too small relative to the volume of the basin.

- Care must be taken in the design of the withdrawal system to minimize outflow velocities and to prevent floc discharge. The discharge should be directed through a physical filter such as vegetated swale that would catch any unintended floc discharge.

- A pH-adjusting chemical should be added into the sediment basin to control pH. Experience shows that the most common problem is low pH.

Treatment System Design

Chemical treatment systems should be designed as batch treatment systems using either ponds or portable trailer-mounted tanks. Flow-through continuous treatment systems are not allowed at this time.

A chemical treatment system consists of the stormwater collection system (either temporary diversion or the permanent site drainage system), a sediment basin or sediment trap, pumps, a chemical feed system, treatment cells, and interconnecting piping.

The treatment system should use a minimum of two lined treatment cells. Multiple treatment cells allow for clarification of treated water while other cells are being filled or emptied. Treatment cells may be basins, traps or tanks. Portable tanks may also be suitable for some sites.

The following equipment should be located in an operation shed:

- The chemical injector

- Secondary contaminant for acid, caustic, buffering compound, and treatment chemical

- Emergency shower and eyewash

- Monitoring equipment which consists of a pH meter and a turbidimeter

Sizing Criteria

The combination of the sediment basin or other holding area and treatment capacity should be large enough to treat stormwater during multiple day storm events. See SE-2, Sediment Basin, for design criteria. Bypass should be provided around the chemical treatment system to accommodate extreme storm events. Runoff volume should be calculated using the Rational Method. Primary settling should be encouraged in the sediment basin/storage pond. A forebay with access for maintenance may be beneficial.

There are two opposing considerations in sizing the treatment cells. A larger cell is able to treat a larger volume of water each time a batch is processed. However, the larger the cell the longer the time required to empty the cell. A larger cell may also be less effective at flocculation and therefore require a longer settling time. The simplest approach to sizing the treatment cell is to multiply the allowable discharge flow rate times the desired drawdown time. A 4-hour drawdown time allows one batch per cell per 8-hour work period, given 1 hour of flocculation followed by 2 hours of settling.

The permissible discharge rate governed by potential downstream effect can be used to calculate the recommended size of the treatment cells. The following discharge flow rate limits apply absent any local requirements:

- If the discharge is direct or indirect to a stream, the discharge flow rate should not exceed 50 percent of the peak flow rate for all events between the 2-year and the 10-year, 24-hour event.

- If discharge is occuring during a storm event equal to or greater than the 10-year storm the allowable discharge rate is the peak flow rate of the 10-year, 24-hour event.

- Discharge to a stream should not increase the stream flow rate by more than 10 percent.

- If the discharge is directly to a lake or major receiving water there is no discharge flow limit.

- If the discharge is to a municipal storm drainage system, the allowable discharge rate may be limited by the capacity of the public system. It may be necessary to clean the municipal storm drainage system prior to the start of the discharge to prevent scouring solids from the drainage system.

- Runoff rates may be calculated using the Rational Method, unless another method is required by the local flood control agency or agency that issued the grading permit.

Costs

Costs for chemical treatment may be significant due to equipment required and cost of chemicals. The cost is offset by the ability to reduce some use of other onsite erosion control BMPs and the reuse of equipment (e.g., pumps and dosing equipment). The incremental cost is generally less than 1% of the total construction costs.

Inspection and Maintenance

Chemical treatment systems must be operated and maintained by individuals with expertise in their use. Chemical treatment systems should be monitored continuously while in use.

The following monitoring should be conducted. Test results should be recorded on a daily log kept on site.

Operational Monitoring

- pH conductivity (as a surrogate for alkalinity), turbidity, and temperature of the untreated stormwater
- Total volume treated and discharged
- Discharge time and flow rate
- Type and amount of chemical used for pH adjustment
- Amount of polymer used for treatment
- Settling time

Compliance Monitoring

- pH and turbidity of the treated stormwater
- pH and turbidity of the receiving water

Bio-monitoring

Treated stormwater should be tested for acute (lethal) toxicity. Bioassays should be conducted by a laboratory accredited by the State of California. **The performance standard for acute toxicity is no statistically significant difference in survival between the control and 100 percent chemically treated stormwater.**

Acute toxicity tests should be conducted with the following species and protocols:

- Fathead minnow, Pimephales promelas (96 hour static-renewal test, method: EPA/600/490/027F). Rainbow trout, Oncorhynchus mykiss (96 hour static-renewal test, method: EPA/600/4-90/027F) may be used as a substitute for fathead minnow.
- Daphnid, Ceriodaphnia dubia, Daphnia pulex, or Daphnia magna (48 hour static test, method: EPA/600/4-90/027F).

All toxicity tests should meet quality assurance criteria and test conditions in the most recent versions of the EPA test method.

Bioassays should be performed on the first five batches and on every tenth batch thereafter or as otherwise approved by the RWQCB. Failure to meet the performance standard should be immediately reported to the RWQCB.

Discharge Compliance:

Prior to discharge, each batch of treated stormwater must be sampled and tested for compliance with pH and turbidity limits. These limits may be established by the water quality standards or a site-specific discharge permit. Sampling and testing for other pollutants may also be necessary at some sites. Turbidity must be within 5 NTUs of the background turbidity. Background is measured in the receiving water, upstream from the treatment process discharge point. pH must be within the range of 6.5 to 8.5 standard units and not cause a change in the pH of the receiving water of more than 0.2 standard units. It is often possible to discharge treated stormwater that has a lower turbidity than the receiving water and that matches the pH.

Treated stormwater samples and measurements should be taken from the discharge pipe or another location representative of the nature of the treated stormwater discharge. Samples used for determining compliance with the water quality standards in the receiving water should not be taken from the treatment pond to decanting. Compliance with the water quality standards is determined in the receiving water.

Operator Training:
Each contractor who intends to use chemical treatment should be trained by an experienced contractor on an active site for at least 40 hours.

Standard BMPs:
Erosion and sediment control BMPs should be implemented throughout the site to prevent erosion and discharge of sediment. ***Sediment Removal and Disposal***

- Sediment should be removed from the storage or treatment cells as necessary. Typically, sediment removal is required at least once during a wet season and at the decommissioning of the cells. Sediment remaining in the cells between batches may enhance the settling process and reduce the required chemical dosage.

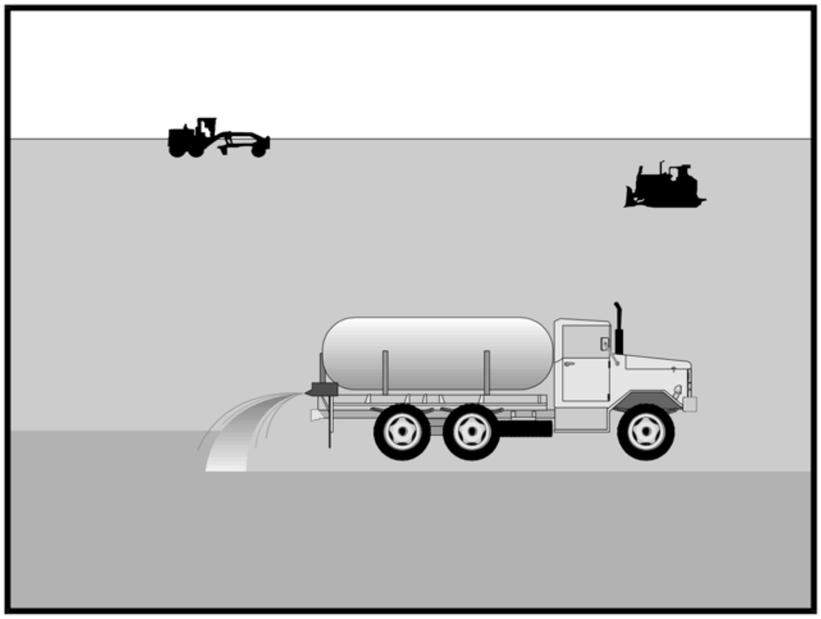
- Sediment may be incorporated into the site away from drainages.

References

Stormwater Management Manual for Western Washington, Volume II – Construction Stormwater Pollution Prevention, Washington State Department of Ecology, August 2001.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Wind Erosion Control



Objectives

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	☑
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment ☒

Nutrients

Trash

Metals

Bacteria

Oil and Grease

Organics

Potential Alternatives

None

Description and Purpose

Wind erosion or dust control consists of applying water or other dust palliatives as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

Suitable Applications

Wind erosion control BMPs are suitable during the following construction activities:

- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Sediment tracking onto paved roads
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period and should be applied daily (or more often) to be effective.

- Over watering may cause erosion.

WE-1 Wind Erosion Control

- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.

- Effectiveness depends on soil, temperature, humidity, and wind velocity.

- Chemically treated sub grades may make the soil water repellant, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.

- Asphalt, as a mulch tack or chemical mulch, requires a 24-hour curing time to avoid adherence to equipment, worker shoes, etc. Application should be limited because asphalt surfacing may eventually migrate into the drainage system.

- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.

Implementation

General

California's Mediterranean climate, with short wet seasons and long hot dry seasons, allows the soils to thoroughly dry out. During these dry seasons, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment.

Dust control, as a BMP, is a practice that is already in place for many construction activities. Los Angeles, the North Coast, and Sacramento, among others, have enacted dust control ordinances for construction activities that cause dust to be transported beyond the construction project property line.

Recently, the State Air Resources Control Board has, under the authority of the Clean Air Act, started to address air quality in relation to inhalable particulate matter less than 10 microns (PM-10). Approximately 90 percent of these small particles are considered to be dust. Existing dust control regulations by local agencies, municipal departments, public works department, and public health departments are in place in some regions within California.

Many local agencies require dust control in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. The following are measures that local agencies may have already implemented as requirements for dust control from contractors:

- Construction and Grading Permits: Require provisions for dust control plans.

- Opacity Emission Limits: Enforce compliance with California air pollution control laws.

- Increase Overall Enforcement Activities: Priority given to cases involving citizen complaints.

- Maintain Field Application Records: Require records of dust control measures from contractor;
- Stormwater Pollution Prevention Plan: (SWPPP): Integrate dust control measures into SWPPP.

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table shows dust control practices that can be applied to site conditions that cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures would include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph, and controlling the number and activity of vehicles on a site at any given time.

SITE CONDITION	DUST CONTROLP RACTICES								
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Silt Fences	Temporary Gravel Construction Entrances/Equipmen Wash Down	Haul Truck Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	X	X	X	X	X				X
Disturbed Areas Subject to Traffic			X	X	X		X		X
Material Stock Pile Stabilization			X	X		X			X
Demolition			X				X	X	
Clearing/ Excavation			X	X		X			X
Truck Traffic on Unpaved Roads			X	X	X		X	X	
Mud/Dirt Carry-Out					X		X		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (EC-1, Scheduling).
- Quickly stabilize exposed soils using vegetation, mulching, spray-on adhesives, calcium chloride, sprinkling, and stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Direct most construction traffic to stabilized roadways within the project site.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.

- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.

- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality Control Board requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER - DO NOT DRINK."
- Materials applied as temporary soil stabilizers and soil binders also generally provide wind erosion control benefits.
- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for wet suppression or chemical stabilization of exposed soils.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and vehicle wash down areas.
- Stabilize inactive construction sites using vegetation or chemical stabilization methods.
- Limit the amount of areas disturbed by clearing and earth moving operations by scheduling these activities in phases.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater.

Costs
Installation costs for water and chemical dust suppression are low, but annual costs may be quite high since these measures are effective for only a few hours to a few days.

Inspection and Maintenance
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Check areas protected to ensure coverage.
- Most dust control measures require frequent, often daily, or multiple times per day attention.

References
Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

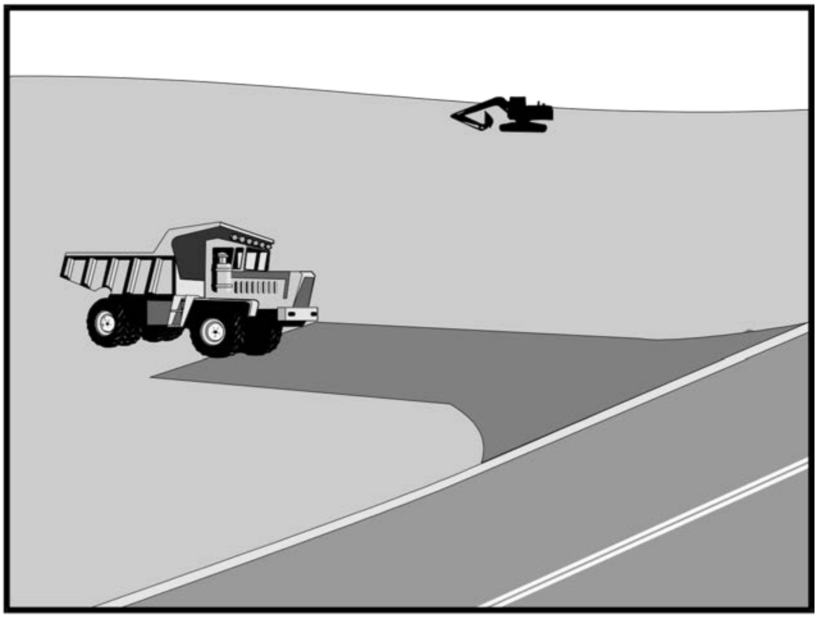
California Air Pollution Control Laws, California Air Resources Board, 1992.

Caltrans, Standard Specifications, Sections 10, “Dust Control”; Section 17, “Watering”; and Section 18, “Dust Palliative”.

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stabilized Construction Entrance / Exit TC-1



Objectives

EC	Erosion Control	Secondary
SE	Sediment Control	Secondary
TC	Tracking Control	Primary
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

- Sediment (Primary)
- Nutrients
- Trash
- Metals
- Bacteria
- Oil and Grease
- Organics

Suitable

Potential Alternatives

None

Description and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Applications

Use at construction sites:

- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.
- Where dust is a problem during dry weather conditions.

Limitations

- Entrances and exits require periodic top dressing with additional stones.
- This BMP should be used in conjunction with street sweeping on adjacent public right of way.
- Entrances and exits should be constructed on level ground only.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water runoff.

Implementation

General

A stabilized construction entrance is a pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights of way or streets. Reducing tracking of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust.

Where traffic will be entering or leaving the construction site, a stabilized construction entrance should be used. NPDES permits require that appropriate measures be implemented to prevent tracking of sediments onto paved roadways, where a significant source of sediments is derived from mud and dirt carried out from unpaved roads and construction sites.

Stabilized construction entrances are moderately effective in removing sediment from equipment leaving a construction site. The entrance should be built on level ground. Advantages of the Stabilized Construction Entrance/Exit is that it does remove some sediment from equipment and serves to channel construction traffic in and out of the site at specified locations. Efficiency is greatly increased when a washing rack is included as part of a stabilized construction entrance/exit. ***Design and Layout***

- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft minimum, and 30 ft minimum width.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized entrance/exit will help remove additional sediment and to keep adjacent streets clean.
- Provide ample turning radii as part of the entrance.
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.

- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.

- Route runoff from stabilized entrances/exits through a sediment trapping device before discharge.

- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.

- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. Do not use asphalt concrete (AC) grindings for stabilized construction access/roadway.

- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.

- Designate combination or single purpose entrances and exits to the construction site.

- Require that all employees, subcontractors, and suppliers utilize the stabilized construction access.

- Implement SE-7, Street Sweeping and Vacuuming, as needed.

- All exit locations intended to be used for more than a two-week period should have stabilized construction entrance/exit BMPs.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMPs are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment.

- Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment.

- Keep all temporary roadway ditches clear.

- Check for damage and repair as needed.

- Replace gravel material when surface voids are visible.

- Remove all sediment deposited on paved roadways within 24 hours.

- Remove gravel and filter fabric at completion of construction

Costs

Average annual cost for installation and maintenance may vary from $1,200 to $4,800 each, averaging $2,400 per entrance. Costs will increase with addition of washing rack, and sediment trap. With wash rack, costs range from $1,200 - $6,000 each, averaging $3,600 per entrance.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, USEPA Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

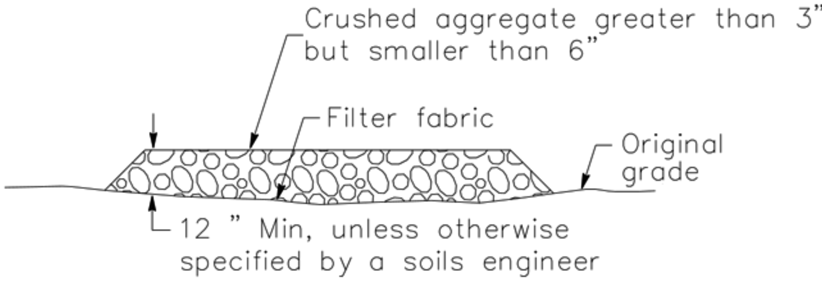
Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

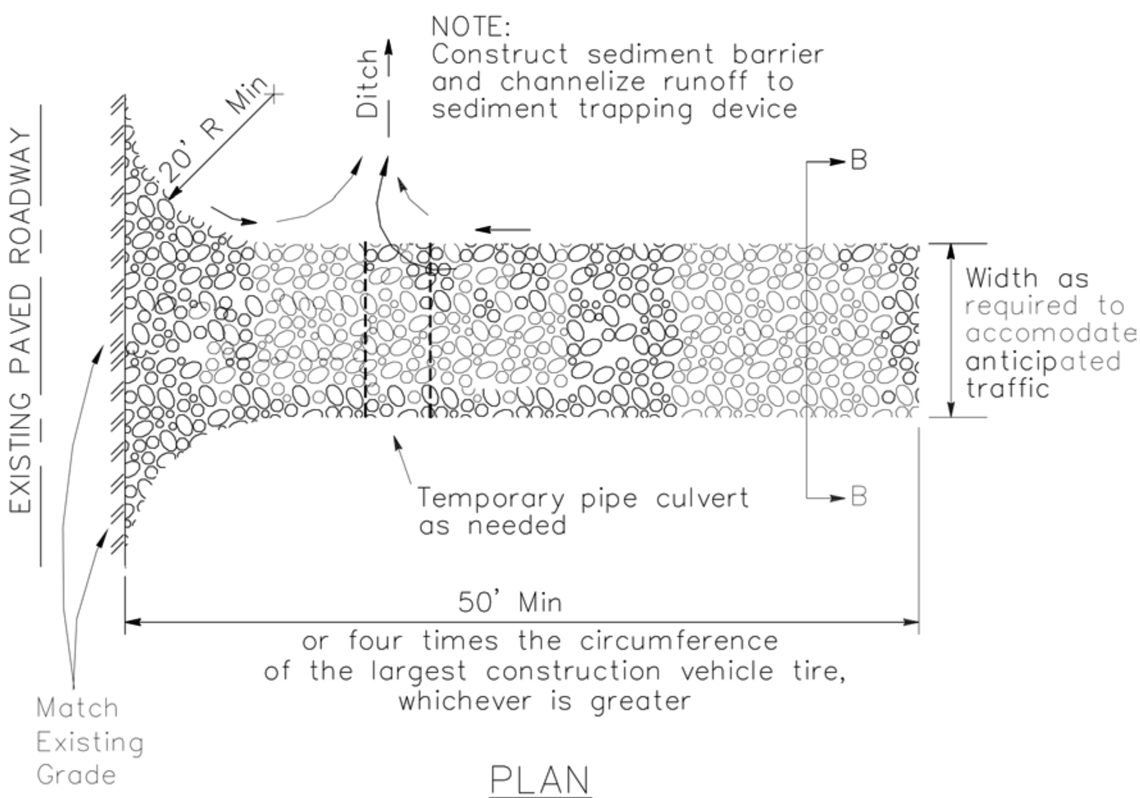
Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters, EPA 840-B-9-002, USEPA, Office of Water, Washington, DC, 1993.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

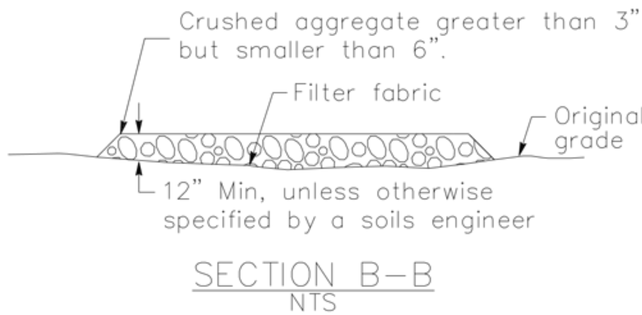


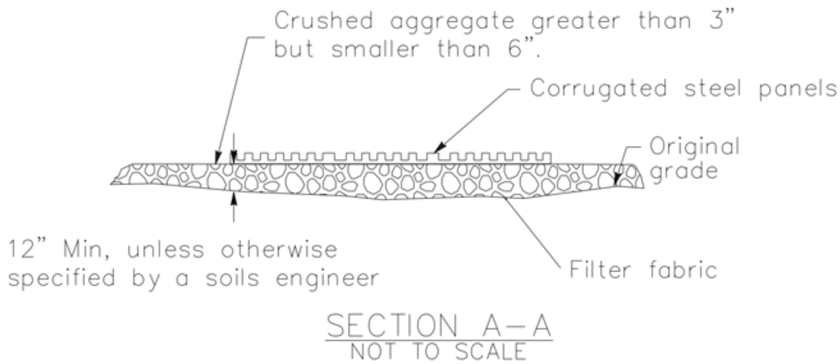
SECTION B–B
NTS

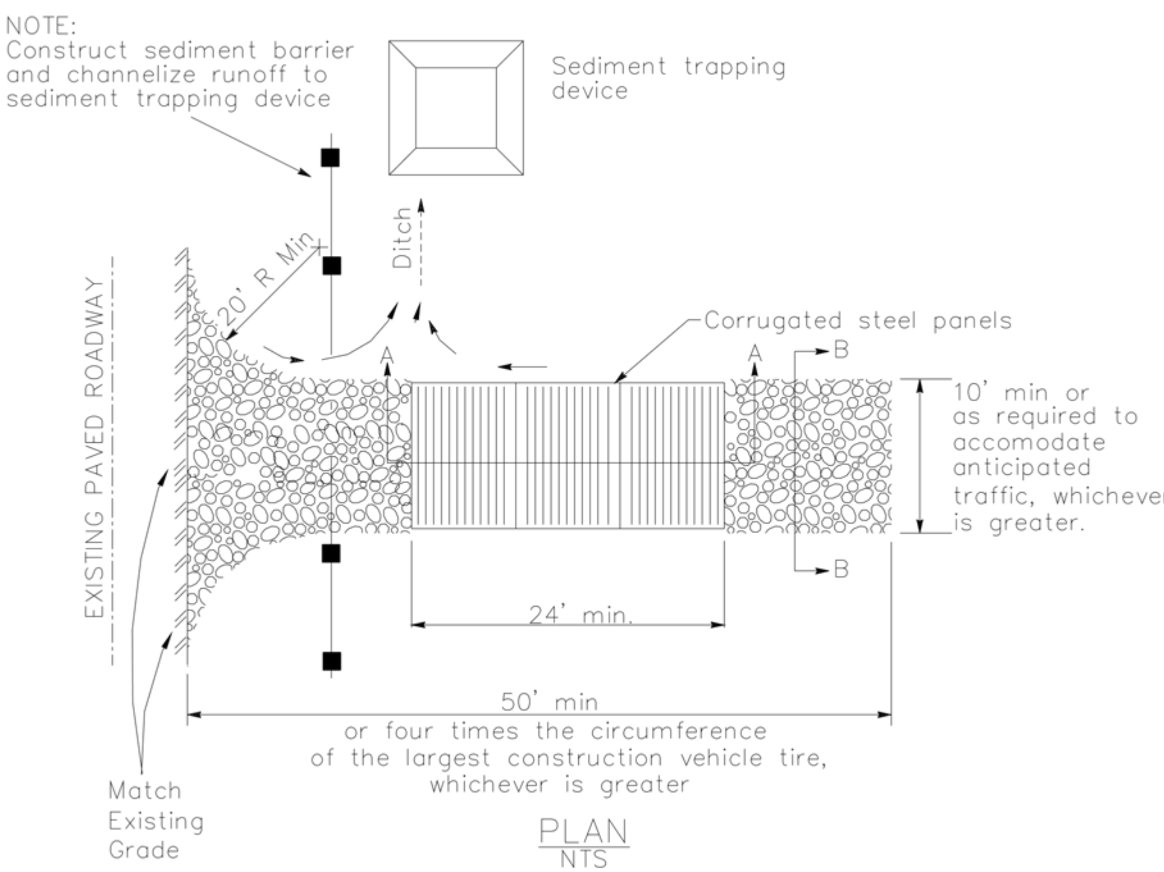


PLAN
NTS

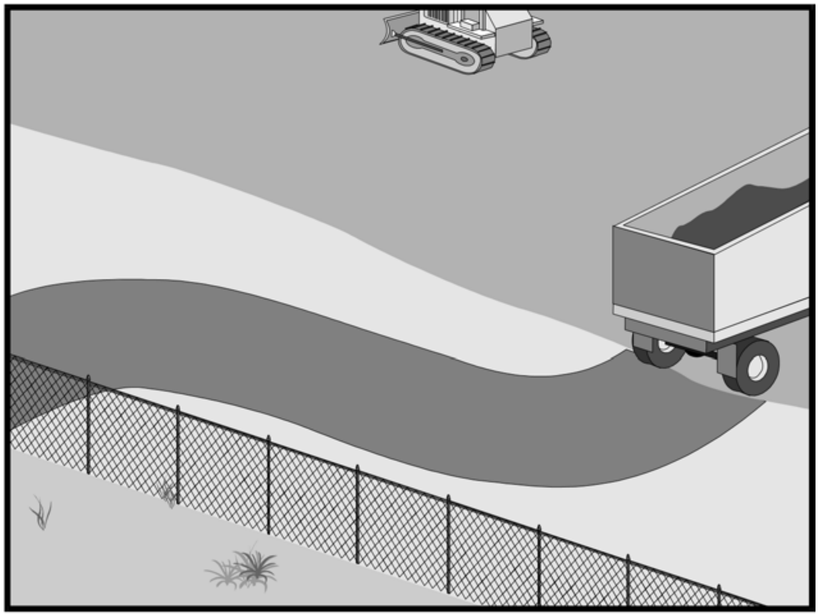
Stabilized Construction Entrance / Exit TC-1







Stabilized Construction Roadway TC-2



Objectives

EC	Erosion Control	Secondary
SE	Sediment Control	Secondary
TC	Tracking Control	Primary
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

Primary Objective

Secondary Objective

Description and Purpose

Access roads, subdivision roads, parking areas, and other onsite vehicle transportation routes should be stabilized immediately after grading, and frequently maintained to prevent erosion and control dust.

Suitable Applications

This BMP should be applied for the following conditions:

- Temporary Construction Traffic:
  - Phased construction projects and offsite road access
  - Construction during wet weather
- Construction roadways and detour roads:
  - Where mud tracking is a problem during wet weather
  - Where dust is a problem during dry weather
  - Adjacent to water bodies
  - Where poor soils are encountered

Limitations

Targeted Constituents

Sediment	Primary
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

- The roadway must be removed or paved when construction is complete.

TC-2 Stabilized Construction Roadway

- Certain chemical stabilization methods may cause stormwater or soil pollution and should not be used. See WE-1, Wind Erosion Control.
- Management of construction traffic is subject to air quality control measures. Contact the local air quality management agency.
- Materials will likely need to be removed prior to final project grading and stabilization.
- Use of this BMP may not be applicable to very short duration projects.

Implementation

General

Areas that are graded for construction vehicle transport and parking purposes are especially susceptible to erosion and dust. The exposed soil surface is continually disturbed, leaving no opportunity for vegetative stabilization. Such areas also tend to collect and transport runoff waters along their surfaces. During wet weather, they often become muddy quagmires that generate significant quantities of sediment that may pollute nearby streams or be transported offsite on the wheels of construction vehicles. Dirt roads can become so unstable during wet weather that they are virtually unusable.

Efficient construction road stabilization not only reduces onsite erosion but also can significantly speed onsite work, avoid instances of immobilized machinery and delivery vehicles, and generally improve site efficiency and working conditions during adverse weather

Installation/Application Criteria

Permanent roads and parking areas should be paved as soon as possible after grading. As an alternative where construction will be phased, the early application of gravel or chemical stabilization may solve potential erosion and stability problems. Temporary gravel roadway should be considered during the rainy season and on slopes greater than 5%.

Temporary roads should follow the contour of the natural terrain to the maximum extent possible. Slope should not exceed 15%. Roadways should be carefully graded to drain transversely. Provide drainage swales on each side of the roadway in the case of a crowned section or one side in the case of a super elevated section. Simple gravel berms without a trench can also be used.

Installed inlets should be protected to prevent sediment laden water from entering the storm sewer system (SE-10, Storm Drain Inlet Protection). In addition, the following criteria should be considered.

- Road should follow topographic contours to reduce erosion of the roadway.

- The roadway slope should not exceed 15%.
- Chemical stabilizers or water are usually required on gravel or dirt roads to prevent dust (WE-1, Wind Erosion Control).
- Properly grade roadway to prevent runoff from leaving the construction site.
- Design stabilized access to support heaviest vehicles and equipment that will use it.

- Stabilize roadway using aggregate, asphalt concrete, or concrete based on longevity, required performance, and site conditions. The use of cold mix asphalt or asphalt concrete (AC) grindings for stabilized construction roadway is not allowed.
- Coordinate materials with those used for stabilized construction entrance/exit points.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, impact weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Keep all temporary roadway ditches clear.
- When no longer required, remove stabilized construction roadway and re-grade and repair slopes.
- Periodically apply additional aggregate on gravel roads.
- Active dirt construction roads are commonly watered three or more times per day during the dry season.

Costs

Gravel construction roads are moderately expensive, but cost is often balanced by reductions in construction delay. No additional costs for dust control on construction roads should be required above that needed to meet local air quality requirements.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

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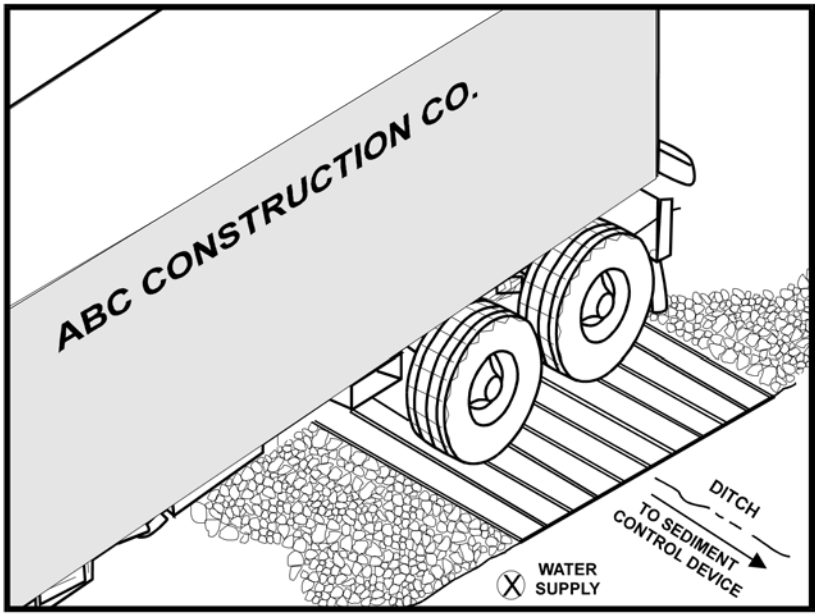

Description and Purpose

Entrance / Outlet Tire Wash TC-3

Objectives

Legend:

Primary Objective

Secondary Objective

EC	Erosion Control
SE	Sediment Control
TC	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

Targeted Constituents

Sediment
Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics

A tire wash is an area located at stabilized construction access points to remove sediment from tires and under carriages and to prevent sediment from being transported onto public roadways.

Suitable Applications

Tire washes may be used on construction sites where dirt and mud tracking onto public roads by construction vehicles may occur.

Potential Alternatives

TC-1 Stabilized Construction

Limitations

- The tire wash requires a supply of wash water.

- A turnout or doublewide exit is required to avoid having entering vehicles drive through the wash area.

- Do not use where wet tire trucks leaving the site leave the road dangerously slick.

Implementation

- Incorporate with a stabilized construction entrance/exit. See TC-1, Stabilized Construction Entrance/Exit.

- Construct on level ground when possible, on a pad of coarse aggregate greater than 3 in. but smaller than 6 in. A geotextile fabric should be placed below the aggregate.

- Wash rack should be designed and constructed/manufactured for anticipated traffic loads.

- Provide a drainage ditch that will convey the runoff from the wash area to a sediment trapping device. The drainage ditch should be of sufficient grade, width, and depth to carry the wash runoff.

- Use hoses with automatic shutoff nozzles to prevent hoses from being left on.

- Require that all employees, subcontractors, and others that leave the site with mud caked tires and undercarriages to use the wash facility.

- Implement SC-7, Street Sweeping and Vacuuming, as needed.

Costs

Costs are low for installation of wash rack.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Remove accumulated sediment in wash rack and/or sediment trap to maintain system performance.

- Inspect routinely for damage and repair as needed.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

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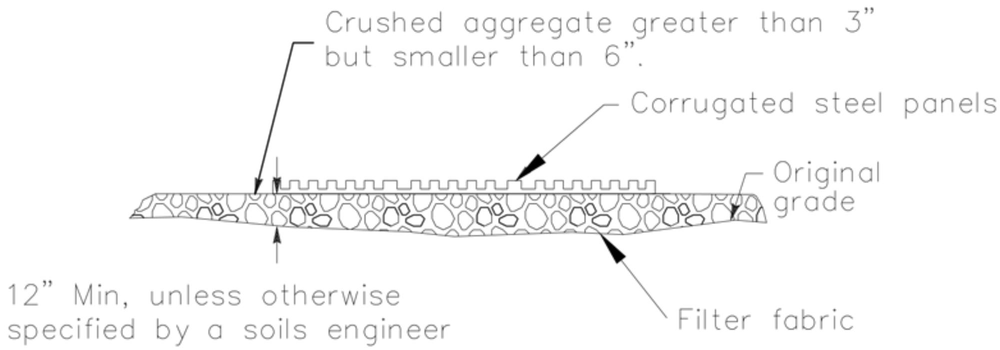
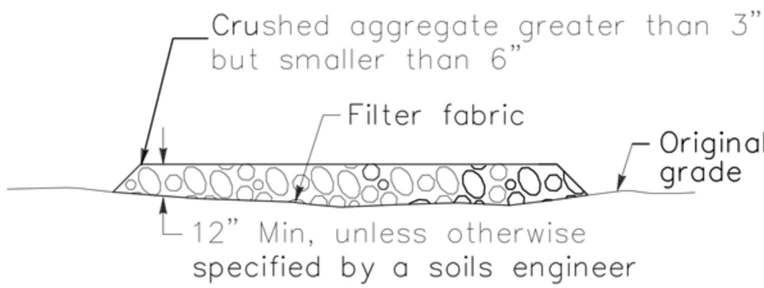


SECTION A–A
NOT TO SCALE



SECTION B–B
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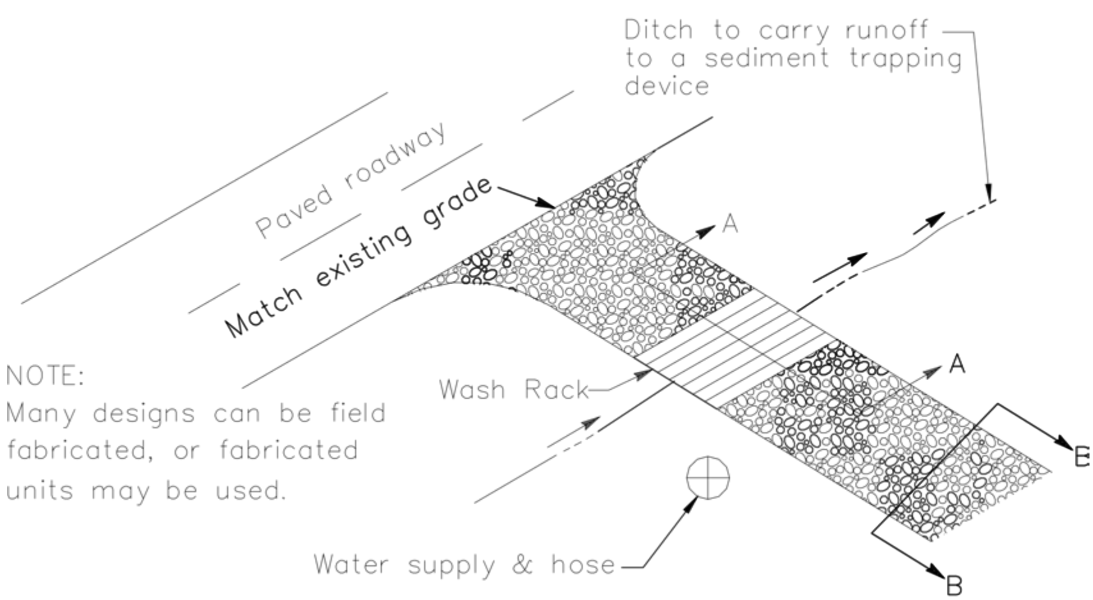


TYPICAL TIRE WASH
NOT TO SCALE

Section 4
Non-Stormwater Management and Material Management BMPs

4.1 Non-Stormwater Management BMPs

The Construction General Permit prohibits the discharge of materials other than stormwater and authorized non-stormwater discharges. It is recognized that certain non-stormwater discharges may be necessary for the completion of construction projects. Such discharges include but are not limited to irrigation of vegetative erosion control measures, pipe flushing and testing, and street cleaning.

Non-stormwater management BMPs are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source or eliminating off-site discharge. These practices involve day-to-day operations of the construction site and are usually under the control of the contractor. These BMPs are also referred to as "good housekeeping practices" which involve keeping a clean, orderly construction site.

Non-stormwater management BMPs also include procedures and practices designed to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning, fueling, and maintenance operations to stormwater drainage systems or to watercourses.

Table 4-1 lists the non-stormwater management BMPs. All these BMPs must be implemented depending on the conditions and applicability of deployment described as part of the BMP.

Table 4-1 Non-Stormwater Management BMPs

BMP#	BMP Name
NS-1	Water Conservation Practices
NS-2	Dewatering Operations
NS-3	Paving and Grinding Operations
NS-4	Temporary Stream Crossing
NS-5	Clear Water Diversion
NS-6	Illicit Connection/Discharge
NS-7	Potable Water/Irrigation
NS-8	Vehicle and Equipment Cleaning
NS-9	Vehicle and Equipment Fueling
NS-10	Vehicle and Equipment Maintenance
NS-11	Pile Driving Operations
NS-12	Concrete Curing
NS-13	Concrete Finishing
NS-14	Material and Equipment Use
NS-15	Demolition Adjacent to Water
NS-16	Temporary Batch Plants

It is recommended that owners and contractors be vigilant regarding implementation of these BMPs, including making their implementation a condition of continued employment, and part of all prime and subcontract agreements. By doing so, the chance of inadvertent violation by an uncaring individual can be prevented, potentially saving thousands of dollars in fines and project delays. Also, if procedures are not properly implemented and/or if BMPs are compromised then the discharge is subject to sampling and analysis requirements contained in the General Permit.

4.2 Waste Management & Materials Pollution Control BMPs

Waste management and materials pollution control BMPs, like non-stormwater management BMPs, are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with stormwater. BMPs also involve day-to-day operations of the construction site, are under the control of the contractor, and are additional “good housekeeping practices” which involve keeping a clean, orderly construction site.

Waste management consists of implementing procedural and structural BMPs for handling, storing, disposing of wastes generated by a construction project. The objective is to prevent the release of materials into stormwater runoff or discharges through proper management of the following types of wastes:

- Solid
- Sanitary
- Concrete
- Hazardous
- Equipment – related wastes

Table 4-2 Waste Management & Materials Pollution Control BMPs

BMP#	BMP Name
WM-1	Material Delivery and Storage
WM-2	Material Use
WM-3	Stockpile Management
WM-4	Spill Prevention and Control
WM-5	Solid Waste Management
WM-6	Hazardous Waste Management
WM-7	Contaminated Soil Management
WM-8	Concrete Waste Management
WM-9	Sanitary/ Septic Waste Management
WM-10	Liquid Waste Management

These and waste

Materials pollution control (also called materials handling) consists of implementing procedural and structural BMPs in the handling, storing, and the use of construction materials. The BMPs are intended to prevent the release of pollutants during stormwater and non-stormwater discharges. The objective is to prevent or reduce the opportunity for contamination of stormwater runoff from construction materials by covering and/or providing secondary containment of storage areas, and by taking adequate precautions when handling materials. These controls must be implemented for all applicable activities, material usage, and site conditions.

Table 4-2 lists the waste management and materials pollution control BMPs. It is important to note that these BMPs should be implemented depending on the conditions/applicability of deployment described as part of the BMP.

4.3 Fact Sheet Format

A BMP fact sheet is a short document that gives all the information about a particular BMP. Typically, each sheet contains the information outlined in Figure 4-1. Completed fact sheets for each of the above activities are provided in Section 4.4.

fact

The fact sheets also contain side bar presentations with information on BMP objectives, targeted constituents, removal effectiveness, and potential alternatives.

NS-xx Example Fact Sheet

Description and Purpose

Suitable Applications

Limitations

Implementation

Costs

Inspection and Maintenance

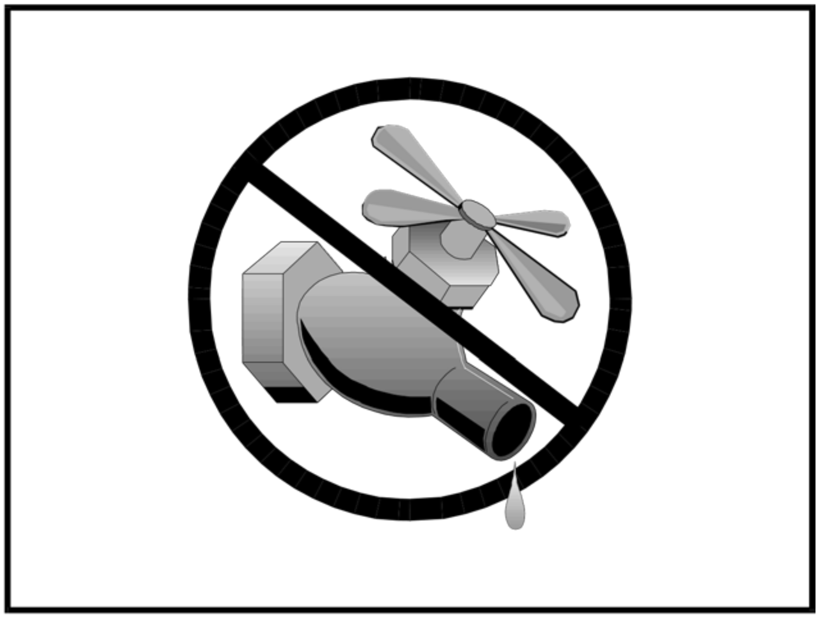
References

Figure 4-1

4.4 BMP Fact Sheets

BMP Fact Sheets for non-stormwater management and waste management and materials pollution control **Example Fact Sheet** follow. The BMP fact sheets are individually page numbered and are suitable for photocopying and inclusions in SWPPPs. Fresh copies of the fact sheets can be individually downloaded from the Caltrans Stormwater BMP Handbook website at http://www.cabmphandbooks.com.

Water Conservation Practices NS-1



Objectives

EC	Erosion Control
SE	Sediment Control
TR	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

Sediment

Nutrients

Trash

Metals

Bacteria

Oil and Grease

Organics

Potential Alternatives

None

Description and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Suitable Applications

Water conservation practices are suitable for all construction sites where water is used, including piped water, metered water, trucked water, and water from a reservoir.

Limitations

- None identified.

Implementation

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Washing of vehicles and equipment on the construction site is discouraged.

- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.

NS-1 Water Conservation Practices

- Direct construction water runoff to areas where it can soak into the ground or be collected and reused.

- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.

- Lock water tank valves to prevent unauthorized use.

Costs

The cost is small to none compared to the benefits of conserving water.

Inspection and Maintenance

- Inspect and verify that activity based BMPs are in place prior to the commencement of authorized non-stormwater discharges.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges are occuring.

- Repair water equipment as needed to prevent unintended discharges.

  - Water trucks
  - Water reservoirs (water buffalos)
  - Irrigation systems
  - Hydrant connections

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Dewatering operations are practices that manage the discharge of pollutants when non-stormwater and accumulated precipitation must be removed from a work location so that construction work may be accomplished.

Suitable Applications

These practices are implemented for discharges of nonstormwater from construction sites. Non-stormwaters include, but are not limited to, groundwater, water from cofferdams, water diversions, and waters used during construction activities that must be removed from a work area.

Description and Purpose

Practices identified in this section are also appropriate for implementation when managing the removal of accumulated precipitation (stormwater) from depressed areas at a construction site.

Limitations

- Site conditions will dictate design and use of dewatering operations.
- The controls discussed in this best management practice (BMP) address sediment only.
- The controls detailed in this BMP only allow for minimal settling time for sediment particles. Use only when site conditions restrict the use of the other control methods.
- Dewatering operations will require, and must comply with, applicable local permits.

Targeted Constituents

Sediment
Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics

Potential Alternatives

SE-5: Fiber Roll
SE-6: Gravel Bag Berm
SE-9: Straw Bale Barrier

Objectives

EC	Erosion Control
SE	Sediment Control
TR	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

Legend:

Primary Objective
Secondary Objective

CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Avoid dewatering discharges where possible by using the water for dust control, by infiltration, etc.

Implementation

- Dewatering non-stormwater cannot be discharged without prior notice to and approval from the Regional Water Quality Control Board (RWQCB) and local stormwater management agency. This includes stormwater that is co-mingled with groundwater or other nonstormwater sources. Once the discharge is allowed, appropriate BMPs must be implemented to ensure the discharge complies with all permit requirements and regional and watershedspecific requirements.

- RWQCB may require a separate NPDES permit prior to the dewatering discharge of nonstormwater. These permits will have specific testing, monitoring, and discharge requirements and can take significant time to obtain.

- The flow chart shown in Figure 1 should be utilized to guide dewatering operations.

- The owner will coordinate monitoring and permit compliance.

- Additional permits or permissions from other agencies may be required for dewatering cofferdams or diversions.

- Dewatering discharges must not cause erosion at the discharge point.

A variety of methods can be used to treat water during dewatering operations. Several devices are presented below and provide options to achieve sediment removal. The size of particles present in the sediment and Permit or receiving water limitations on sediment are key considerations for selecting sediment treatment option(s); in some cases, the use of multiple devices may be appropriate.

Sediment Basin (see also SE-2)

Description:

- A sediment basin is a temporary basin with a controlled release structure that is formed by excavation or construction of an embankment to detain sediment-laden runoff and allow sediment to settle out before discharging. Sediment basins are generally larger than Sediment Traps (SE-3). *Appropriate Applications:*
- Effective for the removal of gravel, sand, silt, some metals that settle out with the sediment, and trash. *Implementation:*
- Excavation and construction of related facilities is required.

- Temporary sediment basins must be fenced if safety is a concern.

- Outlet protection is required to prevent erosion at the outfall location.

Maintenance:

- Maintenance is required for safety fencing, vegetation, embankment, inlet and outfall structures, as well as other features.

- Removal of sediment is required when the storage volume is reduced by one-half.

Sediment Trap (See also SE-3) *Description:*

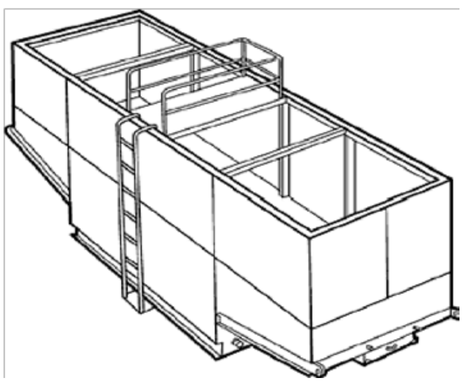
- A sediment trap is a temporary basin formed by excavation and/or construction of an earthen embankment across a waterway or low drainage area to detain sediment-laden runoff and allow sediment to settle out before discharging. Sediment traps are generally smaller than Sediment Basins (SE-2).

Appropriate Applications:

Effective for the removal of large and medium sized particles (sand and gravel) and some metals that settle out with the sediment. *Implementation:*

- Excavation and construction of related facilities is required.
- Trap inlets should be located to maximize the travel distance to the trap outlet.
- Use rock or vegetation to protect the trap outlets against erosion. *Maintenance:*
- Maintenance is required for vegetation, embankment, inlet and outfall structures, as well as other features.
- Removal of sediment is required when the storage volume is reduced by one-third.

Weir Tanks



Description:

- A weir tank separates water and waste by using weirs. The configuration of the weirs (over and under weirs) maximizes the residence time in the tank and determines the waste to be removed from the water, such as oil, grease, and sediments. *Appropriate Applications:*
- The tank removes trash, some settleable solids (gravel, sand, and silt), some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods. *Implementation:*
- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.

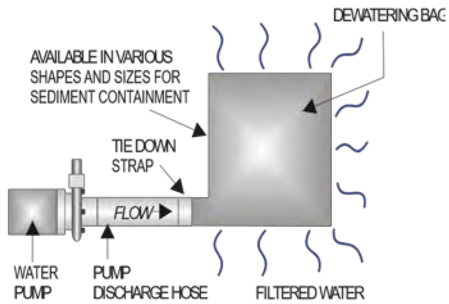
- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors should be consulted to appropriately size tank. *Maintenance:*
- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal must be by licensed waste disposal company.

Dewatering Tanks

Description:

- A dewatering tank removes debris and sediment. Flow enters the tank through the top, passes through a fabric filter, and is discharged through the bottom of the tank. The filter separates the solids from the liquids. *Appropriate Applications:*
- The tank removes trash, gravel, sand, and silt, some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pretreatment for other methods. *Implementation:*
- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.
- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors should be consulted to appropriately size tank. *Maintenance:*
- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal must be by licensed waste disposal company.

Gravity Bag Filter



Description:

- A gravity bag filter, also referred to as a dewatering bag, is a square or rectangular bag made of non-woven geotextile fabric that collects sand, silt, and fines. *Appropriate Applications:*
- Effective for the removal of sediments (gravel, sand, and silt). Some metals are removed with the sediment. *Implementation:*
- Water is pumped into one side of the bag and seeps through the bottom and sides of the bag.
- A secondary barrier, such as a rock filter bed or straw/hay bale barrier, is placed beneath and beyond the edges of the bag to capture sediments that escape the bag. *Maintenance:*
- Inspection of the flow conditions, bag condition, bag capacity, and the secondary barrier is required.
- Replace the bag when it no longer filters sediment or passes water at a reasonable rate.
- The bag is disposed of offsite.

Sand Media Particulate Filter

Description:

- Water is treated by passing it through canisters filled with sand media. Generally, sand filters provide a final level of treatment. They are often used as a secondary or higher level of treatment after a significant amount of sediment and other pollutants have been removed using other methods. *Appropriate Applications:*

④ Effective for the removal of trash, gravel, sand, and silt and some metals, as well as the reduction of biochemical oxygen demand (BOD) and turbidity.

④ Sand filters can be used for stand-alone treatment or in conjunction with bag and cartridge filtration if further treatment is required.

④ Sand filters can also be used to provide additional treatment to water treated via settling or basic filtration. *Implementation:*

④ The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation. *Maintenance:*

④ The filters require regular service to monitor and maintain the level of the sand media. If subjected to high loading rates, filters can plug quickly.

④ Venders generally provide data on maximum head loss through the filter. The filter should be monitored daily while in use, and cleaned when head loss reaches target levels.

④ If cleaned by backwashing, the backwash water may need to be hauled away for disposal, or returned to the upper end of the treatment train for another pass through the series of dewatering BMPs.

Pressurized Bag Filter

Description:

④ A pressurized bag filter is a unit composed of single filter bags made from polyester felt material. The water filters through the unit and is discharged through a header. Vendors provide bag filters in a variety of configurations. Some units include a combination of bag filters and cartridge filters for enhanced contaminant removal. *Appropriate Applications:*

④ Effective for the removal of sediment (sand and silt) and some metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Oil absorbent bags are available for hydrocarbon removal.

④ Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation. *Maintenance:*
- The filter bags require replacement when the pressure differential equals or exceeds the manufacturer's recommendation.

Cartridge Filter

Description:

- Cartridge filters provide a high degree of pollutant removal by utilizing a number of individual cartridges as part of a larger filtering unit. They are often used as a secondary or higher (polishing) level of treatment after a significant amount of sediment and other pollutants are removed. Units come with various cartridge configurations (for use in series with bag filters) or with a larger single cartridge filtration unit (with multiple filters within). *Appropriate Applications:*
- Effective for the removal of sediment (sand, silt, and some clays) and metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Hydrocarbons can effectively be removed with special resin cartridges.
- Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance.

  Maintenance:

- The cartridges require replacement when the pressure differential equals or exceeds the manufacturer's recommendation.

Costs

- Sediment controls are low to high cost measures depending on the dewatering system that is selected. Pressurized filters tend to be more expensive than gravity settling, but are often more effective. Simple tanks are generally rented on a long-term basis (one or more months) and can range from $360 per month for a 1,000 gallon tank to $2,660 per month for a 10,000 gallon tank. Mobilization and demobilization costs vary considerably.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Unit-specific maintenance requirements are included with the description of each unit.

- Sediment removed during the maintenance of a dewatering device may be either spread onsite and stabilized, or disposed of at a disposal site as approved by the owner.

- Sediment that is commingled with other pollutants must be disposed of in accordance with all applicable laws and regulations and as approved by the owner.

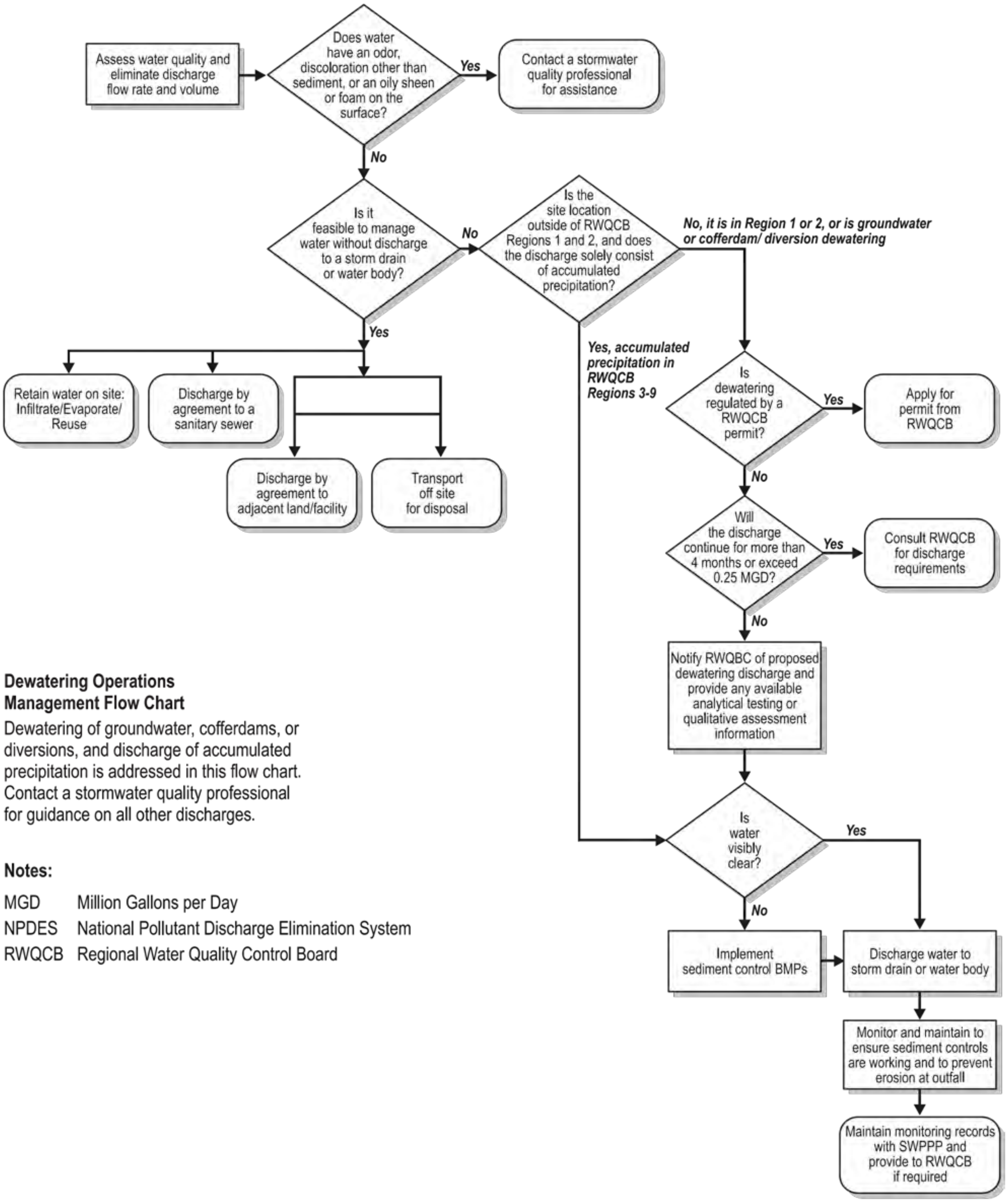
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Labor Surcharge & Equipment Rental Rates, April 1, 2002 through March 31, 2003, California Department of Transportation (Caltrans).



Dewatering Operations Management Flow Chart

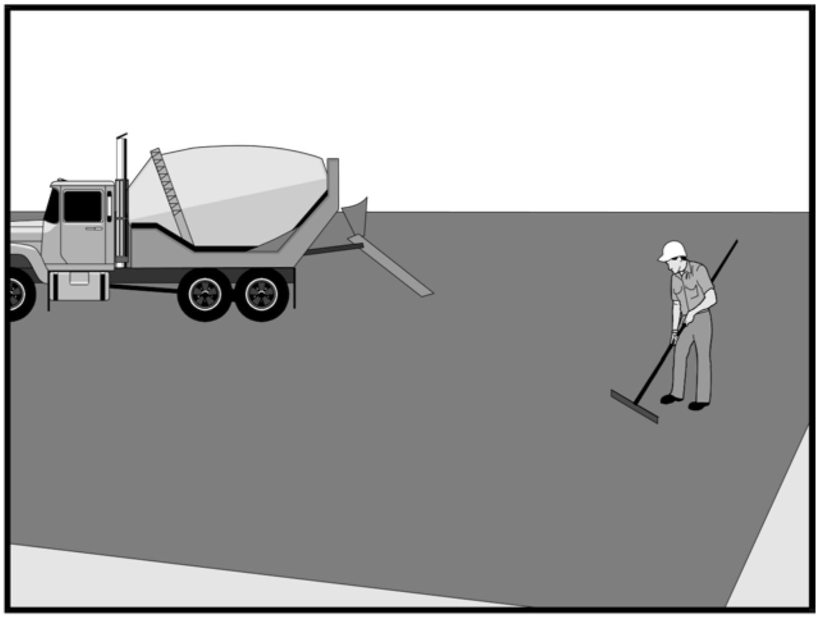
Dewatering of groundwater, cofferdams, or diversions, and discharge of accumulated precipitation is addressed in this flow chart. Contact a stormwater quality professional for guidance on all other discharges.

Notes:

MGD	Million Gallons per Day
NPDES	National Pollutant Discharge Elimination System
RWQCB	Regional Water Quality Control Board

Figure 1
Operations Flow Chart

Paving and Grinding Operations NS-3



Description and Purpose

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent runon and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

Suitable Applications

These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute stormwater runoff or discharge to the storm drain system or watercourses.

Limitations

- Finer solids are not effectively removed by filtration systems.
- Paving opportunities may be limited during wet weather.

Implementation

General

- Avoid paving during the wet season when feasible.
- Reschedule paving and grinding activities if rain is in the forecast.
- Train employees and sub-contractors in pollution prevention and reduction.
- Store materials away from drainage courses to prevent stormwater runon (see WM-1, Material Delivery and Storage).

Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	Primary
WM	Waste Management and Materials Pollution Control	Secondary

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	Primary
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	Primary
Organics	

Potential Alternatives

None

NS-3 Paving and Grinding Operations

- Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or to trap and filter sediment.
- If paving involves an onsite mixing plant, follow the stormwater permitting requirements for industrial activities.
- Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses, These materials should be stored consistent with WM-3, Stockpile Management.
- Disposal of PCC and AC waste should be in conformance with WM-8, Concrete Waste Management.

Saw Cutting, Grinding, and Pavement Removal

- Shovel or vacuum saw-cut slurry and remove from site. Cover or barricade storm drains during saw cutting to contain slurry.
- When paving involves AC, the following steps should be implemented to prevent the discharge of grinding residue, uncompacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:
  - AC grindings, pieces, or chunks used in embankments or shoulder backing must not be allowed to enter any storm drains or watercourses. Install silt fence until structure is stabilized or permanent controls are in place. Examples of temporary perimeter controls can be found in EC-9, Earth Dikes and Drainage Swales; SE-1, Silt Fence; or SE-5, Fiber Rolls.
  - Collect and remove all broken asphalt and recycle when practical. Old or spilled asphalt must be recycled or disposed.
  - Any AC chunks and pieces used in embankments must be placed above the water table and covered by at least 1 ft of material.
- Do not allow saw-cut slurry to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine, should not be allowed to flow across the pavement, and should not be left on the surface of the pavement. See also WM-8, Concrete Waste Management, and WM-10, Liquid Waste Management.
- Dig out activities should not be conducted in the rain.
- Collect dig out material by mechanical or manual methods. This material may be recycled for use as shoulder backing or base material.

- If dig out material cannot be recycled, transport the material back to an approved storage site.

Asphaltic Concrete Paving

- If paving involves asphaltic cement concrete, follow these steps:

  - Do not allow sand or gravel placed over new asphalt to wash into storm drains, streets, or creeks. Vacuum or sweep loose sand and gravel and properly dispose of this waste by referring to WM-5, Solid Waste Management.

  - Old asphalt must be disposed of properly. Collect and remove all broken asphalt from the site and recycle whenever possible.

Portland Cement Concrete Paving

- Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect and return to aggregate base stockpile or dispose of properly.

- Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in WM-8, Concrete Waste Management, or pump the water to the sanitary sewer if allowed by the local wastewater authority.

Sealing Operations

- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate must not be allowed to enter any storm drain or water courses. Apply temporary perimeter controls until structure is stabilized.

- Drainage inlet structures and manholes should be covered with filter fabric during application of seal coat, tack coat, slurry seal, and fog seal.

- Seal coat, tack coat, slurry seal, or fog seal should not be applied if rainfall is predicted to occur during the application or curing period.

Paving Equipment

- Leaks and spills from paving equipment can contain toxic levels of heavy metals and oil and grease. Place drip pans or absorbent materials under paving equipment when not in use. Clean up spills with absorbent materials rather than burying. See NS-10, Vehicle and Equipment Maintenance, WM-4, Spill Prevention and Control, and WM-10, Liquid Waste Management.

- Substances used to coat asphalt transport trucks, and asphalt spreading equipment should not contain soap and should be non-foaming and non-toxic.

- Use only non-toxic substances to coat asphalt transport trucks and asphalt spreading equipment.

- Paving equipment parked onsite should be parked over plastic to prevent soil contamination.

- Clean asphalt coated equipment offsite whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in WM-5, Solid Waste Management. Any cleaning onsite should follow NS-8, Vehicle and Equipment Cleaning.

NS-3 Paving and Grinding Operations

Thermoplastic Striping

- Thermoplastic striper and pre-heater equipment shutoff valves should be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the stormwater drainage system, or watercourses.
- Pre-heaters should be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move when the vehicle is deadheaded.
- Do not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. When possible, recycle thermoplastic material.

Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near drain inlets, the stormwater drainage system, or watercourses.
- Melting tanks should be loaded with care and not filled to beyond six inches from the top to leave room for splashing when vehicle is deadheaded.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large-scale projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.

Costs

- All of the above are low cost measures.

Inspection and Maintenance

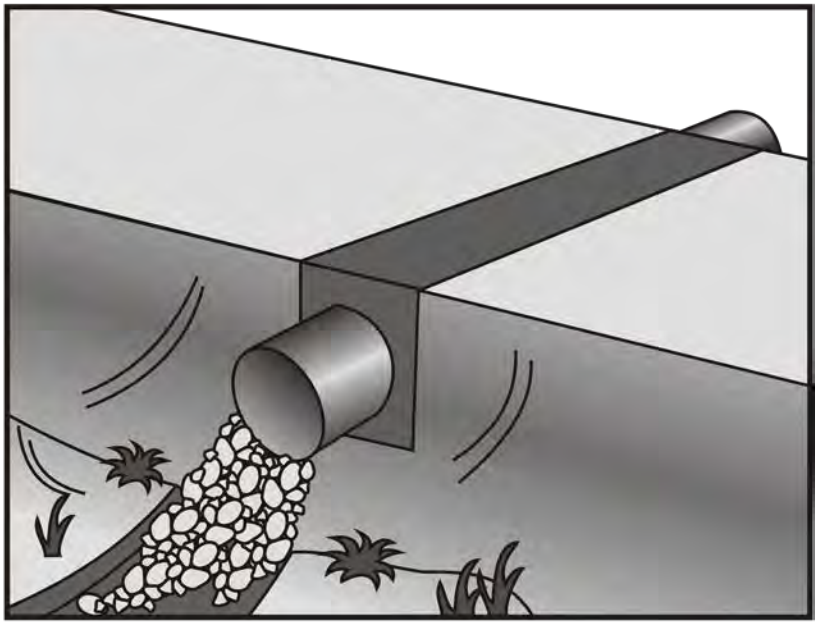
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Keep ample supplies of drip pans or absorbent materials onsite.
- Inspect and maintain machinery regularly to minimize leaks and drips.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Hot Mix Asphalt-Paving Handbook AC 150/5370-14, Appendix I, U.S. Army Corps of Engineers, July 1991.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Objectives

EC	Erosion Control	Secondary
SE	Sediment Control	Secondary
TR	Tracking Control	Secondary
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	Primary
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Description and Purpose

A temporary stream crossing is a temporary culvert, ford or bridge placed across a waterway to provide access for construction purposes for a period of less than one year. Temporary access crossings are not intended to maintain traffic for the public. The temporary access will eliminate erosion and downstream sedimentation caused by vehicles.

Suitable Applications

Temporary stream crossings should be installed at all designated crossings of perennial and intermittent streams on the construction site, as well as for dry channels that may be significantly eroded by construction traffic.

Temporary streams crossings are installed at sites:

- Where appropriate permits have been secured (404 Permits, and 401 Certifications)
- Where construction equipment or vehicles need to frequently cross a waterway
- When alternate access routes impose significant constraints

Targeted Constituents

Sediment	Primary
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

- When crossing perennial streams or waterways causes significant erosion
- Where construction activities will not last longer than one year
- Where appropriate permits have been obtained for the stream crossing

Limitations

The following limitations may apply:

- Installation and removal will usually disturb the waterway.
- Installation may require Regional Water Quality Control Board (RWQCB) 401 Certification, U.S. Army Corps of Engineers 404 permit and approval by California Department of Fish and Game. If numerical-based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required.
- Installation may require dewatering or temporary diversion of the stream. See NS-2, Dewatering Operations and NS-5, Clear Water Diversion.
- Installation may cause a constriction in the waterway, which can obstruct flood flow and cause flow backups or washouts. If improperly designed, flow backups can increase the pollutant load through washouts and scouring.
- Use of natural or other gravel in the stream for construction of Cellular Confinement System (CCS) ford crossing will be contingent upon approval by fisheries agencies.
- Ford crossings may degrade water quality due to contact with vehicles and equipment.
- May be expensive for a temporary improvement.
- Requires other BMPs to minimize soil disturbance during installation and removal.
- Fords should only be used in dry weather.

Implementation

General

The purpose of this BMP is to provide a safe, erosion-free access across a stream for construction equipment. Minimum standards and specifications for the design, construction, maintenance, and removal of the structure should be established by an engineer registered in California. Temporary stream crossings may be necessary to prevent construction equipment from causing erosion of the stream and tracking sediment and other pollutants into the stream.

Temporary stream crossings are used as access points to construction sites when other detour routes may be too long or burdensome for the construction equipment. Often heavy construction equipment must cross streams or creeks, and detour routes may impose too many constraints such as being too narrow or poor soil strength for the equipment loadings.

Additionally, the contractor may find a temporary stream crossing more economical for light–duty vehicles to use for frequent crossings, and may have less environmental impact than construction of a temporary access road.

Location of the temporary stream crossing should address:

- Site selection where erosion potential is low.

- Areas where the side slopes from site runoff will not spill into the side slopes of the crossing.

The following types of temporary stream crossings should be considered:

- **Culverts** – A temporary culvert is effective in controlling erosion but will cause erosion during installation and removal. A temporary culvert can be easily constructed and allows for heavy equipment loads.

- **Fords** - Appropriate during the dry season in arid areas. Used on dry washes and ephemeral streams, and low-flow perennial streams. CCS, a type of ford crossing, is also appropriate for use in streams that would benefit from an influx of gravels. A temporary ford provides little sediment and erosion control and is ineffective in controlling erosion in the stream channel. A temporary ford is the least expensive stream crossing and allows for maximum load limits. It also offers very low maintenance. Fords are more appropriate during the dry ice season and in arid areas of California.

- **Bridges** - Appropriate for streams with high flow velocities, steep gradients and where temporary restrictions in the channel are not allowed.

Design

During the long summer construction season in much of California, rainfall is infrequent and many streams are dry. Under these conditions, a temporary ford may be sufficient. A ford is not appropriate if construction will continue through the winter rainy season, if summer thunderstorms are likely, or if the stream flows during most of the year. Temporary culverts and bridges should then be considered and, if used, should be sized to pass a significant design storm (i.e., at least a 10-year storm). The temporary stream crossing should be protected against erosion, both to prevent excessive sedimentation in the stream and to prevent washout of the crossing.

Design and installation requires knowledge of stream flows and soil strength. Designs should be prepared under direction of, and approved by, a registered civil engineer and for bridges, a registered structural engineer. Both hydraulic and construction loading requirements should be considered with the following:

- Comply with any special requirements for culvert and bridge crossings, particularly if the temporary stream crossing will remain through the rainy season.

- Provide stability in the crossing and adjacent areas to withstand the design flow. The design flow and safety factor should be selected based on careful evaluation of the risks due to over topping, flow backups, or washout.

- Install sediment traps immediately downstream of crossings to capture sediments. See SE-3, Sediment Trap.

- Avoid oil or other potentially hazardous materials for surface treatment.

- Culverts are relatively easy to construct and able to support heavy equipment loads.

- Fords are the least expensive of the crossings, with maximum load limits.

- CCS crossing structures consist of clean, washed gravel and cellular confinement system blocks. CCS are appropriate for streams that would benefit from an influx of gravel; for example, salmonid streams, streams or rivers below reservoirs, and urban, channelized streams. Many urban stream systems are gravel-deprived due to human influences, such as dams, gravel mines, and concrete channels.

- CCS allow designers to use either angular or naturally occurring rounded gravel, because the cells provide the necessary structure and stability. In fact, natural gravel is optimal for this technique, because of the habitat improvement it will provide after removal of the CCS.

- A gravel depth of 6 to 12 in. for a CCS structure is sufficient to support most construction equipment.

- An advantage of a CCS crossing structure is that relatively little rock or gravel is needed, because the CCS provides the stability.

- Bridges are generally more expensive to design and construct, but provide the least disturbance of the streambed and constriction of the waterway flows.

Construction and Use

- Stabilize construction roadways, adjacent work area, and stream bottom against erosion.

- Construct during dry periods to minimize stream disturbance and reduce costs.

- Construct at or near the natural elevation of the streambed to prevent potential flooding upstream of the crossing.

- Install temporary erosion control BMPs in accordance with erosion control BMP fact sheets to minimize erosion of embankment into flow lines.

- Any temporary artificial obstruction placed within flowing water should only be built from material, such as clean gravel or sandbags, that will not introduce sediment or silt into the watercourse.

- Temporary water body crossings and encroachments should be constructed to minimize scour. Cobbles used for temporary water body crossings or encroachments should be clean, rounded river cobble.

- Vehicles and equipment should not be driven, operated, fueled, cleaned, maintained, or stored in the wet or dry portions of a water body where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed.

- The exterior of vehicles and equipment that will encroach on the water body within the project should be maintained free of grease, oil, fuel, and residues.

- Drip pans should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.

- Disturbance or removal of vegetation should not exceed the minimum necessary to complete operations. Precautions should be taken to avoid damage to vegetation by people or equipment. Disturbed vegetation should be replaced with the appropriate soil stabilization measures.

- Riparian vegetation, when removed pursuant to the provisions of the work, should be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation should be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble must be removed upon completion of project activities.

- Conceptual temporary stream crossings are shown in the attached figures.

Costs

Caltrans Construction Cost index for temporary bridge crossings is \$45-\$95/ft^2.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two week intervals in the non-rainy season to verify continued BMP implementation.

- Check for blockage in the channel, sediment buildup or trapped debris in culverts, blockage behind fords or under bridges

- Check for erosion of abutments, channel scour, riprap displacement, or piping in the soil

- Check for structural weakening of the temporary crossings, such as cracks, and undermining of foundations and abutments

- Remove sediment that collects behind fords, in culverts, and under bridges periodically

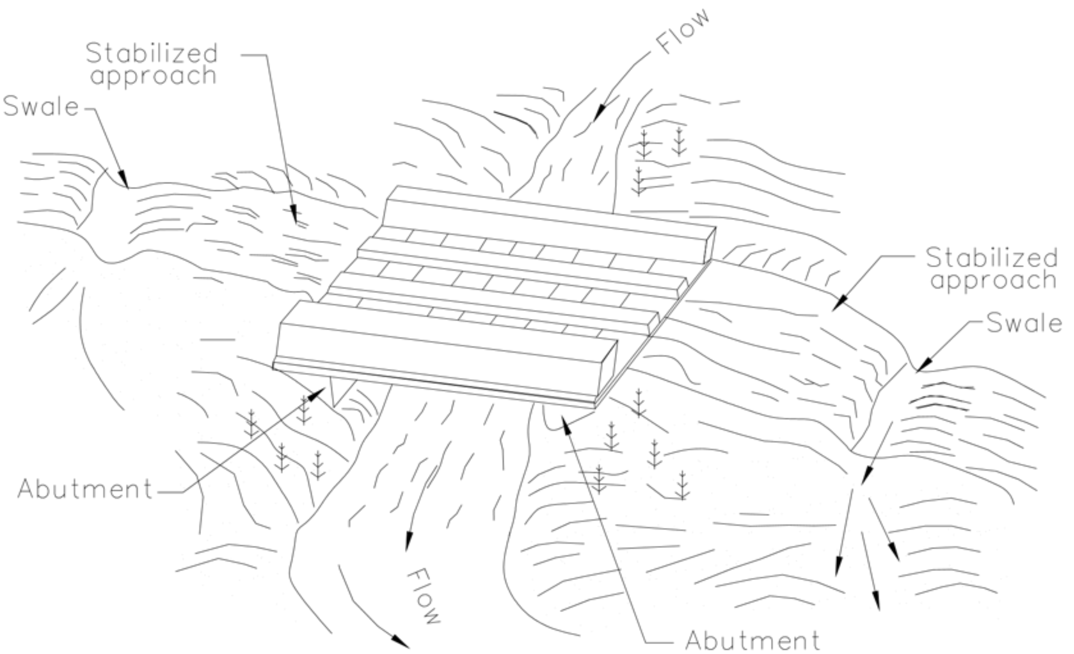
- Replace lost or displaced aggregate from inlets and outlets of culverts and cellular confinement systems

- Remove temporary crossing promptly when it is no longer needed

References

California Bank and Shore Rock Slope Protection Design – Practitioners Guide and Field Evaluations of Riprap Methods, Caltrans Study No. F90TL03, October 2000.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



NOTE:
Surface flow of road diverted by swale and/or dike.

TYPICAL BRIDGE CROSSING
NOT TO SCALE

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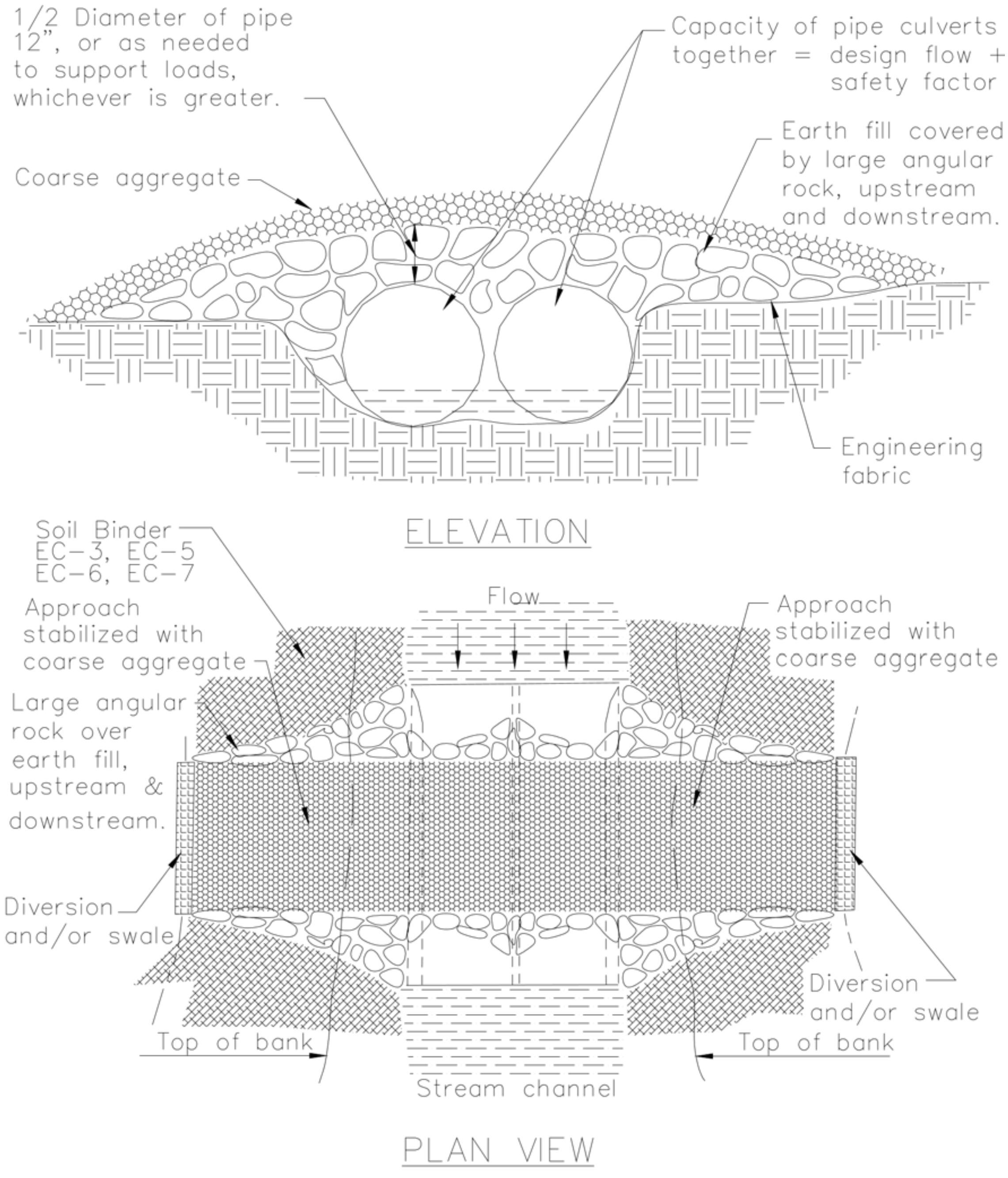
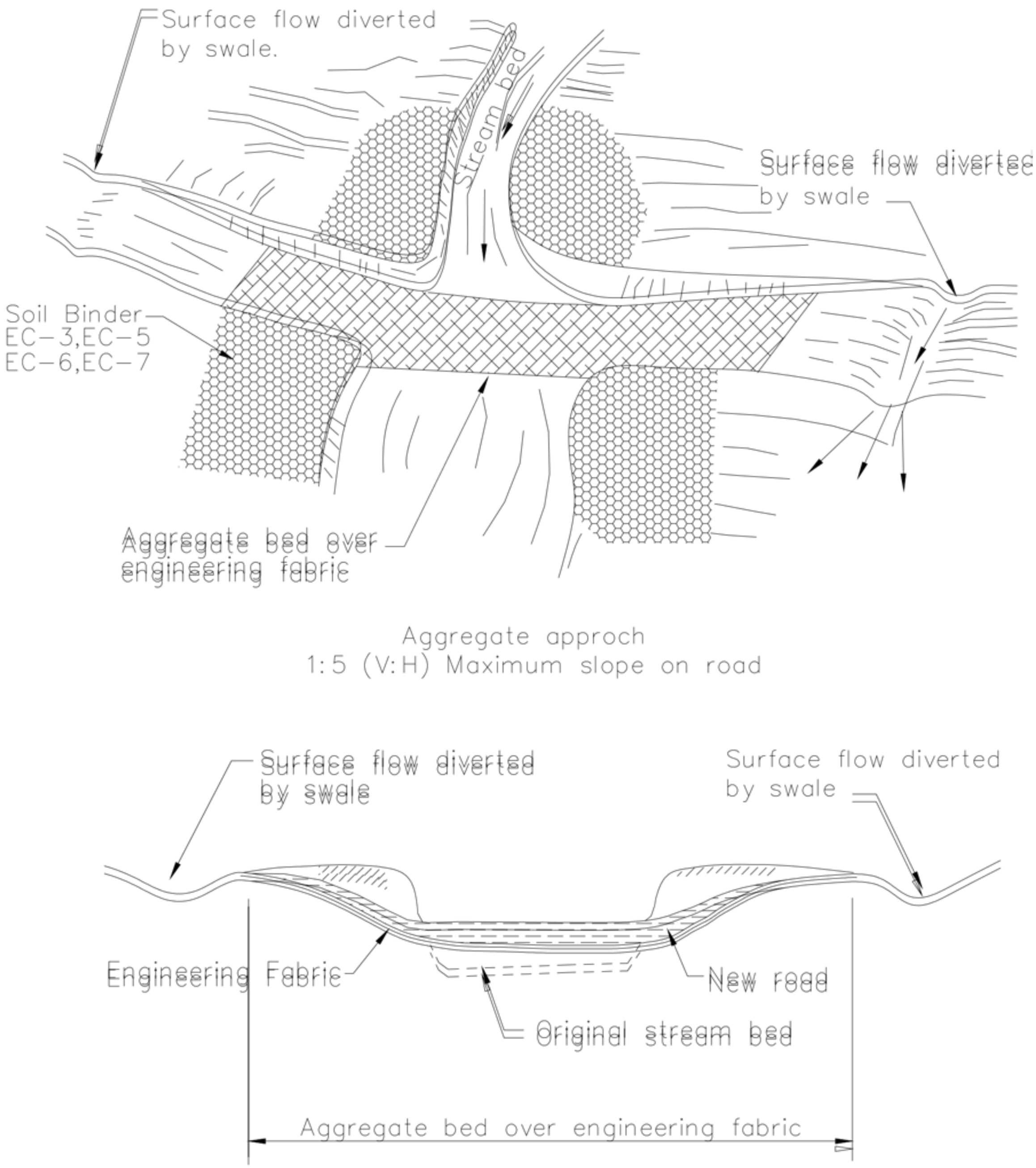
Surface flow of road diverted by swale and/or dike.

TYPICAL BRIDGE CROSSING
NOT TO SCALE

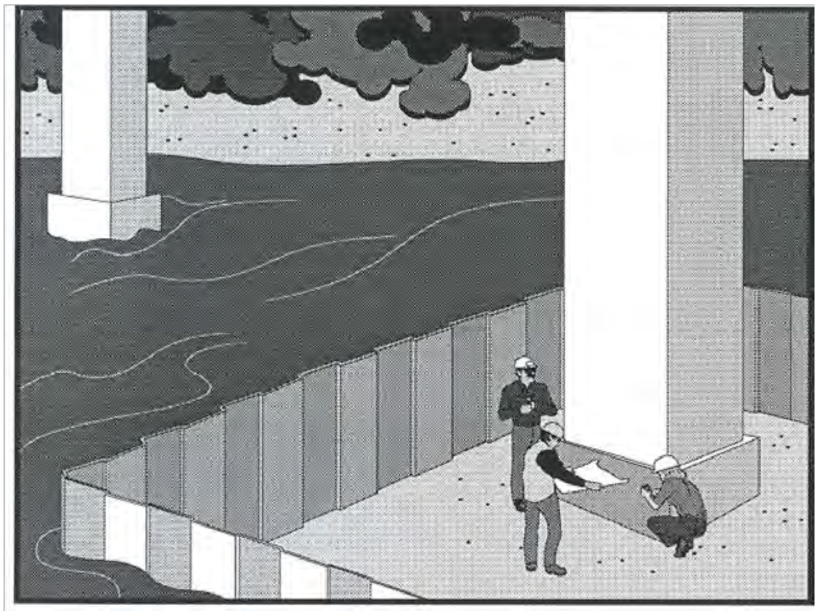


TYPICAL CULVERT CROSSING
NOT TO SCALE



TYPICAL FORD CROSSING
NOT TO SCALE

Clear water diversion consists of a system of structures and measures that intercept clear surface water runoff upstream of a project, transport it around the work area, and discharge it downstream with minimal water quality degradation from either the project construction operations or the construction of the diversion. Clear water diversions are used in a waterway to enclose a construction area and reduce sediment pollution from construction work occurring in or adjacent to water. Structures



Description and Purpose

commonly used as part of this system include diversion ditches, berms, dikes, slope drains, rock, gravel bags, wood, aqua barriers, cofferdams, filter fabric or turbidity curtains, drainage interceptor swales, pipes, or flumes.

Suitable Applications

A clear water diversion is typically implemented where appropriate permits (1601 Agreement) have been secured and work must be performed in a flowing stream or water body.

Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

Sediment ☑

Nutrients

Trash

Metals

Bacteria

Oil and Grease

Organics

Potential Alternatives

None and

- Clear water diversions are appropriate for isolating construction activities occurring within or near a water body such as streambank stabilization, or culvert, bridge, pier or abutment installation. They may also be used in combination with other methods, such as clear water bypasses and/or pumps.
- Pumped diversions are suitable for intermittent and low flow streams.
- Excavation of a temporary bypass channel, or passing the flow through a heavy pipe (called a "flume") with a trench excavated under it, is appropriate for the diversion of streams less than 20 ft wide, with flow rates less than 100 cfs.
- Clear water diversions incorporating clean washed gravel may be appropriate for use in salmonid spawning streams.

Limitations

- Diversion and encroachment activities will usually disturb the waterway during installation and removal of diversion structures.
- Installation may require Regional Water Quality Control Board (RWQCB) 401 Certification, U.S. Army Corps of Engineers 404 permit and approval by California Department of Fish and Game. If numerical-based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required.
- Diversion and encroachment activities may constrict the waterway, which can obstruct flood flows and cause flooding or washouts. Diversion structures should not be installed without identifying potential impacts to the stream channel.
- Diversion or isolation activities are not appropriate in channels where there is insufficient stream flow to support aquatic species in the area dewatered as a result of the diversion.
- Diversion or isolation activities are inappropriate in deep water unless designed or reviewed by an engineer registered in California.
- Diversion or isolation activities should not completely dam stream flow.
- Dewatering and removal may require additional sediment control or water treatment. See NS-2, Dewatering Operations.
- Not appropriate if installation, maintenance, and removal of the structures will disturb sensitive aquatic species of concern.

Implementation *General*

- Implement guidelines presented in NS-17, Streambank Stabilization to minimize impacts to streambanks.

- Where working areas encroach on flowing streams, barriers adequate to prevent the flow of muddy water into streams should be constructed and maintained between working areas and streams. During construction of the barriers, muddying of streams should be held to a minimum.

- Diversion structures must be adequately designed to accommodate fluctuations in water depth or flow volume due to tides, storms, flash floods, etc.

- Heavy equipment driven in wet portions of a water body to accomplish work should be completely clean of petroleum residue, and water levels should be below the fuel tanks, gearboxes, and axles of the equipment unless lubricants and fuels are sealed such that inundation by water will not result in discharges of fuels, oils, greases, or hydraulic fluids.

- Excavation equipment buckets may reach out into the water for the purpose of removing or placing fill materials. Only the bucket of the crane/ excavator/backhoe may operate in a water body. The main body of the crane/excavator/backhoe should not enter the water body except as necessary to cross the stream to access the work site.

- Stationary equipment such as motors and pumps located within or adjacent to a water body, should be positioned over drip pans.

- When any artificial obstruction is being constructed, maintained, or placed in operation, sufficient water should, at all times, be allowed to pass downstream to maintain aquatic life.

- Equipment should not be parked below the high water mark unless allowed by a permit.

- Disturbance or removal of vegetation should not exceed the minimum necessary to complete operations. Precautions should be taken to avoid damage to vegetation by people or equipment. Disturbed vegetation should be replaced with the appropriate erosion control measures.

- Riparian vegetation approved for trimming as part of the project should be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation should be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble should be removed upon completion of project activities.

- Drip pans should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.

- Where possible, avoid or minimize diversion and encroachment impacts by scheduling construction during periods of low flow or when the stream is dry. Scheduling should also consider seasonal releases of water from dams, fish migration and spawning seasons, and water demands due to crop irrigation.

- Construct diversion structures with materials free of potential pollutants such as soil, silt, sand, clay, grease, or oil.

Temporary Diversions and Encroachments

- Construct diversion channels in accordance with EC-9, Earth Dikes and Drainage Swales.

- In high flow velocity areas, stabilize slopes of embankments and diversion ditches using an appropriate liner, in accordance with EC-7, Geotextiles and Mats, or use rock slope protection.

- Where appropriate, use natural streambed materials such as large cobbles and boulders for temporary embankment and slope protection, or other temporary soil stabilization methods.

- Provide for velocity dissipation at transitions in the diversion, such as the point where the stream is diverted to the channel and the point where the diverted stream is returned to its natural channel. See also EC-10, Velocity Dissipation Devices.

Temporary Dry Construction Areas

- When dewatering behind temporary structures to create a temporary dry construction area, such as cofferdams, pass pumped water through a sediment-settling device, such as a portable tank or settling basin, before returning water to the water body. See also NS-2, Dewatering Operations.

- Any substance used to assemble or maintain diversion structures, such as form oil, should be non-toxic and non-hazardous.

- Any material used to minimize seepage underneath diversion structures, such as grout, should be non-toxic, non-hazardous, and as close to a neutral pH as possible. ***Comparison of Diversion and Isolation Techniques:***

- Gravel bags are relatively inexpensive, but installation and removal can be labor intensive. It is also difficult to dewater the isolated area. Sandbags should not be used for this technique in rivers or streams, as sand should never be put into or adjacent to a stream, even if encapsulated in geotextile.

- Gravel Bag Berms (SE-6) used in conjunction with an impermeable membrane are cost effective, and can be dewatered relatively easily. If spawning gravel is used, the impermeable membrane can be removed from the stream, and the gravel can be spread out and left as salmonid spawning habitat if approved in the permit. Only clean, washed gravel should be used for both the gravel bag and gravel berm techniques.

- Cofferdams are relatively expensive, but frequently allow full dewatering. Also, many options now available are relatively easy to install.

- Sheet pile enclosures are a much more expensive solution, but do allow full dewatering. This technique is not well suited to small streams, but can be effective on large rivers or lakes, and where staging and heavy equipment access areas are available.

- K-rails are an isolation method that does not allow full dewatering, but can be used in small to large watercourses, and in fast-water situations.

- A relatively inexpensive isolation method is filter fabric isolation. This method involves placement of gravel bags or continuous berms to 'key-in' the fabric, and subsequently staking the fabric in place. This method should be used in relatively calm water, and can be used in smaller streams. Note that this is not a dewatering method, but rather a sediment isolation method.

- Turbidity curtains should be used where sediment discharge to a stream is unavoidable. They can also be used for in-stream construction, when dewatering an area is not required.

- When used in watercourses or streams, cofferdams must be used in accordance with permit requirements.

- Manufactured diversion structures should be installed following manufacturer's specifications.

- Filter fabric and turbidity curtain isolation installation methods can be found in the specific technique descriptions that follow.

Filter Fabric Isolation Technique

Definition and Purpose

A filter fabric isolation structure is a temporary structure built into a waterway to enclose a construction area and reduce sediment pollution from construction work in or adjacent to water. This structure is composed of filter fabric, gravel bags, and steel t-posts.

Appropriate Applications

- Filter fabric may be used for construction activities such as streambank stabilization, or culvert, bridge, pier or abutment installation. It may also be used in combination with other methods, such as clean water bypasses and/or pumps.

- Filter fabric isolation is relatively inexpensive. This method involves placement of gravel bags or continuous berms to 'key-in' the fabric, and subsequently staking the fabric in place.

- If spawning gravel is used, all other components of the isolation can be removed from the stream, and the gravel may be spread out and left as salmonid spawning habitat if approved in the permit. Whether spawning gravel or other types of gravel are used, only clean washed gravel should be used as infill for the gravel bags or continuous berm.

- This method should be used in relatively calm water, and can be used in smaller streams. This is not a dewatering method, but rather a sediment isolation method.

- Water levels inside and outside the fabric curtain must be about the same, as differential heads will cause the curtain to collapse.

Limitations

- Do not use if the installation, maintenance and removal of the structures will disturb sensitive aquatic species of concern.

- Filter fabrics are not appropriate for projects where dewatering is necessary.

- Filter fabrics are not appropriate to completely dam stream flow.

Design and Installation

- For the filter fabric isolation method, a non-woven or heavy-duty fabric is recommended over standard silt fence. Using rolled geotextiles allows non-standard widths to be used.

- Anchor filter fabric with gravel bags filled with clean, washed gravel. Do not use sand. If a bag should split open, the gravel can be left in the stream, where it can provide aquatic habitat benefits. If a sandbag splits open in a watercourse, the sand could cause a decrease in water quality, and could bury sensitive aquatic habitat.

- Another anchor alternative is a continuous berm, made with the Continuous Berm Machine. This is a gravel-filled bag that can be made in very long segments. The length of the berms is usually limited to 18 ft for ease of handling (otherwise, it gets too heavy to move).

- Place the fabric on the bottom of the stream, and place either a bag of clean, washed gravel or a continuous berm over the bottom of the silt fence fabric, such that a bag-width of fabric lies on the stream bottom. The bag should be placed on what will be the outside of the isolation area.

- Pull the fabric up, and place a metal t-post immediately behind the fabric, on the inside of the isolation area; attach the silt fence to the post with three diagonal nylon ties.

- Continue placing fabric as described above until the entire work area has been isolated, staking the fabric at least every 6 ft.

Inspection and Maintenance

- Immediately repair any gaps, holes or scour.

- Remove and properly dispose of sediment buildup.

- Remove BMP upon completion of construction activity. Recycle or reuse if applicable.

- Revegetate areas disturbed by BMP removal if needed.

Turbidity Curtain Isolation Technique

Definition and Purpose

A turbidity curtain is a fabric barrier used to isolate the near shore work area. The barriers are intended to confine the suspended sediment. The curtain is a floating barrier, and thus does not prevent water from entering the isolated area; rather, it prevents suspended sediment from getting out.

Appropriate Applications

Turbidity curtains should be used where sediment discharge to a stream is unavoidable. They are used when construction activities adjoin quiescent waters, such as lakes, ponds, and slow flowing rivers. The curtains are designed to deflect and contain sediment within a limited area and provide sufficient retention time so that the sediment particles will fall out of suspension.

Limitations

- Turbidity curtains should not be used in flowing water; they are best suited for use in ponds, lakes, and very slow-moving rivers.

- Turbidity curtains should not be placed across the width of a channel.
- Removing sediment that has been deflected and settled out by the curtain may create a discharge problem through the resuspension of particles and by accidental dumping by the removal equipment. *Design and Installation*
- Turbidity curtains should be oriented parallel to the direction of flow.
- The curtain should extend the entire depth of the watercourse in calm-water situations.
- In wave conditions, the curtain should extend to within 1 ft of the bottom of the watercourse, such that the curtain does not stir up sediment by hitting the bottom repeatedly. If it is

  desirable for the curtain to reach the bottom in an active-water situation, a pervious filter fabric may be used for the bottom 1 ft.
- The top of the curtain should consist of flexible flotation buoys, and the bottom should be held down by a load line incorporated into the curtain fabric. The fabric should be a brightly colored impervious mesh.
- The curtain should be held in place by anchors placed at least every 100 ft.
- First, place the anchors, then tow the fabric out in a furled condition, and connect to the anchors. The anchors should be connected to the flotation devices, and not to the bottom of the curtain. Once in place, cut the furling lines, and allow the bottom of the curtain to sink.
- Consideration must be given to the probable outcome of the removal procedure. It must be determined if it will create more of a sediment problem through re-suspension of the particles or by accidental dumping of material during removal. It is recommended that the soil particles trapped by the turbidity curtain only be removed if there has been a significant change in the original contours of the affected area in the watercourse.
- Particles should always be allowed to settle for a minimum of 6 to 12 hours prior to their removal or prior to removal of the turbidity curtain. *Maintenance and Inspection:*
- The curtain should be inspected for holes or other problems, and any repairs needed should be made promptly.
- Allow sediment to settle for 6 to 12 hours prior to removal of sediment or curtain. This means that after removing sediment, wait an additional 6 to 12 hours before removing the curtain.
- To remove, install furling lines along the curtain, detach from anchors, and tow out of the water.

K-rail River Isolation

Definition and Purpose

This temporary sediment control or stream isolation method uses K-rails to form the sediment deposition area, or to isolate the in-stream or near-bank construction area.

Barriers are placed end-to-end in a pre-designed configuration and gravel-filled bags are used at the toe of the barrier and at their abutting ends to seal and prevent movement of sediment beneath or through the barrier walls.

Appropriate Applications
The K-rail isolation can be used in streams with higher water velocities than many other isolation techniques.

- This technique is also useful at the toe of embankments, and cut or fill slopes.

Limitations
- The K-rail method should not be used to dewater a project site, as the barrier is not watertight. *Design and Installation*
- To create a floor for the K-rail, move large rocks and obstructions. Place washed gravel and gravel-filled bags to create a level surface for K-rails to sit. Washed gravel should always be used.

- Place the bottom two K-rails adjacent to each other, and parallel to the direction of flow; fill the center portion with gravel bags. Then place the third K-rail on top of the bottom two. There should be sufficient gravel bags between the bottom K-rails such that the top rail is supported by the gravel. Place plastic sheeting around the K-rails, and secure at the bottom with gravel bags.

- Further support can be added by pinning and cabling the K-rails together. Also, large riprap and boulders can be used to support either side of the K-rail, especially where there is strong current. *Inspection and Maintenance:*
- The barrier should be inspected and any leaks, holes, or other problems should be addressed immediately.

- Sediment should be allowed to settle for at least 6 to 12 hours prior to removal of sediment, and for 6 to 12 hours prior to removal of the barrier.

Stream Diversions
The selection of which stream diversion technique to use will depend upon the type of work involved, physical characteristics of the site, and the volume of water flowing through the project.

Advantages of a Pumped Diversion
- Downstream sediment transport can be nearly eliminated.

- Dewatering of the work area is possible.

- Pipes can be moved around to allow construction operations.

- The dams can serve as temporary access to the site.

- Increased flows can be managed by adding more pumping capacity.

Disadvantages of a Pumped Diversion

- Flow volume is limited by pump capacity.
- A pumped diversion requires 24 hour monitoring of pumps.
- Sudden rain could overtop dams.
- Erosion at the outlet.
- Minor in-stream disturbance is required to install and remove dams. *Advantages of Excavated Channels and Flumes*
- Excavated channels isolate work from water flow and allow dewatering.
- Excavated channels can handle larger flows than pumps. *Disadvantages of Excavated Channels and Flumes*
- Bypass channel or flume must be sized to handle flows, including possible floods.
- Channels must be protected from erosion.
- Flow diversion and re-direction with small dams involves in-stream disturbance and mobilization of sediment. *Design and Installation*
- Installation guidelines will vary based on existing site conditions and type of diversion used.
- Pump capacity must be sufficient for design flow.
- A standby pump is required in case a primary pump fails.
- Dam materials used to create dams upstream and downstream of diversion should be erosion resistant; materials such as steel plate, sheet pile, sandbags, continuous berms, inflatable water bladders, etc., would be acceptable.

When constructing a diversion channel, begin excavation of the channel at the proposed downstream end, and work upstream. Once the watercourse to be diverted is reached and the excavated channel is stable, breach the upstream end and allow water to flow down the new channel. Once flow has been established in the diversion channel, install the diversion weir in the main channel; this will force all water to be diverted from the main channel.

Inspection and Maintenance

- Pumped diversions require 24 hour monitoring of pumps.
- Inspect embankments and diversion channels for damage to the linings, accumulating debris, sediment buildup, and adequacy of the slope protection. Remove debris and repair linings and slope protection as required. Remove holes, gaps, or scour.

- Upon completion of work, the diversion or isolation structure should be removed and flow should be redirected through the new culvert or back into the original stream channel. Recycle or reuse if applicable.

- Revegetate areas disturbed by BMP removal if needed.

Costs
Costs of clear water diversion vary considerably and can be very high.

Inspection and Maintenance
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.

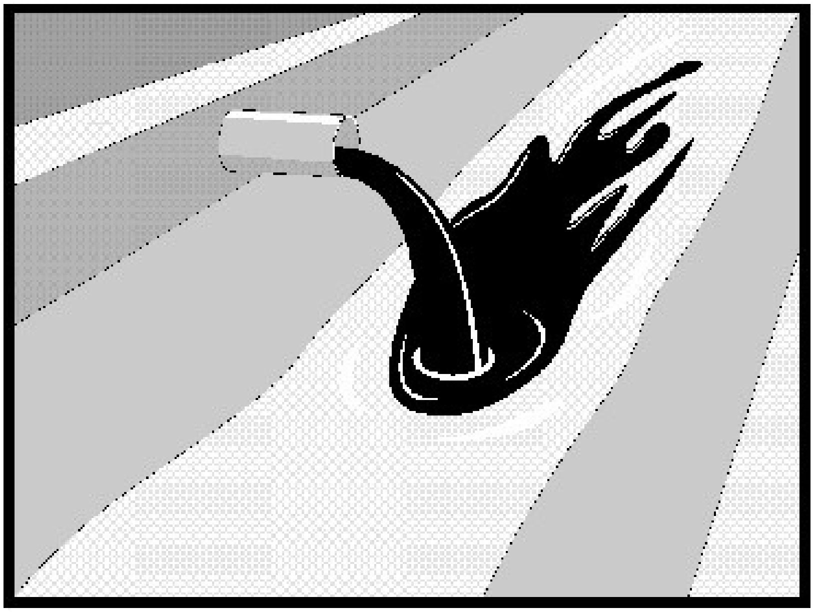
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Refer to BMP-specific inspection and maintenance requirements.

References
California Bank and Shore Rock Slope Protection Design – Practitioners Guide and Field Evaluations of Riprap Methods, Caltrans Study No. F90TL03, October, 2000.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Illicit Connection / Discharge NS-6



Objectives

EC	Erosion Control
SE	Sediment Control
TR	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

- Inspect site before beginning the job for evidence of illicit connections, illegal dumping or discharges. Document any pre-existing conditions and notify the owner.

Sediment
Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics

Potential Alternatives

None

Description and Purpose

Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Illicit connection/discharge and reporting is applicable anytime an illicit connection or discharge is discovered or illegally dumped material is found on the construction site.

Limitations

Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor. If pre-existing hazardous materials or wastes are known to exist onsite, they should be identified in the SWPPP and handled as set forth in the SWPPP.

Implementation

Planning

- Review the SWPPP. Pre-existing areas of contamination should be identified and documented in the SWPPP.

NS-6 Illicit Connection / Discharge

④ Inspect site regularly during project execution for evidence of illicit connections, illegal dumping or discharges.

④ Observe site perimeter for evidence for potential of illicitly discharged or illegally dumped material, which may enter the job site.

Identification of Illicit Connections and Illegal Dumping or Discharges ④

General – unlabeled and unidentifiable material should be treated as hazardous.

④ **Solids** - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.

④ **Liquids** - signs of illegal liquid dumping or discharge can include:

- Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils
- Pungent odors coming from the drainage systems
- Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
- Abnormal water flow during the dry weather season

④ **Urban Areas** - Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:

- Abnormal water flow during the dry weather season
- Unusual flows in sub drain systems used for dewatering
- Pungent odors coming from the drainage systems
- Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
- Excessive sediment deposits, particularly adjacent to or near active offsite construction projects

④ **Rural Areas** - Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:

- Abnormal water flow during the non-irrigation season
- Non-standard junction structures
- Broken concrete or other disturbances at or near junction structures

Reporting
Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery. For illicit connections or discharges to the storm drain system, notify the local stormwater management agency. For illegal dumping, notify the local law enforcement agency.

Cleanup and Removal
The responsibility for cleanup and removal of illicit or illegal dumping or discharges will vary by location. Contact the local stormwater management agency for further information.

Costs
Costs to look for and report illicit connections and illegal discharges and dumping are low. The best way to avoid costs associated with illicit connections and illegal discharges and dumping is to keep the project perimeters secure to prevent access to the site, to observe the site for vehicles that should not be there, and to document any waste or hazardous materials that exist onsite before taking possession of the site.

Inspection and Maintenance
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect the site regularly to check for any illegal dumping or discharge.
- Prohibit employees and subcontractors from disposing of non-job related debris or materials at the construction site.
- Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery.

References
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Potable Water/Irrigation NS-7

Objectives

Legend:

Primary Objective

Secondary Objective

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	▭
WM	Waste Management and Materials Pollution Control	

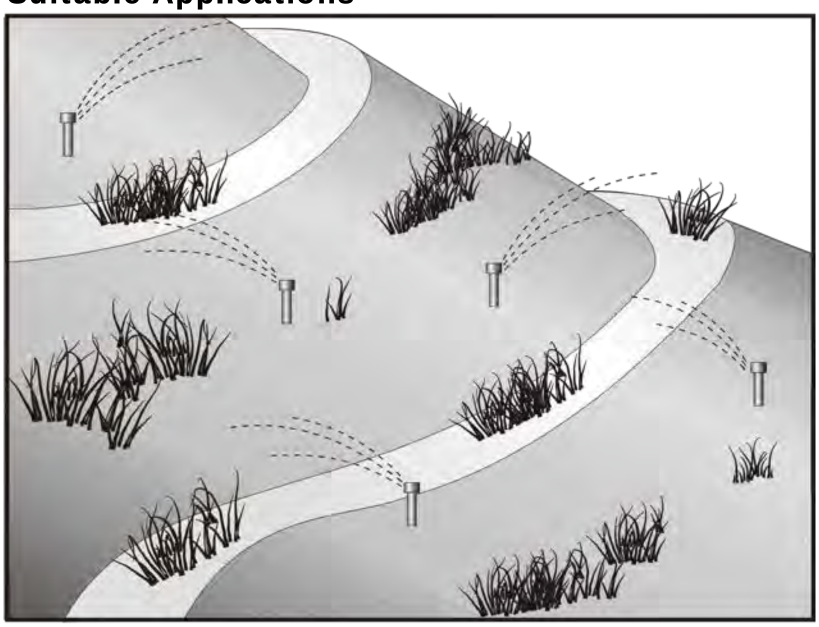
Targeted Constituents

Sediment	
Nutrients	▭
Trash	▭
Metals	
Bacteria	▭
Oil and Grease	
Organics	▭

Description and Purpose

Potable Water/Irrigation consists of practices and procedures to manage the discharge of potential pollutants generated during discharges from irrigation water lines, landscape irrigation, lawn or garden watering, planned and unplanned discharges from potable water sources, water line flushing, and hydrant flushing.

Suitable Applications



Implement this BMP whenever potable water or irrigation water discharges occur at or enter a construction site.

Potential Alternatives

None

Limitations

None identified.

Implementation

④ Direct water from offsite sources around or through a construction site, where feasible, in a way that minimizes contact with the construction site.

④ Discharges from water line flushing should be reused for landscaping purposes where feasible.

- Shut off the water source to broken lines, sprinklers, or valves as soon as possible to prevent excess water flow.

- Protect downstream stormwater drainage systems and watercourses from water pumped or bailed from trenches excavated to repair water lines.

NS-7 Potable Water / Irrigation

- Inspect irrigated areas within the construction limits for excess watering. Adjust watering times and schedules to ensure that the appropriate amount of water is being used and to minimize runoff. Consider factors such as soil structure, grade, time of year, and type of plant material in determining the proper amounts of water for a specific area.

Costs

Cost to manage potable water and irrigation are low and generally considered to be a normal part of related activities.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Repair broken water lines as soon as possible.

- Inspect irrigated areas regularly for signs of erosion and/or discharge.

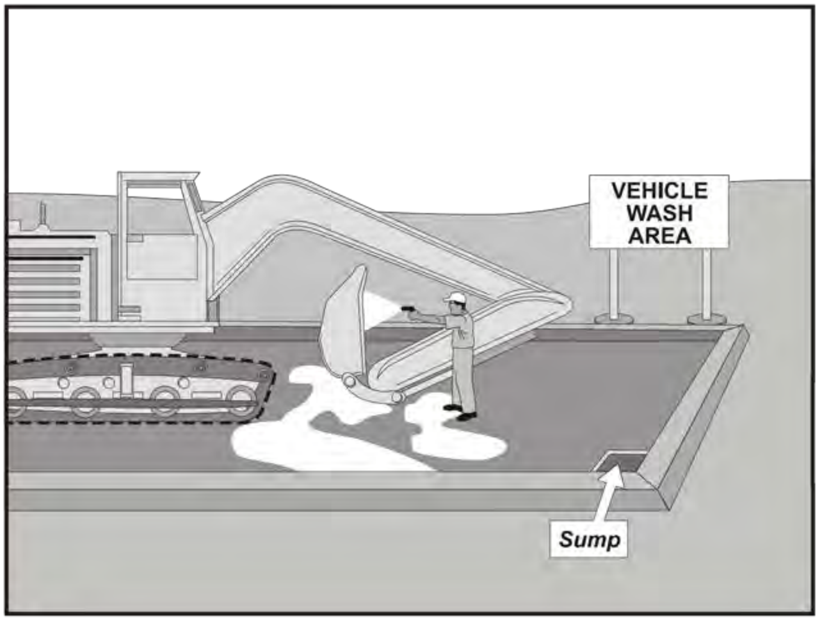
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle and Equipment Cleaning NS-8



Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	⊟
Nutrients	⊟
Trash	
Metals	
Bacteria	
Oil and Grease	⊟
Organics	⊟

Potential Alternatives

None

Description and Purpose

Vehicle and equipment cleaning procedures and practices eliminate or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning operations. Procedures and practices include but are not limited to: using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors in proper cleaning procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment cleaning is performed.

Limitations

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades. Sending vehicles/equipment offsite should be done in conjunction with TR-1, Stabilized Construction Entrance/Exit.

Implementation

Other options to washing equipment onsite include contracting with either an offsite or mobile commercial washing business. These businesses may be better equipped to handle and dispose of the wash waters properly. Performing this work offsite can also be economical by eliminating the need for a separate washing operation onsite.

If washing operations are to take place onsite, then:

NS-8 Vehicle and Equipment Cleaning

- Use phosphate-free, biodegradable soaps.

- Educate employees and subcontractors on pollution prevention measures.

- Do not permit steam cleaning onsite. Steam cleaning can generate significant pollutant concentrates.

- Cleaning of vehicles and equipment with soap, solvents or steam should not occur on the project site unless resulting wastes are fully contained and disposed of. Resulting wastes should not be discharged or buried, and must be captured and recycled or disposed according to the requirements of WM-10, Liquid Waste Management or WM-6, Hazardous Waste Management, depending on the waste characteristics. Minimize use of solvents. Use of diesel for vehicle and equipment cleaning is prohibited.

- All vehicles and equipment that regularly enter and leave the construction site must be cleaned offsite.

- When vehicle and equipment washing and cleaning must occur onsite, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area should have the following characteristics:

  - Located away from storm drain inlets, drainage facilities, or watercourses

  - Paved with concrete or asphalt and bermed to contain wash waters and to prevent runon and runoff

  - Configured with a sump to allow collection and disposal of wash water

  - No discharge of wash waters to storm drains or watercourses

  - Used only when necessary

- When cleaning vehicles and equipment with water:

  - Use as little water as possible. High-pressure sprayers may use less water than a hose and should be considered

  - Use positive shutoff valve to minimize water usage

- Facility wash racks should discharge to a sanitary sewer, recycle system or other approved discharge system and must not discharge to the storm drainage system, watercourses, or to groundwater

Costs

Cleaning vehicles and equipment at an offsite facility may reduce overall costs for vehicle and equipment cleaning by eliminating the need to provide similar services onsite. When onsite cleaning is needed, the cost to establish appropriate facilities is relatively low on larger, longduration projects, and moderate to high on small, short-duration projects.

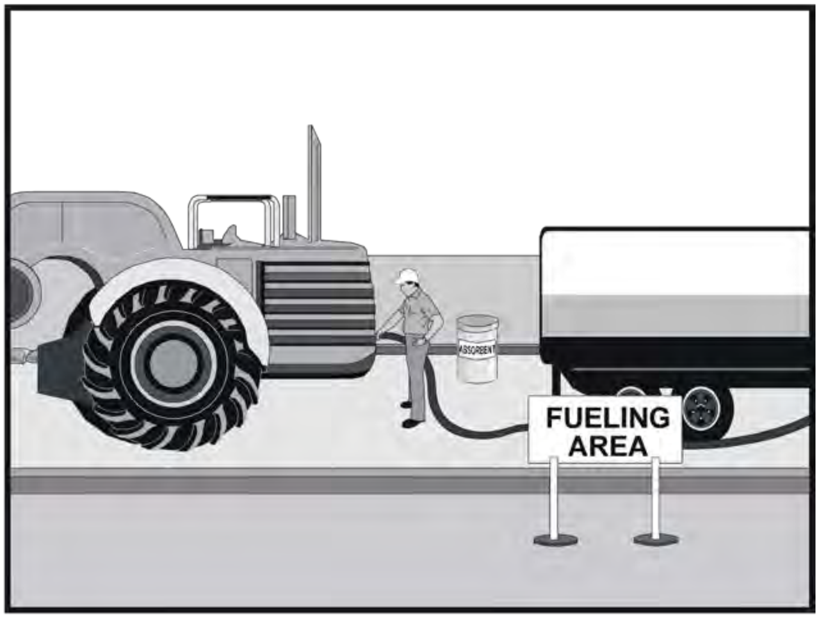
Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspection and maintenance is minimal, although some berm repair may be necessary.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed.
- Prohibit employees and subcontractors from washing personal vehicles and equipment on the construction site.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Swisher, R.D. Surfactant Biodegradation, Marcel Decker Corporation, 1987.



Objectives

EC	Erosion Control
SE	Sediment Control
TR	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

Sediment
Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics

Potential Alternatives

None

Description and Purpose

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks, and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment fueling takes place.

Limitations

Onsite vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment offsite for fueling. Sending vehicles and equipment offsite should be done in conjunction with TR-1, Stabilized Construction Entrance/ Exit.

Implementation

- Use offsite fueling stations as much as possible. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at a site.

- Discourage “topping-off” of fuel tanks.

NS-9 Vehicle and Equipment Fueling

- Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks, and should be disposed of properly after use.
- Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.
- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fueling and cleanup procedures.
- When fueling must take place onsite, designate an area away from drainage courses to be used. Fueling areas should be identified in the SWPPP.
- Dedicated fueling areas should be protected from stormwater runon and runoff, and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and dikes to prevent runon, runoff, and to contain spills.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- Federal, state, and local requirements should be observed for any stationary above ground storage tanks.

Costs

- All of the above measures are low cost except for the capital costs of above ground tanks that meet all local environmental, zoning, and fire codes.

Inspection and Maintenance

- Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately or problem vehicles or equipment should be removed from the project site.

- Keep ample supplies of spill cleanup materials onsite.
- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.

References

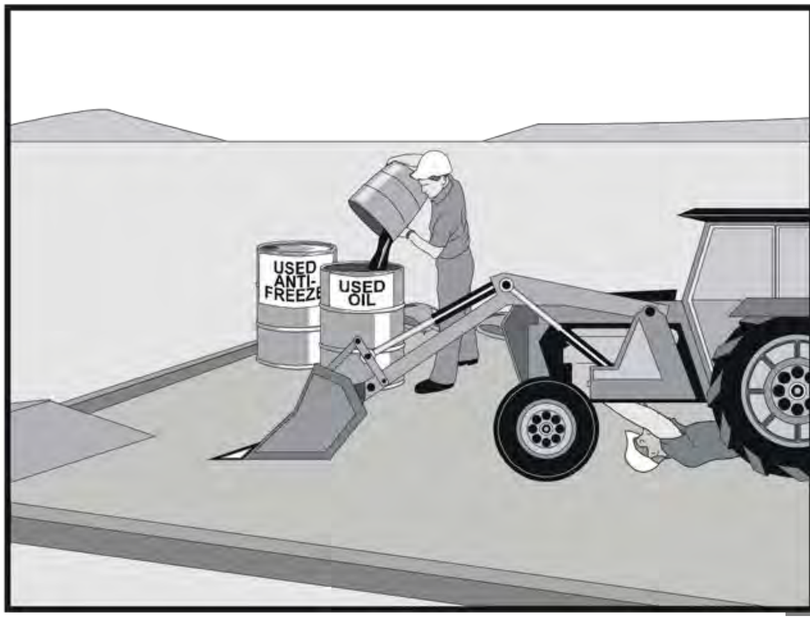
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle & Equipment Maintenance NS-10



Objectives

EC	Erosion Control
SE	Sediment Control
TR	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

Description and Purpose

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a "dry and clean site". The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Suitable Applications

These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles/equipment offsite should be done in conjunction with TR-1, Stabilized Construction Entrance/Exit.

Outdoor vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). For further information on vehicle or equipment servicing, see NS-8, Vehicle and Equipment Cleaning, and NS-9, Vehicle and Equipment Fueling.

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

Sediment	
Nutrients	☐
Trash	☐
Metals	
Bacteria	
Oil and Grease	☐
Organics	☐

Potential Alternatives

None

NS-10 Vehicle & Equipment Maintenance

Implementation

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runon and runoff, and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately.
- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- Drip pans or plastic sheeting should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Consider use of new, alternative greases and lubricants, such as adhesive greases, for chassis lubrication and fifth-wheel lubrication.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.
- Repair leaks of fluids and oil immediately.

Vehicle & Equipment Maintenance NS-10

Listed below is further information if you must perform vehicle or equipment maintenance onsite.

Safer Alternative Products

- Consider products that are less toxic or hazardous than regular products. These products are often sold under an "environmentally friendly" label.

- Consider use of grease substitutes for lubrication of truck fifth-wheels. Follow manufacturers label for details on specific uses.

- Consider use of plastic friction plates on truck fifth-wheels in lieu of grease. Follow manufacturers label for details on specific uses.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, trichloroethane, or methylene chloride. Many of these cleaners are listed in California Toxic Rule as priority pollutants. These materials are harmful and must not contaminate stormwater. They must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents. The "chlor" term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling and Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous wastes separate, do not mix used oil solvents, and keep chlorinated solvents (like,trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around. Provide cover and secondary containment until these materials can be removed from the site.

Oil filters can be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Costs

All of the above are low cost measures. Higher costs are incurred to setup and maintain onsite maintenance areas.

NS-10 Vehicle & Equipment Maintenance

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Keep ample supplies of spill cleanup materials onsite.

- Maintain waste fluid containers in leak proof condition.

- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately or the problem vehicle(s) or equipment should be removed from the project site.

- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

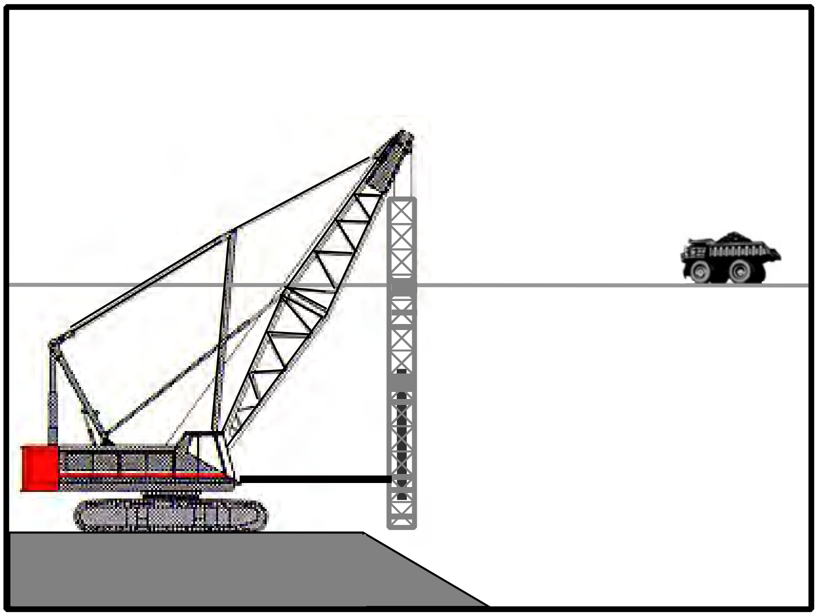
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Pile Driving Operations NS-11



Objectives

EC	Erosion Control
SE	Sediment Control
TR	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control ▭
WM	Waste Management and Materials Pollution Control

Legend:

▭ **Primary Objective**

▭ **Secondary Objective**

Targeted Constituents

Sediment	▭
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	▭
Organics	

Potential Alternatives

None

Description and Purpose

The construction and retrofit of bridges and retaining walls often include driving piles for foundation support and shoring operations. Driven piles are typically constructed of precast concrete, steel, or timber. Driven sheet piles are also used for shoring and cofferdam construction. Proper control and use of equipment, materials, and waste products from pile driving operations will reduce or eliminate the discharge of potential pollutants to the storm drain system, watercourses, and waters of the United States.

Suitable Applications

These procedures apply to all construction sites near or adjacent to a watercourse or groundwater where permanent and temporary pile driving (impact and vibratory) takes place, including operations using pile shells as well as construction of cast-in-steel-shell and cast-in-drilled-hole piles.

Limitations

None identified.

Implementation

- Use drip pans or absorbent pads during vehicle and equipment operation, maintenance, cleaning, fueling, and

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storage. Refer to NS-8, Vehicle and Equipment Cleaning, NS-9, Vehicle and Equipment Fueling, and NS-10, Vehicle and Equipment Maintenance.

NS-11 Pile Driving Operations

- Have spill kits and cleanup materials available at all locations of pile driving. Refer to WM4, Spill Prevention and Control.

- Equipment that is stored or in use in streambeds, or on docks, barges, or other structures over water bodies should be kept leak free.

- Park equipment over plastic sheeting or equivalent where possible. Plastic is not a substitute for drip pans or absorbent pads. The storage or use of equipment in streambeds or other bodies of water must comply with all applicable permits.

- Implement other BMPs as applicable, such as NS-2, Dewatering Operations, WM-5, Solid Waste Management, WM-6, Hazardous Waste Management, and WM-10, Liquid Waste Management.

- When not in use, store pile-driving equipment away from concentrated flows of stormwater, drainage courses, and inlets. Protect hammers and other hydraulic attachments from runon and runoff by placing them on plywood and covering them with plastic or a comparable material prior to the onset of rain.

- Use less hazardous products, e.g., vegetable oil, when practicable.

Costs

All of the above measures can be low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

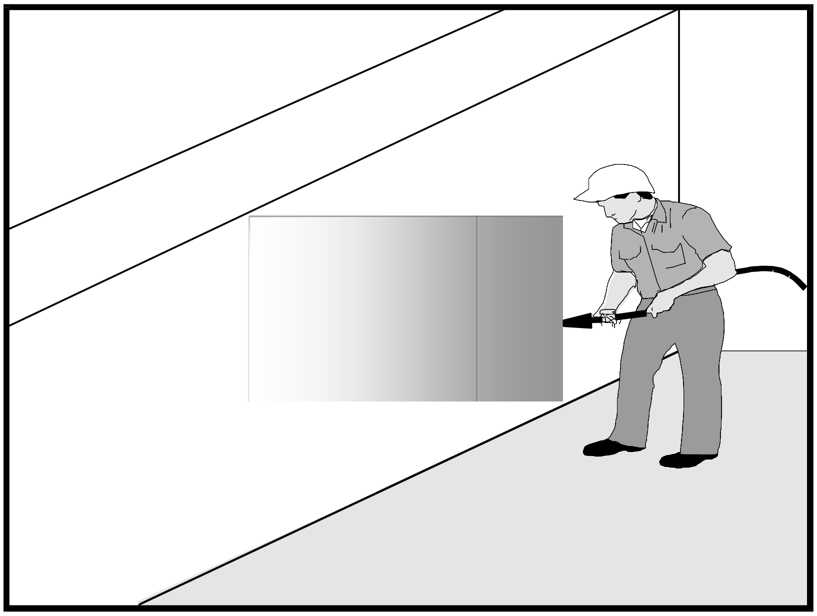
- Inspect equipment every day at startup and repair equipment as needed (i.e., worn or damaged hoses, fittings, and gaskets). Recheck equipment at shift changes or at the end of the day and scheduled repairs as needed.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Concrete Curing NS-12



Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☐ **Secondary Objective**

Targeted Constituents

Description and Purpose

Concrete curing is used in the construction of structures such as bridges, retaining walls, pump houses, large slabs, and structured foundations. Concrete curing includes the use of both chemical and water methods. Discharges of stormwater and non-stormwater exposed to concrete during curing may have a high pH and may contain chemicals, metals, and fines. Proper procedures reduce or eliminate the contamination of stormwater runoff during concrete curing.

Suitable Applications

Suitable applications include all projects where Portland Cement Concrete (PCC) and concrete curing chemicals are placed where they can be exposed to rainfall, runoff from other areas, or where runoff from the PCC will leave the site.

Limitations

None identified.

Implementation

Chemical Curing

- Avoid over spray of curing compounds.

- Minimize the drift of chemical cure as much as possible by applying the curing compound close to the concrete surface. Apply an amount of compound that covers the surface, but does not allow any runoff of the compound.

Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

NS-12 Concrete Curing

- Use proper storage and handling techniques for concrete curing compounds. Refer to WM1, Material Delivery and Storage.

- Protect drain inlets prior to the application of curing compounds.

- Refer to WM-4, Spill Prevention and Control.

Water Curing for Bridge Decks, Retaining Walls, and other Structures

- Direct cure water away from inlets and watercourses to collection areas for infiltration or other means of removal in accordance with all applicable permits.

- Collect cure water at the top of slopes and transport or dispose of water in a non-erodible manner. See EC-9 Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.

- Utilize wet blankets or a similar method that maintains moisture while minimizing the use and possible discharge of water.

Costs

All of the above measures are generally low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Ensure that employees and subcontractors implement appropriate measures for storage, handling, and use of curing compounds.

- Inspect cure containers and spraying equipment for leaks.

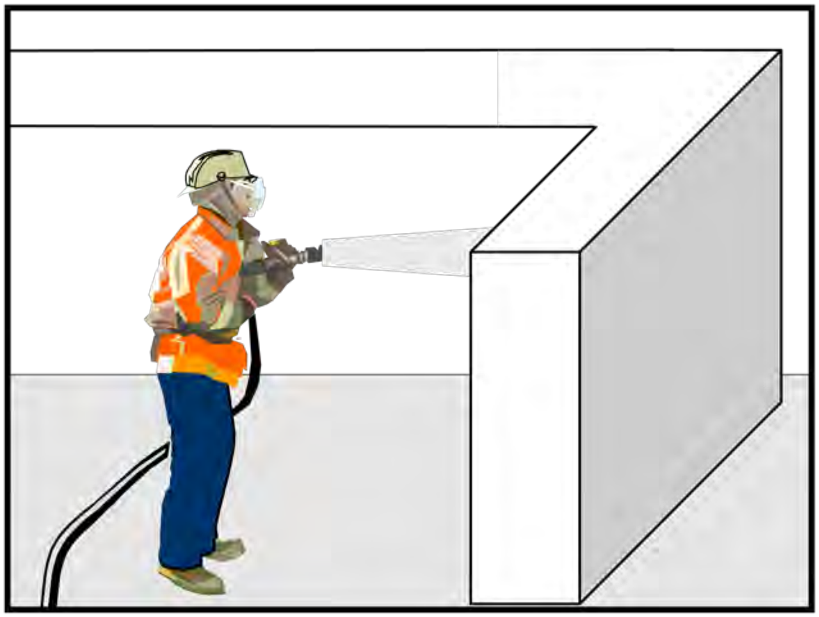
References

Blue Print for a Clean Bay-Construction-Related Industries: Best Management Practices for Stormwater Pollution Prevention; Santa Clara Valley Non Point Source Pollution Control Program, 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Concrete Finishing NS-13



that

Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment
Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics

Potential Alternatives non-

None

Description and Purpose

Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances. Methods include sand blasting, shot blasting, grinding, or high pressure water blasting. Stormwater and non-stormwater exposed to concrete finishing by-products may have a high pH and may contain chemicals, metals, and fines. Proper procedures and implementation of appropriate BMPs can minimize the impact concrete-finishing methods may have on stormwater and

stormwater discharges.

Suitable Applications

These procedures apply to all construction locations where concrete finishing operations are performed.

Limitations

None identified.

Implementation

- Collect and properly dispose of water from high-pressure water blasting operations.

- Collect contaminated water from blasting operations at the top of slopes. Transport or dispose of contaminated water while using BMPs such as those for erosion control. Refer to EC-9, Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.

NS-13 Concrete Finishing

- Direct water from blasting operations away from inlets and watercourses to collection areas for infiltration or other means of removal (dewatering). Refer to NS-2 De-Watering Operations.

- Protect inlets during sandblasting operations. Refer to SE-10, Storm Drain Inlet Protection.

- Refer to WM-8, Concrete Waste Management for disposal of concrete based debris.

- Minimize the drift of dust and blast material as much as possible by keeping the blasting nozzle close to the surface.

- When blast residue contains a potentially hazardous waste, refer to WM-6, Hazardous Waste Management.

Costs

These measures are generally of low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Sweep or vacuum up debris from sandblasting at the end of each shift.

- At the end of each work shift, remove and contain liquid and solid waste from containment structures, if any, and from the general work area.

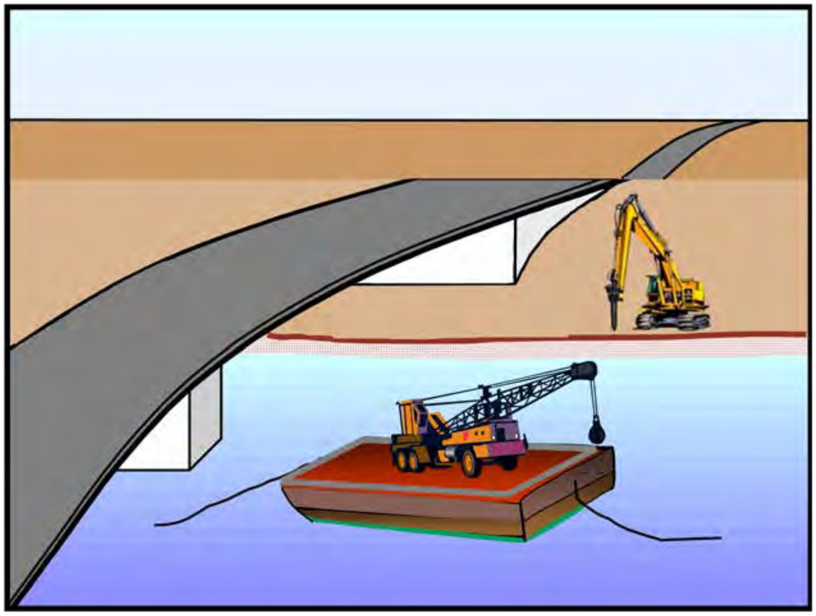
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Material Over Water NS-14



Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☐
Nutrients	☐
Trash	☐
Metals	☐
Bacteria	☐
Oil and Grease	☐
Organics	☐

Potential Alternatives

None

Description and Purpose

Procedures for the proper use, storage, and disposal of materials and equipment on barges, boats, temporary construction pads, or similar locations, that minimize or eliminate the discharge of potential pollutants to a watercourse.

Suitable Applications

Applies where materials and equipment are used on barges, boats, docks, and other platforms over or adjacent to a watercourse including waters of the United States. These procedures should be implemented for construction materials and wastes (solid and liquid), soil or dredging materials, or any other materials that may cause or contribute to exceedances of water quality standards.

Limitations

Dredge and fill activities are regulated by the US Army Corps of Engineers and Regional Boards under Section 404/401 of the Clean Water Act.

Implementation

- Refer to WM-1, Material Delivery and Storage and WM-4, Spill Prevention and Control.
- Use drip pans and absorbent materials for equipment and vehicles and ensure that an adequate supply of spill clean up materials is available.
- Drip pans should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies

NS-14 Material Over Water

when the vehicle or equipment is expected to be idle for more than 1 hour.

- Maintain equipment in accordance with NS-10, Vehicle and Equipment Maintenance. If a leaking line cannot be repaired, remove equipment from over the water.
- Provide watertight curbs or toe boards to contain spills and prevent materials, tools, and debris from leaving the barge, platform, dock, etc.
- Secure all materials to prevent discharges to receiving waters via wind.
- Identify types of spill control measures to be employed, including the storage of such materials and equipment. Ensure that staff is trained regarding the use of the materials, deployment and access of control measures, and reporting measures.
- In case of spills, contact the local Regional Board as soon as possible but within 48 hours.
- Refer to WM-5, Solid Waste Management (non-hazardous) and WM-6, Hazardous Waste Management. Ensure the timely and proper removal of accumulated wastes
- Comply with all necessary permits required for construction within or near the watercourse, such as Regional Water Quality Control Board, U.S. Army Corps of Engineers, Department of Fish and Game or and other local permitting.
- Discharges to waterways should be reported to the Regional Water Quality Control Board immediately upon discovery. A written discharge notification must follow within 7 days. Follow the spill reporting procedures contained in SWPPP.

Costs

These measures are generally of low to moderate cost. Exceptions are areas for temporary storage of materials, engine fluids, or wastewater pump out.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Ensure that employees and subcontractors implement the appropriate measures for storage and use of materials and equipment.

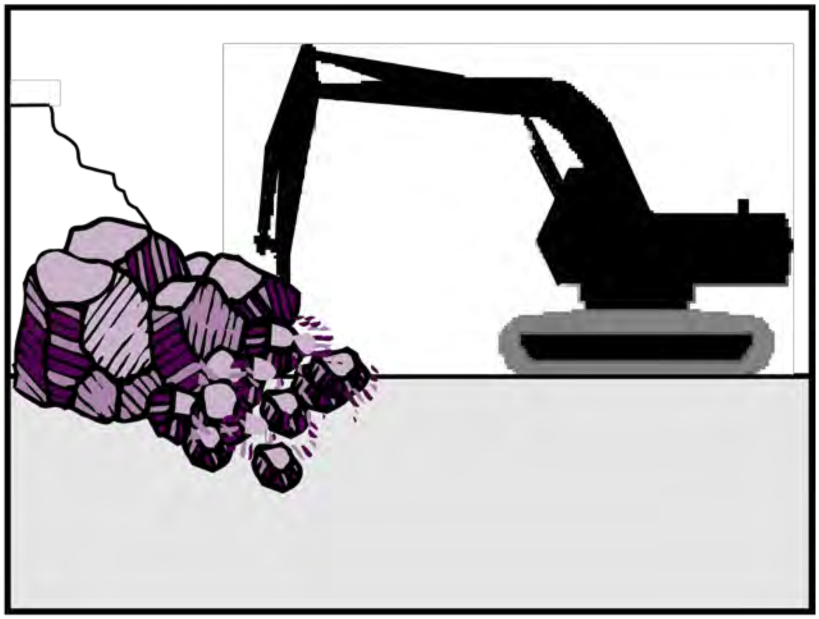
- Inspect and maintain all associated BMPs and perimeter controls to ensure continuous protection of the water courses, including waters of the United States.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Demolition Adjacent to Water NS-15



Description and Purpose

Procedures to protect water bodies from debris and wastes associated with structure demolition or removal over or adjacent to watercourses.

Suitable Applications

Full bridge demolition and removal, partial bridge removal (barrier rail, edge of deck) associated with bridge widening projects, concrete channel removal, or any other structure removal that could potentially affect water quality.

Limitations

None identified.

Implementation

- Refer to NS-5, Clear Water Diversion, to direct water away from work areas.
- Use attachments on construction equipment such as backhoes to catch debris from small demolition operations.
- Use covers or platforms to collect debris.
- Platforms and covers are to be approved by the owner.
- Stockpile accumulated debris and waste generated during demolition away from watercourses and in accordance with WM-3, Stockpile Management.
- Ensure safe passage of wildlife, as necessary.

Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

NS-15 Demolition Adjacent to Water

- Discharges to waterways shall be reported to the Regional Water Quality Control Board immediately upon discovery. A written discharge notification must follow within 7 days. Follow the spill reporting procedures in the SWPPP.

- For structures containing hazardous materials, i.e., lead paint or asbestos, refer to BMP WM-6, Hazardous Waste Management. For demolition work involving soil excavation around lead-painted structures, refer to WM-7, Contaminated Soil Management.

Costs

Cost may vary according to the combination of practices implemented.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Any debris-catching devices shall be emptied regularly. Collected debris shall be removed and stored away from the watercourse and protected from runon and runoff.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Temporary Batch Plants NS-16

Objectives

EC Erosion Control

SE Sediment Control

TR Tracking Control

WE Wind Erosion Control

NS Non-Stormwater Management Control

WM Waste Management and Materials Pollution Control

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

The construction of roads, bridges, retaining walls, and other large structures in remote areas, often requires temporary batch plant facilities to manufacture Portland Cement Concrete (PCC) or asphalt cement (AC). Temporary batch plant facilities typically consist of silos containing fly ash, lime, and cement; heated tanks of liquid asphalt; sand and gravel material storage areas; mixing equipment; above ground storage tanks containing concrete additives and water; and designated areas for sand and gravel truck unloading, concrete truck loading, and concrete truck washout. Proper control and use of equipment, materials, and waste products from temporary batch plant facilities will reduce the discharge of potential pollutants to the storm drain system or watercourses, reduce air emissions, and mitigate noise impacts.

Suitable Applications

These procedures typically apply to construction sites where temporary batch plant facilities are used.

Limitations

The General Permit for discharges of stormwater associated with industrial activities may be applicable to temporary batch plants.

Specific permit requirements or mitigation measures such as Air
Resources Board (ARB), Air Quality Management District (AQMD), Air Pollution Control District (APCD), Regional Water Quality Control Board (RWQCB), county ordinances and city

ordinances may require alternative mitigation measures for temporary batch plants.

Implementation

Planning Implementation steps are as follows:

- Temporary batch plants may be subject to the General Industrial NPDES permit. To comply with the permit, a Notice of Intent (NOI) must be submitted to the State Water Resource Control Board.
- Proper planning, design, and construction of temporary batch plants should be implemented to minimize potential water quality, air pollution, and noise impacts associated with temporary batch plants.
- BMPs and a Sampling and Analysis Plan (SAP) must be included in the project Stormwater Pollution Prevention Plan (SWPPP). BMPs must be implemented, inspected, and maintained.
- Temporary batch plants should be managed to comply with AQMD Statewide Registration Program and/or local AQMD Portable Equipment Registration requirements.
- Construct temporary batch plants down-wind of existing developments whenever possible.
- Placement of access roads should be planned to mitigate water and air quality impacts.

Layout and Design

- Temporary batch plants should be properly located and designed to mitigate water quality impacts to receiving water bodies. Batch plants should be located away from watercourses, drainage courses, and drain inlets. Batch plants should be located to minimize the potential for stormwater runon onto the site.
- Temporary batch plant facilities (including associated stationary equipment and stockpiles) should be located at least 300 ft from any recreational area, school, residence, or other structure not associated with the construction project.
- Construct continuous interior AC or PCC berms around batch plant equipment (mixing equipment, silos, concrete drop points, conveyor belts, admixture tanks, etc.) to facilitate proper containment and cleanup of releases. Rollover or flip top curb or dikes should be placed at ingress and egress points.
- Direct runoff from the paved or unpaved portion of the batch plant into a sump and pipe to a lined washout area or dewatering tank.
- Direct stormwater and non-stormwater runoff from unpaved portions of batch plant facility to catchment ponds or tanks.

- Construct and remove concrete washout facilities in accordance with WM-8, Concrete Waste Management.

- Layout of a typical batch plant and associated BMP is located at the end of this BMP fact sheet.

Operational Procedures

- Washout of concrete trucks should be conducted in a designated area in accordance with WM-8, Concrete Waste Management.

- Do not dispose of concrete into drain inlets, the stormwater drainage system, or watercourses.

- Equipment washing should occur in a designated area in accordance with WM-8, Concrete Waste Management. Washing equipment, tools, or vehicles to remove PCC shall be conducted in accordance with NS-7, Potable Water/Irrigation, and NS-8, Vehicle and Equipment Cleaning.

- All dry material transfer points should be ducted through a fabric or cartridge type filter unless there are no visible emissions from the transfer point.

- Equip all bulk storage silos, including auxiliary bulk storage trailers, with fabric or cartridge type filter(s).

- Maintain silo vent filters in proper operating condition.

- Equip silos and auxiliary bulk storage trailers with dust-tight service hatches.

- Fabric dust collection system should be capable of controlling 99 percent of the particulate matter.

- Fabric dust collectors (except for vent filters) should be equipped with an operational pressure differential gauge to measure the pressure drop across the filters.

- All transfer points should be equipped with a wet suppression system to control fugitive particulate emissions unless there are no visible emissions.

- All conveyors should be covered, unless the material being transferred results in no visible emissions.

- There should be no visible emissions beyond the property line, while the equipment is being operated.

- Collect dust emissions from the loading of open-bodied trucks at the drip point of dry batch plants, or dust emissions from the drum feed for central mix plants.

- Equip silos and auxiliary bulk storage trailers with a visible and/or audible warning mechanism to warn operators that the silo or trailer is full.

- All open-bodied vehicles transporting material should be loaded with a final layer of wet sand and the truck shall be covered with a tarp to reduce emissions.

Tracking Control

- Plant roads (batch truck and material delivery truck roads) and areas between stockpiles and conveyor hoppers should be stabilized (TR-2, Stabilized Construction Roadway), watered (WE-1, Wind Erosion Control), treated with dust-suppressant chemicals, or paved with a cohesive hard surface that can be repeatedly swept, maintained intact, and cleaned as necessary to control dust emissions.

- Trucks should not track PCC from plants onto public roads. Use appropriate practices from TR-1, Stabilized Construction Entrance/Exit to prevent tracking.

Materials Storage

- WM-1, Material Delivery and Storage, should be implemented at all batch plants using concrete components or compounds. An effective strategy is to cover and contain materials.

- WM-2, Material Use should be conducted in a way to minimize or eliminate the discharge of materials to storm drain system or watercourse.

- Ensure that finer materials are not dispersed into the air during operations, such as unloading of cement delivery trucks.

- Stockpiles should be covered and enclosed with perimeter sediment barriers per WM-3, Stockpile Management. Uncovered stockpiles should be sprinkled with water and/or dustsuppressant chemicals as necessary to control dust emissions, unless the stockpiled material results in no visible emissions. An operable stockpile watering system should be onsite at all times.

- Store bagged and boxed materials on pallets and cover on non-working days prior to rain.

- Minimize stockpiles of demolished PCC by recycling them in a timely manner.

- Provide secondary containment for liquid materials (WM-1). Containment should provide sufficient volume to contain precipitation from a 25-year storm plus 10% of the aggregate volume of all containers or plus 100% of the largest container, whichever is greater.

- Handle solid and liquid waste in accordance with WM-5, Solid Waste Management, WM-10, Liquid Waste Management, and WM-8, Concrete Waste Management.

- Maintain adequate supplies of spill cleanup materials and train staff to respond to spills per WM-4, Spill Prevention and Control.

- Immediately clean up spilled cement and fly ash and contain or dampen so that dust or emissions from wind erosion or vehicle traffic are minimized.

Equipment Maintenance

- Equipment should be maintained to prevent fluid leaks and spills per NS-9, Vehicle and Equipment Fueling, and NS-10, Vehicle and Equipment Maintenance.

- Maintain adequate supplies of spill cleanup materials and train staff to respond to spills per WM-4, Spill Prevention and Control.

- Incorporate other BMPs such as WM-5, Solid Waste Management, WM-6, Hazardous Waste Management, and WM-10, Liquid Waste Management.

Costs

Costs will vary depending on the size of the facility and combination of BMPs implemented.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Inspect and repair equipment (for damaged hoses, fittings, and gaskets).

- Inspect and maintain Stabilized Construction Entrance/Exit (TR-1) as needed.

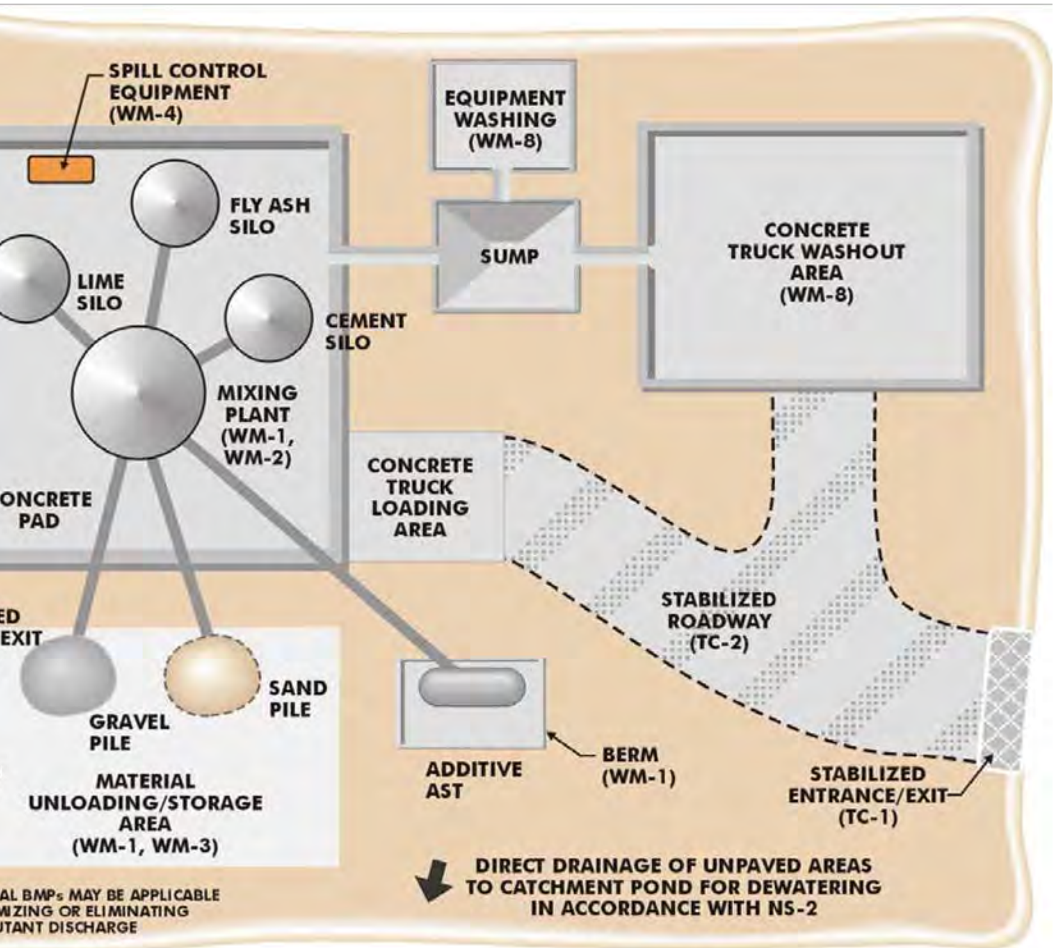
- Inspect and maintain stabilized haul roads as needed.

- Inspect and maintain materials and waste storage areas as needed.

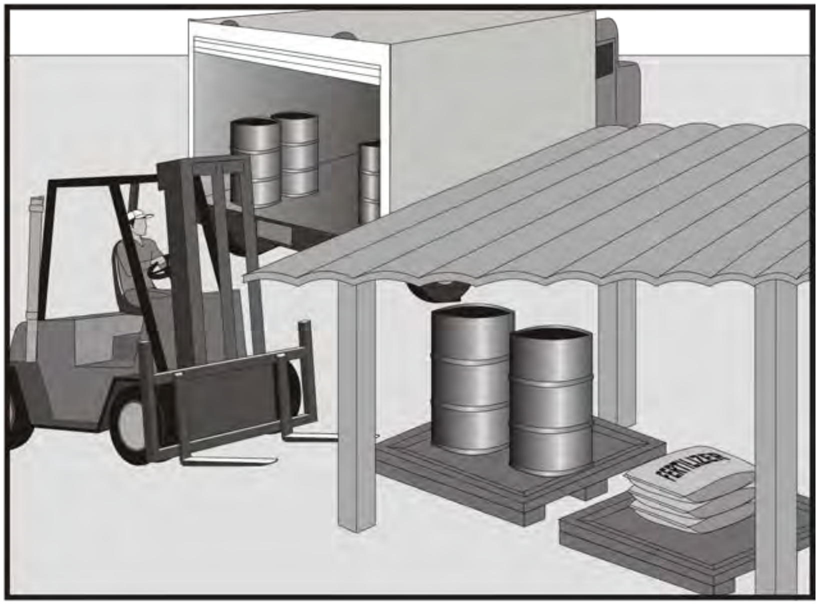
References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Typical Temporary Batch



Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	▭

Legend:

▭ **Primary Objective**

💻 **Secondary Objective**

Targeted Constituents

Sediment	▭
Nutrients	▭
Trash	▭
Metals	▭
Bacteria	
Oil and Grease	▭
Organics	▭

Potential Alternatives

None

Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in a designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and concrete components

WM-1 Material Delivery and Storage

- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Temporary storage area should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be supplied for all materials stored.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located near the construction entrances, away from waterways, if possible.
  - Avoid transport near drainage paths or waterways.
  - Surround with earth berms. See EC-9, Earth Dikes and Drainage Swales.
  - Place in an area which will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.
- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the rainy season, consider storing materials in a covered area. Store materials in secondary containments such as earthen dike, horse trough, or even a children's wading pool for non-reactive

materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in “bus boy” trays or concrete mixing trays.

- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and, when possible, in secondary containment.

- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids to reduce corrosion. Domed plastic covers are inexpensive and snap to the top of drums, preventing water from collecting.

- Chemicals should be kept in their original labeled containers.

- Employees and subcontractors should be trained on the proper material delivery and storage practices.

- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.

- If significant residual materials remain on the ground after construction is complete, properly remove materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices
- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.

- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.

- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.

- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.

- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.

- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.

- Throughout the rainy season, each temporary containment facility should be covered during non-working days, prior to, and during rain events.

- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.

- Stockpiles should be protected in accordance with WM-3, Stockpile Management.

- Materials should be stored indoors within existing structures or sheds when available.

- Proper storage instructions should be posted at all times in an open and conspicuous location.

- An ample supply of appropriate spill clean up material should be kept near storage areas.

- Also see WM-6, Hazardous Waste Management, for storing of hazardous materials.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.

- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.

- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.

- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.

- Keep an ample supply of spill cleanup materials near the storage area.

- Keep storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.

④ Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

4 of 5

References

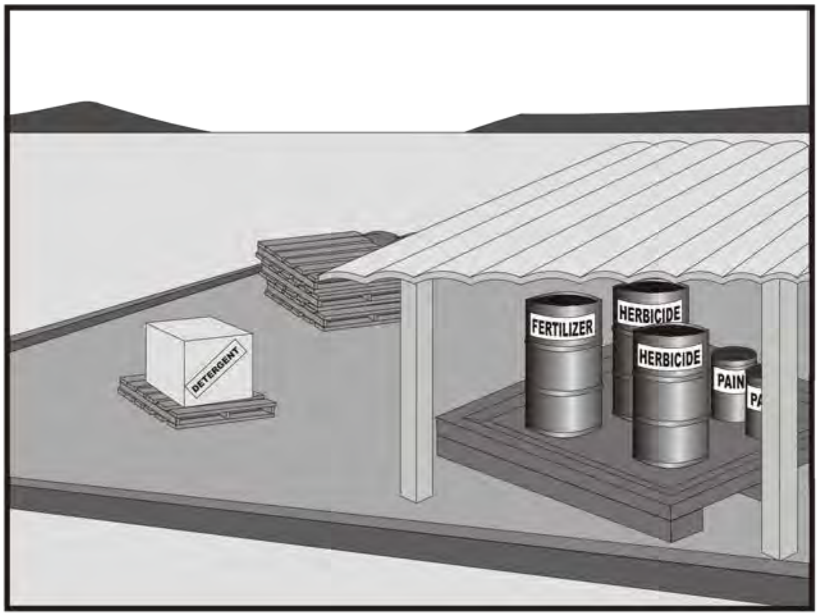
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Material Use WM-2



Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

- Other materials that may be detrimental if released to the environment

Sediment	☐
Nutrients	☐
Trash	☐
Metals	☐
Bacteria	
Oil and Grease	☐
Organics	☐

Potential Alternatives

None

Description and Purpose

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds

WM-2 Material Use

Limitations
Safer alternative building and construction products may not be available or suitable in every instance.

Implementation
The following steps should be taken to minimize risk:

- Minimize use of hazardous materials onsite.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydro seeding. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted, or into a concrete washout pit or temporary sediment trap. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.

- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.

- Require contractors to complete the "Report of Chemical Spray Forms" when spraying herbicides and pesticides.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two–week intervals in the non-rainy season to verify continued BMP implementation.
- Maintenance of this best management practice is minimal.
- Spot check employees and subcontractors throughout the job to ensure appropriate practices are being employed.

References

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Objectives

EC	Erosion Control	
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NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ Primary Objective

☐ Secondary Objective

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Stockpile Management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called "cold mix" asphalt), and pressure treated wood.

Suitable Applications

Implement in all projects that stockpile soil and other materials.

Limitations

None identified.

Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

- Locate stockpiles a minimum of 50 ft away from concentrated flows of stormwater, drainage courses, and inlets.

- Protect all stockpiles from stormwater runon using a temporary perimeter sediment barrier such as berms, dikes, fiber rolls, silt fences, sandbag, gravel bags, or straw bale barriers.

WM-3 Stockpile Management

- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.

- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.

- Place bagged materials on pallets and under cover.

Protection of Non-Active Stockpiles
Non-active stockpiles of the identified materials should be protected further as follows:

Soil stockpiles
- During the rainy season, soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.

- During the non-rainy season, soil stockpiles should be covered or protected with a temporary perimeter sediment barrier prior to the onset of precipitation.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base
- During the rainy season, the stockpiles should be covered or protected with a temporary perimeter sediment barrier at all times.

- During the non-rainy season, the stockpiles should be covered or protected with a temporary perimeter sediment barrier prior to the onset of precipitation.

Stockpiles of "cold mix"
- During the rainy season, cold mix stockpiles should be placed on and covered with plastic or comparable material at all times.

- During the non-rainy season, cold mix stockpiles should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Stockpiles/Storage of pressure treated wood with copper, chromium, and arsenic or ammonical, copper, zinc, and arsenate
- During the rainy season, treated wood should be covered with plastic or comparable material at all times.

- During the non-rainy season, treated wood should be covered with plastic or comparable material at all times and cold mix stockpiles should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Protection of Active Stockpiles
Active stockpiles of the identified materials should be protected further as follows:

- All stockpiles should be protected with a temporary linear sediment barrier prior to the onset of precipitation.

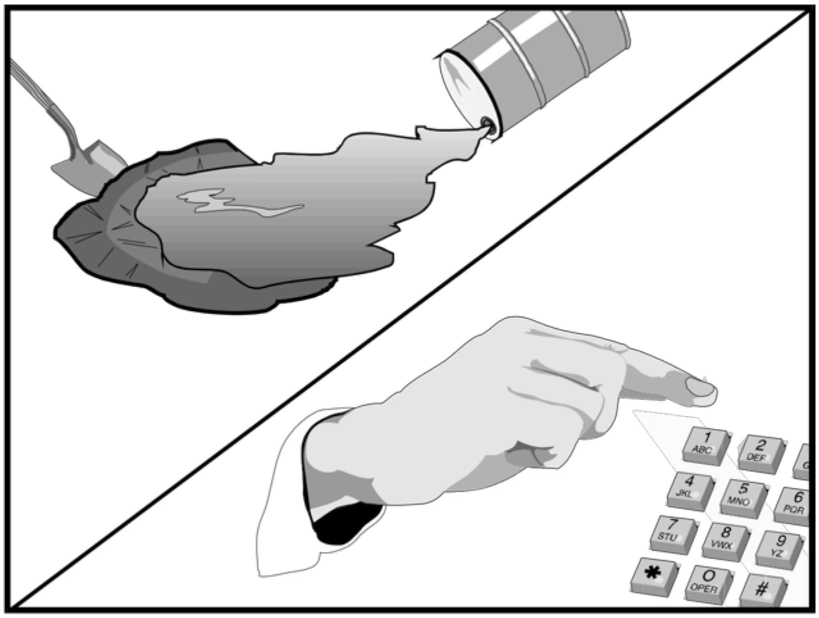
- Stockpiles of “cold mix” should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Costs
All of the above are low cost measures.

Inspection and Maintenance
- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation

- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.

References
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Objectives

EC	Erosion Control
SE	Sediment Control
TC	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control ☑

Legend:

☑ **Primary Objective**

☐ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a “significant spill” is for each material they use, and what is the appropriate response for “significant” and “insignificant” spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- Have contractor’s superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.

- Designate responsible individuals to oversee and enforce control measures.

- Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn't compromise clean up activities.

- Do not bury or wash spills with water.

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.

- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.

- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.

- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.

- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.

- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.

- Use absorbent materials on small spills rather than hosing down or burying the spill.

- Absorbent materials should be promptly removed and disposed of properly.

- Follow the practice below for a minor spill:

  - Contain the spread of the spill.

  - Recover spilled materials.

  - Clean the contaminated area and properly dispose of contaminated materials.

④

Semi-Significant Spills

④ Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

Spills should be cleaned up immediately:

- Contain spread of the spill.

- Notify the project foreman immediately.

- If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.

- If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.

- If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

④ For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:

- Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.

- Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.

- For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.

- Notification should first be made by telephone and followed up with a written report.

- The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.

- Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

④ Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.

- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.

- Regularly inspect onsite vehicles and equipment for leaks and repair immediately

- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.

- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.

- Place drip pans or absorbent materials under paving equipment when not in use.

- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.

- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around

- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.

- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.

- Discourage "topping off" of fuel tanks.

- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

④

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

  Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.

- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

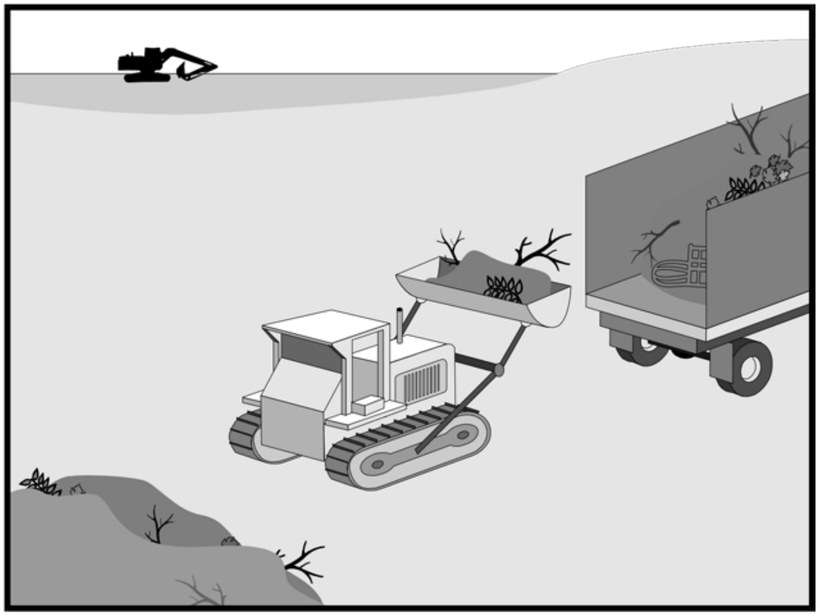
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Solid Waste Management WM-5



Objectives

EC	Erosion Control
SE	Sediment Control
TC	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control ☐

Legend:

☐ Primary Objective

☐ Secondary Objective

Targeted Constituents

Sediment	☐
Nutrients	☐
Trash	☐
Metals	☐
Bacteria	
Oil and Grease	☐
Organics	☐

Potential Alternatives

None

Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials

WM-5 Solid Waste Management

- Highway planting wastes, including vegetative material, plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.

- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.

Solid Waste Management WM-5

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runon should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.

- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.

- Segregate potentially hazardous waste from non-hazardous construction site waste.

- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.

- Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs
All of the above are low cost measures.

Inspection and Maintenance
- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur

- Inspect construction waste area regularly.

- Arrange for regular waste collection.

References
Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

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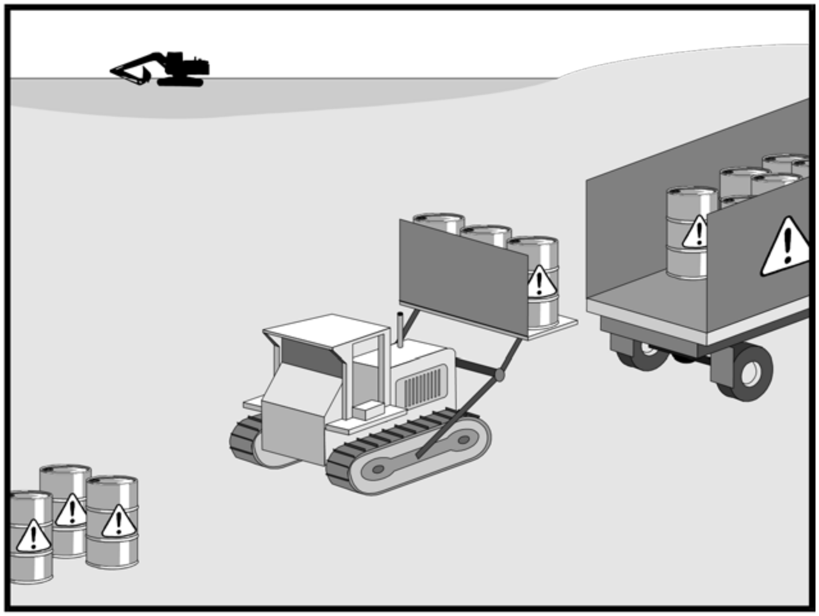

Objectives

EC	Erosion Control
SE	Sediment Control
TC	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control ☑

Legend:

☑ **Primary Objective**

☐ **Secondary Objective**

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum Products - Asphalt Products
- Concrete Curing Compounds - Pesticides
- Palliatives - Acids
- Septic Wastes - Paints
- Stains - Solvents
- Wood Preservatives - Roofing Tar
- Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

In addition, sites with existing structures may contain wastes, which must be disposed of in accordance with federal, state, and local regulations. These wastes include:

- Sandblasting grit mixed with lead-, cadmium-, or chromium-based paints
- Asbestos
- PCBs (particularly in older transformers)

Limitations

- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Nothing in this BMP relieves the contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
- This BMP does not cover aerially deposited lead (ADL) soils. For ADL soils refer to WM-7, Contaminated Soil Management.

Implementation

The following steps will help reduce stormwater pollution from hazardous wastes:

Material Use

- Wastes should be stored in sealed containers constructed of a suitable material and should be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172, 173, 178, and 179.
- All hazardous waste should be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers should be stored in temporary containment facilities that should comply with the following requirements:
  - Temporary containment facility should provide for a spill containment volume equal to 1.5 times the volume of all containers able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.
  - Temporary containment facility should be impervious to the materials stored there for a minimum contact time of 72 hours.
  - Temporary containment facilities should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be placed into drums after each rainfall. These liquids should be handled as a hazardous waste unless testing

determines them to be non-hazardous. Non-hazardous liquids should be sent to an approved disposal site.

- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.

- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.

- Throughout the rainy season, temporary containment facilities should be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs.

④ Drums should not be overfilled and wastes should not be mixed.

④ Unless watertight, containers of dry waste should be stored on pallets.

④ Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over application is expensive and environmentally harmful. Apply surface dressings in several smaller applications, as opposed to one large application. Allow time for infiltration and avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains. People applying pesticides must be certified in accordance with federal and state regulations.

④ Paint brushes and equipment for water and oil based paints should be cleaned within a contained area and should not be allowed to contaminate site soils, watercourses, or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused should be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths should be disposed of as solid waste.

④ Do not clean out brushes or rinse paint containers into the dirt, street, gutter, storm drain, or stream. "Paint out" brushes as much as possible. Rinse water-based paints to the sanitary sewer. Filter and reuse thinners and solvents. Dispose of excess oil-based paints and sludge as hazardous waste.

④ The following actions should be taken with respect to temporary contaminant:

- Ensure that adequate hazardous waste storage volume is available.

- Ensure that hazardous waste collection containers are conveniently located.

- Designate hazardous waste storage areas onsite away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.

- Minimize production or generation of hazardous materials and hazardous waste on the job site.

- Use containment berms in fueling and maintenance areas and where the potential for spills is high.

- Segregate potentially hazardous waste from non-hazardous construction site debris.
- Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.
- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Place hazardous waste containers in secondary containment.
- Do not allow potentially hazardous waste materials to accumulate on the ground.
- Do not mix wastes.
- Use all of the product before disposing of the container.
- Do not remove the original product label; it contains important safety and disposal information.

Waste Recycling Disposal

- Select designated hazardous waste collection areas onsite.
- Hazardous materials and wastes should be stored in covered containers and protected from vandalism.
- Place hazardous waste containers in secondary containment.
- Do not mix wastes, this can cause chemical reactions, making recycling impossible and complicating disposal.
- Recycle any useful materials such as used oil or water-based paint.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Arrange for regular waste collection before containers overflow.
- Make sure that hazardous waste (e.g., excess oil-based paint and sludge) is collected, removed, and disposed of only at authorized disposal areas.

Disposal Procedures

- Waste should be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.
- A Department of Health Services certified laboratory should sample waste to determine the appropriate disposal facility.
- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.

- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- The contractor's superintendent or representative should oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Warning signs should be placed in areas recently treated with chemicals.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, clean up immediately.

Costs

All of the above are low cost measures. ***Inspection and***

Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Hazardous waste should be regularly collected.
- A foreman or construction supervisor should monitor onsite hazardous waste storage and disposal procedures.
- Waste storage areas should be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

- Hazardous spills should be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.

- The National Response Center, at (800) 424-8802, should be notified of spills of federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302. Also notify the Governors Office of Emergency Services Warning Center at (916) 8458911.

- A copy of the hazardous waste manifests should be provided.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

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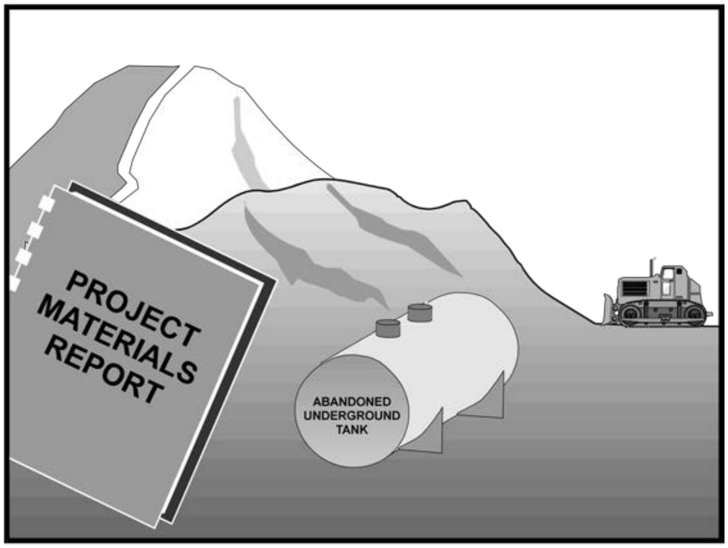
Contaminated Soil Management WM-7



Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting excavations regularly, and remediating contaminated soil promptly.

Suitable Applications

Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, aerial deposition, past use and leaks from underground storage tanks.

Limitations

Contaminated soils that cannot be treated onsite must be disposed of offsite by a licensed hazardous waste hauler. The presence of contaminated soil may indicate contaminated water as well. See NS-2, Dewatering Operations, for more information.

The procedures and practices presented in this BMP are general. The contractor should identify appropriate practices and procedures for the specific contaminants known to exist or discovered onsite.

Implementation

Most owners and developers conduct pre-construction environmental assessments as a matter of routine. Contaminated soils are often identified during project planning and development with known

Objectives

EC Erosion Control
SE Sediment Control
TC Tracking Control
WE Wind Erosion Control
NS Non-Stormwater Management Control
WM Waste Management and Materials Pollution Control ☐

Legend:

☐ **Primary Objective**
☐ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☐
Trash	☐
Metals	☐
Bacteria	☐
Oil and Grease	☐
Organics	☐

Potential Alternatives

None

locations identified in the plans, specifications and in the SWPPP. The contractor should review applicable reports and investigate appropriate call-outs in the plans, specifications, and

SWPPP. Recent court rulings holding contractors liable for cleanup costs when they unknowingly move contaminated soil highlight the need for contractors to confirm a site assessment is completed before earth moving begins.

The following steps will help reduce stormwater pollution from contaminated soil:

- Conduct thorough, pre-construction inspections of the site and review documents related to the site. If inspection or reviews indicated presence of contaminated soils, develop a plan before starting work.

- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.

- Prevent leaks and spills. Contaminated soil can be expensive to treat and dispose of properly. However, addressing the problem before construction is much less expensive than after the structures are in place.

- The contractor may further identify contaminated soils by investigating:

  - Past site uses and activities

  - Detected or undetected spills and leaks

  - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements

  - Contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.

  - Suspected soils should be tested at a certified laboratory.

Education

- Have employees and subcontractors complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified, prior to performing any excavation work at the locations containing material classified as hazardous.

- Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling and disposal procedures.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

Handling Procedures for Material with Aerially Deposited Lead (ADL)

- Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.

- Excavation, transportation, and placement operations should result in no visible dust.

- Caution should be exercised to prevent spillage of lead containing material during transport.

- Quality should be monitored during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

- Minimize onsite storage. Contaminated soil should be disposed of properly in accordance with all applicable regulations. All hazardous waste storage will comply with the requirements in Title 22, CCR, Sections 66265.250 to 66265.260.

- Test suspected soils at an approved certified laboratory.

- Work with the local regulatory agencies to develop options for treatment or disposal if the soil is contaminated.

- Avoid temporary stockpiling of contaminated soils or hazardous material.

- Take the following precautions if temporary stockpiling is necessary:

  - Cover the stockpile with plastic sheeting or tarps.

  - Install a berm around the stockpile to prevent runoff from leaving the area.

  - Do not stockpile in or near storm drains or watercourses.

- Remove contaminated material and hazardous material on exteriors of transport vehicles and place either into the current transport vehicle or into the excavation prior to the vehicle leaving the exclusion zone.

- Monitor the air quality continuously during excavation operations at all locations containing hazardous material.

- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.

- Collect water from decontamination procedures and treat or dispose of it at an appropriate disposal site.

- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.

- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.

- Excavate, transport, and dispose of contaminated material and hazardous material in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP): - United States Department of Transportation (USDOT)

- United States Environmental Protection Agency (USEPA)
- California Environmental Protection Agency (CAL-EPA)

- California Division of Occupation Safety and Health Administration (CAL-OSHA)
- Local regulatory agencies

Procedures for Underground Storage Tank Removals

- Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies that have jurisdiction over such work.
- To determine if it contains hazardous substances, arrange to have tested, any liquid or sludge found in the underground tank prior to its removal.
- Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).
- The underground storage tank, any liquid or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal and transported to disposal facilities permitted to accept such waste.

Water Control

- All necessary precautions and preventive measures should be taken to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to, berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, should be discharged to clean, closed top, watertight transportable holding tanks, treated, and disposed of in accordance with federal, state, and local laws.

Costs

Prevention of leaks and spills is inexpensive. Treatment or disposal of contaminated soil can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Arrange for contractor's Water Pollution Control Manager, foreman, and/or construction supervisor to monitor onsite contaminated soil storage and disposal procedures.
- Monitor air quality continuously during excavation operations at all locations containing hazardous material.

- Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.

- Implement WM-4, Spill Prevention and Control, to prevent leaks and spills as much as possible.

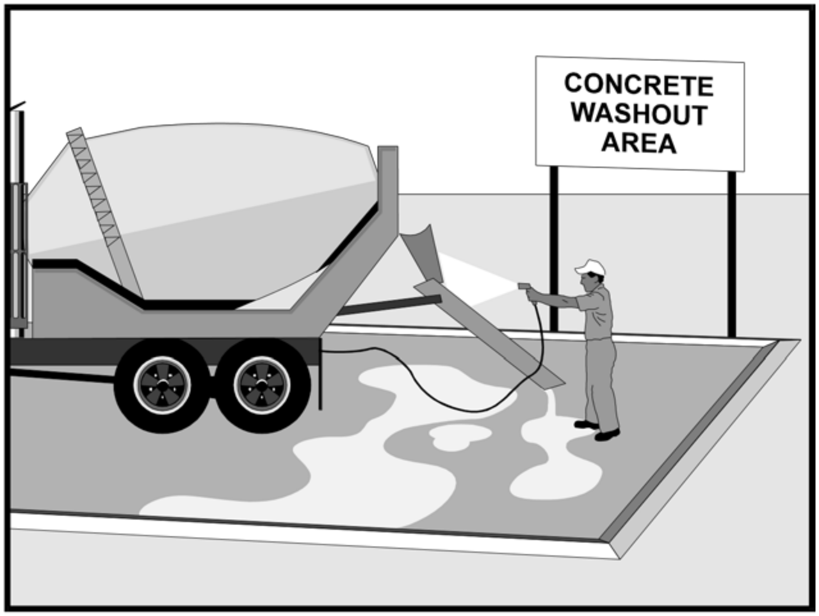
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Objectives

EC	Erosion Control
SE	Sediment Control
TC	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

Legend:

Primary Objective

Secondary Objective

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from concrete waste by conducting washout offsite, performing onsite washout in a designated area, and training employee and subcontractors.

Targeted Constituents

Sediment
Nutrients
Trash
Metals
Bacteria
Oil and Grease
Organics

Suitable Applications

Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete is used as a construction material or where concrete dust and debris result form demolition activities
- Slurries containing portland cement concrete (PCC) or asphalt concrete (AC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition
- Concrete trucks and other concrete-coated equipment are washed onsite
- Mortar-mixing stations exist
- See also NS-8, Vehicle and Equipment Cleaning

Potential Alternatives

None

Limitations

- Offsite washout of concrete wastes may not always be possible.

Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Discuss the concrete management techniques described in this BMP (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.
- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Store dry and wet materials under cover, away from drainage areas.
- Avoid mixing excess amounts of fresh concrete.
- Perform washout of concrete trucks offsite or in designated areas only.
- Do not wash out concrete trucks into storm drains, open ditches, streets, or streams.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- For onsite washout:
  - Locate washout area at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
  - Wash out wastes into the temporary pit where the concrete can set, be broken up, and then disposed properly.
- Avoid creating runoff by draining water to a bermed or level area when washing concrete to remove fine particles and expose the aggregate.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose in the trash.

Education

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.
- Arrange for contractor's superintendent or representative to oversee and enforce concrete waste management procedures. ***Concrete Slurry Wastes***
- PCC and AC waste should not be allowed to enter storm drains or watercourses.

- PCC and AC waste should be collected and disposed of or placed in a temporary concrete washout facility.
- A sign should be installed adjacent to each temporary concrete washout facility to inform concrete equipment operators to utilize the proper facilities.
- Below grade concrete washout facilities are typical. Above grade facilities are used if excavation is not practical.
- A foreman or construction supervisor should monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.
- Saw-cut PCC slurry should not be allowed to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine. Saw cutting residue should not be allowed to flow across the pavement and should not be left on the surface of the pavement. See also NS-3, Paving and Grinding Operations; and WM-10, Liquid Waste Management.
- Slurry residue should be vacuumed and disposed in a temporary pit (as described in OnSite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below) and allowed to dry. Dispose of dry slurry residue in accordance with WM-5, Solid Waste Management.

Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

- Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking.
- A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.
- Temporary concrete washout facilities should be constructed above grade or below grade at the option of the contractor. Temporary concrete washout facilities should be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.
- Temporary washout facilities should have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- Washout of concrete trucks should be performed in designated areas only.
- Only concrete from mixer truck chutes should be washed into concrete wash out.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of offsite.

- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per WM-5, Solid Waste Management. Dispose of hardened concrete on a regular basis.

- Temporary Concrete Washout Facility (Type Above Grade)

  - Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and

    minimum width of 10 ft, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.

  - Straw bales, wood stakes, and sandbag materials should conform to the provisions in SE9, Straw Bale Barrier.

  - Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

- Temporary Concrete Washout Facility (Type Below Grade)

  - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.

  - Lath and flagging should be commercial type.

  - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and disposed of. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and disposed of.

- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.

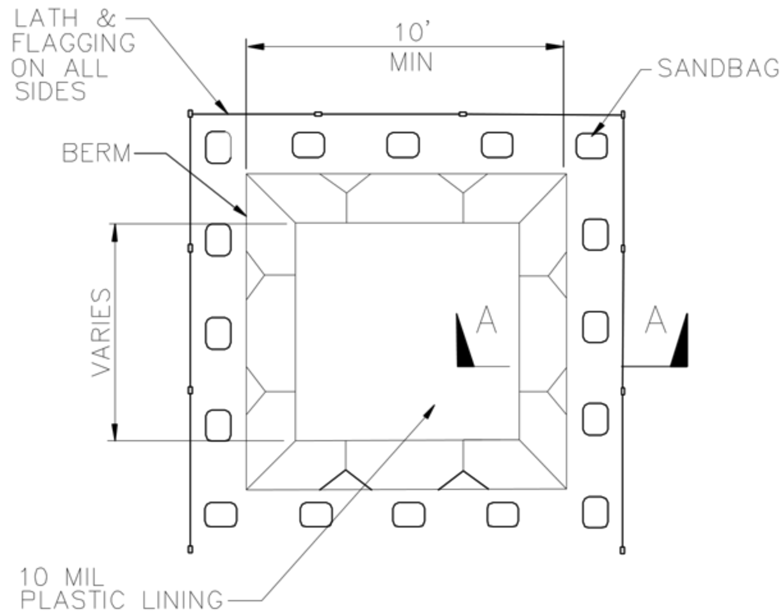
- Temporary concrete washout facilities should be maintained to provide adequate holding capacity with a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilities. Maintaining temporary concrete washout facilities should include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials should be removed and disposed of.
- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



PLAN
NOT TO SCALE
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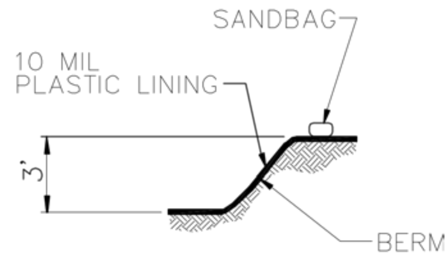
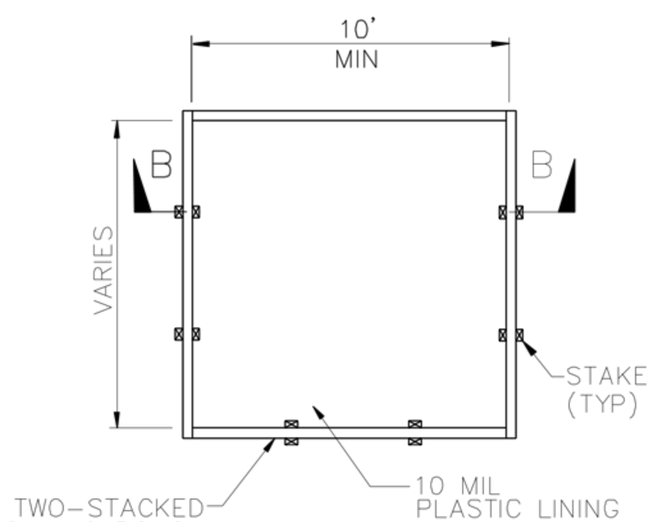


SECTION A–A
NOT TO SCALE



PLAN
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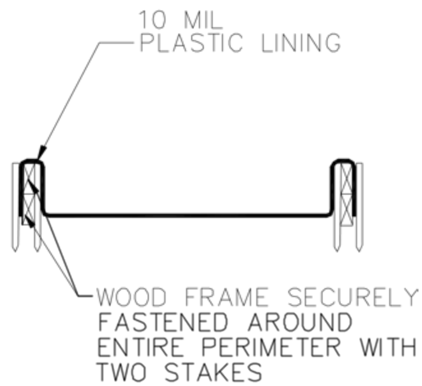
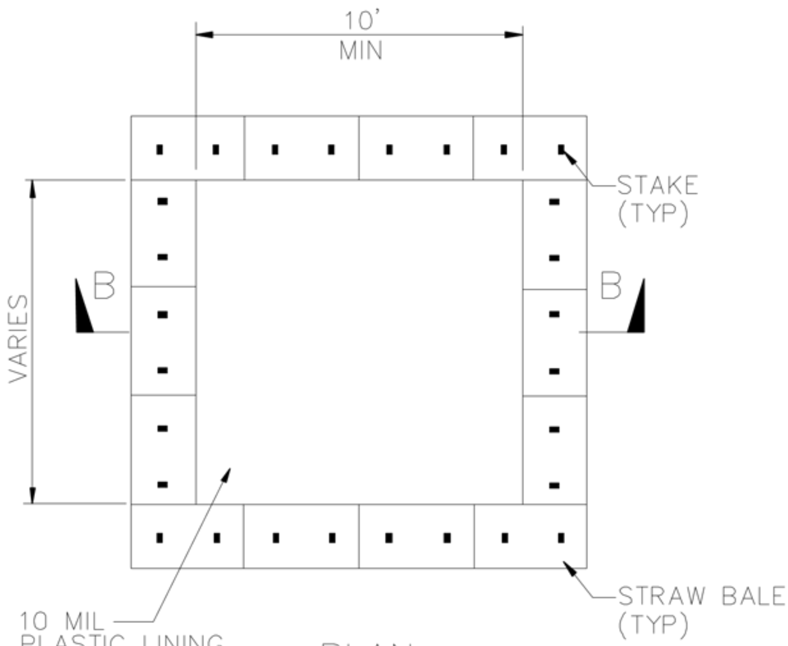
TYPE "ABOVE GRADE"



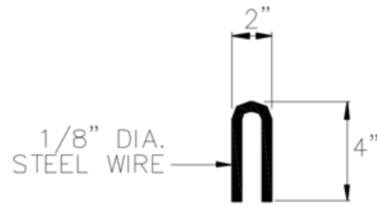
SECTION B–B
NOT TO SCALE

NOTES

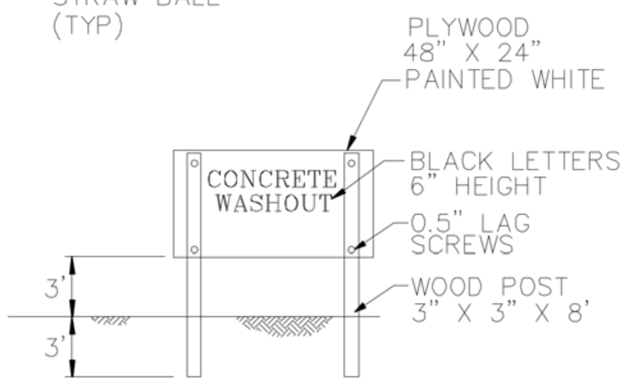
1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.



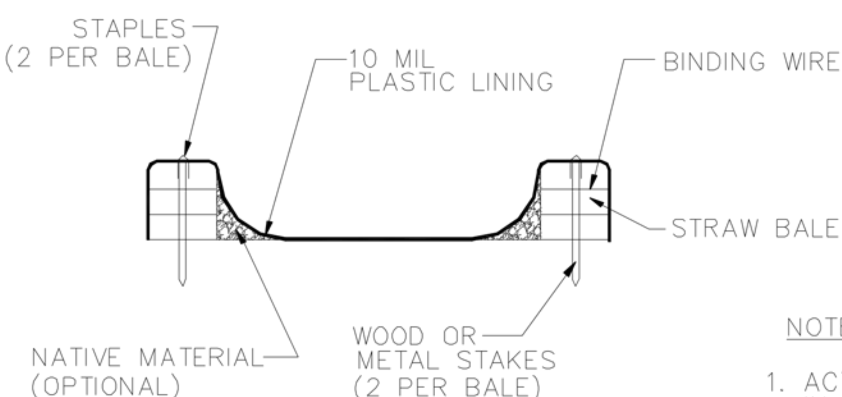
PLAN
NOT TO SCALE
TYPE "ABOVE GRADE" WITH STRAW BALES



STAPLE DETAIL



CONCRETE WASHOUT SIGN DETAIL (OR EQUIVALENT)

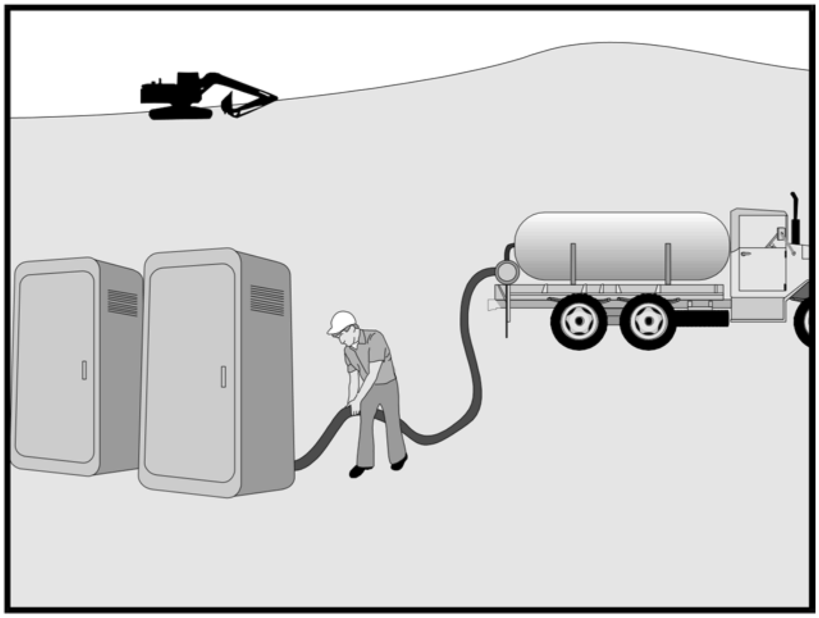


SECTION B–B
NOT TO SCALE

NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

Sanitary/Septic Waste Management WM-9



Objectives

EC	Erosion Control
SE	Sediment Control
TC	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control

Legend:

Primary Objective

Secondary Objective

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.

- Wastewater should not be discharged or buried within the project site.

WM-9 Sanitary / Septic Waste Management

- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary facilities should be located in a convenient location.
- Untreated raw wastewater should never be discharged or buried.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an onsite disposal system (OSDS), such as a septic system, local health agency requirements must be followed.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities overflow.

Education

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.

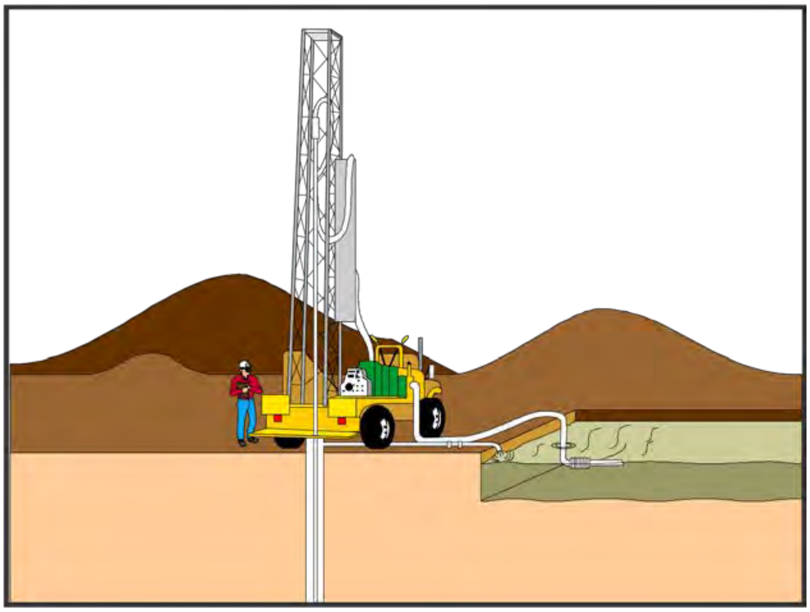
- Arrange for regular waste collection.
- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Liquid Waste Management WM-10



Objectives

EC	Erosion Control
SE	Sediment Control
TC	Tracking Control
WE	Wind Erosion Control
NS	Non-Stormwater Management Control
WM	Waste Management and Materials Pollution Control ☑

Legend:

☑ **Primary Objective**

☐ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

Description and Purpose

Liquid waste management includes procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

Suitable Applications

Liquid waste management is applicable to construction projects that generate any of the following non-hazardous by-products, residuals, or wastes:

- Drilling slurries and drilling fluids
- Grease-free and oil-free wastewater and rinse water
- Dredgings
- Other non-stormwater liquid discharges not permitted by separate permits

Limitations

- Disposal of some liquid wastes may be subject to specific laws and regulations or to requirements of other permits secured for the construction project (e.g., NPDES permits, Army Corps permits, Coastal Commission permits, etc.).
- Liquid waste management does not apply to dewatering operations (NS-2 Dewatering Operations), solid waste management (WM-5, Solid Waste Management), hazardous

wastes (WM-6, Hazardous Waste Management), or concrete slurry residue (WM-8, Concrete Waste Management).

- Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and discharges or flows from emergency fire fighting activities.

Implementation

General Practices

- Instruct employees and subcontractors how to safely differentiate between non-hazardous liquid waste and potential or known hazardous liquid waste.
- Instruct employees, subcontractors, and suppliers that it is unacceptable for any liquid waste to enter any storm drainage device, waterway, or receiving water.
- Educate employees and subcontractors on liquid waste generating activities and liquid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Verify which non-stormwater discharges are permitted by the statewide NPDES permit; different regions might have different requirements not outlined in this permit.
- Apply NS-8, Vehicle and Equipment Cleaning for managing wash water and rinse water from vehicle and equipment cleaning operations.

Containing Liquid Wastes

- Drilling residue and drilling fluids should not be allowed to enter storm drains and watercourses and should be disposed of.
- If an appropriate location is available, drilling residue and drilling fluids that are exempt under Title 23, CCR § 2511(g) may be dried by infiltration and evaporation in a containment facility constructed in conformance with the provisions concerning the Temporary Concrete Washout Facilities detailed in WM-8, Concrete Waste Management.
- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, should be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.
- Liquid wastes should be contained in a controlled area such as a holding pit, sediment basin, roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.

- Precautions should be taken to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in WM-4, Spill Prevention and Control.

- Containment areas or devices should not be located where accidental release of the contained liquid can threaten health or safety or discharge to water bodies, channels, or storm drains.

Capturing Liquid Wastes

- Capture all liquid wastes that have the potential to affect the storm drainage system (such as wash water and rinse water from cleaning walls or pavement), before they run off a surface.

- Do not allow liquid wastes to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.

- Use a sediment trap (SE-3, Sediment Trap) for capturing and treating sediment laden liquid waste or capture in a containment device and allow sediment to settle.

Disposing of Liquid Wastes

- A typical method to handle liquid waste is to dewater the contained liquid waste, using procedures such as described in NS-2, Dewatering Operations, and SE-2, Sediment Basin, and dispose of resulting solids per WM-5, Solid Waste Management.

- Methods of disposal for some liquid wastes may be prescribed in Water Quality Reports, NPDES permits, Environmental Impact Reports, 401 or 404 permits, and local agency discharge permits, etc. Review the SWPPP to see if disposal methods are identified.

- Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management.

- If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

Costs

Prevention costs for liquid waste management are minimal. Costs increase if cleanup or fines are involved.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

WM-10 Liquid Waste Management

- Remove deposited solids in containment areas and capturing devices as needed and at the completion of the task. Dispose of any solids as described in WM-5, Solid Waste Management.

- Inspect containment areas and capturing devices and repair as needed.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Section 5
Glossary and List of Acronyms

5.1 Glossary

303(d) Listed: Water bodies listed as impaired as per Section 303(d) of the 1972 Clean Water Act.

Best Management Practices (BMPs): Includes schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent, eliminate, or reduce the pollution of waters of the receiving waters. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Catch Basin (Also known as Inlet): Box-like underground concrete structure with openings in curbs and gutters designed to collect runoff from streets and pavement.

Clean Water Act (CWA): (33 U.S.C. 1251 et seq.) requirements of the NPDES program are defined under Sections 307, 402, 318 and 405 of the CWA.

Construction Activity: Includes clearing, grading, excavation, and contractor activities that result in soil disturbance.

Construction General Permit: A National Pollutant Discharge Elimination System (NPDES) permit issued by the State Water Resources Control Board for the discharge of stormwater associated with construction activity from soil disturbance of five acres or more. Threshold lowered to one acre beginning October 10, 2003. Construction General Permit No. CAS000002.

Denuded: Land stripped of vegetation or land that has had its vegetation worn down due to the impacts from the elements or humans.

Detention: The capture and subsequent release of stormwater runoff from the site at a slower rate than it is collected, the difference being held in temporary storage.

Discharge: A release or flow of stormwater or other substance from a conveyance system or storage container. Broader – includes release to storm drains, etc.

Effluent Limits: Limitations on amounts of pollutants that may be contained in a discharge. Can be expressed in a number of ways including as a concentration, as a concentration over a time period (e.g., 30-day average must be less than 20 mg/l), or as a total mass per time unit, or as a narrative limit.

Erosion: The wearing away of land surface by wind or water. Erosion occurs naturally from weather or runoff but can be intensified by land-clearing practices related to farming, new development, redevelopment, road building, or timber cutting.

Facility: Is a collection of industrial processes discharging stormwater associated with industrial activity within the property boundary or operational unit.

Grading: The cutting or filling of the land surface to a desired slope or elevation.

Hazardous Waste: A waste or combination of wastes that, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either cause or significantly contribute to an increase in mortality or an increase in serious irreversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed. Possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity) or appears on special EPA or state lists. Regulated under the federal Resource Conservation and Recovery Act and the California Health and Safety Code.

Illicit Discharges: Any discharge to a municipal separate storm sewer that is not in compliance with applicable laws and regulations as discussed in this document.

Industrial General Permit: A National Pollutant Discharge Elimination System (NPDES) Permit (No. CAS000001) issued by the State Water Resources Control Board for discharge of stormwater associated with industrial activity. Board Order 97-03-DWQ.

Inlet: An entrance into a ditch, storm drain, or other waterway.

Integrated Pest Management (IPM): An ecosystem-based strategy that focuses on longterm prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism.

Municipal Separate Storm Sewer System (MS4): A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) designed or used for collecting or conveying storm water; (ii) which is not a combined sewer; and (iii) which is not part of a Publicly Owned Treatment Works (POTW) as defined at Title 40 of the Code of Federal Regulations (CFR) 122.2. A "Small MS4" is defined as an MS4 that is not a permitted MS4 under the Phase I regulations. This definition of a Small MS4 applies to MS4 operated within cities and counties as well as governmental facilities that have a system of storm sewers.

Non-Stormwater Discharge: Any discharge to municipal separate storm sewer that is not composed entirely of stormwater.

Nonpoint Source Pollution: Pollution that does not come from a point source. Nonpoint source pollution originates from aerial diffuse sources that are mostly related to land use.

Notice of Intent (NOI): A formal notice to SWRCB submitted by the owner of an industrial site or construction site that said owner seeks coverage under a General Permit for discharges associated with industrial and construction activities. The NOI provides information on the owner, location, type of project, and certifies that the owner will comply with the conditions of the construction General Permit.

Notice of Termination (NOT): Formal notice to SWRCB submitted by owner/ developer that a construction project is complete.

NPDES Permit: NPDES is an acronym for National Pollutant Discharge Elimination System. NPDES is the national program for administering and regulating Sections 307, 318, 402, and 405 of the Clean Water Act (CWA). In California, the State Water Resources Control Board (SWRCB) has issued a General Permit for stormwater discharges associated with industrial activities (see Appendix A).

Outfall: The end point where storm drains discharge water into a waterway.

Point Source: Any discernible, confined, and discrete conveyance from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.

Pollutant: Generally, any substance introduced into the environment that adversely affects the usefulness of a resource.

Pollution Prevention (P2): Practices and actions that reduce or eliminate the generation of pollutants.

Precipitation: Any form of rain or snow.

Pretreatment: Treatment of waste stream before it is discharged to a collection system.

Reclaim (water reclamation): Planned use of treated effluent that would otherwise be discharged without being put to direct use.

Retention: The storage of stormwater to prevent it from leaving the development site.

Reuse (water reuse): (see Reclaim)

Runoff: Water originating from rainfall, melted snow, and other sources (e.g., sprinkler irrigation) that flows over the land surface to drainage facilities, rivers, streams, springs, seeps, ponds, lakes, and wetlands.

Run-on: Off site stormwater surface flow or other surface flow which enters your site.

Scour: The erosive and digging action in a watercourse caused by flowing water.

Secondary Containment: Structures, usually dikes or berms, surrounding tanks or other storage containers, designed to catch spilled materials from the storage containers.

Sedimentation: The process of depositing soil particles, clays, sands, or other sediments that were picked up by runoff.

Sediments: Soil, sand, and minerals washed from land into water, usually after rain, that collect in reservoirs, rivers, and harbors, destroying fish nesting areas and clouding the water, thus preventing sunlight from reaching aquatic plants. Farming, mining, and building activities without proper implementation of BMPs will expose sediment materials, allowing them to be washed off the land after rainfalls.

Significant Materials: Includes, but not limited to, raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designed under Section 101(14) of CERLCA; any chemical the facility is required to report pursuant to Section 313 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have the potential to be released with stormwater discharges.

Significant Quantities: The volume, concentrations, or mass of a pollutant in stormwater discharge that can cause or threaten to cause pollution, contamination, or nuisance that adversely impact human health or the environment and cause or contribute to a violation of any applicable water quality standards for receiving water.

Source Control BMPs: Operational practices that reduce potential pollutants at the source.

Source Reduction (also source control): The technique of stopping and/ or reducing pollutants at their point of generation so that they do not come into contact with stormwater.

Storm Drains: Above- and below-ground structures for transporting stormwater to streams or outfalls for flood control purposes.

Stormwater: Defined as urban runoff and snowmelt runoff consisting only of those discharges, which originate from precipitation events. Stormwater is that portion of precipitation that flows across a surface to the storm drain system or receiving waters.

Stormwater Discharge Associated with Industrial Activity: Discharge from any conveyance which is used for collecting and conveying stormwater from an area that is directly related to manufacturing, processing, or raw materials storage activities at an industrial plant.

Stormwater Pollution Control Plan (SWPCP): A less formal plan than the SWPPP that addresses the implementation of BMPs at facilities/businesses not covered by a general permit but that have the potential to discharge pollutants.

Stormwater Pollution Prevention Plan (SWPPP): A written plan that documents the series of phases and activities that, first, characterizes your site, and then prompts you to select and carry out actions which prevent the pollution of stormwater discharges.

Treatment Control BMPs: Treatment methods to remove pollutants from stormwater.

Toxicity: Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

Turbidity: Describes the ability of light to pass through water. The cloudy appearance of water caused by suspended and colloidal matter (particles).

5.2 Acronyms

AASHTO	American Association of State Highway and Transportation Officials
AC	Asphalt Concrete
ADL	Aerially Deposited Lead
AIMP	Impervious Area
AINF	Infiltration Area
ANSI	American National Standards Institute
APHA	American Public Health Association
APWA	American Public Works Association
ARS	Agricultural Research Service
AQMD	Air Quality Management District
ASTM	American Society for Testing Materials
AWWA	American Water Works Association
BAT	Best Available Technology (economically available)
BCT	Best Conventional Technology (pollution control)
BFP	Bonded Fiber Matrix
BMPs	Best Management Practices
BOD	Biological Oxygen Demand
CA	Contractor Activities
CAL-EPA	California Environmental Protection Agency
CAL-OSHA	California Division of Occupational Safety and Health Administration
CASQA	California Stormwater Quality Association
CCR	California Code of Regulations
CCS	Cellular Confinement System
CEQA	California Environmental Quality Act

CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Register
CMA	Congestion Management Program
COE	U.S. Army Corps of Engineers
CPI	Coalescing Plate Interceptor
CWA	Clean Water Act (Federal Water Pollution Control Act of 1972 as amended in 1987)
DCIA	Directly Connected Impervious Area
DTSC	California Department of Toxic Substances Control
EEC	Effect Effluent Concentration
EIR	Environmental Impact Report
EMC	Event Mean Concentration
EOS	Equivalent Opening Size
ESA	Environmentally Sensitive Area
ESC	Erosion and Sedimentation Control
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
GIS	Geographical Information System
Hazmat	Hazardous Material
HSG	Hydrologic Soil Groups
IPM	Integrated Pest Management
JURMP	Jurisdictional Urban Runoff Management Program
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration

NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System
NPS	Nonpoint Source
NRC	National Response Center
NRCS	Natural Resources Conservation Service
NSF	National Science Foundation
NURP	National Urban Runoff Program
O&G	Oil and Grease
O&M	Operations and Maintenance
OSDS	On-site Disposal System
OSHA	Occupational Safety and Health Administration
P2	Pollution Prevention
PAHs	Polyaromatic Hydrocarbons
PAM	Polyacrylamide
PCBs	Polychlorinated Biphenyls
PCC	Portland Concrete Cement
PPT	Pollution Prevention Team
POTW	Publicly Owned Treatment Works
PSD	Particle Size Distribution
RCRA	Resource Conservation and Recovery Act
RWQCB	Regional Water Quality Control Board
SAP	Sampling and Analysis Plan

SARA	Superfund Amendments and Reauthorization Act
SIC	Standard Industrial Classification
SPCC	Spill Prevention Control and Countermeasure
SUSMP	Standard Urban Stormwater Mitigation Plan
SWMP	Stormwater Management Program
SWPCP	Stormwater Pollution Control Plan
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resource Control Board
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TSS	Total Suspended Solids
UFC	Uniform Fire Code
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
WEF	Water Environment Federation

Non-Stormwater Discharges SC-10

Description

Non-stormwater discharges (NSWDs) are flows that do not consist entirely of stormwater. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain if local regulations allow. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include: potable water sources, fire hydrant flushing, air conditioner condensate, landscape irrigation drainage and landscape watering, emergency firefighting, etc. as discussed in Section 2.

However there are certain non-stormwater discharges that pose an environmental concern. These discharges may originate from illegal dumping of industrial material or wastes and illegal connections such as internal floor drains, appliances, industrial processes, sinks, and toilets that are illegally connected to the nearby storm drainage system through on-site drainage and piping. These unauthorized discharges (examples of which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains.

Non-stormwater discharges will need to be addressed through a combination of detection and elimination. The ultimate goal is to effectively eliminate unauthorized non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of

Objectives

- *Cover*
- *Contain*
- *Educate*
- *Reduce/Minimize*
- *Product Substitution*

Targeted Constituents	
Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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pollutants on streets and into the storm drain system and downstream water bodies.

Approach

Initially the Discharger must make an assessment of non-stormwater discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is the elimination of unauthorized non-stormwater discharges. See other BMP Fact Sheets for activity-specific pollution prevention procedures.

General Pollution Prevention Protocols

- Implement waste management controls described in SC-34 Waste Handling and Disposal.

- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially those that are not classified as hazardous. These are often not responded to as effectively as they need to be.

- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" or similar stenciled or demarcated next to them to warn against ignorant or unintentional dumping of pollutants into the storm drainage system.

- Manage and control sources of water such as hose bibs, faucets, wash racks, irrigation heads, etc. Identify hoses and faucets in the SWPPP, and post signage for appropriate use.

Non-Stormwater Discharge Investigation Protocols

Identifying the sources of non-stormwater discharges requires the Discharger to conduct an investigation of the facility at regular intervals. There are several categories of non-stormwater discharges:

- Visible, easily identifiable discharges, typically generated as surface runoff, such as uncontained surface runoff from vehicle or equipment washing; and

- Non-visible, (e.g., subsurface) discharges into the site drainage system through a variety of pathways that are not obvious.

The approach to detecting and eliminating non-stormwater discharges will vary considerably, as discussed below:

Visible and identifiable discharges

- Conduct routine inspections of the facilities and of each major activity area and identify visible evidence of unauthorized non-stormwater discharges. This may include:

  - ✓ Visual observations of actual discharges occurring;

- ✓ Evidence of surface staining, discoloring etc. that indicates that discharges have occurred;
- ✓ Pools of water in low lying areas when a rain event has not occurred; and
- ✓ Discussions with operations personnel to understand practices that may lead to unauthorized discharges.

- ☐ If evidence of non-stormwater discharges is discovered:
  - ✓ Document the location and circumstances using Worksheets 5 and 6 (Section 2 of the manual), including digital photos;
  - ✓ Identify and implement any quick remedy or corrective action (e.g., moving uncovered containers inside or to a proper location); and
  - ✓ Develop a plan to eliminate the discharge. Consult the appropriate activity-specific BMP Fact Sheet for alternative approaches to manage and eliminate the discharge.
- ☐ Consult the appropriate activity-specific BMP Fact Sheet for alternative approaches to manage and eliminate the discharge. Make sure the facility SWPPP is up-to-date and includes applicable BMPs to address the non-stormwater discharge.

Other Illegal Discharges (Non visible)

Illicit Connections

- ☐ Locate discharges from the industrial storm drainage system to the municipal storm drain system through review of "as-built" piping schematics.
- ☐ Isolate problem areas and plug illicit discharge points.
- ☐ Locate and evaluate discharges to the storm drain system.
- ☐ Visual Inspection and Inventory:
  - ✓ Inventory and inspect each discharge point during dry weather.
  - ✓ Keep in mind that drainage from a storm event can continue for a day or two following the end of a storm and groundwater may infiltrate the underground stormwater collection system.
  - ✓ Non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

- ☐ A review of the "as-built" piping schematic is a way to determine if there are any connections to the stormwater collection system.

- Inspect the path of loading/unloading area drain inlets and floor drains in older buildings.

- Never assume storm drains are connected to the sanitary sewer system.

Monitoring for investigation/detection of illegal discharges

- If a suspected illegal or unknown discharge is detected, monitoring of the discharge may help identify the content and/or suggest the source. This may be done with a field screening analysis, flow meter measurements, or by collecting a sample for laboratory analysis. Section 5 and Appendix D describe the necessary field equipment and procedures for field investigations.

- Investigative monitoring may be conducted over time. For example if, a discharge is intermittent, then monitoring might be conducted to determine the timing of the discharge to determine the source.

- Investigative monitoring may be conducted over a spatial area. For example, if a discharge is observed in a pipe, then monitoring might be conducted at accessible upstream locations in order to pinpoint the source of the discharge.

- Generally, investigative monitoring requiring collection of samples and submittal for lab analysis requires proper planning and specially trained staff.

Smoke Testing

Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two piping systems. Smoke testing is generally performed at a downstream location and the smoke is forced upstream using blowers to create positive pressure. The advantage to smoke testing is that it can potentially identify multiple potential discharge sources at once.

- Smoke testing uses a harmless, non-toxic smoke cartridges developed specifically for this purpose.

- Smoke testing requires specialized equipment (e.g., cartridges, blowers) and is generally only appropriate for specially trained staff.

- A Standard Operating Procedure (SOP) for smoke testing is highly desirable. The SOP should address the following elements:

  - ✓ Proper planning and notification of nearby residents and emergency services is necessary since introducing smoke into the system may result in false alarms;

  - ✓ During dry weather, the stormwater collection system is filled with smoke and then traced back to sources;

- ✓ Temporary isolation of segments of pipe using sand bags is often needed to force the smoke into leaking pipes; and
- ✓ The appearance of smoke in a waste vent pipe, at a sewer manhole, or even the base of a toilet indicates that there may be a connection between the sanitary and storm water systems.

- Most municipal wastewater agencies will have necessary staff and equipment to conduct smoke testing and they should be contacted if cross connections with the sanitary sewer are suspected. See SC-44 Drainage System Maintenance for more information.

Dye Testing

- Dye testing is typically performed when there is a suspected specific pollutant source and location (i.e., leaking sanitary sewer) and there is evidence of dry weather flows in the stormwater collection system.
- Dye is released at a probable upstream source location, either the facility's sanitary or process wastewater system. The dye must be released with a sufficient volume of water to flush the system.
- Operators then visually examine the downstream discharge points from the stormwater collection system for the presence of the dye.
- Dye testing can be performed informally using commercially available products in order to conduct an initial investigation for fairly obvious cross-connections.
- More detailed dye testing should be performed by properly trained staff and follow SOPs. Specialized equipment such as fluorometers may be necessary to detect low concentrations of dye.
- Most municipal wastewater agencies will have necessary staff and equipment to conduct dye testing and they should be contacted if cross connections with the sanitary sewer are suspected.

TV Inspection of Drainage System

- Closed Circuit Television (CCTV) can be employed to visually identify illicit connections to the industrial storm drainage system. Two types of CCTV systems are available: (1) a small specially designed camera that can be manually pushed on a stiff cable through storm drains to observe the interior of the piping, or (2) a larger remote operated video camera on treads or wheels that can be guided through storm drains to view the interior of the pipe.
- CCTV systems often include a high-pressure water jet and camera on a flexible cable. The water jet cleans debris and biofilm off the inside of pipes so the camera can take video images of the pipe condition.

- CCTV units can detect large cracks and other defects such as offsets in pipe ends caused by root intrusions or shifting substrate.

- CCTV can also be used to detect dye introduced into the sanitary sewer.

- CCTV inspections require specialized equipment and properly trained staff and are generally best left to specialized contractors or municipal public works staff.

Illegal Dumping

- Substances illegally dumped on streets and into the storm drain systems and creeks may include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. These wastes can cause stormwater and receiving water quality problems as well as clog the storm drain system itself.

- Establish a system for tracking incidents. The system should be designed to identify the following:

  - ✓ Illegal dumping hot spots;
  - ✓ Types and quantities (in some cases) of wastes;
  - ✓ Patterns in time of occurrence (time of day/night, month, or year);
  - ✓ Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills);
  - ✓ An anonymous tip/reporting mechanism; and
  - ✓ Evidence of responsible parties (e.g., tagging, encampments, etc.).

- One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people at the facility who are aware of the problem and who have the tools to at least identify the incident, if not correct it. Therefore, train field staff to recognize and report the incidents.

Once a site has been cleaned:

- Post "No Dumping" signs with a phone number for reporting dumping and disposal.

- Landscaping and beautification efforts of hot spots may also discourage future dumping, as well as provide open space and increase property values.

- Lighting or barriers may also be needed to discourage future dumping.

- See fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.

- Conduct field investigations of the industrial storm drain system for potential sources of non-stormwater discharges.

- Pro-actively conduct investigations of high priority areas. Based on historical data, prioritize specific geographic areas and/or incident type for pro-active investigations.

Spill and Leak Prevention and Response

- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.

- Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.

- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

- See SC-11 Spill Prevention Control and Cleanup.

Employee Training Program

- Training of technical staff in identifying and documenting illegal dumping incidents is required. The frequency of training must be presented in the SWPPP, and depends on site-specific industrial materials and activities.

- Consider posting a quick reference table near storm drains to reinforce training.

- Train employees to identify non-stormwater discharges and report discharges to the appropriate departments.

- Educate employees about spill prevention and cleanup.

- Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan. Employees should be able to identify work/jobs with high potential for spills and suggest methods to reduce possibility.

- Determine and implement appropriate outreach efforts to reduce non-permissible non-stormwater discharges.

- Conduct spill response drills annually (if no events occurred) in order to evaluate the effectiveness of the plan.

- When a responsible party is identified, educate the party on the impacts of his or her actions.

Quality Assurance and Record Keeping

Performance Evaluation

- Annually review internal investigation results; assess whether goals were met and what changes or improvements are necessary.

- Obtain feedback from personnel assigned to respond to, or inspect for, illicit connections and illegal dumping incidents.

- Develop document and data management procedures.

- A database is useful for defining and tracking the magnitude and location of the problem.

- Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.

- Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.

- Annually document and report the results of the program.

- Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

- Document training activities.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended “work-arounds.”

- Many facilities do not have accurate, up-to-date ‘as-built’ plans or drawings which may be necessary in order to conduct non-stormwater discharge assessments.

  - ✓ Online tools such as Google Earth™ can provide an aerial view of the facility and may be useful in understanding drainage patterns and potential sources of non-stormwater discharges

  - ✓ Local municipal jurisdictions may have useful drainage systems maps.

- Video surveillance cameras are commonly used to secure the perimeter of industrial facilities against break-ins and theft. These surveillance systems may also be useful for capturing illegal dumping activities. Minor, temporary adjustments to the field of view of existing surveillance camera systems to target known or suspected problem areas may be a cost-effective way of capturing illegal dumping activities and identifying the perpetrators.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Capital facility cost requirements may be minimal unless cross-connections to storm drains are detected.

- Indoor floor drains may require re-plumbing if cross-connections are detected.

- Leaky sanitary sewers will require repair or replacement which can have significant costs depending on the size and industrial activity at the facility.

Maintenance (including administrative and staffing)

- The primary effort is for staff time and depends on how aggressively a program is implemented.

- Costs for containment, and disposal of any leak or discharge is borne by the Discharger.

- Illicit connections can be difficult to locate especially if there is groundwater infiltration.

- Illegal dumping and illicit connection violations requires technical staff to detect and investigate them.

Supplemental Information

Permit Requirements

The IGP authorizes certain Non-Storm Water Discharges (NSWDs) provided BMPs are included in the SWPPP and implemented to:

- Reduce or prevent the contact of authorized NSWDs with materials or equipment that are potential sources of pollutants;

- Reduce, to the extent practicable, the flow or volume of authorized NSWDs;

- Ensure that authorized NSWDs do not contain quantities of pollutants that cause or contribute to an exceedance of a water quality standards (WQS); and,

- Reduce or prevent discharges of pollutants in authorized NSWDs in a manner that reflects best industry practice considering technological availability and economic practicability and achievability."

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Spill Prevention, Control & Cleanup SC-11

Description

Many activities that occur at an industrial or commercial site have the potential to cause accidental spills. Preparation for accidental spills, with proper training and reporting systems implemented, can minimize the discharge of pollutants to the environment.

Spills and leaks are one of the largest contributors of stormwater pollutants. Spill prevention and control plans are applicable to any site at which hazardous materials are stored or used. An effective plan should have spill prevention and response procedures that identify hazardous material storage areas, specify material handling procedures, describe spill response procedures, and provide locations of spill clean-up equipment and materials. The plan should take steps to identify and characterize potential spills, eliminate and reduce spill potential, respond to spills when they occur in an effort to prevent pollutants from entering the stormwater drainage system, and train personnel to prevent and control future spills. An adequate supply of spill clean-up materials must be maintained onsite.

Objectives

- *Cover*
- *Contain*
- *Educate*
- *Reduce/Minimize*
- *Product Substitution*

Targeted Constituents	
Sediment	
Nutrients	
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	
Preventative Maintenance	
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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Approach

General Pollution Prevention Protocols

- ☐ Develop procedures to prevent/mitigate spills to storm drain systems.
- ☐ Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
- ☐ Establish procedures and/or controls to minimize spills and leaks. The procedures should address:
  - ✓ Description of the facility, owner and address, activities, chemicals, and quantities present;

- ✓ Facility map of the locations of industrial materials;
- ✓ Notification and evacuation procedures;
- ✓ Cleanup instructions;
- ✓ Identification of responsible departments; and
- ✓ Identify key spill response personnel.

- ☐ Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of process materials that are brought into the facility.

Spill and Leak Prevention and Response

Spill Prevention

- ☐ Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

- ☐ If illegal dumping is observed at the facility:

  - ✓ Post "No Dumping" signs with a phone number for reporting illegal dumping and disposal. Signs should also indicate fines and penalties applicable for illegal dumping.
  - ✓ Landscaping and beautification efforts may also discourage illegal dumping.
  - ✓ Bright lighting and/or entrance barriers may also be needed to discourage illegal dumping.

- ☐ Store and contain liquid materials in such a manner that if the container is ruptured, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.

- ☐ If the liquid is oil, gas, or other material that separates from and floats on water, install a spill control device (such as a tee section) in the catch basins that collects runoff from the storage tank area.

Preventative Maintenance

- ☐ Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.

- ☐ Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area; and ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

- Sweep and clean the storage area monthly if it is paved, *do not hose down the area to a storm drain.*

- Check tanks (and any containment sumps) daily for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.

- Label all containers according to their contents (e.g., solvent, gasoline).

- Label hazardous substances regarding the potential hazard (corrosive, radioactive, flammable, explosive, poisonous).

- Prominently display required labels on transported hazardous and toxic materials (per US DOT regulations).

- Identify key spill response personnel.

Spill Response

- Clean up leaks and spills immediately.

- Place a stockpile of spill cleanup materials where it will be readily accessible (e.g., near storage and maintenance areas).

- On paved surfaces, clean up spills with as little water as possible.

  - ✓ Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills.

  - ✓ If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

  - ✓ If possible use physical methods for the cleanup of dry chemicals (e.g., brooms, shovels, sweepers, or vacuums).

- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.

- Chemical cleanups of material can be achieved with the use of adsorbents, gels, and foams. Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.

- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Reporting

- Report spills that pose an immediate threat to human health or the environment to the Regional Water Quality Control Board or local authority as location regulations dictate.

- Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).

- Report spills to 911 for dispatch and clean-up assistance when needed. Do not contact fire agencies directly.

- Establish a system for tracking incidents. The system should be designed to identify the following:

  - ✓ Types and quantities (in some cases) of wastes;

  - ✓ Patterns in time of occurrence (time of day/night, month, or year);

  - ✓ Mode of dumping (abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, accidents/spills);

  - ✓ Clean-up procedures; and

  - ✓ Responsible parties.

Employee Training Program

- Educate employees about spill prevention and cleanup.

- Well-trained employees can reduce human errors that lead to accidental releases or spills:

  - ✓ The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur; and

  - ✓ Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.

- Employees should be educated about aboveground storage tank requirements. Employees responsible for aboveground storage tanks and liquid transfers should be thoroughly familiar with the Spill Prevention Control and Countermeasure Plan and the plan should be readily available.

- Train employees to recognize and report illegal dumping incidents.

Other Considerations (Limitations and Regulations)

- State regulations exist for facilities with a storage capacity of 10,000 gallons or more of petroleum to prepare a Spill Prevention Control and Countermeasure (SPCC) Plan (Health & Safety Code Chapter 6.67).
- State regulations also exist for storage of hazardous materials (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the releases or threatened releases.
- Consider requiring smaller secondary containment areas (less than 200 sq. ft.) to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

Requirements

Costs (including capital and operation & maintenance)

- Will vary depending on the size of the facility and the necessary controls.
- Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil or water can be quite expensive.

Maintenance (including administrative and staffing)

- Develop spill prevention and control plan, provide and document training, conduct inspections of material storage areas, and supply spill kits.
- Extra time is needed to properly handle and dispose of spills, which results in increased labor costs.

Supplemental Information

Further Detail of the BMP

Reporting

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the facility and the effectiveness of BMPs. A good record keeping system helps the facility minimize incident recurrence, correctly respond with appropriate cleanup activities, and comply with legal requirements. A record keeping and reporting system should be set up for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm sewer. These records should contain the following information:

- Date and time of the incident;
- Weather conditions;
- Duration of the spill/leak/discharge;

- Cause of the spill/leak/discharge;
- Response procedures implemented;
- Persons notified; and
- Environmental problems associated with the spill/leak/discharge.

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

- Date and time the inspection was performed;
- Name of the inspector;
- Items inspected;
- Problems noted;
- Corrective action required; and
- Date corrective action was taken.

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

Aboveground Tank Leak and Spill Control

Accidental releases of materials from aboveground liquid storage tanks present the potential for contaminating stormwater with many different pollutants. Materials spilled, leaked, or lost from tanks may accumulate in soils or on impervious surfaces and be carried away by stormwater runoff.

The most common causes of unintentional releases are:

- Installation problems;
- Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves);
- External corrosion and structural failure;
- Spills and overfills due to operator error; and
- Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa.

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Practices listed below should be employed to enhance the code requirements:

- Tanks should be placed in a designated area.
- Tanks located in areas where firearms are discharged should be encapsulated in concrete or the equivalent.
- Designated areas should be impervious and paved with Portland cement concrete, free of cracks and gaps, in order to contain leaks and spills.
- Liquid materials should be stored in UL approved double walled tanks or surrounded by a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain.
- For used oil or dangerous waste, a dead-end sump should be installed in the drain.
- All other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- Accumulated stormwater in petroleum storage areas should be passed through an oil/water separator.

Maintenance is critical to preventing leaks and spills. Conduct routine inspections and:

- Check for external corrosion and structural failure.
- Check for spills and overfills due to operator error.
- Check for failure of piping system (pipes, pumps, flanges, coupling, hoses, and valves).
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
- Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Frequently relocate accumulated stormwater during the wet season.

- Periodically conduct integrity testing by a qualified professional.

Vehicle Leak and Spill Control

Major spills on roadways and other public areas are generally handled by highly trained Hazmat teams from local fire departments or environmental health departments. The measures listed below pertain to leaks and smaller spills at vehicle maintenance shops.

In addition to implementing the spill prevention, control, and clean up practices above, use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- Perform all vehicle fluid removal or changing inside or under cover to prevent the run-on of stormwater and the runoff of spills.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Immediately drain all fluids from wrecked vehicles.
- Store wrecked vehicles or damaged equipment under cover.
- Place drip pans or absorbent materials under heavy equipment when not in use.
- Use absorbent materials on small spills rather than hosing down the spill.
- Remove the adsorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- Oil filters disposed of in trashcans or dumpsters can leak oil and contaminate stormwater. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- Design the fueling area to prevent the run-on of stormwater and the runoff of spills:

  Cover fueling area if possible.

  Use a perimeter drain or slope pavement inward with drainage to a sump.

  Pave fueling area with concrete rather than asphalt.

- If dead-end sump is not used to collect spills, install an oil/water separator.
- Install vapor recovery nozzles to help control drips as well as air pollution.
- Discourage "topping-off' of fuel tanks.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- Use absorbent materials on small spills and general cleaning rather than hosing down the area. Remove the absorbent materials promptly.
- Carry out all Federal and State requirements regarding underground storage tanks, or install above ground tanks.
- Do not use mobile fueling of mobile industrial equipment around the facility; rather, transport the equipment to designated fueling areas.
- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Train employees in proper fueling and cleanup procedures.

Industrial Spill Prevention Response

For the purposes of developing a spill prevention and response program to meet the stormwater regulations, facility managers should use information provided in this fact sheet and the spill prevention/response portions of the fact sheets in this handbook, for specific activities.

The program should:

- Integrate with existing emergency response/hazardous materials programs (e.g., Fire Department).
- Develop procedures to prevent/mitigate spills to storm drain systems.
- Identify responsible departments.

- Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

- Address spills at municipal facilities, as well as public areas.

- Provide training concerning spill prevention, response and cleanup to all appropriate personnel.

References and Resources

California's Nonpoint Source Program Plan. http://www.swrcb.ca.gov/nps/index.html.

Clark County Storm Water Pollution Control Manual. Available online at: http://www.co.clark.wa.us/pubworks/bmpman.pdf.

King County Storm Water Pollution Control Manual. Available online at: http://dnr.metrokc.gov/wlr/dss/spcm.htm.

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities

Santa Clara Valley Urban Runoff Pollution Prevention Program. http://www.scvurppp.org.

The Stormwater Managers Resource Center. http://www.stormwatercenter.net/.

Vehicle and Equipment Fueling SC-20

Description

Spills and leaks that occur during vehicle and equipment fueling can contribute hydrocarbons, oil and grease, as well as heavy metals, to stormwater runoff. Implementing the following management practices can help prevent fuel spills and leaks.

Approach

- ◻ Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ◻ Use properly maintained off-site fueling stations whenever possible. These businesses are better equipped to handle fuel and spills properly.

- ◻ Focus pollution prevention activities on containment of spills and leaks, most of which may occur during liquid transfers.

Good Housekeeping

- ◻ "Spot clean" leaks and drips routinely. Leaks are not cleaned up until the absorbent is picked up and disposed of properly.

- ◻ Manage materials and waste properly (see Material Handling and Waste Management) to reduce adverse impacts on stormwater quality.

- ◻ Paint signs on storm drain inlets to indicate that they are not to receive liquid or solid wastes.

- ◻ Post signs at sinks to remind employees not to pour wastes down drains.

Objectives

- *Cover*
- *Contain*
- *Educate*
- *Reduce/Minimize*
- *Product Substitution*

Targeted Constituents	
Sediment	
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Clean yard storm drain inlets(s) regularly and especially after large storms.
- Do not pour materials down storm drains.
- Build a shed or temporary roof over fueling area to limit exposure to rain.
- Post signs to remind employees and customers not to top off the fuel tank when filling and signs that ban customers and employees from changing engine oil or other fluids at that location.
- Report leaking vehicles to fleet maintenance.
- Ensure the following safeguards are in place:
  - ✓ Overflow protection devices on tank systems to warn the operator or automatically shut down transfer pumps when the tank reaches full capacity.
  - ✓ Protective guards around tanks and piping to prevent vehicle or forklift damage.
  - ✓ Clear tagging or labeling of all valves to reduce human error.
  - ✓ Emergency shut-off and emergency phone number.

Preventative Maintenance

Fuel Dispensing Areas

- Inspect vehicles and equipment for leaks regularly and repair immediately.
- Sweep the fueling area weekly, if it is paved, to collect loose particles, and wipe up spills with rags and other absorbent material immediately. Do not hose down the area to a storm drain.
- Fit underground storage tanks with spill containment and overfill prevention systems meeting the requirements of Section 2635(b) of Title 23 of the California Code of Regulations.
- Fit fuel dispensing nozzles with "hold-open latches" (automatic shutoffs) except where prohibited by local fire departments.
- Post signs at the fuel dispenser or fuel island warning vehicle owners/operators against "topping off" of vehicle fuel tanks.
- Design fueling area to prevent stormwater runoff and spills. Use a perimeter drain or slope pavement inward with drainage to sump; regularly remove materials accumulated in sump.
- Pave area with concrete rather than asphalt.

- Cover fueling area with an overhanging roof structure or canopy so that precipitation cannot come in contact with the fueling area. Where covering is not feasible and the fuel island is surrounded by pavement, apply a suitable sealant that protects the asphalt from spilled fuels.

- Install vapor recovery nozzles to help control drips as well as air pollution.

- Use secondary containment when transferring fuel from the tank truck to the fuel tank. Cover storm drains in the vicinity during transfer.

Air/Water Supply Area

- Minimize the possibility of stormwater pollution from air/water supply areas by doing at least one of the following:

  - ✓ Spot clean leaks and drips routinely to prevent runoff of spillage.

  - ✓ Grade and pave the air/water supply area to prevent run-on of stormwater.

  - ✓ Install a roof over the air/water supply area.

  - ✓ Install a low containment berm around the air/water supply area.

Inspection

- Aboveground Tank Leak and Spill Control:

  - ✓ Check for external corrosion and structural failure.

  - ✓ Check for spills and overfills due to operator error.

  - ✓ Check for failure of piping system.

  - ✓ Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.

  - ✓ Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.

  - ✓ Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.

  - ✓ Conduct integrity testing periodically by a qualified professional.

- Inspect and clean, if necessary, storm drain inlets and catch basins within the facility boundary before October 1 each year.

Spill Response and Prevention Procedures

- Keep your spill prevention and control plan up-to-date.
- Maintain an adequate stockpile of spill cleanup materials at locations where it will be readily accessible.
- Clean leaks, drips, and other spills with as little water as possible.
  - ✓ Use rags for small spills,
  - ✓ Use a damp mop for general cleanup,
  - ✓ Use dry absorbent material for larger spills.
- Use the following three-step method for cleaning floors:
  - ✓ Clean spills with rags or other absorbent materials
  - ✓ Sweep floor using dry absorbent material
  - ✓ Mop the floor. Mop water may be discharged to the sanitary sewer via a toilet or sink.
- Remove the adsorbent materials promptly and dispose of properly when using absorbent materials on small spills.
- Store portable absorbent booms (long flexible shafts or barriers made of absorbent material) in unbermed fueling areas.
- Report spills promptly.
- If a dead-end sump is not used to collect spills, install an oil/water separator.

Material Handling and Waste Management

- Do not pour liquid wastes into floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.
- Do not put used or leftover cleaning solutions, solvents, and automotive fluids in the sanitary sewer.
- Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.

- Minimize the possibility of stormwater pollution from outside waste receptacles by doing at least one of the following:
  - ✓ Use only watertight waste receptacle(s) and keep the lid(s) closed.
  - ✓ Grade and pave the waste receptacle area to prevent run-on of stormwater.
  - ✓ Install a roof over the waste receptacle area.
  - ✓ Install a low containment berm around the waste receptacle area.
  - ✓ Use and maintain drip pans under waste receptacles.
- Post “no littering” signs.

Employee Training Program

- Educate employees about facility-wide pollution prevention measures and goals.
- Train designated employees (e.g., those involved with the handling or management of fuels) on proper fueling and cleanup procedures.
- Train designated employees upon hiring and annually thereafter on proper methods for handling and disposing of waste. Make sure that all employees understand stormwater discharge prohibitions, wastewater discharge requirements, and these best management practices.
- Ensure that employees are familiar with the site’s spill control plan and/or proper spill cleanup procedures.
- Use a training log or similar method to document training. The training log should include entries for:
  - ✓ Training topic,
  - ✓ Trainer,
  - ✓ Attendees,
  - ✓ Frequency,
  - ✓ Comments,
  - ✓ Target date for completion of training, and
  - ✓ Date completed.

Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for vehicle and equipment fueling, quantities of materials removed, and improvement actions.

- Keep accurate logs of spill response actions that document what types of liquids were spilled, how it was cleaned up, and how the waste was disposed.

- Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- The retrofitting of existing fueling areas to minimize stormwater exposure or spill runoff can be expensive. Good design must occur during the initial installation. Extruded curb along the "upstream" side of the fueling area to prevent stormwater run-on is of modest cost.

- Capital investments will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance

- Most of the operations and maintenance activities associated with implementing this BMP are integrally linked to routine operations as previously described. Therefore additional O&M is not required.

- For facilities responsible for pre-treating their wastewater prior to discharging, the proper functioning of structural treatment system is an important maintenance consideration.

- Routine cleanout of sumps and oil/water separators is required for the devices to maintain their effectiveness, usually at least once a month. During periods of heavy rainfall, cleanout is required more often to ensure pollutants are not washed through the system. Sediment removal is also required on a regular basis to keep the device working efficiently.

Supplemental Information

Designing New Installations

The elements listed below should be included in the design and construction of new or substantially remodeled facilities.

Fuel Dispensing Areas

- Fuel dispensing areas must be paved with Portland cement concrete (or, equivalent smooth impervious surface), with a 2 to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of stormwater to the extent practicable. The fuel dispensing area is defined as extending 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus 1 foot, whichever is less. The paving around the fuel dispensing area may exceed the minimum dimensions of the "fuel dispensing area" stated above.

- The fuel dispensing area must be covered, and the cover's minimum dimensions must be equal to or greater than the area within the grade break or the fuel dispensing area, as defined above. The cover must not drain onto the fuel dispensing area.

- If necessary, install and maintain an oil control device in the appropriate catch basin(s) to treat runoff from the fueling area.

Outdoor Waste Receptacle Area

- Grade and pave the outdoor waste receptacle area to prevent run-on of stormwater to the extent practicable.

Air/Water Supply Area

- Grade and pave the air/water supply area to prevent run-on of stormwater to the extent practicable.

Designated Fueling Area

- If your facility has large numbers of mobile equipment working throughout the site and you currently fuel them with a mobile fuel truck, consider establishing a designated fueling area. With the exception of tracked equipment such as bulldozers and perhaps small forklifts, most vehicles should be able to travel to a designated area with little lost time. Place temporary "caps" over nearby catch basins or manhole covers so that if a spill occurs it is prevented from entering the storm drain.

Examples

The Spill Prevention Control and Countermeasure (SPCC) Plan, which is required by law for some facilities, is an effective program to reduce the number of accidental spills and minimize contamination of stormwater runoff.

The City of Palo Alto has an effective program for commercial vehicle service facilities. Many of the program's elements, including specific BMP guidance and lists of equipment suppliers, are also applicable to industrial facilities.

References and Resources

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities.

Oregon Department of Environmental Quality, 2013. *Industrial Stormwater Best Management Practices Manual- BMP 8 Vehicle, Pavement and Building Washing*. Available online at: http://www.deq.state.or.us/wq/wqpermit/docs/IndBMP021413.pdf

Sacramento Stormwater Management Program. *Best Management Practices for Industrial Storm Water Pollution Control*. Available online at: http://www.msa.saccounty.net/sactostormwater/documents/guides/industrial-BMP-manual.pdf.

Sacramento County Environmental Management Stormwater Program: Best Management Practices –Vehicle Washing. Available online at: http://www.emd.saccounty.net/EnvHealth/Stormwater/Stormwater-BMPs.html.

Santa Clara Valley Urban Runoff Pollution Prevention Program. http://www.scvurppp-w2k.com/.

US EPA. National Pollutant Discharge Elimination System – Stormwater Menu of BMPs - Municipal Vehicle and Equipment Washing, Available online at: http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=132.

Washington State Department of Ecology, 2012. *Vehicle and Equipment Washwater Discharges Best Management Practices Manual.* Publication no. WQ-R-95-056. Available online at: https://fortress.wa.gov/ecy/publications/publications/95056.pdf.

Vehicle and Equipment Cleaning SC-21

Description

Wash water from vehicle and equipment cleaning activities performed outdoors or in areas where wash water flows onto the ground can contribute toxic hydrocarbons and other organic compounds, oils and greases, nutrients, phosphates, heavy metals, and suspended solids to stormwater runoff. Use of the procedures outlined below can prevent or reduce the discharge of pollutants to stormwater during vehicle and equipment cleaning.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives

General Pollution Prevention Protocols

- ☐ If possible, use properly maintained off-site commercial washing and steam cleaning businesses whenever possible. These businesses are better equipped to handle and properly dispose of the wash waters.
- ☐ Use dry cleaning methods to remove debris and sweep area; avoid washing with water when possible.
- ☐ Good housekeeping practices can minimize the risk of contamination from wash water discharges.
- ☐ Use biodegradable, phosphate-free detergents for washing vehicles as appropriate
- ☐ Emphasize the connection between the storm drain system and runoff, help reinforce that vehicle and equipment washing activities affect local water quality through storm drain stenciling programs.

Objectives

- ■ *Cover*
- ■ *Contain*
- ■ *Educate*
- ■ *Reduce/Minimize*
- ■ *Product Substitution*

Targeted Constituents	
Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Addressed	
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Map on-site storm drain locations to avoid discharges to the storm drain system.

- Designate specific wash area with clarifier or place wash areas away from storm drain connections.

Good Housekeeping

- Mark the area clearly as a wash area by:

  - ✓ Posting signs stating that only washing is allowed in wash area; and

  - ✓ Providing information on how washing is to be done.

- Provide trash containers in wash area.

- Have all vehicle and equipment washing done in areas designed to collect and hold the wash and rinse water or effluent generated. Recycle, collect or treat wash water effluent prior to discharge to the sanitary sewer system.

- If washing/cleaning must occur on-site, consider washing vehicles and equipment inside the building or on an impervious surface to control the targeted constituents by directing them to the sanitary sewer.

- If washing must occur on-site and outdoor:

  - ✓ Use designated paved wash areas. This area must be covered or bermed to collect the wash water and graded to direct the wash water to a treatment or disposal facility.

  - ✓ Do not conduct oil changes and other engine maintenance in the designated washing area. Perform these activities in a place designated for oil change and maintenance activities.

  - ✓ Cover the wash area when not in use to prevent contact with rain water.

- Do not permit steam cleaning wash water to enter the storm drain system.

- If possible, conduct pressure and steam cleaning at appropriate off-site areas to avoid generating runoff with high pollutant concentrations.

Preventative Maintenance

- Install sumps or drain lines to collect wash water for treatment.

- Use hoses with nozzles that automatically turn off when left unattended.

- Perform routine inspections of drain lines, holding tanks, and hoses and repair leaks immediately.

- Perform routine inspection and maintenance of wash water recycling and treatment systems.

Spill Response and Prevention Procedures

- Keep the spill prevention and control plan up-to-date.
- Have an emergency plan, equipment, and trained personnel ready at all times to deal immediately with major spills.
- Collect all spilled liquids and properly dispose of them.
- Store and maintain appropriate spill cleanup materials in a location known to all near the designated wash area.

Material Handling and Waste Management

- Collect all wash water from vehicle and equipment cleaning operations. Consider treating and reusing or discharging wash waters to a sanitary sewer system.
- Large quantities of wash waters may require treatment at the facility. Treatment using a process treatment system (e.g., holding tank, filtration system, and related appurtenances) will require engineering and capital expenditures.
- Collect and treat small amounts of wash water at the facility and either recycle or discharge to the sanitary sewer system or collect and dispose of as an industrial waste.
- Discharge wash waters into sanitary sewer only after contacting local sewer authority to find out if pretreatment is required.

Employee Training Program

- Train employees on proper cleaning and wash water disposal procedures and conduct “refresher” courses on a regular basis.
- Train staff on proper maintenance measures for the wash area.
- Train employees and contractors on proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
- Use a training log or similar method to document training.

Quality Assurance and Record Keeping

- Keep accurate maintenance/inspection logs that document the minimum BMP activities performed for vehicle and equipment cleaning activities and improvement actions.

- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.

- Establish procedures to complete logs and file them in the central office.

Other Facility-Specific Considerations

- Some municipalities may require pretreatment and monitoring of wash water discharges to the sanitary sewer.

- Steam cleaning can generate significant pollutant concentrations requiring that careful consideration be given to the environmental impacts and compliance issues related to the condensate wastewater generated.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of certain BMPs. Provided below are typical limitations and recommended "work-arounds":

- Most car washing best management practices are inexpensive, and rely more on good housekeeping practices (where vehicles are washed, planning for the collection of wash water) than on expensive technology. However, the construction of a specialized area for vehicle washing can be expensive. Also, for facilities that cannot recycle their wash water, the cost of pre-treating wash water through either structural practices or planning for collection and hauling of contaminated water to sewage treatment plants can be cost-prohibitive.

- A potential work-around is to use properly maintained off-site commercial washing and steam cleaning businesses whenever possible.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Many facilities will already have indoor covered areas where vehicle and equipment cleaning takes place and will require no additional capital expenditures for providing cover.

- Capital investments will be required at some sites if systems to collect and recycle/treat and properly discharge wash water are not in place. The cost associated with these investments will vary depending on the size of the washing facility and local regulations regarding effluent wash water.

Maintenance

- Perform wash and collection system inspections and repair.

- Sweep washing areas frequently to remove solid debris.

- Repair berms and dikes as necessary.
- Inspect and maintain sumps, oil/water separators, and on-site treatment/recycling units.

Supplemental Information

Designated Cleaning Areas

- Washing operations outside should be conducted in a designated wash area having the following characteristics:
  - ✓ Paved with Portland cement concrete
  - ✓ Covered and bermed to prevent contact with stormwater and contain wash water
  - ✓ Sloped for wash water collections
  - ✓ Drainage system for wash water to the sanitary or recycle treatment process waste sewer, or to a dead-end sump equipped with an oil/water separator if necessary.

References and Resources

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities.

Oregon Department of Environmental Quality, 2013. *Industrial Stormwater Best Management Practices Manual- BMP 8 Vehicle, Pavement and Building Washing*. Available online at: http://www.deq.state.or.us/wq/wqpermit/docs/IndBMP021413.pdf.

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Vehicle and Equipment Repair SC-22

Description

Vehicle or equipment maintenance and repair are potentially significant sources of stormwater pollution, due to use of harmful materials and wastes during maintenance and repair processes. Engine repair and service (e.g., parts cleaning), replacement of fluids (e.g., oil change), and outdoor equipment storage and parking (leaking vehicles) can impact water quality if stormwater runoff from areas with these activities becomes polluted by a variety of contaminants. Implementation of the following activities must be done where applicable to prevent or reduce the discharge of pollutants to stormwater from vehicle and equipment maintenance and repair activities.

Approach

The BMP approach is to reduce the potential for pollutant discharges through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives. General pollution prevention protocols are presented followed by applicable minimum BMPs as required by the Industrial General Permit.

General Pollution Prevention Protocols

- ☐ Designate a vehicle maintenance area designed to prevent stormwater pollution.
- ☐ Minimize contact of stormwater with outside operations through berming and appropriate drainage routing.
- ☐ Keep accurate maintenance logs to evaluate materials removed and improvements made.
- ☐ Switch to non-toxic chemicals for maintenance when possible.
- ☐ Choose cleaning agents that can be recycled.
- ☐ Use drop cloths and drip pans.

Objectives
■ *Cover*
■ *Contain*
■ *Educate*
■ *Reduce/Minimize*
■ *Product Substitution*

Targeted Constituents	
Sediment	
Nutrients	
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Minimize use of solvents. Clean parts without using solvents whenever possible, or use water-based solvents for cleaning.

- Recycle used motor oil, diesel oil, and other vehicle fluids and parts whenever possible.

Operational Protocols

General

- Move maintenance and repair activities indoors whenever feasible.

- Place curbs around the immediate boundaries of process equipment.

Good Housekeeping

- Store idle equipment under cover

- Use a vehicle maintenance area designed to prevent stormwater pollution - minimize contact of stormwater with outside operations through berming and appropriate drainage routing.

- Avoid hosing down your work areas. If work areas are washed, collect and direct wash water to sanitary sewer. Use dry sweeping if possible.

- Paint signs on storm drain inlets to indicate that they are not to receive liquid or solid wastes.

- Post signs at sinks to remind employees not to pour wastes down drains.

- Clean yard storm drain inlets(s) regularly and especially after large storms.

- Do not pour materials down storm drains.

- Cover the work area to limit exposure to rain.

- Place curbs around the immediate boundaries of process equipment.

- Build a shed or temporary roof over areas where parked cars await repair or salvage, especially wrecked vehicles. Build a roof over vehicles kept for parts.

Preventive Maintenance and Repair Activities

- Provide a designated area for vehicle maintenance.

- Inspect vehicles and equipment for leaks regularly and repair immediately.

- Make sure incoming vehicles are checked for leaking oil and fluids. Do not allow leaking vehicles or equipment on-site without correcting the source of the leak and cleaning up any spill.

- Keep equipment clean; don’t allow excessive build-up of oil and grease.

- Perform all vehicle fluid removal or changing inside or under cover if possible to prevent the run-on of stormwater and the runoff of spills.

- Use a tarp, ground cloth, or drip pans beneath the vehicle or equipment to capture all spills and drips if temporary work is being conducted outside. Collected drips and spills must be disposed, reused, or recycled properly.

- It is important to sweep the maintenance area weekly, if it is paved, to collect loose particles, and wipe up spills with rags and other absorbent material immediately. Do not hose down the area to a storm drain.

- Establish standard procedures to prevent spillage/leakage of fluids including:

  - ✓ Keep a drip pan under the vehicle while you unclip hoses, unscrew filters, or remove other parts. Use a drip pan under any vehicle that might leak while working on it to keep splatters or drips off the shop floor.

  - ✓ Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.

  - ✓ Keep drip pans or containers under vehicles or equipment that may drip during repairs.

  - ✓ Do not change motor oil or perform equipment maintenance in non-appropriate areas.

- Drain oil and other fluids first if the vehicle or equipment is to be stored outdoors. Elevate and tarp stored vehicles and equipment.

- Monitor parked vehicles closely for leaks. Pans should be placed under any leaks to collect the fluids for proper disposal or recycling.

- Mechanics should clean vehicle parts without using liquid cleaners wherever possible to reduce waste.

- Steam cleaning and pressure washing may be used instead of solvent parts cleaning. The wastewater generated from steam cleaning must be discharged to an on-site oil water separator that is connected to a sanitary sewer or blind sump. Non-caustic detergents should be used instead of caustic cleaning agents, detergent-based or water-based cleaning systems in place of organic solvent degreasers, and non-chlorinated solvent in place of chlorinated organic solvents for parts cleaning. Refer to SC21 for more information on steam cleaning.

- Fifth-wheel bearings on trucks require routine lubrication. Typically chassis grease is applied to the fifth-wheel bearing at rates that result in grease dripping off of the bearing into the environment. To address this concern the following options are available:

  - ✓ Use specialized lubricants with good adhesion (e.g., stay in place) properties. Carefully follow manufacturer's label regarding the use of adhesive lubricant for truck fifth-wheels. Typically this means applying no more than 8 oz. of grease. No visible extrusion of lubricant from the fifth-wheel bearing when truck and trailer are connected should be present.

- ✓ Use on-board truck or on-board trailer automatic lubrication systems. If these systems apply lube thinner than National Grease Lubrication Institute #2, equipment for collection of used lubricant is needed to prevent excess lubricant from dripping off the truck.

- ✓ Use plastic or Teflon plates instead of grease or other lubricants. Carefully follow manufacturer's instructions for installation and operation.

- ☐ Use one of the following for lubricating vehicle-trailer coupling:

  - ✓ Specialized adhesive lubricants;
  - ✓ Grease-free fifth wheel slip plates (e.g., plastic or Teflon coatings); and
  - ✓ On-Board automatic lubricating systems.

Spill and Leak Prevention and Response Procedures

- ☐ Keep your spill prevention and control plan up-to-date.

- ☐ Place an adequate stockpile of spill cleanup materials where it will be readily accessible.

- ☐ Clean leaks, drips, and other spills with as little water as possible. Use rags for small spills, a damp mop for general cleanup, and dry absorbent material for larger spills. Use the following three-step method for cleaning floors:

  - ✓ Clean spills with rags or other absorbent materials;
  - ✓ Sweep floor using dry absorbent material; and
  - ✓ Mop the floor.

  Mop water may be discharged to the sanitary sewer via a toilet or sink.

- ☐ Remove the adsorbent materials promptly and dispose of properly when using adsorbent materials on small spills.

Material Handling and Waste Management

- ☐ Designate a special area to drain and replace motor oil, coolant, and other fluids, where there are no connections to the storm drain or the sanitary sewer, and drips and spills can be easily cleaned up.

- ☐ Drain all fluids immediately from wrecked vehicles. Ensure that the drain pan or drip pan is large enough to contain drained fluids (e.g., larger pans are needed to contain antifreeze, which may gush from some vehicles).

- Do not pour liquid waste to floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.
- Do not put used or leftover cleaning solutions, solvents, and automotive fluids and in the sanitary sewer.
- Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.
- Place oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal since municipalities prohibit or discourage disposal of these items in solid waste facilities.
- Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters. Oil filters disposed of in trashcans or dumpsters can leak oil and contaminate stormwater.
- Store cracked batteries in a non-leaking secondary container and dispose of properly at recycling or household hazardous waste facilities.

Employee Training Program

- Train employees and contractors in the proper handling and disposal of engine fluids and waste materials.
- Employees should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
- Conduct annual training to ensure that employees are familiar with the facility's spill control plan and/or proper spill cleanup procedures (You can use reusable cloth rags to clean up small drips and spills instead of disposables; these can be washed by a permitted industrial laundry. Do not clean them at home or at a coin-operated laundry business).
- Use a training log or similar method to document training.

Quality Assurance and Recordkeeping

- Keep accurate maintenance logs to evaluate materials removed and improvements made.
- Establish procedures to collect and file maintenance logs in the central office.

Other Facility-Specific Considerations

Parts Cleaning

Vehicle and equipment maintenance facilities often must clean parts as a part of day-today operations. The following activities should be considered:

- ☐ Clean vehicle parts without using liquid cleaners wherever possible to reduce waste.
- ☐ Steam cleaning and pressure washing may be used instead of solvent parts cleaning.
- ☐ Wastewater generated from steam cleaning must be discharged to an on-site oil water separator that is connected to a sanitary sewer or blind sump.
- ☐ Use non-caustic detergents instead of caustic cleaning agents, detergent-based or water-based cleaning systems in place of organic solvent degreasers, and non-chlorinated solvent in place of chlorinated organic solvents for parts cleaning. Refer to SC21 for more information on steam cleaning.

Potential Limitations and Work-Arounds

- ☐ Some facilities may have space constraints and time limitations that may preclude all work from being conducted indoors.
  - ✓ Designate specific areas for outdoor activities.
  - ✓ Require employees to understand and follow preventive maintenance and spill and leak prevention BMPs.
- ☐ It may not be possible to contain and clean up spills from vehicles/equipment brought on-site after working hours.
  - ✓ Provide a designated area for afterhours deliveries.
  - ✓ Install spill kits.
- ☐ Drain pans (usually 1 ft. x 1 ft.) are generally too small to contain antifreeze
  - ✓ Purchase or fabricate large drip pans (3 ft. x 3 ft.) with sufficient volume to contain expected quantities of liquids based on equipment/vehicle specifications.
- ☐ Dry floor cleaning methods may not be sufficient for some spills.
  - ✓ Use three-step method instead.
- ☐ Identification of engine leaks may require some use of solvents.
  - ✓ Minimize the use of solvents and use drip pans to collect spills and leaks.
- ☐ Prices for recycled materials and fluids may be higher than those of non-recycled materials.

- Some facilities may be limited by a lack of providers of recycled materials, and by the absence of businesses to provide services such as hazardous waste removal, structural treatment practice maintenance, or solvent equipment and solvent recycling.

Potential Facilities and Maintenance Requirements

Facilities Requirements

- For facilities that already have covered areas where maintenance takes place, have berms or other means to retain spills and leaks, and/ have other appropriate constructed systems for containment, there may not need to be any significant new capital investment. Capital costs will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance Requirements

- Most of the operations and maintenance activity associated with implementing this BMP are integrally linked to routine operations as previously described. Therefore, significant additional operations and maintenance efforts are not likely to be required.

- For facilities responsible for pre-treating their wastewater prior to discharging, the proper functioning of structural treatment system is an important maintenance consideration. Routine cleanout of oil and grease is required for the devices to maintain their effectiveness, usually at least once a month. During periods of heavy rainfall, cleanout is required more often to ensure pollutants are not washed through the trap. Sediment removal is also required on a regular basis to keep the device working efficiently.

- It is important to sweep the maintenance area weekly, if it is paved, to collect loose particles, and wipe up spills with rags and other absorbent material immediately. Do not hose down the area to a storm drain.

Supplemental Information

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, 1,1,1-trichloroethane or methylene chloride. Many of these cleaners are harmful and must be disposed of as a hazardous waste. Cleaning without using liquid cleaners (e.g., wire brush) whenever possible reduces waste. Prevent spills and drips of solvents and cleansers to the shop floor. Do all liquid cleaning at a centralized station so the solvents and residues stay in one area. Locate drip pans, drain boards, and drying racks to direct drips back into a solvent sink or fluid holding tank for reuse. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents.

- Clean parts without using liquid cleaners whenever possible to reduce waste.

- Prevent spills and drips of solvents and cleansers to the shop floor.

- Do all liquid cleaning at a centralized station so the solvents and residues stay in one area.

- Locate drip pans, drain boards, and drying racks to direct drips back into a solvent sink or fluid holding tank for reuse.

Recycling

Separating wastes allows for easier recycling and may reduce treatment costs. Keep hazardous and non-hazardous wastes separate, do not mix used oil and solvents, and keep chlorinated solvents (e.g., 1,1,1-trichloroethane) separate from non-chlorinated solvents (e.g., kerosene and mineral spirits).

Many products made of recycled (i.e., refined or purified) materials are available. Engine oil, transmission fluid, antifreeze, and hydraulic fluid are available in recycled form. Buying recycled products supports the market for recycled materials.

- Recycling is always preferable to disposal of unwanted materials.

- Separate wastes for easier recycling. Keep hazardous and non-hazardous wastes separate, do not mix used oil and solvents, and keep chlorinated solvents separate from non-chlorinated solvents.

- Label and track the recycling of waste material (e.g., used oil, spent solvents, batteries).

- Purchase recycled products to support the market for recycled materials.

Safer Alternatives

If possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous material:

- Use non-caustic detergents instead of caustic cleaning for parts cleaning.

- Use detergent-based or water-based cleaning systems in place of organic solvent degreasers. Wash water may require treatment before it can be discharged to the sewer.

- Replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check list of active ingredients to see whether it contains chlorinated solvents.

- Choose cleaning agents that can be recycled.

References and Resources

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities.

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Washington State Department of Ecology, 2012. *Vehicle and Equipment Washwater Discharges Best Management Practices Manual.* Publication no. WQ-R-95-056. Available online at: https://fortress.wa.gov/ecy/publications/publications/95056.pdf.

Outdoor Loading / Unloading SC-30

Description

The loading/unloading of materials usually takes place outside on docks or terminals; therefore, materials spilled, leaked, or lost during loading/unloading may collect in the soil or on other surfaces and have the potential to be carried away by wind, stormwater runoff or when the area is cleaned. Additionally, rainfall may wash pollutants from machinery used to unload or move materials. Implementation of the following protocols will prevent or reduce the discharge of pollutants to stormwater from outdoor loading/unloading of materials.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ◻ Park tank trucks or delivery vehicles in designated areas so that spills or leaks can be contained.
- ◻ Limit exposure of material to rainfall whenever possible.
- ◻ Prevent stormwater run-on.
- ◻ Check equipment regularly for leaks.

Good Housekeeping

- ◻ Develop an operations plan that describes procedures for loading and/or unloading.
- ◻ Conduct loading and unloading in dry weather if possible.

Objectives

- ■ *Cover*
- ■ *Contain*
- ■ *Educate*
- ■ *Reduce/Minimize*
- ■ *Product Substitution*

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered

Good Housekeeping	✓
Preventative Maintenance	
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Cover designated loading/unloading areas to reduce exposure of materials to rain.
- Consider placing a seal or door skirt between delivery vehicles and building to prevent exposure to rain.
- Design loading/unloading area to prevent stormwater run-on, which would include grading or berming the area, and position roof downspouts so they direct stormwater away from the loading/unloading areas.
- Have employees load and unload all materials and equipment in covered areas such as building overhangs at loading docks if feasible.
- Load/unload only at designated loading areas.
- Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections. Several drip pans should be stored in a covered location near the liquid transfer area so that they are always available, yet protected from precipitation when not in use. Drip pans can be made specifically for railroad tracks. Drip pans must be cleaned periodically, and drip collected materials must be disposed of properly.
- Pave loading areas with concrete instead of asphalt.
- Avoid placing storm drains inlets in the area.
- Grade and/or berm the loading/unloading area with drainage to sump; regularly remove materials accumulated in sump.

Spill Response and Prevention Procedures

- Keep your spill prevention and control plan up-to-date or have an emergency spill cleanup plan readily available, as applicable.
- Contain leaks during transfer.
- Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all employees.
- Ensure that employees are familiar with the site's spill control plan and proper spill cleanup procedures.
- Use drip pans or comparable devices when transferring oils, solvents, and paints.

Material Handling and Waste Management

- Spot clean leaks and drips routinely to prevent runoff of spillage.
- Do not pour liquid wastes into floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.

- Do not put used or leftover cleaning solutions, solvents, and automotive fluids in the storm drain or sanitary sewer.
- Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.
- Minimize the possibility of stormwater pollution from outside waste receptacles by doing at least one of the following:
  - ✓ Use only watertight waste receptacle(s) and keep the lid(s) closed.
  - ✓ Grade and pave the waste receptacle area to prevent run-on of stormwater.
  - ✓ Install a roof over the waste receptacle area.
  - ✓ Install a low containment berm around the waste receptacle area.
  - ✓ Use and maintain drip pans under waste receptacles.
- Post “no littering” signs.
- Perform work area clean-up and dry sweep after daily operations.

Employee Training Program

- Train employees (e.g., fork lift operators) and contractors on proper spill containment and cleanup.
- Have employees trained in spill containment and cleanup present during loading/unloading.
- Train employees in proper handling techniques during liquid transfers to avoid spills.
- Make sure forklift operators are properly trained on loading and unloading procedures.

Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document activities performed, quantities of materials removed, and improvement actions.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Establish procedures to complete logs and file them in the central office.
- Keep accurate logs of daily clean-up operations.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended “work-arounds.”

- Space and time limitations may preclude all transfers from being performed indoors or under cover.
  - ✓ Designate specific areas for outdoor loading and unloading.
  - ✓ Require employees to understand and follow spill and leak prevention BMPs.
- It may not be possible to conduct transfers only during dry weather.
  - ✓ Limit materials and equipment rainfall exposure to all extents practicable.
  - ✓ Require employees to understand and follow spill and leak prevention BMPs.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

Many facilities will already have indoor or covered areas where loading/unloading takes place and will require no additional capital expenditures.

If outdoor activities are required, construction of berms or other means to retain spills and leaks may require appropriate constructed systems for containment. These containment areas may require significant new capital investment.

Capital investments will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance

Most of the operations and maintenance activities associated with implementing this BMP are integrally linked to routine operations as previously described. Therefore additional O&M is not required.

- Conduct regular inspections and make repairs and improvements as necessary.
- Check loading and unloading equipment regularly for leaks.
- Conduct regular broom dry-sweeping of area. Do not wash with water.

Supplemental Information

Loading and Unloading of Liquids

- Loading or unloading of liquids should occur in the manufacturing building so that any spills that are not completely retained can be discharged to the sanitary sewer, treatment plant, or treated in a manner consistent with local sewer authorities and permit requirements.

- For loading and unloading tank trucks to above and below ground storage tanks, the following procedures should be used:

  - ✓ The area where the transfer takes place should be paved. If the liquid is reactive with the asphalt, Portland cement should be used to pave the area.

  - ✓ The transfer area should be designed to prevent run-on of stormwater from adjacent areas. Sloping the pad and using a curb, like a speed bump, around the uphill side of the transfer area should reduce run-on.

  - ✓ The transfer area should be designed to prevent runoff of spilled liquids from the area. Sloping the area to a drain should prevent runoff. The drain should be connected to a dead-end sump or to the sanitary sewer. A positive control valve should be installed on the drain.

- For transfer from rail cars to storage tanks that must occur outside, use the following procedures:

  - ✓ Drip pans should be placed at locations where spillage may occur, such as hose connections, hose reels, and filler nozzles. Use drip pans when making and breaking connections.

  - ✓ Drip pan systems should be installed between the rails to collect spillage from tank cars.

References and Resources

Minnesota Pollution Control Agency, *Industrial Stormwater Best Management Practices Guidebook BMP 26 Fueling and Liquid Loading/Unloading Operations*. Available online at: http://www.pca.state.mn.us/index.php/view-document.html?gid=10557.

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Description

Accidental releases of materials from above ground liquid storage tanks, drums, and dumpsters present the potential for contaminating stormwater with many different pollutants. Tanks may store many potential stormwater runoff pollutants, such as gasoline, aviation gas, diesel fuel, kerosene, oils, greases, lubricants and other distilled, blended and refined products derived from crude petroleum. Materials spilled, leaked, or lost from storage tanks may accumulate in soils or on other surfaces and be carried away by rainfall runoff. These source controls apply to containers located outside of a building used to temporarily store liquid materials and include installing safeguards against accidental releases, installing secondary containment, conducting regular inspections, and training employees in standard operating procedures and spill cleanup techniques.

Approach

General Pollution Prevention Protocols

- Educate employees about pollution prevention measures and goals.
- Keep an accurate, up-to-date inventory of the materials delivered and stored on-site.
- Try to keep chemicals in their original containers, and keep them well labeled.
- Develop an operations plan that describes procedures for loading and/or unloading. Refer to SC-30 Outdoor Loading/Unloading of Materials for more detailed BMP information pertaining to loading and unloading of liquids.
- Protect materials from rainfall, run-on, runoff, and wind dispersal:
  - ✓ Cover the storage area with a roof.

Objectives

- *Cover*
- *Contain*
- *Educate*
- *Reduce/Minimize*

Targeted Constituents	
Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- ✓ Minimize stormwater run-on by enclosing the area or building a berm around it.
- ✓ Use a walled structure for storage of liquid containers.
- ✓ Use only watertight containers and keep the lids closed.

- ◻ Employ safeguards against accidental releases:
  - ✓ Provide overflow protection devices to warn operator or automatic shutdown transfer pumps.
  - ✓ Provide protection guards (bollards) around tanks and piping to prevent damage from a vehicle or forklift.
  - ✓ Provide clear tagging or labeling, and restrict access to valves to reduce human error.
  - ✓ Berm or surround tank or container with secondary containment system, including dikes, liners, vaults, or double walled tanks.
  - ✓ Be aware and ready to address the fact that some municipalities require secondary containment areas to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.
  - ✓ Contact the appropriate regulatory agency regarding environmental compliance for facilities with “spill ponds” designed to intercept, treat, and/or divert spills.
  - ✓ Have registered and specifically trained professional engineers identify and correct potential problems such as loose fittings, poor welding, and improper or poorly fitted gaskets for newly installed tank systems.
- ◻ Use MSDSs to ID hazardous components and keep incompatible products apart and to list/have available appropriate PPE and clean-up products.

Good Housekeeping

- ◻ Provide storage tank piping located below product level with a shut-off valve at the tank; ideally this valve should be an automatic shear valve with the shut-off located inside the tank.
- ◻ Provide barriers such as posts or guardrails, where tanks are exposed, to prevent collision damage with vehicles.
- ◻ Provide secure storage to prevent vandalism-caused contamination.
- ◻ Place tight-fitting lids on containers.

- Enclose or cover the containers where they are stored.
- Raise the containers off the ground by use of pallet or similar method, with provisions for spill control.
- Do not store liquid containers near the storm drainage system or surface waters.
- Sweep and clean the storage area regularly if it is paved, do not hose down the area to a storm drain.

Preventative Maintenance

- Inspect storage areas regularly for leaks or spills.
- Conduct routine inspections and check for external corrosion of material containers. Also check for structural failure, spills and overfills due to operator error, failure of piping system.
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
- Visually inspect new tank or container installations for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Replace containers that are leaking, corroded, or otherwise deteriorating with ones in good condition. If the liquid chemicals are corrosive, containers made of compatible materials must be used instead of metal drums.
- New or secondary containers must be labeled with the product name and hazards.

Spill Response and Prevention Procedures

- Keep your spill prevention and control plan up-to-date.
- Maintain an adequate stockpile of spill cleanup materials at locations where it will be readily accessible.
- Have an emergency plan, equipment, and trained personnel ready at all times to deal immediately with major spills.
- Collect spilled liquids and properly dispose of them.
- Remove the adsorbent materials promptly and dispose of properly when using adsorbent materials on small spills.
- Have employees trained in emergency spill cleanup procedures present when dangerous waste, liquid chemicals, or other wastes are delivered.

- Prevent operator errors by using engineering safeguards and thus reducing accidental releases of pollutants.

Material Handling and Waste Management

- Contain the material in such a manner that if the container leaks or spills, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters or groundwater.
- Place drip pans or absorbent materials beneath mounted container taps, and at potential drip and spill locations during filling and unloading of containers. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.
- Ensure that any underground or aboveground storage tanks are designed and managed in accordance with applicable regulations, identified as a potential pollution source, and have secondary containment such as a berm or dike with an impervious surface.
- Do not pour liquids into floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.
- Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.

Employee Training Program

- Train employee (e.g., fork lift operators) and contractors in proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.
- Train employees in proper spill response and prevention, materials handling, and waste management.
- Use a training log or similar method to document training.

Quality Assurance and Record Keeping

- Keep accurate maintenance/inspection logs that document minimum BMP activities performed for liquid container storage and improvement actions.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Establish procedures to complete logs and file them in the central office.

Other Facility-Specific Considerations

- Storage sheds often must meet building and fire code requirements.

- The local fire district must be consulted for limitations on clearance of roof covers over containers used to store flammable materials.
- All specific standards set by Federal and State laws concerning the storage of oil and hazardous materials must be met.
- Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code.
- Storage of oil and hazardous materials must meet specific Federal and State standards including:
  - ✓ Spill Prevention Control and Countermeasure Plan (SPCC) Plan;
  - ✓ Secondary containment;
  - ✓ Integrity and leak detection monitoring; and
  - ✓ Emergency preparedness plans.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Capital investments such as sheds, covers, dikes, and curbs will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance

- Most of the operations and maintenance activities associated with implementing this BMP are integrally linked to routine operations as previously described. Therefore additional O&M is not required.
- Conduct regular inspections and make repairs and improvements as necessary.
- Conduct regular broom dry-sweeping of area. Do not wash with water.

Supplemental Information

The most common causes of unintentional releases are:

- Installation problems;
- Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves);
- External corrosion and structural failure;
- Spills and overfills due to operator error; and
- Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa.

Aboveground Tank Leak and Spill Control

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Practices listed below should be employed to enhance the code requirements:

- Tanks should be placed in a designated area.
- Tanks located in areas where firearms are discharged should be encapsulated in concrete or the equivalent.
- Designated areas should be paved with Portland cement concrete, free of cracks and gaps, and impervious in order to contain leaks and spills.
- Liquid materials should be stored in UL approved double walled tanks or surrounded by a curb or dike to provide the volume to contain 10% of the volume of the containers or 110% of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain.
- For used oil or dangerous waste, a dead-end sump should be installed in the drain.
- Other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- Accumulated stormwater in petroleum storage areas should be passed through an oil/water separator.

Maintenance is critical to preventing leaks and spills. Conduct routine weekly inspections and:

- Check for external corrosion and structural failure.
- Check for spills and overfills due to operator error.
- Check for failure of piping system (pipes, pumps, flanger, coupling, hoses, and valves).
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
- Inspect new tank or container installation visually for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Frequently release accumulated stormwater during the wet season.
- Have periodic integrity testing conducted by a qualified professional.

Dikes

One of the best protective measures against contamination of stormwater is the use of dikes. Containment dikes are berms or retaining walls that are designed to hold spills. Use of dikes is an effective pollution prevention measure for above ground storage tanks and railcar or tank truck loading and unloading areas. The dike surrounds the area of concern and holds the spill, keeping spill materials separated from the stormwater side of the dike area. Diking can be used in any industrial or municipal facility, but it is most commonly used for controlling large spills or releases from liquid storage areas and liquid transfer areas.

- For single-wall tanks, containment dikes should be large enough to hold the contents of the storage tank for the facility plus rain water.
- For trucks, diked areas should be capable of holding an amount equal to the volume of the tank truck compartment. Diked construction material should be strong enough to safely hold spilled materials.
- Dike materials can consist of earth, concrete, synthetic materials, metal, or other impervious materials.
- Strong acids or bases may react with metal containers, concrete, and some plastics.
- Where strong acids or bases or stored, alternative dike materials should be considered. More active organic chemicals may need certain special liners for dikes.
- Dikes may also be designed with impermeable materials to increase containment capabilities.
- Dikes should be inspected during or after significant storms or spills to check for washouts or overflows.
- Regular checks of containment dikes to insure the dikes are capable of holding spills should be conducted.
- Inability of a structure to retain stormwater, dike erosion, soggy areas, or changes in vegetation indicate problems with dike structures. Damaged areas should be patched and stabilized immediately.
- Earthen dikes may require special maintenance of vegetation such as mulching and irrigation.
- Remove accumulated stormwater after precipitation events and dispose of according to local regulations.

Curbing

Curbing is a barrier that surrounds an area of concern. Curbing is similar to containment diking in the way that it prevents spills and leaks from being released into the environment. Curbing is usually small scaled and does not contain large spills to the degree that dikes can. Curbing is common at many facilities in small areas where handling and transfer of liquid materials occur. Curbing can redirect contaminated stormwater away from the storage area. It is useful in areas where liquid materials are transferred from one container to another. Asphalt is a common material used for curbing; however, curbing materials can include earth, concrete, synthetic materials, metal, or other impenetrable materials.

- Spilled materials should be removed immediately from curbed areas to allow space for future spills.
- Curbs should have manually-controlled pump systems rather than common drainage systems for collection of spilled materials.
- The curbed area should be inspected regularly to clear clogging debris.
- Maintenance should also be conducted frequently to prevent overflow of any spilled materials as curbed areas are designed only for smaller spills.
- Remove accumulated stormwater after precipitation events and dispose of according to local regulations.
- Curbing has the following advantages:
  - ✓ Excellent run-on control;
  - ✓ Inexpensive;
  - ✓ Ease of installment;
  - ✓ Provides option to recycle materials spilled in curb areas; and
  - ✓ Common industry practice.

References and Resources

Clark County Clean Water Program. 2009. *Clark County Stormwater Pollution Control Manual Best Management Practices for Businesses and Government Agencies, AS A2 & A3*. Available online at: http://www.clark.wa.gov/boards/CleanWater/documents/PollutionControlManual.pdf.

King County Storm Water Pollution Prevention Manual, 2009 *Commercial Best Management Practice (BMP) Activity Sheets: A-2 Storage of Liquid Materials in Stationary Tanks and A-3 Storage of Liquid Materials in Portable Containers*. Available online at: http://www.kingcounty.gov/environment/waterandland/stormwater/documents/pollution-prevention-manual/commercial-bmp.aspx.

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities.

US EPA. National Pollutant Discharge Elimination System (NPDES) *Industrial Fact Sheet Series for Activities Covered by EPA's MSGP*. Available online at: http://cfpub.epa.gov/npdes/stormwater/swsectors.cfm.

Outdoor Equipment Operations SC-32

Description

Outside process equipment operations and maintenance can contaminate stormwater runoff. Activities, such as grinding, painting, coating, sanding, degreasing or parts cleaning, landfills and waste piles, and solid waste treatment and disposal are examples of process operations that can lead to contamination of stormwater runoff. The targeted constituents will vary for each site depending on the operation being performed.

Approach

Implement source control BMPs to limit exposure of outdoor equipment to direct precipitation and stormwater run-on. Refer to SC-22 Vehicle and Equipment Repair for additional information.

General Pollution Prevention Protocols

- ☐ Perform the activity during dry periods whenever possible.
- ☐ Install secondary containment measures where leaks and spills may occur.
- ☐ Use non-toxic chemicals for maintenance and minimize or eliminate the use of solvents.
- ☐ Connect process equipment area to public sanitary sewer or facility wastewater treatment system when possible. Some jurisdictions require that secondary containment areas be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

Good Housekeeping

- ☐ Manage materials and waste properly (see Material Handling and Waste Management) to reduce adverse impacts on stormwater quality.

Objectives

- Cover
- *Contain*
- *Educate*
- *Reduce/Minimize*

Targeted Constituents	
Sediment	✓
Nutrients	✓
Trash	✓
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Cover the work area with a permanent roof if possible.
- Use drop cloths for sanding and painting operations.
- Use a vacuum for fine particle clean-up in pavement cracks and crevices.
- Minimize contact of stormwater with outside process equipment operations through berming and drainage routing (run-on prevention).
- "Spot clean" leaks and drips routinely. Leaks are not cleaned up until the absorbent is picked up and disposed of properly.
- Paint signs on storm drain inlets to indicate that they are not to receive liquid or solid wastes.
- Use roll down or permanent walls when windy/breezy to prevent wind transport of particulates/pollutants.

Preventative Maintenance

- Design outdoor equipment areas to prevent stormwater runoff and spills. Use a perimeter drain or slope pavement inward with drainage to sump.
- Dry clean the work area regularly. Do not wash outdoor equipment with water if there is a direct connection to the storm drain.
- Pave area with concrete rather than asphalt.
- Inspect outdoor equipment regularly for leaks or spills. Also check for structural failure, spills and overfills due to operator error, and/or failure of piping system.
- Inspect and clean, if necessary, storm drain inlets and catch basins within the outdoor equipment area before October 1 each year.

Spill Response and Prevention Procedures

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Have employees trained in emergency spill cleanup procedures present when dangerous waste, liquid chemicals, or other wastes are delivered.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Prevent operator errors by using engineering safe guards and thus reducing accidental releases of pollutant.

Material Handling and Waste Management

- Do not pour liquid wastes into floor drains, sinks, outdoor storm drain inlets, or other storm drain or sewer connections.

- Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.

- Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.

- Minimize the possibility of stormwater pollution from outside waste receptacles by doing at least one of the following:

  - ✓ Use only watertight waste receptacle(s) and keep the lid(s) closed.

  - ✓ Grade and pave the waste receptacle area to prevent run-on of stormwater.

  - ✓ Install a roof over the waste receptacle area.

Employee Training Program

- Educate employees about pollution prevention measures and goals.

- Train employees on proper equipment operation and maintenance procedures.

- Train all employees upon hiring and annually thereafter on proper methods for handling and disposing of waste. Ensure that all employees understand stormwater discharge prohibitions, wastewater discharge requirements, and these best management practices.

- Use a training log or similar method to document training.

- Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for outdoor equipment, types and quantities of materials removed and disposed of, and any improvement actions.

- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.

- Establish procedures to complete logs and file them in the central office.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended "work-arounds."

- Providing cover over outdoor equipment may be impractical or cost-prohibitive.
  - ✓ Operate outdoor equipment only during periods of dry weather.
- Regular operations and time limitations may require outdoor activities during wet weather.
  - ✓ Designate specific areas for outdoor activities.
  - ✓ Allow time for work area clean-up after each shift.
  - ✓ Require employees to understand and follow preventive maintenance and spill and leak prevention BMPs.
  - ✓ Design and install secondary containment and good housekeeping BMPs for outdoor equipment area.
- Storage sheds often must meet building and fire code requirements.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Many facilities will already have indoor covered areas where vehicle and equipment repairs take place and will require no additional capital expenditures.
- If outdoor activities are required, construction of berms or other means to retain spills and leaks may require appropriate constructed systems for containment. These containment areas may require significant new capital investment.
- Capital investments will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance

- Most of the operations and maintenance activities associated with implementing this BMP are integrally linked to routine operations as previously described. Therefore additional O&M is not required.
- For facilities responsible for pre-treating their wastewater prior to discharging, the proper functioning of structural treatment system is an important maintenance consideration.
- Routine cleanout of oil and grease is required for the devices to maintain their effectiveness, usually at least once a month. During periods of heavy rainfall, cleanout is required more often to ensure pollutants are not washed through the trap. Sediment removal is also required on a regular basis to keep the device working efficiently.

References and Resources

Minnesota Pollution Control Agency. *Industrial Stormwater Best Management Practices Guidebook BMP 26 Fueling and Liquid Loading/Unloading Operations.* Available online at: http://www.pca.state.mn.us/index.php/view-document.html?gid=10557.

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Sacramento County Environmental Management Stormwater Program: Best Management Practices. Available online at: http://www.emd.saccounty.net/EnvHealth/Stormwater/Stormwater-BMPs.html.

Santa Clara Valley Urban Runoff Pollution Prevention Program. http://www.scvurppp-w2k.com/

US EPA. National Pollutant Discharge Elimination System – Industrial Fact Sheet Series for Activities Covered by EPA's Multi Sector General Permit. Available online at: http://cfpub.epa.gov/npdes/stormwater/swsectors.cfm.

Outdoor Storage of Raw Materials SC-33

Description

Stockpiles of raw materials, by-products, and finished products exposed to rain and/or runoff can pollute stormwater. Stormwater can become contaminated when materials wash off or dissolve into water due to improper storage and containment. To prevent or reduce the discharge of pollutants to stormwater from raw material delivery and storage, pollution prevention and source control measures must be implemented, such as minimizing the storage of hazardous materials on-site, enclosing or covering materials, storing materials in a designated area, installing secondary containment, conducting regular inspections, preventing stormwater run-on and runoff, and training employees and subcontractors. This fact sheet focuses on source control BMPs for stockpiles of solid materials; if the raw material, by-product, or product is a liquid, more information for outside storage of liquids can be found under SC-31 Outdoor Liquid Container Storage.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- Emphasize employee education for successful BMP implementation.
- Store materials that could contaminate stormwater inside or under permanent cover. If this is not feasible, then all outside storage areas should be covered with a roof and bermed or enclosed to prevent stormwater contact.
- Elevate and tarp solid materials such as beams, metal, etc.
- Minimize the inventory of raw materials kept outside.

Objectives

- *Cover*
- *Contain*
- *Educate*
- *Reduce/Minimize*

Targeted Constituents	
Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	
Erosion and Sediment Controls	✓
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Keep an accurate, up-to-date inventory of the materials delivered and stored on-site.

- Stormwater runoff that could potentially be contaminated by materials stored outdoors should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.

Good Housekeeping

- If raw materials cannot all be stored inside or under permanent cover, prevent exposure to direct precipitation and stormwater run-on by installing a storm- resistant waterproof covering made of polyethylene, polypropylene or hypalon over all materials stored outside. The covers must be in place at all times when work with the stockpiles is not occurring (Applicable to small stockpiles only).

- Implement erosion control practices at the perimeter of the facilty site and at any catch basins to prevent erosion of the stockpiled material off-site, if the stockpiles are so large that they cannot feasibly be covered and contained.

- Minimize stormwater run-on by enclosing the area or building a berm around it.

- Keep storage areas clean and dry.

- Slope paved areas in a manner that minimizes pooling of water on the site, particularly with materials that may leach pollutants into stormwater and/or groundwater, such as compost, logs, and wood chips. A minimum slope of 1.5% is recommended.

- Secure drums stored in an area where unauthorized persons may not gain access to prevent accidental spillage, pilferage, or any unauthorized use.

- Install curbing or berms along the perimeter of the area to prevent the run-on of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from the stockpile areas.

- Slope the area inside the curb or berm to a drain with sump. The sump should be equipped with an oil and water separator if applicable for materials stored onsite.

- Do not store materials on top of or directly adjacent to storm drain inlets.

- Cover wood products treated with chromated copper arsenate, ammonical copper zinc arsenate, creosote, or pentachlorophenol with properly secured tarps or store indoors.

Preventative Maintenance

- Maintain outdoor storage containers in good condition. Replace leaky or otherwise inadequate containers as necessary.

- Maintain outdoor waterproof covers (e.g., tarps) in good condition and properly secure them to be storm resistant. Replace tarps damaged by UV exposure or wear and tear on a regular basis.

- Perform routine inspection of storm drains and sumps and regularly remove accumulated materials.
- Dry clean the work area regularly. Do not wash outdoor material storage areas with water if there is a direct connection to the storm drain.
- Pave outdoor storage areas for liquids such as solvents with concrete rather than asphalt.
- Conduct regular inspections of storage areas so that leaks and spills are detected as soon as possible.
- Routinely inspect berms, curbing, containment, and sediment controls for proper function and repair as necessary.

Spill and Leak Prevention and Response

- Keep the facility spill prevention and control plan up-to-date.
- Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- Have employees trained in spill containment and cleanup present during the loading/unloading of hazardous or otherwise dangerous materials.

Erosion and Sediment Controls

- Keep materials covered to prevent erosion of stockpiles. This may not be feasible for large stockpiles.
- Install sediment controls such as fiber rolls around the perimeter of stockpiles to prevent transport of raw materials to the storm drain.
- Install drain inlet protection around all inlets to prevent raw materials from entering storm drain.
- Install sediment controls such as silt fence around the perimeter of the site to prevent transport of raw materials to the storm drain or offsite surface waters.

Employee Training Program

- Educate employees about pollution prevention measures and goals.
- Train employees how to properly store outdoor raw materials using the source control BMPs described above.
- Use a training log or similar method to document training.
- Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for outdoor storage of raw materials, types and quantities of materials removed and disposed of, and any improvement actions.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Establish procedures to complete logs and file them in the central office.

Other Facility-Specific Considerations

- Storage sheds often must meet building and fire code requirements. Storage of reactive, ignitable, or flammable liquids must comply with the Uniform Fire Code and the National Electric Code.
- Some municipalities require that secondary containment areas (regardless of size) be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.
- The local fire district must be consulted for limitations on clearance of roof covers over containers used to store flammable materials.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended "work-arounds"

- Space limitations may preclude storing all materials indoors.
  - ✓ Implement good housekeeping, preventative maintenance, and erosion and sediment controls as described above.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Many facilities will already have indoor covered areas where raw materials will be stored and will require no additional capital expenditures.
- If outdoor storage of materials is required, construction of berms or other means to prevent stormwater run-on and runoff may require appropriate constructed systems for containment. These containment areas may require significant new capital investment.
- Purchase and installation of erosion and sediment controls will require additional capital investments, and this amount will vary depending on site characteristics.
- Capital investments will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance

- Accurate and up-to-date inventories should be kept of all stored materials.
- Berms and curbs may require periodic repair and patching.
- Parking lots or other surfaces near bulk materials storage areas should be swept periodically to remove debris blown or washed from storage areas.
- Sweep paved storage areas regularly for collection and disposal of loose solid materials, do not hose down the area to a storm drain or conveyance ditch.
- Erosion and sediment controls require regular inspection and periodic replacement or reinstallation.

Supplemental Information

Raw Material Containment

Paved areas should be sloped in a manner that minimizes pooling of water on the site, particularly with materials that may leach pollutants into stormwater and/or groundwater, such as compost, logs, and wood chips. A minimum slope of 1.5% is recommended.

- Curbing or berms should be placed along the perimeter of the area to prevent the run-on of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from stockpile areas.
- The storm drainage system should be designed to minimize use of catch basins in the interior of the area as they tend to rapidly fill with manufacturing material.

The area should be sloped to drain stormwater to the perimeter where it can be collected or to internal drainage alleyways where material is not stockpiled.

The “doghouse” design has been used to store small liquid containers. The roof and flooring design prevent contact with direct rain or runoff. The doghouse has two solid structural walls and two canvas covered walls. The flooring is wire mesh about secondary containment.

References and Resources

Minnesota Pollution Control Agency, *Industrial Stormwater Best Management Practices Guidebook*. Available online at: http://www.pca.state.mn.us/index.php/view-document.html?gid=10557.

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US EPA. National Pollutant Discharge Elimination System – Industrial Fact Sheet Series for Activities Covered by EPA's Multi Sector General Permit. Available online at: http://cfpub.epa.gov/npdes/stormwater/swsectors.cfm.

Waste Handling & Disposal SC-34

Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, reuse, and recycling; and preventing run-on and runoff.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Accomplish reduction in the amount of waste generated using the following source controls:
  - ✓ Production planning and sequencing;
  - ✓ Process or equipment modification;
  - ✓ Raw material substitution or elimination;
  - ✓ Loss prevention and housekeeping;
  - ✓ Waste segregation and separation; and
  - ✓ Close loop recycling.
- ☐ Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
- ☐ Recycle materials whenever possible.

Objectives

- *Cover*
- *Contain*
- *Educate*
- *Reduce/Minimize*
- *Product Substitution*

Targeted Constituents	
Sediment	
Nutrients	
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Use the entire product before disposing of the container.

- To the extent possible, store wastes under cover or indoors after ensuring all safety concerns such as fire hazard and ventilation are addressed.

- Provide containers for each waste stream at each work station. Allow time after shift to clean area.

Good Housekeeping

- Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater run-on and runoff with a berm. The waste containers or piles must be covered except when in use.

- Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.

- Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain. Clean in a designated wash area that drains to a clarifier.

- Transfer waste from damaged containers into safe containers.

- Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.

- Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.

- Use dry methods when possible (e.g., sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.

- Stencil or demarcate storm drains on the facility's property with prohibitive message regarding waste disposal.

- Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropylene or hypalon.

- If possible, move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.

Preventative Maintenance

- Prevent stormwater run-on from entering the waste management area by enclosing the area or building a berm around the area.

- Prevent waste materials from directly contacting rain.

- Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropylene or hypalon.

- Cover the area with a permanent roof if feasible.

- Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.

- Check waste containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.

- Sweep and clean the waste management area regularly. Use dry methods when possible (e.g., sweeping, vacuuming, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.

- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.

- Repair leaking equipment including valves, lines, seals, or pumps promptly.

Spill Response and Prevention Procedures

- Keep your spill prevention and plan up-to-date.

- Have an emergency plan, equipment and trained personnel ready at all times to deal immediately with major spills.

- Collect all spilled liquids and properly dispose of them.

- Store and maintain appropriate spill cleanup materials in a location known to all near the designated wash area.

- Ensure that vehicles transporting waste have spill prevention equipment that can prevent spills during transport. Spill prevention equipment includes:

  - ✓ Vehicles equipped with baffles for liquid waste; and

  - ✓ Trucks with sealed gates and spill guards for solid waste.

Material Handling and Waste Management

Litter Control

- Post “No Littering” signs and enforce anti-litter laws.

- Provide a sufficient number of litter receptacles for the facility.

- Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

- Keep waste collection areas clean.

- Inspect solid waste containers for structural damage regularly. Repair or replace damaged containers as necessary.

- Secure solid waste containers; containers must be closed tightly when not in use.

- Do not fill waste containers with washout water or any other liquid.

- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc., may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).

- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal. Affix labels to all waste containers.

Chemical/Hazardous Wastes

- Select designated hazardous waste collection areas on-site.

- Store hazardous materials and wastes in covered containers and protect them from vandalism.

- Place hazardous waste containers in secondary containment.

- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.

- Hazardous waste cannot be reused or recycled; it must be disposed of by a licensed hazardous waste hauler.

Employee Training Program

- Educate employees about pollution prevention measures and goals.

- Train employees how to properly handle and dispose of waste using the source control BMPs described above.

- Train employees and subcontractors in proper hazardous waste management.

- Use a training log or similar method to document training.

- Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for waste handling and disposal, types and quantities of waste disposed of, and any improvement actions.

- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.

- Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Capital costs will vary substantially depending on the size of the facility and the types of waste handled. Significant capital costs may be associated with reducing wastes by modifying processes or implementing closed-loop recycling.
- Many facilities will already have indoor covered areas where waste materials will be stored and will require no additional capital expenditures for providing cover.
- If outdoor storage of wastes is required, construction of berms or other means to prevent stormwater run-on and runoff may require appropriate constructed systems for containment.
- Capital investments will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance

- Check waste containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- Sweep and clean the waste management area regularly. Use dry methods when possible (e.g., sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- Repair leaking equipment including valves, lines, seals, or pumps promptly.

References and Resources

Minnesota Pollution Control Agency, *Industrial Stormwater Best Management Practices Guidebook*. Available online at: http://www.pca.state.mn.us/index.php/view-document.html?gid=10557.

New Jersey Department of Environmental Protection, 2013. *Basic Industrial Stormwater General Permit Guidance Document NJPDES General Permit No NJ0088315*, Revised. Available online at: http://www.nj.gov/dep/dwq/pdf/5G2_guidance_color.pdf.

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Oregon Department of Environmental Quality, 2013. *Industrial Stormwater Best Management Practices Manual- BMP 26 Fueling and Liquid Loading/Unloading Operations*. Available online at: http://www.deq.state.or.us/wq/wqpermit/docs/IndBMP021413.pdf.

Sacramento Stormwater Management Program. *Best Management Practices for Industrial Storm Water Pollution Control*. Available online at: http://www.msa.saccounty.net/sactostormwater/documents/guides/industrial-BMP-manual.pdf.

Sacramento County Environmental Management Stormwater Program: Best Management Practices. Available online at: http://www.emd.saccounty.net/EnvHealth/Stormwater/Stormwater-BMPs.html.

Santa Clara Valley Urban Runoff Pollution Prevention Program. http://www.scvurppp-w2k.com/

US EPA. National Pollutant Discharge Elimination System – Industrial Fact Sheet Series for Activities Covered by EPA's Multi Sector General Permit. Available online at: http://cfpub.epa.gov/npdes/stormwater/swsectors.cfm.

Safer Alternative Products SC-35

Description

Promote the use of less harmful products and products that contain little or no TMDL and 303(d) list pollutants. Alternatives exist for most product classes including chemical fertilizers, pesticides, cleaning solutions, janitorial chemicals, automotive and paint products, and consumables (batteries, fluorescent lamps).

Approach

Pattern a new program after the many established programs around the state and country. Integrate this best management practice as much as possible with existing programs at your facility.

Develop a comprehensive program based on:

- The "Precautionary Principle," which is an alternative to the "Risk Assessment" model that says it's acceptable to use a potentially harmful product until physical evidence of its harmful effects are established and deemed too costly from an environmental or public health perspective. For instance, a risk assessment approach might say it's acceptable to use a pesticide until there is direct proof of an environmental impact. The Precautionary Principle approach is used to evaluate whether a given product is safe, whether it is really necessary, and whether alternative products would perform just as well.

- Environmentally Preferable Purchasing Program to minimize the purchase of products containing hazardous ingredients used in the facility's custodial services, fleet maintenance, and facility maintenance in favor of using alternate products that pose less risk to employees and to the environment.

- Integrated Pest Management (IPM) or Less-Toxic Pesticide Program, which uses a pest management approach that minimizes the use of toxic chemicals and gets rid of pests

Objectives

- *Educate*
- *Reduce/Minimize*
- *Product Substitution*

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered

Good Housekeeping	
Preventative Maintenance	
Spill and Leak Prevention and Response	
Material Handling & Waste Management	
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	

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by methods that pose a lower risk to employees, the public, and the environment.

- Energy Efficiency Program including no-cost and low-cost energy conservation and efficiency actions that can reduce both energy consumption and electricity bills, along with long-term energy efficiency investments.

Consider the following mechanisms for developing and implementing a comprehensive program:

- Policies
- Procedures
  - ✓ Standard operating procedures (SOPs);
  - ✓ Purchasing guidelines and procedures; and
  - ✓ Bid packages (services and supplies).
- Materials
  - ✓ Preferred or approved product and supplier lists;
  - ✓ Product and supplier evaluation criteria;
  - ✓ Training sessions and manuals; and
  - ✓ Fact sheets for employees.

Implement this BMP in conjunction with the Vehicle and Equipment Management fact sheets (SC-20 – SC-22) and SC-41 Building and Grounds Maintenance.

Employee Training Program

- Employees who handle potentially harmful materials should be trained in the use of safer alternatives.
- Purchasing departments should be trained on safer alternative products and encouraged to procure less hazardous materials and products that contain little or no harmful substances or TMDL pollutants.
- Employees and contractors / service providers can both be educated about safer alternatives by using information developed by a number of organizations including the references and resources provided in this fact sheet.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended "work-arounds"

- Alternative products may not be available, suitable, or effective in every case.

- ✓ Minimize use of hazardous/harmful products if no alternative product is available.

Regulatory Considerations

This BMP has no regulatory requirements unless local/municipal ordinance applies. Existing regulations already encourage facilities to reduce the use of hazardous materials through incentives such as reduced:

- Specialized equipment storage and handling requirements;
- Storm water runoff sampling requirements;
- Training and licensing requirements; and
- Record keeping and reporting requirements.

Cost Considerations

- The primary cost is for staff time to: 1) develop new policies and procedures and 2) educate purchasing departments and employees who handle potentially harmful materials about the availability, procurement, and use of safer alternatives.
- Some alternative products may be slightly more expensive than conventional products.

Supplemental Information

The following discussion provides some general information on safer alternatives. More specific information on particular hazardous materials and the available alternatives may be found in the references and resources listed below.

- Automotive products – Less toxic alternatives are not available for many automotive products, especially engine fluids. But there are alternatives to grease lubricants, car polishes, degreasers, and windshield washer solution. Refined motor oil is also available.
- Vehicle/Trailer lubrication – Fifth wheel bearings on trucks require routine lubrication. Adhesive lubricants are available to replace typical chassis grease.
- Cleaners – Vegetables-based or citrus-based soaps are available to replace petroleum-based soaps/detergents.
- Paint products – Water-based paints, wood preservatives, stains, and finishes with low VOC content are available.
- Pesticides – Specific alternative products or methods exist to control most insects, fungi, and weeds.
- Chemical Fertilizers – Compost and soil amendments are natural alternatives.
- Consumables – Manufacturers have either reduced or are in the process of reducing the amount of heavy metals in consumables such as batteries and fluorescent lamps.

All fluorescent lamps contain mercury, however low-mercury containing lamps are now available from most hardware and lighting stores. Fluorescent lamps are also more energy efficient than the average incandescentlamp.

- Janitorial chemicals – Even biodegradable soap can harm fish and wildlife beforeit biodegrades. Biodegradable does not mean non-toxic. Safer products and procedures are available for floor stripping and cleaning, as well as carpet, glass, metal, and restroom cleaning and disinfecting. Use paper products with post-consumer recycled content and implement electric had dryers.

Examples

There are a number of business and trade associations, and communities with effective programs. Some of the more prominent are listed below in the references and resources section.

References and Resources

Note: Many of these references provide alternative products for materials that typically are used inside and disposed to the sanitary sewer as well as alternatives to products that usually end up in the storm drain.

General Sustainable Practices and Pollution Prevention Including Pollutant-Specific Information

California Department of Toxic Substances Control, http://www.dtsc.ca.gov/PollutionPrevention/GreenTechnology/Index.cfm.

CalRecycle, http://www.calrecycle.ca.gov/Business/Regulated.htm.

City of Santa Monica Office of Sustainability and Environment, http://www.smgov.net/departments/ose/.

City of Palo Alto, http:// www.city.palo-alto.ca.us/cleanbay.

City and County of San Francisco, Department of the Environment, http://www.sfenvironment.org/toxics-health/greener-business-practices.

Green Business Program, http://www.greenbiz.ca.gov/GRlocal.html .

Product Stewardship Institute, http://www.productstewardship.us/index.cfm.

Sacramento Clean Water Business Partners. http://www.sacstormwater.org/CleanWaterBusinessPartners/CleanWaterBusinessPartners.html.

USEPA. National Pollutant Discharge Elimination System (NPDES) Stormwater Discharges From Industrial Facilities, http://cfpub.epa.gov/npdes/stormwater/indust.cfm.

USEPA Region IX Pollution Prevention Program, http://www.epa.gov/region9/waste/p2/business.html.

Western Sustainability and Pollution Prevention Network, http://wsppn.org/.

Metals (mercury, copper)

National Electrical Manufacturers Association – Environmental Stewardship, http://www.nema.org/Policy/Environmental-Stewardship/pages/default.aspx.

Sustainable Conservation, http://www.suscon.org.

Auto Recycling Project

Brake Pad Partnership

Pesticides and Chemical Fertilizers

Bio-Integral Resource Center, http://www.birc.org.

California Department of Pesticide Regulation, http://www.cdpr.ca.gov/dprprograms.htm.

University of California Statewide IPM Program, http://www.ipm.ucdavis.edu/default.html.

Dioxins

Bay Area Dioxins Project, http://www.abag.ca.gov/bayarea/dioxin/project_materials.htm.

Contaminated or Erodible Areas SC-40

Description

Areas within an industrial site that are bare of vegetation or are subject to activities that promote the suppression of vegetation are often subject to erosion. In addition, they may or may not be contaminated from past or current activities. If the area is temporarily bare because of construction, see SC-42 Building Repair, Remodeling, and Construction. Sites with excessive erosion or the potential for excessive erosion should consider employing the soil erosion BMPs identified in the Construction BMP Handbook. Note that this fact sheet addresses soils that do not exceed hazardous waste criteria (see Title 22 California Code of Regulations for Hazardous Waste Criteria).

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

Implement erosion and sediment control BMPs to stabilize soils and reduce pollutant discharges from contaminated or erodible surfaces.

Erosion and Sediment Controls

- ☐ Preserve natural vegetation whenever possible. See also EC-2 Preservation of Existing Vegetation, in the Construction BMP Handbook.
- ☐ Analyze soil conditions.
- ☐ Remove contaminated soil and dispose of properly.
- ☐ Stabilize loose soils by re-vegetating whenever possible. See also EC-4 Hydroseeding, in the Construction BMP Handbook.

Objectives

- *Cover*
- *Contain*
- *Educate*
- *Reduce/Minimize*
- *Product Substitution*

Targeted Constituents	
Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	
Preventative Maintenance	
Spill and Leak Prevention and	
Material Handling & Waste Management	
Erosion and Sediment Controls	✓
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- ◻ Utilize non-vegetative stabilization methods for areas prone to erosion where vegetative options are not feasible. Examples include:

  - ✓ Areas of vehicular or pedestrian traffic such as roads or paths;
  - ✓ Arid environments where vegetation would not provide timely ground coverage, or would require excessive irrigation;
  - ✓ Rocky substrate, infertile or droughty soils where vegetation would be difficult to establish; and
  - ✓ Areas where vegetation will not grow adequately within the construction time frame.

  There are several non-vegetative stabilization methods and selection should be based on site-specific conditions. See also EC-16 Non-Vegetative Stabilization, in the Construction BMP Handbook.

- ◻ Utilize chemical stabilization when needed. See also EC-5 Soil Binders, in the Construction BMP Handbook.
- ◻ Use geosynthetic membranes to control erosion if feasible. See also EC-7 Geotextiles and Mats, in the Construction BMP Handbook.
- ◻ Stabilize all roadways, entrances, and exits to sufficiently control discharges of erodible materials from discharging or being tracked off the site. See also TC 1-3 Tracking Control, in the Construction BMP Handbook.
- ◻ Implement wind erosion control measures as necessary. See also WE-1 Wind Erosion Control, in the Construction BMP Handbook.

Employee Training Program

- ◻ Educate employees about pollution prevention measures and goals.
- ◻ Train employees how to properly install and maintain the erosion and sediment source control BMPs described above. Detailed information is provided in the Construction BMP Handbook.
- ◻ Use a training log or similar method to document training.

Quality Assurance and Record Keeping

- ◻ Keep accurate logs that document actions taken to maintain and improve the effectiveness of the erosion and sediment control BMPs described above.
- ◻ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- ◻ Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Many facilities do not have contaminated or erodible areas and will require no additional capital expenditures.

- For sites with contaminated or erodible areas, purchase and installation of erosion and sediment controls will require additional capital investments, and this amount will vary depending on site characteristics and the types of BMPs being implemented.

- Minimize costs by maintaining existing vegetation and limiting site operations on bare soils.

Maintenance

- The erosion and sediment control BMPs described above require periodic inspection and maintenance to remain effective. The cost of these actions will vary depending on site characteristics and the types of BMPs being implemented.

- Irrigation costs may be required to establish and maintain vegetation.

Supplemental Information

Stabilization of Erodible Areas

Preserving stabilized areas minimizes erosion potential, protects water quality, and provides aesthetic benefits. The most effective way to control erosion is to preserve existing vegetation. Preservation of natural vegetation provides a natural buffer zone and an opportunity for infiltration of stormwater and capture of pollutants in the soil matrix. This practice can be used as a permanent source control measure.

Vegetation preservation should be incorporated into the site. Preservation requires good site management to minimize operations on bare soils where vegetation exists. Proper maintenance is important to ensure healthy vegetation that can control erosion. Different species, soil types, and climatic conditions will require different maintenance activities such as mulching, fertilizing, liming, irrigation, pruning and weed and pest control.

The preferred approach is to leave as much native vegetation on-site as possible, thereby reducing or eliminating any erosion problem. However, assuming the site already has contaminated or erodible surface areas, there are four possible courses of action which can be taken:

- The area can be revegetated if it is not in use and therefore not subject to damage from site activities. In as much as the area is already devoid of vegetation, special measures are likely necessary. Lack of vegetation may be due to the lack of water and/or poor soils. The latter can perhaps be solved with fertilization, or the ground may simply be too compacted from prior use. Improving soil conditions may be sufficient to support the recovery of vegetation. Use process wastewater for irrigation if possible, and see the Construction BMP Handbook for further procedures on establishing vegetation.

- Watering trucks to prevent dust.

- Chemical stabilization can be used as an alternate method in areas where temporary seeding practices cannot be used because of season or climate. It can provide immediate, effective, and inexpensive erosion control. Application rates and procedures recommended by the manufacturer should be followed as closely as possible to prevent the products from forming ponds and creating large areas where moisture cannot penetrate the soil. See also EC-5, Soil Binders, in the Construction BMP Handbook for more information. Advantages of chemical stabilization include:

  - ✓ Applied easily to the surface;
  - ✓ Stabilizes areas effectively; and
  - ✓ Provides immediate protection to soils that are in danger of erosion.

- Contaminated soils should be cleaned up or removed. This requires determination of the level and extent of the contamination. Removal must comply with State and Federal regulations; permits must be acquired and fees paid.

- Non-vegetated stabilization methods are suitable for permanently protecting from erosion by water and wind. Non-vegetated stabilization should only be utilized when vegetation cannot be established due to soil or climactic conditions, or where vegetation may be a potential fire hazard.

  Examples of non-vegetative stabilization BMPs are provided below:

  - ✓ ***Decomposed Granite (DG) and Gravel Mulch*** are suitable for use in areas where vegetation establishment is difficult, on flat surfaces, trails and pathways, and when used in conjunction with a stabilizer or tackifier, on shallow slopes (i.e., 10:1 [H:V]). DG and gravel can also be used on shallow rocky slopes where vegetation cannot be established for permanent erosion control.

  - ✓ ***Degradable Mulches*** can be used to cover and protect soil surfaces from erosion both in temporary and permanent applications. In many cases, the use of mulches by themselves requires routine inspection and re-application. See EC-3 Hydraulic Mulch, EC-6 Straw Mulch, EC-8 Wood Mulch, or EC-14 Compost Blankets of the Construction BMP Handbook for more information.

  - ✓ ***Geotextiles and Mats*** can be used as a temporary stand-alone soil stabilization method. Depending on material selection, geotextiles and mats can be a short-term (3 months – 1 year) or long-term (1-2 years) temporary stabilization method. For more information on geotextiles and mats see EC-7 Geotextiles and Mats of the Construction BMP Handbook.

  - ✓ ***Rock Slope Protection*** can be used when the slopes are subject to scour or have a high erosion potential, such as slopes adjacent to flowing waterways or slopes subject to overflow from detention facilities (spillways).

- ✓ ***Soil Binders*** can be used for temporary stabilization of stockpiles and disturbed areas not subject to heavy traffic. See EC-5 Soil Binders for more information. References and Resources.

References and Resources

California Stormwater Quality Association 2012, *Construction Stormwater Best Management Practice Handbook*. Available at http://www.casqa.org.

City of Seattle, Seattle Public Utilities Department of Planning and Development, 2009. *Stormwater Manual Vol. 1 Source Control Technical Requirements Manual*.

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities.

Sacramento Stormwater Management Program. *Best Management Practices for Industrial Storm Water Pollution Control*. Available online at: http://www.msa.saccounty.net/sactostormwater/documents/guides/industrial-BMP-manual.pdf.

Santa Clara Valley Urban Runoff Pollution Prevention Program, http://www.scvurppp-w2k.com/.

Tahoe Regional Planning Agency, *Best Management Practices Handbook*, 2012. Available online at: http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf.

The Storm Water Managers Resource Center, http://www.stormwatercenter.net.

U.S. Environmental Protection Agency, *Construction Site Stormwater Runoff Control*. Available online at: http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=4.

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, abnormal pH, and oils and greases. Utilizing the protocols in this fact sheet will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Switch to non-toxic chemicals for maintenance to the maximum extent possible.
- ☐ Choose cleaning agents that can be recycled.
- ☐ Encourage proper lawn management and landscaping, including use of native vegetation.
- ☐ Encourage use of Integrated Pest Management techniques for pest control.
- ☐ Encourage proper onsite recycling of yard trimmings.
- ☐ Recycle residual paints, solvents, lumber, and other material as much as possible.

Objectives

- *Cover*
- *Contain*
- *Educate*
- *Reduce/Minimize*
- *Product Substitution*

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	
Organics	

Minimum BMPs Covered

Good Housekeeping	✓
Preventative Maintenance	
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

- Clean work areas at the end of each work shift using dry cleaning methods such as sweeping and vacuuming.

Good Housekeeping

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.

- If soaps or detergents are not used, and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.

- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement.

Landscaping Activities

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.

- Use mulch or other erosion control measures on exposed soils. See also SC-40, Contaminated and Erodible Areas, for more information.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.

- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.

- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.

- Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.

- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. If directed off-site, you should direct the water through hay bales and filter fabric or use other sediment filters or traps.

- Store toxic material under cover during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.

- Use mulch or other erosion control measures when soils are exposed.

- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.

- Consider an alternative approach when bailing out muddy water: do not put it in the storm drain; pour over landscaped areas.

- Use hand weeding where practical.

Fertilizer and Pesticide Management

- Do not use pesticides if rain is expected.

- Do not mix or prepare pesticides for application near storm drains.

- Use the minimum amount needed for the job.

- Calibrate fertilizer distributors to avoid excessive application.

- Employ techniques to minimize off-target application (e.g., spray drift) of pesticides, including consideration of alternative application techniques.

- Apply pesticides only when wind speeds are low.

- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.

- Irrigate slowly to prevent runoff and then only as much as is needed.

- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.

Spill Response and Prevention Procedures

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.
- Familiarize employees with the Spill Prevention Control and Countermeasure Plan.
- Clean up spills immediately.

Material Handling and Waste Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- Use less toxic pesticides that will do the job when applicable. Avoid use of copper-based pesticides if possible.
- Dispose of empty pesticide containers according to the instructions on the container label.
- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Employee Training Program

- Educate and train employees on pesticide use and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the needs of individual staff.

Quality Assurance and Record Keeping

- Keep accurate logs that document maintenance activities performed and minimum BMP measures implemented.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Additional capital costs are not anticipated for building and grounds maintenance. Implementation of the minimum BMPs described above should be conducted as part of regular site operations.

Maintenance

- Maintenance activities for the BMPs described above will be minimal, and no additional cost is anticipated.

Supplemental Information

Fire Sprinkler Line Flushing

Site fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water, though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping, but it is subject to rusting and results in lower quality water. Initially, the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time (typically a year) and between flushes may accumulate iron, manganese, lead, copper, nickel, and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

City of Seattle, Seattle Public Utilities Department of Planning and Development, 2009. *Stormwater Manual Vol. 1 Source Control Technical Requirements Manual.*

Kennedy/Jenks Consultants, 2007. *The Truckee Meadows Industrial and Commercial Storm Water Best Management Practices Handbook.* Available online at: http://www.cityofsparks.us/sites/default/files/assets/documents/env-control/construction/TM-I-C_BMP_Handbook_2-07-final.pdf.

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US EPA, 1997. *Best Management Practices Handbook for Hazardous Waste Containers*. Available online at: http://www.epa.gov/region6/6en/h/handbk4.pdf.

Ventura Countywide Stormwater Management Program Clean Business Fact Sheets. Available online at: http://www.vcstormwater.org/documents/programs_business/building.pdf.

Building Repair and Construction SC-42

Description

Site modifications are common, particularly at large industrial sites. The activity may vary from minor and normal building repair to major remodeling, or the construction of new facilities. These activities can generate pollutants including solvents, paints, paint and varnish removers, finishing residues, spent thinners, soap cleaners, kerosene, asphalt and concrete materials, adhesive residues, and old asbestos installation. Protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants to stormwater from building repair, remodeling, and minor construction by using soil erosion controls, enclosing or covering building material storage areas, using good housekeeping practices, using safer alternative products, and training employees.

This fact sheet is intended to be used for minor repairs and construction. If major construction is required, the guidelines in the Construction BMP Handbook should be followed.

Approach

The BMP approach is to reduce potential for pollutant discharges through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- Recycle residual paints, solvents, lumber, and other materials to the maximum extent practicable.
- Avoid outdoor repairs and construction during periods of wet weather.
- Use safer alternative products to the maximum extent practicable. See also SC-35 Safer Alternative Products for more information.

Objectives

- *Cover*
- *Contain*
- *Educate*
- *Reduce/Minimize*
- *Product Substitution*

Targeted Constituents	
Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	✓
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Buy recycled products to the maximum extent practicable.

- Inform on-site contractors of company policy on these matters and include appropriate provisions in their contract to ensure certain proper housekeeping and disposal practices are implemented.

- Make sure that nearby storm drains are well marked to minimize the chance of inadvertent disposal of residual paints and other liquids.

Good Housekeeping

Repair & Remodeling

- Keep the work site clean and orderly. Remove debris in a timely fashion. Sweep and vacuum the area regularly to remove sediments and small debris.

- Cover raw materials of particular concern that must be left outside, particularly during the rainy season. See also SC-33 Outdoor Storage of Raw Materials for more information.

- Use equipment and tools such as bag sanders to reduce accumulation of debris.

- Limit/prohibit work on windy days; implement roll-down walls or other measures to reduce wind transport of pollutants.

- Do not dump waste liquids down the storm drain.

- Dispose of wash water, sweepings, and sediments properly.

- Store liquid materials properly that are normally used in repair and remodeling such as paints and solvents. See also SC-31 Outdoor Liquid Container Storage for more information.

- Sweep out rain gutters or wash the gutter and trap the particles at the outlet of the downspout. A sock or geofabric placed over the outlet may effectively trap the materials. If the downspout is tight lined, place a temporary plug at the first convenient point in the storm drain and pump out the water with a vactor truck, and clean the catch basin sump where you placed the plug.

- Clean the storm drain system in the immediate vicinity of the construction activity after it is completed. See also SC-44 Drainage System Maintenance for more information.

Painting

- Enclose painting operations consistent with local air quality regulations and OSHA.

- Local air pollution regulations may, in many areas of the state, specify painting procedures which if properly carried out are usually sufficient to protect water quality.

- Develop paint handling procedures for proper use, storage, and disposal of paints.

- Transport paint and materials to and from job sites in containers with secure lids and tied down to the transport vehicle.
- Test and inspect spray equipment prior to starting to paint. Tighten all hoses and connections and do not overfill paint containers.
- Mix paint indoors before using so that any spill will not be exposed to rain. Do so even during dry weather because cleanup of a spill will never be 100 percent effective.
- Transfer and load paint and hot thermoplastic away from storm drain inlets.
- Do not transfer or load paint near storm drain inlets.
- Plug nearby storm drain inlets prior to starting painting and remove plugs when job is complete when there is risk of a spill reaching storm drains.
- Cover nearby storm drain inlets prior to starting work if sand blasting is used to remove paint.
- Use a ground cloth to collect the chips if painting requires scraping or sand blasting of the existing surface. Dispose of the residue properly.
- Cover or enclose painting operations properly to avoid drift.
- Clean the application equipment in a sink that is connected to the sanitary sewer if using water based paints.
- Capture all cleanup-water and dispose of properly.
- Dispose of paints containing lead or tributyl tin and considered a hazardous waste properly.
- Store leftover paints if they are to be kept for the next job properly, or dispose properly.
- Recycle paint when possible. Dispose of paint at an appropriate household hazardous waste facility.

Spill Response and Prevention Procedures

- Keep your spill prevention and control plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Clean up spills immediately.
- Excavate and remove the contaminated (stained) soil if a spill occurs on dirt.

Material Handling and Waste Management

- Post “No Littering” signs and enforce anti-litter laws.

- Provide a sufficient number of litter receptacles for the facility.
- Clean out and cover litter receptacles frequently to prevent spillage.
- Keep waste collection areas clean.
- Inspect solid waste containers for structural damage regularly. Repair or replace damaged containers as necessary.
- Secure solid waste containers; containers must be closed tightly when not in use.
- Do not fill waste containers with washout water or any other liquid.
- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc., may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).
- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal. Affix labels to all waste containers.
- Make sure that hazardous waste is collected, removed, and disposed of properly. See also SC-34, Waste Handling and Disposal for more information.

Sediment and Erosion Controls

- Limit disturbance to bare soils and preserve natural vegetation whenever possible. See also EC-2, Preservation of Existing Vegetation, in the Construction BMP Handbook.
- Stabilize loose soils by re-vegetating whenever possible. See also EC-4 Hydroseeding, in the Construction BMP Handbook.
- Utilize non-vegetative stabilization methods for areas prone to erosion where vegetative options are not feasible. Examples include:
  - ✓ Areas of vehicular or pedestrian traffic such as roads or paths;
  - ✓ Arid environments where vegetation would not provide timely ground coverage, or would require excessive irrigation;
  - ✓ Rocky substrate, infertile or droughty soils where vegetation would be difficult to establish; and
  - ✓ Areas where vegetation will not grow adequately within the construction time frame.

There are several non-vegetative stabilization methods and selection should be based on site-specific conditions. See also EC-16 Non-Vegetative Stabilization, in the Construction BMP Handbook.

- Utilize chemical stabilization when needed. See also EC-5 Soil Binders, in the Construction BMP Handbook.

- Use geosynthetic membranes to control erosion if feasible. See also EC-7 Geotextiles and Mats, in the Construction BMP Handbook.

- Stabilize all roadways, entrances, and exits to sufficiently control discharges of erodible materials from discharging or being tracked off the site. See also TC1-3 Tracking Control, in the Construction BMP Handbook.

- Refer to the supplemental information provided below for projects that involve more extensive soil disturbance activities.

Employee Training Program

- Educate employees about pollution prevention measures and goals.

- Train employees how to properly implement the source control BMPs described above. Detailed information for Sediment and Erosion Control BMPs is provided in the Construction BMP Handbook.

- Proper education of off-site contractors is often overlooked. The conscientious efforts of well trained employees can be lost by unknowing off-site contractors, so make sure they are well informed about pollutant source control responsibilities.

- Use a training log or similar method to document training.

Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for building repair and construction, types and quantities of waste disposed of, and any improvement actions.

- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.

- Establish procedures to complete logs and file them in the central office.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of BMPs. Provided below are typical limitations and recommended "work-arounds."

- This BMP is for minor construction only. The State's General Construction Activity Stormwater Permit has more extensive requirements for larger projects that would disturb one or more acres of surface.

  - ✓ Refer to the companion "Construction Best Management Practice Handbook" which contains specific guidance and best management practices for larger-scale projects.

- Time constraints may require some outdoor repairs and construction during wet weather.
  - ✓ Require employees to understand and follow good housekeeping and spill and leak prevention BMPs.
  - ✓ Inspect sediment and erosion control BMPs daily during periods of wet weather and repair or improve BMP implementation as necessary.
- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
  - ✓ Minimize use of hazardous materials to the maximum extent practicable.
- Be certain that actions to help stormwater quality are consistent with Cal- and Fed-OSHA and air quality regulations.
- Prices for recycled/safer alternative materials and fluids may be higher than those of conventional materials.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Limited capital investments may be required at some sites if adequate cover and containment facilities do not exist for construction materials and wastes.
- Purchase and installation of erosion and sediment controls, if needed will require additional capital investments, and this amount will vary depending on site characteristics and the types of BMPs being implemented.
- Minimize costs by maintaining existing vegetation and limiting construction operations on bare soils.

Maintenance

- The erosion and sediment control BMPs described above require periodic inspection and maintenance to remain effective. The cost of these actions will vary depending on site characteristics and the types of BMPs being implemented.
- Irrigation costs may be required to establish and maintain vegetation.

Supplemental Information

Soil/Erosion Control

If the work involves exposing large areas of soil, employ the appropriate soil erosion and control techniques. See the Construction Best Management Practice Handbook. If old buildings are being torn down and not replaced in the near future, stabilize the site using measures described in SC-40 Contaminated or Erodible Areas.

If a building is to be placed over an open area with a storm drainage system, make sure the storm inlets within the building are covered or removed, or the storm line is connected to the sanitary sewer. If because of the remodeling a new drainage system is to be installed or the existing system is to be modified, consider installing catch basins as they serve as effective “in-line” treatment devices. Include in the catch basin a “turn-down” elbow or similar device to trap floatables.

References and Resources

City of Seattle, Seattle Public Utilities Department of Planning and Development, 2009. *Stormwater Manual Vol. 1 Source Control Technical Requirements Manual*.

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Kennedy/Jenks Consultants, 2007. *The Truckee Meadows Industrial and Commercial Storm Water Best Management Practices Handbook*. Available online at: http://www.cityofsparks.us/sites/default/files/assets/documents/env-control/construction/TM-I-C_BMP_Handbook_2-07-final.pdf.

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US EPA. *Construction Site Stormwater Runoff Control*. Available online at: http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=4.

Parking Area Maintenance SC-43

Description

Parking lots can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants from parking areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

BMPs for other outdoor areas on site (loading/unloading, material storage, and equipment operations) are described in SC-30 through SC-33.

Approach

The goal of this program is to ensure stormwater pollution prevention practices are considered when conducting activities on or around parking areas to reduce potential for pollutant discharge to receiving waters. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ◻ Encourage advanced designs and maintenance strategies for impervious parking lots. Refer to the treatment control BMP fact sheets in this manual for additional information.

- ◻ Keep accurate maintenance logs to evaluate BMP implementation.

Good Housekeeping

- ◻ Keep all parking areas clean and orderly. Remove debris, litter, and sediments in a timely fashion.

- ◻ Post "No Littering" signs and enforce anti-litter laws.

Objectives

- *Cover*
- *Contain*
- *Educate*
- *Reduce/Minimize*
- *Product Substitution*

Targeted Constituents	
Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Provide an adequate number of litter receptacles.

- Clean out and cover litter receptacles frequently to prevent spillage.

Preventative Maintenance

Inspection

Have designated personnel conduct inspections of parking facilities and stormwater conveyance systems associated with parking facilities on a regular basis.

- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Surface Cleaning

- Use dry cleaning methods (e.g., sweeping, vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system if possible.

- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.

- Sweep all parking lots at least once before the onset of the wet season.

- Dispose of parking lot sweeping debris and dirt at a landfill.

- Follow the procedures below if water is used to clean surfaces:

  - ✓ Block the storm drain or contain runoff.

  - ✓ Collect and pump wash water to the sanitary sewer or discharge to a pervious surface. Do not allow wash water to enter storm drains.

- Follow the procedures below when cleaning heavy oily deposits:

  - ✓ Clean oily spots with absorbent materials.

  - ✓ Use a screen or filter fabric over inlet, then wash surfaces.

  - ✓ Do not allow discharges to the storm drain.

  - ✓ Vacuum/pump discharges to a tank or discharge to sanitary sewer.

  - ✓ Dispose of spilled materials and absorbents appropriately.

Surface Repair

- Check local ordinance for SUSMP/LID ordinance.

- Preheat, transfer or load hot bituminous material away from storm drain inlets.

- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff.

- Cover and seal nearby storm drain inlets where applicable (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.

- Use only as much water as necessary for dust control during sweeping to avoid runoff.

- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Spill Response and Prevention Procedures

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.

- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.

- Clean up fluid spills immediately with absorbent rags or material.

- Dispose of spilled material and absorbents properly.

Employee Training Program

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.

- Train employees and contractors in proper techniques for spill containment and cleanup.

- Use a training log or similar method to document training.

Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for parking area maintenance, types and quantities of waste disposed of, and any improvement actions.

- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.

- Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Capital investments may be required at some sites to purchase sweeping equipment, train sweeper operators, install oil/water/sand separators, or implement advanced BMPs. These costs can vary significantly depending upon site conditions and the amount of BMPs required.

Maintenance

- Sweep and clean parking lots regularly to minimize pollutant transport into storm drains from stormwater runoff.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Maintain advanced BMPs such as vegetated swales, infiltration trenches, or detention basins as appropriate. Refer to the treatment control fact sheets for more information.

Supplemental Information

Advanced BMPs

Some parking areas may require advanced BMPs to further reduce pollutants in stormwater runoff, and a few examples are listed below. Refer to the Treatment Control Fact Sheets and the New Development and Redevelopment Manual for more information.

- When possible, direct sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low quantities.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.

References and Resources

City of Seattle, Seattle Public Utilities Department of Planning and Development, 2009. *Stormwater Manual Vol. 1 Source Control Technical Requirements Manual.*

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Drainage System Maintenance SC-44

Description

As a consequence of its function, the stormwater drainage facilities on site convey stormwater that may contain certain pollutants either to the offsite conveyance system that collects and transports urban runoff and stormwater, or directly to receiving waters. The protocols in this fact sheet are intended to reduce pollutants leaving the site to the offsite drainage infrastructure or to receiving waters through proper on-site conveyance system operation and maintenance. The targeted constituents will vary depending on site characteristics and operations.

Approach

Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

- ☐ Develop and follow a site specific drainage system maintenance plan that describes maintenance locations, methods, required equipment, water sources, sediment collection areas, disposal requirements, and any other pertinent information.

Good Housekeeping

Illicit Connections and Discharges

- ☐ Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:

Objectives

- ■ *Cover*
- ■ *Contain*
- ■ *Educate*
- ■ *Reduce/Minimize*

Targeted Constituents	
Sediment	✓
Nutrients	✓
Trash	✓
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- ✓ Identify evidence of spills such as paints, discoloring, odors, etc.
- ✓ Record locations of apparent illegal discharges/illicit connections.
- ✓ Track flows back to potential discharges and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- ✓ Eliminate the discharge once the origin of flow is established.

□ Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” or similar stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

□ Refer to fact sheet SC-10 Non-Stormwater Discharges for additional information.

Illegal Dumping

□ Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.

□ Establish a system for tracking incidents. The system should be designed to identify the following:

- ✓ Illegal dumping hot spots;
- ✓ Types and quantities (in some cases) of wastes;
- ✓ Patterns in time of occurrence (time of day/night, month, or year);
- ✓ Mode of dumping (abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, accidents/spills); and
- ✓ Responsible parties.

□ Post “No Dumping” signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.

□ Refer to fact sheet SC-10 Non-Stormwater Discharges for additional information.

Preventative Maintenance

Catch Basins/Inlet Structures

□ Staff should regularly inspect facilities to ensure compliance with the following:

- ✓ Immediate repair of any deterioration threatening structural integrity.
- ✓ Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.

- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.

- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Prioritize storm drain inlets; clean and repair as needed.

- Keep accurate logs of the number of catch basins cleaned.

- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.

- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.

- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.

- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.

- Conduct routine maintenance at each pump station.

- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.

- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Wildlife. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Army Corps of Engineers and USFWS.

Spill Response and Prevention Procedures

- Keep your spill prevention control plan up-to-date.

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- Clean up all spills and leaks using “dry” methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.

Employee Training Program

- Educate employees about pollution prevention measures and goals.
- Train employees how to properly handle and dispose of waste using the source control BMPs described above.
- Train employees and subcontractors in proper hazardous waste management.
- Use a training log or similar method to document training.
- Ensure that employees are familiar with the site’s spill control plan and/or proper spill cleanup procedures.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - ✓ OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).
  - ✓ OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).
  - ✓ Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for drainage system maintenance, types and quantities of waste disposed of, and any improvement actions.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Keep accurate logs of illicit connections, illicit discharges, and illegal dumping into the storm drain system including how wastes were cleaned up and disposed.
- Establish procedures to complete logs and file them in the central office.

Potential Limitations and Work-Arounds

Provided below are typical limitations and recommended “work-arounds” for drainage system maintenance:

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.

  - ✓ Perform all maintenance onsite and do not flush accumulated material downstream to private property or riparian habitats.

- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, and liquid/sediment disposal.

  - ✓ Develop and follow a site specific drainage system maintenance plan that describes maintenance locations, methods, required equipment, water sources, sediment collection areas, disposal requirements, and any other pertinent information.

- Regulations may include adoption of substantial penalties for illegal dumping and disposal.

  - ✓ Do not dump illegal materials anywhere onsite.

  - ✓ Identify illicit connections, illicit discharge, and illegal dumping.

  - ✓ Cleanup spills immediately and properly dispose of wastes.

- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the sanitary sewer system.

  - ✓ Collect all materials and pollutants accumulated in drainage system and dispose of according to local regulations.

  - ✓ Install debris excluders in areas with a trash TMDL.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Capital costs will vary substantially depending on the size of the facility and characteristics of the drainage system. Significant capital costs may be associated with purchasing water trucks, vacuum trucks, and any other necessary cleaning equipment or improving the drainage infrastructure to reduce the potential.

- Developing and implementing a site specific drainage system maintenance plan will require additional capital if a similar program is not already in place.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.
- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Supplemental Information

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing re-suspension and overflow of a portion of the solids during storm events. Flushing prevents “plug flow” discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used if allowed or that fire hydrant line flushing coincide with storm sewer flushing.

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APPENDIX H
BMP Implementation Log

TABLE H.1
BMP IMPLEMENTATION LOG

Industrial Activity/Material and Location	BMP (description)	Implementation Frequency	Implementation Description or Fact Sheet Reference	Person Responsible for Implementing BMP
Processing Rock at the Rock Plant located on the Upper Quarry Floor	Sediment Pond	Daily	Appendix G	Jason Voss
Excavating Rock and Sand at the Upper Quarry Floor and the Middle Quarry Floor	Sediment traps, Stormwater Storage tank	Daily	Appendix G	Jason Voss
Crushing Rock at the Rock Plant on the Upper Quarry Floor	Sediment Pond	Daily	Appendix G	Jason Voss
Processing Sand at the Sand Plant	Sediment Pond	Daily	Appendix G	Jason Voss
Processing Water Residual from the Sand Plant	Reuse of water Residual in a Closed Loop System	Daily	Filer press that produces a clay cake with a moisture content of about 20 percent. Water excreted from the cake filtration process goes back into the closed loop system.	Jason Voss
Dust Control	Material Handling	Daily	Appendix G	Jason Voss
Recycling Area for Asphalt and Concrete at the Recycle Plant	Sediment Trap	Daily	Appendix G	Jason Voss
Harvesting Metal from the Recycling	Good Housekeeping,	Daily	Appendix G	Jason Voss

Industrial Activity/Material and Location	BMP (description)	Implementation Frequency	Implementation Description or Fact Sheet Reference	Person Responsible for Implementing BMP
Asphalt and Concrete Process at the Recycle Plant	Material Handling and Waste Management.			
Processing Incoming Industrial Material	Good Housekeeping, Material Handling and Waste Management.	Daily	Appendix G	Jason Voss
Fueling Equipment and Large Vehicles	Secondary Containment Structures	Daily	Appendix G	Jason Voss
Handling and Storing Materials at the Rock Plant, Sand Plant, and Recycle Plant	Good Housekeeping, Material Handling and Waste Management.	Daily	Appendix G	Jason Voss
Removing Sediment	Preventative Maintenance with CAT 247 Skidsteer	Annually and when needed	Appendix G	Jason Voss

APPENDIX I
BMP Observation Forms

MONTHLY BMP INSPECTION REPORT

Date and Time of Inspection:		Date Report Written:	
PART I. GENERAL INFORMATION			
Site Information			
Facility Name:			
Facility Address:			
Photos Taken: (Circle one)	Yes	No	Photo Reference IDs:
Weather			
Estimate storm beginning: (date and time)		Estimate storm duration: (hours)	
Estimate time since last runoff from any drainage area: (days or hours)		Rain gauge reading and location: (in)	
Is a “Qualifying Storm Event” predicted or did one occur (i.e., discharge from site preceded by 48-hrs without discharge)? (Y/N) If yes, summarize forecast:			
Exception Documentation (explanation required if inspection could not be conducted).			
Inspector Information			
Inspector Name:		Inspector Title:	
Signature:		Date:	

PART II. BMP OBSERVATIONS.			
Describe deficiencies in Part III.			
Minimum BMPs (List and Inspect all BMPs Implemented)	**Failures or other Deficiencies (yes, no, N/A)**	**Action Required (yes/no)**	**Action Implemented (Date)**
Good Housekeeping			
Preventative Maintenance			
Spill and Leak Prevention and Response			
Materials Handling and Waste Management			
Erosion and Sediment Controls			

PART II. BMP OBSERVATIONS.			
Describe deficiencies in Part III.			
Minimum BMPs (List and Inspect all BMPs Implemented)	**Failures or other Deficiencies (yes, no, N/A)**	**Action Required (yes/no)**	**Action Implemented (Date)**
Stormwater Containment and Discharge Reduction BMPs			
Treatment Control BMPs			
Other Advanced BMPs			

PART II. BMP OBSERVATIONS.			
Describe deficiencies in Part III.			
Minimum BMPs (List and Inspect all BMPs Implemented)	**Failures or other Deficiencies (yes, no, N/A)**	**Action Required (yes/no)**	**Action Implemented (Date)**

PART III. DESCRIPTIONS OF BMP DEFICIENCIES		
Deficiency	**Repairs Implemented:** **Note -** Repairs must be completed as soon as possible.	
	Repaired (Y/N)	**Corrective Action Implemented**
1.		
2.		
3.		
4.		

PART IV. ADDITIONAL CORRECTIVE ACTIONS REQUIRED.	
Identify additional corrective actions not included with BMP Deficiencies (Part III) above. Identify BMPs that need more frequent inspection. Note if SWPPP change is required.	
Required Actions	**Implementation Date**

APPENDIX J
Industrial General Permit

National Pollutant Discharge Elimination System (NPDES)

General Permit for Stormwater Discharges
Associated with Industrial Activates
Order NPDES
No. CAS000001

Appendix J has attached the certification of the General Permit. The entire version of the General Permit is not attached to this document due to its length. The full General Permit document is kept on-site with the hard copy of the SWPPP and is available online at: https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/industrial/2014indgenpermit/wqo2014_0057_dwq_revmar2015.pdf

Revegetation Plan
Stevens Creek Quarry

CUPERTINO, SANTA CLARA COUNTY, CALIFORNIA

Prepared For:
Andrew White
Benchmark Resources
2515 East Bidwell Street
Folsom, CA 95630
awhite@benchmarkresources.com

WRA Contact:
Kari Dupler
dupler@wra-ca.com

Date:
December 2020

WRA Project #:
30306

ENVIRONMENTAL CONSULTANTS

2169-G East Francisco Blvd., San Rafael, CA 94901 (415) 454-8868 tel info@wra-ca.com www.wra-ca.com

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APPENDICES

1.0 INTRODUCTION

This Revegetation Plan (Plan) describes the revegetation program for the Stevens Creek Quarry (Quarry) proposed Reclamation Plan Amendment (RPA) in Cupertino, Santa Clara County (Appendix B, Figure 1). This Plan provides specific guidance on soil amendments, species planting palette, and revegetation success criteria.

This plan provides recommendations for revegetation of 159 acres of an approximately 251-acre Reclamation Plan Amendment area ([Study Area], Appendix B, Figure 2). The recommendations in this Plan are intended to comply with the requirements of the California Surface Mining and Reclamation Act (SMARA), Public Resources Code section 2710 et seq., and SMARA's reclamation standards at Code of Regulations, Title 14, section 3705 et seq. (Reclamation Standards).

This Revegetation Plan includes a description of the following:

- Goals of the revegetation program;
- Site characteristics that influence revegetation;
- Proposed soil development and planting methods; and
- Performance standards.

Appendix A lists potential suitable plant species for revegetation of the Study Area. Appendix B includes Figures 1 and 2 as referenced in this Revegetation Plan.

1.1 Revegetation Goals and Objectives

The ultimate goal for revegetation efforts in the Study Area is self-sustaining revegetated cover that supports reclamation to an open space condition suitable for future development as allowed under the County Zoning Ordinance. The county Hillside district allows by right uses such as general agriculture, livestock, agricultural accessory structures and uses, nurseries, consumer recycling facilities and wineries. A variety of other uses are allowed subject to a use permit. Interim erosion control planting may be used to provide temporary protection for disturbed areas until such time that they may be reclaimed to the approved end use.

Revegetation should stabilize the site against erosion if and until post-mining land uses are developed. On-site test plots will be used to refine the planting plan such that the most successful plant species and soil blends will be used preferentially to facilitate revegetation of the site as quickly as possible.

1.2 Summary of Revegetation Tasks

Tasks described in this Plan will provide vegetative cover using predominantly native plants for final contours, thus controlling erosion and stabilizing slopes. Revegetation efforts will utilize plant materials capable of self-regeneration without continued dependence on irrigation, soil amendments, or fertilizer, in accordance with the Reclamation Standards. Seeding of the finished slopes with a mixture of grasses, herbaceous plants, and shrubs will provide surface cover and erosion control for the new slopes. Shrub planting areas will be located on mine benches between largely unvegetated highwalls that must remain for slope stability purposes. This Plan describes a test plot program, soil treatment and plant installation, maintenance and adaptive management guidelines, and verifiable monitoring standards to achieve the goals and objectives listed above.

2.0 EXISTING CONDITIONS

2.1 Native Soil Types

The USDA *Soil Survey of Santa Clara Area, California* (USDA 1958) indicates that the Study Area has six native soil types (map units) and depicts excavated Quarry areas as a “Pit” map unit. These map units are described in detail below. According to the soil survey, the native soils of the Study Area were subject to erosion and gullying, and were either generally quite shallow hosting a plant community dominated by scrub or deeper supporting a more robust bay or oak woodland community. Although historical Quarry activities have largely removed the native soils, successful revegetation is expected based on local experience.

Pit (Ec) - This map unit consists of areas large enough to map where excavations have been made and where the original soil has been removed. Excavations in this area have been principally for drain rock, aggregate base rock, and sand.

Merbeth-Literr complex, 30 to 65 percent slopes - The Merbeth-series soil consists of very deep, well-drained soils formed in old alluvium from mixed rock sources. These soils are on hills of dissected terraces. Soil temperatures range from 60 to 62ºF and are dry from about June 15 to October 15 (about 120 days). This series is geographically associated with Literr soils, which have mollic epipedons.

Mouser-Maymen complex, 30 to 75 percent slopes - The Mouser-series soils consist of deep and very deep, well-drained soils that formed in residuum weathered from sandstone, mudstone, and greenstone. They are on summits and side slopes of mountains and hills. Mean annual temperature is about 57ºF and are usually moist in between November and May, and have a xeric moisture regime. This series is geographically associated with Maymen soils, which are shallow, somewhat excessively drained soils found on mountains.

Katykat-Sanikara complex, 8 to 30 percent slopes - The Katykat series soils formed in residuum weathered from sandstone and mudstone of the Franciscan formation and are found on side slopes and summits of mountains and foothills. They are geographically associated with Sanikara soils, which are shallow to a lithic contact. The climate is subhumid, mesothermal with warm dry summers and cool moist winters. These soils are well drained, moderately permeable, with medium to rapid runoff. The mean annual soil temperature is about 57ºF.

Footpath-Mouser complex, 50 to 75 percent slopes - The Footpath-series soils consist of moderately deep to a paralithic contact, well drained soils that formed in residuum weathered from greenstone. These soils are found on hills, mountain slopes, and summits. The climate is subhumid, mesothermal with warm, dry summers and cool moist winters. Mean annual soil temperatures range from 55 to 59ºF. This series is geographically associated with Mouser soils, which are deep and very deep soils.

Sanikara-Footpath complex, 30 to 75 percent slopes - The Sanikara-series soil consists of very shallow and shallow to lithic contact, well-drained soils formed in residuum weathered from sandstone and greenstone. They are on hills, mountain slopes, and summits. The mean annual temperature is about 57ºF. This series is geographically associated with Footpath soils, which are moderately deep to a paralithic contact.

2.2 Climate

The Study Area lies within a semi-arid Mediterranean climate zone characterized by warm summer and mild winter temperatures with a substantial slope effect contributing to vegetative community differences on north- and south-facing slopes. Rainfall occurs mainly from

November through April. Average annual rainfall is about 22 inches; however, precipitation can range widely from year to year. On north-facing slopes, conditions are moister and less warm than on south-facing slopes, as evidenced by the differences in vegetative communities. The Study Area has both north-facing and south-facing slopes. The initially unvegetated slopes of the Study Area may experience relatively higher summer temperatures than would be expected for this region because sparse vegetative cover will be less effective in reflecting and absorbing sunlight until a denser cover of vegetation is established.

2.3 Vegetation

Vegetation in the Study Area is described in the Jurisdictional Delineation (LSA 2017) and biological constraints report (WRA 2020). A majority of the Study Area has been historically disturbed by Quarry operations; virtually all areas to be reclaimed have already been subjected to vegetation removal and mining. Northern mixed chaparral / scrub oak chaparral, and coast live oak woodland are presumably the natural communities that once dominated the Study Area. These biological communities form a mosaic on south-facing, dry, rocky slopes with thin soils dominated by chaparral species. North-facing slopes and shaded ravines are generally dominated by a mature tree and shrub-dominated canopy. These north facing slopes support oak woodland and bay forest in the canyons and scrub oak chaparral on the ridges.

Shrub species typical of the chaparral community on south-facing slopes include mainly native species: California sagebrush (*Artemisia californica*), chamise (*Adenostoma fasciculatum*), coyote brush (*Baccharis pilularis*), scrub oak (*Quercus berberidifolia*), buckbrush (*Ceanothus cuneatus*), toyon (*Heteromeles arbutifolia*), and poison oak (*Toxicodendron diversilobum*). On north-facing slopes, typical overstory species include coast live oak (*Q. agrifolia*), California bay (*Umbellularia californica*), scrub oak, toyon, and California buckeye (*Aesculus californica*), with scattered valley oak (*Q. lobata*), and blue oak (*Q. douglasii*). Scrub species in the understory on north-facing slopes are typically coyote brush and poison oak.

3.0 SOIL DEVELOPMENT

The conditions of this site limit the conventional SMARA regulation approach to soils salvage and redistribution. The different surfaces and substrate materials (cut and fill surfaces) that will remain at reclamation will have different growth capabilities and planting adaptability. The revegetation plan therefore provides options for the operator to employ. Existing stockpiles of soil, new topsoil generated during new mined surfaces (if any), and imported fill will be incorporated with the top layer of overburden rock when present to improve soil conditions. However, the majority of quarry surfaces have long been established, and new disturbance areas, which contain salvageable topsoil and vegetation, are limited if any. The overburden rock substrate and potential soil materials are characterized as follows:

Overburden: Overburden alone may not be an ideal substrate for certain plant communities given its texture and low organic content. Overburden would benefit from the addition of imported topsoil as available and/or organic amendments. Blending stockpiled overburden with topsoil and other materials is a consideration for improving texture and nutrient content.

Native Topsoil: Planned new areas of mining are limited to marginal perimeter at the west boundary of Parcel B, where topsoil salvage and vegetation salvage and chipping may occur, producing little soil for overall site reclamation.

Rock Plant Fines: The Rock Plant fines material is a by-product of the rock processing activities at the quarry. It has a clay loam texture and contains a substantially greater amount of silt and clay compared to the overburden rock. The Rock Plant fines material are expected to have virtually no low organic matter content. Blending the Rock Plant fines material with the overburden may improve soil texture conditions.

Imported Soils: SCQ has long imported surplus construction soil that meets site-specific acceptance criteria and will continue to do so under the approved and amended reclamation plan. Sources of this material will continue to be evaluated for contamination and testing for pesticides, salts, and other impediments to plant growth where the materials would be used for final cover.

Areas to be revegetated in the Study Area will primarily consist of an overburden rock surface and cut and fill slopes. Overburden is typically fine-grained material that is not suitable as rock product. Slopes scheduled to undergo revegetation will be graded to a final contour ranging from 3:1 to 5:1 depending on the location within the Quarry. Where mining activities have resulted in compaction of the soil, ripping, discing, or other means will be used in revegetation areas to establish a suitable rooting zone in preparation for planting. Where access roads, haul roads, or other traffic routes are to be revegetated, all road base materials are recommended be stripped from the road, the substrate shall be ripped or disked as needed to promote establishment of an appropriate root zone, a soil mix containing topsoil or compost will be spread to promote plant growth, and the area will be revegetated.

3.1 Target Soil Characteristics

To augment growth media, imported surplus construction soil with higher organic matter content than on-site materials may be used in revegetation. Based on experience with soils and native plants, and considering the available and potential materials to develop a planting substrate, the soil preparation depth for areas targeted for scrub planting over the majority of the surfaces is 6 inches, though the depths will be evaluated in the test plots. The shrub plantings on highwall benches may require a deeper planting substrate, such as 12 inches to support root establishment. The importation of excess materials from local construction may occasionally include soils that could be stockpiled for placement on final reclamation surfaces.

4.0 REVEGETATION

Revegetation will focus on developing stable surfaces with self-sustaining cover of predominantly native plants. Revegetation efforts will be implemented following completion of overburden placement and preparation. Planting and maintenance will be conducted using an adaptive management approach, based on a revegetation test plot that will be initiated prior to revegetation activities. A preliminary erosion control stage may be incorporated prior to the revegetation tasks listed below. The native seed mix shown in Table 1 includes species that have proven successful in other local revegetation and is recommended to provide erosion control and initial establishment of native grasses and herbaceous species as needed in temporarily disturbed areas. Other similar species may be used as necessary to establish vegetative cover.

Table 1. Proposed erosion control seed mix.

SCIENTIFIC NAME	COMMON NAME
Bromus carinatus	California brome
Elymus glaucus	blue wildrye
Lupinus nanus	sky lupine
Nassella pulchra	purple needlegrass
Plantago erecta	California plantain
Trifolium willdenovii	tomcat clover
Vulpia microstachys	three weeks fescue

Appendix A provides an extensive list of native species that may be considered for revegetation use. Propagule availability, lead time needed for nursery production, and results of sampling within the Study Area will help to refine this list. When possible, the majority of seed and container plants used in the reclamation revegetation effort will come from commercial sources.

4.1 Seeding

In the Study Area, contoured surfaces will be covered with native grass, herb, and shrub species via broadcast seeding or hydroseeding (a homogenous slurry of mulch, fertilizer, seed, and a binding agent) over the areas to be revegetated. Access roads will be left bare until the completion of the contouring and slope seeding, at which time unneeded roads will be revegetated. A preliminary seed mix of shrubs and grasses is shown in Table 2.

Table 2. Preliminary species for general seeding

SHRUBS	
Artemisia californica	California sagebrush
Baccharis pilularis	coyote brush
Eriogonum fasciculatum	California buckwheat
Salvia leucophylla	purple sage
Salvia mellifera	black sage
GRASSES AND HERBS	
Achillea millefolium	yarrow
Artemisia douglasiana	mugwort
Bromus carinatus	California brome
Elymus glaucus	blue wildrye
Eschscholzia californica	California poppy
Heterotheca grandiflora	telegraph weed
Lotus purshianus	Spanish clover
Lotus scoparius	deerweed
Lupinus nanus	sky lupine
Melica californica	California melic
Nassella pulchra	purple needlegrass
Poa secunda	one-sided bluegrass
Trifolium willdenovii	tomcat clover

4.2 Shrub Plantings

Shrubs will be planted as container plants or seeds in the revegetation areas. To the extent feasible, shrubs to be planted will be obtained from seeds collected from the Quarry property or from local sources. Shrubs will be planted at approximately 4.5-foot spacing in designated planting areas or at a spacing suitable for the location and species of the plantings. The remaining slopes and benches will be covered with shallower topsoil and/or soil-building materials and seeded with a grass/herb/shrub seed mix, without containerized shrub plantings.

The need for herbivory protection for specific species will be evaluated based on the results of the early stages of the proposed reclamation project. Weed mats or several inches of mulch may be placed around planted shrubs to reduce competition and retain moisture.

This plan is designed to provide appropriate conditions for native species so that they are not dependent upon irrigation. The need for irrigation during initial establishment will be assessed during the adaptive management reclamation efforts. If monitoring during the first five years of the early revegetation stages indicate significant losses of plant material that threatens achievement of performance standards, the need for irrigation will be re-evaluated during each year to assure long term success.

Shrub species in undisturbed adjacent habitats or observed to perform well in previous revegetation areas and test plot results described below in Section 5.0 will be selected for planting. A list of shrubs to be planted on benches of the Study Area is provided in Table 3. Species selection and numbers will depend on propagule collection and availability, other similar species may be utilized to meet vegetation cover requirements.

Table 3. Shrubs for planting on Study Area benches.

SCIENTIFIC NAME	COMMON NAME
SHRUBS	
Heteromeles arbutifolia	toyon
Rhamnus californica	California coffeeberry
Rhamnus crocea	redberry
Ribes californicum	hillside gooseberry
Ribes malvaceum	chaparral currant

4.3 Timing

Seeding should be performed and completed between September 1 and December 1 to take advantage of warm soil temperatures and winter rains for successful germination and establishment. Container planting should be performed during the winter season and completed by approximately the end of January to improve plant establishment.

5.0 TEST PLOT PROGRAM

As part of the revegetation effort, a minimum of four 100-foot x 100-foot test plots, as well as control and no seed areas will be established. These plots will be representative of the substrate conditions at reclamation. The test plots will be maintained and monitored once annually following establishment, and tests will be conducted to refine revegetation techniques and seeding rates to meet performance standards. Additional tests will be conducted if the initial tests and active revegetation are not successful. This may include modification of the amount of seed, soil preparation, or amendments, as necessary.

6.0 MONITORING

6.1 Installation Monitoring

To ensure adherence to the guidelines of this revegetation plan, all implementation activities will be monitored by a qualified individual. Records will be kept of soil-building treatments applied, addition of soil amendments as determined to be necessary, and all plant and seed installation. Seeding records will include identification of the date of application and a description and map of the location where various seed mixes are applied. Additionally, installation of shrub plantings will be documented to identify the location and approximate area planted, and the number of shrubs planted or seeded.

6.2 Vegetation Monitoring

Monitoring must be performed to document revegetation success. Following installation, each revegetation area should be monitored as necessary to determine if reseeding, irrigation, or soil amendments are necessary to demonstrate the performance criteria at the earliest possible time. Revegetation will be monitored annually until the area meets performance standards for two consecutive years without intervention. Revegetation sites shall be identified on a map and monitored to assure that standards are adequately achieved to within a minimum 80 percent confidence level as required by Reclamation Standards.

Soil Surface Treatment Differentiation – Due to available topsoil volumes, soil surface treatments will differ. Because these soil surface treatments are anticipated to influence plant growth due to differences in organic matter availability, water holding capabilities, and compaction rates, plant establishment will predictably vary between growth media types. All vegetation monitoring plots shall be stratified to include multiple plots within each soil surface treatment area.

Shrub Planting Areas – Randomly selected plots will be monitored in planting areas, with the number of plots sampled suitable to attain 80 percent confidence in data results. In addition, both north- and south-facing areas should be represented in sampling. All container planting areas will be sampled using a nested approach as utilized in reference site data collection; other sampling methods may be used but will require appropriate conversion of native species richness standards. The nested approach means that once a plot center is randomly selected, , shrubs within a five meter radius and herbs within a one meter radius from the plot center. Monitors will identify and count all shrubs surviving in their respective plots. Cover of all shrub and herb species within each layer will be estimated within each respective plot, and all species will be identified to the extent possible.

Seeded areas - Sampling plots will be selected randomly throughout the areas seeded with grasses, herbs, and shrubs to determine native species richness and percent cover of each species. As with the planting areas, sampling will occur in nested plots, with shrubs assessed within five meter radius and herbs within a one meter radius from the plot center. The number of plots for each installation stage will be selected in order to achieve an 80 percent confidence level in the performance results. Stratification of sampling areas may be necessary if the mix of shrubs and herbs varies greatly in different areas either due to variation in seed applications or soil or other site conditions. For example, areas strongly dominated by herbs and grasses may instead be monitored using smaller sampling plots appropriate to grasslands.

Revegetated areas should be monitored in late spring or early summer to ensure that most plants will be identifiable to the species level. Monitoring will be conducted by a qualified biologist with experience in plant identification. After monitoring data has been collected, a report summarizing the success of revegetation efforts, comparison of data to Year 5 performance standards, any observed obstacles to achieving performance standards, and any remedial actions recommended will be prepared and submitted by October 15 of that year. This will allow for proper timing of remedial plantings and/or seeding if determined to be necessary.

6.3 Performance Standards

Performance standards describe the minimum targets for species richness and percent cover for seeding and planting areas. Performance standards represent anticipated conditions five years after installation. SMARA requirements state that performance standards must be met for two consecutive years without significant human intervention prior to release of financial assurances.

Site data will be used to choose appropriate reference sites and develop an achievable set of performance standards considering differences associated with different soil surface treatments. The standards in Table 9 will be adapted to create achievable performance standards. Native species richness targets have been chosen to reflect data collected from the reference sites and test plot results and then adjusted for anticipated soil surface treatments.

Table 9. Proposed five-year performance standards for Study Area revegetation

	North- and East-facing benches		South-facing benches		Seeded Areas shrub/grassland mix	
	Shrub	Herb	Shrub	Herb	Shrub	Herb
Richness *(avg. native species per plot)***	50%	75%	50%	75%	50%	75%
Canopy Cover	15%	20%	15%	20%	15%*	20%*

*Performance standards for seeded areas may need to be adjusted to reflect the species mix ultimately selected based on reference sites and test plot results. In particular, the balance between shrub and herbaceous species cover may vary.

**Richness standards will be based on a percentage of natives observed in reference plots. 5m-radius plots for shrubs, and 1m-radius plots for herbs/grasses.

6.4 Performance Standards for Weed Control

In addition to vegetation monitoring to assess the success of revegetation efforts, the density of weeds (non-native invasive plants) will be assessed as part of vegetation sampling described in Section 6.2.

Reference plots will be surveyed by WRA in undisturbed natural mixed chaparral / scrub oak chaparral adjacent to the Quarry property to assess native and non-native species richness and cover. For the purposes of Study Area maintenance and monitoring, non-native plants listed in the Cal-IPC Inventory (2020) as highly invasive will be considered invasive weeds subject to control and performance standards. If invasive weeds are found to exceed a combined 10 percent relative cover over all sampled quadrats, weed abatement activities will commence. The following species should be included as subject to this performance standard: yellow star thistle (*Centaurea solstitialis*, annual), black mustard (*Brassica nigra*, annual), stinkwort (*Dittrichia graveolens*, annual), pampas grass (*Cortaderia* spp., perennial), and fennel (*Foeniculum vulgare*, perennial). Some of these species are only listed as moderately invasive by Cal-IPC, but they should be managed promptly because they are currently present in large numbers near the Study Area and may impede establishment of native cover.

6.5 Adaptive Management

The planting strategy described above may prove to be less efficient than other strategies developed through site specific test plots. Therefore, if a different planting strategy is implemented in the Study Area in which the above performance standards and monitoring guidelines cannot be followed, a revision to this revegetation plan will be submitted as a substitute for this document or portions thereof.

7.0 MAINTENANCE

Maintenance of revegetation areas shall consist of reseeding or replanting unsuccessful revegetation efforts, weed control to limit the extent of noxious weeds, and repair of erosion damage. If any significant rills or gullies are identified in the Study Area, remedial actions will include reseeding of the area with an approved erosion control seed mix, and if necessary, slope stabilization measures will be undertaken.

If revegetation efforts are not successful with regard to the performance standards outlined in Section 6.3 of this report within five years following initial seeding, the under-performing areas will be reevaluated to determine the measures necessary to improve performance. If necessary, these areas will be reseeded and/or replanted with methods modified as needed. This may include the use of container stock and irrigation or simply additional seeding during a wet winter season. Prior to reseeding, the operator shall evaluate previous revegetation practices to identify cultural methods to benefit the overall revegetation effort. If, after a site is reseeded, revegetation efforts still do not yield satisfactory results, additional reseeding or other intervention methods may be required.

Weed control is necessary to reduce the occurrence of undesirable invasive and noxious species of plants that may invade and where weeds could interfere with revegetation efforts or increase fire hazards, as specified in SMARA regulations. Weeds are undesired, generally introduced, and invasive plants that can compete with revegetation efforts. However, many introduced species occur widely in the region and are common in both the surrounding active

Quarry and adjacent natural open space lands. Eradication of all weeds is therefore unachievable; therefore, specific noxious plant species are targeted for control.

As described in Section 6.4, species listed by Cal-IPC (2020) as highly invasive will be considered problematic and will be targeted during maintenance of this revegetation effort if they exceed the designated threshold of ten percent cover. Invasive plant species typically found in the Study Area and in surrounding lands include yellow star thistle, black mustard, stinkwort, pampas grass, and fennel.

Weed control methods may include chemical and mechanical removal techniques depending on the species and number of individuals encountered. Priorities in weed abatement should focus on those species listed as highly invasive, in addition to other weeds that directly threaten the successful establishment and survival of native species. The percent cover of weeds, abatement measures recommended and undertaken, and other observations on weed control will be included in vegetation monitoring reports. Weed abatement responsibilities may cease once performance standards have been met for each phase of revegetation efforts, unless invasive species in completed revegetation areas are deemed a threat to nearby efforts still in progress.

8.0 REFERENCES

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WRA, Inc. 2010c. Revegetation Plan Permanente Quarry. Cupertino, Santa Clara County, California. May

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APPENDIX A

PLANT LIST FOR REVEGETATION

Appendix A. Potential native plant palette for Stevens Creek Quarry upland revegetation. Species in bold were successfully established in previous revegetation efforts on the nearby Permanente Quarry, or have colonized revegetation sites effectively at Permanente Quarry, and were included in seed mixes or planting palettes.

FAMILY	SCIENTIFIC NAME	COMMON NAME
NATIVE GRASSES		
Poaceae	*Bromus carinatus*	California brome
Poaceae	***Elymus glaucus***	**blue wildrye**
Poaceae	*Elymus multisetus*	big squirreltail grass
Poaceae	*Festuca occidentalis*	western fescue
Poaceae	*Festuca rubra*	red fescue
Poaceae	*Leymus triticoides*	creeping wild rye
Poaceae	*Melica californica*	California melic grass
Poaceae	***Nassella pulchra***	**purple needle grass**
Poaceae	*Vulpia microstachys*	three-weeks fescue
Poaceae	*Poa secunda*	one-sided bluegrass
NATIVE HERBS		
Asteraceae	*Achillea millefolium*	common yarrow
Asteraceae	*Achyrachaena mollis*	blow wives
Asteraceae	*Eriophyllum confertiflorum*	golden yarrow
Asteraceae	***Heterotheca grandiflora***	**telegraph weed**
Asteraceae	*Wyethia glabra*	smooth mule ears
Brassicaceae	*Streptanthus glandulosus* ssp. *glandulosus*	bristly jewelflower
Caryophyllaceae	*Silene californica*	California windmill pink
Fabaceae	*Lotus purshianus* var. *purshianus*	Spanish clover
Fabaceae	***Lotus scoparius***	**deerweed**
Fabaceae	*Lupinus bicolor*	miniature lupine
Fabaceae	*Lupinus microcarpus* var. *densiflorus*	chick lupine
Fabaceae	*Lupinus nanus*	sky lupine
Fabaceae	*Lupinus succulentus*	succulent lupine
Fabaceae	*Trifolium willdenovii*	tomcat clover
Hydrophyllaceae	*Nemophila menziesii*	baby blue eyes
Hydrophyllaceae	*Phacelia campanularia*	desert bells
Iridaceae	*Sisyrinchium bellum*	blue-eyed grass
Lamiaceae	*Salvia columbariae*	chia
Liliaceae	*Chlorogalum pomeridianum*	soap plant
Linaceae	*Linum grandiflorum*	flowering flax
Nyctaginaceae	*Mirabilis californica*	California four o'clock
Onagraceae	*Camissonia ovata*	sun cup

FAMILY	SCIENTIFIC NAME	COMMON NAME
Onagraceae	*Clarkia purpurea* ssp. *Quadrivulnera*	winecup clarkia
Onagraceae	*Epilobium canum*	California fuchsia
Onagraceae	*Oenothera elata* var. *hookeri*	evening primrose
Papaveraceae	***Eschscholzia californica***	**California poppy**
Papaveraceae	*Stylomecon heterophylla*	wind poppy
Plantaginaceae	*Plantago erecta*	California plantain
Polemoniaceae	*Navarretia squarrosa*	skunkweed
Polygonaceae	*Eriogonum nudum*	naked buckwheat
Portulacaceae	*Calandrinia ciliata*	red maids
Rosaceae	*Fragaria vesca*	woodland strawberry
Scrophulariaceae	*Antirrhinum kelloggii*	Kellogg's snapdragon
Scrophulariaceae	*Castilleja exserta*	purple owl's clover
Scrophulariaceae	*Scrophularia californica*	bee plant
NATIVE SHRUBS		
Asteraceae	***Artemisia californica***	**California sagebrush**
Asteraceae	*Artemisia douglasiana*	California mugwort
Asteraceae	***Baccharis pilularis***	**coyote brush**
Caprifoliaceae	*Sambucus mexicana*	blue elderberry
Ericaceae	*Arctostaphylos glauca*	big berry manzanita
Ericaceae	*Arctostaphylos viscida*	white-leaf manzanita
Fabaceae	*Lupinus albifrons var. albifrons*	silver bush lupine
Grossulariaceae	*Ribes californicum*	hillside gooseberry
Grossulariaceae	*Ribes malvaceum*	chaparral currant
Lamiaceae	***Salvia leucophylla***	**purple sage**
Lamiaceae	***Salvia mellifera***	**black sage**
Malvaceae	*Malacothamnus fasciculatus*	chaparral bushmallow
Malvaceae	*Malacothamnus fremontii*	Fremont's bushmallow
Polygonaceae	***Eriogonum fasciculatum***	**California buckwheat**
Rhamnaceae	*Ceanothus cuneatus*	buckbrush
Rhamnaceae	*Ceanothus integerrimus*	deer brush
Rhamnaceae	*Ceanothus leucodermis*	chaparral whitethorn
Rhamnaceae	*Rhamnus californicus*	coffeeberry
Rhamnaceae	*Rhamnus crocea*	redberry
Rosaceae	***Adenostoma fasciculatum***	**chamise**
Rosaceae	*Cercocarpus betuloides*	birch-leaf mountain mahogany
Rosaceae	*Heteromeles arbutifolia*	toyon
Rosaceae	*Holodiscus discolor*	ocean spray

FAMILY	SCIENTIFIC NAME	COMMON NAME
Rosaceae	*Prunus ilicifolius*	holly-leaf cherry
Rosaceae	*Rosa californica*	wild rose
Scrophulariaceae	*Mimulus aurantiacus*	bush monkey flower
Sterculiaceae	*Fremontodendron californica*	flannel-bush

APPENDIX B

FIGURES

Path: L:\Acad 2000 Files\30000\30306\GIS\ArcMap\30306Base.aprx

Sources: National Geographic, WRA | Prepared By: JSChuster, 12/8/2020

Figure 1. Study Area Regional Location Map

Stevens Creek Quarry
Biological Constraints
Cupertino, Santa Clara County, California

0 1 2 Miles

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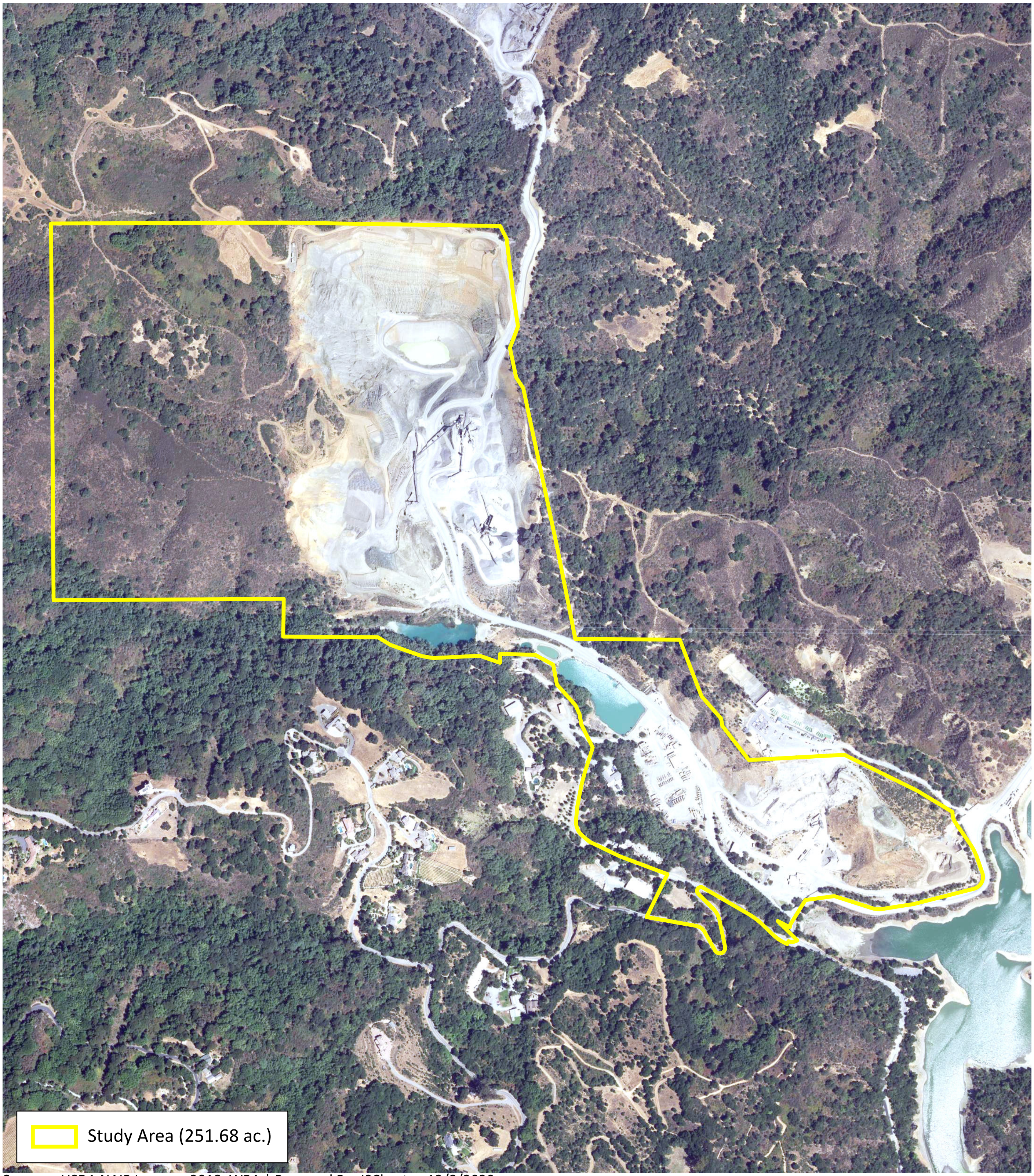
WRA ENVIRONMENTAL CONSULTANTS



Path: L:\Acad 2000 Files\30000\30306\GIS\ArcMap\30306Base.aprx

Sources: USDA NAIP Imagery 2018, WRA | Prepared By: JSChuster, 12/8/2020

Figure 2. Study Area Overview

Stevens Creek Quarry
Biological Constraints
Cupertino, Santa Clara County, California

0 500 1,000 Feet

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wra ENVIRONMENTAL CONSULTANTS

Conditions of Approval to be inserted upon approval.

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

for

Stevens Creek Quarry, Inc.

12100 Stevens Canyon Road
Cupertino, CA 95014
Phone: (408) 253-2512
Fax: (408) 257-4614

Original Date of Plan: September 19, 2014
Date of Last Plan Amendment: *April 29, 2016*
Date of Last Plan Review: September 19, 2014
Designated SCQ person accountable for spill prevention: Jason Voss, Quarry Operations Manager

CERTIFICATION
I hereby certify that I have examined the facility, and being familiar with the provisions of 40 CFR part 112, attest that this SPCC Plan has been prepared in accordance with good engineering practices.

Engineer: Thomas A. Platz, P.E.

Signature: ______________________

Registration Number: C41039

State: California

Date: 04/29/2016

NOTICE
The statements in this document are intended solely as guidance. This document is not intended and cannot be relied upon to create rights, substantive or procedural, enforceable by any party in litigation with the United States.

**SPILL PREVENTION CONTROL AND COUNTERMEASURE
COMPLIANCE INSPECTION PLAN
REVIEW PAGE**

In accordance with 40 CFR 112.5(b), a review and evaluation of this SPCC Plan is conducted at least once every 5 years. As a result of this review and evaluation Stevens Creek Quarry will amend the SPCC Plan within six months of the review to include more effective prevention and control technology if: (1) such technology will significantly reduce the likelihood of a spill event from the facility, and (2) if such technology has been field-proven at the time of review. 40 CFR 112.5(c) states that any technical amendments to the SPCC Plan shall be certified by a Professional Engineer within six months after a change occurs in the facility design, construction, operation, or maintenance which materially affects the facility's potential for the discharge of oil into or upon the navigable waters of the United States or adjoining shorelines. Non-technical amendments (such as changes to names or phone numbers) do not need PE certification.

Review Dates	**Signature**
____________	______________________________________
____________	______________________________________
____________	______________________________________
____________	______________________________________
____________	______________________________________
____________	______________________________________

MANAGEMENT APPROVAL

Stevens Creek Quarry is committed to the prevention of discharges of oil to navigable waters and the environment, and maintains the highest standards for spill prevention control and countermeasures through regular review, updating, and implementation of this Spill Prevention Control and Countermeasure Plan for the Stevens Creek Quarry aboveground storage tanks.

Authorized Facility Representative: Jason Voss
Title: Quarry Operations Manager

______________________________________ ____________________
Signature Date

TABLE OF CONTENTS

APPENDICES

1. FACILITY OWNER and OPERATOR

Stevens Creek Quarry, Inc.
12100 Stevens Canyon Road
Cupertino, CA 95014
Phone: (408) 253-2512
Fax: (408) 257-4614

2. FACILITY CONTACT(s)

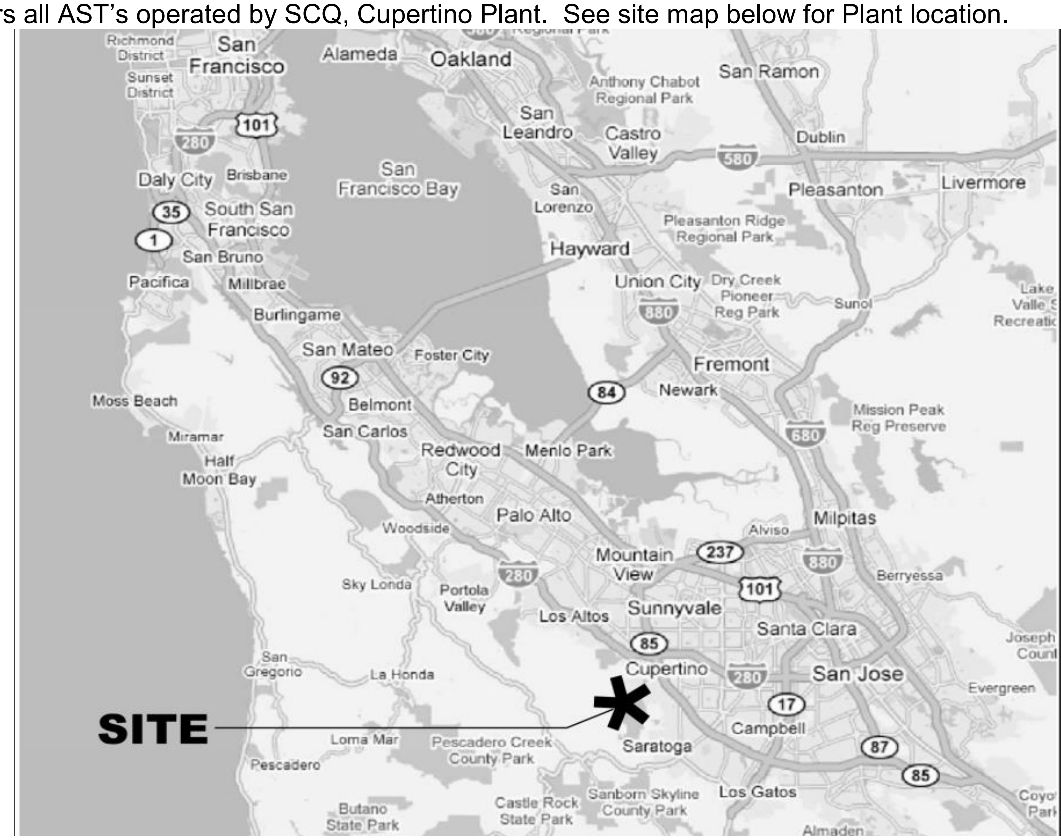
Name: Jason Voss
Title: Quarry Operations Manager
Telephone: (408) 253-2512
Cell Phone: (408) 640-6160

3. FACILITY DESCRIPTION

A. Facility Operations

Stevens Creek Quarry, Inc (SCQ) serves the Mid-Peninsula and South Bay regions of the San Francisco Bay area in producing, transporting, and placing construction aggregates and engineered fill. SCQ also recycles asphalt and concrete, and processes clean fill. Other services available include trucking (RVT), street sweeping, water trucks, private or public construction and bare or operated equipment rentals. The Quarry operation has three levels, the Lower Quarry Floor, the Middle Quarry Floor and the Upper Quarry Floor.

As part of their operations, SCQ maintains and operates numerous aboveground petroleum storage tanks / containers (ASTs). Hazardous materials stored on site that have potential for spill include diesel fuel, oils, gear lube, waste solids, antifreeze, mineral spirits, grease, coolant. This SPCC covers all AST's operated by SCQ, Cupertino Plant. See site map below for Plant location.



As part of their operations of the Cupertino Plant, SCQ maintains and operates several above ground petroleum tank/containers with a cumulative storage capacity of greater than 1,320 gallons. Total above ground storage capacity of all petroleum tanks is 26,695 gallons. Tanks are located at various sites across SCQ Cupertino Plant as indicated in Appendix 4, Figure 2 and as summarized in Section B. Facility Storage table below. Particular details of each tank site are described hereafter:

1. Fuel Station provides diesel for all plant operations. Fuel Station is located in the middle quarry floor and contains 1-10,000 gal red diesel tank and 1-12,000 gal diesel tank. Both tanks are raised 13” above ground and fully contained in concrete box with approximately 21,000 gal capacity each. All dispensing piping is located on the top of the tank. The tank and discharge piping is visually inspected monthly for any leaks. The 10,000 gal tank is filled 2-3 times per week and the 12,000 gal tank is filled once per week. See Figure 3, Appendix 4 for a detailed tank and location plan.

2. Quarry Tractor Shop includes Buildings 2, 4 and 5. The buildings are located within the Middle Quarry Floor. Building 2 contains steel drums and tanks with oils and waste solids (refer to table below for details). Secondary containment is metal box for the tanks or metal box with a grate as a platform for the drums to sit in top. Waste Oil in the tanks is accumulated on-site no more than 30 days before it is picked up by the Oil Recycler. Waste and waste oil in steel drums are picked up every 2-3 months by the Oil Recycler. See Figure 4, Appendix 4 for a detailed tank and location plan.

Amended 04/29/2016: Oil filled transformers are located just east of Building 2. Mobile on-site refueling vehicles are parked just west of Building 4. Refueling vehicles have several compartments with diesel, oils, coolant, etc. as detailed in the table below. The Vehicles are parked on plastic sheeting with large drip pans placed under the vehicles. Refer to Figure 4, Appendix 4 for locations of the transformers and mobile refueling vehicles.

3. Rich Voss Trucking (RVT) is located within the Middle Quarry Floor which includes truck maintenance shop, plant maintenance oil sheds, and new and used oil sheds. See Figure 3, Appendix 4 for RVT location plan.

- Truck maintenance shop contains two motor oil hoses.
- Plant maintenance shed houses 6-55 gal (330 gal) steel drums of oil. Steel drums sit on a metal grate platform over an 8' x 4' x 20” metal box. The capacity of the secondary containment is 400 gal.
- New and used oil sheds house steel drums and tanks with oil, grease, antifreeze, waste oils and solids, and coolant. Refer to table below for more details.
    - Used Oil Shed has 600 gal waste oil tank raised 1” above the floor. The tank is contained in 4' x 9' x 4' deep metal box with 1,087 gal capacity. All dispensing piping is located on the top of the tank. The tank and discharge piping is visually inspected monthly for any leaks.

      The shed houses 3-55 gal steel drums for used oil filters and absorbent pads with 90 gal capacity metal containment.

      There is also a double walled plastic tank with radiator coolant.

    - New Oil Shed New has an oil tank and 4-55 gal steel drums with containment. The tank is 300 gallons, raised 1” above the floor. The tank is placed in metal box approximately 7' x 4.5' x 4' in size, capable of catching 864 gallons of spill. All dispensing piping is located on the top of the tank. The tank and discharge piping is visually inspected monthly for any leaks.

The 4-55 gal steel drums sit on a metal grate platform over a 4' x 8' x 20" metal box. The metal box's capacity is 400 gallons.

4. Other Areas of the plant includes the Recycle Screening Area in the Lower Quarry Floor, and Sand and Rock Plants in the Upper Quarry Floor. The rock crushing and screening operation produces base rock, drain rock, road sub base, and fill material. Equipment used in the harvesting of rock includes front end loaders, bulldozers, and graders. The harvested rock is processed onsite at the rock plant located on the upper quarry floor. The rock is crushed, screened, and sorted by size before conveyance to the appropriate stockpile. See Figures 5 and 6, Appendix 4 for the Recycle Screening Area and the Rock Plant locations.

Facility Storage – Above Ground Storage Tanks

Tank Location	Tank Type	Secondary Containment	Volume (gals)	Contents
1. Fuel Station				
Fuel Station	Tank	Concrete Floor and Walls	10,000	Red Diesel Fuel
Fuel Station	Tank	Concrete Floor and Walls	12,000	Diesel Fuel
2. Quarry Tractor Shop				
Building 2 Area B	3 Steel Drums	Metal Box	55 each	Waste Solids
Building 2 Area B	3 Steel Drums	Metal Box	55 each	Waste Solids
Building 2 Area B	Tank	Metal Box	570	Waste Oil
Building 2 Area B	Plastic Tank	Double Walled	107	Used Antifreeze
Building 4	Tank	Metal Box	220	Gear Lube
Building 4	Tank	Metal Box	500	Drive Train Fluid HD
Building 4	Double Walled Tank	Metal Box	250	Drive Train Fluid HD
Building 4	Plastic Tank	Double Walled	150	New Antifreeze
Building 4	Tank	Metal Box	500	Engine Oil
Building 5	2 Steel Drum	Metal Box	55 each	Mineral Spirits
Building 5	Steel Drum	Inside Building	55	Brake Oil
Building 5	Steel Drum	Inside Building	55	Grease
Building 2 Area A	*Transformers*	*Transformers*		*Oil*
Mobil On-site Refueling Vehicles	*Compartment* *Compartment* *Steel Drum* *Compartment* *Compartment* *Compartment* *Compartment* *Compartment*	*Large Drip Pans*	*2000* *80* *55* *80* *80* *80* *80* *150*	*Diesel* *Engine Coolant* *Grease* *1540 Engine Oil* *10W Oil* *85/140W Oil* *50w Oil* *Waste Oil*
3. RV Trucking				
New Oil Shed	Tank	Metal Box	300	Motor Oil
New Oil Shed	4 Steel Drum	Metal Box	55 each	Oil
New Oil Shed	2 Steel Drum	Metal Box	55 each	Grease
New Oil Shed	2 Steel Drum	Metal Box	150 each	Antifreeze
Used Oil Shed	2 Steel Drum	Metal Box	55 each	Waste Material
Used Oil Shed	Steel Drum	Metal Box	55	Waste Material
Used Oil Shed	Tank	Metal Box	600	Waste Oil
Used Oil Shed	Plastic Tanks	Double Walled	138	New Radiator Coolant
Plant Maintenance Oil Shed	6 Steel Drums	Metal Box	55 each	Oil
4. Other Areas				
Rock Plant	*Transformers*			*Oil*
Recycle Screening Area	Tank	Double Walled	50	Diesel
Scale/Office	Tank	Double Walled	80	Diesel
Sand Plant	*Transformers*			*Oil*

B. Drainage Pathway and Distance to Navigable Waters (from Storm Water Pollution Prevention Plan, prepared by Freeman Associates, dated July 2014)

Drainage patterns and facilities are shown in Figure 2, Appendix 4.

The property is bisected by Rattlesnake Creek, Swiss Creek and a No Named Tributary. Rattlesnake Creek, the No Name Tributary, and a culvert from Montebello Road flow into Swiss Creek which skirts along the southern edge of the Quarry operation. The native water from Rattlesnake Creek flows into Sediment Pond No. 1. Consequently the quarry storm water from the Upper Quarry Floor is combined with the native waters from the entire 890 acre Rattlesnake Creek watershed. The Swiss Creek Watershed is 590 acres and the No Name Tributary Watershed is 165 acres. Swiss Creek flows along the edge of the quarry area and eventually flows into a culvert that passes under Stevens Canyon Road and discharges into Stevens Creek Reservoir. The quarry storm water does not co-mingle with the native waters of Swiss Creek and the No Name Tributary.

Storm Water Drainage Facilities

Runoff from the west side of the Upper Quarry Floor is directed into drainage ditches, swales, drop inlets, culverts and Sediment Pond No. 6 all of which eventually flow into Sediment Pond No. 5. Sediment Pond No. 5 retains the storm water until it fills up and discharges through a riser and culvert into Sediment Pond No. 1 as shown on Figure 3b. Native waters from Rattlesnake Creek, upstream of the property, also flow into this Pond. Discharge from Sediment Pond No. 1 is controlled by two weirs that flow into two 30 inch culverts which drain into Sediment Ponds No. 2, 3 and 4 located at the north end of the Middle Quarry Floor. Runoff from the north east side of the Upper Quarry Floor is directed into the Pit/Pond. Stormwater runoff from the central section on the east side of the main haul road is directed into drainage ditches, swales, drop inlets, and culverts that primarily flow into Sediment Pond No. 5. A small amount of runoff from this area is directed to Sediment Pond No. 2 on the Middle Quarry Floor.

Storm water runoff from the gravel base haul road at the northern end of the Middle Quarry Floor is directed into Sediment Ponds 2, 3 and 4 via sheet flow and drainage ditches. All of these Ponds are controlled by weirs that discharge through culverts to the next Pond and eventually discharge through Outfall # 1 at the outlet and weir of Sediment Pond No. 4. This discharged water flows through a ByPass-Pipe under the Middle Quarry Floor when it daylights it discharges into Swiss Creek. Across from Pond No. 4 is Sediment Trap No. 5, which collects and holds storm water runoff before it flows through a riser into a culvert that discharges into Sediment Pond No. 4.

The central section of the Middle Quarry Floor area at RV Trucking is sloped either toward the paved haul road where surface runoff is collected in concrete lined swales; or toward drainage ditches and a drop inlet which flows into a Metal Stormwater Storage Tank. Once the tank is full the storm water flows through a culvert and concrete swale into Sediment Trap No. 1 (Sediment Trap below the Quarry Truck Shop) on the Lower Quarry Floor.

Stormwater runoff from the Middle Quarry floor is directed to Sediment Trap No. 1, on the Lower Quarry Floor which is lined with rock to slow down the water and capture sediments. Water flowing through the rock lined Sediment Trap No. 1 pass through a series of four cells separated by check dams before discharging into a stand pipe to Outfall # 2 at Swiss Creek. Surface water runoff from the Quarry Truck Shop (maintenance area) at the south end of the Middle Quarry Floor is directed into a concrete lined swale to a drop inlet that flows through a culvert into Sediment Trap No. 1. Sediment Trap # 1 will be improved during the summer of 2014 to add rock check dams and/or underground sediment detention boxes. At the north end of the Middle Quarry Floor, Sediment Trap No. 4 collects runoff from a small drainage area across from Sediment Ponds Nos. 3 and 4 and directs it into Sediment Pond No. 4.

Runoff on the eastern portion of the Lower Quarry Floor is contained on-site by a large 8-foot berm paralleling the property line along Stevens Canyon Road, and small berms across the driveways. Storm water is collected in drainage ditches, concrete lined swales, French drains, swales with check dams, culverts, drop inlets, Underground Stormwater Storage Tank by the Office, and an Open Concrete Drainage Box with check Dams. These drainages eventually flow into Sediment Traps No. 2 and 3. The sediment traps, Underground Stormwater Storage Tank, and an Open Concrete Drainage Box with check Dams, drop inlets, check dams, and sacks of flocculant at strategic locations facilitate settlement of sediments. The stand pipes surrounded by rock material in the sediment traps serve to impede the flow of water and help to collect sediments before the storm water reaches Swiss Creek.

4. SPILL HISTORY [112.7(a)]

There have been no spills from this facility for the tanks listed in this SPCC.

5. POTENTIAL SPILL PREDICTIONS, VOLUMES, RATES, AND CONTROL [112.7(b)]

The monitoring of the space between the tanks (for double-walled) or accumulation in the secondary containment system (for single-walled) will indicate in advance of inner tank leaks. If an inner tank leak is found, the tank must be repaired or replaced with secondary containment system tanks. The tanks are inspected on a monthly basis.

6. PREVENTION MEASURES PROVIDED

A. Containment and / or Diversionary Structures and Equipment [112.7(c)]

All of the tanks indicated in this SPCC Plan are located in an onshore facility more than several miles from the nearest navigable waters. On-site emergency spill equipment and materials include loaders for berming [112.7(c)(1)(i)], pickup, and removal; absorbent pads and booms [112.7(c)(1)(iv)], sorbent materials [112.7(c)(1)(vii)]; and brooms, shovels, and empty drums. Spill equipment is stored at all areas of Plant operations.

B. Inspections, Tests, and Records [112.7(e)]

Formal facility inspections are conducted monthly. Records of these inspections are documented and signed by the inspector or operations manager. During the inspections, all tanks, containment structures, valves, pipelines, and other equipment are inspected. The tanks level is physically checked before and directly after the fill. There is an overfill protection filler valve in the tanks. The checklist used for these inspections can be found in Appendix 1. Inspection, training, and tank integrity testing records are retained for at least three years.

C. Personnel, Training, and Discharge Prevention Procedures [112.7(f)]

Jason Voss is the designated person accountable for spill prevention at SCQ. All new hires are required to have spill prevention training which includes a complete review of SCQ’s SPCC Plan. Annually, all employees receive refresher training for spill response protocol and procedures. Logs of attendees are retained for at least three years.

During monthly safety briefings, spill prevention is discussed. Any near-misses or incidents are discussed in these briefings in order to prevent them from recurring. Employee feedback and recommendations are encouraged in spill prevention and operation. Sign-in sheets, which include the topics of discussion at each meeting, are maintained for documentation.

D. Site Security [112.7(g)]

(1) Fencing: The site is completely fenced in, access-controlled, and has 24-hour security cameras at the front gate.

(2) Flow valves locked: The filler hose is emptied and the drain locations have no valves (they are capped with pipe plugs).

(3) Starter controls locked: not provided

(4) Pipeline loading / unloading connections securely capped: The loading cam lock disconnects are capped when not in use and the filler equipment is located in a locked cabinet.

(5) Lighting adequate to detect spills: Fuel operations are performed during daylight only, with sufficient light to detect any spills.

E. Facility Tank Car / Truck Loading and Unloading Operations [112.7(h)]

(1) Loading / unloading procedures meet DOT regulations: SCQ requires all drivers to comply with DOT regulations in 49 CFR part 177 and facility standard operating procedures.

(2) Warning or barrier system for vehicles: Warning signs are posted in all the loading / unloading areas, including the fuel island, to prevent vehicular departure before disconnecting flexible or fixed transfer lines. A trained SCQ employee is present to observe all loading / unloading and fueling operations.

(3) Vehicles examined for lowermost drainage outlets before leaving: Warning signs are posted in the loading / unloading areas, including the fuel island, to remind drivers to examine drain outlets prior to departure. A trained SCQ employee is present to observe all loading / unloading and fueling operations.

F. Facility Drainage [112.8(b)]

(1) No diked areas are provided. Tanks have secondary containment and are formally monitored monthly, although impromptu visual inspections by passing employees occur on almost a daily basis. Steel drums are contained in metal boxes and undergo same inspection.

(2) No valves are provided.

(3) Due to tank secondary containment systems, plant drainage systems from undiked areas is uncontrolled.

(4) Due to the distance to navigable waters from all tank sites, any discharge will be diverted in the event of a spill. In the event of an uncontrolled spill, loaders will be employed to block runoff of any fuel oil to prevent oil from reaching navigable waters. In the unlikely event of a spill, offsite spill equipment would be employed for cleanup.

(5) No pumps are used for treatment.

G. Bulk Storage Containers [112.8(c)]

(1) Tank compatibility with its contents: The internal tank walls are constructed of welded steel compatible with the material stored (diesel fuel, gasoline and motor oils, etc).

(2) Secondary containment: Calculations are included in Appendix 3.

(3) Drainage: All exterior tanks have secondary containment; therefore, no diked areas are provided.

(4) Buried metallic storage tanks: None of the tanks in this SPCC are buried.

(5) Corrosion protection of partially buried metallic tanks: None of the tanks in this SPCC are buried.

(6) Aboveground tank periodic integrity testing: The tank is observed by facility personnel during operating hours. Formal inspections are conducted monthly to examine the exterior of the tank and the containment areas. These inspections are documented using the report form which can be found in Appendix 1. In accordance with API 653, every ten years (or more often when necessary based on visual inspection or monitoring results), the ASTs are drained, cleaned, inspected, repaired (if necessary), and repainted (if necessary).

(7) Control of leakage through internal heating coils: This tank is not equipped with heating coils.

(8) Tank installation fail-safe engineered: When tanks is filled, the level is physically checked before and directly after the fill. There is an overfill protection filler valve in the tank.

(9) Observation of disposal facilities for effluent discharge: There are no effluent discharges from this facility. Any materials that must be removed from the site are taken to an approved disposal facility.

(10) Visible oil leak corrections from tank seams and gaskets: Visible oil leaks are reported to the maintenance department through a work order system so that they can be fixed immediately. The maintenance department informs the plant operator when the repair has been completed or if additional time is needed to obtain parts and remedy the leak. Measures will be taken to minimize and mitigate the leak while awaiting repair. Any spilled oil is cleaned up immediately by the operations personnel.

(11) Appropriate position of mobile or portable oil storage tanks. In the event of a spill, loaders will be employed to contain the spill by berming or ditching. Loaders are located on-site.

H. Facility Transfer Operations [112.8(d)]

(1) All refueling is exposed.

(2) All terminal connections in the tank loading / unloading area are capped when not in use. Pipelines that are out of service are evacuated and blank-flanged. All aboveground piping is marked with product content, origin, and direction of flow.

(3) All pipe is supported directly by the tank.

(4) All aboveground valves, pipelines, and pipe supports at SCQ are observed at the beginning of each shift and throughout the day by operations personnel. Aboveground pipelines and valves are also examined during the weekly inspection discussed previously and documented (see Appendix 2).

(5) All piping is attached directly to the top of the tank. This tank is located outside traveled ways. Warning signs are prominently displayed in the tank area.

I. Emergency Contacts

Part 110-Discharge of Oil: 110.10 Notice. Any person in charge of a vessel or of an onshore or offshore facility shall, as soon as he or she has knowledge of any discharge of oil from such vessel or facility in violation of §110.6, immediately notify the National Response Center (NRC) (800-424-8802; in the Washington, DC metropolitan area, 426-2675). If direct reporting to the NRC is not practicable, reports may be made to the Coast Guard or EPA predesignated On-Scene Coordinator (OSC) for the geographic area where the discharge occurs. All such reports shall be promptly relayed to the NRC. If it is not possible to notify the NRC or the predesignated OSC immediately, reports may be made immediately to the nearest Coast Guard unit, provided that the person in charge of the vessel or onshore or offshore facility notifies the NRC as soon as possible. The reports shall be made in accordance with such procedures as the Secretary of Transportation may prescribe. The procedures for such notice are set forth in U.S. Coast Guard regulations, 33 CFR part 153, subpart B and in the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR part 300, subpart E. (Approved by the Office of Management and Budget under the control number 2050-0046.)

Hazardous Spill (will contact Fire Department)	911
National Response Center:	800-424-8802
Jason Voss, Quarry Operations Manager:	408-640-6160
Office of Emergency Services – County of Santa Clara	408-299-2501
Department of Environment Health – County of Santa Clara	408-918-3400
State Water Quality Control Board – San Francisco Bay	510-622-2300

Appendix 1. Monthly AST Inspection Report

MONTHLY A.S.T. INSPECTION REPORT

DATE:	Time:	Inspector:
LOCATION:		

	1	2	3	4	5	6	7	8
Location	Fuel Station	Fuel Station	Building 2 Area B	Building 2 Area B	Building 2 Area B	Building 2 Area B	Building 2 Area A	Building 4
Tank Size (Gals)	10000	12,000	3x55	3x55	570	107		220
Tank fluid level								
General appearance								
Any visible leaks? Hose and breakaway								
Nozzle								
Piping								
Corrosion/Paint								
Ladders								
Platforms								
Lighting								
Locks								
Spill equipment								
High level alarm test								
Level gauge working								
Notes:								

MONTHLY A.S.T. INSPECTION REPORT

DATE:	Time:		Inspector:					
LOCATION:								
	9	10	11	12	13	14	15	16
Location	Building 4	Building 4	Building 4	Building 4	Building 4	Building 5	Building 5	Building 5
Tank Size (Gals)	500	290	150	500	88	2x55	55	55
Tank fluid level								
General appearance								
Any visible leaks? Hose and breakaway								
Nozzle								
Piping								
Corrosion/Paint								
Ladders								
Platforms								
Lighting								
Locks								
Spill equipment								
High level alarm test								
Level gauge working								
Notes:								

MONTHLY A.S.T. INSPECTION REPORT

DATE:		Time:		Inspector:				
LOCATION:								
	17	18	19	20	21	22	23	24
Tank Size (Gals)	Mobil Onsite Refueling Vehicles	Truck Maint Shop	New Oil Shed	New Oil Shed	New Oil Shed	New Oil Shed	Used Oil Shed	Used Oil Shed
Tank fluid level	2605	2 Oil Hoses	300	4x55	2x55	2x150	2x55	55
General appearance								
Any visible leaks? Hose and breakaway								
Nozzle								
Piping								
Corrosion/Paint								
Ladders								
Platforms								
Lighting								
Locks								
Spill equipment								
High level alarm test								
Level gauge working								
Notes:								

MONTHLY A.S.T. INSPECTION REPORT								
DATE:		Time:		Inspector:				
LOCATION:								
	25	26	27	28	29	30	31	
Location	Used Oil Shed	Used Oil Shed	Plant Maint Oil Shed	Rock Plant	Recycle Screening Area	Scale / Office	Sand Plant	
Tank Size (Gals)	600	138	6x55		50	80		
Tank fluid level								
General appearance								
Any visible leaks? Hose and breakaway								
Nozzle								
Piping								
Corrosion/Paint								
Ladders								
Platforms								
Lighting								
Locks								
Spill equipment								
High level alarm test								
Level gauge working								
Notes:								

Appendix 2. Certification of the Applicability of the Substantial Harm Criteria Checklist

CERTIFICATION OF THE APPLICABILITY OF THE SUBSTANTIAL HARM CRITERIA CHECKLIST

FACILITY NAME: Stevens Creek Quarry

FACILITY ADDRESS: 12100 Stevens Canyon Road
Cupertino, California 95014

1. Does the facility transfer oil over water to or from vessels and does the facility have a total oil storage capacity greater than or equal to 42,000 gallons?

❒ **Yes** ☒ **No**

2. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and does the facility lack secondary containment that is sufficiently large to contain the capacity of the largest aboveground oil storage tank plus sufficient freeboard to allow for precipitation within any aboveground oil storage tank area?

❒ **Yes** ☒ **No**

3. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the formula in Attachment C-III, Appendix C, 40 CFR 112 or a comparable formula[1]) such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments? For further description of fish and wildlife and sensitive environments, see Appendices I, II, and III to DOC/NOAA's "Guidance for Facility and Vessel Response Environments" (Section 10, Appendix E, 40 CFR 112 for availability) and the applicable Area Contingency Plan.

❒ **Yes** ☒ **No**

4. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the appropriate formula (Attachment C-III, Appendix C, 40 CFR 112 or a comparable formula[1]) such that a discharge from the facility would shut down a public drinking water intake[2]?

❒ **Yes** ☒ **No**

5. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and has the facility experienced a reportable oil spill in an amount greater than or equal to 10,000 gallons within the last 5 years?

❒ **Yes** ☒ **No**

[1] If a comparable formula is used, documentation of the reliability and analytical soundness of the comparable formula must be attached to this form.

[2] For the purposes of 40 CFR part 112, public drinking water intakes are analogous to public water systems as described at 40 CFR 143.2(c).

CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document, and that based on my inquiry of those individuals responsible for obtaining this information, I believe that the submitted information is true, accurate, and complete.

Jason Voss
Name (please type or print)

____
Signature

Quarry Operations Manager
Title

____
Date

Appendix 3. Secondary Containment Calculations

RVT Shop – Truck Maintenance

Suspended Oil hoses bringing Oil from adjacent New Oil Shed.

RVT Shop – New Oil and Used Oil Sheds

Used Oil Shed

Waste oil tank

Metal Box: 4'x 9'-1" x 4' deep = 145.33 Cu. Ft. or 1,087 gallons

Tank: 44" diameter x 95" long = 83.64 cu. Ft. or 628 gallons

Steel drums for used oil filters

Metal Containment w/Grate on top: 29.5" x 30" x 6" deep = 3.1 cu. ft.

54" x 48" x 6" deep = 9.0 cu.ft

12.1 cu. Ft. or 90 gal

Steel drums: 3*55 gallon = 165 gallons

Plastic Tank for used radiator coolant (Double Walled)

Tank: 36" Dia x 36" tall = 1.5' x 3.14 x 3' = 14.13 cu. Ft. or 106 gal

New Oil Shed

New oil tank

Metal Box: 80" x 4'-4" x 4' deep = 6.67'x 4.33'x 4'= 115.5 cu. Ft. or 864 gallons

Tank: 4' diameter x 6' long = 75.36 or 563.7 gallons

Steel drums

Metal Box w/Grate on Top: 4' x 8' x 20" deep = 53.44 cu. Ft. or 400 gallons

Steel Drums: 4- 55 gallon = 220 gallons

Metal Box w/Grate on Top: 4' x' 8' x 20" deep = 53.44 cu. Ft. or 400 gallons

Steel Drums: 1-55 gallon drum = 55 gallons

RVT Shop – Plant Maintenance Shed

Oil Shed for Plants:

Metal Box w/Grate on Top: 8' x 4' x 20" deep = 53.33 sq. ft. or 399 gallons

Steel Drums: 6- 55 gallon drums = 330 gallons

Fueling Station

Concrete secondary Containment of 10,000 gallon tank:

41'-5' x 22' – 8" x 3' deep = 41.42' x 22.67' x3'= 2,816.97 cu. Ft. or 21,072 gallons

Tanks: 7'-10" diameter x 27'-3" long = 1,308.13 or 10,000 gallons

Concrete secondary containment box with 12,000 tank:

41'-5' x 22' – 8" x 3' deep = 41.42' x 22.67' x3'= 2,816.97 cu. Ft. or 21,072 gallons

Tank: 7'-10" diameter x 32'-2" long = 1,544.17 cu. Ft. or 12,000 gallons

Quarry Tractor Shop – Building 2 Area B

Metal Box w/Grate: 4' x 8'x 0.5' = 16 cu ft. or 200 gallons

Steel Drums: 6- 55 gallon drums = 330 gallons

Metal Box: 40” x 11’-4” x 27.5” deep = 86.34 cu. ft. or 646 gallons
Tank is 37” diameter x 10.25’ long = 76.4 cu. Ft. or 570 gallons

Quarry Tractor Shop- Buildings #4 and #5

Building #4 – Geer Lube Tank
Metal Box: 54” x 34” x 36” tall = 4.5’ x 2.83’ x 3’ tall = 38.21 cu. Ft. or 286 gallons
Tank: 29.5” x 51.5” x 37” tall = 2.45’ x 4.29 x 3.08 = 32.37 cu. Ft. or 220 gallons

Building #4 – Drive Train Fluid HD
Metal Box: 55” x 30” x 37” tall = 4.58’ x 2.5’ x 3.08’ = 35.27 cu. Ft. or 264 gallons
Tank is double walled - 250 gal

Building #4 – Drive Train Fluid HD – 500 gallon tank
Metal Box: 52” x 80” x 43” tall = 4.33’ x 6.67’ x 3.58’ = 103.39 cu ft. or 773 gallons
Tanks: 48” diameter x 73” long = 76.36 cu. Ft. or 500 gallons

Building #4 – Metal box in back right corner
Metal Box: 52” x 80” x 39.5” = 4.33’ x 6.67’ x 3.29’ = 95.02 cu ft. or 711 gallons
Tanks is 48” diameter x 73” long = 76.36 cu. Ft. or 500 gallons

Building #4 – Metal trough for oil hoses
Metal trough: 16” x 80” x 16” = 1.33’ x 6.66’ x 1.33’ = 11.8 cu ft. or 88 gallons

Building #5 – Metal box w/ 2-55 gal drums
Metal Box: 4’ x 8’ x 0.5’ = 16 cu ft. or 120 gallons
Steel Drums: 2- 55 gallon drums = 110 gallons

Appendix 4. Figures

DATE PREPARED: 09/02/2014

STEVENS CREEK QUARRY

SPCC

FIGURE 1 – OVERALL MAP

triad/holmes assoc
civil engineering
land surveying

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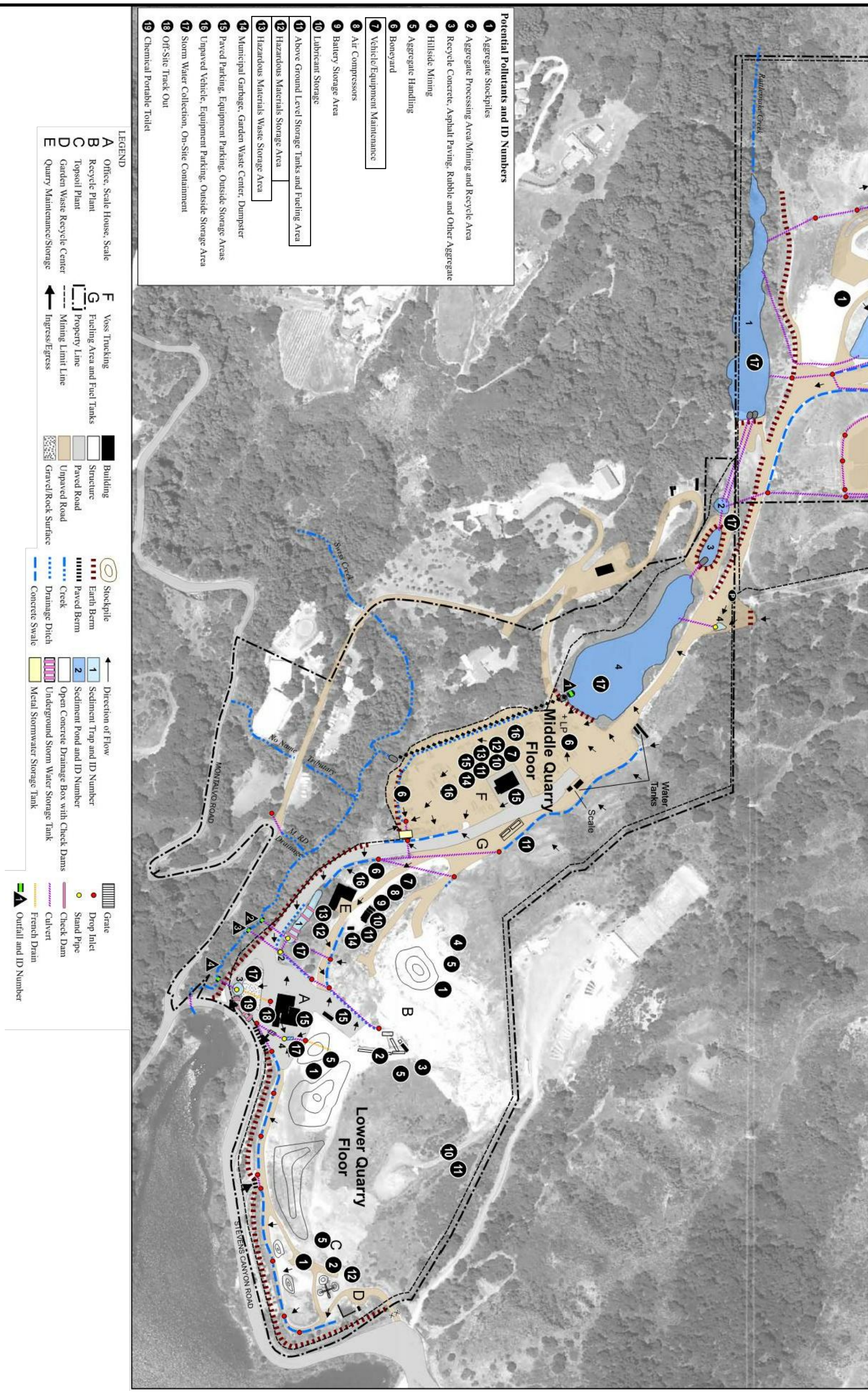

N.T.S.

DATE PREPARED: 09/02/2014

STEVENS CREEK QUARRY

SPCC

FIGURE 2.A – SITE AND DRAINAGE PLAN
LOWER AND MIDDLE QUARRY FLOOR

triad/holmes assoc
civil engineering
land surveying

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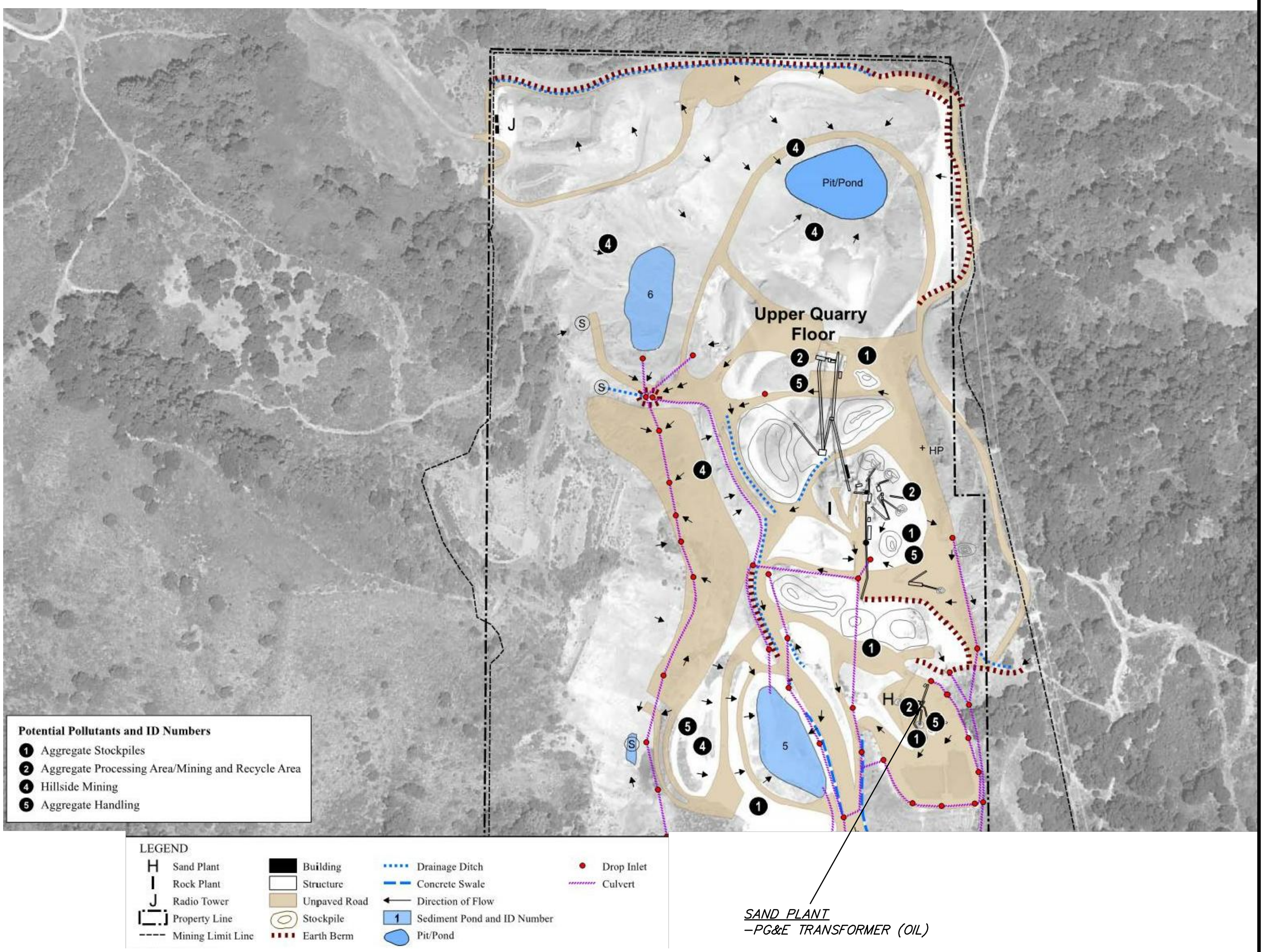

N.T.S.

DATE PREPARED: 09/02/2014
AMENDED: 04/29/2016

STEVENS CREEK QUARRY

SPCC

FIGURE 2.B – SITE AND DRAINAGE PLAN

UPPER QUARRY FLOOR

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land surveying

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STEVENS CREEK QUARRY

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FIGURE 3 – FUELING STATION AND RICH VOSS TRUCKING

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STEVENS CREEK QUARRY

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FIGURE 4 – QUARRY TRACTOR SHOP

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STEVENS CREEK QUARRY

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FIGURE 5 – ROCK PLANT

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STEVENS CREEK QUARRY

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FIGURE 6 – GARDEN CENTER

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