INFORMATION HANDOUT

For Contract No. 04-4G5914
At 04-SM-280-9.4

Identified by
Project ID 0414000366

PERMITS

U.S. Fish and Wildlife Service

United States Army Corps of Engineers

WATER QUALITY

California Regional Water Quality Control Board

San Francisco Bay Section
Board Order No. 2003-0017-DWQ

Water Quality Information Handout, dated January 29, 2015

ENCROACHMENT PERMITS

City and County of San Francisco Public Utilities Commission – Watershed Access Permit

MATERIALS INFORMATION

Water Source Availability

Preliminary Site Investigation Report, dated September 30, 2013

Tunnel Safety Orders-Underground Classification, dated January 2, 2015

PG&E Natural Gas Pipeline - Maximum Loading, added per Addendum #1, dated May 27, 2015

Replaced per Addendum #1, dated May 27, 2015

Fish and Wildlife Service – Biological Opinion, dated December 23, 2014

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

In Reply Refer to:
08ESMF00-2014-F-0342-1

DEC 2 3 2014

Ms. Melanie Brent, Office Chief
Caltrans District 4 Environmental Analysis
California Department of Transportation
P.O. Box 23660
Oakland, California 94623-0660

Subject: Biological Opinion on the Effects of the Proposed Interstate 280 Repair Pipe System and Backfill Sinkhole Project, San Mateo County, California (Caltrans EA 4G590)

Dear Ms. Brent:

This Biological Opinion (BO) is in response to the California Department of Transportation's (Caltrans) letter, dated September 26, 2013, requesting formal consultation for the proposed Interstate 280 (I-280) Repair Pipe System and Backfill Sinkhole Project (Caltrans EA 4G590), San Mateo County, California. Your letter was received by the U.S. Fish and Wildlife Service (Service) on October 1, 2013. At issue are the effects of the project on the threatened California red-legged frog (*Rana draytonii*), its designated critical habitat, and the endangered San Francisco garter snake (*Thamnophis sirtalis tetrataenia*). This document is issued under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act).

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) legislation (23 U.S.C. 327) allows the Secretary of the U.S. Department of Transportation acting through the Federal Highway Administration (FHWA) to establish a Surface Transportation Project Delivery Pilot Program, whereby a State may assume the FHWA responsibilities under the National Environmental Policy Act (NEPA) for environmental review, agency consultation and other action pertaining to the review or approval of a specific project. Caltrans assumed these responsibilities for the FHWA on July 1, 2007 through a Memorandum of Understanding (MOU) within the State of California (http://www.dot.ca.gov/ser/downloads/MOUs/nepa_delegation/sec6005mou.pdf).

The Service has reviewed the project as described in the August 2013 biological assessment, the October 6 and October 8, 2014, revised project description, May 23, 2013, site visit, supporting documentation, and evaluation of project effects, and concurs with the determination that the project as described is likely to adversely affect the California red-legged frog, San Francisco garter snake, and designated critical habitat for the California red-legged frog. This biological opinion is based on: (1) the Interstate 280 Repair Pipe System and Backfill Sinkhole Project, Biological Assessment dated August 2013, as revised; (2) letter from Caltrans to the Service dated October 6, 2014; (3) the May 23, 2013, site visit; (4) miscellaneous correspondence and electronic mail concerning the proposed action between Caltrans and the Service; and (5) other information available to the Service.

Consultation History

May 23, 2013	The Service attended a site visit with Caltrans to discuss potential project effects on listed species and determine what areas posed risks based on on-site habitat suitability.
October 1, 2013	The Service received a letter requesting the initiation of formal consultation dated September 26, 2013, and a Biological Assessment for the I-280 Repair Pipe System and Backfill Sinkhole Project.
April 1, 2014	The Service attended a conference call with Caltrans to discuss the proposed action and notified Caltrans that the project was within designated critical habitat for the California red-legged frog. An analysis of critical habitat was not provided within their biological assessment and their formal consultation package was considered incomplete.
April 17, 2014	The Service notified Caltrans via email that their August 2013 biological assessment made the determination of a Not Likely to Adversely Affect (NLAA) for the California red-legged frog and San Francisco garter snake. The Service informed Caltrans that we did not agree with this determination as the effects were likely to adversely affect both species and designated critical habitat for the California red-legged frog. In order for the Service to complete the formal consultation process and issue a biological opinion and incidental take coverage; we will need a letter from Caltrans stating that the determinations for the effects to the California red-legged frog and San Francisco garter snake are Likely to Adversely Affect. We requested this clarification during April 1, 2014, phone conversation. The Service requested Caltrans submit a corrected formal consultation initiation letter with the appropriate determinations made for these species.
April 21, 2014	The Service received a revised letter dated April 4, 2014, requesting formal consultation and a revised biological opinion with the determinations of likely to adversely affect the California red-legged frog and San Francisco garter snake.
June 12, 2014	The Service notified Caltrans that the project lies within California red-legged frog designated critical habitat, unit SNM-1. The Service requested Caltrans provide an evaluation of adverse effects to designated critical habitat as well as an assessment of the Primary Constituent Elements (PCE's) within the action area. The Service requested Caltrans provide area calculations of the PCEs within the action area as well as area calculations for effects to designated critical habitat.
June 27, 2014	The Service received an evaluation of the project effects to California red-legged frog designated critical habitat from Caltrans.
October 6, 2014	The Service received a revised project description since a portion of the project was completed as an emergency maintenance repair action in early 2014.

October 8, 2014	The Service received another change to the project description with a revision to the area of direct effects.
October 17, 2014	The Service received revised exhibits depicting the emergency work and proposed Phase II work to be covered under this biological opinion.
November 6, 2014	The Service received revised exhibits and area calculations for the emergency phase and proposed Phase II action.
November 14, 2014	The Service reviewed the project description, biological assessment, species determinations, and supplemental material submitted as part of the consultation package and determined your consultation package was complete.
December 11, 2014	The Service requested additional information from Caltrans on the Bay checkerspot butterfly (*Euphydryas editha bayensis*) and mission blue butterfly (*Icaricia icarioides missionensis*).
December 17, 2014	The Service received requested information from Caltrans on the Bay checkerspot butterfly and the mission blue butterfly sufficient to complete the analysis.
April 16, 2013 - December 11, 2014	Electronic and phone correspondence between Caltrans and the Service.

BIOLOGICAL OPINION

Description of the Proposed Action

The following project description, inclusive of the proposed compensation and proposed conservation measures, was provided by Caltrans and is an excerpt from the August 2013 Biological Assessment, as revised, with minor modifications for reasons of clarity and accuracy provided by the Service.

Project Description

As part of the proposed action, Caltrans proposes to replace a pipe system west of I-280 at post mile 9.4 in unincorporated San Mateo County, California. The project is situated along a Caltrans maintenance road, approximately 320 feet south of I-280 and 800 feet north of Canada Road. The existing drainage system consists of a 60-inch corrugated steel pipe (CSP), two lateral 24-inch CSPs, three drainage inlets, a headwall, and a riser. The 60-inch CSP is located at the bottom of an embankment approximately 320 feet from southbound I-280. Two lateral lines carry storm water from I-280 to the 60-inch CSP. The eastern lateral line discharges directly into the 60-inch CSP whereas the western lateral line discharges into an existing drainage inlet, then continues and discharges into the 60-inch CSP. The 60-inch CSP flows west and discharges storm water into an unnamed creek. The 60-inch CSP is situated between a headwall to the west and a riser to the east.

The 60-inch corrugated metal pipe is corroding along a portion of its length and threatens to undermine an existing maintenance access road and the supporting fill slope of I-280. The purpose of the proposed action is to correct the undermining by replacing the corroding drainage system.

The original 60-inch metal pipe will be abandoned in place and 850 feet of new 60-inch reinforced concrete pipe (RCP) will be constructed adjacent to the original pipe location. The new pipe system will use the existing outfall, tying the new pipe to the back of the existing headwall by a bonded mechanical connection, thus limiting construction to upland of the riparian area. Caltrans will also be replacing the exiting gravel maintenance road. A portion of the original 60-inch CSP will be removed: 20 feet including the 10 feet adjacent to the riser and the 10 feet adjacent to the headwall. Also, Caltrans will remove 29 feet and abandon in place 53 feet of the 24-inch CSP. The area of Waters of the U.S. affected includes 0.095-acre for the 60-inch CSP and 0.004-acre for the new pipe will be minimized using trench shields or equivalent, and the work area will be delimited with ESA fencing.

Caltrans will maintain the hydrologic connection between the laterals and the downstream unnamed creek by installing a 60-inch RCP of 850 linear feet beneath the existing maintenance road. Caltrans will tie-in the new 60-inch RCP with an existing 60-inch RCP and tie-in the laterals to the new 60-inch RCP. Six willow trees will be removed from the area near the exiting headwall in order to tie-in the new pipe.

Emergency Work Completed to Date

The existing pipe corroded in one section, opening a hole in the pipe, and causing a sinkhole to form. The corroded pipe was spot-repaired and the sinkhole was backfilled in an emergency maintenance activity in October and November of 2013.

Proposed Conservation Measures

Proposed Compensation

To offset permanent effects to California red-legged frog and San Francisco garter snake, suitable habitat for each species, or suitable multi-species habitat in coordination with the Service, will be created, restored, or set aside in perpetuity at a ratio of 3:1 for permanent effects and 1.1:1 for temporary effects (Table 1). Alternatively, credits will be purchased at a Service-approved conservation bank. Compensation plans will be subject to review and approval by the Service. On-site restoration of temporarily affected areas may qualify as compensation at a 1:1 ratio once conditions are verified by the Service.

Table 1: Proposed Compensation for Temporary and Permanent Effects

Species	Effects						Total Compensation
	Temporary (acres)			Permanent (acres)			
	Impact	Compensation		Impact	Compensation		
		Ratio	Need		Ratio	Need	
California red-legged frog	2.18	1.1:1	2.40	0.02	3:1	0.06	2.46
San Francisco garter snake	2.18	1.1:1	2.40	0.02	3:1	0.06	2.46

General Conservation Measures

To reduce potential effects to sensitive biological resources, Caltrans proposes to incorporate construction BMPs and avoidance and minimization measures into the proposed roadway construction project. These measures will be communicated to the contractor through the use of

special provisions included in the contract bid solicitation package. These measures include the following:

1. **Seasonal Avoidance**. Construction actions will be scheduled to minimize effects on listed species and habitats. Except for limited vegetation clearing necessary to minimize effects to nesting birds, all ground-disturbing activities in species habitat will be conducted between April 15 and October 15.

2. **Environmental Awareness Training**. Prior to the start of construction, a qualified biologist will conduct an educational training program for all construction personnel including contractors and subcontractors. The training will include, at a minimum, a description of the California red-legged frog, San Francisco garter snake, and their habitat within the action area; an explanation of the status of these species and protection under state and federal laws; the avoidance and minimization measures to be implemented to reduce take of these species; communication and work stoppage procedures in case a listed species is observed within the action area; and an explanation of the Environmentally Sensitive Areas (ESAs) and Wildlife Exclusion Fencing (WEF) and the importance of maintaining these structures. An informational brochure conveying this information with images of these species to aid in identification will be prepared and distributed to all construction personnel. Upon completion of the program, personnel will sign a form stating that they attended the program and understand all the avoidance and minimization measures and implications of the Act.

3. **Environmentally Sensitive Areas**. Prior to the start of construction all ESAs – defined as areas containing sensitive habitats adjacent to or within construction work areas for which physical disturbance is not allowed – will be clearly delineated using high visibility orange fencing. Construction work areas include the active construction site and all areas providing support for the proposed action including areas used for vehicle parking, equipment and material storage and staging, access roads, etc. The ESA fencing will remain in place throughout the duration of the proposed action, while construction activities are ongoing, and will be regularly inspected and fully maintained at all times. The final project plans will depict all locations where ESA fencing will be installed and will provide installation specifications. The bid solicitation package special provisions will clearly describe acceptable fencing material and prohibited construction-related activities including vehicle operation, material and equipment storage, access roads and other surface-disturbing activities within ESAs.

4. **Wildlife Exclusion Fencing**. Prior to the start of construction, WEF will be installed at the edge of the project footprint in all areas where California red-legged frogs or San Francisco garter snakes could enter the construction area. The location of the fencing shall be determined by the Resident Engineer and Service-approved biologist in cooperation with the Service prior to the start of staging or surface disturbing activities. A conceptual fencing plan shall be submitted to the Service for review and approval prior to WEF installation. The location, fencing materials, installation specifications, and monitoring and repair criteria shall be approved by the Service prior to start of construction. Caltrans shall include the WEF specifications on the final project plans. Caltrans shall include the WEF specifications including installation and maintenance criteria in the bid solicitation package special provisions. The WEF shall remain in place throughout the duration of the project and shall be regularly inspected and fully maintained. Repairs to the WEF shall be made within 24

hours of discovery. Upon project completion the WEF shall be completely removed, the area cleaned of debris and trash, and returned to natural conditions.

5. **Avoidance of Entrapment**. To prevent inadvertent entrapment of animals during construction, all excavated, steep-walled holes or trenches more than one foot deep will be covered with plywood or similar materials at the close of each working day or provided with one or more escape ramps constructed of earth fill or wooden planks. The Service-approved biologist shall inspect all holes and trenches at the beginning of each workday and before such holes or trenches are filled. All replacement pipes, culverts, or similar structures stored in the action area overnight will be inspected before they are subsequently moved, capped, and/or buried. If at any time a listed species is discovered, the Resident Engineer and Service-approved biologist will be notified immediately and the Service-approved biologist shall implement the species observation and handling protocol outlined below.

6. **Best Management Practices**. Storm Water Pollution Prevention Plans (SWPPP) and erosion control BMPs will be developed and implemented to minimize any wind or water-related erosion and will be in compliance with the requirements of the Regional Water Quality Control Board. The SWPPP will reference the Caltrans Construction Site BMPs Manual. This manual is comprehensive and includes many other protective measures and guidance to prevent and minimize pollutant discharges and can be found online at: http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm. Protective measures will include, at a minimum:

    a. No discharge of pollutants from vehicle and equipment cleaning is allowed into any storm drains or watercourses.

    b. Vehicle and equipment fueling and maintenance operations must be at least 50 feet away from watercourses, except at established commercial gas stations or established vehicle maintenance facility.

    c. Concrete wastes are collected in washouts and water from curing operations is collected and disposed. Neither will be allowed into watercourses.

    d. Spill containment kits will be maintained onsite at all times during construction operations and/or staging or fueling of equipment.

    e. Dust control measures will include use of water trucks and dust palliatives to control dust in excavation-and-fill areas, covering temporary access road entrances and exits with rock (rocking), and covering of temporary stockpiles when weather conditions require.

    f. Coir rolls or straw wattles that do not contain plastic or synthetic monofilament netting will be installed along or at the base of slopes during construction to capture sediment.

    g. Protection of graded areas from erosion using a combination of silt fences, fiber rolls, etc. along toes of slopes or along edges of designated staging areas, and erosion control netting (such as jute or coir) as appropriate on sloped areas. Erosion control materials that use plastic or synthetic monofilament netting will not be used within the action area. This includes products that use photodegradable or biodegradable synthetic netting, which can take several months to decompose. Acceptable materials include natural fibers such as jute, coconut, twine or other similar fibers.

h. Permanent erosion control measures such as bio-filtration strips and swales to receive storm water discharges from the highway, or other impervious surfaces will be incorporated to the maximum extent practicable.

i. All grindings and asphaltic-concrete waste will be stored within previously disturbed areas absent of habitat and at a minimum of 50 feet from any aquatic habitat, culvert, or drainage feature.

7. **Construction Site Management Practices**. The following site restrictions will be implemented to avoid or minimize effects on listed species and their habitats:

a. A speed limit of 15 miles per hour (mph) in the project footprint in unpaved areas will be enforced to reduce dust and excessive soil disturbance.

b. Construction access, staging, storage, and parking areas, will be located within the project Caltrans ROW outside of any designated ESA or outside of the Caltrans ROW in areas environmentally cleared by the contractor. Access routes and the number and size of staging and work areas will be limited to the minimum necessary to construct the proposed project. Routes and boundaries of roadwork will be clearly marked prior to initiating construction or grading.

c. To the maximum extent practicable, any borrow material will be certified to be non-toxic and weed free.

d. All food and food-related trash items will be enclosed in sealed trash containers and properly disposed of off-site.

e. No pets from project personnel will be allowed anywhere in the action area during construction.

f. No firearms will be allowed on the project site except for those carried by authorized security personnel, or local, State or Federal law enforcement officials.

g. A Spill Response Plan will be prepared. Hazardous materials such as fuels, oils, solvents, etc. will be stored in sealable containers in a designated location that is at least 50 feet from hydrologic features.

h. All equipment will be properly maintained and free of leaks. Servicing of vehicles and construction equipment including fueling, cleaning, and maintenance will occur at least 50 feet from any hydrologic features.

8. **Vegetation Removal**. Any vegetation that is within the cut and fill line or growing in locations where permanent structures will be placed (e.g., road alignment, shoulder widening, soil nail walls, etc.) will be cleared. Vegetation will be cleared only where necessary and will be cut above soil level except in areas that will be excavated for roadway construction. This will allow plants that reproduce vegetatively to resprout after construction. All clearing and grubbing of woody vegetation will occur by hand or using light construction equipment such as backhoes. If clearing and grubbing occurs between February 1 and August 31, a qualified biologist(s) will survey for nesting birds within the area(s) to be disturbed including a perimeter buffer of 100 feet for passerines and 300 feet for raptors before clearing activities begin. All nest avoidance requirements of the Migratory Bird Treaty Act and California Fish and Game Code Sections 3503 and 3503.5 will be observed. All cleared

vegetation will be removed from the project footprint to prevent attracting animals to the project site. The contractor will be responsible for obtaining all permits, licenses, and environmental clearances for properly disposing of such materials. A Service-approved biologist will be present during all vegetation clearing and grubbing activities. Prior to vegetation removal, the Service-approved biologist shall thoroughly survey the area for California red-legged frogs and San Francisco garter snakes. Once the Service-approved biologist has thoroughly surveyed the area, clearing and grubbing may continue without further restrictions on equipment; however, the Service-approved biologist shall remain onsite to monitor for California red-legged frogs and San Francisco garter snakes until all clearing and grubbing activities are complete. After project completion, all temporarily affected areas shall be returned to original grade and contours to the maximum extent practicable, protected with proper erosion control materials, and revegetated with native species appropriate for the region and habitat communities on site.

9. **Reduce Spread of Invasive Species**. To reduce the spread of invasive non-native plant species and minimize the potential decrease of palatable vegetation for wildlife species, Caltrans will comply with Executive Order 13112. This order is provided to prevent the introduction of invasive species and provide for their control in order to minimize the economic, ecological, and human health impacts. In the event that high- or medium-priority noxious weeds, as defined by the California Department of Food and Agriculture or the California Invasive Plant Council, are disturbed or removed during construction-related activities, the contractor will contain the plant material associated with these noxious weeds and dispose of it in a manner that will not promote the spread of the species. The contractor will be responsible for obtaining all permits, licenses, and environmental clearances for properly disposing of materials. Areas subject to noxious weed removal or disturbance will be replanted with fast-growing native grasses or a native erosion control seed mixture. If seeding is not possible, the area should be covered to the extent practicable with heavy black plastic solarization material until the end of the project.

10. **Replant, Reseed, and Restore Disturbed Areas**. All slopes or unpaved areas affected by the proposed action will be restored to natural conditions. Slopes and bare ground will be reseeded with native grasses and shrubs characteristic of the floristic region and native local habitats to stabilize soils and prevent erosion. Where disturbance includes the removal of trees or plants, native species will be replanted and maintained until they become established. A revegetation plan with success criteria will be submitted to the Service for review and approval. Temporary effects comprise areas denuded, manipulated, or otherwise modified from their existing, pre-project conditions, thereby removing one or more essential components of a listed species' habitat as a result of project activities that include, but are not limited to, construction, staging, storage, lay down, vehicle access, parking, etc. Temporary effects must be restored to baseline habitat values or better within one year following initial disturbance. Areas subject to ongoing operations and maintenance are not considered temporary even if they are restored within one year following initial disturbance. Affected areas not fulfilling these criteria are considered permanent.

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the purposes of the effects assessment, the action area encompasses 14-acre project footprint and surrounding lands

extending 100 feet beyond the project footprint in unincorporated San Mateo County. The action area encompasses the project footprint, equipment staging areas, access routes, Caltrans Right-of-Way limits, and adjacent lands that will be subjected to noise, light, and vibration disturbance. Habitat within the action area comprises existing dirt and gravel access roads, coast live oak woodland, willow riparian, ruderal grassland, mixed grassland and Baccharis scrub, mixed scrub, seasonal wetland, and open water vegetation communities.

Analytical Framework for the Jeopardy Determinations

Jeopardy Determination

In accordance with policy and regulation, the jeopardy analyses in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the California red-legged frog and San Francisco garter snake range-wide condition, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the California red-legged frog and San Francisco garter snake in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the California red-legged frog and San Francisco garter snake; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the California red-legged frog and San Francisco garter snake; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the California red-legged frog and San Francisco garter snake.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the California red-legged frog and San Francisco garter snake current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of these species in the wild.

The jeopardy analyses in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the California red-legged frog and San Francisco garter snake and the role of the action area in the survival and recovery of the California red-legged frog and San Francisco garter snake as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Adverse Modification Determination

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this biological opinion relies on four components: (1) the *Status of Critical Habitat*, which evaluates the range-wide condition of critical habitat for the SPECIES in terms of primary constituent elements (PCE)s, the factors responsible for that condition, and the intended recovery function of the critical habitat at the provincial and range-wide scale; (2) the *Environmental Baseline*, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent

activities on the PCEs and how that will influence the recovery role of affected critical habitat units and; (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the recovery role of affected critical habitat units.

For purposes of the adverse modification determination, the effects of the proposed Federal action on the California red-legged frog critical habitat are evaluated in the context of the range-wide condition of the critical habitat at the provincial and range-wide scales, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the California red-legged frog.

The analysis in this biological opinion places an emphasis on using the intended range-wide recovery function of California red-legged frog critical habitat and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

Status of the Species and Environmental Baseline

California Red-legged Frog

Listing Status: The California red-legged frog was listed as a threatened species on May 23, 1996 (61 FR 25813) (Service 1996). Critical habitat was designated for this species on April 13, 2006 (71 FR 19244) (Service 2006a) and revisions to the critical habitat designation were published on March 17, 2010 (75 FR 12816) (Service 2010). At this time, the Service recognized the taxonomic change from *Rana aurora draytonii* to *Rana draytonii* (Shaffer *et al.* 2010). A recovery plan was published for the California red-legged frog on September 12, 2002 (Service 2002).

Description: The California red-legged frog is the largest native frog in the western United States (Wright and Wright 1949), ranging from 1.5 to 5.1 inches in length (Stebbins 2003). The abdomen and hind legs of adults are largely red, while the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish background color. Dorsal spots usually have light centers (Stebbins 2003), and dorsolateral folds are prominent on the back. Larvae (tadpoles) range from 0.6 to 3.1 inches in length, and the background color of the body is dark brown and yellow with darker spots (Storer 1925).

Distribution: The historic range of the California red-legged frog extended from the vicinity of Elk Creek in Mendocino County, California, along the coast inland to the vicinity of Redding in Shasta County, California, and southward to northwestern Baja California, Mexico (Fellers 2005; Jennings and Hayes 1985; Hayes and Krempels 1986). The species was historically documented in 46 counties but the taxa now remains in 238 streams or drainages within 23 counties, representing a loss of 70 percent of its former range (Service 2002). California red-legged frogs are still locally abundant within portions of the San Francisco Bay area and the central California coast. Isolated populations have been documented in the Sierra Nevada, northern coast, and northern Transverse Ranges. The species is believed to be extirpated from the southern Transverse and Peninsular Ranges, but is still present in Baja California, Mexico (CDFW 2014).

Status and Natural History: California red-legged frogs predominately inhabit permanent water sources such as streams, lakes, marshes, natural and manmade ponds, and ephemeral drainages in valley bottoms and foothills up to 4,921 feet in elevation (Jennings and Hayes 1994, Bulger *et al.*

2003, Stebbins 2003). However, they also inhabit ephemeral creeks, drainages, and ponds with minimal riparian and emergent vegetation. California red-legged frogs breed from November to April, although earlier breeding records have been reported in southern localities. Breeding generally occurs in still or slow-moving water often associated with emergent vegetation, such as cattails, tules, or overhanging willows (Storer 1925, Hayes and Jennings 1988). Female frogs deposit egg masses on emergent vegetation so that the egg mass floats on or near the surface of the water (Hayes and Miyamoto 1984).

Habitat includes nearly any area within 1-2 miles of a breeding site that stays moist and cool through the summer including vegetated areas with coyote brush, California blackberry thickets, and root masses associated with willow and California bay trees (Fellers 2005). Sheltering habitat for California red-legged frogs potentially includes all aquatic, riparian, and upland areas within the range of the species and includes any landscape feature that provides cover, such as animal burrows, boulders or rocks, organic debris such as downed trees or logs, and industrial debris. Agricultural features such as drains, watering troughs, spring boxes, abandoned sheds, or haystacks may also be used. Incised stream channels with portions narrower and depths greater than 18 inches also may provide important summer sheltering habitat. Accessibility to sheltering habitat is essential for the survival of California red-legged frogs within a watershed, and can be a factor limiting frog population numbers and survival.

California red-legged frogs do not have a distinct breeding migration (Fellers 2005). Adults are often associated with permanent bodies of water. Some individuals remain at breeding sites year-round, while others disperse to neighboring water features. Dispersal distances are typically less than 0.5 mile, with a few individuals moving up to 1-2 miles (Fellers 2005). Movements are typically along riparian corridors, but some individuals, especially on rainy nights, move directly from one site to another through normally inhospitable habitats, such as heavily grazed pastures or oak-grassland savannas (Fellers 2005).

In a study of California red-legged frog terrestrial activity in a mesic area of the Santa Cruz Mountains, Bulger *et al.* (2003) categorized terrestrial use as migratory and non-migratory. The latter occurred from one to several days and was associated with precipitation events. Migratory movements were characterized as the movement between aquatic sites and were most often associated with breeding activities. Bulger *et al.* (2003) reported that non-migrating frogs typically stayed within 200 feet of aquatic habitat 90 percent of the time and were most often associated with dense vegetative cover, *i.e.*, California blackberry, poison oak, and coyote brush. Dispersing frogs in northern Santa Cruz County traveled distances from 0.25 mile to more than 2 miles without apparent regard to topography, vegetation type, or riparian corridors (Bulger *et al.* 2003).

In a study of California red-legged frog terrestrial activity in a xeric environment in eastern Contra Costa County, Tatarian (2008) noted that 57 percent of frogs fitted with radio transmitters in the Round Valley study area stayed at their breeding pools, whereas 43 percent moved into adjacent upland habitat or to other aquatic sites. Her study reported a peak seasonal terrestrial movement occurring in the fall months associated with the first 0.2 inch of precipitation and tapering off into spring. Upland movement activities ranged from 3 to 233 feet, averaging 80 feet, and were associated with a variety of refugia including grass thatch, crevices, cow hoof prints, ground squirrel burrows at the base of trees or rocks, logs, and under man-made structures; others were associated with upland sites lacking refugia (Tatarian 2008). The majority of terrestrial movements lasted from 1 to 4 days; however, one adult female was reported to remain in upland habitat for 50 days (Tatarian 2008). Upland refugia closer to aquatic sites were used more often and were more

commonly associated with areas exhibiting higher object cover, *e.g.*, woody debris, rocks, and vegetative cover. Subterranean cover was not significantly different between occupied upland habitat and non-occupied upland habitat.

California red-legged frogs are often prolific breeders, laying their eggs during or shortly after large rainfall events in late winter and early spring (Hayes and Miyamoto 1984). Egg masses containing 2,000 - 5,000 eggs are attached to vegetation below the surface and hatch after 6 - 14 days (Storer 1925, Jennings and Hayes 1994). In coastal lagoons, the most significant mortality factor in the pre-hatching stage is water salinity (Jennings *et al.* 1992). Eggs exposed to salinity levels greater than 4.5 parts per thousand resulted in 100 percent mortality (Jennings and Hayes 1990). Increased siltation during the breeding season can cause asphyxiation of eggs and small larvae. Larvae undergo metamorphosis 3.5 - 7 months following hatching and reach sexual maturity at 2 - 3 years of age (Storer 1925; Wright and Wright 1949; Jennings and Hayes 1985, 1990, 1994). Of the various life stages, larvae probably experience the highest mortality rates, with less than 1 percent of eggs laid reaching metamorphosis (Jennings *et al.* 1992). California red-legged frogs may live 8 to 10 years (Jennings *et al.* 1992). Populations can fluctuate from year to year; favorable conditions allow the species to have extremely high rates of reproduction and thus produce large numbers of dispersing young and a concomitant increase in the number of occupied sites. In contrast, the animal may temporarily disappear from an area when conditions are stressful (*e.g.*, during periods of drought, disease, etc.).

The diet of California red-legged frogs is highly variable and changes with the life history stage. The diet of the larvae is not well studied, but is likely similar to that of other ranid frogs, feeding on algae, diatoms, and detritus by grazing on the surface of rocks and vegetation (Fellers 2005; Kupferberg 1996a, 1996b, 1997). Hayes and Tennant (1985) analyzed the diets of California red-legged frogs from Cañada de la Gaviota in Santa Barbara County during the winter of 1981 and found invertebrates (comprising 42 taxa) to be the most common prey item consumed; however, they speculated that this was opportunistic and varied based on prey availability. They ascertained that larger frogs consumed larger prey and were recorded to have preyed on Pacific chorus frogs, threespine stickleback, and, to a limited extent, California mice, which were abundant at the study site (Hayes and Tennant 1985, Fellers 2005). Although larger vertebrate prey was consumed less frequently, it represented over half of the prey mass eaten by larger frogs suggesting that such prey may play an energetically important role in their diets (Hayes and Tennant 1985). Juvenile and subadult/adult frogs varied in their feeding activity periods; juveniles fed for longer periods throughout the day and night, while subadult/adults fed nocturnally (Hayes and Tennant 1985). Juveniles were significantly less successful at capturing prey and all life history stages exhibited poor prey discrimination, feeding on several inanimate objects that moved through their field of view (Hayes and Tennant 1985).

Threats: Habitat loss, non-native species introduction, and urban encroachment are the primary factors that have adversely affected the California red-legged frog throughout its range. Several researchers in central California have noted the decline and eventual local disappearance of California and northern red-legged frogs in systems supporting bullfrogs (Jennings and Hayes 1990, Twedt 1993), red swamp crayfish, signal crayfish, and several species of warm water fish including sunfish, goldfish, common carp, and mosquitofish (Moyle 1976; Barry 1992; Hunt 1993; Fisher and Schaffer 1996). This has been attributed to predation, competition, and reproduction interference. Twedt (1993) documented bullfrog predation of juvenile northern red-legged frogs, and suggested that bullfrogs could prey on subadult California red-legged frogs as well. Bullfrogs may also have a competitive advantage over California red-legged frogs. For instance, bullfrogs are larger and

possess more generalized food habits (Bury and Whelan 1984). In addition, bullfrogs have an extended breeding season (Storer 1933) during which an individual female can produce as many as 20,000 eggs (Emlen 1977). Furthermore, bullfrog larvae are unpalatable to predatory fish (Kruse and Francis 1977). Bullfrogs also interfere with California red-legged frog reproduction by eating adult male California red-legged frogs. Both California and northern red-legged frogs have been observed in amplexus (mounted on) with both male and female bullfrogs (Jennings and Hayes 1990, Jennings 1993, Twedt 1993). Thus bullfrogs are able to prey upon and out-compete California red-legged frogs, especially in sub-optimal habitat.

The urbanization of land within and adjacent to California red-legged frog habitat has also affected the threatened amphibian. These declines are attributed to channelization of riparian areas, enclosure of the channels by urban development that blocks dispersal, and the introduction of predatory fishes and bullfrogs. Diseases may also pose a significant threat, although the specific effects of disease on the California red-legged frog are not known. Pathogens are suspected of causing global amphibian declines (Davidson *et al.* 2003). Chytridiomycosis and ranaviruses are a potential threat because these diseases have been found to adversely affect other amphibians, including the listed species (Davidson *et al.* 2003; Lips *et al.* 2006). Mao *et al.* (1999 cited in Fellers 2005) reported northern red-legged frogs infected with an iridovirus, which was also presented in sympatric threespine sticklebacks in northwestern California. Non-native species, such as bullfrogs and non-native tiger salamanders that live within the range of the California red-legged frog have been identified as potential carriers of these diseases (Garner *et al.* 2006). Human activities can facilitate the spread of disease by encouraging the further introduction of non-native carriers and by acting as carriers themselves (*i.e.*, contaminated boots, waders, or fishing equipment). Human activities can also introduce stress by other means, such as habitat fragmentation, that results in the listed species being more susceptible to the effects of disease.

Recovery Plan: The recovery plan for the California red-legged frog identifies eight recovery units (Service 2002). The establishment of these recovery units is based on the determination that various regional areas of the species' range are essential to its survival and recovery. The status of the California red-legged frog was considered within the small-scale recovery units as opposed to their overall range. These recovery units are delineated by major watershed boundaries as defined by U.S. Geological Survey hydrologic units and the limits of its range. The goal of the recovery plan is to protect the long-term viability of all extant populations within each recovery unit. Within each recovery unit, core areas have been delineated and represent contiguous areas of moderate to high California red-legged frog densities that are relatively free of exotic species such as bullfrogs. The goal of designating core areas is to protect metapopulations. Thus when combined with suitable dispersal habitat, will allow for the long-term viability within existing populations. The management strategy identified within the Recovery Plan will allow for the recolonization of habitats within and adjacent to core areas that are naturally subjected to periodic localized extinctions, thus assuring the long-term survival and recovery of California red-legged frogs.

<u>California Red-legged Frog Critical Habitat</u>

The Service designated critical habitat for the California red-legged frog on April 13, 2006 (71 FR 19244) (Service 2006a) and a revised designation to the critical habitat was published on March 17, 2010 (75 FR 12816) (Service 2010). At this time, the Service recognized the taxonomic change from *Rana aurora draytonii* to *Rana draytonii* (Shaffer *et al.* 2010). Critical habitat is defined in Section 3 of the Act as: (1) The specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (a) essential to the conservation of the species and (b) that may require special management

considerations or protection; and (2) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. In determining which areas to designate as critical habitat, the Service considers those physical and biological features that are essential to a species' conservation and that may require special management considerations or protection (50 CFR 424.12(b)). The Service is required to list the known PCEs together with the critical habitat description. Such physical and biological features include, but are not limited to, the following:

1. Space for individual and population growth, and for normal behavior;
2. Food, water, air, light, minerals, or other nutritional or physiological requirements;
3. Cover or shelter;
4. Sites for breeding, reproduction, rearing of offspring, or dispersal; and
5. Generally, habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

The PCEs defined for the California red-legged frog were derived from its biological needs. The area designated as revised critical habitat provides aquatic habitat for breeding and non-breeding activities and upland habitat for shelter, foraging, predator avoidance, and dispersal across its range. The PCEs and, therefore, the resulting physical and biological features essential for the conservation of the species were determined from studies of California red-legged frog ecology. Based on the above needs and our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, the Service determined that the PCEs essential to the conservation of the California red-legged frog are:

1. *Aquatic Breeding Habitat.* Standing bodies of fresh water (with salinities less than 7.0 parts per thousand), including: natural and manmade (*e.g.*, stock) ponds, slow-moving streams or pools within streams, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years.

2. *Non-Breeding Aquatic Habitat.* Freshwater and wetted riparian habitats, as described above, that may not hold water long enough for the species to hatch and complete its aquatic life cycle but that do provide for shelter, foraging, predator avoidance, and aquatic dispersal for juvenile and adult California red-legged frogs. Other wetland habitats that would be considered to meet these elements include, but are not limited to: plunge pools within intermittent creeks; seeps; quiet water refugia during high water flows; and springs of sufficient flow to withstand the summer dry period.

3. *Upland Habitat.* Upland areas adjacent to or surrounding breeding and non-breeding aquatic and riparian habitat up to a distance of 1 mile in most cases and comprised of various vegetational series such as grasslands, woodlands, wetland, or riparian plant species that provide the frog shelter, forage, and predator avoidance. Upland features are also essential in that they are needed to maintain the hydrologic, geographic, topographic, ecological, and edaphic features that support and surround the wetland or riparian habitat. These upland features contribute to the filling and drying of the wetland or riparian habitat and are responsible for maintaining suitable periods of pool inundation for larval frogs and their food sources, and provide breeding, non-breeding, feeding, and sheltering habitat for juvenile and adult frogs (e.g., shelter, shade, moisture, cooler temperatures, a prey base, foraging opportunities, and areas for predator avoidance). Upland habitat should include

structural features such as boulders, rocks and organic debris (*e.g.*, downed trees, logs), as well as small mammal burrows and moist leaf litter.

4. *Dispersal Habitat.* Accessible upland or riparian dispersal habitat within designated units and between occupied locations within a minimum of 1 mile of each other that allow for movement between such sites. Dispersal habitat includes various natural habitats and altered habitats such as agricultural fields, which do not contain barriers (*e.g.*, heavily traveled road without bridges or culverts) to dispersal. Dispersal habitat does not include moderate- to high-density urban or industrial developments with large expanses of asphalt or concrete, nor does it include large reservoirs over 50 acres in size, or other areas that do not contain those features identified in PCEs 1, 2, or 3 as essential to the conservation of the species.

With the revised designation of critical habitat, the Service intends to conserve the geographic areas containing the physical and biological features that are essential to the conservation of the species, through the identification of the appropriate quantity and spatial arrangement of the PCEs sufficient to support the life-history functions of the species. Because not all life-history functions require all the PCEs, not all areas designated as critical habitat will contain all the PCEs. Please refer to the final designation of critical habitat for California red-legged frog for additional information (75 FR 12816).

San Francisco Garter Snake

Refer to the five-year review for the species status (Service 2006b).

Environmental Baseline

California Red-legged Frog

The action area is located within the South San Francisco Bay Core Area (San Mateo Bayside Hydrologic Sub-Area) and the South and East Bay Recovery Unit (Service 2002, 2006a). The recovery action guidelines provide recommendations for minimizing the effects of various land and water uses, non-native species/predators, and air and water contamination in addition to outlining recommendations for habitat preservation. These recommendations assist in the conservation and recovery of the species, protect high quality habitat within core areas and priority watersheds, increase opportunities for dispersal, population expansion, and recolonization, and provide connectivity between core areas and occupied watersheds. The conservation needs for the East San Francisco Bay Core Area are: (1) protect existing populations; (2) control non-native predators; (3) study the effects of grazing in riparian corridors, ponds and uplands; (4) reduce impacts associated with livestock grazing; (5) protect habitat connectivity; (6) minimize effects of recreation and off-road vehicle use, e.g. Corral Hollow watershed; (7) avoid and reduce impacts of urbanization; and (8) protect habitat buffers from nearby urbanization.

There is a pond located approximately 1,000 feet northwest of the action area that was reported to support California red-legged frog breeding (CDFW 2014). Egg-masses and metamorphs were observed in 2007 and 2006, respectively (CDFW 2014). Additional breeding occurrences have been reported along the perimeter of Upper Crystal Springs Reservoir supporting all life history stages (CDFW 2014). Upper Crystal Springs Reservoir lies approximately 700 feet west of the action area and is hydrologically connected via the drainage running within the willow riparian corridor. Within the action area, suitable breeding and non-breeding aquatic habitat is present within the open water

and seasonal wetland/ephemeral drainage vegetation communities, respectively. Suitable upland and dispersal habitat is present throughout the entire action area.

Breeding has not been documented from the open water habitat within the action area; however, protocol-level breeding surveys have not been conducted. Breeding is unlikely based on the small size of the pond, but cannot be ruled out. The coast live oak woodland, willow riparian, ruderal grassland, mixed grassland and Baccharis scrub, and mixed scrub vegetation communities provide suitable upland, foraging, refugia, and dispersal habitat for California red-legged frogs. Caltrans determined that California red-legged frogs have the potential to occur throughout all habitats within the action area, but are not expected to breed within the action area.

I-280 represents a major barrier to dispersal of California red-legged frogs eastward from the action area and Upper Crystal Springs Reservoir. Canada Road is a paved county road that runs between the action area and Upper Crystal Springs Reservoir, but does not present a barrier to movement; however, it does pose a risk of injury or mortality to California red-legged frogs due to vehicle and bicycle traffic and depredation by predators.

Aquatic features and upland and dispersal habitat within the action area are important to the conservation and recovery of the species based on the following: 1) they are located within the known range of the species and within the South San Francisco Bay Core Area; 2) they provide suitable habitat for juvenile and adult life history stages of the species; 3) they provide opportunities for dispersal, population expansion and recolonization. For these reasons, the Service has determined there is a reasonable potential for juvenile and adult California red-legged frogs to inhabit, forage, seek refuge or disperse within and through the action area.

Critical Habitat

The entire action area lies within the Cahill Ridge SNM-1 designated critical habitat unit, which is located in north central San Mateo County, west of I-280 and south of Pacifica, California (75 FR 12816). This unit comprises 34,952 acres and contains the features that are essential for the conservation of the species. The unit contains aquatic habitat for breeding and non-breeding activities (PCE 1 and PCE 2) and upland habitat for foraging and dispersal activities (PCE 3 and PCE 4). The unit contains high-quality permanent and ephemeral aquatic habitats consisting of ponds and streams surrounded by riparian and emergent vegetation that provides for breeding and upland areas for dispersal, shelter, and food. The unit represents the only unit in the San Francisco peninsula, and would assist in maintaining the distribution of the California red-legged frog population within the San Francisco area, and provide connectivity to units farther south into Santa Cruz County. The designation of this unit requires special management considerations to address development and nonnative invasive plants, which may alter aquatic and upland habitats and thereby result in the direct or indirect loss of egg masses or adults.

The action area contains all four PCE's. The open water provides suitable breeding habitat (PCE-1); however, the project is not expected to effect this pond. The ephemeral creek and season wetland provides suitable non-breeding aquatic habitat (PCE-2). The majority of the action area is comprised of coast live oak woodland, willow riparian, ruderal grassland, mixed grassland and Baccharis scrub, mixed scrub habitat which is considered suitable upland (PCE-3) and dispersal (PCE-4) habitat.

San Francisco Garter Snake

The action area is located within the range of the Crystal Springs Reservoir garter snake population and is set within a mosaic of various open water, shallow coves, marshes, creek in-flows, and adjacent upland and dispersal habitat. Hydrologic features within the action area include a small open water pond near the western project boundary, an adjacent seasonal wetland, and ephemeral drainage that parallels the project alignment. Suitable upland foraging, refugia, and dispersal habitat is present within the willow riparian, coast live oak woodland, ruderal grassland, mixed grassland, and mixed scrub vegetation communities throughout the action area. California red-legged frog breeding, a primary prey species for San Francisco garter snakes, has been documented breeding along the edges of Upper Crystal Springs Reservoir and in a pond approximately 1,000 feet to the northwest (CDFW 2014). This suggests that the habitat within and adjacent to the action area are productive amphibian and reptiles habitat; thereby suitable San Francisco garter snake habitat.

Occurrences of juvenile and adult San Francisco garter snakes have been reported along the entire perimeter of the Upper Crystal Springs Reservoir dating from 1946 through 2004 (CDFW 2014). The reservoir is situated approximately 700 feet to the west and is hydrologically connected via an unnamed drainage to the action area. Based on habitat suitability within the action area, connectivity to occupied habitats along Upper Crystal Springs Reservoir, and the presence of breeding, foraging, sheltering and dispersal habitat, the Service has determined there is a reasonable probability for San Francisco garter snakes to inhabit or disperse through the action area.

Effects of the Action

California Red-legged Frog and San Francisco Garter Snake

The proposed project will likely adversely affect the California red-legged frog and San Francisco garter snake by harming or harassing juveniles and adults inhabiting suitable upland, dispersal, and non-breeding aquatic habitat within the action area. The aspects of the proposed action most likely to affect the California red-legged frog and San Francisco garter snake are confined to the construction phase of the project associated with the construction of the trenching, backfill, slope stabilization, and 60-inch corrugated pipe installation and tie-in activities.

Construction noise, vibration, and increased human activity may interfere with normal behaviors – feeding, sheltering, movement between refugia and foraging grounds, and other essential behaviors of the California red-legged frog and San Francisco garter snake – resulting in avoidance of areas that have suitable habitat but intolerable levels of disturbance. Short-term temporal effects will occur when vegetative cover and subterranean upland habitat is removed during project construction. Caltrans proposes to minimize these effects, in part, by locating construction staging, storage and parking areas outside of sensitive habitat; clearly marking construction work boundaries to prevent crews from affecting more habitat than is absolutely necessary, installing one-way wildlife exclusion fencing to allow California red-legged frogs and San Francisco garter snakes to escape the work area and prevent them from (re-)entering the work area, and revegetating all areas disturbed by project activities.

The proposed construction activities could result in the introduction of chemical contaminants to the site. California red-legged frogs and San Francisco garter snakes using these areas could be exposed to any contaminants that are present at the site. Exposure pathways could include inhalation, dermal contact, direct ingestion, or secondary ingestion of contaminated soil, plants, or prey species. Exposure to contaminants could cause short- or long-term morbidity, possibly

resulting in reduced productivity or mortality. Caltrans proposes to minimize these risks by implementing a Storm Water Pollution Prevention Plan, erosion control BMPs, and a Spill Response Plan, which will consist of refueling, oiling or cleaning of vehicles and equipment a minimum of 50 feet from aquatic resources; installing coir rolls, straw wattles and/or silt fencing to capture sediment and prevent runoff or other harmful chemicals from entering the wetland; and locating staging, storage and parking areas away from aquatic habitats.

Preconstruction surveys and the relocation of individual California red-legged frogs by a Service-approved biologist will minimize the likelihood of serious injury or mortality; however, capturing and handling frogs may result in stress during handling, containment, and transport. Death and injury of individuals could occur at the time of relocation or later in time subsequent to their release. Although survivorship for translocated amphibians has not been estimated, survivorship of translocated wildlife, in general, is low because of intraspecific competition, lack of familiarity with the relocation site with regard to breeding, feeding, and sheltering habitats, risk of contracting disease in foreign environment, and increased risk of predation. These effects will be minimized by using qualified Service-approved biologists, limiting the duration of handling, and relocating amphibians to suitable nearby habitat.

Biologists and construction workers traveling to the action area from other project sites may transmit diseases by introducing contaminated equipment. The chance of a disease being introduced into a new area is greater today than in the past due to the increasing occurrences of disease throughout amphibian populations in California and the United States. It is possible that chytridiomycosis, caused by chytrid fungus (*Batrachochytrium dendrobatidis*), may exacerbate the effects of other diseases on amphibians or increase the sensitivity of the amphibian to environmental changes (e.g., water pH) that reduce normal immune response capabilities (Bosch et al. 2001, Weldon et al. 2004). Implementing proper decontamination procedures prior to and following aquatic surveys and handling of frogs and salamanders will minimize the risk of transferring diseases through contaminated equipment or clothing.

Temporary effects to listed species may occur in areas denuded, manipulated, or otherwise modified from their existing, pre-project conditions, thereby removing one or more essential components of a listed species' habitat as a result of project activities that include, but are not limited to, construction, staging, storage, lay down, vehicle access, parking, etc. Temporary effects to habitat must be restored to baseline habitat values or better within one year following initial disturbance. Areas subject to ongoing operations and maintenance are not considered temporary even if they are restored within one year following initial disturbance. Affected areas not fulfilling these criteria are considered permanent. Habitat affected would become unavailable to these species during the construction phase and could result in loss of foraging or movement habitat, altered behavioral displays (e.g., flushing from cover during vegetation clearing or ground disturbing activities, decreased foraging success, increased risk of predation, etc.), and displacement from or avoidance of habitat features within the action area. The proposed action would result in the permanent loss and/or degradation of 0.02-acre of California red-legged frog and San Francisco garter snake upland and dispersal habitat; and the temporary loss and/or degradation of 2.18 acres of California red-legged frog and San Francisco garter snake upland and dispersal habitat. There will be no affects to breeding or nonbreeding aquatic habitat. Caltrans has proposed a compensatory habitat conservation measure at a ratio of 3:1 (acres of compensation to acres of habitat loss) for permanent effects and 1.1:1 for temporary effects.

These effects will be further minimized by installing environmentally sensitive area fencing to keep workers from straying into otherwise undisturbed habitat; erecting wildlife exclusion fencing to deter species from wandering onto the construction site; implementing storm water and erosion BMP's; educating workers about the presence of California red-legged frogs and San Francisco garter snakes, their habitat, identification, regulatory laws, and avoidance and minimization measures; and requiring a Service-approved biologist(s) to be present to monitor project activities within or adjacent to suitable habitat.

California Red-legged Frog Critical Habitat

The proposed action will result in the permanent loss and/or degradation of 0.02-acre of upland (PCE 3) and dispersal (PCE 4) habitat and the temporary loss and/or degradation of 2.18 acres of upland (PCE 3) and dispersal (PCE 3) habitat comprising willow riparian, coast live oak woodland, ruderal grassland, mixed grassland, and mixed scrub vegetation communities. The proposed action will not affect California red-legged frog breeding or non-breeding aquatic habitat since the open water, seasonal wetland, and ephemeral drainage habitats located within the action area will be avoided. Caltrans has minimized effects to California red-legged frog critical habitat by incorporating design modifications that avoid or minimize disturbance or loss of designated critical habitat containing PCEs. The permanent loss and/or degradation of 0.02-acre and temporary loss and/or degradation of 2.18 acres of California red-legged frog critical habitat supporting PCEs 3 and 4 will not compromise the recovery function of SNM-1, based on the location of effected critical habitat along an existing roadway.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. No other State, Tribal, local or private actions are anticipated in the action area within the foreseeable future.

Conclusion

After reviewing the current status of the California red-legged frog and San Francisco garter snake; the environmental baseline for the action area; the effects of the proposed I-280 Repair Pipe System and Backfill Sinkhole Project and the cumulative effects; it is the Service's biological opinion that the project, as proposed, is likely to adversely affect both species, but is not likely to jeopardize their continued existence. This determination is based on our opinion that the magnitude of the effects of this action does not appreciably reduce the likelihood of both the survival and recovery of these species in the wild.

After reviewing the current status of designated critical habitat for the California red-legged frog, the environmental baseline for each critical habitat unit, effects of the proposed action, and cumulative effects, the Service finds that the project, as proposed, is not likely to destroy or adversely modify critical habitat for the California red-legged frog based upon the statutory provisions of the Act. The local effects resulting from the proposed action will not result in the inability of range-wide critical habitat to remain functional or serve its intended recovery role for these species.

INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by Caltrans so that they become binding conditions of any grant or permit issued to Caltrans, as appropriate, in order for the exemption in section 7(o)(2) to apply. Caltrans has a continuing duty to regulate the activity covered by this incidental take statement. If Caltrans (1) fails to require Caltrans to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

California Red-Legged Frog

The Service anticipates that incidental take of the California red-legged frog may be difficult to detect due to their cryptic nature and wariness of humans. Losses of this species may also be difficult to quantify due to a lack of baseline survey data and seasonal/annual fluctuations in their numbers due to environmental or human-caused disturbances. Due to the difficulty in quantifying the number of California red-legged frogs that will be taken as a result of the proposed action, the Service is quantifying take incidental to the proposed action as the harm and harassment of all California red-legged frogs inhabiting or utilizing the 14-acre action area. The Service anticipates that take of juvenile and adult life history stages may be harmed or harassed as a result of habitat loss/degradation, construction-related disturbance, or capture and relocation efforts. Mortality or injury of California red-legged frogs is not anticipated based on the full implementation of the proposed conservation measures. Upon implementation of the following Reasonable and Prudent Measures, take of all juvenile and adult California red-legged frogs within the action area in accordance with the amount and type of take outlined above will become exempt from the prohibitions described under section 9 of the Act. No other forms of take of California red-legged frogs are authorized under this opinion.

San Francisco Garter Snake

The Service expects that incidental take of the San Francisco garter snake may be difficult to detect or quantify because this animal may range over a large territory and the finding of an injured or dead individual is unlikely because they may seek refuge in aquatic habitat, burrows or other underground refugia. Due to the difficulty in quantifying the number of San Francisco garter snakes that will be

taken as a result of the proposed action, the Service is quantifying take incidental to the proposed action as the harm and harassment of all San Francisco garter snakes inhabiting or utilizing the 14-acre action area. The Service anticipates that take of juvenile and adult life history stages may be harmed or harassed as a result of habitat loss/degradation, or construction-related disturbance. Mortality or injury of San Francisco garter snakes is not anticipated based on the full implementation of the proposed conservation measures. Upon implementation of the following Reasonable and Prudent Measures, take of all juvenile and adult San Francisco garter snakes within the action area in accordance with the amount and type of take outlined above will become exempt from the prohibitions described under section 9 of the Act. No other forms of take of San Francisco garter snakes are authorized under this opinion.

Effect of the Take

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to jeopardize the California red-legged frog or San Francisco garter snake.

Reasonable and Prudent Measures

The Service has determined that the following reasonable and prudent measure is necessary and appropriate to minimize impacts of incidental take of California red-legged frog or San Francisco garter snake:

1. Minimize the effects to the California red-legged frog and San Francisco garter snake by implementing the proposed action as described, as modified by the following terms and conditions.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, Caltrans must comply with the following terms and conditions, which implement the reasonable and prudent measure, described above and outline required reporting/monitoring requirements. These Terms and Conditions are nondiscretionary. The following Terms and Conditions implement the Reasonable and Prudent Measure number 1:

1. **Compliance with Biological Opinion.** Caltrans shall include Special Provisions that include the Conservation Measures and the Terms and Conditions of this biological opinion in the solicitation for bid information for all contracts for the project that are issued by them to all contractors. Caltrans shall require all contractors and subcontractors to comply with the Act in the performance of the proposed action and shall perform the action as outlined in the Project Description of this biological opinion as provided by Caltrans in the Biological Assessment dated August 2013, revised project description dated October 6, 2013, and all other supporting documentation submitted to the Service in support of the action. Changes to the Project Description or performance of work outside the scope of this biological opinion are subject to the requirements of reinitiation of formal consultation.

2. **Implementation of Biological Opinion.** Caltrans shall ensure the Resident Engineer or their designee shall have full authority to implement and enforce all Conservation Measures and Terms and Conditions of this biological opinion. The Resident Engineer or his/her

designee shall maintain a copy of this biological opinion onsite whenever construction is in progress. Their name(s) and telephone number(s) shall be provided to the Service at least 30 calendar days prior to groundbreaking at the project.

3. **Proposed Compensation**. The compensation measures proposed by Caltrans and outlined in Table 1 will minimize the effects of harm on the California red-legged frog and San Francisco garter snake. Habitat considered for compensation shall comprise high quality breeding, foraging, sheltering, migration, and/or dispersal habitat. Caltrans shall comply with all applicable CDFW regulations pertaining to mitigation for species designated as fully protected and/or listed by the State. Compensation shall be implemented in accordance with the Selected Review Criteria for Section 7 Off-Site Compensation provided in Appendix A. If conservation banking credits are to be purchased, Caltrans shall submit a conceptual compensation plan to the Service for review and approval prior to the purchase of credits. If the proposed compensation scheme is not fully implemented, Caltrans shall provide an alternative compensation scheme to be reviewed and approved by the Service. On-site restoration of temporarily affected areas may qualify as compensation at a 1:1 ratio if it is restored within one calendar year following project completion and the conditions are verified by the Service. All compensation will be acquired prior to the beginning of earthmoving for the project.

4. **Biological Monitor Approval and Stop Work Authority**. The qualifications of all proposed Service-approved biological monitors shall be presented to the Service for review and written approval at least 30 calendar days prior to project initiation. The Service-approved biological monitors shall keep a copy of this biological opinion in his/her possession when onsite. Through the Resident Engineer or his/her designee, the Service-approved biological monitors shall be given the authority to communicate verbally, by telephone, email, or hardcopy with Caltrans personnel, construction personnel or any other person(s) at the project site or otherwise associated with the project to ensure that the terms and conditions of this biological opinion are met. The Service-approved biologist(s) through communication with the Resident Engineer or his/her designee shall have oversight over implementation of the Terms and Conditions in this Biological Opinion, and shall have the authority to stop project activities if they determine any of the requirements associated with these Terms and Conditions are not being fulfilled. If the Service-approved biologist(s) exercises this authority, the Service shall be notified by telephone and email within 24 hours. The Service contact is Coast-Bay Division Chief of the Endangered Species Program, Sacramento Fish and Wildlife Office at telephone (916) 414-6600.

5. **Biological Monitoring Records**. The Service-approved biologist(s) shall maintain monitoring records that include: (1) the beginning and ending time of each day's monitoring effort; (2) a statement identifying the listed species encountered, including the time and location of the observation; (3) the time the specimen was identified and by whom and its condition; and (4) a description of any actions taken. The Service-approved biologist(s) shall maintain complete records in their possession while conducting monitoring activities and shall immediately surrender records to the Service, CDFW, and/or their designated agents upon request. If requested, all monitoring records shall be provided to the Service within 30 of the completion of monitoring work.

6. **Agency Access**. If verbally requested through the Resident Engineer or Construction Inspector, before, during, or upon completion of ground breaking and construction

activities, Caltrans shall ensure the Service or their designated agents can immediately and without delay, access and inspect the project site for compliance with the proposed project description, conservation measures, and terms and conditions of this Biological Opinion, and to evaluate project effects to the California red-legged frog and San Francisco garter snake and their habitat.

7. **Proper Use of Erosion Control Devices**. To prevent California red-legged frogs and San Francisco garter snakes from becoming entangled, trapped, or injured, erosion control materials that use plastic or synthetic monofilament netting will not be used within the action area. This includes products that use photodegradable or biodegradable synthetic netting, which can take several months to decompose. Acceptable materials include natural fibers such as jute, coconut, twine or other similar fibers.

8. **Wildlife Exclusion Fencing**. WEF shall be a minimum of 30 inches tall and shall be buried a minimum of 4 inches deep and backfilled with soil, sand bags or other means to prevent California red-legged frogs or San Francisco garter snakes from passing under the fence and entering the project footprint. Vegetation shall be cleared to within two inches of ground level to prevent California red-legged frogs or San Francisco garter snakes from using vegetation to gain access to the project site by climbing over the WEF. Vegetation within 18 inches of the WEF shall remain clear during the entire time the WEF is in operation. The WEF shall consist of a material that does not allow California red-legged frogs or San Francisco garter snakes from climbing into the project site and has a minimum 4-inch lip on the top facing away from the project construction area.

9. **Biological Monitoring**. A Service-approved biologist(s) shall be onsite during all activities that may result in take of California red-legged frogs or San Francisco garter snakes as determined by the Service. A minimum of one Service-approved biologist shall be on-site or available by phone to respond in a timely manner throughout the project duration. Caltrans shall coordinate with the Service to determine which locations will require the presence with Service-approved biological monitors. The Service will consider the implementation of specific project activities without the oversight of an on-site Service-approved biologist on a case-by-case basis.

10. **Preconstruction and Daily Surveys**. Preconstruction surveys shall be conducted by a Service-approved biologist immediately prior to the initiation of any ground disturbing activities and vegetation clearing that may result in take of California red-legged frogs or San Francisco garter snakes as determined by the Service. All suitable aquatic and upland habitat including refugia habitat such as dense vegetation, small woody debris, refuse, burrows, etc., shall be thoroughly inspected. The Service-approved biologist(s) shall conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of California red-legged frogs or San Francisco garter snakes as determined by the Service.

11. **Protocol for Species Observation and Handling**. If an California red-legged frog or San Francisco garter snake is encountered in the action area, work activities within 50 feet of the individual shall cease immediately and the Resident Engineer and Service-approved biologist shall be notified. Based on the professional judgment of the Service-approved biologist, if project activities can be conducted without harming or injuring the California red-legged frog or San Francisco garter snake, it may be left at the location of discovery and monitored

by the Service-approved biologist. All project personnel shall be notified of the finding and at no time shall work occur within 50 feet of the California red-legged frog or San Francisco garter snake without a Service-approved biologist present. San Francisco garter snakes shall not be captured or handled without authorization from the Service and CDFW, and shall be monitored until it leaves the action area on its own accord, unless the situation poses an imminent risk of injury or mortality to the individual(s). If it is determined by the Service-approved biologist that relocating the California red-legged frog is necessary, the following steps shall be followed:

a. Prior to handling and relocation, the Service-approved biologist will take precautions to prevent introduction of amphibian diseases in accordance with the *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* (Service 2005). Disinfecting equipment and clothing is especially important when biologists are coming to the action area to handle amphibians after working in other aquatic habitats.

b. California red-legged frogs shall be captured by hand, dipnet, or other Service-approved methodology, transported and relocated to nearby suitable habitat outside of the work area and released as soon as practicable the same day of capture. Holding/transporting containers and dipnets shall be thoroughly cleaned, disinfected, and rinsed with freshwater prior to use within the action area. The Service shall be notified within 24 hours of all capture, handling, and relocation efforts.

Reporting Requirements

In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, Caltrans shall adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, Caltrans must reinitiate formal consultation as per 50 CFR 402.16.

1. The Service must be notified within one (1) working day of the finding of any injured or dead listed species or any unanticipated damage to its habitat associated with the proposed project. Notification will be made to the Coast-Bay Division Chief of the Endangered Species Program at the Sacramento Fish and Wildlife Office at (916) 414-6600, and must include the date, time, and precise location of the individual/incident clearly indicated on a U.S. Geological Survey 7.5 minute quadrangle or other maps at a finer scale, as requested by the Service, and any other pertinent information. When an injured or dead individual of the listed species is found, Caltrans shall follow the steps outlined in the Disposition of Individuals Taken section below.

2. Other pertinent reporting information such as monitoring reports (if not included as a term and condition), notification of project completion/implementation, etc. including when this information is due to the Service.

Disposition of Individuals Taken

Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag

containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instruction s are received from the Service regarding the disposition of the dead specimen. The Service contact persons are the Coast-Bay Division Chief of the Endangered Species Program at the Sacramento Fish and Wildlife Office at (916) 414-6600; and the Resident Agent-in-Charge of the Service's Office of Law Enforcement, 5622 Price Way, McClellen, California 95562, at (916) 569-8444.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1. Caltrans District 4 should work with the Service to develop a conservation strategy that would identify the current safe passage potential along Bay Area highways and the areas where safe passage for wildlife could be enhanced or established.

2. Caltrans should assist the Service in implementing recovery actions identified in the *Recovery Plan for the California Red-legged Frog* (Service 2002) and the *Recovery Plan for the San Francisco Garter Snake*, California (Service 1985).

3. Caltrans should consider participating in the planning for a regional habitat conservation plan for the California red-legged frog, San Francisco garter snake, other listed species, and sensitive species.

4. Caltrans should consider establishing functioning preservation and creation conservation banking systems to further the conservation of the California red-legged frog, San Francisco garter snake, and other appropriate species. Such banking systems also could possibly be utilized for other required mitigation (i.e., seasonal wetlands, riparian habitats, etc.) where appropriate. Efforts should be made to preserve habitat along roadways in association with wildlife crossings.

5. Roadways can constitute a major barrier to critical wildlife movement. Therefore, Caltrans should incorporate culverts, tunnels, or bridges on highways and other roadways that allow safe passage by the California red-legged frog, San Francisco garter snake, other listed animals, and wildlife. Photographs, plans, and other information into the BAs if "wildlife friendly" crossings are incorporated into projects. Efforts should be made to establish upland culverts designed specifically for wildlife movement rather than accommodations for hydrology. Transportation agencies should also acknowledge the value of enhancing human safety by providing safe passage for wildlife in their early project design.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION--CLOSING STATEMENT

This concludes formal consultation on the I-280 Repair Pipe System and Backfill Sinkhole Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any additional take will not be exempt from the prohibitions of section 9 of the Act, pending reinitiation.

If you have any questions regarding this biological opinion on the proposed I-280 Repair Pipe System and Backfill Sinkhole Project, San Mateo County, California, contact Jerry Roe or Ryan Olah at the letterhead address or at (916) 414-6600.

Sincerely,

Jennifer M. Norris
Field Supervisor

Enclosures

cc:
Melissa Escaron, California Department of Fish and Wildlife, Napa, California

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APPENDIX A
Sacramento Fish and Wildlife Office
Review Criteria for Section 7 Compensation
Revised January 30, 2014

Property Assurances and Conservation Easement

- ☐ Title Report [*preliminary at proposal, and Final Title Insurance at recordation*]; no older than six months;
- ☐ Property Assessment and Warranty;
- ☐ Subordination Agreement [*include if any outstanding debts or liens on the property; may be needed for existing easements*];
- ☐ Legal Description and Parcel Map;
- ☐ Conservation Easement [*use the current SFWO standardized CE template*]; or
- ☐ Non-Template Conservation Easement [*this requires additional review*]

Site Assessment and Development

- ☐ Phase I Environmental Site Assessment;
- ☐ Habitat Development Plan [*include if habitat will be constructed, restored, or enhanced*];
- ☐ Construction Security Analysis *[applicable if habitat is being constructed/ enhanced/ restored]*;
- ☐ Performance Security Analysis [*applicable if there are performance standards*];

Site Management

- ☐ Interim Management Plan;
- ☐ Interim Management Security Analysis and Schedule;
- ☐ Long-Term Management Plan;
- ☐ Endowment Fund Analysis and Schedule;
- ☐ Endowment Funding Agreement or Trust Agreement or Declaration of Trust [*DFW calls this a "mitigation agreement"*]

Guidelines

Real Estate Assurances and Conservation Easement (CE)

Title Report

1. Who holds fee title to property?
2. Exceptions to title. Are there any liens or encumbrances (existing debts, leases, or easements) on the property? Note that any existing exceptions to title will have priority over a conservation easement for the mitigation project.
    a. Review Preliminary Title Report to evaluate liens and encumbrances (see Property Assessment and Warranty, below).
    b. Could any of these exceptions to title potentially interfere with either biological habitat values or ownership? If existing easements can potentially interfere with the conservation values/habitat of the property, those portions of the land should be deducted from the total compensation acreage available on the site.
    c. Split estates. Have the water or mineral rights been severed from title? If so, property owner should be encouraged to re-acquire those rights, or at least to acquire the surface-entry rights to remove or limit access for mineral exploration/development.

Property Assessment and Warranty

1. Property owner should submit a Property Assessment and Warranty, which discusses every exception to title listed on the Preliminary Title Report and Final Title Insurance Policy, evaluating any potential impacts to the conservation values that could result from the exceptions to title (see below).
2. The Property Assessment and Warranty should include a summary and full explanation of all exceptions remaining on the title, with a statement that the owner/Grantor accepts responsibility for all lands being placed under the CE as available for the primary purposes of the easement, as stated in the easement, and assures that these lands have a free and clear title and are available to be placed under the CE.

Subordination Agreement

1. A Subordination Agreement is necessary if there is any outstanding debt on the property; it could also be used to subordinate liens or easements. Review Subordination Agreement language for adequacy—the lending bank or other lien or rights holder must agree to fully subordinate each lien, encumbrance, or easement under the CE.

Legal Description and Parcel Map

1. Ensure accuracy of map, and location and acreage protected under the CE.
2. Both the map and the legal description should explain the boundaries of the individual project compensation site. The site should *not* have 'leftover' areas for later use.
3. Ask for an easement map to be prepared (if applicable), showing all easements on the property.

Conservation Easement from Template

1. Who will hold the easement?
   a. Conservation easements require third-party oversight by a qualified non-profit or government agency (=easement holder or Grantee). Minimum qualifications for an easement holder include:
      i. Maintaining accreditation by the Land Trust Accreditation Commission http://www.landtrustaccreditation.org/home.
      ii. Organized under IRS 501(c)(3);
      iii. Qualified under CA Civil Code § 815;
      iv. Bylaws, Articles of Incorporation, and biographies of Boards of Directors on file at;
         1. Must meet requirements of SFWO, including 51% disinterested parties on the Board of Directors;
      v. Approved by SFWO
2. Project Applicant should submit a redline version showing all of their proposed revisions in track changes or other editable electronic format, along with an explanation of all deviations from the template.

Non-Template Conservation Easement

1. If not using the CE template, the Project Applicant should specify objections they have to the template. This may substantially delay processing as the non-template CE will require review by the Solicitor's Office. Alternate CEs are subject to SFWO approval prior to being granted and recorded.
2. The Project Applicant must either 1) add SFWO as a third-party beneficiary, or 2) add language throughout the document, in all appropriate places, that will assure SFWO the right to enforce, inspect, and approve any and all uses and/or changes under the CE prior to occurrence (including land use, biological management or ownership).
3. Include, at a minimum, language to:
   a. Reserve all mineral, air, and water rights under the CE as necessary to maintain and operate the site in perpetuity;
   b. Ensure all future development rights are forfeited;
   c. Ensure all prohibited uses contained in the CE template are addressed; and
   d. Link the CE, Management Plan, and the Endowment Fund within the document (e.g., note that each exists to support the others, and where each of the documents can be located if a copy is required).
4. Insert necessary language, particularly, but not exclusively, per: (can compare to CE template):
   a. Rights of Grantee
   b. Grantee's Duties
   c. Reserved Rights
   d. Enforcement
   e. Remedies
   f. Access
   g. Costs and Liabilities
   h. Assignment and Transfer
   i. Merger
   j. Notices

5. Include a signature block for USFWS to sign "approved as to form."

Site Assessment and Development

Phase I Environmental Site Assessment

1. The Phase I ESA must show that the compensation site is not subject to any recognized environmental conditions as defined by the American Society for Testing and Materials (ASTM) Standard E1527-05 "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, available at http://www.astm.org/Standards/E1527.htm, (i.e., the presence or likely presence of any Hazardous Substances or petroleum products).
2. If the Phase I ESA identifies any recognized environmental conditions, the Project Applicant must represent and warrant to the SFWO that all appropriate assessment, clean up, remediation, or removal action has been completed.
3. If the Phase I ESA identifies any recognized environmental conditions, a Phase II ESA may be needed for sampling and laboratory analysis.

Restoration or Habitat Development Plan [*not required if the site is preservation only*]

1. The overall plan governing construction and habitat establishment activities required to be conducted on the Property, including, without limitation, creation, restoration, and enhancement of habitat.
   a. This plan should include the baseline conditions of the Property including biological resources, geographic location and features, topography, hydrology, vegetation, past, present, and adjacent land uses, species and habitats occurring on the property, a description of the activities and methodologies for creating, restoring, or enhancing habitat types, a map of the approved modifications, overall habitat establishment goals, objectives and Performance Standards, monitoring methodologies required to evaluate and meet the Performance Standards, an approved schedule for reporting monitoring results, a discussion of possible remedial actions, and any other information deemed necessary by the SFWO.
2. Any permits and other authorizations needed to construct and maintain the site shall be included and in place prior to the start of construction of the habitat.
3. Full construction plans for any habitat construction are subject to SFWO approval and must be *SFWO-approved prior* to the start of construction of the habitat.

Construction Security

1. Construction Security in the amount of 100% of a reasonable third party estimate or contract to create, restore, or enhance habitats on the property in accordance with the Restoration or Habitat Development Plan.
2. Construction Security can be drawn on should the project proponent default.
3. The Construction Security should be in the form of an irrevocable standby letter of credit or a cashier's check.
   a. LOC: issued for a period of at least one year, and provide that the expiration date will be automatically extended for at least one year on each successive expiration date unless, until extension is no longer necessary.
   b. Beneficiary: a third party subject to approval by the SFWO.
   c. Language in a draft letter of credit subject to approval by the SFWO.

Performance Security *[only necessary if habitat if performance standards have been identified]*

1. Performance Security in the amount of 20% of the Construction Security.
2. Performance Security can be drawn on should the Performance Standards not be met, if remedial action becomes necessary.
3. The Performance Security in the form of an irrevocable standby letter of credit or a cashier's check.
   a. LOC: issued for a period of at least one year, and provide that the expiration date will be automatically extended for at least one year on each successive expiration date unless, until extension is no longer necessary.
   b. Beneficiary: a third party who is subject to approval by the SFWO.
   c. Language in a draft letter of credit is subject to SFWO approval.

Site Management

Interim Management Plan

1. The Interim Management Plan should identify the short-term management, monitoring, and reporting activities to be conducted from the time construction ends until the Endowment Fund has been fully funded for three years and all the Performance Standards in the Development Plan have been met. This may be the same as the Long-term Management Plan.

Interim Management Security Analysis and Schedule

The purpose of the Interim Management Security is to allow the endowment to grow for at least three years without any disbursements, and is a safeguard to ensure that there will be enough funds in the endowment to pay for future management costs. The period can be longer than three years; a 5 year period is recommended by many land trusts.

1. Interim Management Security (in the form of a standby letter of credit) in the amount equal to the estimated cost to implement the Interim Management Plan during the first three years of the Interim Management Period, as set for in the Interim Management Security Analysis and Schedule.
2. The Interim Management Security Analysis and Schedule should be in the form of a table and/or spreadsheet that shows all of the tasks (management, monitoring, reporting), task descriptions, labor (hours), cost per unit, cost frequency, timing or scheduling of the tasks, the total annual funding necessary for each task, and any associated assumptions for each task required by the Interim Management Plan. The total annual expenses should include administration and contingency costs.
3. The Interim Management Security:
   a. Held by a qualified, non-profit organization or government agency, subject to SFWO approval [see requirements under CE above], and
   b. Held according to minimum standards for assuring maximum success in earning potential, and will include assurances to safeguard against loss of principle.
   c. Instructions for disbursements or releases from the fund must be outlined in the Endowment Management Agreement/Trust Agreement/Declaration of Trust.

Long-Term Management Plan (LTMP)

1. The LTMP template identifies the long-term management, monitoring and reporting activities to be conducted.
2. The LTMP should include at minimum:
   a. Purpose of the Project and purpose of the LTMP;
   b. A baseline description of the setting, location, history, and types of land use activities, geology, soils, climate, hydrology, habitats present (once project meets Performance Standards), and species descriptions;
   c. Overall management, maintenance and monitoring goals; specific tasks and timing of implementation; and discussion of any constraints, which may affect goals;
   d. The Endowment Fund Analysis and Schedule (see below);
   e. Discussion of Adaptive Management actions for reasonably foreseeable events and possible thresholds for evaluating and implementing Adaptive Management;
   f. Rights of access to the Property and prohibited uses of the Property as provided in the CE; and
   g. Procedures for Property transfer, land manager replacement, amendments, and notices.
3. The LTMP must be incorporated by reference in the CE.
4. The LTMP is considered a living document and may be revised as necessary upon agreement of the land manager, easement holder, and SFWO.

Endowment Fund Analysis and Schedule

1. Can use a PAR or PAR-like analysis and must be based upon the final LTMP, subject to SFWO approval.
   - The analysis should be developed with input by the land manager and conservation easement holder.
2. The analysis and schedule should be in the form of a table and/or spreadsheet that shows, at a minimum:
   - all of the tasks (management, monitoring, reporting)
   - task descriptions, with tasks numbers cross-referenced in management plan(s)
   - labor (hours)
   - materials
   - cost per unit (hr., linear feet, each, etc.).
   - cost frequency
   - timing or scheduling of the tasks,
   - the total annual funding necessary for each task, and
   - the assumptions required for each task by the Management Plan.
3. The total annual expenses should include administration and contingency costs (contingency can be included on each line item – identify the percentage). Unless there is a separate endowment for the purpose of monitoring and reporting on the CE conditions, then, the analysis should also include costs of
   - Monitoring and reporting CE conditions;
   - Defending the CE; and
   - Liability insurance.

4. The Endowment Fund::
   - Held by a qualified, SFWO-approved, non-profit organization or government agency [see requirements under CE above],
   - Held according to minimum standards for assuring maximum success in earning potential, and should include assurances for no loss of principle.
   - Disbursements or releases from the fund must be for documented expenditures, as they occur.

Endowment Funding Agreement

1. This is the agreement between the endowment holder and the Project Applicant, as to how the endowment is to be funded, held, and disbursed;
2. USFWS is not signatory to this agreement, but there should be a signature block on the agreement for SFWO to sign "approved as to form";
3. USFWS has approval authority over the language in the document, and it must state that modifications or transfer of the endowment to another holder are subject to USFWS approval;
4. This agreement can also be called: "Trust Agreement" or "Declaration of Trust." When the CDFW is involved, this is called "Mitigation Agreement."

United States Army Corps of Engineer (ACOE), dated January 29, 2015

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
1455 MARKET STREET, 16TH FLOOR
SAN FRANCISCO, CALIFORNIA 94103-1398

JAN 27 2015

Regulatory Division (1145b)

Subject: File Number 2014-00260S

Ms. Richelle P. Perez
Caltrans, District 4 Project Manager
Attention: Frances Malamud-Roam
111 Grand Avenue, MS-7A
Oakland, California 94612

Dear Ms. Perez:

This correspondence is in reference to your submittal of October 6, 2014, concerning Department of the Army (DA) authorization to conduct drainage pipe improvements to protect an existing maintenance access road and the supporting fill slope of Interstate 280 (I-280) located on a Caltrans maintenance road adjacent to Interstate 280, at post mile 9.4, approximately 0.2 miles from Canada Road, 0.6 miles from Edgewood Road, in unincorporated San Mateo County, California (Latitude: 37.499298° N, Longitude: 122.325271° W).

Work within U.S. Army Corps of Engineers' (Corps) jurisdiction will include replacing a culvert pipe and repairing a sinkhole caused by the leaking pipe. The existing system contains a 60-inch corrugated steel pipe (CSP) running parallel to I-280 and a 24-inch CSP running under and perpendicular to the freeway. The 60-inch CSP has corroded along a portion of its length, allowing leaks and sinkhole formation, and threatens to undermine the access road and the supporting fill slope of I-280. To correct the undermining, 810 feet of the original 60-inch CSP and 53 feet of the 24-ich CSP will be abandoned in place and a new 850-foot long section of reinforced concrete pipe (RCP) will be constructed adjacent to the original pipe location. The removal of existing pipe sections will impact 0.097 acre of culverted other waters of the U.S. which flow into an unnamed creek and wetlands downstream. The excavation area for the new RSP will be minimized by using trench shields and will occur within a fenced area. The new pipe will use the existing outfall by tying into the back of the existing headwall with a bonded mechanical connection, thus limiting connection pipe construction to the upland portion of the riparian area. All work shall be completed in accordance with the plans and drawings titled "Interstate 280 Repair Pipe System EA 4G590, Figure 4: Waters of the U.S. Impacts," provided as Enclosure A.

Section 404 of the Clean Water Act (CWA) generally regulates the discharge of dredged or fill material below the plane of ordinary high water in non-tidal waters of the United States, below the high tide line in tidal waters of the United States, and within the lateral extent of wetlands adjacent to these waters. Section 10 of the Rivers and Harbors Act generally regulates construction of structures and work, including excavation, dredging, and discharges of dredged

or fill material, occurring below the plane of mean high water in tidal waters of the United States; in former diked baylands currently below mean high water; outside the limits of mean high water but affecting the navigable capacity of tidal waters; or below the plane of ordinary high water in non-tidal waters designated as navigable waters of the United States. Navigable waters of the United States generally include all waters subject to the ebb and flow of the tide; and/or all waters presently used, or have been used in the past, or may be susceptible for future use to transport interstate or foreign commerce. A Preliminary Jurisdictional Determination (JD) has been completed for your site. Preliminary JDs are written indications that there may be waters of the U.S. on a parcel or indications of the approximate location(s) of waters of the U.S. on a parcel. Preliminary JDs are advisory in nature and may not be appealed. Please see the enclosed Preliminary JD form and map labeled, "Preliminary Jurisdictional Determination, Project Name: I-280 Repair Pipe System and Backfill Sinkhole, File 2014-00260S," and dated December 30, 2014 (Enclosure A).

Based on a review of the information in your submittal, the project qualifies for authorization under Department of the Army Nationwide Permit (NWP) 14 for *Linear Transportation Projects*, 77 Fed. Reg. 10,184 (Feb. 21, 2012) (Enclosure 1), pursuant to Section 404 of the CWA of 1972, as amended (33 U.S.C. § 1344 *et seq*.). The project must be in compliance with the terms of the NWP, the general conditions of the Nationwide Permit Program, and the San Francisco District regional conditions cited in Enclosure 2. You must also be in compliance with any special conditions specified in this letter for the NWP authorization to remain valid. Non-compliance with any term or condition could result in the revocation of the NWP authorization for your project, thereby requiring you to obtain an Individual Permit from the Corps. This NWP authorization does not obviate the need to obtain other State or local approvals required by law.

This verification will remain valid until March 18, 2017, unless the NWP authorization is modified, suspended, or revoked. Activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon a NWP will remain authorized provided the activity is completed within 12 months of the date of a NWP's expiration, modification, or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization in accordance with 33 C.F.R. § 330.4(e) and 33 C.F.R. § 330.5 (c) or (d). This verification will remain valid if, during the time period between now and March 18, 2017, the activity complies with any subsequent modification of the NWP authorization. The Chief of Engineers will periodically review NWPs and their conditions and will decide to modify, reissue, or revoke the permits. If a NWP is not modified or reissued within five years of its effective date, it automatically expires and becomes null and void. It is incumbent upon you to remain informed of any changes to the NWPs. Changes to the NWPs would be announced by Public Notice posted on our website (http://www.spn.usace.army.mil/Missions/RegulatoryPublicNotices.aspx). Upon completion of the project and all associated mitigation requirements, you shall sign and return the Certification

of Compliance, Enclosure 3, verifying that you have complied with the terms and conditions of the permit.

This authorization will not be effective until you have obtained a Section 401 water quality certification from the San Francisco Bay Regional Water Quality Control Board (RWQCB). If the RWQCB fails to act on a valid request for certification within two months after receipt of a complete application, the Corps will presume a waiver of water quality certification has been obtained. You shall submit a copy of the certification to the Corps prior to the commencement of work.

General Condition 18 stipulates that project authorization under a NWP does not allow for the incidental take of any federally-listed species in the absence of a biological opinion (BO) with incidental take provisions. As the principal federal lead agency for this project, the California Department of Transportation initiated consultation with the United States Fish and Wildlife Service (USFWS) to address project related impacts to listed species, pursuant to Section 7(a) of the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 *et seq.*). By letter of December 23, 2014, USFWS issued a BO (08ESMF00-2014-F0342-1) cited in Enclosure 4, with an incidental take statement for California red-legged frog and San Francisco garter snake (*Thamnophis sirtalis tetrataenia*).

In order to ensure compliance with this NWP authorization, the following special conditions shall be implemented:

1. To remain exempt from the prohibitions of Section 9 of the Endangered Species Act, the non-discretionary Terms and Conditions for incidental take of federally-listed California red-legged frog, their designated critical habitat, and San Francisco garter snake shall be fully implemented as stipulated in the Biological Opinion entitled, "Biological Opinion on the Effects of the Proposed Interstate 280 Repair Pipe System and Backfill Sinkhole Project, San Mateo County, California (Caltrans EA 4G590)," (pp. 21-24) dated December 23, 2014 (Enclosure 4). Project authorization under the NWP is conditional upon compliance with the mandatory terms and conditions associated with incidental take. Failure to comply with the terms and conditions for incidental take, where take of a federally-listed species occurs, would constitute an unauthorized take and non-compliance with the NWP authorization for your project. The USFWS is, however, the authoritative federal agency for determining compliance with the incidental take statement and for initiating appropriate enforcement actions or penalties under the Endangered Species Act.

2. Authorization under this Corps permit is conditional upon your adherence to the project description and plans as submitted. Deviation from this may be interpreted as a violation of the permit. Please contact the Corps if there are any modifications to the project.

3. If any additional federally protected species are found within the project area, work in habitat supporting the species shall not continue until the Corps completes consultation with the U.S. Fish and Wildlife Service, and/or National Marine Fisheries Service, pursuant to Section 7 of the Endangered Species Act, as amended. The Corps shall notify the applicant in writing when work may commence.

4. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, work shall cease in the affected area, and you must notify this office of the findings immediately. We will initiate the Federal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

5. All temporary impacts shall be restored at least to preconstruction condition, and only native riparian species may be used for replanting.

6. All work occurring below the plane of ordinary high water (OHW) of the affected creek should be confined to the low-flow period of June 15 to October 15 to minimize downstream sedimentation.

7. Construction fencing or flagging shall be used to keep construction crews and equipment from straying outside the specified project area. No impacts are to occur outside the project footprint to other waters or wetlands. Fencing shall be installed to protect these areas from impacts associated with the project.

8. All material and debris generated as a result of the project construction shall be removed from the site and disposed of in an appropriate location outside of Corps jurisdiction.

9. All standard Best Management Practices shall be implemented to prevent the movement of sediment downstream. No debris, soil, silt, sand, bark, slash, sawdust, cement, concrete, washings, petroleum products, or other organic or earthen material shall be allowed to enter into or be placed where it may be washed by rainfall or runoff into the waterways.

You may refer any questions on this matter to Justin Yee of my Regulatory staff by telephone at (415) 503-6788 or by e-mail at Justin.J.Yee@usace.army.mil. All correspondence should be addressed to the Regulatory Division, South Branch, referencing the file number at the head of this letter.

The San Francisco District is committed to improving service to our customers. My Regulatory staff seeks to achieve the goals of the Regulatory Program in an efficient and cooperative manner, while preserving and protecting our nation's aquatic resources. If you would like to provide comments on our Regulatory Program, please complete the Customer Service Survey Form available on our website: http://www.spn.usace.army.mil/Missions/Regulatory.aspx

Sincerely,

Katerina Galacatos

Jane M. Hicks
for: Chief, Regulatory Division

Enclosures

Copy Furnished (w/ Encl A only):

CA RWQCB, Oakland, CA

Water Quality Control Permit (Water Quality Certification),
dated January 22, 2015

Sent via electronic mail--no hard copy to follow

January 22, 2015
CIWQS Place No. 810480
Regulatory Measure No. 398724

California Department of Transportation
Attn.: Richelle P. Perez
richelle.perez.dot.ca.gov
111 Grand Ave.
Oakland, CA 94612-3717

Subject: Water Quality Certification for the Interstate 280 Drainage Pipe System Repair Project near the City of Belmont, San Mateo County

Department Project No.: EA 04-4G590

Dear Ms. Perez:

We have reviewed and hereby issue water quality certification (Certification) to the California Department of Transportation (Department) for the Interstate 280 Drainage Pipe System Repair Project (Project). The Department has applied for Nationwide Permit 12 for Utility Line Activities from the U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act (33 U.S.C. § 1344). As such, the Department has applied to the San Francisco Bay Regional Water Quality Control Board (Water Board) for a Clean Water Act Section 401 water quality certification that the Project will not violate State water quality standards.

Project: The following Project description was derived from application materials received by Water Board staff on October 22, 2014, and supplemental information provided by the Department via email on November 3, December 1, 15, and 22, 2014, and January 20, 2015. The application was deemed complete by Water Board staff on January 21, 2015. The Water Board received payment of the full fee for the Project on November 13, 2014.

The Department proposes to replace a storm drain pipe system under a maintenance road located approximately 350 feet south of I-280 at milepost 9.4, near Belmont. An existing 60-inch corrugated metal pipe (CMP) has deteriorated, causing a large sink hole to form above the pipe, which is impacting the maintenance road and supporting fill slope of I-280. A new 850 linear foot storm drain system consisting of 54-inch and 60-inch reinforced concrete pipe (RCP) will be installed on a parallel alignment, adjacent to the existing 60-inch CMP. The new system will connect to existing 24-inch lateral corrugated steel pipes draining from I-280, and will also connect to the existing concrete headwall at the outfall. No impacts to the downstream jurisdictional water are expected, as all work to connect the new storm drain system will occur on the upstream side of the existing headwall. The existing 60-inch CMP will be plugged and

abandoned by filling the pipe with concrete slurry or sand upon completion of the installation of the new storm drain system.

Impacts: Project implementation will permanently impact approximately 0.093 acres (850 linear feet) of culverted jurisdictional waters due to fill and abandonment of an 850-foot, 60-inch diameter corrugated metal pipe.

Avoidance and Minimization: The Department has avoided and minimized impacts to jurisdictional waters by utilizing the existing concrete headwall at the outfall, thus avoiding any impact to downstream waters, wetlands and riparian habitat

Mitigation: Because the Project will only impact culverted jurisdictional waters which will be replaced by a new storm drain system and will connect to the existing headwall at the outfall, mitigation will not be required.

CEQA Compliance: The Project was evaluated pursuant to the requirements of the California Environmental Quality Act (CEQA) in a Negative Declaration issued on January 9, 2015.

Certification: I hereby issue an order certifying that any discharge from the referenced project will comply with the applicable provisions of sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 303 (Water Quality Standards and Implementation Plans), 306 (National Standards of Performance), and 307 (Toxic and Pretreatment Effluent Standards) of the Clean Water Act, and with other applicable requirements of State law. This discharge is also regulated under State Water Resources Control Board Order No. 2003 - 0017 – DWQ, "General Waste Discharge Requirements for Dredge and Fill Discharges That Have Received State Water Quality Certification" which requires compliance with all conditions of this Water Quality Certification. The following conditions are associated with this certification:

1. The Department shall adhere to the Standard conditions imposed by Nationwide Permit No. 12, issued to the Department by the U.S. Army Corps of Engineers, and the Biological Opinion issued by the United States Fish and Wildlife Service;

2. The Project shall be constructed in conformance with the Project Description described in this Certification and Certification application materials. Any change in the Project that could impact State waters may require compensatory mitigation and shall first be reported to and found acceptable by the Water Board Executive Officer;

3. No equipment shall be operated in areas of flowing or standing water; no fueling, cleaning or maintenance of vehicles or equipment shall take place within jurisdictional waters or within any areas where an accidental discharge to jurisdictional waters may occur;

4. Except as expressly allowed in this Certification, the discharge, or creation of the potential for discharge, to waters of the State of any construction wastes and/or soil materials including cement, fresh concrete, or washings thereof, silts, clay, sand, oil or petroleum products and other organic materials to waters of the State is prohibited;

5. The Department shall not use or allow the use of erosion control products that contain synthetic materials within waters of the State at any time. The Department shall request approval from Water Board staff if an exception from this requirement is needed at a specific location. In upland and riparian areas, the Department shall prioritize the use of

wildlife-friendly biodegradable (not photo-degradable) erosion control products. The Department shall not use or allow the use of erosion control products that contain synthetic netting for permanent erosion control (i.e. erosion control materials to be left in place for two years or after the completion date of the Project).

If the Department finds that erosion control netting or products have entrapped or harmed wildlife, personnel shall remove the netting or product and replace it with wildlife-friendly biodegradable products;

6. The discharge of sediment to waters of the State, or to areas where sediment may discharge to waters of the State, is prohibited. The Department shall implement all appropriate sediment and erosion control construction best management practices, including management of excavated materials during the excavation, transport, and stockpiling process;

7. This certification does not allow for the take, or incidental take, of any special status species. The Department shall use the appropriate protocols, as approved by the California Department of Fish and Game and the U.S. Fish and Wildlife Service, to ensure that Project activities do not impact the Beneficial Use of the Preservation of Rare and Endangered Species;

8. The Department shall maintain a copy of this water quality certification at the Project site so as to be available at all times to site operating personnel. It is the responsibility of the Department to assure that all personnel (employees, contractors, and subcontractors) are adequately informed and trained regarding the conditions of this certification;

9. This certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to Section 13330 of the California Water Code (CWC) and Section 3867 of Title 23 of the California Code of Regulations(23 CCR);

10. This certification action does not apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license, unless the pertinent certification application was filed pursuant to California Code of Regulations (CCR) Title 23, Subsection 3855(b) and that application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought; and,

11. Certification is conditioned upon total payment of the full fee required in State regulations (23 CCR Section 3833). Water Board staff received full payment of $1,710 on November 13, 2014.

We anticipate your cooperation in implementing these conditions. However, please be advised that any violation of water quality certification conditions is a violation of State law and subject to administrative civil liability pursuant to California Water Code (CWC) section 13350. Failure to respond, inadequate response, late response, or failure to meet any condition of this certification may subject you to civil liability imposed by the Water Board to a maximum of $5,000 per day per violation or $10 for each gallon of waste discharged in violation of this certification.

We anticipate no further action on this request. Should new information come to our attention that indicates a water quality problem with this project, the Water Board may issue Waste Discharge Requirements pursuant to 23 CCR Section 3857.

If you have any question, please contact Derek Beauduy at (510) 622-2348 or via e-mail to derek.beauduy@waterboards.ca.gov.

Sincerely,

for Bruce H. Wolfe
Executive Officer

cc (via e-mail):
Mr. Bill Orme SWRCB-DWQ
Mr. Jason Brush, USEPA
Ms. Jane Hicks, USACE
Ms. Katerina Galacatos, USACE
Mr. Ryan Olah, USFWS
Mr. Hardeep Takhar, Caltrans
Mr. Cyrus Vafai, Caltrans
Mr. Dale Bowyer, Water Board

04-4G591 Water Quality Information Handout, dated January 29, 2015

WATER QUALITY INFORMATION HANDOUT

CONTRACT NO. 04-4G5911

04-SM-280-PM 9.4

DRAINAGE PIPE REPLACEMENT,

SINK HOLE PROJECT

California Department of Transportation
District 04
Office of Water Quality
111 Grand Avenue, Oakland, CA 94612

January , 2015

Disclaimer

A "Disclaimer" is required specifying that the information provided in the Water Quality Information Handout is just a guideline and is to be used for information purposes only and should not be considered a sole source document to adhere to the requirements of the new National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP), Number CAS000002, adopted on September 2, 2009. The contractor is required to provide water quality monitoring, sampling and implement best management practices (BMPs) based on standard industry operations, field conditions and conditions encountered based on the contractor's means and methods. The information in this handout is not to be construed in any way as a waiver of the provisions in the CGP. Bidders and contractors are cautioned to make independent investigations and examinations as they deem necessary to satisfy the conditions encountered in performance of work, with respect to the following: sampling and monitoring locations, distribution of watershed areas for sizing of BMPs, and selection of BMPs in order to conform to the requirement of the contract documents and the CGP.

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J RISK LEVEL DETERMINATION

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L WATER POLLUTION CONTROL DRAWING

1 Project Information

1A Project Description

Caltrans proposes to replace a drainage pipe west of Interstate 280 at post mile 9.4. The 60-inch corrugated metal pipe, which has failed along a portion of its length, has created a sinkhole sufficiently large enough to begin impacting an existing maintenance access road and supporting fill slope of Interstate 280.

The original 60-inch metal pipe will be abandoned in place and 850 feet of new 60-inch reinforced concrete pipe will be constructed adjacent to the original pipe location. The new pipe system will use the existing outfall, tying the new pipe to the back of the existing headwall by a bonded mechanical connection, thus keeping new construction restricted to upland habitat. The sinkhole will be backfilled. All abandoned sections of the pipe will be filled with slurry or sand and left in place. The existing maintenance access road will be restored.

Latitude and Longitude:	37.4983, -122.3157
Construction Start Date	06/15/2015
Construction End Date	10/15/2015
Project Area	2.0 ac
Disturbed Soil Area	1.40 ac

1B Receiving Water Bodies

Unnamed creek at the job site and Upper Crystal Springs Reservoir close to the job site, the receiving water bodies, are neither listed in the Clean Water Act 2010 303(d) List of Water Quality Limited Segments for Sedimentation/Siltation nor the project area is located within the high-risk receiving watershed area.

2 Construction General Permit

Since the disturbed soil area is more than one acre, this project must comply with the conditions of the Caltrans Statewide National Pollutant Discharge Elimination System (NPDES) Permit (No. CAS000002) or Construction General Permit (No. 2009-0009- DWQ) or San Francisco Bay Regional Water Quality Control Board Municipal NPDES Permit (No. R2-2009-0074). A Storm

Water Pollution Prevention Plan (SWPPP) is required. A Notice of Intent (NOI) shall be filed before commencing any construction activities at the job site for this project.

2A Risk Level

This project has disturbed soil area more than one acre hence RL determination is assessed. This project has low site sediment risk factor and has high receiving water (RW) risk factor. Hence its combined risk factor is RL# 2.

3 Temporary Construction Site BMPs

The estimated quantities of temporary construction site best management practices (BMPs) are in the PSE package. The recommended BMPs shall be implemented to address the temporary water quality impacts resulting from the construction activities in job site. The BMPs include the measures of soil stabilization, sediment control, wind erosion control, tracking control, non-storm water management, and waste management/materials pollution control.

4 Permits

4A General

Required permits:

1. 401 Certification from the Regional Water Quality Board
2. 404 Permit from the U.S. Army Corps of Engineers
3. Biological Opinion from the U.S. Fish and Wildlife

5 ATTACHMENTS

ATTACHMENT A

VICINITY MAP

INDEX OF PLANS

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

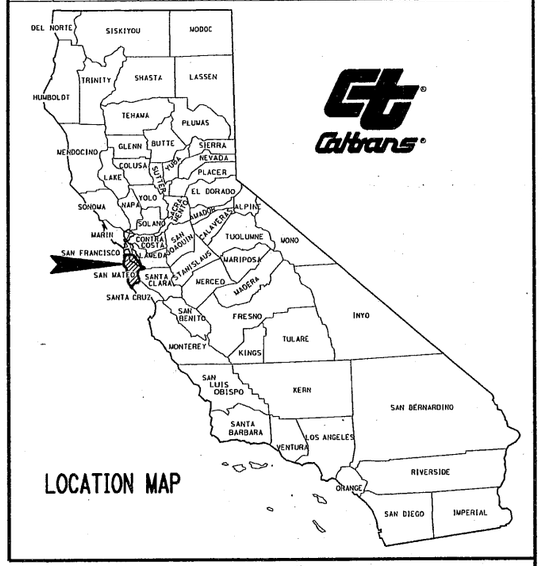
PROJECT PLANS FOR CONSTRUCTION ADJACENT TO

STATE HIGHWAY

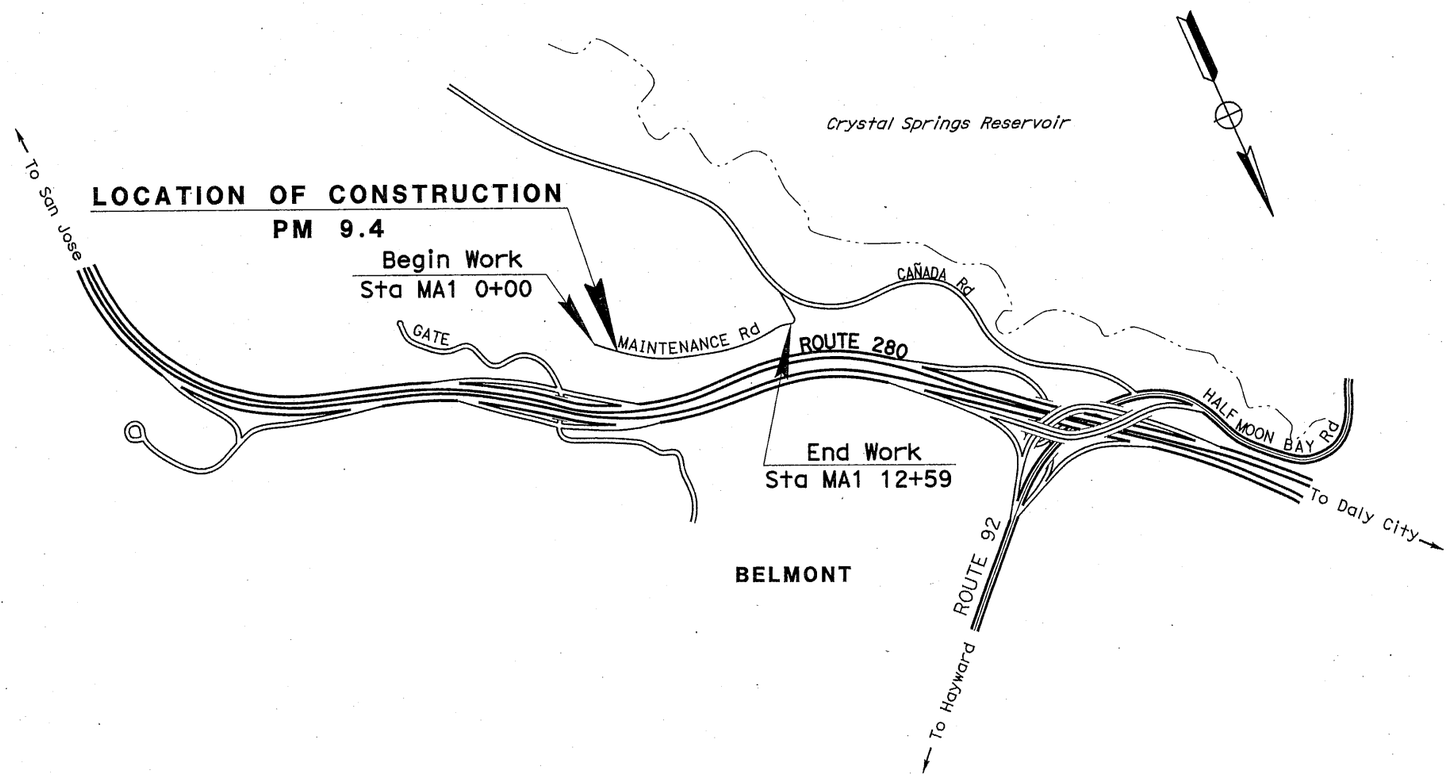
IN SAN MATEO COUNTY
NEAR BELMONT
AT 1.0 MILE SOUTHEAST OF ROUTE 92/280 SEPARATION

TO BE SUPPLEMENTED BY STANDARD PLANS DATED 2010

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	280	9.4		



LOCATION MAP



NO SCALE

95% PS&E REVIEW

PROJECT ENGINEER DATE
REGISTERED CIVIL ENGINEER

Brian M. Wood
No. 76969
Exp. 12-31-14
CIVIL
STATE OF CALIFORNIA
REGISTERED PROFESSIONAL ENGINEER

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

CONTRACT No.	04-4G5904
PROJECT ID	0412000619

LAST REVISION 03-14-14

DATE PLOTTED => 14-MAR-2014
TIME PLOTTED => 13:45

PROJECT MANAGER: RICHELLE PEREZ

DESIGN MANAGER: BOB ZANDIPOUR

THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE "NOTICE TO BIDDERS."

ATTACHMENT B

PROJECT DISCHARGE LOCATION PLAN

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	280	9.4		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTE:

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

ABBREVIATIONS:

RCP REINFORCED CONCRETE PIPE
CSP CORRUGATED STEEL PIPE

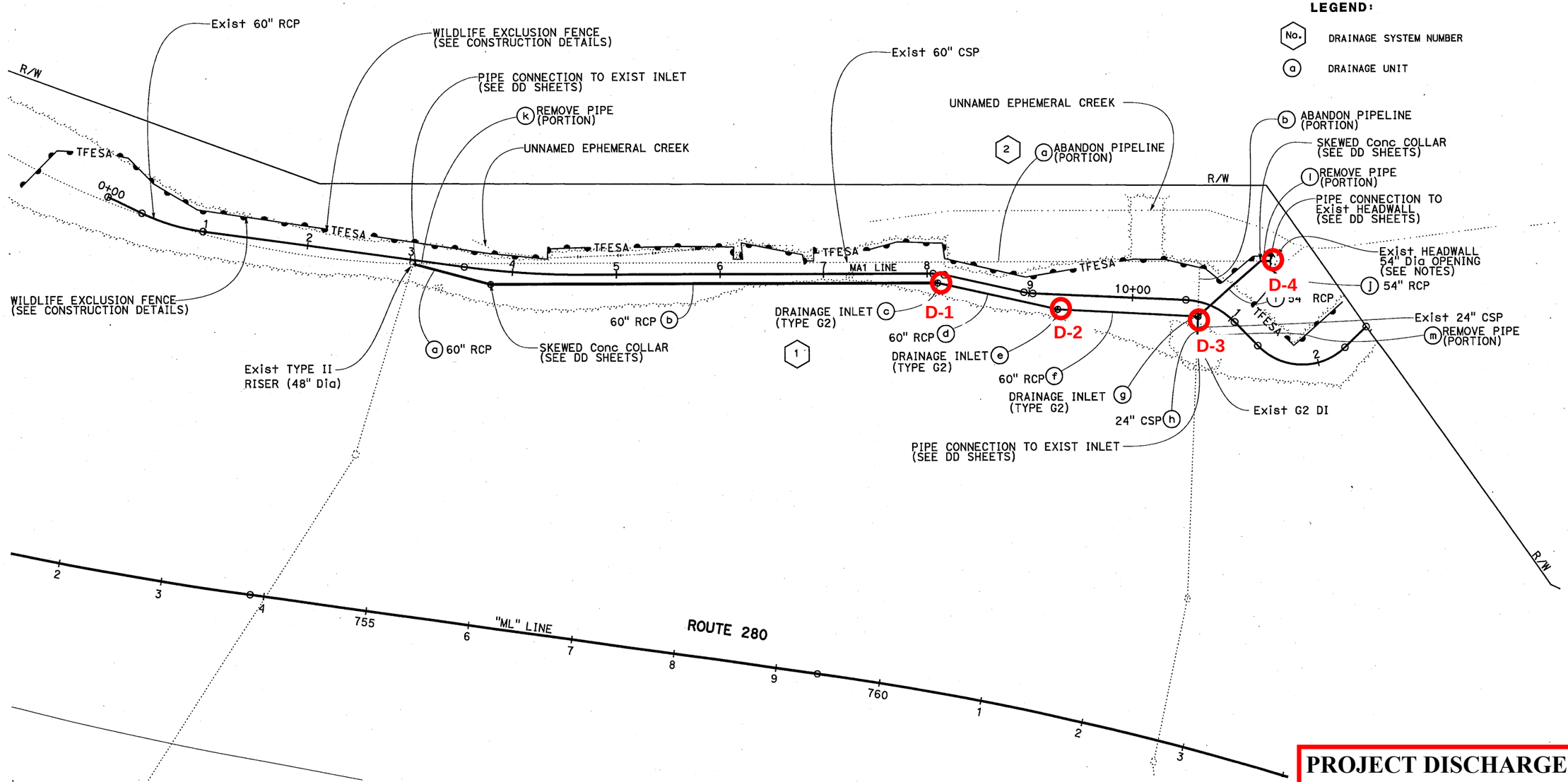
D-x PROJECT DISCHARGE LOCATION PLAN

NOTES:

1. DATUM IS NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD).
2. SEE G-SHEETS FOR CONTOUR GRADING DETAILS.
3. FOR UTILITIES INFORMATION, SEE UTILITY PLANS.
4. THE CONTRACTOR IS TO VERIFY THE SIZE OF THE HEADWALL OPENING THROUGH FIELD MEASUREMENT.

LEGEND:

No. DRAINAGE SYSTEM NUMBER
a DRAINAGE UNIT



APPROVED FOR DRAINAGE WORK ONLY

THIS PLAN ACCURATE FOR DRAINAGE WORK ONLY

PROJECT DISCHARGE LOCATION PLAN

REVISED BY	DATE REVISED
A	A
A	A

CALCULATED-DESIGNED BY A
CHECKED BY A
FUNCTIONAL SUPERVISOR A

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
DESIGN

LAST REVISION 02-05-14
DATE PLOTTED => 14-MAR-2014
TIME PLOTTED => 15:58

BORDER LAST REVISED 7/2/2010
USERNAME => s133768
DGN FILE => 04120006191a001.dgn
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
UNIT 0728
PROJECT NUMBER & PHASE 04120006191

ATTACHMENT C

GROUNDWATER SEEPAGE RATE

State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. BOB ZANDIPOUR
Senior Transportation Engineer
Office of Toll Bridge

Date: March 12, 2014

Attention: B. Wood
J. Moor

File: 04- SM- 280 PM 9.4
04-4G5901
E-FIS 0412000619
Belmont Pipe Replacement

From: RIFAAT NASHED RN
Engineering Geologist
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

CHRIS RISDEN
Chief, Branch B
Office of Geotechnical Design – West
Geotechnical Services
Division of Engineering Services

Subject : SEEPAGE RATE (FLOW RATE) ESTIMATE AT BELMONT PIPE REPLACEMENT

This memo is in response to your request to provide the groundwater depth and seepage rate for the excavation of soil planned for replacing an approximate 830-foot long section of broken drainage pipe located south of Interstate 280 at San Mateo County, near the city of Belmont, California. It is our understanding that this information will be used in estimating dewatering quantities.

It should be noted that our estimate is based on the following:

1- The total width for the excavated trench will be 9 ft diameter (the new pipe needs to be 60 inches, and 2 ft in each side of the pipe for backfill).
2- The length of the replacement pipe is 830 ft and the excavation length is 840 ft (5 feet in each side for backfill).
3- The depth of the excavation ranges between 10 ft and 30 feet, but we considered the worst case scenario as 30 ft.
4- The groundwater depth ranges between 10.5 ft and 17 feet, but we considered the worst case scenario as 10.5 ft.
5- The ground elevation at the eight boreholes (B1- B8) ranges between 315 ft to 320, but we considered the worst case scenario as 315 ft.

Based on Preliminary Site Investigation Report for "Belmont Sinkhole Repair, San Mateo County, California" prepared by Geocone Consultants, Inc in September 2013, the soil at and below the groundwater level and extending to the bottom of the excavation is silty sand with some gravel and trace clay, silty clay with some gravel, well-graded sand with silt.

By using the Coefficient of Permeability, K value 1.4 ft /day for silty sand with gravel (SM), the seepage rate for this soil layer is 2.7 gallon/day/ft^2.

By using the Coefficient of Permeability, K value 0.0027 ft /day for sandy to silty clay (CL), the seepage rate for this soil layer is 0.01 gallon/day/ft^2.

By using the Coefficient of Permeability, K value 1.4 ft /day for well graded sand with silt (SW), the seepage rate for this soil layer is 2.7 gallon/day/ft^2.

According to "The Federal Highway Report NO. FHWA-TS-80-224, Page 48-49" the Coefficient of Permeability K (ft./day) for the soils encountered are as follows

Unified Soil Classification	Coefficient of Permeability K (ft./day)
Silty Sand (SM)	$2.7x10^{-4}$ to 1.4
Clay (CL)	$2.7x10^{-5}$ to $2.7x10^{-3}$
Well graded sand	1.4 to 137

Our estimate of the seepage rate (flow rate) for the project area in general is approximately 2.0 gallons /day/ ft^2. This seepage rate (flow rate) estimate is provided for cost estimate purposes only.

If you have any questions or need additional information, please call Rifaat Nashed at (510) 622-1773 or Chris Risden at (510) 622-8757.

c: TPokrywka, CRisden, Daily File

RNashed/mm

Belmont Pipe Replacement - Seepage Rate

Soil Type	Bed Thickness under G.W.(ft)	Length (ft)	Width (ft)	A (ft^2)	K (ft/day)	H (ft)	H0 (ft)	dH (ft)	d S (ft)	i	q(ft3/day)	q total (Gallon/day)	Flow Rate (Gallon/day/ft2)	Average flow rate (Gallon/day/ft2)
Silty Sand with gravel (SM)	3.5	840.0	9	5943	1.40	304.5	285.00	19.50	74.1	0.2632	2189.526316	16339.74863	2.7494108405	2.70
Sandy to Silty clay (CL)	6.0	840.0	9	10197	0.0027	304.5	285.00	19.50	74.1	0.2632	7.245236842	54.06893166	0.005302435	0.01
Well graded sand with silt (SW)	10.0	840.0	9	24540	1.40	304.5	285.00	19.50	74.1	0.2632	9041.052632	67470.54203	2.7494108	2.70
Total				40680								83864.35958		
													General Average	1.8

q = KiA

Note

A = Surface area

k = Soil permeability (from Hwy Subdrainage Design Report No. FHWA - TS-80-224- Page 48-49)

H = ground water elevation

H0 = elevation the bottom of excavation

dH = water head

ds = gradient distance Li = 3.8x(H - H0).....Ref. FHWA-Ts-80-224 Page 66

"i" = dH/ds

q total = (gallon/day/ft2) = q total (gallon/day)/ total surface area

ATTACHMENT D

DEWATERING LOCATION PLAN

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	280	9.4		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

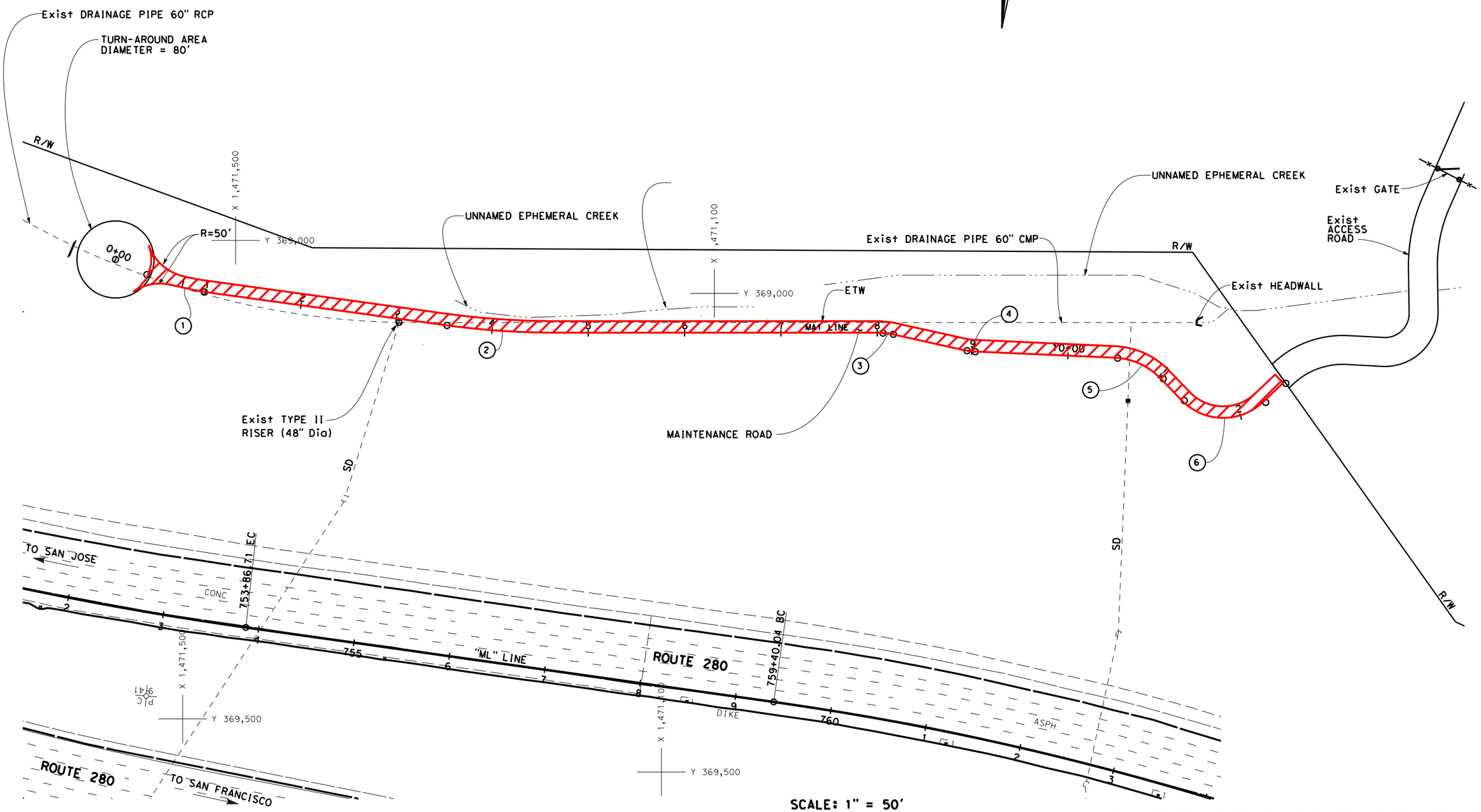
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTE:

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

LEGEND:

DEWATERING LOCATION



SCALE: 1" = 50'

DEWATERING LOCATION PLAN

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

DESIGN

Caltrans

FUNCTIONAL SUPERVISOR

CALCULATED-DESIGNED BY

CHECKED BY

REVISED BY

DATE REVISED

LAST REVISION 01-31-14

DATE PLOTTED => $DATE

TIME PLOTTED => $TIME

ATTACHMENT E

LIST OF PUBLICLY OWNED TREATMENT WORKS (POTW) FACILITY

	City Discharger	Treatment Plant Name	WDR Discharger Name	Discharger Contact Name	Contact Phone No.	Contact Email	Mail Address	Ct Contact for Groundwater & De-Watering Discharges	Service Area of the POTW
26	San Francisco International Airport WQCP	San Francisco International Airport WQCP	San Francisco International Airport WQCP	Sam Mehta	650-821-7841	sam.mehta@flysfo.com		They would not allow, except if the Reg. Board insisted. Would have to be checked for TPH - contact Stormwater "guru" / Utilities head Mark Costanza @ 650-821-7809	Just the S.F.I. Airport - they said no parts of Hwys 101 or 380 enter their system
27	San Mateo	San Mateo Waste Water Treatment Plant (formerly San Mateo WQCP)	San Mateo WQCP	Kacey Karmendy	650-522-7388	karmendy@ci.sanmateo.ca.us		Per "Best Contact" Vern Bessey @ 650-522-7342 new org. name is SMWTP and serves Cities of San Mateo and Foster City. They disallow clean groundwater and SW if it just has sediment, prefers Baker tanks and discharge to storm drain. Will accept IF contaminated - permit and testing needed, including "site history"	They cover: "San Mateo, half of Hillsborough, Foster City, unincorporated S.M. County, and a very small part of Belmont." Contact Otis Chan 650-522-7305 for GIS information.
28	South S.F	South S.F./San Bruno WQCP	City of South San Francisco	Dave Castagnola; Terry White	650-829-3844; 650-877-8551	dcastagnola@wqcp.ci.ssf.ca.us; terry.white@ssf.net	Dave Castagnola, City of South San Francisco, 195 Belleair Road, South San Francisco, CA 94080; Terry White, Deputy Director, Maintenance Service, City of South San Francisco, 550 North Canal St., South San Francisco, CA 94080	Contact : Kevin Maffei for permit information at 650-829-3881. Permit can be expedited, a WQ profile is needed, one-time permit fee of $ 60.00, then $1.83 per 100 Cu ft.	They cover: "South San Francisco, San Bruno, Colma, and a very small part of Daly City." No GIS available. Plant phone # 650-877-8555.
29	San Bruno		City of San Bruno	Scott Munns	650-616-7066	smunns@ci.sanbruno.ca.us	Scott Munns, Director, Public Works, City of San Bruno, 567 El Camino Real, San Bruno, CA 94066	Same as South S.F. / San Bruno WQCP - see line # 28	Part of South S.F. / San Bruno WQCP - see line # 28
30	Colma		Colma City	Ellen Ellsworth	650-757-8888	ellen.ellsworth@colma.ca.gov	Richard Mao, City Engineer, Town of Colma, 1188 El Camino Real, Colma, CA 94014	Same as South S.F. / San Bruno WQCP - see line # 28	Part of South S.F. / San Bruno WQCP - see line # 28
31	Millbrae	Millbrae WPC	Millbrae WPC	Thomas Colletti	650-259-2381	tcolletti@ci.millbrae.ca.us	Thomas Colletti, City of Millbrae, 621 Magnolia Ave., Millbrae, CA 94030	Best contacts: Dick York, 650-259-2393, Supt. Of WWTP; and/or David Ocampo 650-259-2392 Lab Supt. (issues g-water permit) Permit needed, sampling for contaminates needed, etc., -they have done this in the past.	Just the City of Millbrae. Plant phone # is 650-259-2388
32	Pacifica	Calera CRK Water Recycling Plant	Calera CRK Water Recycling Plant	Dave Gromm	650-738-4663	grommd@ci.pacifica.ca.us		Handles the City of Pacifica. Best contact is Brian Martinez @ 650-738-4669. Per Dave Gromm: "new plant has lots of capacity" will accept discharge after permit, testing, etc.	The city of Pacifica and a small part of Daly City
33	Burlingame	Veolia Water [formerly Burlingame WWTP]	Burlingame WWTP	Phil Scott,	650-558-7673; 650-558-7679	pscott@burlingame.org; bsalzon@burlingame.org	Phil Scott, Public Work Superintendant, 501 Primrose, Burlingame, CA 94010	Contact Doug Bell @ 558-7245 or dbell@burlingame.org: "not straightforward" he would need to "run it by 3-4 people" - it could be"handled in different ways" - would probably have to check out the ways this was handled the previous times…etc.	Burlingame and half of Hillsborough. Plant phone # is 650-342-3727

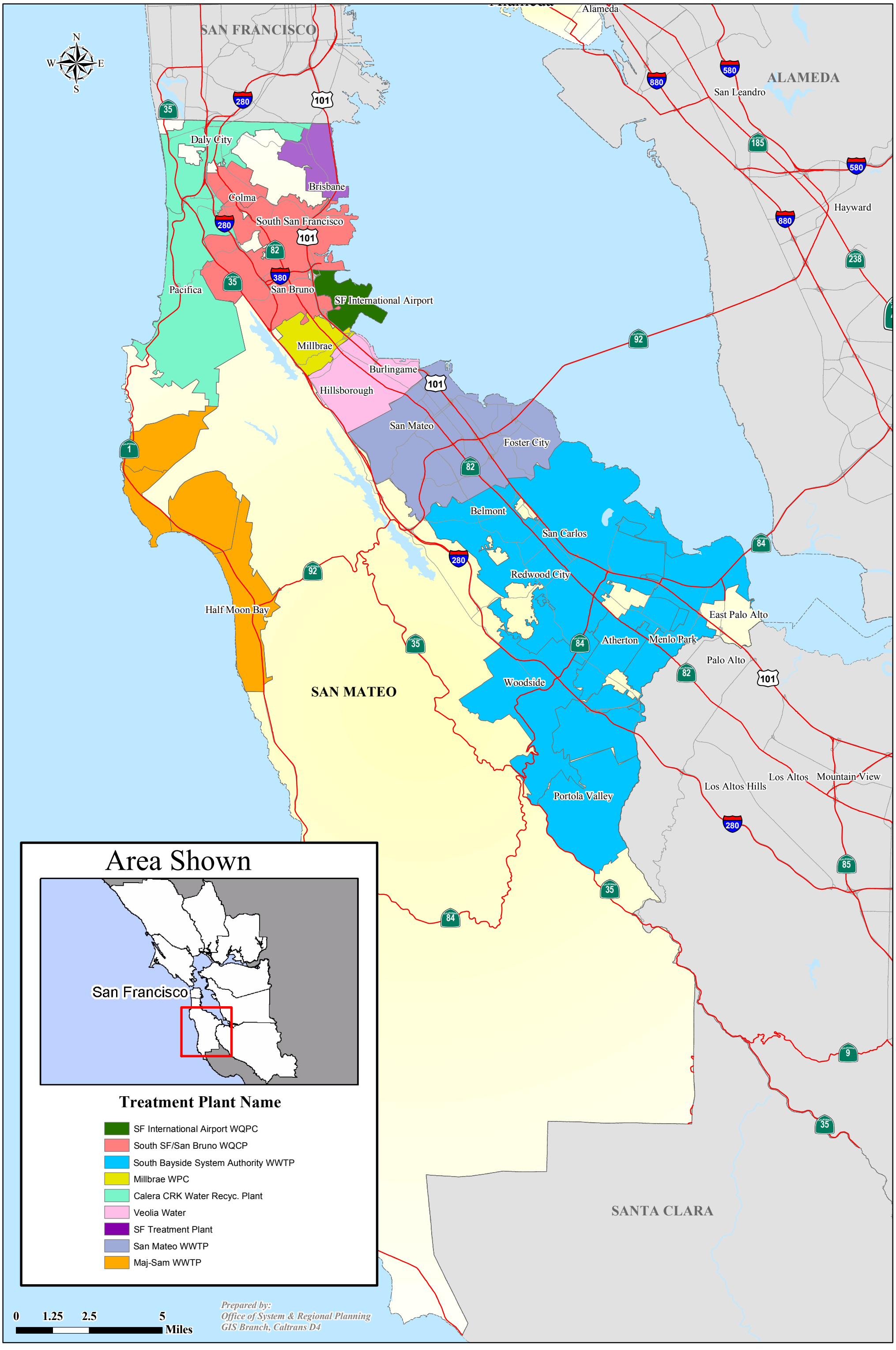
34	Hillsborough		Town of Hillsborough	David Bishop	650-375-7411	dbishop@hillsca.org	Kevin Oconnell, Public Work Director, Town of Hillsborough, 1600 Flibunda Ave., Hillsborough, CA 94010-6418	Hillsborough sends their WW to Burlingame and SMWWT plants for treatment- see Lines # A -27 and 33.	Hillsborough sends their WW to Burlingame and SMWWT plants for treatment- see Lines # A -27 and 33.
55	Maj-Sam WWTP	Maj-Sam WWTP	Sewer Authority Mid-Coastside	Tony Pullin	650-726-0124	tony@samcleanswater.org		Contact :Brenda Donald 650-726-0124x105 - she will mail packet of info $50 fee, 10 cents per Gal. Brenda@samcleanswater.org	Rural San Mateo Coast - Hwy 001 from Montara to Half Moon Bay "8 or 9 miles of Coast - and a little bit of Hwy 92" - per Tony Pullin
56			City of Half Moon Bay	Ed Marlow	(650) 726-8260	emarlow@psomas.com	Ed Marlow - Interim Assistant City Manager, Department of Public Works, 501 Main Street, City of Half Moon Bay, CA 94019	Same as Maj-Sam - see Line #55	Same as Maj-Sam - see Line #55
57			Granada Sanitary District	Gina Holmes	(650) 726-7093	gsd@netwiz.net	Gina Holms, Administrator, Granada Sanitary District, 455 Avenue, P.O. Box 335, El Granada, CA 94018	Same as Maj-Sam - see Line #55	Same as Maj-Sam - see Line #55
			Dudek Associate (Granada SD consultant)	chuck Duffy	(760)942-5147	cduffy@dudek.com	605 3rd St., Encinitas, CA 92024	Same as Maj-Sam - see Line #55	Same as Maj-Sam - see Line #55
58			Montara Sanitary District	George Irving	(650) 728-3545	msd@montara.com	George Irving, District Manager, Montara Sanitary District, 8888 Cabrillo Highway, P.O. Box, Montara, CA 94037	Same as Maj-Sam - see Line #55	Same as Maj-Sam - see Line #55
	Treasure Island WPCP	Treasure Island WPCP	SF PUC	Nathan Brennan	(415)242-2256 X1358	mcarlin@sfwater.org nbrennan@sfwater.org	Michael Carlin, SFPUC, Planning Bureau Manager, 1141 Market St., Suite 401, San Francisco, CA 94103, 415-934-5787	Best contact is Vic Vista @ 415-274-0318 at the "very small" plant on TI. Would want Chloride levels checked - and other sampling, and permit required.	Yerba Buena Island and Treasure Island
59	South Bayside System Authority WWTP	South Bayside System Authority WWTP	South Bayside System Authority	Bob Donaldson	650-594-8411x127	rdonaldson@sbsa.org	Robert Donaldson, South Bayside Ssytem Authority, 1400 Radio Road, Redwood City, CA 94065	Contact Ken Kaufman @ 650-594-8411 x 128 or kkaufman@sbsa.org "Individual Evaluation" No website, Need permit and water analysis "usually 1 to 3 day turn-around for Permit	SBSA takes WW from Belmont, San Carlos, all of Redwood City, and Redwood Shores. Has joint operating agreement with "WestBay" and also treats waste from Woodside, Atherton, Portola Valley, and Menlo Park. Good Contacts: Bob Donaldson and Jim Bewley @ 650-591-7121
60			City of Belmont	Kathleen E. Phalen	650-595-7469	kphalen@ci.belmont.ca.us	Kathleen E. Phalen, Associate Civil Engineer, City of Belmont, 1070 Sixth Ave. Suite 306, Belmont, CA 94002	Same as SBSA Authority WWTP - see line 59	Same as SBSA -see Line # A-59
61			City of Redwood City	Peter Ingram; Marilyn Harang	650-780-7466; 650-780-7477	pingram@redwoodcity.org; mharang@redwoodcity.org	Peter Ingram, Director, Public Works Services, City of Redwood City, 1400 Broadway, Redwood City, CA 94063-2505	Same as SBSA Authority WWTP - see line 59	Same as SBSA - see Line # A-59
62			City of San Carlos	Parviz Mokhtari	650-802-4202	parviz.mokhtari@ci.san-carlos.ca.us	Parviz Mokhtari, Director of Public Works, City of San Carlos, 600 Elm St., San Carlos, CA 94070	Same as SBSA Authority WWTP - see line 59	Same as SBSA - see Line # A-59
63			Town of Woodside	Kent Dewell	650-851-6790		Kent Dewell, Town Engineer, Toen of Woodside, P.O. Box 94062, Woodside, CA 94062	Same as SBSA Authority WWTP - see line 59	Same as SBSA - see Line # A-59

64			West Bay SD	Tim Clayton	650-321-0384	tclayton@westbaydst.com	Tim Clayton, District Manager, West Bay Sanitary District, 500 Laurel St., Menlo Park, CA 94025	Same as SBSA Authority WWTP - see line 59	Same as SBSA - see Line # A-59
65	For collection system in unincorporated areas	For collection system in unincorporated areas	San Mateo County	Brian Lee	650-599-1497	blee@anmateo.ca.us	Brian Lee, Department of Public Works, 555 County Center, 5th Floor, Redwood City, CA 94063-1665	Same as SBSA Authority WWTP - see line 59	Same as SBSA - see Line # A-59
66	North San Mateo WWTP	North San Mateo WWTP	North San Mateo County	Patrick Sweetland	650-991-8201	psweetland@dalycity.org	Patrick Sweetland, Director of Water and Wastewater Resources, North San Mateo Sanitary District, 153 Lake Merced Blv., Daily City, CA 94015	Same as SBSA Authority WWTP - see line 59	Same as SBSA - see Line # A-59
106	Satellite system of City and County of SF treatment plant	Satellite system of City and County of SF treatment plant	City of Brisbane	Matthew Fabry	415-508-2134	mfabry@ci.brisbane.ca.us	Matthew Fabry, City of Brisbane, Publc Works Department, 50 Park Place, Brisbane, CA 94005-1310	Per Matt Fabry @ 415-508-2134 "they would accept in accordance with the regulations of the permit for SMCO. They would accept some non - Storm Water discharge" - he would like to hear more specifics before assuring acceptance.	Services Brisbane and the Guadalupe Canal area. They send their WW to the SF Combined System. [Only Ct ROW is US 101] They have their service electronically - call Matt Lee at 415-508-2132

ATTACHMENT F

POTW SERVICE AREA MAP

San Mateo County - POTW Service Areas



ATTACHMENT G

401 CERTIFICATION

Sent via electronic mail--no hard copy to follow

January 22, 2015
CIWQS Place No. 810480
Regulatory Measure No. 398724

California Department of Transportation
Attn.: Richelle P. Perez
richelle.perez.dot.ca.gov
111 Grand Ave.
Oakland, CA 94612-3717

Subject: Water Quality Certification for the Interstate 280 Drainage Pipe System Repair Project near the City of Belmont, San Mateo County

Department Project No.: EA 04-4G590

Dear Ms. Perez:

We have reviewed and hereby issue water quality certification (Certification) to the California Department of Transportation (Department) for the Interstate 280 Drainage Pipe System Repair Project (Project). The Department has applied for Nationwide Permit 12 for Utility Line Activities from the U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act (33 U.S.C. § 1344). As such, the Department has applied to the San Francisco Bay Regional Water Quality Control Board (Water Board) for a Clean Water Act Section 401 water quality certification that the Project will not violate State water quality standards.

Project: The following Project description was derived from application materials received by Water Board staff on October 22, 2014, and supplemental information provided by the Department via email on November 3, December 1, 15, and 22, 2014, and January 20, 2015. The application was deemed complete by Water Board staff on January 21, 2015. The Water Board received payment of the full fee for the Project on November 13, 2014.

The Department proposes to replace a storm drain pipe system under a maintenance road located approximately 350 feet south of I-280 at milepost 9.4, near Belmont. An existing 60-inch corrugated metal pipe (CMP) has deteriorated, causing a large sink hole to form above the pipe, which is impacting the maintenance road and supporting fill slope of I-280. A new 850 linear foot storm drain system consisting of 54-inch and 60-inch reinforced concrete pipe (RCP) will be installed on a parallel alignment, adjacent to the existing 60-inch CMP. The new system will connect to existing 24-inch lateral corrugated steel pipes draining from I-280, and will also connect to the existing concrete headwall at the outfall. No impacts to the downstream jurisdictional water are expected, as all work to connect the new storm drain system will occur on the upstream side of the existing headwall. The existing 60-inch CMP will be plugged and

abandoned by filling the pipe with concrete slurry or sand upon completion of the installation of the new storm drain system.

Impacts: Project implementation will permanently impact approximately 0.093 acres (850 linear feet) of culverted jurisdictional waters due to fill and abandonment of an 850-foot, 60-inch diameter corrugated metal pipe.

Avoidance and Minimization: The Department has avoided and minimized impacts to jurisdictional waters by utilizing the existing concrete headwall at the outfall, thus avoiding any impact to downstream waters, wetlands and riparian habitat

Mitigation: Because the Project will only impact culverted jurisdictional waters which will be replaced by a new storm drain system and will connect to the existing headwall at the outfall, mitigation will not be required.

CEQA Compliance: The Project was evaluated pursuant to the requirements of the California Environmental Quality Act (CEQA) in a Negative Declaration issued on January 9, 2015.

Certification: I hereby issue an order certifying that any discharge from the referenced project will comply with the applicable provisions of sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 303 (Water Quality Standards and Implementation Plans), 306 (National Standards of Performance), and 307 (Toxic and Pretreatment Effluent Standards) of the Clean Water Act, and with other applicable requirements of State law. This discharge is also regulated under State Water Resources Control Board Order No. 2003 - 0017 – DWQ, "General Waste Discharge Requirements for Dredge and Fill Discharges That Have Received State Water Quality Certification" which requires compliance with all conditions of this Water Quality Certification. The following conditions are associated with this certification:

1. The Department shall adhere to the Standard conditions imposed by Nationwide Permit No. 12, issued to the Department by the U.S. Army Corps of Engineers, and the Biological Opinion issued by the United States Fish and Wildlife Service;

2. The Project shall be constructed in conformance with the Project Description described in this Certification and Certification application materials. Any change in the Project that could impact State waters may require compensatory mitigation and shall first be reported to and found acceptable by the Water Board Executive Officer;

3. No equipment shall be operated in areas of flowing or standing water; no fueling, cleaning or maintenance of vehicles or equipment shall take place within jurisdictional waters or within any areas where an accidental discharge to jurisdictional waters may occur;

4. Except as expressly allowed in this Certification, the discharge, or creation of the potential for discharge, to waters of the State of any construction wastes and/or soil materials including cement, fresh concrete, or washings thereof, silts, clay, sand, oil or petroleum products and other organic materials to waters of the State is prohibited;

5. The Department shall not use or allow the use of erosion control products that contain synthetic materials within waters of the State at any time. The Department shall request approval from Water Board staff if an exception from this requirement is needed at a specific location. In upland and riparian areas, the Department shall prioritize the use of

wildlife-friendly biodegradable (not photo-degradable) erosion control products. The Department shall not use or allow the use of erosion control products that contain synthetic netting for permanent erosion control (i.e. erosion control materials to be left in place for two years or after the completion date of the Project).

If the Department finds that erosion control netting or products have entrapped or harmed wildlife, personnel shall remove the netting or product and replace it with wildlife-friendly biodegradable products;

6. The discharge of sediment to waters of the State, or to areas where sediment may discharge to waters of the State, is prohibited. The Department shall implement all appropriate sediment and erosion control construction best management practices, including management of excavated materials during the excavation, transport, and stockpiling process;

7. This certification does not allow for the take, or incidental take, of any special status species. The Department shall use the appropriate protocols, as approved by the California Department of Fish and Game and the U.S. Fish and Wildlife Service, to ensure that Project activities do not impact the Beneficial Use of the Preservation of Rare and Endangered Species;

8. The Department shall maintain a copy of this water quality certification at the Project site so as to be available at all times to site operating personnel. It is the responsibility of the Department to assure that all personnel (employees, contractors, and subcontractors) are adequately informed and trained regarding the conditions of this certification;

9. This certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to Section 13330 of the California Water Code (CWC) and Section 3867 of Title 23 of the California Code of Regulations(23 CCR);

10. This certification action does not apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license, unless the pertinent certification application was filed pursuant to California Code of Regulations (CCR) Title 23, Subsection 3855(b) and that application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought; and,

11. Certification is conditioned upon total payment of the full fee required in State regulations (23 CCR Section 3833). Water Board staff received full payment of $1,710 on November 13, 2014.

We anticipate your cooperation in implementing these conditions. However, please be advised that any violation of water quality certification conditions is a violation of State law and subject to administrative civil liability pursuant to California Water Code (CWC) section 13350. Failure to respond, inadequate response, late response, or failure to meet any condition of this certification may subject you to civil liability imposed by the Water Board to a maximum of $5,000 per day per violation or $10 for each gallon of waste discharged in violation of this certification.

We anticipate no further action on this request. Should new information come to our attention that indicates a water quality problem with this project, the Water Board may issue Waste Discharge Requirements pursuant to 23 CCR Section 3857.

If you have any question, please contact Derek Beauduy at (510) 622-2348 or via e-mail to derek.beauduy@waterboards.ca.gov.

Sincerely,

for Bruce H. Wolfe
Executive Officer

cc (via e-mail):
Mr. Bill Orme SWRCB-DWQ
Mr. Jason Brush, USEPA
Ms. Jane Hicks, USACE
Ms. Katerina Galacatos, USACE
Mr. Ryan Olah, USFWS
Mr. Hardeep Takhar, Caltrans
Mr. Cyrus Vafai, Caltrans
Mr. Dale Bowyer, Water Board

ATTACHMENT H

1602 CERTIFICATION/BIOLOGICAL OPINION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

In Reply Refer to:
08ESMF00-2014-F-0342-1

DEC 2 3 2014

Ms. Melanie Brent, Office Chief
Caltrans District 4 Environmental Analysis
California Department of Transportation
P.O. Box 23660
Oakland, California 94623-0660

Subject: Biological Opinion on the Effects of the Proposed Interstate 280 Repair Pipe System and Backfill Sinkhole Project, San Mateo County, California (Caltrans EA 4G590)

Dear Ms. Brent:

This Biological Opinion (BO) is in response to the California Department of Transportation's (Caltrans) letter, dated September 26, 2013, requesting formal consultation for the proposed Interstate 280 (I-280) Repair Pipe System and Backfill Sinkhole Project (Caltrans EA 4G590), San Mateo County, California. Your letter was received by the U.S. Fish and Wildlife Service (Service) on October 1, 2013. At issue are the effects of the project on the threatened California red-legged frog (*Rana draytonii*), its designated critical habitat, and the endangered San Francisco garter snake (*Thamnophis sirtalis tetrataenia*). This document is issued under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act).

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) legislation (23 U.S.C. 327) allows the Secretary of the U.S. Department of Transportation acting through the Federal Highway Administration (FHWA) to establish a Surface Transportation Project Delivery Pilot Program, whereby a State may assume the FHWA responsibilities under the National Environmental Policy Act (NEPA) for environmental review, agency consultation and other action pertaining to the review or approval of a specific project. Caltrans assumed these responsibilities for the FHWA on July 1, 2007 through a Memorandum of Understanding (MOU) within the State of California (http://www.dot.ca.gov/ser/downloads/MOUs/nepa_delegation/sec6005mou.pdf).

The Service has reviewed the project as described in the August 2013 biological assessment, the October 6 and October 8, 2014, revised project description, May 23, 2013, site visit, supporting documentation, and evaluation of project effects, and concurs with the determination that the project as described is likely to adversely affect the California red-legged frog, San Francisco garter snake, and designated critical habitat for the California red-legged frog. This biological opinion is based on: (1) the Interstate 280 Repair Pipe System and Backfill Sinkhole Project, Biological Assessment dated August 2013, as revised; (2) letter from Caltrans to the Service dated October 6, 2014; (3) the May 23, 2013, site visit; (4) miscellaneous correspondence and electronic mail concerning the proposed action between Caltrans and the Service; and (5) other information available to the Service.

Consultation History

May 23, 2013	The Service attended a site visit with Caltrans to discuss potential project effects on listed species and determine what areas posed risks based on on-site habitat suitability.
October 1, 2013	The Service received a letter requesting the initiation of formal consultation dated September 26, 2013, and a Biological Assessment for the I-280 Repair Pipe System and Backfill Sinkhole Project.
April 1, 2014	The Service attended a conference call with Caltrans to discuss the proposed action and notified Caltrans that the project was within designated critical habitat for the California red-legged frog. An analysis of critical habitat was not provided within their biological assessment and their formal consultation package was considered incomplete.
April 17, 2014	The Service notified Caltrans via email that their August 2013 biological assessment made the determination of a Not Likely to Adversely Affect (NLAA) for the California red-legged frog and San Francisco garter snake. The Service informed Caltrans that we did not agree with this determination as the effects were likely to adversely affect both species and designated critical habitat for the California red-legged frog. In order for the Service to complete the formal consultation process and issue a biological opinion and incidental take coverage; we will need a letter from Caltrans stating that the determinations for the effects to the California red-legged frog and San Francisco garter snake are Likely to Adversely Affect. We requested this clarification during April 1, 2014, phone conversation. The Service requested Caltrans submit a corrected formal consultation initiation letter with the appropriate determinations made for these species.
April 21, 2014	The Service received a revised letter dated April 4, 2014, requesting formal consultation and a revised biological opinion with the determinations of likely to adversely affect the California red-legged frog and San Francisco garter snake.
June 12, 2014	The Service notified Caltrans that the project lies within California red-legged frog designated critical habitat, unit SNM-1. The Service requested Caltrans provide an evaluation of adverse effects to designated critical habitat as well as an assessment of the Primary Constituent Elements (PCE's) within the action area. The Service requested Caltrans provide area calculations of the PCEs within the action area as well as area calculations for effects to designated critical habitat.
June 27, 2014	The Service received an evaluation of the project effects to California red-legged frog designated critical habitat from Caltrans.
October 6, 2014	The Service received a revised project description since a portion of the project was completed as an emergency maintenance repair action in early 2014.

October 8, 2014	The Service received another change to the project description with a revision to the area of direct effects.
October 17, 2014	The Service received revised exhibits depicting the emergency work and proposed Phase II work to be covered under this biological opinion.
November 6, 2014	The Service received revised exhibits and area calculations for the emergency phase and proposed Phase II action.
November 14, 2014	The Service reviewed the project description, biological assessment, species determinations, and supplemental material submitted as part of the consultation package and determined your consultation package was complete.
December 11, 2014	The Service requested additional information from Caltrans on the Bay checkerspot butterfly (*Euphydryas editha bayensis*) and mission blue butterfly (*Icaricia icarioides missionensis*).
December 17, 2014	The Service received requested information from Caltrans on the Bay checkerspot butterfly and the mission blue butterfly sufficient to complete the analysis.
April 16, 2013 - December 11, 2014	Electronic and phone correspondence between Caltrans and the Service.

BIOLOGICAL OPINION

Description of the Proposed Action

The following project description, inclusive of the proposed compensation and proposed conservation measures, was provided by Caltrans and is an excerpt from the August 2013 Biological Assessment, as revised, with minor modifications for reasons of clarity and accuracy provided by the Service.

Project Description

As part of the proposed action, Caltrans proposes to replace a pipe system west of I-280 at post mile 9.4 in unincorporated San Mateo County, California. The project is situated along a Caltrans maintenance road, approximately 320 feet south of I-280 and 800 feet north of Canada Road. The existing drainage system consists of a 60-inch corrugated steel pipe (CSP), two lateral 24-inch CSPs, three drainage inlets, a headwall, and a riser. The 60-inch CSP is located at the bottom of an embankment approximately 320 feet from southbound I-280. Two lateral lines carry storm water from I-280 to the 60-inch CSP. The eastern lateral line discharges directly into the 60-inch CSP whereas the western lateral line discharges into an existing drainage inlet, then continues and discharges into the 60-inch CSP. The 60-inch CSP flows west and discharges storm water into an unnamed creek. The 60-inch CSP is situated between a headwall to the west and a riser to the east.

The 60-inch corrugated metal pipe is corroding along a portion of its length and threatens to undermine an existing maintenance access road and the supporting fill slope of I-280. The purpose of the proposed action is to correct the undermining by replacing the corroding drainage system.

The original 60-inch metal pipe will be abandoned in place and 850 feet of new 60-inch reinforced concrete pipe (RCP) will be constructed adjacent to the original pipe location. The new pipe system will use the existing outfall, tying the new pipe to the back of the existing headwall by a bonded mechanical connection, thus limiting construction to upland of the riparian area. Caltrans will also be replacing the exiting gravel maintenance road. A portion of the original 60-inch CSP will be removed: 20 feet including the 10 feet adjacent to the riser and the 10 feet adjacent to the headwall. Also, Caltrans will remove 29 feet and abandon in place 53 feet of the 24-inch CSP. The area of Waters of the U.S. affected includes 0.095-acre for the 60-inch CSP and 0.004-acre for the new pipe will be minimized using trench shields or equivalent, and the work area will be delimited with ESA fencing.

Caltrans will maintain the hydrologic connection between the laterals and the downstream unnamed creek by installing a 60-inch RCP of 850 linear feet beneath the existing maintenance road. Caltrans will tie-in the new 60-inch RCP with an existing 60-inch RCP and tie-in the laterals to the new 60-inch RCP. Six willow trees will be removed from the area near the exiting headwall in order to tie-in the new pipe.

Emergency Work Completed to Date

The existing pipe corroded in one section, opening a hole in the pipe, and causing a sinkhole to form. The corroded pipe was spot-repaired and the sinkhole was backfilled in an emergency maintenance activity in October and November of 2013.

Proposed Conservation Measures

Proposed Compensation

To offset permanent effects to California red-legged frog and San Francisco garter snake, suitable habitat for each species, or suitable multi-species habitat in coordination with the Service, will be created, restored, or set aside in perpetuity at a ratio of 3:1 for permanent effects and 1.1:1 for temporary effects (Table 1). Alternatively, credits will be purchased at a Service-approved conservation bank. Compensation plans will be subject to review and approval by the Service. On-site restoration of temporarily affected areas may qualify as compensation at a 1:1 ratio once conditions are verified by the Service.

Table 1: Proposed Compensation for Temporary and Permanent Effects

Species	Effects						Total Compensation
	Temporary (acres)			Permanent (acres)			
	Impact	Compensation		Impact	Compensation		
		Ratio	Need		Ratio	Need	
California red-legged frog	2.18	1.1:1	2.40	0.02	3:1	0.06	2.46
San Francisco garter snake	2.18	1.1:1	2.40	0.02	3:1	0.06	2.46

General Conservation Measures

To reduce potential effects to sensitive biological resources, Caltrans proposes to incorporate construction BMPs and avoidance and minimization measures into the proposed roadway construction project. These measures will be communicated to the contractor through the use of

special provisions included in the contract bid solicitation package. These measures include the following:

1. **Seasonal Avoidance**. Construction actions will be scheduled to minimize effects on listed species and habitats. Except for limited vegetation clearing necessary to minimize effects to nesting birds, all ground-disturbing activities in species habitat will be conducted between April 15 and October 15.

2. **Environmental Awareness Training**. Prior to the start of construction, a qualified biologist will conduct an educational training program for all construction personnel including contractors and subcontractors. The training will include, at a minimum, a description of the California red-legged frog, San Francisco garter snake, and their habitat within the action area; an explanation of the status of these species and protection under state and federal laws; the avoidance and minimization measures to be implemented to reduce take of these species; communication and work stoppage procedures in case a listed species is observed within the action area; and an explanation of the Environmentally Sensitive Areas (ESAs) and Wildlife Exclusion Fencing (WEF) and the importance of maintaining these structures. An informational brochure conveying this information with images of these species to aid in identification will be prepared and distributed to all construction personnel. Upon completion of the program, personnel will sign a form stating that they attended the program and understand all the avoidance and minimization measures and implications of the Act.

3. **Environmentally Sensitive Areas**. Prior to the start of construction all ESAs – defined as areas containing sensitive habitats adjacent to or within construction work areas for which physical disturbance is not allowed – will be clearly delineated using high visibility orange fencing. Construction work areas include the active construction site and all areas providing support for the proposed action including areas used for vehicle parking, equipment and material storage and staging, access roads, etc. The ESA fencing will remain in place throughout the duration of the proposed action, while construction activities are ongoing, and will be regularly inspected and fully maintained at all times. The final project plans will depict all locations where ESA fencing will be installed and will provide installation specifications. The bid solicitation package special provisions will clearly describe acceptable fencing material and prohibited construction-related activities including vehicle operation, material and equipment storage, access roads and other surface-disturbing activities within ESAs.

4. **Wildlife Exclusion Fencing**. Prior to the start of construction, WEF will be installed at the edge of the project footprint in all areas where California red-legged frogs or San Francisco garter snakes could enter the construction area. The location of the fencing shall be determined by the Resident Engineer and Service-approved biologist in cooperation with the Service prior to the start of staging or surface disturbing activities. A conceptual fencing plan shall be submitted to the Service for review and approval prior to WEF installation. The location, fencing materials, installation specifications, and monitoring and repair criteria shall be approved by the Service prior to start of construction. Caltrans shall include the WEF specifications on the final project plans. Caltrans shall include the WEF specifications including installation and maintenance criteria in the bid solicitation package special provisions. The WEF shall remain in place throughout the duration of the project and shall be regularly inspected and fully maintained. Repairs to the WEF shall be made within 24

hours of discovery. Upon project completion the WEF shall be completely removed, the area cleaned of debris and trash, and returned to natural conditions.

5. **Avoidance of Entrapment**. To prevent inadvertent entrapment of animals during construction, all excavated, steep-walled holes or trenches more than one foot deep will be covered with plywood or similar materials at the close of each working day or provided with one or more escape ramps constructed of earth fill or wooden planks. The Service-approved biologist shall inspect all holes and trenches at the beginning of each workday and before such holes or trenches are filled. All replacement pipes, culverts, or similar structures stored in the action area overnight will be inspected before they are subsequently moved, capped, and/or buried. If at any time a listed species is discovered, the Resident Engineer and Service-approved biologist will be notified immediately and the Service-approved biologist shall implement the species observation and handling protocol outlined below.

6. **Best Management Practices**. Storm Water Pollution Prevention Plans (SWPPP) and erosion control BMPs will be developed and implemented to minimize any wind or water-related erosion and will be in compliance with the requirements of the Regional Water Quality Control Board. The SWPPP will reference the Caltrans Construction Site BMPs Manual. This manual is comprehensive and includes many other protective measures and guidance to prevent and minimize pollutant discharges and can be found online at: http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm. Protective measures will include, at a minimum:

    a. No discharge of pollutants from vehicle and equipment cleaning is allowed into any storm drains or watercourses.

    b. Vehicle and equipment fueling and maintenance operations must be at least 50 feet away from watercourses, except at established commercial gas stations or established vehicle maintenance facility.

    c. Concrete wastes are collected in washouts and water from curing operations is collected and disposed. Neither will be allowed into watercourses.

    d. Spill containment kits will be maintained onsite at all times during construction operations and/or staging or fueling of equipment.

    e. Dust control measures will include use of water trucks and dust palliatives to control dust in excavation-and-fill areas, covering temporary access road entrances and exits with rock (rocking), and covering of temporary stockpiles when weather conditions require.

    f. Coir rolls or straw wattles that do not contain plastic or synthetic monofilament netting will be installed along or at the base of slopes during construction to capture sediment.

    g. Protection of graded areas from erosion using a combination of silt fences, fiber rolls, etc. along toes of slopes or along edges of designated staging areas, and erosion control netting (such as jute or coir) as appropriate on sloped areas. Erosion control materials that use plastic or synthetic monofilament netting will not be used within the action area. This includes products that use photodegradable or biodegradable synthetic netting, which can take several months to decompose. Acceptable materials include natural fibers such as jute, coconut, twine or other similar fibers.

h. Permanent erosion control measures such as bio-filtration strips and swales to receive storm water discharges from the highway, or other impervious surfaces will be incorporated to the maximum extent practicable.

i. All grindings and asphaltic-concrete waste will be stored within previously disturbed areas absent of habitat and at a minimum of 50 feet from any aquatic habitat, culvert, or drainage feature.

7. **Construction Site Management Practices**. The following site restrictions will be implemented to avoid or minimize effects on listed species and their habitats:

   a. A speed limit of 15 miles per hour (mph) in the project footprint in unpaved areas will be enforced to reduce dust and excessive soil disturbance.

   b. Construction access, staging, storage, and parking areas, will be located within the project Caltrans ROW outside of any designated ESA or outside of the Caltrans ROW in areas environmentally cleared by the contractor. Access routes and the number and size of staging and work areas will be limited to the minimum necessary to construct the proposed project. Routes and boundaries of roadwork will be clearly marked prior to initiating construction or grading.

   c. To the maximum extent practicable, any borrow material will be certified to be non-toxic and weed free.

   d. All food and food-related trash items will be enclosed in sealed trash containers and properly disposed of off-site.

   e. No pets from project personnel will be allowed anywhere in the action area during construction.

   f. No firearms will be allowed on the project site except for those carried by authorized security personnel, or local, State or Federal law enforcement officials.

   g. A Spill Response Plan will be prepared. Hazardous materials such as fuels, oils, solvents, etc. will be stored in sealable containers in a designated location that is at least 50 feet from hydrologic features.

   h. All equipment will be properly maintained and free of leaks. Servicing of vehicles and construction equipment including fueling, cleaning, and maintenance will occur at least 50 feet from any hydrologic features.

8. **Vegetation Removal**. Any vegetation that is within the cut and fill line or growing in locations where permanent structures will be placed (e.g., road alignment, shoulder widening, soil nail walls, etc.) will be cleared. Vegetation will be cleared only where necessary and will be cut above soil level except in areas that will be excavated for roadway construction. This will allow plants that reproduce vegetatively to resprout after construction. All clearing and grubbing of woody vegetation will occur by hand or using light construction equipment such as backhoes. If clearing and grubbing occurs between February 1 and August 31, a qualified biologist(s) will survey for nesting birds within the area(s) to be disturbed including a perimeter buffer of 100 feet for passerines and 300 feet for raptors before clearing activities begin. All nest avoidance requirements of the Migratory Bird Treaty Act and California Fish and Game Code Sections 3503 and 3503.5 will be observed. All cleared

vegetation will be removed from the project footprint to prevent attracting animals to the project site. The contractor will be responsible for obtaining all permits, licenses, and environmental clearances for properly disposing of such materials. A Service-approved biologist will be present during all vegetation clearing and grubbing activities. Prior to vegetation removal, the Service-approved biologist shall thoroughly survey the area for California red-legged frogs and San Francisco garter snakes. Once the Service-approved biologist has thoroughly surveyed the area, clearing and grubbing may continue without further restrictions on equipment; however, the Service-approved biologist shall remain onsite to monitor for California red-legged frogs and San Francisco garter snakes until all clearing and grubbing activities are complete. After project completion, all temporarily affected areas shall be returned to original grade and contours to the maximum extent practicable, protected with proper erosion control materials, and revegetated with native species appropriate for the region and habitat communities on site.

9. **Reduce Spread of Invasive Species**. To reduce the spread of invasive non-native plant species and minimize the potential decrease of palatable vegetation for wildlife species, Caltrans will comply with Executive Order 13112. This order is provided to prevent the introduction of invasive species and provide for their control in order to minimize the economic, ecological, and human health impacts. In the event that high- or medium-priority noxious weeds, as defined by the California Department of Food and Agriculture or the California Invasive Plant Council, are disturbed or removed during construction-related activities, the contractor will contain the plant material associated with these noxious weeds and dispose of it in a manner that will not promote the spread of the species. The contractor will be responsible for obtaining all permits, licenses, and environmental clearances for properly disposing of materials. Areas subject to noxious weed removal or disturbance will be replanted with fast-growing native grasses or a native erosion control seed mixture. If seeding is not possible, the area should be covered to the extent practicable with heavy black plastic solarization material until the end of the project.

10. **Replant, Reseed, and Restore Disturbed Areas**. All slopes or unpaved areas affected by the proposed action will be restored to natural conditions. Slopes and bare ground will be reseeded with native grasses and shrubs characteristic of the floristic region and native local habitats to stabilize soils and prevent erosion. Where disturbance includes the removal of trees or plants, native species will be replanted and maintained until they become established. A revegetation plan with success criteria will be submitted to the Service for review and approval. Temporary effects comprise areas denuded, manipulated, or otherwise modified from their existing, pre-project conditions, thereby removing one or more essential components of a listed species' habitat as a result of project activities that include, but are not limited to, construction, staging, storage, lay down, vehicle access, parking, etc. Temporary effects must be restored to baseline habitat values or better within one year following initial disturbance. Areas subject to ongoing operations and maintenance are not considered temporary even if they are restored within one year following initial disturbance. Affected areas not fulfilling these criteria are considered permanent.

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the purposes of the effects assessment, the action area encompasses 14-acre project footprint and surrounding lands

extending 100 feet beyond the project footprint in unincorporated San Mateo County. The action area encompasses the project footprint, equipment staging areas, access routes, Caltrans Right-of-Way limits, and adjacent lands that will be subjected to noise, light, and vibration disturbance. Habitat within the action area comprises existing dirt and gravel access roads, coast live oak woodland, willow riparian, ruderal grassland, mixed grassland and Baccharis scrub, mixed scrub, seasonal wetland, and open water vegetation communities.

Analytical Framework for the Jeopardy Determinations

Jeopardy Determination

In accordance with policy and regulation, the jeopardy analyses in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the California red-legged frog and San Francisco garter snake range-wide condition, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the California red-legged frog and San Francisco garter snake in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the California red-legged frog and San Francisco garter snake; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the California red-legged frog and San Francisco garter snake; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the California red-legged frog and San Francisco garter snake.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the California red-legged frog and San Francisco garter snake current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of these species in the wild.

The jeopardy analyses in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the California red-legged frog and San Francisco garter snake and the role of the action area in the survival and recovery of the California red-legged frog and San Francisco garter snake as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Adverse Modification Determination

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this biological opinion relies on four components: (1) the *Status of Critical Habitat*, which evaluates the range-wide condition of critical habitat for the SPECIES in terms of primary constituent elements (PCE)s, the factors responsible for that condition, and the intended recovery function of the critical habitat at the provincial and range-wide scale; (2) the *Environmental Baseline*, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent

activities on the PCEs and how that will influence the recovery role of affected critical habitat units and; (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the recovery role of affected critical habitat units.

For purposes of the adverse modification determination, the effects of the proposed Federal action on the California red-legged frog critical habitat are evaluated in the context of the range-wide condition of the critical habitat at the provincial and range-wide scales, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the California red-legged frog.

The analysis in this biological opinion places an emphasis on using the intended range-wide recovery function of California red-legged frog critical habitat and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

Status of the Species and Environmental Baseline

California Red-legged Frog

Listing Status: The California red-legged frog was listed as a threatened species on May 23, 1996 (61 FR 25813) (Service 1996). Critical habitat was designated for this species on April 13, 2006 (71 FR 19244) (Service 2006a) and revisions to the critical habitat designation were published on March 17, 2010 (75 FR 12816) (Service 2010). At this time, the Service recognized the taxonomic change from *Rana aurora draytonii* to *Rana draytonii* (Shaffer *et al.* 2010). A recovery plan was published for the California red-legged frog on September 12, 2002 (Service 2002).

Description: The California red-legged frog is the largest native frog in the western United States (Wright and Wright 1949), ranging from 1.5 to 5.1 inches in length (Stebbins 2003). The abdomen and hind legs of adults are largely red, while the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish background color. Dorsal spots usually have light centers (Stebbins 2003), and dorsolateral folds are prominent on the back. Larvae (tadpoles) range from 0.6 to 3.1 inches in length, and the background color of the body is dark brown and yellow with darker spots (Storer 1925).

Distribution: The historic range of the California red-legged frog extended from the vicinity of Elk Creek in Mendocino County, California, along the coast inland to the vicinity of Redding in Shasta County, California, and southward to northwestern Baja California, Mexico (Fellers 2005; Jennings and Hayes 1985; Hayes and Krempels 1986). The species was historically documented in 46 counties but the taxa now remains in 238 streams or drainages within 23 counties, representing a loss of 70 percent of its former range (Service 2002). California red-legged frogs are still locally abundant within portions of the San Francisco Bay area and the central California coast. Isolated populations have been documented in the Sierra Nevada, northern coast, and northern Transverse Ranges. The species is believed to be extirpated from the southern Transverse and Peninsular Ranges, but is still present in Baja California, Mexico (CDFW 2014).

Status and Natural History: California red-legged frogs predominately inhabit permanent water sources such as streams, lakes, marshes, natural and manmade ponds, and ephemeral drainages in valley bottoms and foothills up to 4,921 feet in elevation (Jennings and Hayes 1994, Bulger *et al.*

2003, Stebbins 2003). However, they also inhabit ephemeral creeks, drainages, and ponds with minimal riparian and emergent vegetation. California red-legged frogs breed from November to April, although earlier breeding records have been reported in southern localities. Breeding generally occurs in still or slow-moving water often associated with emergent vegetation, such as cattails, tules, or overhanging willows (Storer 1925, Hayes and Jennings 1988). Female frogs deposit egg masses on emergent vegetation so that the egg mass floats on or near the surface of the water (Hayes and Miyamoto 1984).

Habitat includes nearly any area within 1-2 miles of a breeding site that stays moist and cool through the summer including vegetated areas with coyote brush, California blackberry thickets, and root masses associated with willow and California bay trees (Fellers 2005). Sheltering habitat for California red-legged frogs potentially includes all aquatic, riparian, and upland areas within the range of the species and includes any landscape feature that provides cover, such as animal burrows, boulders or rocks, organic debris such as downed trees or logs, and industrial debris. Agricultural features such as drains, watering troughs, spring boxes, abandoned sheds, or haystacks may also be used. Incised stream channels with portions narrower and depths greater than 18 inches also may provide important summer sheltering habitat. Accessibility to sheltering habitat is essential for the survival of California red-legged frogs within a watershed, and can be a factor limiting frog population numbers and survival.

California red-legged frogs do not have a distinct breeding migration (Fellers 2005). Adults are often associated with permanent bodies of water. Some individuals remain at breeding sites year-round, while others disperse to neighboring water features. Dispersal distances are typically less than 0.5 mile, with a few individuals moving up to 1-2 miles (Fellers 2005). Movements are typically along riparian corridors, but some individuals, especially on rainy nights, move directly from one site to another through normally inhospitable habitats, such as heavily grazed pastures or oak-grassland savannas (Fellers 2005).

In a study of California red-legged frog terrestrial activity in a mesic area of the Santa Cruz Mountains, Bulger *et al.* (2003) categorized terrestrial use as migratory and non-migratory. The latter occurred from one to several days and was associated with precipitation events. Migratory movements were characterized as the movement between aquatic sites and were most often associated with breeding activities. Bulger *et al.* (2003) reported that non-migrating frogs typically stayed within 200 feet of aquatic habitat 90 percent of the time and were most often associated with dense vegetative cover, *i.e.*, California blackberry, poison oak, and coyote brush. Dispersing frogs in northern Santa Cruz County traveled distances from 0.25 mile to more than 2 miles without apparent regard to topography, vegetation type, or riparian corridors (Bulger *et al.* 2003).

In a study of California red-legged frog terrestrial activity in a xeric environment in eastern Contra Costa County, Tatarian (2008) noted that 57 percent of frogs fitted with radio transmitters in the Round Valley study area stayed at their breeding pools, whereas 43 percent moved into adjacent upland habitat or to other aquatic sites. Her study reported a peak seasonal terrestrial movement occurring in the fall months associated with the first 0.2 inch of precipitation and tapering off into spring. Upland movement activities ranged from 3 to 233 feet, averaging 80 feet, and were associated with a variety of refugia including grass thatch, crevices, cow hoof prints, ground squirrel burrows at the base of trees or rocks, logs, and under man-made structures; others were associated with upland sites lacking refugia (Tatarian 2008). The majority of terrestrial movements lasted from 1 to 4 days; however, one adult female was reported to remain in upland habitat for 50 days (Tatarian 2008). Upland refugia closer to aquatic sites were used more often and were more

commonly associated with areas exhibiting higher object cover, *e.g.*, woody debris, rocks, and vegetative cover. Subterranean cover was not significantly different between occupied upland habitat and non-occupied upland habitat.

California red-legged frogs are often prolific breeders, laying their eggs during or shortly after large rainfall events in late winter and early spring (Hayes and Miyamoto 1984). Egg masses containing 2,000 - 5,000 eggs are attached to vegetation below the surface and hatch after 6 - 14 days (Storer 1925, Jennings and Hayes 1994). In coastal lagoons, the most significant mortality factor in the pre-hatching stage is water salinity (Jennings *et al.* 1992). Eggs exposed to salinity levels greater than 4.5 parts per thousand resulted in 100 percent mortality (Jennings and Hayes 1990). Increased siltation during the breeding season can cause asphyxiation of eggs and small larvae. Larvae undergo metamorphosis 3.5 - 7 months following hatching and reach sexual maturity at 2 - 3 years of age (Storer 1925; Wright and Wright 1949; Jennings and Hayes 1985, 1990, 1994). Of the various life stages, larvae probably experience the highest mortality rates, with less than 1 percent of eggs laid reaching metamorphosis (Jennings *et al.* 1992). California red-legged frogs may live 8 to 10 years (Jennings *et al.* 1992). Populations can fluctuate from year to year; favorable conditions allow the species to have extremely high rates of reproduction and thus produce large numbers of dispersing young and a concomitant increase in the number of occupied sites. In contrast, the animal may temporarily disappear from an area when conditions are stressful (*e.g.*, during periods of drought, disease, etc.).

The diet of California red-legged frogs is highly variable and changes with the life history stage. The diet of the larvae is not well studied, but is likely similar to that of other ranid frogs, feeding on algae, diatoms, and detritus by grazing on the surface of rocks and vegetation (Fellers 2005; Kupferberg 1996a, 1996b, 1997). Hayes and Tennant (1985) analyzed the diets of California red-legged frogs from Cañada de la Gaviota in Santa Barbara County during the winter of 1981 and found invertebrates (comprising 42 taxa) to be the most common prey item consumed; however, they speculated that this was opportunistic and varied based on prey availability. They ascertained that larger frogs consumed larger prey and were recorded to have preyed on Pacific chorus frogs, threespine stickleback, and, to a limited extent, California mice, which were abundant at the study site (Hayes and Tennant 1985, Fellers 2005). Although larger vertebrate prey was consumed less frequently, it represented over half of the prey mass eaten by larger frogs suggesting that such prey may play an energetically important role in their diets (Hayes and Tennant 1985). Juvenile and subadult/adult frogs varied in their feeding activity periods; juveniles fed for longer periods throughout the day and night, while subadult/adults fed nocturnally (Hayes and Tennant 1985). Juveniles were significantly less successful at capturing prey and all life history stages exhibited poor prey discrimination, feeding on several inanimate objects that moved through their field of view (Hayes and Tennant 1985).

Threats: Habitat loss, non-native species introduction, and urban encroachment are the primary factors that have adversely affected the California red-legged frog throughout its range. Several researchers in central California have noted the decline and eventual local disappearance of California and northern red-legged frogs in systems supporting bullfrogs (Jennings and Hayes 1990, Twedt 1993), red swamp crayfish, signal crayfish, and several species of warm water fish including sunfish, goldfish, common carp, and mosquitofish (Moyle 1976; Barry 1992; Hunt 1993; Fisher and Schaffer 1996). This has been attributed to predation, competition, and reproduction interference. Twedt (1993) documented bullfrog predation of juvenile northern red-legged frogs, and suggested that bullfrogs could prey on subadult California red-legged frogs as well. Bullfrogs may also have a competitive advantage over California red-legged frogs. For instance, bullfrogs are larger and

possess more generalized food habits (Bury and Whelan 1984). In addition, bullfrogs have an extended breeding season (Storer 1933) during which an individual female can produce as many as 20,000 eggs (Emlen 1977). Furthermore, bullfrog larvae are unpalatable to predatory fish (Kruse and Francis 1977). Bullfrogs also interfere with California red-legged frog reproduction by eating adult male California red-legged frogs. Both California and northern red-legged frogs have been observed in amplexus (mounted on) with both male and female bullfrogs (Jennings and Hayes 1990, Jennings 1993, Twedt 1993). Thus bullfrogs are able to prey upon and out-compete California red-legged frogs, especially in sub-optimal habitat.

The urbanization of land within and adjacent to California red-legged frog habitat has also affected the threatened amphibian. These declines are attributed to channelization of riparian areas, enclosure of the channels by urban development that blocks dispersal, and the introduction of predatory fishes and bullfrogs. Diseases may also pose a significant threat, although the specific effects of disease on the California red-legged frog are not known. Pathogens are suspected of causing global amphibian declines (Davidson *et al.* 2003). Chytridiomycosis and ranaviruses are a potential threat because these diseases have been found to adversely affect other amphibians, including the listed species (Davidson *et al.* 2003; Lips *et al.* 2006). Mao *et al.* (1999 cited in Fellers 2005) reported northern red-legged frogs infected with an iridovirus, which was also presented in sympatric threespine sticklebacks in northwestern California. Non-native species, such as bullfrogs and non-native tiger salamanders that live within the range of the California red-legged frog have been identified as potential carriers of these diseases (Garner *et al.* 2006). Human activities can facilitate the spread of disease by encouraging the further introduction of non-native carriers and by acting as carriers themselves (*i.e.*, contaminated boots, waders, or fishing equipment). Human activities can also introduce stress by other means, such as habitat fragmentation, that results in the listed species being more susceptible to the effects of disease.

Recovery Plan: The recovery plan for the California red-legged frog identifies eight recovery units (Service 2002). The establishment of these recovery units is based on the determination that various regional areas of the species' range are essential to its survival and recovery. The status of the California red-legged frog was considered within the small-scale recovery units as opposed to their overall range. These recovery units are delineated by major watershed boundaries as defined by U.S. Geological Survey hydrologic units and the limits of its range. The goal of the recovery plan is to protect the long-term viability of all extant populations within each recovery unit. Within each recovery unit, core areas have been delineated and represent contiguous areas of moderate to high California red-legged frog densities that are relatively free of exotic species such as bullfrogs. The goal of designating core areas is to protect metapopulations. Thus when combined with suitable dispersal habitat, will allow for the long-term viability within existing populations. The management strategy identified within the Recovery Plan will allow for the recolonization of habitats within and adjacent to core areas that are naturally subjected to periodic localized extinctions, thus assuring the long-term survival and recovery of California red-legged frogs.

California Red-legged Frog Critical Habitat

The Service designated critical habitat for the California red-legged frog on April 13, 2006 (71 FR 19244) (Service 2006a) and a revised designation to the critical habitat was published on March 17, 2010 (75 FR 12816) (Service 2010). At this time, the Service recognized the taxonomic change from *Rana aurora draytonii* to *Rana draytonii* (Shaffer *et al.* 2010). Critical habitat is defined in Section 3 of the Act as: (1) The specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (a) essential to the conservation of the species and (b) that may require special management

considerations or protection; and (2) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. In determining which areas to designate as critical habitat, the Service considers those physical and biological features that are essential to a species' conservation and that may require special management considerations or protection (50 CFR 424.12(b)). The Service is required to list the known PCEs together with the critical habitat description. Such physical and biological features include, but are not limited to, the following:

1. Space for individual and population growth, and for normal behavior;
2. Food, water, air, light, minerals, or other nutritional or physiological requirements;
3. Cover or shelter;
4. Sites for breeding, reproduction, rearing of offspring, or dispersal; and
5. Generally, habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

The PCEs defined for the California red-legged frog were derived from its biological needs. The area designated as revised critical habitat provides aquatic habitat for breeding and non-breeding activities and upland habitat for shelter, foraging, predator avoidance, and dispersal across its range. The PCEs and, therefore, the resulting physical and biological features essential for the conservation of the species were determined from studies of California red-legged frog ecology. Based on the above needs and our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, the Service determined that the PCEs essential to the conservation of the California red-legged frog are:

1. *Aquatic Breeding Habitat.* Standing bodies of fresh water (with salinities less than 7.0 parts per thousand), including: natural and manmade (*e.g.*, stock) ponds, slow-moving streams or pools within streams, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years.

2. *Non-Breeding Aquatic Habitat.* Freshwater and wetted riparian habitats, as described above, that may not hold water long enough for the species to hatch and complete its aquatic life cycle but that do provide for shelter, foraging, predator avoidance, and aquatic dispersal for juvenile and adult California red-legged frogs. Other wetland habitats that would be considered to meet these elements include, but are not limited to: plunge pools within intermittent creeks; seeps; quiet water refugia during high water flows; and springs of sufficient flow to withstand the summer dry period.

3. *Upland Habitat.* Upland areas adjacent to or surrounding breeding and non-breeding aquatic and riparian habitat up to a distance of 1 mile in most cases and comprised of various vegetational series such as grasslands, woodlands, wetland, or riparian plant species that provide the frog shelter, forage, and predator avoidance. Upland features are also essential in that they are needed to maintain the hydrologic, geographic, topographic, ecological, and edaphic features that support and surround the wetland or riparian habitat. These upland features contribute to the filling and drying of the wetland or riparian habitat and are responsible for maintaining suitable periods of pool inundation for larval frogs and their food sources, and provide breeding, non-breeding, feeding, and sheltering habitat for juvenile and adult frogs (e.g., shelter, shade, moisture, cooler temperatures, a prey base, foraging opportunities, and areas for predator avoidance). Upland habitat should include

structural features such as boulders, rocks and organic debris (*e.g.*, downed trees, logs), as well as small mammal burrows and moist leaf litter.

4. *Dispersal Habitat.* Accessible upland or riparian dispersal habitat within designated units and between occupied locations within a minimum of 1 mile of each other that allow for movement between such sites. Dispersal habitat includes various natural habitats and altered habitats such as agricultural fields, which do not contain barriers (*e.g.*, heavily traveled road without bridges or culverts) to dispersal. Dispersal habitat does not include moderate- to high-density urban or industrial developments with large expanses of asphalt or concrete, nor does it include large reservoirs over 50 acres in size, or other areas that do not contain those features identified in PCEs 1, 2, or 3 as essential to the conservation of the species.

With the revised designation of critical habitat, the Service intends to conserve the geographic areas containing the physical and biological features that are essential to the conservation of the species, through the identification of the appropriate quantity and spatial arrangement of the PCEs sufficient to support the life-history functions of the species. Because not all life-history functions require all the PCEs, not all areas designated as critical habitat will contain all the PCEs. Please refer to the final designation of critical habitat for California red-legged frog for additional information (75 FR 12816).

San Francisco Garter Snake

Refer to the five-year review for the species status (Service 2006b).

Environmental Baseline

California Red-legged Frog

The action area is located within the South San Francisco Bay Core Area (San Mateo Bayside Hydrologic Sub-Area) and the South and East Bay Recovery Unit (Service 2002, 2006a). The recovery action guidelines provide recommendations for minimizing the effects of various land and water uses, non-native species/predators, and air and water contamination in addition to outlining recommendations for habitat preservation. These recommendations assist in the conservation and recovery of the species, protect high quality habitat within core areas and priority watersheds, increase opportunities for dispersal, population expansion, and recolonization, and provide connectivity between core areas and occupied watersheds. The conservation needs for the East San Francisco Bay Core Area are: (1) protect existing populations; (2) control non-native predators; (3) study the effects of grazing in riparian corridors, ponds and uplands; (4) reduce impacts associated with livestock grazing; (5) protect habitat connectivity; (6) minimize effects of recreation and off-road vehicle use, e.g. Corral Hollow watershed; (7) avoid and reduce impacts of urbanization; and (8) protect habitat buffers from nearby urbanization.

There is a pond located approximately 1,000 feet northwest of the action area that was reported to support California red-legged frog breeding (CDFW 2014). Egg-masses and metamorphs were observed in 2007 and 2006, respectively (CDFW 2014). Additional breeding occurrences have been reported along the perimeter of Upper Crystal Springs Reservoir supporting all life history stages (CDFW 2014). Upper Crystal Springs Reservoir lies approximately 700 feet west of the action area and is hydrologically connected via the drainage running within the willow riparian corridor. Within the action area, suitable breeding and non-breeding aquatic habitat is present within the open water

and seasonal wetland/ephemeral drainage vegetation communities, respectively. Suitable upland and dispersal habitat is present throughout the entire action area.

Breeding has not been documented from the open water habitat within the action area; however, protocol-level breeding surveys have not been conducted. Breeding is unlikely based on the small size of the pond, but cannot be ruled out. The coast live oak woodland, willow riparian, ruderal grassland, mixed grassland and Baccharis scrub, and mixed scrub vegetation communities provide suitable upland, foraging, refugia, and dispersal habitat for California red-legged frogs. Caltrans determined that California red-legged frogs have the potential to occur throughout all habitats within the action area, but are not expected to breed within the action area.

I-280 represents a major barrier to dispersal of California red-legged frogs eastward from the action area and Upper Crystal Springs Reservoir. Canada Road is a paved county road that runs between the action area and Upper Crystal Springs Reservoir, but does not present a barrier to movement; however, it does pose a risk of injury or mortality to California red-legged frogs due to vehicle and bicycle traffic and depredation by predators.

Aquatic features and upland and dispersal habitat within the action area are important to the conservation and recovery of the species based on the following: 1) they are located within the known range of the species and within the South San Francisco Bay Core Area; 2) they provide suitable habitat for juvenile and adult life history stages of the species; 3) they provide opportunities for dispersal, population expansion and recolonization. For these reasons, the Service has determined there is a reasonable potential for juvenile and adult California red-legged frogs to inhabit, forage, seek refuge or disperse within and through the action area.

Critical Habitat

The entire action area lies within the Cahill Ridge SNM-1 designated critical habitat unit, which is located in north central San Mateo County, west of I-280 and south of Pacifica, California (75 FR 12816). This unit comprises 34,952 acres and contains the features that are essential for the conservation of the species. The unit contains aquatic habitat for breeding and non-breeding activities (PCE 1 and PCE 2) and upland habitat for foraging and dispersal activities (PCE 3 and PCE 4). The unit contains high-quality permanent and ephemeral aquatic habitats consisting of ponds and streams surrounded by riparian and emergent vegetation that provides for breeding and upland areas for dispersal, shelter, and food. The unit represents the only unit in the San Francisco peninsula, and would assist in maintaining the distribution of the California red-legged frog population within the San Francisco area, and provide connectivity to units farther south into Santa Cruz County. The designation of this unit requires special management considerations to address development and nonnative invasive plants, which may alter aquatic and upland habitats and thereby result in the direct or indirect loss of egg masses or adults.

The action area contains all four PCE's. The open water provides suitable breeding habitat (PCE-1); however, the project is not expected to effect this pond. The ephemeral creek and season wetland provides suitable non-breeding aquatic habitat (PCE-2). The majority of the action area is comprised of coast live oak woodland, willow riparian, ruderal grassland, mixed grassland and Baccharis scrub, mixed scrub habitat which is considered suitable upland (PCE-3) and dispersal (PCE-4) habitat.

San Francisco Garter Snake

The action area is located within the range of the Crystal Springs Reservoir garter snake population and is set within a mosaic of various open water, shallow coves, marshes, creek in-flows, and adjacent upland and dispersal habitat. Hydrologic features within the action area include a small open water pond near the western project boundary, an adjacent seasonal wetland, and ephemeral drainage that parallels the project alignment. Suitable upland foraging, refugia, and dispersal habitat is present within the willow riparian, coast live oak woodland, ruderal grassland, mixed grassland, and mixed scrub vegetation communities throughout the action area. California red-legged frog breeding, a primary prey species for San Francisco garter snakes, has been documented breeding along the edges of Upper Crystal Springs Reservoir and in a pond approximately 1,000 feet to the northwest (CDFW 2014). This suggests that the habitat within and adjacent to the action area are productive amphibian and reptiles habitat; thereby suitable San Francisco garter snake habitat.

Occurrences of juvenile and adult San Francisco garter snakes have been reported along the entire perimeter of the Upper Crystal Springs Reservoir dating from 1946 through 2004 (CDFW 2014). The reservoir is situated approximately 700 feet to the west and is hydrologically connected via an unnamed drainage to the action area. Based on habitat suitability within the action area, connectivity to occupied habitats along Upper Crystal Springs Reservoir, and the presence of breeding, foraging, sheltering and dispersal habitat, the Service has determined there is a reasonable probability for San Francisco garter snakes to inhabit or disperse through the action area.

Effects of the Action

California Red-legged Frog and San Francisco Garter Snake

The proposed project will likely adversely affect the California red-legged frog and San Francisco garter snake by harming or harassing juveniles and adults inhabiting suitable upland, dispersal, and non-breeding aquatic habitat within the action area. The aspects of the proposed action most likely to affect the California red-legged frog and San Francisco garter snake are confined to the construction phase of the project associated with the construction of the trenching, backfill, slope stabilization, and 60-inch corrugated pipe installation and tie-in activities.

Construction noise, vibration, and increased human activity may interfere with normal behaviors – feeding, sheltering, movement between refugia and foraging grounds, and other essential behaviors of the California red-legged frog and San Francisco garter snake – resulting in avoidance of areas that have suitable habitat but intolerable levels of disturbance. Short-term temporal effects will occur when vegetative cover and subterranean upland habitat is removed during project construction. Caltrans proposes to minimize these effects, in part, by locating construction staging, storage and parking areas outside of sensitive habitat; clearly marking construction work boundaries to prevent crews from affecting more habitat than is absolutely necessary, installing one-way wildlife exclusion fencing to allow California red-legged frogs and San Francisco garter snakes to escape the work area and prevent them from (re-)entering the work area, and revegetating all areas disturbed by project activities.

The proposed construction activities could result in the introduction of chemical contaminants to the site. California red-legged frogs and San Francisco garter snakes using these areas could be exposed to any contaminants that are present at the site. Exposure pathways could include inhalation, dermal contact, direct ingestion, or secondary ingestion of contaminated soil, plants, or prey species. Exposure to contaminants could cause short- or long-term morbidity, possibly

resulting in reduced productivity or mortality. Caltrans proposes to minimize these risks by implementing a Storm Water Pollution Prevention Plan, erosion control BMPs, and a Spill Response Plan, which will consist of refueling, oiling or cleaning of vehicles and equipment a minimum of 50 feet from aquatic resources; installing coir rolls, straw wattles and/or silt fencing to capture sediment and prevent runoff or other harmful chemicals from entering the wetland; and locating staging, storage and parking areas away from aquatic habitats.

Preconstruction surveys and the relocation of individual California red-legged frogs by a Service-approved biologist will minimize the likelihood of serious injury or mortality; however, capturing and handling frogs may result in stress during handling, containment, and transport. Death and injury of individuals could occur at the time of relocation or later in time subsequent to their release. Although survivorship for translocated amphibians has not been estimated, survivorship of translocated wildlife, in general, is low because of intraspecific competition, lack of familiarity with the relocation site with regard to breeding, feeding, and sheltering habitats, risk of contracting disease in foreign environment, and increased risk of predation. These effects will be minimized by using qualified Service-approved biologists, limiting the duration of handling, and relocating amphibians to suitable nearby habitat.

Biologists and construction workers traveling to the action area from other project sites may transmit diseases by introducing contaminated equipment. The chance of a disease being introduced into a new area is greater today than in the past due to the increasing occurrences of disease throughout amphibian populations in California and the United States. It is possible that chytridiomycosis, caused by chytrid fungus (*Batrachochytrium dendrobatidis*), may exacerbate the effects of other diseases on amphibians or increase the sensitivity of the amphibian to environmental changes (e.g., water pH) that reduce normal immune response capabilities (Bosch et al. 2001, Weldon et al. 2004). Implementing proper decontamination procedures prior to and following aquatic surveys and handling of frogs and salamanders will minimize the risk of transferring diseases through contaminated equipment or clothing.

Temporary effects to listed species may occur in areas denuded, manipulated, or otherwise modified from their existing, pre-project conditions, thereby removing one or more essential components of a listed species' habitat as a result of project activities that include, but are not limited to, construction, staging, storage, lay down, vehicle access, parking, etc. Temporary effects to habitat must be restored to baseline habitat values or better within one year following initial disturbance. Areas subject to ongoing operations and maintenance are not considered temporary even if they are restored within one year following initial disturbance. Affected areas not fulfilling these criteria are considered permanent. Habitat affected would become unavailable to these species during the construction phase and could result in loss of foraging or movement habitat, altered behavioral displays (e.g., flushing from cover during vegetation clearing or ground disturbing activities, decreased foraging success, increased risk of predation, etc.), and displacement from or avoidance of habitat features within the action area. The proposed action would result in the permanent loss and/or degradation of 0.02-acre of California red-legged frog and San Francisco garter snake upland and dispersal habitat; and the temporary loss and/or degradation of 2.18 acres of California red-legged frog and San Francisco garter snake upland and dispersal habitat. There will be no affects to breeding or nonbreeding aquatic habitat. Caltrans has proposed a compensatory habitat conservation measure at a ratio of 3:1 (acres of compensation to acres of habitat loss) for permanent effects and 1.1:1 for temporary effects.

These effects will be further minimized by installing environmentally sensitive area fencing to keep workers from straying into otherwise undisturbed habitat; erecting wildlife exclusion fencing to deter species from wandering onto the construction site; implementing storm water and erosion BMP's; educating workers about the presence of California red-legged frogs and San Francisco garter snakes, their habitat, identification, regulatory laws, and avoidance and minimization measures; and requiring a Service-approved biologist(s) to be present to monitor project activities within or adjacent to suitable habitat.

California Red-legged Frog Critical Habitat

The proposed action will result in the permanent loss and/or degradation of 0.02-acre of upland (PCE 3) and dispersal (PCE 4) habitat and the temporary loss and/or degradation of 2.18 acres of upland (PCE 3) and dispersal (PCE 3) habitat comprising willow riparian, coast live oak woodland, ruderal grassland, mixed grassland, and mixed scrub vegetation communities. The proposed action will not affect California red-legged frog breeding or non-breeding aquatic habitat since the open water, seasonal wetland, and ephemeral drainage habitats located within the action area will be avoided. Caltrans has minimized effects to California red-legged frog critical habitat by incorporating design modifications that avoid or minimize disturbance or loss of designated critical habitat containing PCEs. The permanent loss and/or degradation of 0.02-acre and temporary loss and/or degradation of 2.18 acres of California red-legged frog critical habitat supporting PCEs 3 and 4 will not compromise the recovery function of SNM-1, based on the location of effected critical habitat along an existing roadway.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. No other State, Tribal, local or private actions are anticipated in the action area within the foreseeable future.

Conclusion

After reviewing the current status of the California red-legged frog and San Francisco garter snake; the environmental baseline for the action area; the effects of the proposed I-280 Repair Pipe System and Backfill Sinkhole Project and the cumulative effects; it is the Service's biological opinion that the project, as proposed, is likely to adversely affect both species, but is not likely to jeopardize their continued existence. This determination is based on our opinion that the magnitude of the effects of this action does not appreciably reduce the likelihood of both the survival and recovery of these species in the wild.

After reviewing the current status of designated critical habitat for the California red-legged frog, the environmental baseline for each critical habitat unit, effects of the proposed action, and cumulative effects, the Service finds that the project, as proposed, is not likely to destroy or adversely modify critical habitat for the California red-legged frog based upon the statutory provisions of the Act. The local effects resulting from the proposed action will not result in the inability of range-wide critical habitat to remain functional or serve its intended recovery role for these species.

INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by Caltrans so that they become binding conditions of any grant or permit issued to Caltrans, as appropriate, in order for the exemption in section 7(o)(2) to apply. Caltrans has a continuing duty to regulate the activity covered by this incidental take statement. If Caltrans (1) fails to require Caltrans to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

California Red-Legged Frog

The Service anticipates that incidental take of the California red-legged frog may be difficult to detect due to their cryptic nature and wariness of humans. Losses of this species may also be difficult to quantify due to a lack of baseline survey data and seasonal/annual fluctuations in their numbers due to environmental or human-caused disturbances. Due to the difficulty in quantifying the number of California red-legged frogs that will be taken as a result of the proposed action, the Service is quantifying take incidental to the proposed action as the harm and harassment of all California red-legged frogs inhabiting or utilizing the 14-acre action area. The Service anticipates that take of juvenile and adult life history stages may be harmed or harassed as a result of habitat loss/degradation, construction-related disturbance, or capture and relocation efforts. Mortality or injury of California red-legged frogs is not anticipated based on the full implementation of the proposed conservation measures. Upon implementation of the following Reasonable and Prudent Measures, take of all juvenile and adult California red-legged frogs within the action area in accordance with the amount and type of take outlined above will become exempt from the prohibitions described under section 9 of the Act. No other forms of take of California red-legged frogs are authorized under this opinion.

San Francisco Garter Snake

The Service expects that incidental take of the San Francisco garter snake may be difficult to detect or quantify because this animal may range over a large territory and the finding of an injured or dead individual is unlikely because they may seek refuge in aquatic habitat, burrows or other underground refugia. Due to the difficulty in quantifying the number of San Francisco garter snakes that will be

taken as a result of the proposed action, the Service is quantifying take incidental to the proposed action as the harm and harassment of all San Francisco garter snakes inhabiting or utilizing the 14-acre action area. The Service anticipates that take of juvenile and adult life history stages may be harmed or harassed as a result of habitat loss/degradation, or construction-related disturbance. Mortality or injury of San Francisco garter snakes is not anticipated based on the full implementation of the proposed conservation measures. Upon implementation of the following Reasonable and Prudent Measures, take of all juvenile and adult San Francisco garter snakes within the action area in accordance with the amount and type of take outlined above will become exempt from the prohibitions described under section 9 of the Act. No other forms of take of San Francisco garter snakes are authorized under this opinion.

Effect of the Take

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to jeopardize the California red-legged frog or San Francisco garter snake.

Reasonable and Prudent Measures

The Service has determined that the following reasonable and prudent measure is necessary and appropriate to minimize impacts of incidental take of California red-legged frog or San Francisco garter snake:

1. Minimize the effects to the California red-legged frog and San Francisco garter snake by implementing the proposed action as described, as modified by the following terms and conditions.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, Caltrans must comply with the following terms and conditions, which implement the reasonable and prudent measure, described above and outline required reporting/monitoring requirements. These Terms and Conditions are nondiscretionary. The following Terms and Conditions implement the Reasonable and Prudent Measure number 1:

1. **Compliance with Biological Opinion.** Caltrans shall include Special Provisions that include the Conservation Measures and the Terms and Conditions of this biological opinion in the solicitation for bid information for all contracts for the project that are issued by them to all contractors. Caltrans shall require all contractors and subcontractors to comply with the Act in the performance of the proposed action and shall perform the action as outlined in the Project Description of this biological opinion as provided by Caltrans in the Biological Assessment dated August 2013, revised project description dated October 6, 2013, and all other supporting documentation submitted to the Service in support of the action. Changes to the Project Description or performance of work outside the scope of this biological opinion are subject to the requirements of reinitiation of formal consultation.

2. **Implementation of Biological Opinion.** Caltrans shall ensure the Resident Engineer or their designee shall have full authority to implement and enforce all Conservation Measures and Terms and Conditions of this biological opinion. The Resident Engineer or his/her

designee shall maintain a copy of this biological opinion onsite whenever construction is in progress. Their name(s) and telephone number(s) shall be provided to the Service at least 30 calendar days prior to groundbreaking at the project.

3. **Proposed Compensation**. The compensation measures proposed by Caltrans and outlined in Table 1 will minimize the effects of harm on the California red-legged frog and San Francisco garter snake. Habitat considered for compensation shall comprise high quality breeding, foraging, sheltering, migration, and/or dispersal habitat. Caltrans shall comply with all applicable CDFW regulations pertaining to mitigation for species designated as fully protected and/or listed by the State. Compensation shall be implemented in accordance with the Selected Review Criteria for Section 7 Off-Site Compensation provided in Appendix A. If conservation banking credits are to be purchased, Caltrans shall submit a conceptual compensation plan to the Service for review and approval prior to the purchase of credits. If the proposed compensation scheme is not fully implemented, Caltrans shall provide an alternative compensation scheme to be reviewed and approved by the Service. On-site restoration of temporarily affected areas may qualify as compensation at a 1:1 ratio if it is restored within one calendar year following project completion and the conditions are verified by the Service. All compensation will be acquired prior to the beginning of earthmoving for the project.

4. **Biological Monitor Approval and Stop Work Authority**. The qualifications of all proposed Service-approved biological monitors shall be presented to the Service for review and written approval at least 30 calendar days prior to project initiation. The Service-approved biological monitors shall keep a copy of this biological opinion in his/her possession when onsite. Through the Resident Engineer or his/her designee, the Service-approved biological monitors shall be given the authority to communicate verbally, by telephone, email, or hardcopy with Caltrans personnel, construction personnel or any other person(s) at the project site or otherwise associated with the project to ensure that the terms and conditions of this biological opinion are met. The Service-approved biologist(s) through communication with the Resident Engineer or his/her designee shall have oversight over implementation of the Terms and Conditions in this Biological Opinion, and shall have the authority to stop project activities if they determine any of the requirements associated with these Terms and Conditions are not being fulfilled. If the Service-approved biologist(s) exercises this authority, the Service shall be notified by telephone and email within 24 hours. The Service contact is Coast-Bay Division Chief of the Endangered Species Program, Sacramento Fish and Wildlife Office at telephone (916) 414-6600.

5. **Biological Monitoring Records**. The Service-approved biologist(s) shall maintain monitoring records that include: (1) the beginning and ending time of each day's monitoring effort; (2) a statement identifying the listed species encountered, including the time and location of the observation; (3) the time the specimen was identified and by whom and its condition; and (4) a description of any actions taken. The Service-approved biologist(s) shall maintain complete records in their possession while conducting monitoring activities and shall immediately surrender records to the Service, CDFW, and/or their designated agents upon request. If requested, all monitoring records shall be provided to the Service within 30 of the completion of monitoring work.

6. **Agency Access**. If verbally requested through the Resident Engineer or Construction Inspector, before, during, or upon completion of ground breaking and construction

activities, Caltrans shall ensure the Service or their designated agents can immediately and without delay, access and inspect the project site for compliance with the proposed project description, conservation measures, and terms and conditions of this Biological Opinion, and to evaluate project effects to the California red-legged frog and San Francisco garter snake and their habitat.

7. **Proper Use of Erosion Control Devices**. To prevent California red-legged frogs and San Francisco garter snakes from becoming entangled, trapped, or injured, erosion control materials that use plastic or synthetic monofilament netting will not be used within the action area. This includes products that use photodegradable or biodegradable synthetic netting, which can take several months to decompose. Acceptable materials include natural fibers such as jute, coconut, twine or other similar fibers.

8. **Wildlife Exclusion Fencing**. WEF shall be a minimum of 30 inches tall and shall be buried a minimum of 4 inches deep and backfilled with soil, sand bags or other means to prevent California red-legged frogs or San Francisco garter snakes from passing under the fence and entering the project footprint. Vegetation shall be cleared to within two inches of ground level to prevent California red-legged frogs or San Francisco garter snakes from using vegetation to gain access to the project site by climbing over the WEF. Vegetation within 18 inches of the WEF shall remain clear during the entire time the WEF is in operation. The WEF shall consist of a material that does not allow California red-legged frogs or San Francisco garter snakes from climbing into the project site and has a minimum 4-inch lip on the top facing away from the project construction area.

9. **Biological Monitoring**. A Service-approved biologist(s) shall be onsite during all activities that may result in take of California red-legged frogs or San Francisco garter snakes as determined by the Service. A minimum of one Service-approved biologist shall be on-site or available by phone to respond in a timely manner throughout the project duration. Caltrans shall coordinate with the Service to determine which locations will require the presence with Service-approved biological monitors. The Service will consider the implementation of specific project activities without the oversight of an on-site Service-approved biologist on a case-by-case basis.

10. **Preconstruction and Daily Surveys**. Preconstruction surveys shall be conducted by a Service-approved biologist immediately prior to the initiation of any ground disturbing activities and vegetation clearing that may result in take of California red-legged frogs or San Francisco garter snakes as determined by the Service. All suitable aquatic and upland habitat including refugia habitat such as dense vegetation, small woody debris, refuse, burrows, etc., shall be thoroughly inspected. The Service-approved biologist(s) shall conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of California red-legged frogs or San Francisco garter snakes as determined by the Service.

11. **Protocol for Species Observation and Handling**. If an California red-legged frog or San Francisco garter snake is encountered in the action area, work activities within 50 feet of the individual shall cease immediately and the Resident Engineer and Service-approved biologist shall be notified. Based on the professional judgment of the Service-approved biologist, if project activities can be conducted without harming or injuring the California red-legged frog or San Francisco garter snake, it may be left at the location of discovery and monitored

by the Service-approved biologist. All project personnel shall be notified of the finding and at no time shall work occur within 50 feet of the California red-legged frog or San Francisco garter snake without a Service-approved biologist present. San Francisco garter snakes shall not be captured or handled without authorization from the Service and CDFW, and shall be monitored until it leaves the action area on its own accord, unless the situation poses an imminent risk of injury or mortality to the individual(s). If it is determined by the Service-approved biologist that relocating the California red-legged frog is necessary, the following steps shall be followed:

a. Prior to handling and relocation, the Service-approved biologist will take precautions to prevent introduction of amphibian diseases in accordance with the *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* (Service 2005). Disinfecting equipment and clothing is especially important when biologists are coming to the action area to handle amphibians after working in other aquatic habitats.

b. California red-legged frogs shall be captured by hand, dipnet, or other Service-approved methodology, transported and relocated to nearby suitable habitat outside of the work area and released as soon as practicable the same day of capture. Holding/transporting containers and dipnets shall be thoroughly cleaned, disinfected, and rinsed with freshwater prior to use within the action area. The Service shall be notified within 24 hours of all capture, handling, and relocation efforts.

Reporting Requirements

In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, Caltrans shall adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, Caltrans must reinitiate formal consultation as per 50 CFR 402.16.

1. The Service must be notified within one (1) working day of the finding of any injured or dead listed species or any unanticipated damage to its habitat associated with the proposed project. Notification will be made to the Coast-Bay Division Chief of the Endangered Species Program at the Sacramento Fish and Wildlife Office at (916) 414-6600, and must include the date, time, and precise location of the individual/incident clearly indicated on a U.S. Geological Survey 7.5 minute quadrangle or other maps at a finer scale, as requested by the Service, and any other pertinent information. When an injured or dead individual of the listed species is found, Caltrans shall follow the steps outlined in the Disposition of Individuals Taken section below.

2. Other pertinent reporting information such as monitoring reports (if not included as a term and condition), notification of project completion/implementation, etc. including when this information is due to the Service.

Disposition of Individuals Taken

Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag

containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instruction s are received from the Service regarding the disposition of the dead specimen. The Service contact persons are the Coast-Bay Division Chief of the Endangered Species Program at the Sacramento Fish and Wildlife Office at (916) 414-6600; and the Resident Agent-in-Charge of the Service's Office of Law Enforcement, 5622 Price Way, McClellen, California 95562, at (916) 569-8444.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1. Caltrans District 4 should work with the Service to develop a conservation strategy that would identify the current safe passage potential along Bay Area highways and the areas where safe passage for wildlife could be enhanced or established.

2. Caltrans should assist the Service in implementing recovery actions identified in the *Recovery Plan for the California Red-legged Frog* (Service 2002) and the *Recovery Plan for the San Francisco Garter Snake*, California (Service 1985).

3. Caltrans should consider participating in the planning for a regional habitat conservation plan for the California red-legged frog, San Francisco garter snake, other listed species, and sensitive species.

4. Caltrans should consider establishing functioning preservation and creation conservation banking systems to further the conservation of the California red-legged frog, San Francisco garter snake, and other appropriate species. Such banking systems also could possibly be utilized for other required mitigation (i.e., seasonal wetlands, riparian habitats, etc.) where appropriate. Efforts should be made to preserve habitat along roadways in association with wildlife crossings.

5. Roadways can constitute a major barrier to critical wildlife movement. Therefore, Caltrans should incorporate culverts, tunnels, or bridges on highways and other roadways that allow safe passage by the California red-legged frog, San Francisco garter snake, other listed animals, and wildlife. Photographs, plans, and other information into the BAs if "wildlife friendly" crossings are incorporated into projects. Efforts should be made to establish upland culverts designed specifically for wildlife movement rather than accommodations for hydrology. Transportation agencies should also acknowledge the value of enhancing human safety by providing safe passage for wildlife in their early project design.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION--CLOSING STATEMENT

This concludes formal consultation on the I-280 Repair Pipe System and Backfill Sinkhole Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any additional take will not be exempt from the prohibitions of section 9 of the Act, pending reinitiation.

If you have any questions regarding this biological opinion on the proposed I-280 Repair Pipe System and Backfill Sinkhole Project, San Mateo County, California, contact Jerry Roe or Ryan Olah at the letterhead address or at (916) 414-6600.

Sincerely,

Jennifer M. Norris
Field Supervisor

Enclosures

cc:
Melissa Escaron, California Department of Fish and Wildlife, Napa, California

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APPENDIX A
Sacramento Fish and Wildlife Office
Review Criteria for Section 7 Compensation
Revised January 30, 2014

Property Assurances and Conservation Easement

- ☐ Title Report [*preliminary at proposal, and Final Title Insurance at recordation*]; no older than six months;
- ☐ Property Assessment and Warranty;
- ☐ Subordination Agreement [*include if any outstanding debts or liens on the property; may be needed for existing easements*];
- ☐ Legal Description and Parcel Map;
- ☐ Conservation Easement [*use the current SFWO standardized CE template*]; or
- ☐ Non-Template Conservation Easement [*this requires additional review*]

Site Assessment and Development

- ☐ Phase I Environmental Site Assessment;
- ☐ Habitat Development Plan [*include if habitat will be constructed, restored, or enhanced*];
- ☐ Construction Security Analysis *[applicable if habitat is being constructed/ enhanced/ restored]*;
- ☐ Performance Security Analysis [*applicable if there are performance standards*];

Site Management

- ☐ Interim Management Plan;
- ☐ Interim Management Security Analysis and Schedule;
- ☐ Long-Term Management Plan;
- ☐ Endowment Fund Analysis and Schedule;
- ☐ Endowment Funding Agreement or Trust Agreement or Declaration of Trust [*DFW calls this a "mitigation agreement"*]

Guidelines

Real Estate Assurances and Conservation Easement (CE)

Title Report

1. Who holds fee title to property?
2. Exceptions to title. Are there any liens or encumbrances (existing debts, leases, or easements) on the property? Note that any existing exceptions to title will have priority over a conservation easement for the mitigation project.
    a. Review Preliminary Title Report to evaluate liens and encumbrances (see Property Assessment and Warranty, below).
    b. Could any of these exceptions to title potentially interfere with either biological habitat values or ownership? If existing easements can potentially interfere with the conservation values/habitat of the property, those portions of the land should be deducted from the total compensation acreage available on the site.
    c. Split estates. Have the water or mineral rights been severed from title? If so, property owner should be encouraged to re-acquire those rights, or at least to acquire the surface-entry rights to remove or limit access for mineral exploration/development.

Property Assessment and Warranty

1. Property owner should submit a Property Assessment and Warranty, which discusses every exception to title listed on the Preliminary Title Report and Final Title Insurance Policy, evaluating any potential impacts to the conservation values that could result from the exceptions to title (see below).
2. The Property Assessment and Warranty should include a summary and full explanation of all exceptions remaining on the title, with a statement that the owner/Grantor accepts responsibility for all lands being placed under the CE as available for the primary purposes of the easement, as stated in the easement, and assures that these lands have a free and clear title and are available to be placed under the CE.

Subordination Agreement

1. A Subordination Agreement is necessary if there is any outstanding debt on the property; it could also be used to subordinate liens or easements. Review Subordination Agreement language for adequacy—the lending bank or other lien or rights holder must agree to fully subordinate each lien, encumbrance, or easement under the CE.

Legal Description and Parcel Map

1. Ensure accuracy of map, and location and acreage protected under the CE.
2. Both the map and the legal description should explain the boundaries of the individual project compensation site. The site should *not* have 'leftover' areas for later use.
3. Ask for an easement map to be prepared (if applicable), showing all easements on the property.

Conservation Easement from Template

1. Who will hold the easement?
   a. Conservation easements require third-party oversight by a qualified non-profit or government agency (=easement holder or Grantee). Minimum qualifications for an easement holder include:
      i. Maintaining accreditation by the Land Trust Accreditation Commission http://www.landtrustaccreditation.org/home.
      ii. Organized under IRS 501(c)(3);
      iii. Qualified under CA Civil Code § 815;
      iv. Bylaws, Articles of Incorporation, and biographies of Boards of Directors on file at;
         1. Must meet requirements of SFWO, including 51% disinterested parties on the Board of Directors;
      v. Approved by SFWO
2. Project Applicant should submit a redline version showing all of their proposed revisions in track changes or other editable electronic format, along with an explanation of all deviations from the template.

Non-Template Conservation Easement

1. If not using the CE template, the Project Applicant should specify objections they have to the template. This may substantially delay processing as the non-template CE will require review by the Solicitor's Office. Alternate CEs are subject to SFWO approval prior to being granted and recorded.
2. The Project Applicant must either 1) add SFWO as a third-party beneficiary, or 2) add language throughout the document, in all appropriate places, that will assure SFWO the right to enforce, inspect, and approve any and all uses and/or changes under the CE prior to occurrence (including land use, biological management or ownership).
3. Include, at a minimum, language to:
   a. Reserve all mineral, air, and water rights under the CE as necessary to maintain and operate the site in perpetuity;
   b. Ensure all future development rights are forfeited;
   c. Ensure all prohibited uses contained in the CE template are addressed; and
   d. Link the CE, Management Plan, and the Endowment Fund within the document (e.g., note that each exists to support the others, and where each of the documents can be located if a copy is required).
4. Insert necessary language, particularly, but not exclusively, per: (can compare to CE template):
   a. Rights of Grantee
   b. Grantee's Duties
   c. Reserved Rights
   d. Enforcement
   e. Remedies
   f. Access
   g. Costs and Liabilities
   h. Assignment and Transfer
   i. Merger
   j. Notices

5. Include a signature block for USFWS to sign "approved as to form."

Site Assessment and Development

Phase I Environmental Site Assessment

1. The Phase I ESA must show that the compensation site is not subject to any recognized environmental conditions as defined by the American Society for Testing and Materials (ASTM) Standard E1527-05 "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, available at http://www.astm.org/Standards/E1527.htm, (i.e., the presence or likely presence of any Hazardous Substances or petroleum products).
2. If the Phase I ESA identifies any recognized environmental conditions, the Project Applicant must represent and warrant to the SFWO that all appropriate assessment, clean up, remediation, or removal action has been completed.
3. If the Phase I ESA identifies any recognized environmental conditions, a Phase II ESA may be needed for sampling and laboratory analysis.

Restoration or Habitat Development Plan [*not required if the site is preservation only*]

1. The overall plan governing construction and habitat establishment activities required to be conducted on the Property, including, without limitation, creation, restoration, and enhancement of habitat.
   a. This plan should include the baseline conditions of the Property including biological resources, geographic location and features, topography, hydrology, vegetation, past, present, and adjacent land uses, species and habitats occurring on the property, a description of the activities and methodologies for creating, restoring, or enhancing habitat types, a map of the approved modifications, overall habitat establishment goals, objectives and Performance Standards, monitoring methodologies required to evaluate and meet the Performance Standards, an approved schedule for reporting monitoring results, a discussion of possible remedial actions, and any other information deemed necessary by the SFWO.
2. Any permits and other authorizations needed to construct and maintain the site shall be included and in place prior to the start of construction of the habitat.
3. Full construction plans for any habitat construction are subject to SFWO approval and must be *SFWO-approved prior* to the start of construction of the habitat.

Construction Security

1. Construction Security in the amount of 100% of a reasonable third party estimate or contract to create, restore, or enhance habitats on the property in accordance with the Restoration or Habitat Development Plan.
2. Construction Security can be drawn on should the project proponent default.
3. The Construction Security should be in the form of an irrevocable standby letter of credit or a cashier's check.
   a. LOC: issued for a period of at least one year, and provide that the expiration date will be automatically extended for at least one year on each successive expiration date unless, until extension is no longer necessary.
   b. Beneficiary: a third party subject to approval by the SFWO.
   c. Language in a draft letter of credit subject to approval by the SFWO.

Performance Security *[only necessary if habitat if performance standards have been identified]*

1. Performance Security in the amount of 20% of the Construction Security.
2. Performance Security can be drawn on should the Performance Standards not be met, if remedial action becomes necessary.
3. The Performance Security in the form of an irrevocable standby letter of credit or a cashier's check.
   a. LOC: issued for a period of at least one year, and provide that the expiration date will be automatically extended for at least one year on each successive expiration date unless, until extension is no longer necessary.
   b. Beneficiary: a third party who is subject to approval by the SFWO.
   c. Language in a draft letter of credit is subject to SFWO approval.

Site Management

Interim Management Plan

1. The Interim Management Plan should identify the short-term management, monitoring, and reporting activities to be conducted from the time construction ends until the Endowment Fund has been fully funded for three years and all the Performance Standards in the Development Plan have been met. This may be the same as the Long-term Management Plan.

Interim Management Security Analysis and Schedule

The purpose of the Interim Management Security is to allow the endowment to grow for at least three years without any disbursements, and is a safeguard to ensure that there will be enough funds in the endowment to pay for future management costs. The period can be longer than three years; a 5 year period is recommended by many land trusts.

1. Interim Management Security (in the form of a standby letter of credit) in the amount equal to the estimated cost to implement the Interim Management Plan during the first three years of the Interim Management Period, as set for in the Interim Management Security Analysis and Schedule.
2. The Interim Management Security Analysis and Schedule should be in the form of a table and/or spreadsheet that shows all of the tasks (management, monitoring, reporting), task descriptions, labor (hours), cost per unit, cost frequency, timing or scheduling of the tasks, the total annual funding necessary for each task, and any associated assumptions for each task required by the Interim Management Plan. The total annual expenses should include administration and contingency costs.
3. The Interim Management Security:
   a. Held by a qualified, non-profit organization or government agency, subject to SFWO approval [see requirements under CE above], and
   b. Held according to minimum standards for assuring maximum success in earning potential, and will include assurances to safeguard against loss of principle.
   c. Instructions for disbursements or releases from the fund must be outlined in the Endowment Management Agreement/Trust Agreement/Declaration of Trust.

Long-Term Management Plan (LTMP)

1. The LTMP template identifies the long-term management, monitoring and reporting activities to be conducted.
2. The LTMP should include at minimum:
   a. Purpose of the Project and purpose of the LTMP;
   b. A baseline description of the setting, location, history, and types of land use activities, geology, soils, climate, hydrology, habitats present (once project meets Performance Standards), and species descriptions;
   c. Overall management, maintenance and monitoring goals; specific tasks and timing of implementation; and discussion of any constraints, which may affect goals;
   d. The Endowment Fund Analysis and Schedule (see below);
   e. Discussion of Adaptive Management actions for reasonably foreseeable events and possible thresholds for evaluating and implementing Adaptive Management;
   f. Rights of access to the Property and prohibited uses of the Property as provided in the CE; and
   g. Procedures for Property transfer, land manager replacement, amendments, and notices.
3. The LTMP must be incorporated by reference in the CE.
4. The LTMP is considered a living document and may be revised as necessary upon agreement of the land manager, easement holder, and SFWO.

Endowment Fund Analysis and Schedule

1. Can use a PAR or PAR-like analysis and must be based upon the final LTMP, subject to SFWO approval.
   - The analysis should be developed with input by the land manager and conservation easement holder.
2. The analysis and schedule should be in the form of a table and/or spreadsheet that shows, at a minimum:
   - all of the tasks (management, monitoring, reporting)
   - task descriptions, with tasks numbers cross-referenced in management plan(s)
   - labor (hours)
   - materials
   - cost per unit (hr., linear feet, each, etc.).
   - cost frequency
   - timing or scheduling of the tasks,
   - the total annual funding necessary for each task, and
   - the assumptions required for each task by the Management Plan.
3. The total annual expenses should include administration and contingency costs (contingency can be included on each line item – identify the percentage). Unless there is a separate endowment for the purpose of monitoring and reporting on the CE conditions, then, the analysis should also include costs of
   - Monitoring and reporting CE conditions;
   - Defending the CE; and
   - Liability insurance.

4. The Endowment Fund::
   - Held by a qualified, SFWO-approved, non-profit organization or government agency [see requirements under CE above],
   - Held according to minimum standards for assuring maximum success in earning potential, and should include assurances for no loss of principle.
   - Disbursements or releases from the fund must be for documented expenditures, as they occur.

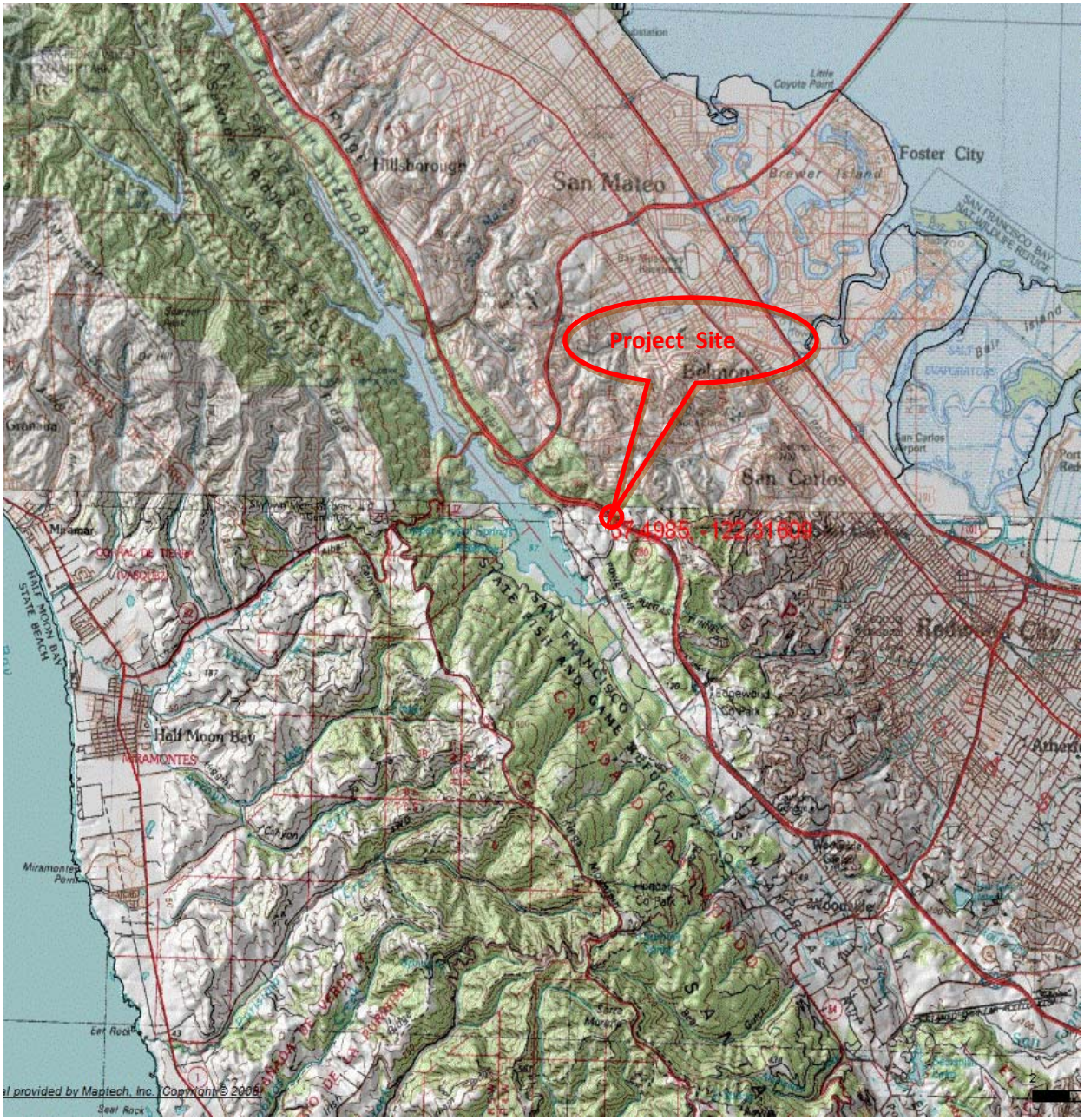
Endowment Funding Agreement

1. This is the agreement between the endowment holder and the Project Applicant, as to how the endowment is to be funded, held, and disbursed;
2. USFWS is not signatory to this agreement, but there should be a signature block on the agreement for SFWO to sign "approved as to form";
3. USFWS has approval authority over the language in the document, and it must state that modifications or transfer of the endowment to another holder are subject to USFWS approval;
4. This agreement can also be called: "Trust Agreement" or "Declaration of Trust." When the CDFW is involved, this is called "Mitigation Agreement."

ATTACHMENT I

SUMMER FLOW CALCULATION

EA 4G590
Drainage Pipe Replacement (Belmont Sinkhole Repair)
Unnamed Ephemeral Creek
Summer Runoff Rates



Norman Gonsalves

Caltrans D4 Office of Water Quality

July 2014

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1. INTRODUCTION

1.1 Purpose and Need

This study evaluates the risk associated with summer flows in Unnamed Ephemeral Creek, at Post Mile 9.4 on State Route 280, in San Matio County, California.

The project scope includes replacing an approximately 830-foot-long section of a broken drainage pipe and repair of the sinkhole damage. The damaged drainage pipe has created a large sinkhole along southbound I-280.

It is needed to establish a reasonable risk to be assumed by the contractor for stream diversion work necessary for the construction of a new highway bridge at this location. It may also be needed to determine the probability of occurrence of significant flows that actually occur during the project construction period.

The period of interest ("summer flows") for this project is from June 1 to October 15.

This document is intended to explain the methodology used to determine summer flows for this project and to present the results clearly. It is not intended to be an instruction manual for the software used.

The use of Streamstats and Web Soil Survey, both very popular online tools, is quite straightforward. Minimal guidance has been provided for selecting rain gages in BASINS 4.1. Creating a SWMM file with BASINS 4.1 could present some challenges.

SWMM, with its large set of engineering methods, has a high potential for producing widely varying results. Therefore, some guidance was presented on its use for this purpose, to hopefully limit the range of results.

Using a spreadsheet to separate flows for the period of interest requires the development and use of a Visual Basic macro. Expert spreadsheet users should find this task not too difficult.

The use of HEC-SSP for the log-Pearson III analysis is also fairly straightforward. The user, however, needs to become familiar with this software, BASINS 4.1 and especially SWMM 5.

2. METHODOLOGY

2.1 Methodology Outline

The basic premise is to analyze an annual series of stream flows in Unnamed Ephemeral Creek that includes only the days in the period of interest for each year.

Unnamed Ephemeral Creek is un-gauged and therefore its flow rates have to be simulated. This is accomplished using publicly available continuous rainfall data and a hydrology model to generate a complete set of daily runoff flow rates. The Rational Method may used for watersheds of area less than 0.5 square mile (Caltrans Highway Design Manual (HDM) Index 819.2).

A spreadsheet is then used to isolate flow rates for the period of interest, from which an annual series is derived. Probabilities of occurrence for various flow rates are then calculated using a log-Pearson Type III distribution, as recommended in Bulletin 17B (Section 4.3.4 of HDS-2 Highway Hydrology).

2.2 Software

2.2.1 Streamstats: The Unnamed Ephemeral Creek watershed was plotted using Streamstats, (http://water.usgs.gov/osw/streamstats) which is an online application created by the United States Geological Survey (USGS).

Streamstats uses a Digital Elevation Model to plot stream paths and watershed limits. It produces the shed area (A, in square miles), Mean Annual Precipitation (p, in inches), and the altitude index (H, in thousands of feet).

The software uses these values to calculate peak flows for the shed, for various return periods, using the Regional Flood-Frequency Equations found in Figure 819.2C in the HDM. These “all-year-round” peak flows will be used later to calibrate the hydrology model.

It also produces the elevation at the shed outlet (project site), mean shed slope, percentage of shed covered by forest, percentage of shed covered by lakes and ponds, percentage of

shed impervious area and the length of the longest shed flow path. These are useful for SWMM and hand calculations.

2.2.2 Web Soil Survey (http://**websoilsurvey**.nrcs.usda.gov) produces the Hydologic Soil Groups (HSG) for soils within the watershed. Using the watershed plot from Streamstats, the user plots the watershed in Web Soil Survey. This results in percentages of each soil type for the shed. These, when combined with the cover type (forest, impervious area, etc), produce Curve Numbers for use in SWMM 5, to calculate watershed infiltration. A single area-weighted Curve Number should be developed.

2.2.3 BASINS 4.1 (http://www.aquaterra.com/basins4) produces the continuous rainfall data for the shed runoff simulation. The rain gage should be selected carefully, taking elevation and years of rainfall data into consideration. The data should be edited to keep only non-zero hourly precipitation values, for efficiency. Either a Rainfall File (Section 11.3 of the SWMM Manual) or Time Series File (Section 11.6 of the SWMM Manual) should be generated in BASINS 4.1 for use in SWMM.

2.2.4 SWMM 5 (http://www.epa.gov/nrmrl/wswrd/wq/models/swmm) should be used to convert the continuous rainfall data from BASINS 4.1 to an hourly shed runoff set.

The project should be set up as a single watershed (S1) and outlet (Out1), with a rain gage (RG1). Watershed information from Streamstats (area in acres, mean slope, percentage of impervious area) should be used.

Watershed values for “Manning's overland n” and “watershed storage” for pervious and impervious surfaces, needed in S1, may be taken from Tables A.5 and A.6 in the SWMM Manual. The infiltration method should be set to “Curve Number” in the SWMM Options dialog box and the Reporting Time steps to 1 hour.

The weighted Curve Number from Web Soil Survey should be entered in the Infiltration dialog box, within the S1 watershed dialog box.

The model should be run after the rainfall or time-series file from BASINS 4.1 is connected to the rain gage, the simulation dates are set in the SWMM Options dialog box.

The Statistics reporting tool should be used to view the return periods of the simulated runoff events, by setting Object Category to Sub-catchment, Object Name to S1, Variable Analyzed to Runoff, Event Time Period to Annual and Statistic to Peak.

At this point, values for the return periods are based on the natural distribution of the data. These values will change somewhat after data are fit to a log-Pearson III distribution.

The 5-year event should be used for calibrating the SWMM model because it is intermediate between the 2-year and 10-year events. The simulated 2-year event will tend to be higher, and the simulated 10-year event lower, than the corresponding events from Streamstats.

Calibration should be accomplished by varying the watershed width until 5-year simulated peak from SWMM is close (within 5%) of the 5-year event from Streamstats.

The complete flow series is produced by resetting the Event Time Period in the Statistics Reporting tool from Annual to Daily and re-running the tool (after matching the 5-year events).

2.2.5 Spreadsheet. The complete flow series generated in SWMM should be copied to a spreadsheet, via the clipboard. Unnecessary columns should be deleted, keeping only the “Start Date” and “Daily Peak” columns. Sort the data by date, oldest first.

Flow values for the days of interest (1 June to 15 October, for example) should be extracted from the complete series and an annual series based on these days only should be created (using a Visual Basic macro, for example).

2.2.6 HEC-SSP (http://www.hec.usace.army.mil/software/hec-ssp) should used to perform the log-Pearson Type III analysis on the annual series, by importing the series directly from the spreadsheet.

This analysis produces flow values for standard return periods, based on industry-accepted software and methods.

3. RESULTS AND RECOMMENDATIONS

3.1 Streamstats

Basin Characteristics Report (StreamStats)

Date: Mon Jul 21 2014 11:48:52 Mountain Daylight Time
NAD83 Latitude: 37.4984 (37 29 54)
NAD83 Longitude: -122.3160 (-122 18 58)

Parameter	Value
Area, in square miles	0.1
Mean annual precipitation, in inches	24.7
Maximum elevation, in feet	796
Minimum elevation, in feet	515
Elevation at outlet, in feet	515
Average basin elevation, in feet	643
High Elevation Index - Percent of area above 6000 feet	0
Altitude Index, in thousands of feet. Estimated as 0.00083 times mean basin elevation.	0.53
Mean basin slope computed from 30 m DEM, in percent	14.7
Percentage of basin covered by forest	7.11
Percent of area covered by lakes and ponds	0
Percentage of impervious area determined from NLCD 2001 imperviousness dataset	4.3
Latitude of the outlet, NAD83	37.49842
Distance in miles from basin centroid to the coast	7.57

Streamstats Ungaged Site Report

Date: Mon Jul 21 2014 12:11:03 Mountain Daylight Time
Site Location: California
NAD83 Latitude: 37.4984 (37 29 54)
NAD83 Longitude: -122.3160 (-122 18 58)
Drainage Area: 0.1 mi2
Percent Urban: 13.0 %
Percent Impervious: 4.3 %

Table 2. Regional Regression Equation Input

Peak-Flow Basin Characteristics			
100% Central Coast Region (0.1 mi2)			
Parameter	Value	Regression Equation Valid Range	
		Minimum	Maximum
Drainage Area (square miles)	0.1 (below min value 0.17)	0.17	4156
Mean Annual Precipitation (inches)	24.7	8	52
Altitude Index (thousand feet)	0.53	0.1	2.4

Table 3. Regional Regression Equation Output

Peak-Flow Streamflow Statistics					
Statistic	Flow (ft3/s)	Standard Error (percent)	Equivalent years of record	90 % Prediction Interval	
				Minimum	Maximum
PK2	5.08				
PK5	12.5				
PK10	19.2				
PK25	29.3				
PK50	37.3				
PK100	47.4				
PK500	71.5				

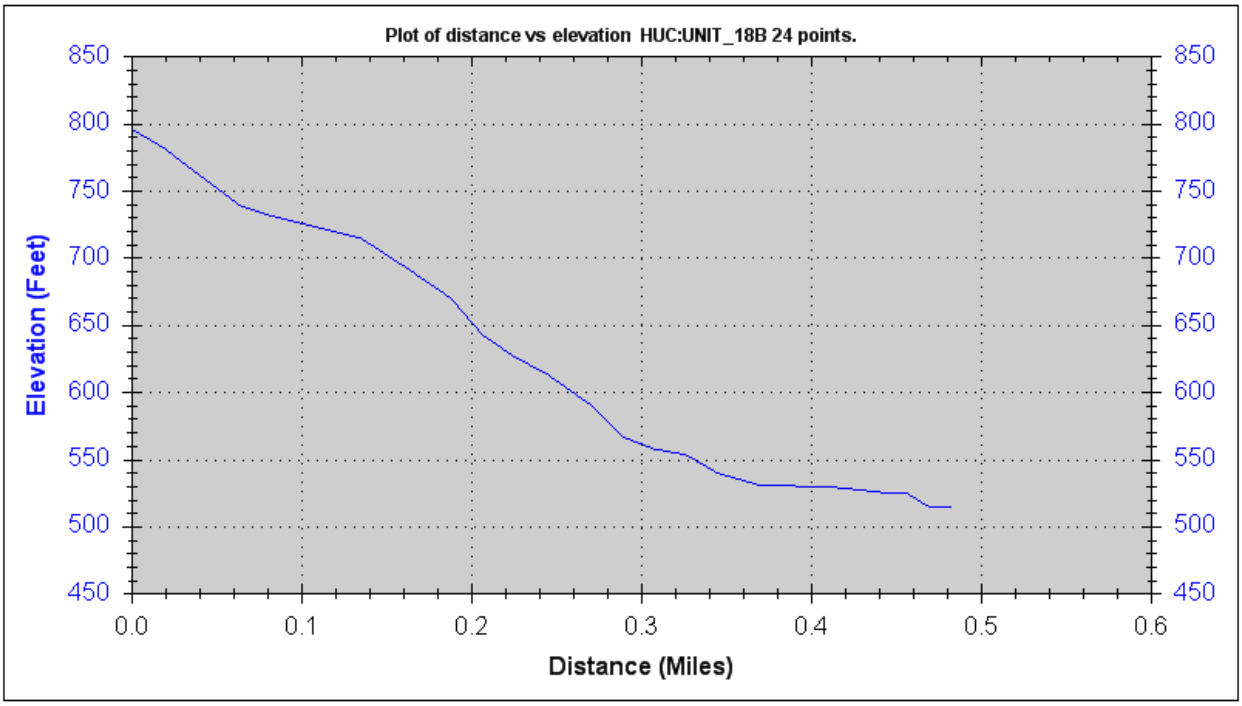


Fig 1. Profile of Unnamed EphemeralCreek to SR-280 (from StreamStats)

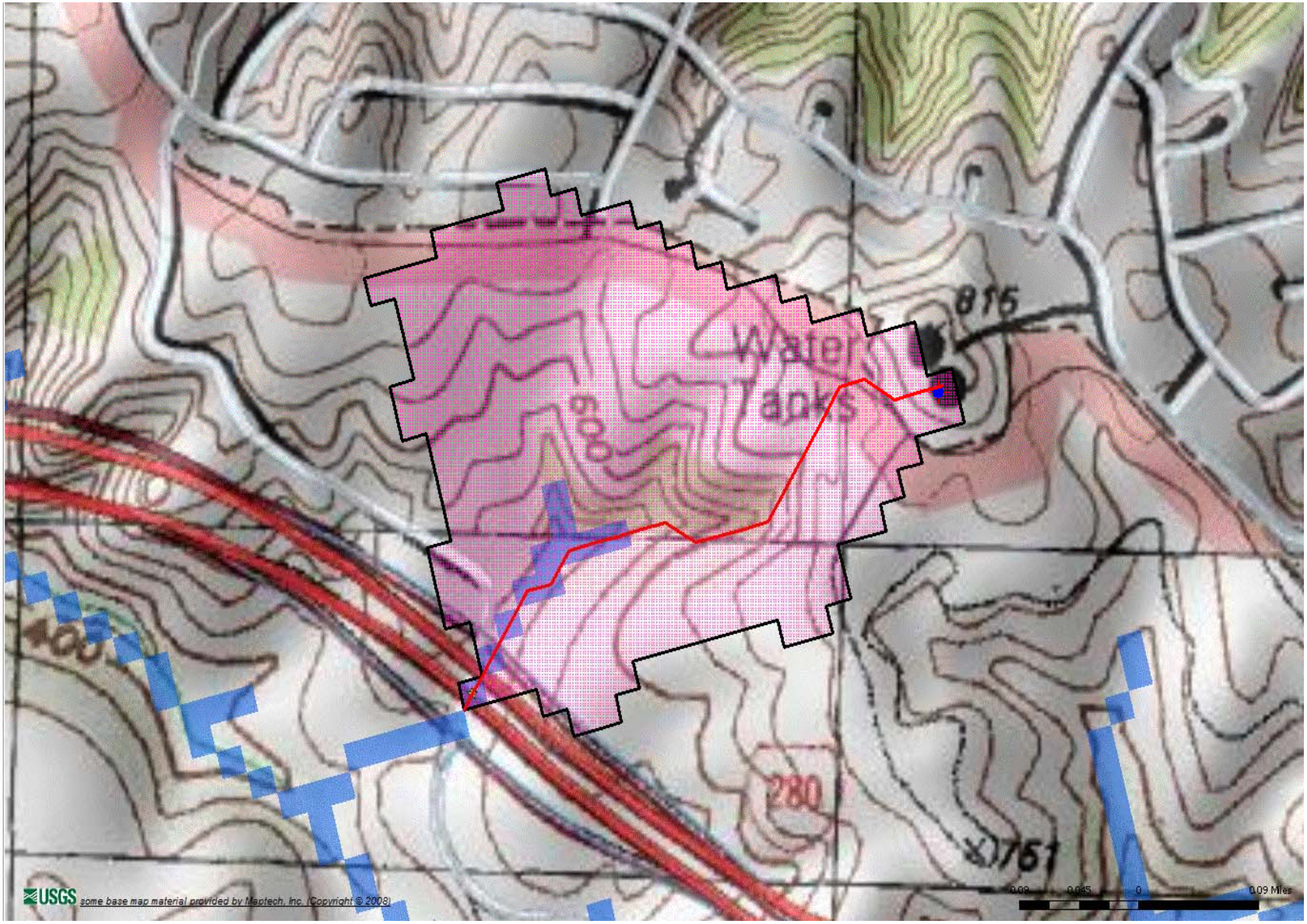


Fig 2. Sarco Cr watershed at SR-29 (produced with StreamStats)

3.2 Web Soil Survey

Table 4. Weighted Curve Number

Symbol	HSG	Area (Acre)	Area (%)	Cover	CN*	Area*CN
113	C	50.4	79.8	Poor-brush-weed grass micture	77	3880.8
124	D	10.6	16.8	Orthents - Urban land complex (cut/fill)	98	1038.8
133	D	2.1	3.4	Urban land -Orthents (cut/fill)	98	205.8
Totals for Area of Interest		63.2	100			5125.4

*CN taken from Table 5.4 HDS-2 Highway Hydrology

Total Area = 63.2 acres.

Total Area*CN = 5125.4

Weighted Curve Number = Total Area*CN/Total Area=81

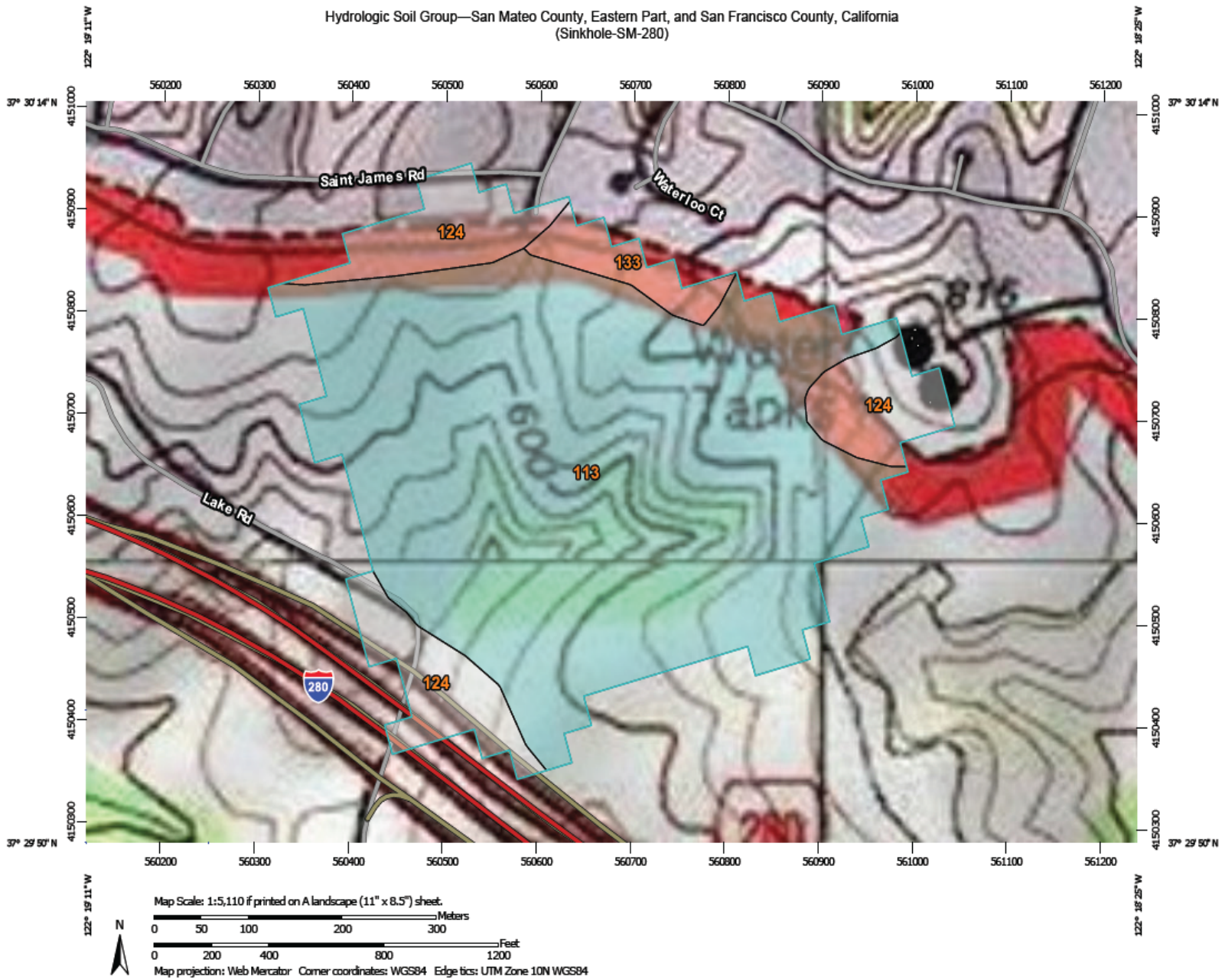


Fig 3. Hydrologic Soil Group Map (from Web Soil Survey)

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Topographic Map
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Mateo County, Eastern Part, and San Francisco County, California
Survey Area Data: Version 10, Dec 23, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 26, 2010—Sep 17, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Fig 4. Map legend for Figure 3.

Table 5. Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Mateo County, Eastern Part, and San Francisco County, California (CA689)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
113	Fagan loam, 15 to 50 percent slopes	C	50.4	79.8%
124	Orthents, cut and fill-Urban land complex, 5 to 75 percent slopes		10.6	16.8%
133	Urban land-Orthents, cut and fill complex, 5 to 75 percent slopes		2.1	3.4%
Totals for Area of Interest			**63.2**	**100.0%**

3.3 Basins 4.1

Rain gage selection

The rain gages considered are listed below.

Table 6. Rain gages considered.

Station Name	Start	End	LAT	LNG	PRECI	ELEV
			deg	deg	inch	ft
CAZADERO	6/30/1948	8/31/1971	38.533	-	51.81	323.08
GRATON	6/30/1948	12/31/200	38.430	-	42.07	60.96
GUERNEVILLE	6/30/1948	4/30/1971	38.503	-	39.95	18.288
HEALDSBURG	12/31/193	12/31/200	38.617	-	41.63	32.918
HEALDSBURG NO 2	6/30/1948	9/30/1996	38.633	-	41.63	45.72
OCCIDENTAL	6/30/1948	12/31/200	38.385	-	52.98	263.65
SANTA ROSA SONOMA	9/1/2000	12/31/200	38.503	-	35.31	34.747

*MAP = Mean Annual Precipitation

OCCIDENTAL station was chosen, despite being further away than GUERNEVILLE.station Its length of record was 61 years, whereas GUERNEVILLE had only 23 years of data. The project site average basin elevation (399 ft) also closely matches with OCCIDENTAL elevation(263.65 ft) despite GUERNEVILLE elevation (18.28 ft). In addition, project site mean annual precipitation (50.3 inches) derived from StramStat closely matched with OCCIDENTAL (52.98 inches) whereas GUERNEVILLE (39.95 inches).

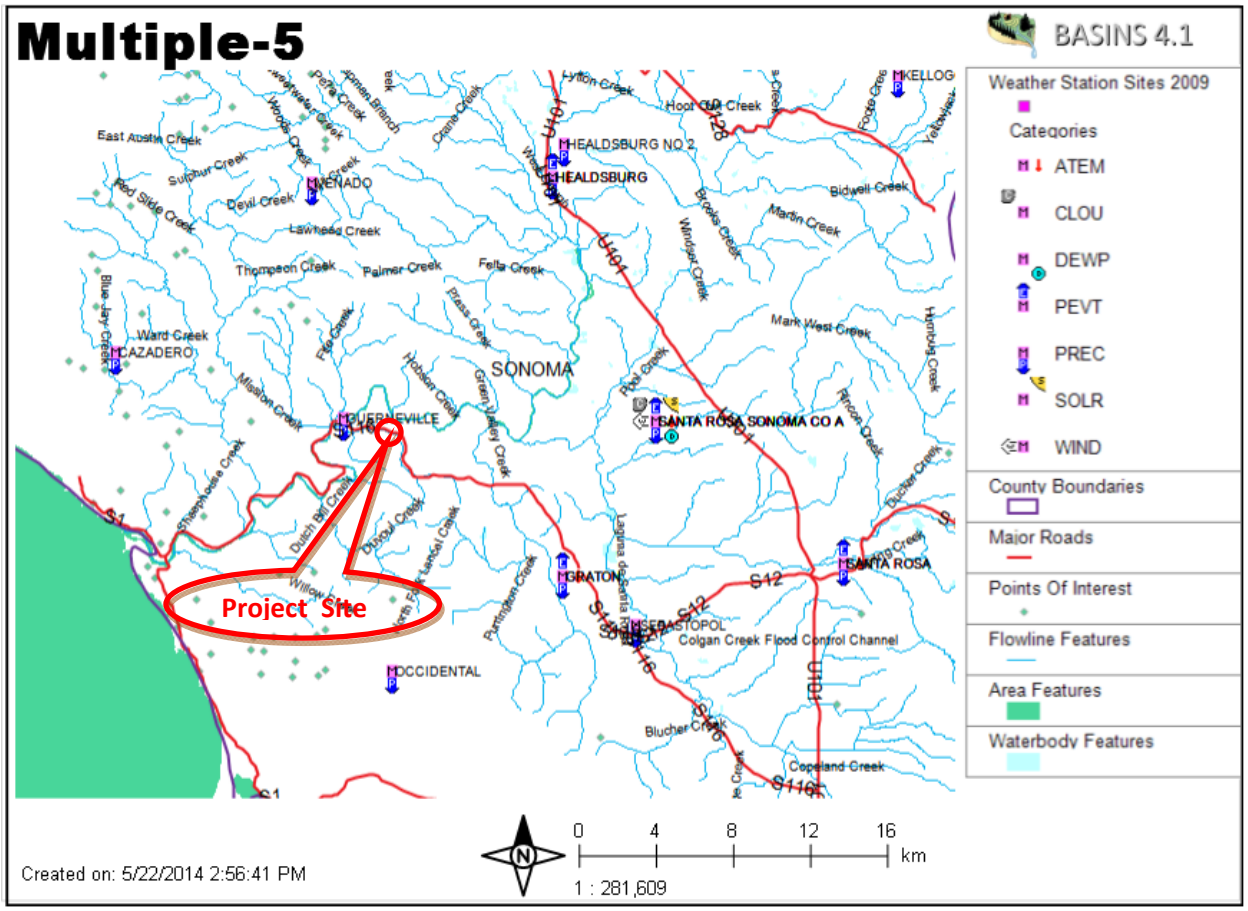


Fig 5. Rain gages considered, with data begin and end dates (from Basins 4.1)

3.4 SWMM 5

SWMM input (for non-default values)

Watershed values:
Area = 2816.9 acres = 4.4 square mile (Table 1)
Width = - feet (varied to match PK5 from Table 3)
%Slope = 35.9 (Table 1)
%Imperv = 0.1 (Table 1)
N-Perv = 0.4 (Manning's overland n for "Woods - Light underbush" (SWMM manual Appendix A.6)
Dstore-Perv = 0.3 (Forest litter depression storage, SWMM manual Appendix A.5)
Infiltration curve number = 72 (Table 4)

A single watershed should be created in SWMM, using the values above and default values. The time steps should be set to 1 hour, except the routing step (left at default). A time series rainfall file from BASINS 4.1, with continuous hourly rainfall for OCCIDENTAL(Table 6) should be used, with analysis started on 6/30/1948 at 00:00 hours. Reporting should start on 01/01/1951and the analysis should end on 12/31/2009, at 00:00 hours.

The SWMM model should be calibrated and run as described in Section 2.2.4 of this report. Flow values from the SWMM output are shown in Table 7, along with values for the same events from Streamstats (from Table 3), for comparison.

Table 7. Comparison of Streamstats and SWMM flow output

Event	Flows (cfs)		Comment
	Streamstats	SWMM	
2-year	652	578	-11.35%
5-year	904	904	Match
10-year	1110	1208	+8.82%
25-year	1290	1503	+16.51%

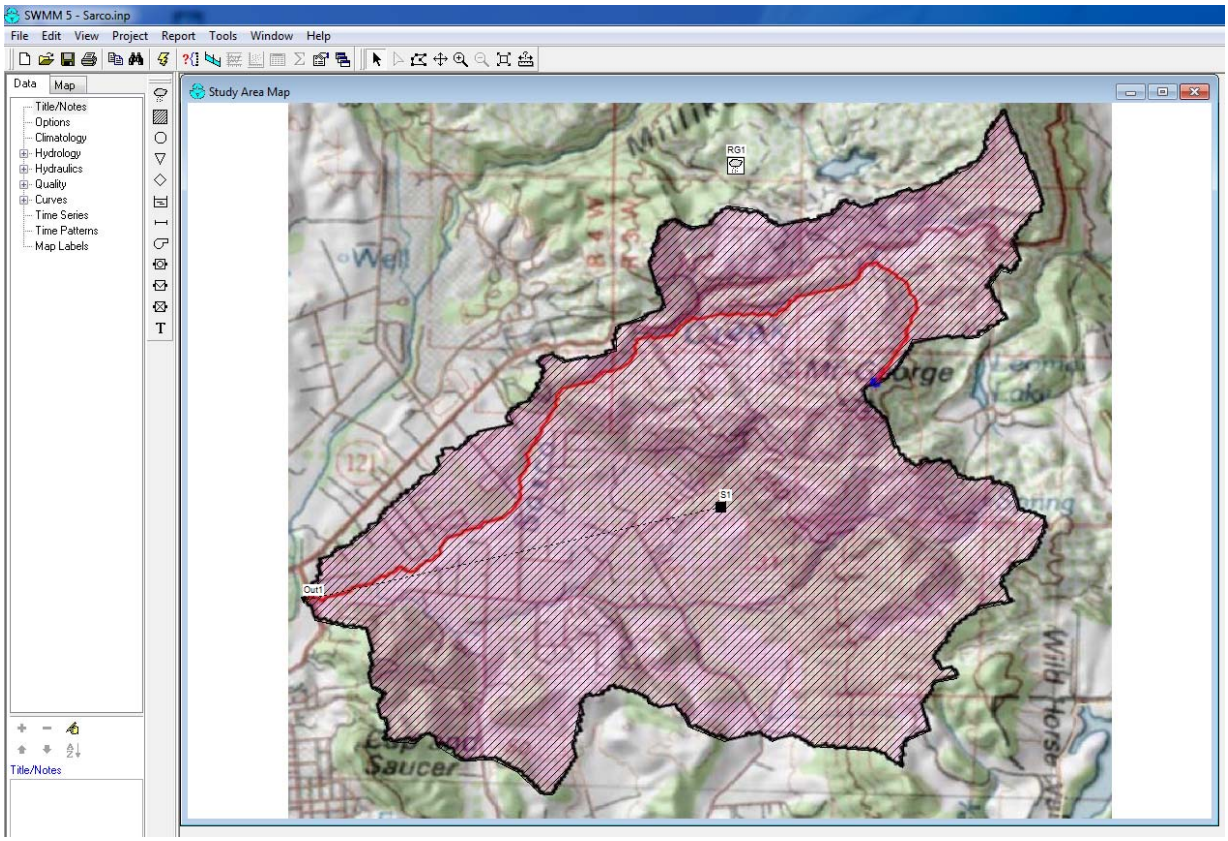


Fig 6. The SWMM interface.

3.5 Spreadsheet

After simulated flows for the period of interest (6/1/1949 to 10/15/1972) are isolated the annual series in the left half of the table below is produced.

It can be seen that flows in October dominate this annual series both in frequency and magnitude. The effect of removing October from the period of interest would also be studied, by creating another annual series, from 6/1/1949 to 9/30/1972.

Table 8. Annual series for summer months only

6/1/1951 to 10/15/2009			6/1/1951 to 9/30/2009		
Year	Date	Value	Year	Date	Value
1951	10/3/1951	20.216	1951	9/18/1951	2.810
1952	6/28/1952	59.500	1952	6/28/1952	59.500
1953	6/5/1953	73.480	1953	6/5/1953	73.480
1954	8/27/1954	32.149	1954	8/27/1954	32.149
1955	9/15/1955	43.568	1955	9/15/1955	43.568
1956	9/19/1956	20.710	1956	9/19/1956	20.710
1957	10/13/1957	227.368	1957	9/28/1957	129.014
1958	6/3/1958	25.549	1958	6/3/1958	25.549
1959	9/18/1959	350.918	1959	9/18/1959	350.918
1960	10/6/1960	14.961	1960	6/1/1960	3.608
1961	9/16/1961	20.684	1961	9/16/1961	20.684
1962	10/13/1962	1503.266	1962	9/28/1962	18.058
1963	10/11/1963	252.425	1963	9/12/1963	30.388
1964	6/8/1964	69.388	1964	6/8/1964	69.388
1965	8/11/1965	116.417	1965	8/11/1965	116.417
1966	6/6/1966	16.434	1966	6/6/1966	16.434
1967	6/2/1967	208.571	1967	6/2/1967	208.571
1968	10/12/1968	106.974	1968	8/19/1968	11.944
1969	10/15/1969	425.812	1969	6/9/1969	0.921
1970	6/9/1970	37.825	1970	6/9/1970	37.825
1971	9/29/1971	26.131	1971	9/29/1971	26.131
1972	10/15/1972	180.087	1972	9/26/1972	121.164
1973	10/7/1973	52.532	1973	9/22/1973	38.073
1974	7/8/1974	107.914	1974	7/8/1974	107.914
1975	10/10/1975	224.197	1975	7/15/1975	9.507
1976	10/1/1976	98.24	1976	8/18/1976	89.5
1977	9/19/1977	94.032	1977	9/19/1977	94.032
1978	9/10/1978	146.924	1978	9/10/1978	146.924

1979	10/13/1979	0.814	1979	6/1/1979	0.265
1980	10/13/1980	17.834	1980	7/2/1980	10.212
1981	10/7/1981	94.427	1981	9/24/1981	15.298
1982	9/16/1982	192.764	1982	9/16/1982	192.764
1983	8/20/1983	141.218	1983	8/20/1983	141.218
1984	10/11/1984	128.649	1984	8/31/1984	57.431
1985	9/11/1985	63.132	1985	9/11/1985	63.132
1986	9/24/1986	97.884	1986	9/24/1986	97.884
1987	6/1/1987	0.118	1987	6/1/1987	0.118
1988	6/7/1988	17.301	1988	6/7/1988	17.301
1989	9/17/1989	204.213	1989	9/17/1989	204.213
1990	6/1/1990	49.197	1990	6/1/1990	49.197
1991	6/28/1991	40.186	1991	6/28/1991	40.186
1992	6/29/1992	117.235	1992	6/29/1992	117.235
1993	10/14/1993	130.842	1993	6/4/1993	97.875
1994	10/4/1994	225.957	1994	6/6/1994	2.908
1995	6/1/1995	122.401	1995	6/1/1995	122.401
1996	6/1/1996	1.548	1996	6/1/1996	1.548
1997	10/8/1997	229.843	1997	8/20/1997	93.92
1998	6/1/1998	23.125	1998	6/1/1998	23.125
1999	10/6/1999	3.929	1999	9/22/1999	1.051
2000	10/10/2000	20.563	2000	6/7/2000	8.499
2001	9/24/2001	89.524	2001	9/24/2001	89.524
2002	6/1/2002	1.69	2002	6/1/2002	1.69
2003	8/22/2003	107.946	2003	8/22/2003	107.946
2004	9/19/2004	10.814	2004	9/19/2004	10.814
2005	6/9/2005	72.923	2005	6/9/2005	72.923
2006	10/4/2006	113.287	2006	6/28/2006	7.972
2007	10/10/2007	121.69	2007	9/20/2007	1.549
2008	10/4/2008	23.49	2008	6/1/2008	0.771
2009	10/13/2009	1304.828	2009	9/14/2009	10.642

3.6 HEC-SSP

A Bulletin 17B analysis should be performed for 3 scenarios for this project:

1. The Full period of interest (6/1/1949 to 10/15/1972)
2. The Shortened period of interest, without October (6/1/1949 to 9/30/1972)and
3. The Full Year (for comparison).

The HEC-SSP reports for the 3 scenarios are attached at the end of this report.

Table 9. Results From HEC-SSP analyses

Event	Full	Shortened	Full Year
	cfs	cfs	cfs
2-year	71.9	31.5	607.5
5-year	208.9	105.6	880.3
10-year	331.3	174.5	1077.2

3.7 Recommendations

A stream diversion should be designed for at least twice the number of summers for which the diversion would be needed. This is necessary to reduce the likelihood of flooding to less than once per season.

If the Sarco diversion would be needed for one summer then the -year event would be required. This would be 71.9 cfs up to October 15, but could be reduced to 31.5 cfs up to September 30.

4. ATTACHMENT - HEC-SSP REPORTS

4.1 HEC-SSP Report - 6/1/1951 To 10/15/2009

```
-------------------------------
Bulletin 17B Frequency Analysis
    09 May 2014   04:24 PM
-------------------------------

--- Input Data ---

Analysis Name: Sarco
Description: Sarco

Data Set Name: Sarco-FLOW-PEAK
```

```
DSS File Name: C:\Users\s136558\Documents\HEC\Sarco\Sarco.dss
DSS Pathname: ///FLOW-PEAK/01jan1900/IR-CENTURY//

Report File Name:
C:\Users\s136558\Documents\HEC\Sarco\Bulletin17bResults\Sarco\Sarco.rpt
XML File Name:
C:\Users\s136558\Documents\HEC\Sarco\Bulletin17bResults\Sarco\Sarco.xml

Start Date:
End Date:

Skew Option: Use Station Skew
Regional Skew: -Infinity
Regional Skew MSE: -Infinity

Plotting Position Type: Median

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95

Display ordinate values using 1 digits in fraction part of value


--- End of Input Data ---


--- Preliminary Results ---


<< Skew Weighting >>
-----------------------------------------------------------------
Based on 59 events, mean-square error of station skew =      0.25
Mean-square error of regional skew =                           -?
-----------------------------------------------------------------
```

<< Frequency Curve >>
Sarco-FLOW-PEAK

Computed Curve FLOW, cfs	Expected Probability	Percent Chance Exceedance	Confidence Limits FLOW, cfs 0.05	0.95
634.0	649.1	0.2	1,132.4	398.7
593.8	608.1	0.5	1,051.1	375.6
552.8	566.6	1.0	969.2	351.9
500.4	512.4	2.0	865.7	321.2
409.7	419.0	5.0	690.7	267.4
323.1	328.5	10.0	528.9	214.6
221.7	224.2	20.0	347.9	150.9
78.3	78.3	50.0	113.3	55.0
16.9	16.4	80.0	24.6	11.0
6.1	5.7	90.0	9.5	3.5
2.3	2.1	95.0	4.0	1.2
0.3	0.2	99.0	0.6	0.1

<< Systematic Statistics >>
Sarco-FLOW-PEAK

Log Transform: FLOW, cfs		Number of Events	
Mean	1.745	Historic Events	0
Standard Dev	0.716	High Outliers	0
Station Skew	-1.284	Low Outliers	0
Regional Skew	---	Zero Events	0
Weighted Skew	---	Missing Events	0
Adopted Skew	-1.284	Systematic Events	59

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 59 events, 10 percent outlier test deviate K(N) = 2.831
Computed low outlier test value = 0.52

1 low outlier(s) identified below test value of 0.52

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Systematic Statistics >>
Sarco-FLOW-PEAK

Log Transform:	

FLOW, cfs		Number of Events	
Mean	1.791	Historic Events	0
Standard Dev	0.628	High Outliers	0
Station Skew	-0.764	Low Outliers	1
Regional Skew	---	Zero Events	0
Weighted Skew	---	Missing Events	0
Adopted Skew	-1.284	Systematic Events	59

<< High Outlier Test >>

Based on 58 events, 10 percent outlier test deviate K(N) = 2.824
Computed high outlier test value = 3,660.39

0 high outlier(s) identified above test value of 3,660.39

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Sarco-FLOW-PEAK

Events Analyzed		Ordered Events			
Day Mon Year	FLOW cfs	Rank	Water Year	FLOW cfs	Median Plot Pos
03 Oct 1951	20.2	1	1963	1,503.3	1.18
28 Jun 1952	59.5	2	2010	1,304.8	2.86
05 Jun 1953	73.5	3	1970	425.8	4.55
27 Aug 1954	32.1	4	1959	350.9	6.23
15 Sep 1955	43.6	5	1964	252.4	7.91
19 Sep 1956	20.7	6	1998	229.8	9.60
13 Oct 1957	227.4	7	1958	227.4	11.28
03 Jun 1958	25.5	8	1995	226.0	12.96
18 Sep 1959	350.9	9	1976	224.2	14.65
06 Oct 1960	15.0	10	1967	208.6	16.33
16 Sep 1961	20.7	11	1989	204.2	18.01
13 Oct 1962	1,503.3	12	1982	192.8	19.70
11 Oct 1963	252.4	13	1973	180.1	21.38
08 Jun 1964	69.4	14	1978	146.9	23.06
11 Aug 1965	116.4	15	1983	141.2	24.75
06 Jun 1966	16.4	16	1994	130.8	26.43
02 Jun 1967	208.6	17	1985	128.6	28.11
12 Oct 1968	107.0	18	1995	122.4	29.80
15 Oct 1969	425.8	19	2008	121.7	31.48
09 Jun 1970	37.8	20	1992	117.2	33.16
29 Sep 1971	26.1	21	1965	116.4	34.85
15 Oct 1972	180.1	22	2007	113.3	36.53
07 Oct 1973	52.5	23	2003	107.9	38.22
08 Jul 1974	107.9	24	1974	107.9	39.90

10 Oct 1975	224.2	25	1969	107.0	41.58
01 Oct 1976	98.2	26	1977	98.2	43.27
19 Sep 1977	94.0	27	1986	97.9	44.95
10 Sep 1978	146.9	28	1982	94.4	46.63
13 Oct 1979	0.8	29	1977	94.0	48.32
13 Oct 1980	17.8	30	2001	89.5	50.00
07 Oct 1981	94.4	31	1953	73.5	51.68
16 Sep 1982	192.8	32	2005	72.9	53.37
20 Aug 1983	141.2	33	1964	69.4	55.05
11 Oct 1984	128.6	34	1985	63.1	56.73
11 Sep 1985	63.1	35	1952	59.5	58.42
24 Sep 1986	97.9	36	1974	52.5	60.10
01 Jun 1987	0.1	37	1990	49.2	61.78
07 Jun 1988	17.3	38	1955	43.6	63.47
17 Sep 1989	204.2	39	1991	40.2	65.15
01 Jun 1990	49.2	40	1970	37.8	66.84
28 Jun 1991	40.2	41	1954	32.1	68.52
29 Jun 1992	117.2	42	1971	26.1	70.20
14 Oct 1993	130.8	43	1958	25.5	71.89
04 Oct 1994	226.0	44	2009	23.5	73.57
01 Jun 1995	122.4	45	1998	23.1	75.25
01 Jun 1996	1.5	46	1956	20.7	76.94
08 Oct 1997	229.8	47	1961	20.7	78.62
01 Jun 1998	23.1	48	2001	20.6	80.30
06 Oct 1999	3.9	49	1952	20.2	81.99
10 Oct 2000	20.6	50	1981	17.8	83.67
24 Sep 2001	89.5	51	1988	17.3	85.35
01 Jun 2002	1.7	52	1966	16.4	87.04
22 Aug 2003	107.9	53	1961	15.0	88.72
19 Sep 2004	10.8	54	2004	10.8	90.40
09 Jun 2005	72.9	55	2000	3.9	92.09
04 Oct 2006	113.3	56	2002	1.7	93.77
10 Oct 2007	121.7	57	1996	1.5	95.45
04 Oct 2008	23.5	58	1980	0.8	97.14
13 Oct 2009	1,304.8	59	1987	0.1*	98.82

* Outlier

<< Skew Weighting >>

Based on 59 events, mean-square error of station skew = 0.144
Mean-square error of regional skew = -?

<< Frequency Curve >>

Sarco-FLOW-PEAK

Computed Curve FLOW, cfs	Expected Probability	Percent Chance Exceedance	Confidence Limits FLOW, cfs 0.05	0.95
1,092.1	1,176.6	0.2	2,035.7	673.1
917.9	977.8	0.5	1,666.7	575.9
781.9	826.4	1.0	1,386.3	498.5
644.0	674.5	2.0	1,110.2	418.4

463.0	479.4	5.0	762.4	310.1
331.3	339.2	10.0	522.2	228.1
208.9	211.8	20.0	312.1	148.4
71.9	71.9	50.0	99.2	52.6
19.1	18.6	80.0	26.7	12.9
8.5	8.1	90.0	12.6	5.2
4.1	3.8	95.0	6.5	2.3
0.9	0.7	99.0	1.7	0.4

<< Synthetic Statistics >>
Sarco-FLOW-PEAK

Log Transform: FLOW, cfs		Number of Events	
Mean	1.777	Historic Events	0
Standard Dev	0.634	High Outliers	0
Station Skew	-0.762	Low Outliers	1
Regional Skew	---	Zero Events	0
Weighted Skew	---	Missing Events	0
Adopted Skew	-0.762	Systematic Events	59

--- End of Analytical Frequency Curve ---

4.2 HEC-SSP Report - 6/1/1951 To 9/30/2009

```
Bulletin 17B Frequency Analysis
    20 May 2014   11:04 AM
--------------------------------


--- Input Data ---


Analysis Name: Sarco2
Description: Sarco2


Data Set Name: Sarco2-FLOW-PEAK
DSS File Name: C:\Users\s136558\Documents\HEC\Sarco2\Sarco2.dss
DSS Pathname: ///FLOW-PEAK/01jan1900/IR-CENTURY//


Report File Name:
C:\Users\s136558\Documents\HEC\Sarco2\Bulletin17bResults\Sarco2\Sarco2.rpt
XML File Name:
C:\Users\s136558\Documents\HEC\Sarco2\Bulletin17bResults\Sarco2\Sarco2.xml


Start Date:
End Date:


Skew Option: Use Station Skew
Regional Skew: -Infinity
Regional Skew MSE: -Infinity


Plotting Position Type: Median


Upper Confidence Level: 0.05
Lower Confidence Level: 0.95


Display ordinate values using 1 digits in fraction part of value


--- End of Input Data ---


--- Preliminary Results ---


<< Skew Weighting >>
-----------------------------------------------------------------
Based on 59 events, mean-square error of station skew =     0.182
Mean-square error of regional skew =                           -?
-----------------------------------------------------------------
```

<< Frequency Curve >>
Sarco2-FLOW-PEAK

Computed Curve FLOW, cfs	Expected Probability	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	0.95
526.9	556.1	0.2	1,055.1	305.1
460.4	483.5	0.5	904.1	270.1
403.0	422.0	1.0	776.5	239.4
339.9	353.9	2.0	639.4	205.1
249.3	257.8	5.0	449.8	154.6
178.2	182.4	10.0	308.0	113.4
109.0	110.7	20.0	178.2	71.7
32.0	32.0	50.0	47.6	21.8
6.1	6.0	80.0	9.3	3.8
2.2	2.0	90.0	3.5	1.2
0.8	0.7	95.0	1.5	0.4
0.1	0.1	99.0	0.2	0.0

<< Systematic Statistics >>
Sarco2-FLOW-PEAK

Log Transform: FLOW, cfs		Number of Events	
Mean	1.376	Historic Events	0
Standard Dev	0.777	High Outliers	0
Station Skew	-1.009	Low Outliers	0
Regional Skew	---	Zero Events	0
Weighted Skew	---	Missing Events	0
Adopted Skew	-1.009	Systematic Events	59

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 59 events, 10 percent outlier test deviate K(N) = 2.831
Computed low outlier test value = 0.15

1 low outlier(s) identified below test value of 0.15

Statistics and frequency curve adjusted for 1 low outlier(s)

<< Systematic Statistics >>
Sarco2-FLOW-PEAK

Log Transform: FLOW, cfs		Number of Events	
Mean	1.416	Historic Events	0
Standard Dev	0.721	High Outliers	0
Station Skew	-0.864	Low Outliers	1
Regional Skew	---	Zero Events	0
Weighted Skew	---	Missing Events	0
Adopted Skew	-1.009	Systematic Events	59

<< High Outlier Test >>

Based on 58 events, 10 percent outlier test deviate K(N) = 2.824
Computed high outlier test value = 2,825.01

0 high outlier(s) identified above test value of 2,825.01

Note: Statistics and frequency curve were modified
using conditional probablity adjustment.

--- Final Results ---

<< Plotting Positions >>
Sarco2-FLOW-PEAK

Events Analyzed		Ordered Events			
Day Mon Year	FLOW cfs	Rank	Water Year	FLOW cfs	Median Plot Pos
18 Sep 1951	2.8	1	1959	350.9	1.18
28 Jun 1952	59.5	2	1967	208.6	2.86
05 Jun 1953	73.5	3	1989	204.2	4.55
27 Aug 1954	32.1	4	1982	192.8	6.23
15 Sep 1955	43.6	5	1978	146.9	7.91
19 Sep 1956	20.7	6	1983	141.2	9.60
28 Sep 1957	129.0	7	1957	129.0	11.28
03 Jun 1958	25.5	8	1995	122.4	12.96
18 Sep 1959	350.9	9	1972	121.2	14.65
01 Jun 1960	3.6	10	1992	117.2	16.33
16 Sep 1961	20.7	11	1965	116.4	18.01
28 Sep 1962	18.1	12	2003	107.9	19.70
12 Sep 1963	30.4	13	1974	107.9	21.38
08 Jun 1964	69.4	14	1986	97.9	23.06
11 Aug 1965	116.4	15	1993	97.9	24.75
06 Jun 1966	16.4	16	1977	94.0	26.43
02 Jun 1967	208.6	17	1997	93.9	28.11
19 Aug 1968	11.9	18	2001	89.5	29.80
09 Jun 1969	0.9	19	1976	89.5	31.48
09 Jun 1970	37.8	20	1953	73.5	33.16

29 Sep 1971	26.1	21	2005	72.9	34.85
26 Sep 1972	121.2	22	1964	69.4	36.53
22 Sep 1973	38.1	23	1985	63.1	38.22
08 Jul 1974	107.9	24	1952	59.5	39.90
15 Jul 1975	9.5	25	1984	57.4	41.58
18 Aug 1976	89.5	26	1990	49.2	43.27
19 Sep 1977	94.0	27	1955	43.6	44.95
10 Sep 1978	146.9	28	1991	40.2	46.63
01 Jun 1979	0.3	29	1973	38.1	48.32
02 Jul 1980	10.2	30	1970	37.8	50.00
24 Sep 1981	15.3	31	1954	32.1	51.68
16 Sep 1982	192.8	32	1963	30.4	53.37
20 Aug 1983	141.2	33	1971	26.1	55.05
31 Aug 1984	57.4	34	1958	25.5	56.73
11 Sep 1985	63.1	35	1998	23.1	58.42
24 Sep 1986	97.9	36	1956	20.7	60.10
01 Jun 1987	0.1	37	1961	20.7	61.78
07 Jun 1988	17.3	38	1962	18.1	63.47
17 Sep 1989	204.2	39	1988	17.3	65.15
01 Jun 1990	49.2	40	1966	16.4	66.84
28 Jun 1991	40.2	41	1981	15.3	68.52
29 Jun 1992	117.2	42	1968	11.9	70.20
04 Jun 1993	97.9	43	2004	10.8	71.89
06 Jun 1994	2.9	44	2009	10.6	73.57
01 Jun 1995	122.4	45	1980	10.2	75.25
01 Jun 1996	1.5	46	1975	9.5	76.94
20 Aug 1997	93.9	47	2000	8.5	78.62
01 Jun 1998	23.1	48	2006	8.0	80.30
22 Sep 1999	1.1	49	1960	3.6	81.99
07 Jun 2000	8.5	50	1994	2.9	83.67
24 Sep 2001	89.5	51	1951	2.8	85.35
01 Jun 2002	1.7	52	2002	1.7	87.04
22 Aug 2003	107.9	53	2007	1.5	88.72
19 Sep 2004	10.8	54	1996	1.5	90.40
09 Jun 2005	72.9	55	1999	1.1	92.09
28 Jun 2006	8.0	56	1969	0.9	93.77
20 Sep 2007	1.5	57	2008	0.8	95.45
01 Jun 2008	0.8	58	1979	0.3	97.14
14 Sep 2009	10.6	59	1987	0.1*	98.82

* Outlier

```
<< Skew Weighting >>
-------------------------------------------------------------------
Based on 59 events, mean-square error of station skew =     0.155
Mean-square error of regional skew =                           -?
-------------------------------------------------------------------
```

<< Frequency Curve >>
Sarco2-FLOW-PEAK

Computed Curve FLOW, cfs	Expected Probability	Percent Chance Exceedance	Confidence Limits 0.05 FLOW, cfs	0.95
588.5	630.8	0.2	1,172.7	343.4
498.3	529.4	0.5	968.8	295.7
425.6	449.4	1.0	808.6	256.5
350.1	366.8	2.0	647.0	215.0
249.0	258.2	5.0	439.0	157.6
174.5	178.9	10.0	293.9	113.7
105.6	107.3	20.0	167.9	71.2
31.8	31.8	50.0	46.2	22.2
6.8	6.6	80.0	10.0	4.3
2.6	2.5	90.0	4.1	1.5
1.1	1.0	95.0	1.9	0.6
0.2	0.1	99.0	0.4	0.1

<< Synthetic Statistics >>
Sarco2-FLOW-PEAK

Log Transform: FLOW, cfs		Number of Events	
Mean	1.398	Historic Events	0
Standard Dev	0.732	High Outliers	0
Station Skew	-0.870	Low Outliers	1
Regional Skew	---	Zero Events	0
Weighted Skew	---	Missing Events	0
Adopted Skew	-0.870	Systematic Events	59

--- End of Analytical Frequency Curve ---

4.3 HEC-SSP Report - 1/1/1951 To 12/31/2009

```
-------------------------------
Bulletin 17B Frequency Analysis
    19 May 2014   04:35 PM
-------------------------------

--- Input Data ---

Analysis Name: Sarco3
Description: Sarco3

Data Set Name: Sarco3-FLOW-PEAK
DSS File Name: C:\Users\s136558\Documents\HEC\Sarco3\Sarco3.dss
DSS Pathname: ///FLOW-PEAK/01jan1900/IR-CENTURY//

Report File Name:
C:\Users\s136558\Documents\HEC\Sarco3\Bulletin17bResults\Sarco3\Sarco3.rpt
XML File Name:
C:\Users\s136558\Documents\HEC\Sarco3\Bulletin17bResults\Sarco3\Sarco3.xml

Start Date:
End Date:

Skew Option: Use Station Skew
Regional Skew: -Infinity
Regional Skew MSE: -Infinity

Plotting Position Type: Median

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---


----------------------
<< Low Outlier Test >>
----------------------
 Based on 59 events, 10 percent outlier test deviate K(N) = 2.831
                         Computed low outlier test value = 182.38

           0 low outlier(s) identified below test value of 182.38


-----------------------
<< High Outlier Test >>
-----------------------
 Based on 59 events, 10 percent outlier test deviate K(N) = 2.831
                       Computed high outlier test value = 2,079.92

        0 high outlier(s) identified above test value of 2,079.92
```

--- Final Results ---

<< Plotting Positions >>
Sarco3-FLOW-PEAK

Events Analyzed			Ordered Events			
Day	Mon	Year	FLOW cfs	Rank	Water Year	FLOW cfs	Median Plot Pos
01	Dec	1951	565.2	1	1978	1,603.1	1.18
07	Dec	1952	505.2	2	1963	1,503.3	2.86
13	Nov	1953	417.3	3	1986	1,411.7	4.55
17	Jan	1954	452.2	4	1982	1,305.7	6.23
22	Dec	1955	834.4	5	2010	1,304.8	7.91
23	Feb	1956	342.5	6	2006	1,208.2	9.60
17	Dec	1957	266.3	7	1996	1,050.2	11.28
03	Apr	1958	666.7	8	1979	1,021.5	12.96
16	Feb	1959	481.4	9	2003	935.4	14.65
01	Dec	1960	487.0	10	1999	928.3	16.33
01	Dec	1961	350.1	11	1970	922.1	18.01
13	Oct	1962	1,503.3	12	1967	904.1	19.70
31	Jan	1963	537.9	13	2003	870.0	21.38
23	Dec	1964	582.1	14	1983	866.2	23.06
05	Jan	1965	485.6	15	1956	834.4	24.75
05	Jan	1966	578.0	16	1998	832.3	26.43
21	Jan	1967	904.1	17	1997	774.9	28.11
30	Jan	1968	582.5	18	1974	761.2	29.80
16	Oct	1969	447.6	19	2008	757.8	31.48
14	Jan	1970	922.1	20	1980	751.4	33.16
26	Mar	1971	259.0	21	1996	682.0	34.85
14	Nov	1972	681.8	22	1973	681.8	36.53
12	Jan	1973	552.6	23	1958	666.7	38.22
04	Jan	1974	761.2	24	2000	623.8	39.90
12	Feb	1975	369.4	25	1982	609.4	41.58
02	Mar	1976	498.4	26	1987	603.0	43.27
21	Nov	1977	1,603.1	27	1995	585.5	44.95
16	Jan	1978	576.9	28	1968	582.5	46.63
11	Jan	1979	1,021.5	29	1965	582.1	48.32
19	Feb	1980	751.4	30	1966	578.0	50.00
21	Nov	1981	609.4	31	1985	577.6	51.68
04	Jan	1982	1,305.7	32	1978	576.9	53.37
25	Feb	1983	866.2	33	1952	565.2	55.05
27	Nov	1984	523.5	34	1973	552.6	56.73
08	Feb	1985	577.6	35	2006	543.9	58.42
18	Feb	1986	1,411.7	36	1963	537.9	60.10
13	Feb	1987	603.0	37	2002	528.5	61.78
23	Nov	1988	409.3	38	1993	525.6	63.47
26	Nov	1989	317.0	39	1985	523.5	65.15
27	May	1990	400.3	40	1993	511.9	66.84
26	Oct	1991	494.5	41	1953	505.2	68.52
29	Oct	1992	525.6	42	1976	498.4	70.20
13	Jan	1993	511.9	43	1992	494.5	71.89
06	Nov	1994	585.5	44	1961	487.0	73.57
12	Dec	1995	1,050.2	45	1965	485.6	75.25
01	Apr	1996	682.0	46	1959	481.4	76.94
22	Jan	1997	774.9	47	2005	455.4	78.62
03	Feb	1998	832.3	48	1954	452.2	80.30

07 Feb 1999	928.3	49	1970	447.6	81.99
14 Feb 2000	623.8	50	1954	417.3	83.67
02 Dec 2001	528.5	51	1989	409.3	85.35
16 Dec 2002	870.0	52	1990	400.3	87.04
14 Mar 2003	935.4	53	1975	369.4	88.72
08 Dec 2004	455.4	54	1962	350.1	90.40
31 Dec 2005	1,208.2	55	1956	342.5	92.09
27 Feb 2006	543.9	56	1990	317.0	93.77
20 Dec 2007	249.6	57	1958	266.3	95.45
04 Jan 2008	757.8	58	1971	259.0	97.14
13 Oct 2009	1,304.8	59	2008	249.6	98.82

<< Skew Weighting >>

Based on 59 events, mean-square error of station skew = 0.1
Mean-square error of regional skew = -?

<< Frequency Curve >>
Sarco3-FLOW-PEAK

Computed Curve FLOW, cfs	Expected Probability	Percent Chance Exceedance	Confidence Limits FLOW, cfs 0.05	0.95
2,347.1	2,528.5	0.2	3,046.9	1,927.3
2,013.8	2,129.1	0.5	2,548.9	1,683.7
1,778.3	1,856.4	1.0	2,205.9	1,508.0
1,555.5	1,605.9	2.0	1,889.3	1,338.7
1,277.7	1,302.8	5.0	1,506.6	1,122.1
1,077.2	1,090.2	10.0	1,240.4	960.7
880.3	885.7	20.0	989.7	796.5
607.5	607.5	50.0	666.6	553.3
427.5	425.2	80.0	472.7	379.9
358.4	354.9	90.0	401.3	312.0
311.1	306.3	95.0	352.7	265.7
240.8	233.4	99.0	280.2	197.9

<< Systematic Statistics >>
Sarco3-FLOW-PEAK

Log Transform: FLOW, cfs		Number of Events	
Mean	2.790	Historic Events	0
Standard Dev	0.187	High Outliers	0
Station Skew	0.192	Low Outliers	0
Regional Skew	---	Zero Events	0
Weighted Skew	---	Missing Events	0
Adopted Skew	0.192	Systematic Events	59

--- End of Analytical Frequency Curve ---

5. REFERENCES

1. Caltrans Highway Design Manual, 6th Edition, May 2012.
2. HDS-2 Highway Hydrology, FHWA-NHI-02-001, October 2002.
3. Storm Water Management Model User’s Manual, Version 5.0. EPA/600/R-05/040, July 2010.

ATTACHMENT J

RISK LEVEL DETERMINATION

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://water.epa.gov/polwaste/npdes/stormwater/Welcome-to-the-Rainfall-Erosivity-Factor-Calculator.cfm		
5	**R Factor Value**		2.37
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.32
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		4.42
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	3.352128	
16	**Site Sediment Risk Factor**	**Low**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment** (For help with impaired waterbodies please visit the link below) or has a **USEPA approved TMDL implementation plan for sediment**?: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml **OR** A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan) http://www.waterboards.ca.gov/waterboards_map.shtml	**Yes**	**High**
Region 1 Basin Plan Region 2 Basin Plan Region 3 Basin Plan Region 4 Basin Plan Region 5 Basin Plan Region 6 Basin Plan Region 7 Basin Plan Region 8 Basin Plan Region 9 Basin Plan		

Combined Risk Level Matrix

Receiving Water Risk	Sediment Risk: Low	Sediment Risk: Medium	Sediment Risk: High
Low	Level 1	Level 2	
High	Level 2		Level 3

Project Sediment Risk: Low

Project RW Risk: High

Project Combined Risk: Level 2

ATTACHMENT K

PRELIMINARY SITE INVESTIGATION REPORT

(INCLUDED AT THE BEGINNING OF THE INFORMATION HANDOUT)

ATTACHMENT L

WATER POLLUTION CONTROL DRAWING

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	280	9.4		

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER NO. EXP. CIVIL STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTE:

FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

WPC LEGEND:

TEMPORARY HYDRAULIC MULCH (BFMO

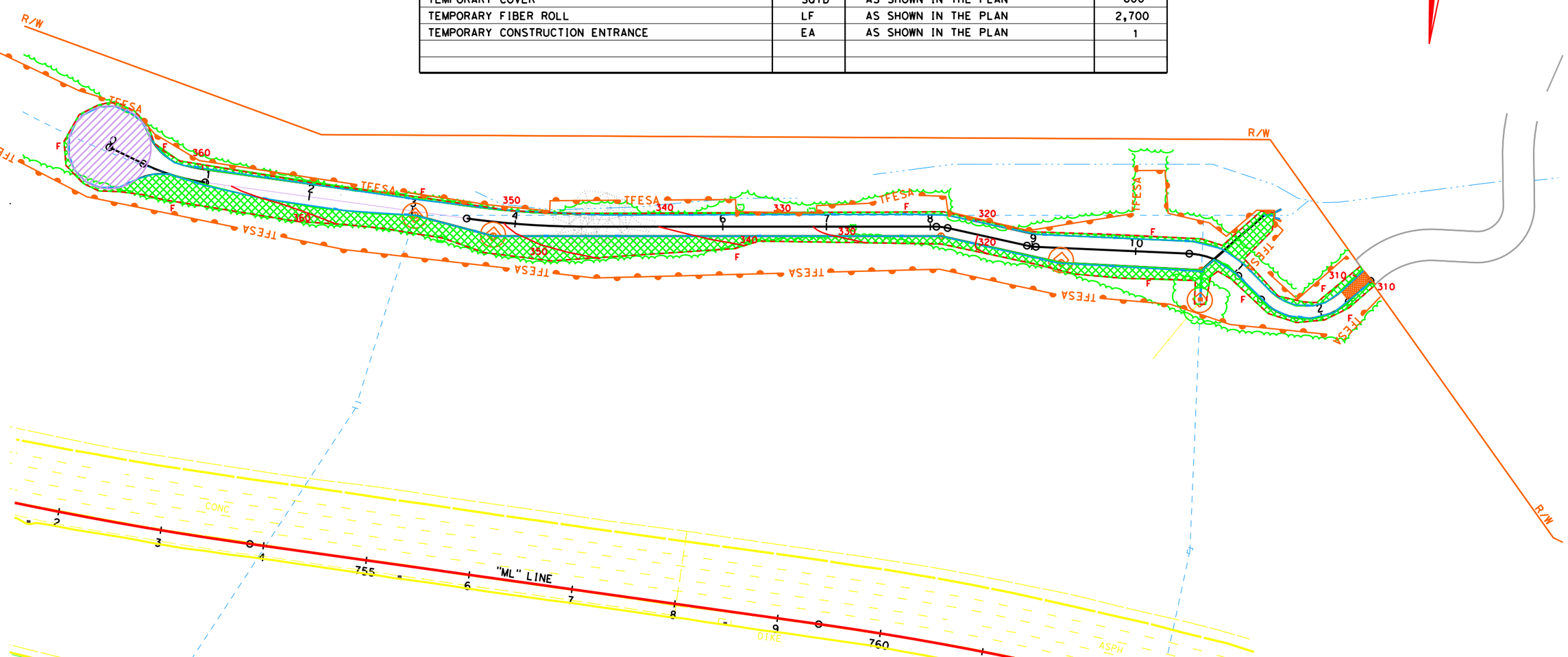
TEMPORARY COVER

WPC NOTE:

TEMPORARY BMP LOCATIONS ARE DESIGNED BASED ON DISTURBED AREA AND STORM WATER FLOW PATTERN INFORMATION AVAILABLE AT DESIGN PHASE. CONTRACTOR IS RESPONSIBLE TO DEVELOP A WPCP THAT STABILIZES THE ENTIRE PROJECT SITE INCLUDING ALL UNEXPECTED DISTURBED AREA AND COMPLIES WITH PERMITS, LICENSES, AGGREMENTS AND CERTIFICATIONS (PLACS).

TEMPORARY WATER POLLUTION CONTROL QUANTITIES

ITEM	UNIT	STATION	QUANTITY
TEMPORARY DRAINAGE INET PROTECTION	EA	AS SHOWN IN THE PLAN	5
TEMPORARY HYDRAULIC MULCH (BFM)	SQYD	AS SHOWN IN THE PLAN	2200
TEMPORARY COVER	SQYD	AS SHOWN IN THE PLAN	600
TEMPORARY FIBER ROLL	LF	AS SHOWN IN THE PLAN	2,700
TEMPORARY CONSTRUCTION ENTRANCE	EA	AS SHOWN IN THE PLAN	1



SCALE: 1" = 50'

APPROVED FOR TEMPORARY WATER POLLUTION CONTROL WORK ONLY

TEMPORARY WATER POLLUTION CONTROL PLAN
WPC-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

WATER QUALITY

SENIOR LANDSCAPE ARCHITECT: KAMRAN NAKHJIRI

CALCULATED-DESIGNED BY: GANGA TRIPATHI

CHECKED BY: KAMRAN NAKHJIRI

REVISED BY

DATE REVISED

LAST REVISION 03-13-14

DATE PLOTTED => $DATE

TIME PLOTTED => $TIME

04-4G591 Watershed Access Permit (10 2 13), dated October 3, 2013

CITY AND COUNTY OF SAN FRANCISCO
PUBLIC UTILITIES COMMISSION
NATURAL RESOURCES DIVISION
LAND AND RESOURCES MANAGEMENT SECTION

WATER
HETCH HETCHY WATER & POWER
CLEAN WATER

WATERSHED ACCESS PERMIT
*Amended for Extension of Time

PERMITTEE INFORMATION

ORGANIZATION: Caltrans NUMBER IN GROUP: 20
ADDRESS: 111 Grand Avenue, Oakland, CA 94612
PERSON IN CHARGE: Richelle P. Perez
ADDRESS: 111 Grand Avenue, Oakland, CA 94612
PHONE NUMBER: (510) 286-4998 CELL #: (510) 715-9996 FAX NUMBER: (510) 622-5460

DESCRIPTION OF ACCESS *Ext. of time 'til October 31, 2015

DATE(S) OF PERMIT: September 16 – October 31, 2013
TIME ENTERING: 7:00 AM TIME LEAVING: 5:00 PM
PURPOSE: Construction Project on State Right-of-way
STARTING POINT: Near Belmont at Canada Road off of Interstate 280
DESTINATION: Downslope of Interstate 280 at Post Mile 9.4 (see attached map)

VEHICLE INFORMATION

VEHICLE DESCRIPTION: Various YEAR: MAKE: MODEL:
COLOR: LICENSE PLATE NO: STATE: CA

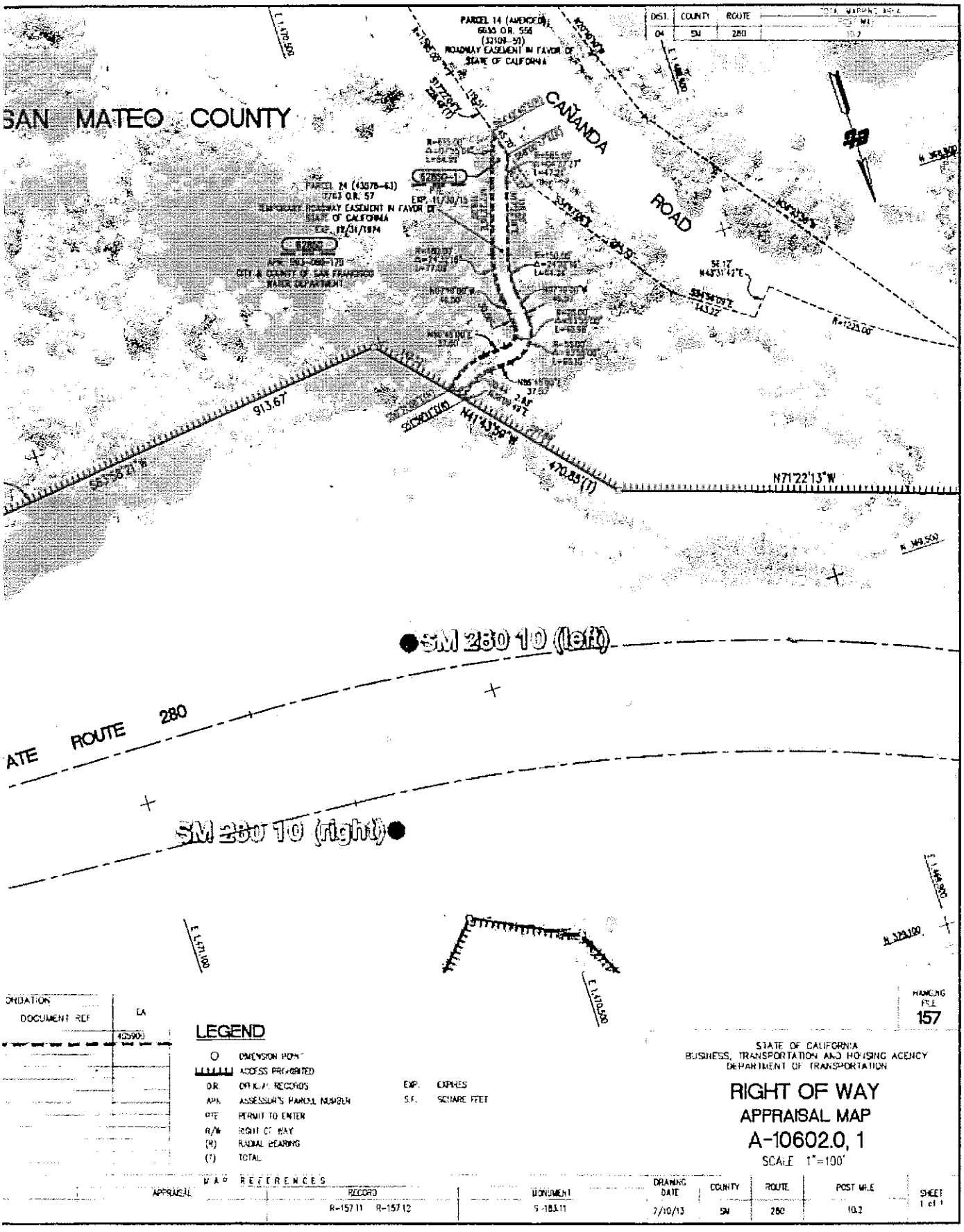
PERMIT CONDITIONS

1. Notification of access shall be made to Millbrae Dispatch at (650) 872-5900 at least 48 hours in advance of your event AND on the morning of the event prior to entering our property.
2. A work report must be provided to the San Francisco Public Utilities Commission, attention Joe Naras, within 30 days after the event takes place, but no later than 10/31/15.
3. NOTE: If a gate key is necessary, you may obtain a key on the day of entry at the San Francisco Water Department's Office, located at 1000 El Camino Real, Millbrae, and you must return the key immediately at the end of the day. If you need a long-term key, contact Gloria Ng at gng@sfwater.org for a key request form.
4. YOU MUST HAVE THIS PERMIT WITH YOU AND A PHOTO I. D. WHEN PICKING UP THE KEY; AND, YOU MUST HAVE THIS PERMIT WITH YOU WHILE ON THE WATERSHED. PLEASE DISPLAY ONE COPY OF THIS PERMIT ON YOUR VEHICLE IF IT IS PARKED WITHIN THE WATERSHED PROPERTY. THANK YOU!

APPROVAL

ISSUED BY: _____ DATE: 10/3/13
AUTHORIZED SIGNATURE

1657 ROLLINS ROAD ♦ BURLINGAME, CALIFORNIA 94010 ♦ (650) 652-3212 ♦ FAX (650) 652-3219



DIST.	COUNTY	ROUTE
04	SM	280

HANGING FILE 157

LEGEND

- ○ DIMENSION POINT
- ACCESS PROHIBITED
- O.R. OFFICIAL RECORDS
- APN ASSESSOR'S PARCEL NUMBER
- PTE PERMIT TO ENTER
- R/W RIGHT OF WAY
- (R) RADIAL BEARING
- (T) TOTAL
- EXP. EXPIRES
- S.F. SQUARE FEET

STATE OF CALIFORNIA
BUSINESS, TRANSPORTATION AND HOUSING AGENCY
DEPARTMENT OF TRANSPORTATION

RIGHT OF WAY
APPRAISAL MAP
A-10602.0, 1

SCALE 1"=100'

MAP REFERENCES

APPRAISAL	RECORD	MONUMENT	DRAWING DATE	COUNTY	ROUTE	POST MILE	SHEET
	R-157.11 R-157.12	S-183.11	7/10/13	SM	280	10.2	1 of 1

JULY 10, 2013

04-4G591 Water Source Availability

CONTRACT No.: 04-4G5914
Dist-Co-Rte-PM: 04-SM-280-9.4

WATER SOURCE AVAILABILITY

CITY OF
PALO
ALTO

TO: Persons Interested In Recycled Water

FROM: Palo Alto Regional Water Quality Control Plant

SUBJECT: Recycled Water Application, Permit, and Rules

REUSE OF TERTIARY RECYCLED WATER

The Palo Alto Regional Water Quality Control Plant will provide tertiary recycled water at no charge to permitted contractors, commercial landscapers, industrial and commercial facilities, institutions, and government agencies. The plant produces "TERTIARY" quality water pursuant to state regulations. Acceptable uses are shown on the following page.

RECYCLED WATER PERMIT COST

The Recycled Water Permit Fee is $50.00 check or money order (no cash) payable to "**City of Palo Alto**." Payment should be included with the application. Payment of the permit fee allows self-service pickup and use of recycled water for three years on a first come-first served basis up to the capacity of the Recycled Water Plant (4.5 mgd).

STANDIPE LOCATION & HOURS

The overhead standpipe is located at 2501 Embarcadero Way, Palo Alto, CA 94303. The standpipe provides two connections:

1. An overhead water tank truck fill rate as high as 500-gallons per minute.
2. A 2-inch fire hose for filling smaller tanks

Standpipe fill hours are Monday to Friday 7:00 a.m. to 4:30 p.m. except on Palo Alto public holidays[1] and monthly Household Hazardous Waste collection days (the first Friday of the month from 2:00 p.m. to 5:00 p.m.). The system may be shut down on some occasions for maintenance. Hours may be expanded during exceptional drought conditions. Permittees applying recycled water from the standpipe to use areas outside the plant service area will not have priority to use the water during periods of drought (or other circumstances) where recycled water needs to be rationed to those areas within the plant service area.

WATER QUALITY

The recycled water meets state regulations for safe use of tertiary recycled water. A recent laboratory analysis info sheet is available for analyzing agronomic and other water quality data.

PERMIT AND APPLICATION

Users/distributors are required to fill out and sign the attached recycled water permit[2] and application and shall be responsible for the proper distribution and use of the recycled water. Recycled water permit applications are available from the Regional Water Quality Control Plant website or at 2501 Embarcadero Way, Palo Alto, CA 94303 during business hours. Changes in use or use sites will require an updated application to be approved.

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[1] See http://www.cityofpaloalto.org/cals/

[2] Palo Alto Municipal Code Chapter 16.12 and San Francisco Bay RWQCB Board Order 93-160

Suitable Uses* of Recycled Water

Use of Recycled Water	Treatment Level		
	Tertiary Recycled Water	Secondary-2.2 Recycled Water	Secondary-23 Recycled Water
Irrigation of:			
Food crops–contact with edible portion of crop	Allowed	Not Allowed	Not Allowed
Parks and playgrounds	Allowed	Not Allowed	Not Allowed
School yards	Allowed	Not Allowed	Not Allowed
Residential landscaping	Allowed	Not Allowed	Not Allowed
Unrestricted access golf courses	Allowed	Not Allowed	Not Allowed
Any other irrigation uses not prohib. by other prov. of CCR	Allowed	Not Allowed	Not Allowed
Food crops–edible portion above gd/not in contact w/ recl. Water	Allowed	Allowed	Not Allowed
Cemetaries	Allowed	Allowed	Allowed
Freeway landscaping	Allowed	Allowed	Allowed
Restricted access golf courses	Allowed	Allowed	Allowed
Ornamental nursery stock and sod farms	Allowed	Allowed	Allowed
Pasture for milk animals	Allowed	Allowed	Allowed
Any nonedible vegetation with access control to prevent use as if it were a park, playground or school yard.	Allowed	Allowed	Allowed
Orchards w/ no contact between edible portion and recl. water.	Allowed	Allowed	Allowed
Vineyards w/ no contact between edible portion and recl. water	Allowed	Allowed	Allowed
Non food-bearing trees not irrigated <14 days of harvest	Allowed	Allowed	Allowed
Fodder crops (e.g. alfalfa) and fiber crops (e.g. cotton)	Allowed	Allowed	Allowed
Seed crops not eaten by humans	Allowed	Allowed	Allowed
Food crops that undergo commercial pathogen-destroying processing before human consumption (e.g. sugar beets)	Allowed	Allowed	Allowed
Supply for impoundments:			
Nonrestricted rec. impound., w/ suppl. monit. for path. org.	Allowed**	Not Allowed	Not Allowed
Restricted rec. impound. and fish hatcheries	Allowed	Allowed	Not Allowed
Landscape impound. w/o decorative fountains	Allowed	Allowed	Allowed
Supply for cooling or air cond.:			
Ind. or comm. cooling or air cond. with cooling tower, evaporative condenser, or spraying that creates a mist	Allowed***	Not Allowed	Not Allowed
Ind. or comm. cooling or air cond. w/o cooling tower, evaporative condenser, or spraying that creates a mist	Allowed	Allowed	Allowed
Other uses:			
Flushing toilets and urinals	Allowed	Not Allowed	Not Allowed
Priming drain traps	Allowed	Not Allowed	Not Allowed
Industrial process water that may contact workers	Allowed	Not Allowed	Not Allowed
Structural fire fighting	Allowed	Not Allowed	Not Allowed
Decorative fountains	Allowed	Not Allowed	Not Allowed
Commercial laundries	Allowed	Not Allowed	Not Allowed
Consol. of backfill material around potable water pipelines	Allowed	Not Allowed	Not Allowed
Artificial snow making for commercial outdoor uses	Allowed	Not Allowed	Not Allowed
Industrial boiler feed	Allowed	Allowed	Allowed
Nonstructural fire fighting	Allowed	Allowed	Allowed
Backfill consol. around nonpotable piping	Allowed	Allowed	Allowed
Soil compaction	Allowed	Allowed	Allowed
Mixing concrete	Allowed	Allowed	Allowed
Dust control on roads and streets	Allowed	Allowed	Allowed
Cleaning roads, sidewalks and outdoor work areas	Allowed	Allowed	Allowed
Flushing sanitary sewers	Allowed	Allowed	Allowed

* Refer to the full text of the latest version of Title-22

** With "conventional tertiary treatment" additional monitoring may be necessary

*** Drift eliminators and/or biocides are required if public or employees can be exposed to mist

RULES AND REGULATIONS FOR THE USE OF RECYCLED WATER

A. RECYCLED WATER USE AGREEMENTS

1. Final requirements added to those in this permit packet may be required pursuant to state regulations, the plant's NPDES permit, and other requirements, as warranted and will constitute the Recycled Water Use Agreement[3]

2. For large scale and long-term projects, a more detailed application meeting State of California Department of Public Health and/or San Francisco Bay Regional Water Quality Control Board requirements may apply and involve additional requirements.

B. RECYCLED WATER USER: PERMIT RULES AND REGULATIONS

1. Recycled Water Production[4, 5]
   a. The City of Palo Alto is the recycled water producer, producing "TERTIARY" recycled water.
   b. The permittee is a "USER" and may only use recycled water produced by the city that is filtered, oxidized, and disinfected, meeting the following water quality standards:

5-day biochemical oxygen demand (BOD)	10 mg/l, 30 day average
5-day BOD	20 mg/l, daily maximum
Dissolved Oxygen	1.0 mg/l, daily minimum
Dissolved Sulfide	0.1 mg/l, daily maximum
Turbidity	2 turbidity units, maximum daily average
Turbidity	5 turbidity units, maximum, 5% of any 24-h period
Turbidity	10 turbidity units, maximum
Total Coliform Organisms	The median concentration of total coliform bacteria measured in the disinfected effluent does not exceed an MPN of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed and the number of total coliform bacteria does not exceed an MPN of 23 per 100 milliliters in more than one sample in any 30 day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 milliliters.

   c. The city reserves the right to discontinue the delivery of recycled water at any time it cannot meet its responsibilities as Producer to distribute recycled water meeting the above requirements.[6]

2. Use Rules
   a. Reuse of recycled water shall not create a nuisance per Water Code[7], defined as:

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[3] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.2
[4] San Francisco Bay RWQCB Board Order 93-160, Section A.1, A.2, and A.4
[5] Title 22, Division 4, Chapter 3, Section 60301 – 60355
[6] San Francisco Bay RWQCB Board Order 93-160, Section A.3
[7] San Francisco Bay RWQCB Board Order 93-160, Prohibitions Section B.1; California Water Code 13050(m)

i...Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.

ii...Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.

iii...Occurs during, or as a result of, the treatment or disposal of wastes.

b. No recycled water shall be discharged from the treatment facilities, irrigation holding tanks, storage ponds, man-made marsh, or other containment, other than for irrigation, industrial reuse, or for discharge to a municipal sewage collection system.[8]

c. Recycled water shall not be used as a domestic or animal water supply.[9]

d. Spray, mist, or runoff shall not enter dwellings, designated outdoor eating areas, or food handling facilities.[10]

e. Drinking water fountains shall be protected against contact with recycled water spray, mist, or runoff.[11]

f. Recycled water shall not be applied in groundwater recharge and wellhead protection areas (so designated by local agencies).[12]

3. Cross Connection Prevention

a. There shall be no cross-connections between the potable water supply and pipes containing recycled water. Supplementing recycled water with water used for domestic supply shall not be allowed except through an air-gap separation.[13]

b. An air-gap or reduced pressure principle backflow device shall be provided at all domestic water service connections to recycled water use areas.[14]

c. Except as allowed under section 7604 of title 17, California Code of Regulations, no physical connection shall be made or allowed to exist between any recycled water system and any separate system conveying potable water.[15]

d. Cross connection prevention shall be provided, as required, pursuant to state and local regulations.[16]

4. Irrigation Rules

a. No recycled water used for irrigation shall be applied during periods of rainfall or when soils are saturated such that runoff occurs.[17]

b. No recycled water used for irrigation shall be allowed to escape to areas outside the designated use areas by surface flow or by airborne spray.[18]

c. Recycled water shall not be applied to park, golf course, or landscape areas in such a manner or at such times that may expose golf, picnickers, or other

---

[8] San Francisco Bay RWQCB Board Order 93-160, Prohibitions Section B.5
[9] San Francisco Bay RWQCB Board Order 93-160, Prohibitions Section B.6
[10] Title 22, Division 4, Chapter 3, Section 60310 (e) (2)
[11] Title 22, Division 4, Chapter 3, Section 60310 (e) (3)
[12] Board Order 96-011 (by reference only)
[13] San Francisco Bay RWQCB Board Order 93-160, Prohibitions Section B.6
[14] San Francisco Bay RWQCB Board Order 93-160, Prohibitions Section B.6
[15] Title 22, Division 4, Chapter 3, Section 60310 (h)
[16] Title 17, Division 1, Chapter 5, Group 4, Article 2
[17] San Francisco Bay RWQCB Board Order 93-160, Prohibitions Section B.2
[18] San Francisco Bay RWQCB Board Order 93-160, Prohibitions Section B.3

individuals, or that may cause picnic tables, and other food and drinking outlets to come into contact with airborne spray droplets.[19]

d. Any irrigation runoff shall be confined to the recycled water use area, unless the runoff does not pose a public health threat and is authorized by the regulatory agency.[20]
e. To the extent possible, the operation of the irrigation system should be during periods of minimal public use of the approved area.[21]

5. Signs

   a. The User shall assure that all above ground equipment, including pumps, piping, storage reservoir, and valves, etc. which may at any time contain recycled water shall be adequately and clearly identified with warning signs. The User shall make all necessary provisions to inform the public that the liquid being distributed is recycled water and is unfit for human consumption.[22]
   b. Warning signs and labels should read "CAUTION: NONPOTABLE WATER – DO NOT DRINK," or "CAUTION: RECYCLED WATER – DO NOT DRINK," or other approved sign.[23]
   c. All use areas where recycled water is used that are accessible to the public shall be posted with signs that are visible to the public, in a size no less than 4 inches high by 8 inches wide, that include the following wording : "RECYCLED WATER - DO NOT DRINK". Each sign shall display an international symbol similar to that shown in Title 22 regulations, Section 60310-A. The Department of Public Health may accept alternative signage and wording, or an educational program, provided the applicant demonstrates to the Department of Public Health that the alternative approach will assure an equivalent degree of public notification.[24]

6. On-site Requirements[25]
   a. Dual plumbed systems for toilet and urinal flushing and floor trap priming shall comply with state regulations.[26]
   b. Special rules apply to use of recycled water for industrial or commercial cooling or air conditioning that involve the use of a cooling tower, evaporative condenser, spraying or any mechanism that creates a mist.[27]
   c. Water strainers may be required on-site
   d. Irrigation controllers shall be:
      i. Automatic
      ii. Provided with a moisture sensor controller[28] to prevent irrigation during periods of rainfall.

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[19] San Francisco Bay RWQCB Board Order 93-160, Prohibitions Section B.4
[20] Title 22, Division 4, Chapter 3, Section 60310 (e) (1)
[21] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.9, Guidelines for Distribution of Nonpotable Water, California-Nevada Section American Water Works Association (1992), Section 5.10.2
[22] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.8
[23] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.9, Guidelines for Distribution of Nonpotable Water, California-Nevada Section American Water Works Association (1992), Section 5.12
[24] Title 22, Division 4, Chapter 3, Section 60310 (g)
[25] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.9, Guidelines for Distribution of Nonpotable Water, California-Nevada Section American Water Works Association (1992), Section 5
[26] Title 22, Division 4, Chapter 3, Article 5
[27] Title 22, Division 4, Chapter 3, Section 60306

iii. Color coded differently from potable water controllers.
iv. Labeled inside and outside that water is recycled water.
v. Provided with any special instructions for recycled water use needed for those managing the system.

e. Backflow prevention is required if potable water shares the use area with recycled water.
f. Pipelines, equipment, and irrigated areas should be clearly identified with purple pipe, warning tape, tape wrap, signs, etc. as follows:
   i. New systems - Per state regulations
   ii. Converted onsite systems – By review with RWQCP staff
g. Hoses
   i. Recycled water hose bibbs are not allowed; quick couplers with signage are allowed for recycled water.
   ii. Nonpotable hoses shall not be compatible with onsite potable hose bibb connections.
   iii. Potable hose bibbs shall also have a sign when nonpotable water is used onsite.
   iv. The portions of the recycled water piping system that are in areas subject to access by the general public shall not include any hose bibbs. Only quick couplers that differ from those used on the potable water system shall be used on the portions of the recycled water piping system in areas subject to public access.[29]
h. Onsite potable water lines shall also have 3-inch wide warning tape provided on top of the pipe.
i. Horizontal / vertical separations are required.
j. Any drinking fountains must be outside of nonpotable use areas.
k. Applications must indicate that no drinking fountains, picnic tables, or food establishments will exist in the use area.

7. Water Trucks
   a. Trucks shall have a label indicating that they contain recycled water.[30]

8. Impoundments
   a. Warning signs shall be installed to notify that the water in the impoundment is unsafe to drink.[31]
   b. No impoundment of disinfected tertiary recycled water shall occur within a certain distance of a domestic water supply well.[32]

9. System Management

   a. Users will be responsible for the application of recycled water on their respective use areas and associated operations and maintenance.[33]

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[28] A satellite, wireless, or internet based ET controller is an acceptable alternative to a moisture sensor.
[29] Title 22, Division 4, Chapter 3, Section 60310 (i)
[30] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.9, Guidelines for Distribution of Nonpotable Water, California-Nevada Section American Water Works Association (1992), Section 5.8
[31] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.9, Guidelines for Distribution of Nonpotable Water, California-Nevada Section American Water Works Association (1992), Section 5.12
[32] Title 22, Division 4, Chapter 3, Section 60310
[33] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.5

b. The User shall provide employee training to assure proper operation of recycled water facilities, worker protection, and compliance with state rules.[34]
c. The USER is responsible for all onsite system maintenance, supervision, user training, noticing RWQCP of system changes, operation in accordance with rules and regulations, and reporting.[35]
d. City, county, and state regulatory staff overseeing recycled water will have the right to inspect use areas during reasonable hours for verifying records and proper application of recycled water as well as ensure proper maintenance, supervision, training, and operation of recycled water systems.[36]
e. Violations of any of the rules herein should be self-reported to the RWQCP, with corrective actions planned and implemented by the USER. Failure to correct and/or cease violations within a timeframe determined by the Producer may result in termination of the User's permit. Penalties may also be assessed.[37]
f. Recycled water customers shall meter and record flow. Recycled water users shall make self-monitoring observations pursuant to any requirements in their permit.[38]
g. Recycled water facilities shall be operated in conformance with the California Department of Public Health 'Guidelines for Use of Reclaimed Wastewater for Irrigation and Impoundment' and "Guidelines for Worker Protection at Reclamation Use Areas" and the American Water Works Association California-Nevada Section's Guideline for the Distribution of Nonpotable Water.[39]
h. User shall conduct a complete inspection of all irrigation lines, sprinklers, and emitters at least once each year during the dormant season. A report of the findings of these inspections, including descriptions of any significant repairs or modifications made to the distribution systems, shall be submitted annually.[40]
i. User must carry a copy of the Recycled Water Use Agreement, release form, and Board Order 93-160 and provide them for inspection to state, county, and local officers when requested.[41]

C. MISCELLANEOUS RULES

1. Recycled water shall not be allowed to escape from the designated use area as surface flow to either pond or to enter waters of the state.

2. Adequate measures shall be taken to minimize public contact with recycled water and to prevent the breeding of flies, mosquitoes, and other vectors of public health significance during the process of reuse.

3. Signs
   a. Adequate means of notification shall be provided to inform the public that recycled water is being used. Conspicuous warning signs with proper wording of sufficient size to be clearly read shall be posted at adequate intervals around the use area, unless public access is otherwise restricted.

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[34] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.7
[35] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.6
[36] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.10; California Water Code 13267 (c)
[37] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.9, Guidelines for Distribution of Nonpotable Water, California-Nevada Section American Water Works Association (1992), Section 6.5 and 6.6
[38] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.4
[39] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.9
[40] San Francisco Bay RWQCB Board Order 93-160, Self Monitoring Program Section VI.2
[41] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.3

b. All recycled water valves, outlets and sprinkler heads should be appropriately tagged to warn the public that the water is not safe for drinking or direct contact. Tank trucks used for carrying or spraying recycled water should be identified as such.

4. Use: Recycled water shall not be applied on walkways, passing vehicles, buildings, or areas not under the control of the user.

5. Irrigation: The landscape irrigation must be done during periods when the grounds will have maximum opportunity to dry before use by the public. Irrigated areas shall be properly graded to minimize ponded water.

D. MISSCELLANEOUS RULES FOR IMPOUNDMENTS

1. Distribution (filling) would occur from tank truck manually with the operator present at all times.

2. Appropriate signs would be posted to identify the water as being recycled water and no wading allowed.

3. Algae growth due to nutrients in recycled water to be controlled by manual removal or other appropriate means.

4. It is <u>not recommended</u> to use chemicals containing metals.

GUIDELINES FOR WORKER PROTECTION[42]
(State Department of Public Health Guidelines)

The following guidelines pertain to all categories of recycled water:

A. Workers should be informed that although recycled water has been treated to lower health risks, bacterial and viral contamination may be present and potentially may cause illness or infection. Contact with recycled water by ingestion, inhalation of mist, or on cuts or abrasions should be avoided, and the precautionary measures listed below should be carefully reviewed and followed.

B. Precautionary measures should be taken to minimize worker contact with constituents of recycled water.

1. Workers should not be subjected to recycled water sprays, mists or aerosols.

2. Workers should be protected with protective clothing when there will be more than casual contact with the recycled water.

3. Where oxidized, coagulated, clarified, filtered, or disinfected recycled water is used, less stringent precautions may be allowed. [Note: City provides recycled water meeting this criteria.]

C. Safe drinking water should be supplied for workers. Where bottled water is provided, the water should be in contamination-proof containers and protected from recycled water and dust.

D. Hand-washing facilities should be provided consisting of potable water supply, hand-washing soap, and single use sanitary paper towels. The importance of hand washing should be stressed when working with recycled water, especially before eating or smoking.

E. Workers should not apply recycled water by hand held nozzles or other hand held devices that can produce sprays, mists or aerosols.

F. Precautions should be taken to avoid contamination of food taken into recycled water use areas. Food should not be taken into areas still wet with recycled water.

G. Workers should be notified that recycled water is in use. Notification should include the posting of conspicuous warning signs with proper wording of sufficient size to be clearly read.

In those locations where English is not the primary language of the workers, the signs should be in the appropriate language as well as English.

H. An adequate First Aid kit should be available on location. Cuts and abrasions should be promptly washed, disinfected, and bandaged.

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[42] San Francisco Bay RWQCB Board Order 93-160, Provisions Section C.9, Guidelines for Worker Protection, California Department of Public Health

APPLICATION FOR RECYCLED WATER USE PERMIT

USER Name:_____
USER Address:_____
USER City, State, Zip:_____
USER phone:_____
USER email:_____

SITE SUPERVISOR Name:_____
SITE SUPERVISOR Address:_____
SITE SUPERVISOR City, State, Zip:_____
SITE SUPERVISOR phone:_____
SITE SUPERVISOR email:_____

Distribution method:

- ☐ Water truck spray
- ☐ Water truck hose
- ☐ Irrigation system
- ☐ Hard piped connection

Maximum anticipated usage (gallons / day)_____
Address of Use Area(s)_____
_____
_____

Type of Recycled Water Use (check all that apply)

- ☐ Irrigation of:
  - ☐ parks and playgrounds
  - ☐ school yards
  - ☐ residential landscaping
  - ☐ golf course
  - ☐ cemetery
  - ☐ freeway landscaping
  - ☐ nursery stock and sod farm
  - ☐ orchard, vineyard, food crops
  - ☐ other_____
- ☐ Impoundment:
  - ☐ nonrestricted recreational with body contact
  - ☐ restricted recreational impoundment
  - ☐ fish hatchery
  - ☐ landscape
- ☐ Onsite Use:
  - ☐ cooling or air conditioner
    - ☐ with cooling tower, evaporative condenser, or spraying that creates a mist
    - ☐ without cooling tower, evaporative condenser, or spraying that creates a mist
  - ☐ flushing toilets and/or urinals
  - ☐ priming drain traps
  - ☐ industrial process water
  - ☐ industrial boiler feed
  - ☐ commercial laundries
- ☐ Other:
  - ☐ decorative fountains

- ☐ dust control on roads and streets
- ☐ cleaning roads, sidewalks, and outdoor work areas
- ☐ flushing sanitary sewers
- ☐ consolidation of backfill material
  - ☐ around potable water pipelines
  - ☐ around nonpotable water pipelines
- ☐ soil compaction
- ☐ fire fighting
  - ☐ structural
  - ☐ nonstructural
- ☐ mixing concrete

- ☐ other_____

Questions for User for Review by Producer

General Questions for All Applicants

1. Are animals regularly present in the use area?_____
2. Are there dwellings present in the use area?_____
3. Are there designated outdoor eating areas in the use area?_____
4. Are there food and drinking outlets in the use area?_____
5. Are there food handling and/or food service establishments in the use area?_____
6. Are there drinking water fountains in the use area?_____
7. Are there picnic tables in the use area?_____
8. Is the use area in a groundwater recharge zone designated by the local agency?_____
9. Is the use area in a domestic water wellhead protection area designated by the local agency?_
10. Will potable water be sharing the use area with recycled water?_____
11. Will the recycled water be mixed with potable water for further distribution/use?_____
12. Is there a domestic water system in the recycled water use area?_____
13. Are there above ground pumps, piping, or valves that will contain recycled water in the use area?_____
14. Will the public have access to the use area? _____
15. Will the use site have dual plumbing in a building?_____
16. Will the use site have toilet and urinal flushing with recycled water?_____
17. Will the use site have floor trap priming with the recycled water?_____
18. Will the use site use recycled water for industrial and commercial cooling or air conditioning?_____
19. Are there any hose bibbs in the recycled water use area?_____
20. Are there any hose bibbs on the entire property?_____
21. Will the use site have an impoundment?_____
22. Do workers distributing recycled water have safe drinking water accessible?_____
23. Do workers distributing recycled water have hand washing facilities with a potable water supply, hand-washing soap, and single use sanitary paper towels available?_____
24. Do workers distributing recycled water have a First Aid kit available at the use area?_____

Include Suitable Drawings, If Warranted, Including:

1. Show recycled water use area
2. Show recycled water piping, irrigation system, storage tanks, etc.
3. Show potable system in the same recycled water use area
4. Show hose bibbs (recycled water and potable water) on entire property
5. Show backflow preventers on property
6. Show all domestic wells on property and within 100 feet from periphery of use area
7. Show designated eating areas, food service facilities, drinking fountains, picnic tables, dwellings
8. Show impoundments

If using standpipe:

1. What size tank will be filled?_____
2. What are the cities where water will be distributed?_____
3. Does the truck have a label indicating that it contains recycled water?_____

THIS PERMIT IS FOR THE PROPOSED USE OF RECYCLED WATER, CONDITIONAL UPON THE FOLLOWING:

1. The enclosed permit packet's "Rules and Regulations for the Use of Recycled Water" shall be complied with.
2. The proposed use shall be ceased immediately when rules and regulations have been violated (by either the producer, user, or the distributor), and shall not be resumed until such time that all conditions causing the violations have been corrected.
3. The enclosed "Guidelines for Worker Protection" shall be complied with.
4. This permit may be terminated by the Producer (i.e., the City of Palo Alto Regional Water Quality Control Plant) at any time when deemed necessary.

Recycled water is water, which has been recycled from Sanitary Sewage. I have read the entire permit packet, initialed all pages, understand all rules, and agree to abide by the rules for its use as stated above. Recycled water is being provided by the City of Palo Alto to the undersigned at the request of, and for the benefit of, the undersigned. In consideration of its receipt, the undersigned hereby agrees to indemnify, defend, save harmless the City of Palo Alto, its officers, agents, and employees from any and all claims, demands, or liability associated with or arising out of the possession, use or examination of said material by or for the undersigned.

_____

Signature of Applicant/User and Application Date

_____

Signature of Application Approver and Date
James S. Allen, Manager Regional Water Quality Control Plant

RECYCLED WATER USE PERMIT	This Use Permit must be available for inspection at all times. The Permittee is subject to all Prohibitions. Specifications and Provisions of San Francisco Bay RWQCB Board Order No. 93-160 and the attached "Rules and Regulations for the Use of Recycled Water."
NAME OF PRODUCER: Regional Water Quality Control Plant ADDRESS: City of Palo Alto Regional Water Quality Control Plant 2501 Embarcadero Way Palo Alto, CA 94303	

EFFECTIVE DATE OF PERMIT_____ EXPIRATION DATE_____

PRODUCER INFORMATION

PRODUCER'S LEVEL OF TREATMENT (ALL DISINFECTED):
☐ secondary-23 ☐ secondary-2.2 ☒ tertiary (Title 22 60301.230) ☐ tertiary with conventional treatment

VOLUME OF RECYCLED WATER AUTHORIZED PER DAY _____ GALLONS

METHOD OF WATER DISTRIBUTION _____TANKER TRUCK _____OTHER_____

USER INFORMATION

NAME OF USER_____

ADDRESS_____

PHONE_____ CONTACT NAME_____

EMAIL_____

SITE SUPERVISOR INFORMATION (If different from above)

SITE SUPERVISOR_____ PHONE_____

ADDRESS_____

EMAIL ADDRESS_____

Users and Site Supervisors must follow the attached Guidelines for Worker Protection, Rules and Regulations for the Use of Recycled Water, and San Francisco Bay RWQCB Board Order No. 93-160.

TYPE OF WATER REUSE

APPLICATION METHOD _____TANK TRUCK _____TANK TRUCK SPRAY _____IRRIGATION SYSTEM

USE OF THE WATER _____

WHERE APPLIED: COUNTY_____ CITY_____

CERTIFICATION

I HEREBY CERTIFY UNDER PENALTY OF PERJURY THAT THE INFORMATION PROVIDED IN THIS APPLICATION AND IN ANY ATTACHMENTS IS TRUE AND ACCURATE TO THE BEST OF MY KNOWLEDGE. I ALSO CERTIFY THAT I HAVE READ AND AGREE TO ABIDE BY SAN FRANCISCO BAY RWQCB BOARD ORDER NO. 93-160.

PRODUCER
SIGNATURE_____TITLE *PLANT MANAGER* DATE_____

USER
SIGNATURE_____TITLE_____DATE_____

SITE SUPERVISOR
SIGNATURE_____TITLE_____DATE_____

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. 93-160

WATER RECLAMATION REQUIREMENTS FOR:

CITY OF PALO ALTO
PALO ALTO REGIONAL WATER QUALITY CONTROL PLANT
PALO ALTO
SANTA CLARA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter called the Board), finds that:

1. The City of Palo Alto (hereinafter called Producer) operates a tertiary wastewater treatment plant and water reclamation facility at 2501 Embarcadero Way, Palo Alto. The Producer submitted a Reclamation Master Plan dated April 1992 for the use of reclaimed water throughout the service area of the Regional Water Quality Control Plant (RWQCP).

2. The Producer proposes to divert approximately nine million gallons per day (9 mgd) of tertiary-treated effluent from its Regional Water Quality Control Plant and to further treat the effluent to acceptable levels at its reclamation facility for various reclaimed water uses. Current and potential reclaimed water users and use areas have been identified as listed below and shown in Figure 1 (attached). Users are not required to limit the quantity of use to the estimated usage listed below. Other potential users may be identified in the future and added to the following list.

Users	Estimated Usage (mgd)
City Parks and Schools	2.5
Stanford University	1.6
Shoreline Golf Course	1.2
Sharon Heights Golf Course	1.0
Palo Alto Golf Course	0.8
Stanford Research Park	0.5
NASA Ames Research Center	0.5
Truck fill stations	0.5
Caltrans	0.2
Palo Alto Muni Service Center	0.2

3. The Producer will permit specific reuse projects located within the areas listed in Finding 2 of this Order by obtaining Reclaimed Water Use Agreements with individual Users. The Producer will design and incrementally install reclaimed water transmission facilities to serve these projects. Users will submit engineering reports for each individual project to the Producer for approval. The Producer will maintain these reports at its facility.

4. The Producer will continue to investigate other potential reuse strategies such as groundwater recharge, streamflow augmentation, and dual water supply for new construction. This will enable the Producer to move towards achieving a goal of reusing the maximum possible amount of reclaimed water.

5. The production and uses of reclaimed water are currently permitted under Order No. 86-33, adopted by the Board on May 21, 1986, which prescribes water reclamation requirements for irrigation of the golf courses and parks in the cities of Palo Alto and Mountain View. Up to two million gallons per day of tertiary-treated effluent was diverted, and further treated to unrestricted use quality for use on the parks and golf courses.

6. Board Order No. 91-042 provided "blanket" authorization for tanker-truck distribution of reclaimed water and the expansion of existing fixed irrigation system projects already subject to water reuse requirements. Reclaimed water distribution at the truck fill stations operated by the Producer are currently permitted under Order No. 91-042.

7. This Order incorporates the requirements of Order No. 86-33 and Order No. 91-042, and therefore supersedes both Orders.

8. California Water Code Section 13512 states that it is the intention of the legislature that the State undertake all possible steps to encourage development of water reclamation facilities so that reclaimed water may be made available to help meet the growing water demands of the State.

   Section 13523 provides that a regional board, after consulting with and receiving the recommendations of the State Department of Health Services, and if it determines such action to be necessary to protect the public health, safety, or welfare, shall prescribe water reclamation requirements for water which is used or proposed to be used as reclaimed water. The use of reclaimed water for the purposes specified in Finding 2, could affect the public health, safety, or welfare, and requirements for those uses are, therefore, necessary in accordance with the California Water Code.

   In Section 13550, the Legislature defines the use of potable domestic water for the irrigation of greenbelt areas, including but not limited to cemetaries, golf courses, parks, and highway landscaped areas, as a waste or an unreasonable use of such water within the meaning of Section 2 of Article X of the California Constitution when suitable reclaimed water is available.

   Section 13576(e) states that the use of reclaimed water has proven to be safe from a public health standpoint and that the State Department of Health Services is updating regulations for the use of reclaimed water.

9. This Order's requirements conform with and implement the water reclamation criteria of the State Department of Health Services (Title 22, Division 4, Chapter 3, Sections 60301-60355 of the California Code of Regulations [CCR]) to protect the public health, safety, and welfare.

10. The Board amended its Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on September 16, 1992, and the State Water Resources Control Board (State Board) approved it on April 27, 1993. The Basin Plan supports water reclamation and further states that the disposal of wastewater to inland, estuarine, or coastal waters is not considered a permanent wastewater disposal solution where the potential exists for conservation and reclamation. The Basin Plan prescribes water quality objectives for reclaimed water, as well as for ground and surface waters of Santa Clara County. The Basin Plan identifies beneficial uses of the underlying groundwaters as:

- Industrial service and process water supply
- Municipal and domestic supply
- Agricultural supply

The Basin Plan identifies beneficial uses of the surface waters of South San Francisco Bay and its tributaries as :

- Water contact recreation
- Non-water contact recreation
- Wildlife habitat
- Preservation of rare and endangered species
- Estuarine habitat
- Fish migration
- Fish spawning
- Industrial service and process supply
- Shellfish harvesting
- Navigation
- Commercial and sport fishing

11. Effluent limitations of this Order are based on applicable CCR Title 22 regulations, the Basin Plan, State Plans and policies, current plant performance, and best professional judgement. The limitations are considered to be those attainable by best available technology, in the judgment of the Board.

12. The proposed uses of reclaimed water will maintain and enhance natural resources, and thus this Order is categorically exempt from the provisions of the California Environmental Quality Act in accordance with Title 14, California Administrative Code, Chapter 3, Section 15307.

13. The Board has notified the Users, Producer, and interested agencies and persons of its intent to prescribe water reclamation requirements for the proposed discharges, and has provided them with an opportunity for a public hearing and to submit their written views and recommendations.

14. The Board, at a public meeting, heard and considered all comments pertaining to these proposed uses of reclaimed water.

IT IS HEREBY ORDERED, that the City of Palo Alto (Producer and User) and the Users who have signed Reclaimed Water Use Agreements pursuant to this Order, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, shall comply with the following:

A. Reclaimed Water Quality Specifications

1. Unrestricted Quality Reclaimed Water (2.2 MPN)

The Producer shall assure that reclaimed water used for industrial reuse, irrigation in areas with a high probability of direct public contact as may occur in portions of parks, playgrounds, schoolyards, golf courses that include residential development with exposure to irrigation spray, and other areas where the public has similar exposure, shall be an adequately oxidized, coagulated, clarified, filtered, and disinfected water (as defined in CCR Title 22, Division 4, Chapter 3, Sections 60301-60335) that meets the following quality limits at all times:

a.	CBOD (5-day, 20°C)	20 mg/L daily maximum 10 mg/L monthly average
b.	Dissolved Oxygen	1.0 mg/L minimum
c.	Dissolved Sulfide	0.1 mg/L maximum
d.	Turbidity	2 NTU maximum daily average operating turbidity and not exceeding 5 NTU more than five (5) percent of the time during any 24-hour period.
e.	Total coliform bacteria	At any point downstream of the disinfection facilities after adequate contact with disinfectant, the median number of total coliform organisms shall not exceed 2.2 MPN/100 mL as determined from the bacteriological results of the last seven (7) days for which analyses have been completed, and the number of total coliform organisms shall not exceed 23 MPN/100 mL in any sample.

2. Restricted Quality Reclaimed Water (23 MPN)

The Producer shall assure that reclaimed water to be used for irrigation of golf courses, cemeteries, freeway landscapes, and landscapes in other areas where the public has restricted access or exposure, shall at a minimum be an adequately oxidized and disinfected water that meets the following quality limits prior to delivery for any such use at all times:

a.	CBOD (5-day, 20°C)	20 mg/L daily maximum 10 mg/L monthly average

b.	Dissolved Oxygen	1.0 mg/L minimum
c.	Dissolved Sulfide	0.1 mg/L maximum
d.	Total coliform bacteria	At any point downstream of the disinfection facilities after adequate contact with disinfectant, the median number of total coliform organisms shall not exceed 23 MPN/100 mL as determined from the bacteriological results of the last seven (7) days for which analyses have been completed, and the number of total coliform organisms shall not exceed 240 MPN/100 mL in any two consecutive samples.

3. The Producer shall discontinue delivery of reclaimed water to Users during any period in which it has reason to believe that the limits for that use as specified in A.1 or A.2 of this Order are not being met. The delivery of reclaimed water shall not be resumed until all conditions which caused the limits to be violated have been corrected.

4. The State Department of Health Services is currently revising the Title 22 regulations for water reuse. When revised regulations are finalized, the Executive Officer may authorize changes to the restricted and unrestricted reclaimed water uses consistent with those regulations.

B. Prohibitions

1. The treatment, storage, distribution, or reuse of reclaimed water shall not create a nuisance as defined in section 13050(m) of the California Water Code.

2. No reclaimed water used for irrigation shall be applied during periods of rainfall or when soils are saturated such that runoff occurs.

3. No reclaimed water used for irrigation shall be allowed to escape to areas outside the designated use areas by surface flow or by airborne spray.

4. Reclaimed water shall not be applied to park, golf course, or landscape areas in such a manner or at such times that may expose golfers, picnickers, or other individuals, or that may cause picnic tables, and other food and drinking outlets to come into contact with airborne spray droplets.

5. No reclaimed water shall be discharged from the treatment facilities, irrigation holding tanks, storage ponds, man-made marsh, or other containment, other than for irrigation or industrial reuse in accordance with this Order or for discharge to a municipal sewage collection system.

6. Reclaimed water shall not be used as a domestic or animal water supply. There

shall be no cross-connections between the potable water supply and pipes containing reclaimed water. Supplementing reclaimed water with water used for domestic supply shall not be allowed except through an air-gap separation. An air-gap or reduced pressure principle backflow device shall be provided at all domestic water service connections to reclaimed water use areas.

C. Provisions

1. Order No. 86-33 is hereby rescinded. This Order supersedes Order 91-042 for all uses specified by that Order.

2. Reclaimed Water Use Agreements, obtained by the Producer with each User, form the basis of permitted reclaimed water use by specific Users. Reclaimed Water Use Agreements shall specify self-monitoring requirements for each User, based on the attached self-monitoring program. If someone other than the User is responsible for applying the reclaimed water (Distributor), e.g. a truck hauler, then the User shall inform them of these requirements in a written agreement or other suitable manner. A Distributor shall fill out a Reclaimed Water Release Form when receiving reclaimed water from the Producer.

3. A copy of the Reclaimed Water Use Agreement and this Order must be provided to the Users by the Producer. The Users and Distributors must have these available at all times for inspection by Regional Board staff, the Producer, or State/County Health Officers. The Distributors must also carry the Reclaimed Water Release Form at all times.

4. The Producer shall comply with the self-monitoring program as adopted by the Board and as may be amended by the Executive Officer. The Producer is responsible for collecting reports from users. Users are responsible for submitting on-site observation reports and use data to the Producer, who will compile and file self-monitoring reports with the Regional Board.

5. The Producer will be responsible for ensuring that reclaimed water meets the quality standards of this Order and for operation and maintenance of major transport facilities and associated appurtenances. Users will be responsible for the application of reclaimed water on their respective use areas and associated operations and maintenance.

6. The Producer and Users shall maintain in good working order and operate as efficiently as possible any facility or control system installed by the Producer or Users to achieve compliance with the water reclamation requirements.

7. The Producer and Users shall provide employee training to assure proper operation of reclamation facilities, worker protection, and compliance with this Order.

8. The Producer and Users shall assure that all above ground equipment, including pumps, piping, storage reservoir, and valves, etc. which may at any

time contain reclaimed water shall be adequately and clearly identified with warning signs. The Producer and Users shall make all necessary provisions to inform the public that the liquid being distributed is reclaimed water and is unfit for human consumption.

9. Reclamation facilities shall be operated in conformance with the California Department of Health Service "Guidelines for Use of Reclaimed Wastewater for Irrigation and Impoundment" and "Guidelines for Worker Protection at Reclamation Use Areas" and the American Water Works Association, California-Nevada Section's *Guidelines for the Distribution of Non-potable Water.*

10. The Producer and Users shall permit the Board or its authorized representative in accordance with California Water Code Section 13267(c):

    a. Entry upon premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of the Order.

    b. Access to and copy of any records that must be kept under the conditions of this Order.

    c. Inspection of any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order.

    d. To photograph, sample, and monitor for the purpose of assuring compliance with this Order.

11. The Board will revise this Order periodically and may revise these requirements when necessary.

I, Steven R. Ritchie, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on 12/15/93.

STEVEN R. RITCHIE
EXECUTIVE OFFICER

Attachments:

A. Figure 1 -- PARWQCP Water Reclamation Reuse Areas
B. DOHS Guidelines for Use of Reclaimed Wastewater for Irrigation and Impoundment
C. DOHS Guidelines for Worker Protection at Water Reclamation Use Areas
D. Self-Monitoring Program

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

SELF-MONITORING PROGRAM

FOR

CITY OF PALO ALTO
PALO ALTO REGIONAL WATER QUALITY CONTROL PLANT
PALO ALTO
SANTA CLARA COUNTY

ORDER NO. 93-160

SELF-MONITORING PROGRAM

CITY OF PALO ALTO
PALO ALTO REGIONAL WATER QUALITY CONTROL PLANT
RECYCLED WATER USERS
ORDER NO. 93-160

I. GENERAL

Reporting responsibilities of waste dischargers are specified in Sections 13225(a), 13267(b), 13268, 13383, and 13387(b) of the California Water Code and the San Francisco Bay Regional Board's Resolution No. 73-16.

The principle purposes of a monitoring program by a Producer of reclaimed water, also referred to as a self-monitoring program, are:

1. To document compliance with water reclamation requirements and prohibitions established by this Regional Board; and

2. To facilitate self-policing by the Producer in the prevention and abatement of pollution arising from water reclamation.

II. RECLAIMED WATER SAMPLING AND ANALYSIS

The Producer shall document effluent quality under their regular facility Waste Discharge Requirements self-monitoring program (Order No. 93-085). See below for any violations related to the water reuse program.

III. REPORTS TO BE FILED WITH THE REGIONAL BOARD

1. Violation of Requirements

In the event the Producer is unable to comply with conditions of the water reclamation requirements and prohibitions, the Producer shall notify the Regional Board in writing within two weeks of the non-compliance. The written report shall include pertinent information explaining reasons for non-compliance and shall indicate what steps are being taken to prevent the problems from recurring.

2. Annual Self-Monitoring Report

An annual report for each calendar year shall be submitted to the Board by January 30 of the following year. The report shall include:

a. Letter of Transmittal: A letter transmitting self-monitoring reports should accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Producer has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory.

The transmittal letter shall contain a statement by the Producer, or the Producer's authorized agent, under penalty of perjury, that to the best of the signer's knowledge the report is true, accurate, and complete.

b. Tabulations of the results from each required analysis by Producer specified in Table 1 (Attachment A) by date, time, type of sample, and station.

c. A list of existing and new authorized reclaimed water Users, including the name, location, and projected annual flow to be delivered.

d. Tabulation of inspections and observations of reuse sites, including User's standard observations and random inspections by the Producer.

e. A summary of effluent violations related to water reclamation, violations found during inspection of reuse sites, corrective actions taken, and any changes to or revoking of User authorizations.

f. A summary of ground water monitoring conducted in accordance with provisions of the Environmental Impact Report completed for the reclamation project.

g. An update regarding development of the Reclamation Master Plan, including planning, design, and construction of facilities, and preparation of required reports and technical documents.

IV. STANDARD OBSERVATIONS

1. Evidence of runoff of reclaimed water from the site (show affected area on a sketch, and estimate volume).

2. Odor of wastewater origin from irrigation site: If present, indicate apparent source, characterization, direction of travel, and any public use areas or offsite facilities affected by the odors.

3. Evidence of ponding of reclaimed water, and/or evidence of mosquitoes breeding within the irrigation area due to ponded water.

4. Warning signs properly posted to inform public that irrigation water is reclaimed water, which is not safe for drinking.

5. Evidence of leaks or breaks in the irrigation system pipelines or tubing.

6. Evidence of plugged, broken, or otherwise faulty drip irrigation system emitters or spray irrigation sprinklers.

V. DESCRIPTION OF SAMPLING AND OBSERVATION STATIONS

1. RECLAIMED WATER

Station	Description
E-001	Location at the Palo Alto Regional Water Quality Control Plant where a representative sample of treatment plant effluent being diverted for reclamation can be obtained and total diverted flow can be measured.

2. LAND OBSERVATION STATIONS

Station	Description
L-1 to L-n	Locations at a sufficient number of points at reuse areas in order to ensure compliance with water reclamation requirements.

3. IMPOUNDMENT FACILITIES

Station	Description
P-1 to P-n	Locations at points along the periphery of each storage, ornamental, golf course, or other pond or impoundment.

VI. SCHEDULE OF SAMPLING, MEASUREMENTS, AND ANALYSIS

1. The self-monitoring program is applicable during the periods when reclaimed water is in use. The Producer and Users are required to perform observations, sampling, measurements, and analyses according to the schedule given in Table 1 (Attachment A).

2. The Producer shall require the Users to conduct a complete inspection of all irrigation lines, sprinklers, and emitters at least once each year during the dormant season. A report of the findings of these inspections, including descriptions of any significant repairs or modifications made to the distribution systems, shall be submitted in the annual report (due January 30 of each year).

I, Steven R. Ritchie, Executive Officer, hereby certify that the foregoing Self-Monitoring Program:

1. Has been developed in accordance with the procedure set forth in this Regional Board's Resolution No. 73-16 in order to obtain data and document compliance with Water Reclamation Requirements established in Regional Board Order No. 93-160.

2. Has been revised and ordered by the Executive Officer on June 20, 1995. This Self-Monitoring Program supersedes the previous program and amends the water reclamation requirements adopted by the Board on December 15, 1993.

3. May be reviewed at any time subsequent to the effective date upon written notice from the Executive Officer or request from the Producer, and revisions will be ordered by the Executive Officer.

STEVEN R. RITCHIE
EXECUTIVE OFFICER

Attachment: Table 1 - Schedule for Sampling, Measurements, and Analysis

File No. 2189.8103 (SMM)

ATTACHMENT A

TABLE 1
SCHEDULE FOR SAMPLING, MEASUREMENTS, AND ANALYSIS
Palo Alto RWQCP - Water Reclamation Req'ts

SAMPLING STATIONS	E-1			All L	All P
TYPE OF SAMPLE	Grab	C-24	Cont.	Obs.	Obs.
Flow Rate (gallons/day)			D	Q[1]	Q[1]
Total Coliform (MPN/100ml)	3/W[2]				
Turbidity (NTU)		3/W[2]			
Dissolved Oxygen (mg/l)	3/W[2]				
Dissolved Sulfides (mg/l) (if DO < 1 mg/l)	3/W[2]				
pH (units)	3/W[2]				
Chlorine Residual (mg/l)			D[2]		
Applicable Standard Observations				A[3]	A[3]

LEGEND FOR TABLE 1

Type of Sample
Grab = Instantaneous grab sample
C-24 = 24-hour composite sample
Cont. = Continous monitoring (recorder)
Obs. = Observation

Sampling Frequency
D = Daily
3/W = Three times per week
W = Weekly
2/M = Twice per month
Q = Quarterly
A = Annual

---

[1] **Flow totals for each User will be compiled by the Producer on a quarterly basis. Daily average flow will be calculated from these quarterly totals and reported for each User in the Producer's annual report.**

[2] **When producing reclaimed water.**

[3] **Observations that the Producer requires each User to complete when reclaimed water is being used. The Producer will establish User self-monitoring requirements that depend on the size and complexity of each site, as a condition of each User's permit.**

From: Allen, James [mailto:James.Allen@CityofPaloAlto.org]
Sent: Monday, January 26, 2015 6:23 AM
To: Chen, Jing@DOT
Cc: Wood, Brian@DOT; Zandipour, Bob@DOT; Dutt, Sangita
Subject: RE: Recycled Water Supply for Construction - Damaged drainage pipe replacement project 04-4g5911 at SM280

Jing,

If you choose not to use more conveniently located potable water from a hydrant in your construction area, we have a truckfill standpipe at 2501 Embarcadero Way in Palo Alto with recycled water for your purposes. You should consider the # of truck trips and whether it is worth the extra cost and trouble.

Our permit can be found at http://www.cityofpaloalto.org/civicax/filebank/documents/44991

There is no charge for the recycled water.

James Allen, Plant Manager
650-329-2243
City of Palo Alto
Environmental Services Division
Water Quality Control Plant
2501 Embarcadero Way
Palo Alto, CA 94303

From: Chen, Jing@DOT [mailto:jing.z.chen@dot.ca.gov]
Sent: Friday, January 23, 2015 3:29 PM
To: Dutt, Sangita; Allen, James
Cc: Wood, Brian@DOT; Zandipour, Bob@DOT
Subject: Recycled Water Supply for Construction - Damaged drainage pipe replacement project 04-4g5911 at SM280

Hi James & Sangita,

We need to insert a recycled water source information into project Standard Special Provisions for construction purposes.

The project noted above proposes to replace a 850-foot drainage pipe west of Interstate 280 at post mile 9.4. The project will be in construction in 2015 and the water needed during construction is approximately 400,000 gallons. Also, most of this quantity will be used for embankment, aggregate base, and dust control.

Would you please confirm via email if your facility could provide recycled water for construction of this project. And, would you also please provide a Memo of Recycled Water Application, Permit, and Rules to us. Your help would be appreciated.

Thanks
Jing Z. Chen, P.E.
Transportation Engineer (Civil)
Office of Toll Bridge Design
(510) 622-8759

04-4G591 Preliminary Site Investigation Report, dated September 30, 2013

PRELIMINARY SITE INVESTIGATION REPORT

BELMONT SINKHOLE REPAIR
SAN MATEO COUNTY, CALIFORNIA

PREPARED FOR:
CALIFORNIA DEPARTMENT OF TRANSPORTATION
DISTRICT 4
OFFICE OF ENVIRONMENTAL ENGINEERING
111 GRAND AVENUE, MS8C
OAKLAND, CA 94612

PREPARED BY:
GEOCON CONSULTANTS, INC.
6671 BRISA STREET
LIVERMORE, CA 94550

GEOCON PROJECT NO. E8560-02-48
CALTRANS EA 04-4G5900
CALTRANS PROJECT # 04-1200-0619-0

SEPTEMBER 2013

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A. Boring Permit
B. Laboratory Reports and Chain-of-custody Documentation
C. Metal Statistical Analysis

REPORT LIMITATIONS

This report has been prepared exclusively for the State of California Department of Transportation (Caltrans) District 4. The information contained herein is only valid as of the date of the report and will require an update to reflect additional information obtained.

This report is not a comprehensive site characterization and should not be construed as such. The findings as presented in this report are predicated on the results of the limited sampling and laboratory testing performed. In addition, the information obtained is not intended to address potential impacts related to sources other than those specified herein. Therefore, the report should be deemed conclusive with respect to only the information obtained. We make no warranty, express or implied, with respect to the content of this report or any subsequent reports, correspondence or consultation. Geocon strived to perform the services summarized herein in accordance with the local standard of care in the geographic region at the time the services were rendered.

The contents of this report reflect the views of the author who is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of California or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

GEOCON CONSULTANTS, INC.

Luann Beadle
Senior Staff Scientist

Richard Day, CEG, CHG
Senior Geologist

PROFESSIONAL GEOLOGIST
RICHARD W. DAY
No. 5479
Exp. 09-30-13
STATE OF CALIFORNIA

CALIFORNIA DEPARTMENT OF TRANSPORTATION – DISTRICT 4
OFFICE OF ENVIRONMENTAL ENGINEERING

Reviewed By:	Recommended By:	Approved By:
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Baojia Ke 510.895.3675 510.895.3680 fax sanleandrolab@emsl.com	EMSL Analytical, Inc. 2235 Polvorosa Ave., Suite 230 San Leandro, CA 94577 (*Geocon Subcontractor*)	Soil Sample Analysis
Jose Tenorio, Jr. 702.307.2659 702.307.2691 fax jojo@atl-labs.com	Advanced Technology Laboratories 3151 Post Road Las Vegas, NV 89118 *(Geocon Subcontractor)*	Soil Sample Analysis

PRELIMINARY SITE INVESTIGATION REPORT

1.0 INTRODUCTION

This Preliminary Site Investigation Report for the damaged storm drainage culvert near Interstate 280 (I-280), approximately 4,600 feet southeast of State Route 92 (SR-92), in San Mateo County, California was prepared by Geocon Consultants, Inc. under California Department of Transportation (Caltrans) Contract No. 04A3578 and Task Order No. 48 (TO-48), EA 04-4G5900.

1.1 Project Description and Proposed Improvements

The project includes replacing an approximately 830-foot-long section of a broken drainage pipe in San Mateo County, near the city of Belmont, California. The damaged drainage pipe has created a large sinkhole along southbound Interstate 280 (I-280), and proposed activities include the excavation of soil at the current sinkhole location, replacement of the existing pipe, and repair of the sinkhole damage. Work will take place within Caltrans right-of-way. The project location is depicted on the attached Vicinity Map, Figure 1.

1.2 General Objectives

The purpose of the site investigation was to evaluate concentrations of California Assessment Manual 17 (CAM 17) metals and naturally-occurring asbestos (NOA) in soil as well as CAM 17 metals in groundwater.

The information obtained from this investigation will be used by Caltrans to evaluate soil handling practices, worker health and safety, and soil and groundwater reuse and disposal options.

2.0 BACKGROUND

2.1 Hazardous Waste Determination Criteria

Regulatory criteria to classify a waste as California hazardous for handling and disposal purposes are contained in the CCR, Title 22, Division 4.5, Chapter 11, Article 3, §66261.24. Criteria to classify a waste as Resource, Conservation, and Recovery Act (RCRA) hazardous are contained in Chapter 40 of the Code of Federal Regulations (40 CFR), Section 261.

For waste containing metals, the waste is classified as California hazardous when: 1) the representative total metal content equals or exceeds the respective Total Threshold Limit Concentration (TTLC); or 2) the representative soluble metal content equals or exceeds the respective Soluble Threshold Limit Concentration (STLC) based on the standard Waste Extraction Test (WET). A waste has the potential of exceeding the STLC when the waste's total metal content is greater than or equal to ten times the respective STLC value since the WET uses a 1:10 dilution ratio. Hence, when a total metal is detected at

a concentration greater than or equal to ten times the respective STLC, and assuming that 100 percent of the total metals are soluble, soluble metal analysis is required. A material is classified as RCRA hazardous, or Federal hazardous, when the representative soluble metal content equals or exceeds the Federal regulatory level based on the Toxicity Characteristic Leaching Procedure (TCLP).

The above regulatory criteria are based on chemical concentrations. Wastes may also be classified as hazardous based on other criteria such as ignitability and corrosivity; however, for the purposes of this investigation, toxicity (i.e., representative lead concentrations) is the primary factor considered for waste classification since waste generated during the construction activities would not likely warrant testing for ignitability or other criteria. Waste that is classified as either California hazardous or RCRA hazardous requires management as a hazardous waste.

2.2 Environmental Screening Levels

The San Francisco Bay Regional Water Quality Control Board (SFRWQCB) has prepared a technical report entitled *Screening For Environmental Concerns At Sites With Contaminated Soil and Groundwater, Interim Final* (updated May 2013), which presents Environmental Screening Levels (ESLs) for soil, groundwater, soil gas, and surface water, to assist in evaluating sites impacted by releases of hazardous chemicals. The ESLs are conservative values for more than 100 commonly detected contaminants which may be used to compare with environmental data collected at a site. "The ESLs are intended to help expedite the identification and evaluation of potential environmental concerns at sites where contamination has been identified. Data collected at a site can be directly compared to the ESLs, and the need for additional actions quickly determined" (RWQCB May 2013). ESLs are strictly risk assessment tools and "not intended to serve as a rule to determine if a waste is hazardous under the state or federal regulations (RWQCB May 2013)."

Residential and commercial/industrial land use ESLs are commonly used by contractors, soil trucking companies, and private and commercial land owners as default acceptance criteria to evaluate suitability of import soil material. The following ESL tables were used for this characterization:

- Table A. Shallow Soil (≤3m bgs), Groundwater is a Current or Potential Source of Drinking Water
- Table B. Shallow Soil (≤3m bgs), Groundwater is not a Current or Potential Source of Drinking Water
- Table F. Surface Water Bodies
- Table K-3. Direct Exposure Soil Screening Levels, Construction/Trench Worker Exposure Scenario

The respective ESLs are listed at the end of Tables 2 and 4 for comparative purposes.

3.0 SCOPE OF SERVICES

The scope of services performed under TO-48, EA 04-4G5900 included the following:

3.1 Pre-field Activities

- Prepared the *Preliminary Site Investigation Workplan* and *Health and Safety Plan*, dated May 2013.
- Obtained a boring permit from San Mateo County Environmental Health Division (SMCEHD). A copy of the boring permit is included as Appendix A.
- Retained the services of Cruz Brothers Locators to provide utility clearance services prior to field operations.
- Retained the services of Advanced Technology Laboratories, Las Vegas (ATL-LV), a Caltrans-approved and California-certified analytical laboratory, to perform the chemical analyses of soil and groundwater samples.
- Retained the services of EMSL, Inc., a Caltrans-approved and California-certified analytical laboratory, to perform the asbestos analysis of soil samples.
- Notified Underground Service Alert (USA) at least 48 hours prior to field work.

3.2 Field Activities

The field investigation was performed on July 1, 2013, by Geocon staff. The following field activities were performed during the sampling efforts:

- Advanced eight soil borings at the project location using direct-push drilling techniques. The borings were advanced to a maximum depth of 23 feet.

The following samples were collected:

- 33 soil samples for CAM 17 metals analysis.
- 24 soil samples for NOA analysis.
- 2 groundwater samples for CAM 17 analysis.
- 1 equipment rinse blank for total lead analysis.

All samples were transported to California-certified environmental laboratories for analysis under standard chain-of-custody (COC) documentation.

4.0 INVESTIGATIVE METHODS

4.1 Sampling Procedures

Soil samples were collected from eight boring locations identified by the Caltrans TO Manager using direct-push sampling techniques. Boring coordinates are presented on Table 1 and locations are shown on the Site Plan, Figure 2.

Soil samples collected using a direct-push sample rig were obtained by hydraulically advancing a 2-inch-diameter, 4-foot-long stainless steel core-barrel sampler lined with an acetate sample tube into undisturbed soil. Soil samples were collected for laboratory analysis by cutting an approximately 6-inch-long section of the acetate tube from the target sample depth, capping the ends with Teflon tape and plastic end caps, and then placing the sample tube in a chest cooled with ice for storage and delivery to the analytical laboratory.

Grab-groundwater samples were collected from borings B2 and B6 by pumping groundwater through ¼-inch-diameter disposable polyethylene tubing fitted with a check valve. Samples were then transferred to the appropriate sample containers and placed in a chest cooled with ice. Filtration for metals analysis was performed in the laboratory.

Sample containers were labeled and transported to a Caltrans-approved, certified environmental laboratory using standard COC documentation. Soil borings were back-filled to near-surface with bentonite slurry.

Geocon provided QA/QC procedures during the field activities. These procedures included washing the sampling equipment with a Liqui-Nox® solution followed by a double rinse with deionized water. The equipment rinse blank was collected by pouring deionized water over the cleaned sampling equipment and collecting it into a sample container for laboratory analysis. Decontamination water was disposed of to the ground surface within Caltrans right-of-way in a manner not to create runoff, away from drain inlets or potential water bodies.

4.2 Laboratory Analyses

Laboratory analyses were performed by ATL-LV and EMSL under standard turnaround-time (TAT) per the Task Order Manager. The laboratory reports and COC documentation are included in Appendix B.

The soil samples were analyzed as follows:

- 33 samples for CAM 17 metals according to Title 22 CCR, EPA Test Methods 6010 ICAP and 7471.
- 2 samples with total chromium concentrations equal to or exceeding 50 mg/kg (i.e. equal to or exceeding ten times the STLC of 5.0 mg/l) were further analyzed for WET chromium.

The 2 groundwater samples were analyzed for:

- CAM 17 metals according to EPA Test Methods 6010 ICAP and 7470.

The QA/QC equipment rinse blank sample was analyzed for total lead using EPA Test Method 6010 ICAP.

4.3 Laboratory QA/QC

QA/QC procedures were performed for each method of analysis with specificity for each analyte listed in the test method's QA/QC. The laboratory QA/QC procedures included the following:

- One method blank for every ten samples, batch of samples or type of matrix, whichever was more frequent.
- One sample analyzed in duplicate for every ten samples, batch of samples or type of matrix, whichever was more frequent.
- One spiked sample for every ten samples, batch of samples or type of matrix; whichever was more frequent, with spike made at ten times the detection limit or at the analyte level.

Prior to submitting the samples to the laboratory, the COC documentation was reviewed for accuracy and completeness.

5.0 INVESTIGATIVE RESULTS

5.1 Subsurface Conditions

Observations during field activities indicated that soil in the areas consisted of loose, soft, dry, brown gravelly silt to a depth of approximately 4 feet. Loose to medium dense, moist, brown silty sand with regolith gravels was present to a depth of up to 9 feet. Medium dense, moist, brown to dark brown/grey silty sand with some gravel and trace clay was present to 14 feet, and stiff, moist brown sandy to silty clay with some gravel to 20 feet. Medium dense, wet to moist, grey, well-graded, fine to medium sand with silt to 23 feet. Groundwater was encountered at depths of 10.5 to 17 feet.

5.2 Laboratory Analytical Results

The analytical results are summarized in Tables 2 through 4 and are summarized below:

Soil Sample Results:

- The following metals were not detected above their respective laboratory reporting limits: antimony, beryllium, cadmium, mercury, molybdenum, silver, and thallium.
- Total chromium was reported at concentrations ranging from 4.5 to 110 mg/kg.
- WET chromium was reported at concentrations of 0.057 and 0.59 mg/l.
- Remaining CAM 17 metals were reported in the samples at total concentrations below ten times their respective STLCs.
- NOA was not detected in the samples at or above the target sensitivity of 0.25% Chrysotile.

Groundwater Sample Results:

- The following metals were not detected above their respective laboratory reporting limits: antimony, beryllium, cadmium, lead, mercury, nickel, selenium, thallium, vanadium, and zinc.
- Arsenic, barium, chromium, cobalt, copper, molybdenum, and silver were detected at concentrations ranging from <0.0030 to 0.071 mg/l.

QA/QC Sample Results:

- Total lead was not detected at or above the laboratory reporting limit of 0.0050 mg/l in the equipment rinse blank sample.

5.3 Laboratory Quality Assurance/Quality Control

We reviewed the QA/QC results provided with the laboratory analytical reports. The data indicate non-detect results for the method blanks at or above reporting limits. The Matrix Spike (MS) and/or Matrix Spike Duplicate (MSD) were outside recovery criteria for several samples, possibly due to matrix interference, however the associated laboratory control sample recoveries were acceptable. The relative percent differences (RPD) for MS/MSD were outside of recovery limits for several samples. Remaining samples and internal laboratory QA/QC samples showed acceptable recoveries and relative percent differences (RPDs). Based on this limited data review, no additional qualifications of the soil data are necessary, and the data are of sufficient quality for the purposes of this report.

6.0 CONCLUSIONS

6.1 CAM 17 Metals in Soil

With the exception of chromium, CAM 17 metals were reported in the samples at total concentrations below ten times their respective STLCs. WET chromium was reported at concentrations below the STLC of < 5.0 mg/l; therefore would be classified as non-hazardous based on chromium concentrations.

The CAM 17 metals concentrations in site soil were compared to ESLs. Arsenic was reported at concentrations greater than one or more ESL values.

Because concentrations of arsenic exceeded one or more ESL, non-parametric bootstrap techniques were used to calculate the data. Risk assessment characterization is based on the 95% UCL of the soil for the site; this is in accordance with the Risk Assessment Guidance for Superfund (RAGS) Volume 1 Documentation for Exposure Assessment.

The upper one-sided 95% upper confidence limit (UCL) of the arithmetic mean is defined as the value that, when calculated repeatedly for randomly drawn subsets of site data, equals or exceeds the true mean 95% of the time. The UCLs of the arithmetic mean concentration are used as the mean concentrations because it is not possible to know the true mean due to the essentially infinite number of soil samples that could be collected from a site. The UCLs therefore account for uncertainties due to limited sampling data. As data become less limited at a site, uncertainties decrease, and the UCLs move closer to the true mean.

The bootstrap test result is included in Appendix C. ESLs, UCLs, and published background concentrations for arsenic are summarized in the table below:

Metal	Maximum	95% UCL	Shallow Soil Residential ESL	Shallow Soil Commercial/ Industrial ESL	Worker Direct Exposure ESL	PUBLISHED BACKGROUND MEAN[1]	PUBLISHED BACKGROUND RANGE [1]
Arsenic	7.8	4.30	0.39	0.96	10	3.5	0.6 to 11.0

Concentrations reported in mg/kg

[1] Kearney Foundation of Soil Science, March 1996

The 95% UCL arsenic concentration is greater than the residential and commercial land use ESLs; however, it is less than the construction exposure ESL and within the published background range. The SFRWQCB *November 2007 Update to Environmental Screening Levels (ESLs) Technical*

Document states that ambient background concentrations of arsenic typically exceed risk-based screening levels. In such instances, it may be more appropriate to compare site data to regionally specific established background levels.

Based on the reported results for arsenic, offsite reuse or disposal of excavated soil may be restricted based on arsenic content, depending on proposed use.

Metals results for soil samples are summarized in Table 2.

6.2 Naturally-Occurring Asbestos in Soil

NOA was not detected at the 0.25% target sensitivity level in the 24 samples collected. A summary of NOA results is included in Table 3.

6.3 CAM 17 Metals in Groundwater

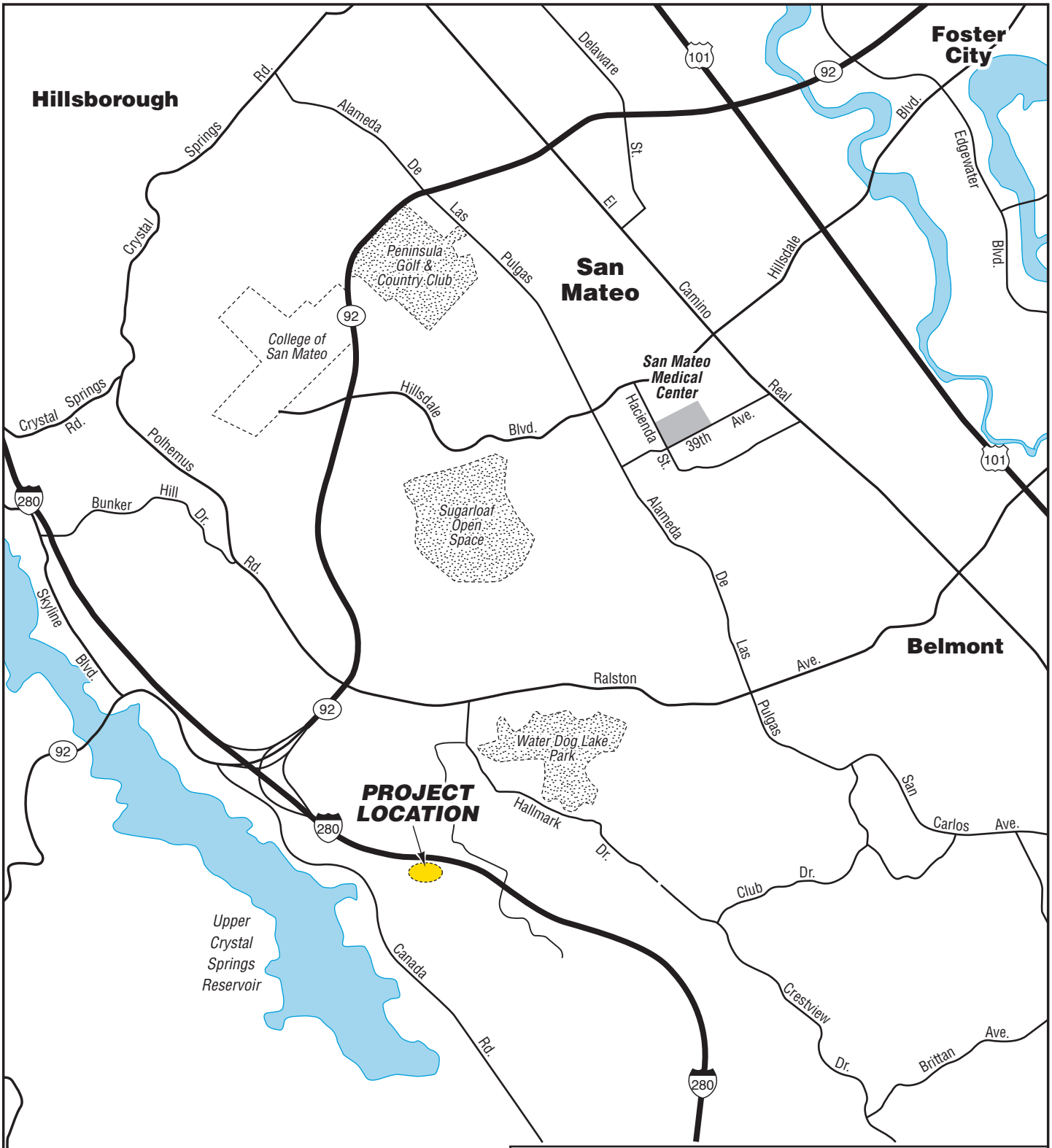
Grab-groundwater samples were collected from borings B2 and B6 and analyzed for CAM 17 metals.

- Ten metals (antimony, beryllium, cadmium, lead, mercury, nickel, selenium, thallium, vanadium, and zinc) were not detected at or above the laboratory reporting limits.
- Three metals (barium, chromium, and molybdenum) were reported at concentrations below their respective ESLs.
- Four metals (arsenic, cobalt, copper, and silver) were reported at concentrations exceeding one or more of their respective ESLs.

Based on the reported CAM 17 metals concentrations, groundwater generated during construction may require treatment prior to discharge or disposal.

6.4 Worker Protection

The contractor(s) should prepare a project-specific health and safety plan to prevent or minimize worker exposure to metals and NOA in soil as well as metals in groundwater. The plan should include protocols for environmental and personnel monitoring, requirements for personal protective equipment, and other health and safety protocols and procedures for the handling of soil and groundwater.



GEOCON CONSULTANTS, INC.
6671 BRISA STREET – LIVERMORE, CA 94550
PHONE 925.371.5900 – FAX 925.371.5915

I-280 Sinkhole Repair

San Mateo County, California

GEOCON Proj. No. E8560-02-48

Task Order No. 48

VICINITY MAP

September 2013

Figure 1

GEOCON CONSULTANTS, INC.

6671 BRISA STREET, LIVERMORE, CA 94550; PHONE 925 371-5900 - FAX 925 371-5915

Belmont Sinkhole		
Belmont, California	SITE PLAN	
GEOCON Proj. No. E8560-02-48		
EA No. 04-4G5900	September 2013	Figure 2

SITE0713

TABLE 1
Boring Coordinates
I-280 Sinkhole Repair Project
San Mateo County, California

Boring	Northing	Easting
B1	2,009,411.749	6,031,964.613
B2	2,009,417.958	6,032,069.638
B3	2,009,411.245	6,032,167.184
B4	2,009,426.290	6,032,266.375
B5	2,009,434.889	6,032,359.523
B6	2,009,462.829	6,032,458.431
B7	2,009,468.708	6,032,571.324
B8	2,009,468.007	6,032,664.115

Northing and easting coordinates shown in feet, NAD 83, Zone 3

TABLE 2
Summary of CAM 17 Metals Results - Soil
I-280 Sinkhole Repair Project
San Mateo County, California

Sample ID	Sample Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
B1-0	0 to 0.5	<2.0	3.4	110	<1.0	<1.0	25	7.8	16	8.1	<0.10	<1.0	31	<1.0	<1.0	<1.0	26	34
B1-1.5	1.5 to 2	<2.0	2.8	130	<1.0	<1.0	14	6.6	11	7.7	<0.10	<1.0	18	<1.0	<1.0	<1.0	23	28
B1-3.5	3.5 to 4	<2.0	2.8	140	<1.0	<1.0	14	6.3	11	7.5	<0.10	<1.0	18	<1.0	<1.0	<1.0	24	28
B1-10.5	10.5 to 11	<2.0	3.0	110	<1.0	<1.0	14	6.3	12	7.1	<0.10	<1.0	18	<1.0	<1.0	<1.0	21	29
B2-0	0 to 0.5	<2.0	4.7	170	<1.0	<1.0	35	13	26	12	<0.10	<1.0	47	1.1	<1.0	<1.0	30	52
B2-2.5	2.5 to 3	<2.0	3.9	140	<1.0	<1.0	32	11	22	8.8	<0.10	<1.0	42	<1.0	<1.0	<1.0	27	43
B2-5.5	5.5 to 6	<2.0	<1.0	210	<1.0	<1.0	4.5	5.2	<2.0	2.4	<0.10	<1.0	2.9	<1.0	<1.0	<1.0	26	58
B2-10.5	10.5 to 11	<2.0	2.6	130	<1.0	<1.0	13	5.6	11	7.1	<0.10	<1.0	16	<1.0	<1.0	<1.0	22	27
B2-16 (GWI)		<2.0	3.6	110	<1.0	<1.0	32	6.9	16	6.9	<0.10	<1.0	36	<1.0	<1.0	<1.0	29	30
B3-0	0 to 0.5	<2.0	5.9	120	<1.0	<1.0	37	14	32	12	<0.10	<1.0	51	1.0	<1.0	<1.0	33	56
B3-1.5	1.5 to 2	<2.0	7.8	96	<1.0	<1.0	24	12	39	12	<0.10	<1.0	39	1.1	<1.0	<1.0	24	64
B3-3.5	3.5 to 4	<2.0	6.5	120	<1.0	<1.0	85	20	34	9.9	<0.10	<1.0	130	1.2	<1.0	<1.0	40	60
B3-14.5	14.5 to 15	<2.0	3.1	100	<1.0	<1.0	*0.057* 34	8.3	15	5.7	<0.10	<1.0	41	<1.0	<1.0	<1.0	32	34
B4-0	0 to 0.5	<2.0	<1.0	260	<1.0	<1.0	5.5	6.5	<2.0	3.1	<0.10	<1.0	2.2	<1.0	<1.0	<1.0	35	82
B4-1.5	1.5 to 2	<2.0	7.1	200	<1.0	<1.0	34	15	41	11	<0.10	<1.0	44	1.4	<1.0	<1.0	37	68
B4-5.5	5.5 to 6	<2.0	3.0	180	<1.0	<1.0	16	8.5	12	8.2	<0.10	<1.0	29	<1.0	<1.0	<1.0	22	33
B4-14.5	14.5 to 15	<2.0	2.3	99	<1.0	<1.0	12	7.6	8.6	11	<0.10	<1.0	18	<1.0	<1.0	<1.0	21	27
B5-0	0 to 0.5	<2.0	<1.0	210	<1.0	<1.0	6.2	5.3	<2.0	5.1	<0.10	<1.0	4.9	<1.0	<1.0	<1.0	30	68
B5-2.5	2.5 to 3	<2.0	4.6	180	<1.0	<1.0	20	20	36	10	<0.10	<1.0	33	1.2	<1.0	<1.0	33	57
B5-3.5	3.5 to 4	<2.0	7.4	110	<1.0	<1.0	39	14	38	12	<0.10	<1.0	58	1.2	<1.0	<1.0	28	70
B5-19.5	19.5 to 20	<2.0	2.8	100	<1.0	<1.0	14	7.0	11	6.8	<0.10	<1.0	18	<1.0	<1.0	<1.0	23	28
B6-0	0 to 0.5	<2.0	<1.0	170	<1.0	<1.0	5.8	4.6	<2.0	2.6	<0.10	<1.0	4.8	<1.0	<1.0	<1.0	26	57
B6-2.5	2.5 to 3	<2.0	4.4	150	<1.0	<1.0	39	9.8	26	6.6	<0.10	<1.0	42	1.2	<1.0	<1.0	43	39
B6-5.5	5.5 to 6	<2.0	6.7	320	<1.0	<1.0	28	13	34	12	<0.10	<1.0	44	<1.0	<1.0	<1.0	26	62
B6-19.5	19.5 to 20	<2.0	3.7	89	<1.0	<1.0	15	9.2	11	6.9	<0.10	<1.0	21	<1.0	<1.0	<1.0	23	31
B7-0	0 to 0.5	<2.0	<1.0	200	<1.0	<1.0	5.7	5.5	<2.0	2.9	<0.10	<1.0	3.1	<1.0	<1.0	<1.0	31	67
B7-2.5	2.5 to 3	<2.0	5.0	210	<1.0	<1.0	37	12	25	7.5	<0.10	<1.0	48	<1.0	<1.0	<1.0	37	44
B7-5.5	5.5 to 6	<2.0	3.8	160	<1.0	<1.0	17	11	18	8.4	<0.10	<1.0	28	<1.0	<1.0	<1.0	24	40
B7-19.5	19.5 to 20	<2.0	2.1	87	<1.0	<1.0	16	5.6	9.1	6.1	<0.10	<1.0	20	<1.0	<1.0	<1.0	20	25

TABLE 2
Summary of CAM 17 Metals Results - Soil
I-280 Sinkhole Repair Project
San Mateo County, California

Sample ID	Sample Depth (ft)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
B8-0	0 to 0.5	<2.0	2.1	200	<1.0	<1.0	20	8.1	11	12	<0.10	<1.0	37	<1.0	<1.0	<1.0	31	67
B8-1.5	1.5 to 2	<2.0	5.5	200	<1.0	<1.0	44	15	29	8.6	<0.10	<1.0	67	<1.0	<1.0	<1.0	40	50
B8-3.5	3.5 to 4	<2.0	6.6	170	<1.0	<1.0	20	13	38	9.9	<0.10	<1.0	31	<1.0	<1.0	<1.0	27	56
B8-22.5	22.5 to 23	<2.0	2.7	120	<1.0	<1.0	110	20	35	4.8	<0.10	<1.0	130	1.2	<1.0	<1.0	54	45
							0.59											
Equipment Blank		---	---	---	---	---	---	---	---	<0.005 mg/l	---	---	---	---	---	---	---	---
Environmental Screening Levels (ESLs)																		
Residential Land Use (mg/kg)		20	0.39	750	4.0	12	750	23	230	80	6.7	40	150	10	20	0.78	200	600
Commercial/Industrial Land Use (mg/kg)		40	0.96	1,500	8.0	12	750	80	230	320	10	40	150	10	40	10	200	600
Construction Worker Exposure (mg/kg)		120	10	61,000	180	110	460,000	49	12,000	320	27	1,500	6,100	1,500	1,500	3.1	1,500	93,000
Hazardous Waste Criteria																		
TTLC (mg/kg)		500	500	10,000	75	100	2,500	8,000	2,500	1,000	20	3,500	2,000	100	500	700	2,400	5,000
STLC (mg/l)		15	5.0	100	0.75	1.0	5.0	80	25	5.0	0.2	350	20	1.0	5.0	7.0	24	250
TCLP (mg/l)		---	5.0	100	---	1.0	6.0	---	---	5.0	0.2	---	---	1.0	5.0	---	---	---

Results are shown in milligrams per kilogram (mg/kg).
mg/kg = milligrams per kilogram
mg/l = milligrams per liter
Values listed for chromium are for Chromium III, as there is no standard for total chromium.
< = Analyte was not detected above the laboratory reporting limit.
ESLs = Environmental Screening Levels, Tables A and K-3. (SFRWQCB, May 2013.)
TTLC = total threshold limit concentration
STLC = soluble threshold limit concentration
TCLP = toxicity characteristic leaching procedure
Values shown in italics indicates results of WET analysis.

TABLE 3
Summary of NOA Results - Soil
I-280 Sinkhole Repair Project
San Mateo County, California

Sample ID	Sample Depth (feet)	Asbestos Content (% dry weight)
B1-1.5	1.5 to 2	ND
B1-5.5	5.5 to 6	ND
B1-10.5	10.5 to 11	ND
B2-1.5	1.5 to 2	ND
B2-5.5	5.5 to 6	ND
B2-10.5	10.5 to 11	ND
B3-1.5	1.5 to 2	ND
B3-5.5	5.5 to 6	ND
B3-14.5	14.5 to 15	ND
B4-1.5	1.5 to 2	ND
B4-5.5	5.5 to 6	ND
B4-14.5	14.5 to 15	ND
B5-1.5	1.5 to 2	ND
B5-5.5	5.5 to 6	ND
B5-14.5	14.5 to 15	ND
B6-1.5	1.5 to 2	ND
B6-5.5	5.5 to 6	ND
B6-14.5	14.5 to 15	ND
B7-1.5	1.5 to 2	ND
B7-5.5	5.5 to 6	ND
B7-22.5	22.5 to 23	ND
B8-1.5	1.5 to 2	ND
B8-5.5	5.5 to 6	ND
B8-22.5	22.5 to 23	ND

ND = None detected at 0.25% target analytical sensitivity.

TABLE 4
Summary of CAM 17 Metals Results - Groundwater
I-280 Sinkhole Repair Project
San Mateo County, California

Sample ID	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
B2-GW	<0.010	<0.010	0.11	<0.0030	<0.0030	0.0050	<0.0030	0.020	<0.010	<0.00020	<0.0050	<0.0050	<0.010	0.0053	<0.015	<0.0030	<0.010
B6-GW	<0.010	0.013	0.068	<0.0030	<0.0030	0.0038	0.0070	0.023	<0.010	<0.00020	0.071	<0.0050	<0.010	0.0059	<0.015	<0.0030	<0.010
Equipment Blank	---	---	---	---	---	---	---	---	<0.0050	---	---	---	---	---	---	---	---
ESLs																	
GW is current/potential source	0.006	0.010	1.0	0.00053	0.00025	0.05	0.0030	0.0031	0.0025	0.000025	0.18	0.0082	0.0050	0.00019	0.0020	0.015	0.081
GW not current/potential source	0.030	0.036	1.0	0.00053	0.00025	0.18	0.0030	0.0031	0.0025	0.000025	0.24	0.0082	0.0050	0.00019	0.0040	0.019	0.081
Surface Water - Freshwater	0.006	0.00014	1.0	0.0027	0.00025	0.05	0.0030	0.0090	0.0025	0.000025	0.18	0.052	0.0050	0.00034	0.0020	0.015	0.12
Surface Water - Marine	0.50	0.00014	1.0	0.00053	0.0093	0.18	0.0030	0.0031	0.0081	0.000025	0.24	0.0082	0.071	0.00019	0.0040	0.019	0.081
Surface Water - Estuarine	0.030	0.00014	1.0	0.00053	0.00025	0.18	0.0030	0.0031	0.0025	0.000025	0.24	0.0082	0.0050	0.00019	0.0040	0.019	0.081

Notes:

Data are shown in milligrams per liter (mg/l).

< = Not detected above the stated laboratory reporting limit

ESLs = Environmental Screening Levels, Tables A, B, and F (SFRWQCB, May 2013)

APPENDIX A

ORDINANCE: 04023

ENVIRONMENTAL HEALTH
SAN MATEO COUNTY

Protecting Our Health and Environment

PERMIT 13- 1356

P/E: 2010 MONITORING WELLS - INSTALLATION/DESTRUCTION

FACILITY:
S HWY 280 @ HWY 92, UNINC

OWNER:
CALTRANS DEPARTMENT OF OF TR
111 GRAND AVENUE
OAKLAND

WP0009515 FA0050676
NO APN LISTED
AMOUNT PAID: 577.00

CONTRACTOR:
GEOCON CONSULTANTS INC

TERMS & CONDITIONS:

CONSTRUCT SOIL BORINGS (8)
CONSULTANT: GEOCON CONSULTANTS INC
PROJECT MGR:LUANN BEADLE
SEE SPECIAL CONDITIONS NOTED ON APPLICATION

MARC MULLANEY

ENVIRONMENTAL HEALTH SPECIALIST

DATE ISSUED: 6/21/2013

EXPIRATION DATE: 10/21/2013

THIS PERMIT IS NONTRANSFERABLE AND MUST BE POSTED ON-SITE IN A CONSPICUOUS PLACE

PAID
CK. NO. # 015920
DATE $577.00 JG 6/17/13

SAN MATEO COUNTY ENVIRONMENTAL HEALTH
JUN 17 2013
RECEIVED

2013 SUBSURFACE DRILLING PERMIT APPLICATION

SAN MATEO COUNTY ENVIRONMENTAL HEALTH SERVICES DIVISION
2000 ALAMEDA DE LAS PULGAS, SUITE 100, SAN MATEO, CA 94403
VOICE (650) 372-6200 FAX (650) 627-8244

FEES:
$577.00 (env. borings or any wells)
$361.00 (geotechnical borings only)

ALLOW FOUR (4) WORKING DAYS FOR PROCESSING PERMIT, DRILLING DATE & TIME MUST BE SCHEDULED WITH COUNTY STAFF AT LEAST TWO (2) WORKING DAYS (48 HOURS) IN ADVANCE BUT AT LEAST TWO (2) WORKING DAYS AFTER APPLICATION SUBMITTAL

PURPOSE OF APPLICATION
☐ GROUNDWATER MONITORING / VAPOR WELL INSTALLATION ☒ CONSTRUCT SOIL BORINGS
☐ GROUNDWATER MONITORING / VAPOR WELL DESTRUCTION ☐ EXTENSION OF PERMIT # ____
NO. OF WELLS ____ NO. OF BORINGS 8 WELL/BORING NAMES B1 through B8

PURPOSE OF DRILLING ☒ ENVIRONMENTAL ☐ GEOTECHNICAL
REQUIRED BY ☐ COUNTY GPP (permit approval is not to be considered work plan approval) ☐ RWQCB/DTSC/USEPA (Provide approval letter) ☒ OTHER (i.e. voluntary)

SITE/ DRILLING INFORMATION

SITE NAME South Side of I-280 near Canada Rd ASSESSOR'S PARCEL # (REQUIRED) NA (adjacent # 093090130) (one per permit)
DRILLING LOCATION ADDRESS: SOUTH 280 @ INTERSECTION HWY 92 CITY near Belmont ZIP ____
To Be Constructed In: ☒ Public Property ☐ Private Property ☐ Refuse ☒ Other Caltrans Right-of-way
Schematics for construction only may be submitted in lieu of description below, particularly if wells will be constructed differently
Maximum Proposed Depth Wells/Borings 22 feet (feet) Drilling Method Direct-push
Boring Diameter 2 Casing Diameter ____ Filter Pack Interval ____ Screen Interval ____
Destruction Method(6 gallons water max per 94 lb cement, up to 5% bentonite): ☒ Pressure Grouting (provide well construction logs) ☐ Overdrilling (guide rods for entire depth required)

WELL/ BORING OWNER: **(WELL/BORING OWNER NAME OR CONTACT PERSON SHOULD MATCH SIGNATURE)**

NAME State of CA Dept. of Transportation (Caltrans) CONTACT PERSON Keith Fang
ADDRESS 111 Grand Ave, MS8C CITY, STATE, ZIP Oakland, CA, 94612
TELEPHONE 510-286-8795 EMAIL keith.fang@dot.ca.gov
It is my responsibility to notify the County of any known changes in the purpose of this well/boring from that which is indicated on this applicationand to notify the County of any known damage to the well, and to maintain the well in good condition. *(Letter signed by well/boring owner/contact person, containing above language and attesting to knowledge of all permit requirements and conditions, may be substituted for signature.)*
Well/Boring Owner's/Contact Person's Signature: ____ **Date:** 6/11/13

PROPERTY OWNER: **(NAME AS APPEARS ON ASSESSOR'S ROLES SHOULD MATCH SIGNATURE)**

NAME Caltrans CONTACT PERSON Keith Fang
ADDRESS 111 Grand Ave, MS8C CITY, STATE, ZIP Oakland, CA, 94612
TELEPHONE 510-286-8795 EMAIL keith.fang@dot.ca.gov
I understand that a well/boring is being installed on my property. I agree to notify the County and Well Owner of any known damage to the well. (Letter signed by property owner, containing above language, or encroachment permit may be substituted for signature on permit application.)
Property Owner's Signature: ____ **Date:** 6/11/13

DRILLING COMPANY:

DRILLING COMPANY Geocon Consultants, Inc. CONTACT PERSON Luann Beadle
ADDRESS 6671 Brisa St CITY, STATE, ZIP Livermore, CA, 94550
Telephone 925-961-5272 EMAIL beadle@geoconinc.com C57 DRILLERS LICENSE # 716050
I certify that the well/boring will be constructed in compliance with the conditions of this permit (see reverse), the San Mateo County Well Ordinance, and the State Water Well Standards, and that the license listed above is considered current and active by the Contractors State License Board.
Driller's Signature: ____ **Date:** 6/11/13

CONSULTANT COMPANY:

CONSULTANT COMPANY Geocon Consultants, Inc. PROJECT MANAGER Luann Beadle
ADDRESS 6671 Brisa St. TELEPHONE 925-961-5272
CITY, STATE, ZIP Livermore, CA, 94550 EMAIL beadle@geoconinc.com
I certify that this application is correct to the best of my knowledge and the well/boring will be constructed/destroyed in compliance with the conditions of this permit (see reverse), the San Mateo County Well Ordinance, and the State Water Well Standards. I understand that I am responsible for General Conditions "D and E" of this permit and if I indicated the purpose of drilling is geotechnical, then no one will use the boring to collect any samples for environmental analyses. (*Responsible Professional must be a California Professional Geologist or Civil Engineer.*)
Responsible Professional's Name (Please print legibly) Richard Day
Responsible Professional's Signature ____ **Date:** 6/11/13
California Professional Geologist (PG) No. 5479 **or Civil Engineer (PE) No.** ____

Please see additional pages of application for requirements, general permit conditions, instructions, and fees.

Revised every January 1

FA50676

 2013 SUBSURFACE DRILLING PERMIT APPLICATION

REQUIREMENTS:

An accurate & correct map of existing and proposed well/boring locations **must** be included with the permit application. The well/boring location map **must** include the following.

1. North arrow, existing & historic site features, wells, approximate property lines and any other pertinent existing & historic features and information.
2. Proposed well/boring locations to scale.

A work plan describing the drilling and construction/destruction methodology may be requested by County staff. Upon review of information on this application, and subject to approval noted below, a permit will be issued allowing well/boring owner, driller, and responsible professional to perform the specified work. The permit is subject to both General and Special Conditions stated below. A copy of the approved Subsurface Drilling Permit **must** be available on site while work related to the permit is being performed. Drilling may begin at the notified date and time whether County staff is present or not.

GENERAL CONDITIONS:

A. Well and boring construction and destruction under this permit is subject to the Standards for the Construction of Wells in San Mateo County, County Groundwater Protection Program (GPP) Guidelines, Policies & Procedures, the State Water Well Standards, and any instructions by a Health Department representative.

B. Well/Boring Owner, Driller, and Responsible Professional assume responsibility for all activities and uses under the permit, including compliance with Workmen's Compensation Laws, and indemnify, defend and save the County of San Mateo, its' officers, agents and employees, free and harmless from any and all expense, cost, or liability in connection with or resulting from work or stopped-work associated with the permit, including, but not limited to, property damage, personal injury, wrongful death, and loss of income.

C. All borings **must** be properly destroyed (grouted/sealed) within 24 hours of drilling unless special conditions are approved in writing as part of this permit. Borings lasting longer than 24 hours without a variance are considered wells.

D. Analytical results of all soil, vapor, and groundwater samples collected during the execution of drilling under this permit **must** be submitted to County GPP staff by the Responsible Professional within 60 days of sample collection. If contamination is discovered during drilling, verbal notification to County GPP by the Responsible Professional is **required** within 72 hours of discovery. Proper storage, labeling & disposal of investigation-derived residual wastes are the responsibility of the consultant unless stated otherwise contractually.

E. A copy of the State DWR Form 188, boring logs and well construction details for all borings/wells except geotechnical borings, signed by a Responsible Professional, **must** be submitted to County GPP by the Responsible Professional within 60 days of drilling/construction/destruction. As-built locations/dimensions **must** be finalized in subsequent report of findings submitted to County GPP by the Responsible Professional within 60 days of drilling/construction/destruction.

F. Permit is valid only for the purpose specified herein. No change in purpose or required procedures, as described on this permit application, in the associated workplan, or in the special conditions below, will be allowed except upon written permission from the County. Construction aspects can be changed based on conditions encountered in the field.

G. Permit is valid for a mobilization associated with originally permitted boring/well locations only, including contingency locations, and is automatically canceled if not exercised, or if an extension is not applied for and granted within 120 days of the original permit issuance date. Failure to notify staff of cancellation or delay in start time will result in the Consultant being billed an Inspection Cancellation fee of $264 for 2013 if GPP staff attempted to perform an inspection.

H. Wells installed under this permit may not be used for domestic, municipal, commercial, or irrigation water supply.

I. All work performed **must** conform to Business and Profession Codes and State Water Well Standards.

J. Top-of-casing elevation of all wells **must** be surveyed to the nearest 0.01-foot relative to Mean Sea Level or NAVD88 and submitted to County GPP within 60 days of drilling, and to State GeoTracker as appropriate. Geotechnical wells are exempt from this requirement if a written variance from GPP is obtained prior to drilling.

K. Latitude and longitude of all wells **must** be surveyed with sub-meter accuracy relative to NAD83 and submitted to County GPP within 60 days of drilling, and to State GeoTracker as appropriate.

L. Violation of any requirement or general or special permit condition may result in an order by GPP staff to cease work under this permit, correct the violation, and potentially re-permit the work as a new mobilization.

SPECIAL CONDITIONS: USE TREMIE FOR GROUTING ALL SOIL BORINGS

County Approval: [signature] RO/FA# MEW Date: 6/18/13

GEOCON
CONSULTANTS, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. E8560-02-48
June 11, 2013

VIA EMAIL

Mr. Keith Fang
Caltrans – District 4
Environmental Engineering
111 Grand Avenue, MS 8C
Oakland, CA 94612

Subject: SOIL AND GROUNDWATER SAMPLING WORKPLAN
INTERSTATE 280, SINKHOLE REPAIR PROJECT
SAN MATEO COUNTY, CALIFORNIA
CONTRACT NO. 04A3578, TASK ORDER NO. 48, EA NO. 04-4G5900

Dear Mr. Fang:

Geocon is submitting this workplan to perform soil and groundwater sampling associated with a sinkhole repair project south of Interstate 280 (I-280), near the city of Belmont in San Mateo County, California (Figure 1, Vicinity Map).

In general accordance with Caltrans Contract 04A3578 and Task Order No. 48 (TO-48), this workplan describes the scope of services and outlines procedures and methods Geocon will employ to complete the project.

PURPOSE

A previous investigation in the I-280 corridor identified elevated concentrations of nickel and naturally-occurring asbestos (NOA).The purpose of this sampling investigation is to assess soil for the presence or absence of hazardous concentrations of metals and NOA and groundwater for hazardous concentrations of metals. The analytical results of the sampling will be used to evaluate soil handling practices, worker health and safety, and soil and groundwater reuse and disposal options.

Eight boring locations are planned to be advanced during the investigation. The borings will be advanced to a maximum depth of 23 feet, or to groundwater if encountered at shallower depths.

The proposed boring locations are shown on Figure 2, Soil Boring Location Map.

Project Personnel

Mr. Richard Day, a Certified Engineering Geologist (CEG), will manage the project. Mr. Chris Merritt, a California Professional Geologist (PG), will be performing the field investigation.

Geocon employees performing fieldwork on this project will be "HAZWOPER"-certified with 40-hour and 8-hour annual refresher training, as appropriate.

PROJECT SCOPE

Outlined below is a summary of the scope of services that Geocon will perform in accordance with TO-48.

Pre-field Activities

- Conduct a pre-work site visit with the Caltrans Task Order Manager.
- Prepare a health and safety plan (HSP) for the proposed site investigation. The HSP will provide guidelines on the use of personal protective equipment and the health and safety procedures implemented during the proposed survey activities as specified in T8 CCR §1529, T8 CCR §3203, T8 CCR §3204, T8 CCR §§5095-5100, T8 CCR §5144, and T8 CCR §5192.
- Retain the services of Caltrans-approved, California-licensed laboratory.
- Obtain a drilling permit from San Mateo County Environmental Health Services Division.
- Retain the services of Caltrans-approved utility locator.
- Notify Underground Service Alert (USA) at least 48 hours prior to fieldwork.
- Arrange site work with Caltrans.

Soil and Groundwater Sampling

Borings will be advanced using a direct push drill rig equipped with 2-inch direct-push sampling equipment. Soil samples will be collected from each boring at sample depths shown in Table 1 using a 4-foot-long stainless steel core-barrel sampler lined with an acetate sample tube. The acetate sample tube selected for laboratory analysis at each sample interval will be capped with Teflon tape and plastic end caps, and placed in a chest cooled with ice for temporary storage prior to transport to the analytical laboratory.

The soil and groundwater samples will be transported under chain-of-custody protocol to Advanced Technology Laboratories (ATL-LV), a State of California-certified and Caltrans-approved laboratory located in Las Vegas, Nevada.

Groundwater is expected to be encountered within the depth range of the proposed borings. Once it is encountered, groundwater will be collected via a disposable polyethylene bailer or polyethylene tubing and check valve. Groundwater retrieved to ground surface in the bailer or tube will be emptied into the appropriate sample containers for storage and transport to the analytical laboratory. Groundwater will be collected from borings B2 and B6.

Reusable sampling equipment will be cleaned between sample locations using a non-phosphate detergent (Alconox™ or Liquinox™ solution) followed by a double rinse with deionized water. Excess decontamination fluids and soil cuttings generated during the field investigation will be containerized in 5-gallon buckets and transported offsite.

Boreholes that extend to groundwater will be backfilled with Portland cement from the bottom of the boring to ground surface. Shallow soil borings that do not extend to groundwater will be backfilled to ground surface with soil cuttings.

Boring locations will be surveyed using Differential Global Positioning System (DGPS) equipment.

Laboratory Analyses

Soil and groundwater samples will be analyzed for the following constituents:

- 32 soil samples will be analyzed for California Assessment Manual (CAM) 17 metals using EPA Test Method 6010 ICAP and 7471A.
- 24 soil samples will be analyzed for naturally occurring asbestos (NOA) using CARB Method 435.
- Up to 2 groundwater samples will be analyzed for CAM17 metals following EPA Test Method 6010 ICAP.

A sample matrix is presented as Table 1.

At the discretion of Caltrans, soil samples may be further analyzed for soluble metal concentrations by the California Waste Extraction Test (WET) analysis following EPA Test Method 7420, and/or the Federal Toxicity Characteristic Leaching Procedure (TCLP) following EPA Test Method 1311.

One equipment blank will be provided for every chain-of-custody submitted to the laboratory. The equipment blank will be prepared by pouring deionized water onto the sampling device and into a laboratory container. The equipment blanks will be analyzed for lead using EPA Test Method 6010 ICAP.

Method blanks, duplicates, and spiked samples will be required for laboratory quality assurance/quality control purposes.

All soil and groundwater samples will be submitted on regular turnaround time following submittal to the laboratory. The results will be forwarded to Caltrans by fax or e-mail upon receipt from the laboratory.

Report Preparation

Geocon will prepare a *Site Investigation Report* that documents the results of the investigation. The report will provide background information, field observations, laboratory data, data evaluation, and conclusions. The report will include diagrams of sample locations and laboratory results presented in tabular format. The report will include identifying the soil samples' minimum, arithmetic mean, and maximum metal concentrations. Geocon will input the information into an Excel spreadsheet and provide an electronic copy to the Task Order Manager. The *Site Investigation Report* will be prepared and signed by a California-registered Professional Geologist.

One electronic copy of the draft report will be provided to Caltrans for review. Six bound copies of the final *Site Investigation Report* will be submitted after Caltrans provides written draft report review comments. Two electronic (CD) copies of the final report will be submitted with the bound copies.

If there are any questions concerning the contents of this workplan, or if Geocon may be of further service, please contact me at your convenience.

Sincerely,

GEOCON CONSULTANTS, INC.

Luann Beadle
Sr. Staff Scientist

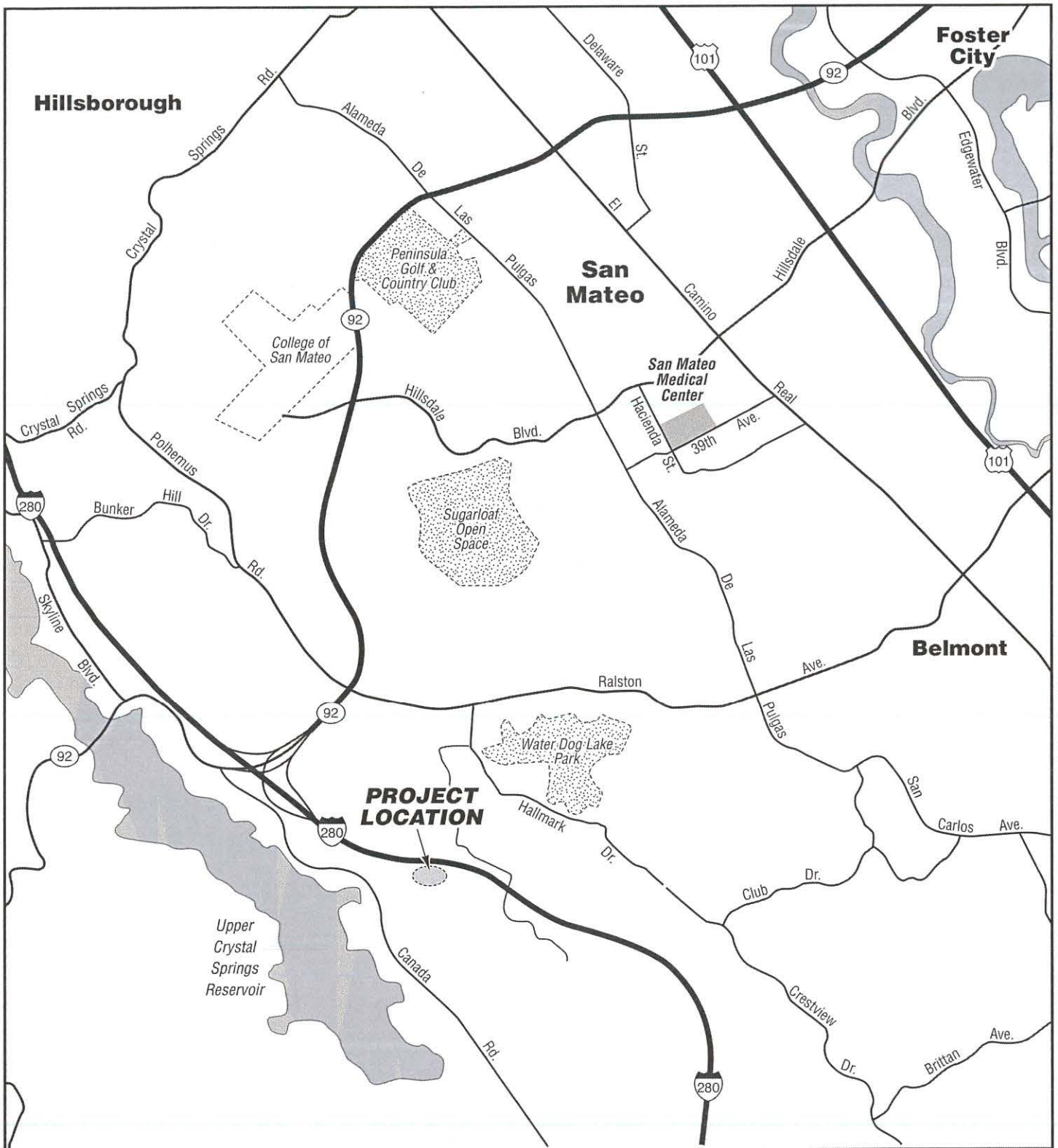
Richard Day, CEG, CHG
Senior Geologist

PROFESSIONAL GEOLOGIST
RICHARD W. DAY
No. 5479
Exp. 09-30-13
STATE OF CALIFORNIA

(1) Addressee

Attachments:

Figure 1 – Vicinity Map
Figure 2 – Soil Boring Location Map
Table 1 – Sample Analysis Matrix



N

0 1

Scale in Miles

GEOCON
CONSULTANTS, INC.
6671 BRISA STREET – LIVERMORE, CA 94550
PHONE 925.371.5900 – FAX 925.371.5915

I-280 Sinkhole Repair

San Mateo County, California

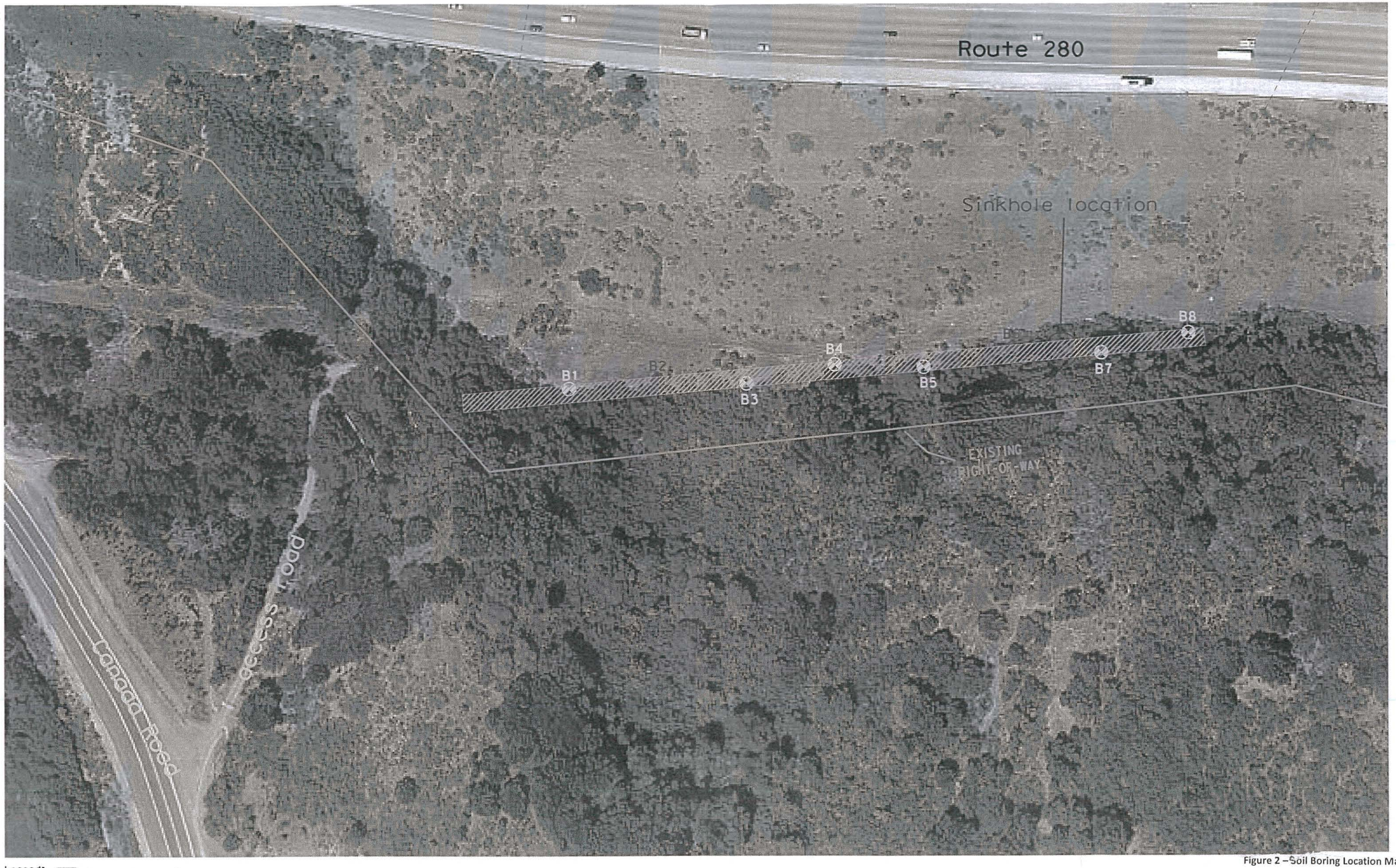
GEOCON Proj. No. E8560-02-48

Task Order No. 48

VICINITY MAP

May 2013

Figure 1



Legend:
Proposed treching area
Soil sample boring

Scale 1" = 100'

Figure 2 – Soil Boring Location Map

SM-280 PM 9.4
EA 04-4G5900
PN 04-1200-0619-0

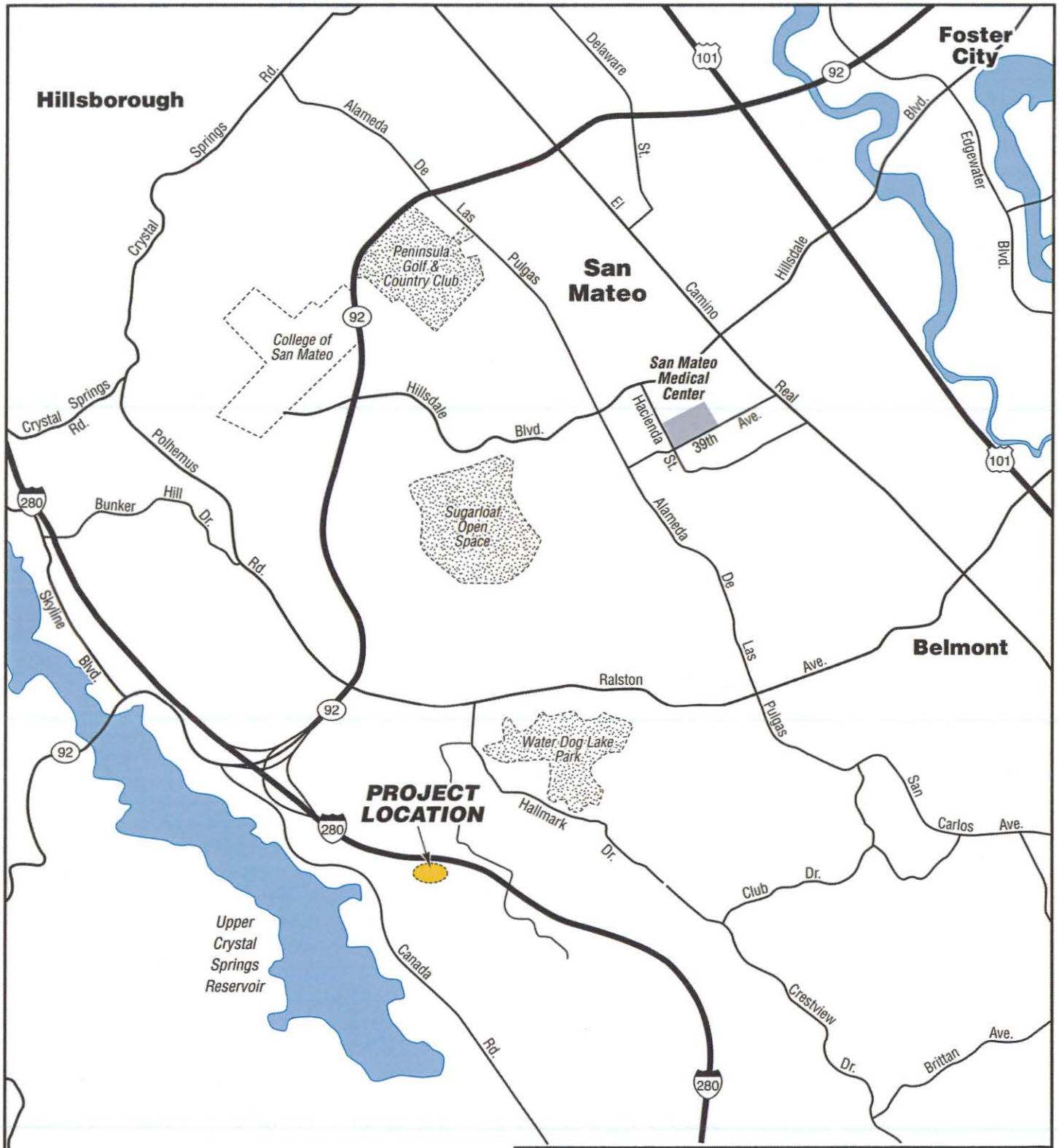
TABLE 1
Sample Analyses Matrix
I-280 Sinkhole Repair Project
San Mateo County, California

Sample ID	Sample Depth (ft)	CAM 17 Metals	NOA CARB 435	TOTAL LEAD
B1-0	0 to 0.5	X	---	---
B1-1.5	1.5 to 2.0	X	X	---
B1-3.5	3.5 to 4.0	X	---	---
B1-5.5	5.5 to 6.0	---	X	---
B1-10.5	10.5 to 11	X	X	---
B2-0	0 to 0.5	X	---	---
B2-1.5	1.5 to 2.0	---	X	---
B2-2.5	2.5 to 3.0	X	---	---
B2-5.5	5.5 to 6.0	X	X	---
B2-10.5	10.5 to 11	X	X	---
B2-GW	GW*	X	---	---
B3-0	0 to 0.5	X	---	---
B3-1.5	1.5 to 3.0	X	X	---
B3-3.5	3.5 to 4.0	X	---	---
B3-5.5	5.5 to 6.0	---	X	---
B3-14.5	14.5 to 15	X	X	---
B4-0	0 to 0.5	X	---	---
B4-1.5	1.5 to 2.0	X	X	---
B4-5.5	5.5 to 6.0	X	X	---
B4-14.5	14.5 to 15	X	X	---
B5-0	0 to 0.5	X	---	---
B5-1.5	1.5 to 2.0	---	X	---
B5-2.5	2.5 to 3.0	X	---	---
B5-3.5	3.5 to 4.0	X	---	---
B5-5.5	5.5 to 6.0	---	X	---
B5-14.5	14.5 to 15	---	X	---
B5-19.5	19.5 to 20	X	---	---
B6-0	0 to 0.5	X	---	---
B6-1.5	1.5 to 2.0	---	X	---
B6-2.5	2.5 to 3.0	X	---	---
B6-5.5	5.5 to 6.0	X	X	---
B6-14.5	14.5 to 15	---	X	---
B6-19.5	19.5 to 20	X	---	---
B6-GW	GW*	X	---	---

TABLE 1
Sample Analyses Matrix
I-280 Sinkhole Repair Project
San Mateo County, California

Sample ID	Sample Depth (ft)	CAM 17 Metals	NOA CARB 435	TOTAL LEAD
B7-0	0 to 0.5	X	---	---
B7-1.5	1.5 to 2.0	---	X	---
B7-2.5	2.5 to 3.0	X	---	---
B7-5.5	5.5 to 6.0	X	X	---
B7-19.5	19.5 to 20	X	---	---
B7-22.5	22.5 to 23	---	X	---
B8-0	0 to 0.5	X	---	---
B8-1.5	1.5 to 3.0	X	X	---
B8-3.5	3.5 to 4.0	X	---	---
B8-5.5	5.5 to 6.0	---	X	---
B8-22.5	22.5 to 23	X	X	---
Equipment Rinse Blank		---	---	**X**
	TOTAL	**34**	**24**	**1**

Notes
Sample depths are shown in feet
GW = Sample depth of 20 feet or at water table, whichever is shallower
*Groundwater samples are to be filtered by lab prior to addition of acid preservative.



GEOCON
CONSULTANTS, INC.
6671 BRISA STREET – LIVERMORE, CA 94550
PHONE 925.371.5900 – FAX 925.371.5915

I-280 Sinkhole Repair

San Mateo County, California

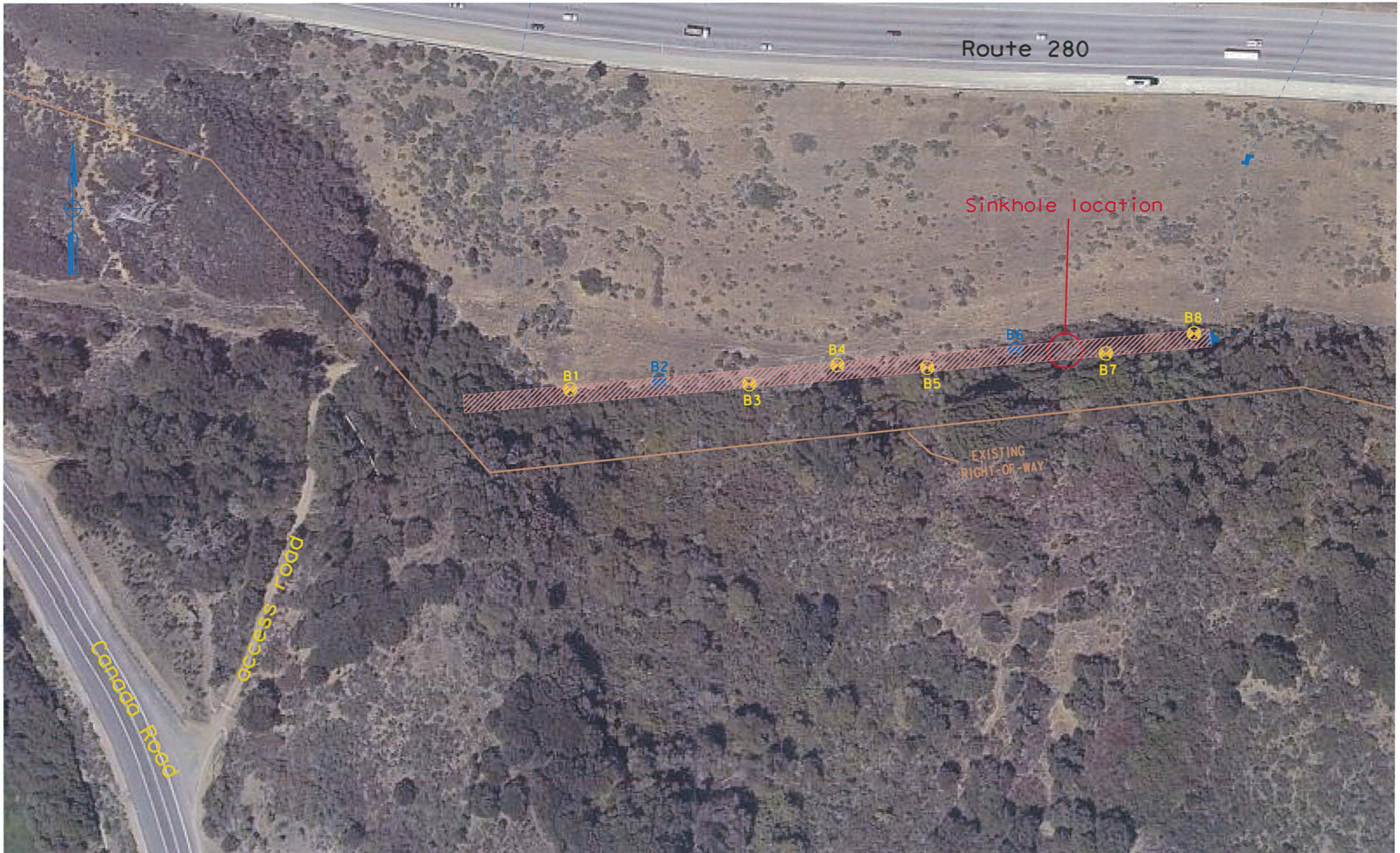
GEOCON Proj. No. E8560-02-48

Task Order No. 48

VICINITY MAP

May 2013

Figure 1



Legend:
Proposed treching area
Soil sample boring

Scale 1" : 100'

Figure 2 – Soil Boring Location Map

SM-280 PM 9.4
EA 04-4G5900
PN 04-1200-0619-0

APPENDIX B

July 10, 2013

Luann Beadle
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550

TEL: 925-371-5900 Ext 403
FAX: (925) 371-5915

CA-ELAP No.: 2676
NV Cert. No.: NV-009222007A

Workorder No.: N010508

RE: Belmont Sinkhole, E8560-02-48

Attention: Luann Beadle

Enclosed are the results for sample(s) received on July 02, 2013 by Advanced Technology Laboratories, Inc. . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (702) 307-2659 if I can be of further assistance to your company.

Sincerely,

for Geogamundo

Jose Tenorio Jr.
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories - Las Vegas.

CLIENT: Geocon Consultants, Inc.
Project: Belmont Sinkhole, E8560-02-48
Lab Order: N010508

CASE NARRATIVE

SAMPLE RECEIVING/GENERAL COMMENTS:

Samples were received intact with proper chain of custody documentation.

Cooler temperature and sample preservation were verified upon receipt of samples if applicable.

Information on sample receipt conditions including discrepancies can be found in attached Sample Receipt Checklist Form.

Samples were analyzed within method holding time.

Analytical Comments for EPA 6010B:

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) are outside recovery criteria for some analytes on QC samples SampID
N010508-001A-MS, N010508-021A-MS, N010508-032A-MS, N010508-001A-MSD and N010508-021A-MSD possibly due to matrix interference. The associated Laboratory Control Sample (LCS) recovery was acceptable.

RPD for Sample Duplicate (DUP) is outside criteria for some analytes on samples N010508-001A-DUP, N010508-012A-DUP, N010508-021A-DUP, and N010508-032A-DUP.

Advanced Technology Laboratories, Inc. *3151 W. Post Rd Las Vegas, NV 89118 Tel: 702-307-2659 Fax: 702-307-2691*

Advanced Technology Laboratories, Inc.

Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Project: Belmont Sinkhole, E8560-02-48
Lab Order: N010508
Contract No:

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collection Date	Date Received	Date Reported
N010508-001A	B1-0	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-002A	B1-1.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-003A	B1-3.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-004A	B1-10.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-005A	B2-0	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-006A	B2-2.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-007A	B2-5.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-008A	B2-10.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-009A	B2-16 (GWI)	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-010A	B2-GW	Groundwater	7/1/2013 11:57:00 AM	7/2/2013	7/10/2013
N010508-010B	B2-GW	Groundwater	7/1/2013 11:57:00 AM	7/2/2013	7/10/2013
N010508-011A	B3-0	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-012A	B3-1.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-013A	B3-3.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-014A	B3-14.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-015A	B4-0	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-016A	B4-1.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-017A	B4-5.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-018A	B4-14.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-019A	B5-0	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-020A	B5-2.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-021A	B5-3.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-022A	B5-19.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-023A	B6-0	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-024A	B6-2.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-025A	B6-5.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-026A	B6-19.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-027A	B6-GW	Groundwater	7/1/2013 2:31:00 PM	7/2/2013	7/10/2013
N010508-027B	B6-GW	Groundwater	7/1/2013 2:31:00 PM	7/2/2013	7/10/2013

Advanced Technology Laboratories, Inc.
3151 W. Post Rd Las Vegas, NV 89118 Tel: 702-307-2659 Fax: 702-307-2691

CLIENT: Geocon Consultants, Inc.
Project: Belmont Sinkhole, E8560-02-48
Lab Order: N010508
Contract No:

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collection Date	Date Received	Date Reported
N010508-028A	B7-0	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-029A	B7-2.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-030A	B7-5.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-031A	B7-19.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-032A	B8-0	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-033A	B8-1.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-034A	B8-3.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-035A	B8-22.5	Soil	7/1/2013	7/2/2013	7/10/2013
N010508-036A	EB	Water		7/2/2013	7/10/2013

Advanced Technology Laboratories, Inc.
3151 W. Post Rd Las Vegas, NV 89118 Tel: 702-307-2659 Fax: 702-307-2691

ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-001

Client Sample ID: B1-0
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 01:32 PM
Arsenic	3.4	1.0		mg/Kg	1	7/8/2013 01:32 PM
Barium	110	1.0		mg/Kg	1	7/8/2013 01:32 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 01:32 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 01:32 PM
Chromium	25	1.0		mg/Kg	1	7/8/2013 01:32 PM
Cobalt	7.8	1.0		mg/Kg	1	7/8/2013 01:32 PM
Copper	16	2.0		mg/Kg	1	7/8/2013 01:32 PM
Lead	8.1	1.0		mg/Kg	1	7/8/2013 01:32 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 01:32 PM
Nickel	31	1.0		mg/Kg	1	7/8/2013 01:32 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 01:32 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 01:32 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 01:32 PM
Vanadium	26	1.0		mg/Kg	1	7/8/2013 01:32 PM
Zinc	34	1.0		mg/Kg	1	7/8/2013 01:32 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories, Inc.
3151 W. Post Rd Las Vegas, NV 89118 Tel: 702-307-2659 Fax: 702-307-2691

ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-002

Client Sample ID: B1-1.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 02:12 PM
Arsenic	2.8	1.0		mg/Kg	1	7/8/2013 02:12 PM
Barium	130	1.0		mg/Kg	1	7/8/2013 02:12 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 02:12 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 02:12 PM
Chromium	14	1.0		mg/Kg	1	7/8/2013 02:12 PM
Cobalt	6.6	1.0		mg/Kg	1	7/8/2013 02:12 PM
Copper	11	2.0		mg/Kg	1	7/8/2013 02:12 PM
Lead	7.7	1.0		mg/Kg	1	7/8/2013 02:12 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 02:12 PM
Nickel	18	1.0		mg/Kg	1	7/8/2013 02:12 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 02:12 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 02:12 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 02:12 PM
Vanadium	23	1.0		mg/Kg	1	7/8/2013 02:12 PM
Zinc	28	1.0		mg/Kg	1	7/8/2013 02:12 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories, Inc.
3151 W. Post Rd Las Vegas, NV 89118 Tel: 702-307-2659 Fax: 702-307-2691

Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	B1-3.5
Lab Order:	N010508	**Collection Date:**	7/1/2013
Project:	Belmont Sinkhole, E8560-02-48	**Matrix:**	SOIL
Lab ID:	N010508-003		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
EPA 7471				**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
EPA 3050B				**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 02:19 PM
Arsenic	2.8	1.0		mg/Kg	1	7/8/2013 02:19 PM
Barium	140	1.0		mg/Kg	1	7/8/2013 02:19 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 02:19 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 02:19 PM
Chromium	14	1.0		mg/Kg	1	7/8/2013 02:19 PM
Cobalt	6.3	1.0		mg/Kg	1	7/8/2013 02:19 PM
Copper	11	2.0		mg/Kg	1	7/8/2013 02:19 PM
Lead	7.5	1.0		mg/Kg	1	7/8/2013 02:19 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 02:19 PM
Nickel	18	1.0		mg/Kg	1	7/8/2013 02:19 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 02:19 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 02:19 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 02:19 PM
Vanadium	24	1.0		mg/Kg	1	7/8/2013 02:19 PM
Zinc	28	1.0		mg/Kg	1	7/8/2013 02:19 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories, Inc.

3151 W. Post Rd Las Vegas, NV 89118 Tel: 702-307-2659 Fax: 702-307-2691

Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	B1-10.5
Lab Order:	N010508	**Collection Date:**	7/1/2013
Project:	Belmont Sinkhole, E8560-02-48	**Matrix:**	SOIL
Lab ID:	N010508-004		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
EPA 7471				**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
EPA 3050B				**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 02:36 PM
Arsenic	3.0	1.0		mg/Kg	1	7/8/2013 02:36 PM
Barium	110	1.0		mg/Kg	1	7/8/2013 02:36 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 02:36 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 02:36 PM
Chromium	14	1.0		mg/Kg	1	7/8/2013 02:36 PM
Cobalt	6.3	1.0		mg/Kg	1	7/8/2013 02:36 PM
Copper	12	2.0		mg/Kg	1	7/8/2013 02:36 PM
Lead	7.1	1.0		mg/Kg	1	7/8/2013 02:36 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 02:36 PM
Nickel	18	1.0		mg/Kg	1	7/8/2013 02:36 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 02:36 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 02:36 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 02:36 PM
Vanadium	21	1.0		mg/Kg	1	7/8/2013 02:36 PM
Zinc	29	1.0		mg/Kg	1	7/8/2013 02:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	B2-0
Lab Order:	N010508	**Collection Date:**	7/1/2013
Project:	Belmont Sinkhole, E8560-02-48	**Matrix:**	SOIL
Lab ID:	N010508-005		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
EPA 7471				**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
EPA 3050B				**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 02:43 PM
Arsenic	4.7	1.0		mg/Kg	1	7/8/2013 02:43 PM
Barium	170	1.0		mg/Kg	1	7/8/2013 02:43 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 02:43 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 02:43 PM
Chromium	35	1.0		mg/Kg	1	7/8/2013 02:43 PM
Cobalt	13	1.0		mg/Kg	1	7/8/2013 02:43 PM
Copper	26	2.0		mg/Kg	1	7/8/2013 02:43 PM
Lead	12	1.0		mg/Kg	1	7/8/2013 02:43 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 02:43 PM
Nickel	47	1.0		mg/Kg	1	7/8/2013 02:43 PM
Selenium	1.1	1.0		mg/Kg	1	7/8/2013 02:43 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 02:43 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 02:43 PM
Vanadium	30	1.0		mg/Kg	1	7/8/2013 02:43 PM
Zinc	52	1.0		mg/Kg	1	7/8/2013 02:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-006

Client Sample ID: B2-2.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 02:50 PM
Arsenic	3.9	1.0		mg/Kg	1	7/8/2013 02:50 PM
Barium	140	1.0		mg/Kg	1	7/8/2013 02:50 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 02:50 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 02:50 PM
Chromium	32	1.0		mg/Kg	1	7/8/2013 02:50 PM
Cobalt	11	1.0		mg/Kg	1	7/8/2013 02:50 PM
Copper	22	2.0		mg/Kg	1	7/8/2013 02:50 PM
Lead	8.8	1.0		mg/Kg	1	7/8/2013 02:50 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 02:50 PM
Nickel	42	1.0		mg/Kg	1	7/8/2013 02:50 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 02:50 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 02:50 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 02:50 PM
Vanadium	27	1.0		mg/Kg	1	7/8/2013 02:50 PM
Zinc	43	1.0		mg/Kg	1	7/8/2013 02:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-007

Client Sample ID: B2-5.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 02:57 PM
Arsenic	ND	1.0		mg/Kg	1	7/8/2013 02:57 PM
Barium	210	1.0		mg/Kg	1	7/8/2013 02:57 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 02:57 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 02:57 PM
Chromium	4.5	1.0		mg/Kg	1	7/8/2013 02:57 PM
Cobalt	5.2	1.0		mg/Kg	1	7/8/2013 02:57 PM
Copper	ND	2.0		mg/Kg	1	7/8/2013 02:57 PM
Lead	2.4	1.0		mg/Kg	1	7/8/2013 02:57 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 02:57 PM
Nickel	2.9	1.0		mg/Kg	1	7/8/2013 02:57 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 02:57 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 02:57 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 02:57 PM
Vanadium	26	1.0		mg/Kg	1	7/8/2013 02:57 PM
Zinc	58	1.0		mg/Kg	1	7/8/2013 02:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-008

Client Sample ID: B2-10.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
EPA 7471				**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
EPA 3050B				**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 03:03 PM
Arsenic	2.6	1.0		mg/Kg	1	7/8/2013 03:03 PM
Barium	130	1.0		mg/Kg	1	7/8/2013 03:03 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 03:03 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 03:03 PM
Chromium	13	1.0		mg/Kg	1	7/8/2013 03:03 PM
Cobalt	5.6	1.0		mg/Kg	1	7/8/2013 03:03 PM
Copper	11	2.0		mg/Kg	1	7/8/2013 03:03 PM
Lead	7.1	1.0		mg/Kg	1	7/8/2013 03:03 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 03:03 PM
Nickel	16	1.0		mg/Kg	1	7/8/2013 03:03 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 03:03 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 03:03 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 03:03 PM
Vanadium	22	1.0		mg/Kg	1	7/8/2013 03:03 PM
Zinc	27	1.0		mg/Kg	1	7/8/2013 03:03 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-009

Client Sample ID: B2-16 (GWI)
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
EPA 7471				**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
EPA 3050B				**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 03:10 PM
Arsenic	3.6	1.0		mg/Kg	1	7/8/2013 03:10 PM
Barium	110	1.0		mg/Kg	1	7/8/2013 03:10 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 03:10 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 03:10 PM
Chromium	32	1.0		mg/Kg	1	7/8/2013 03:10 PM
Cobalt	6.9	1.0		mg/Kg	1	7/8/2013 03:10 PM
Copper	16	2.0		mg/Kg	1	7/8/2013 03:10 PM
Lead	6.9	1.0		mg/Kg	1	7/8/2013 03:10 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 03:10 PM
Nickel	36	1.0		mg/Kg	1	7/8/2013 03:10 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 03:10 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 03:10 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 03:10 PM
Vanadium	29	1.0		mg/Kg	1	7/8/2013 03:10 PM
Zinc	30	1.0		mg/Kg	1	7/8/2013 03:10 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	B2-GW
Lab Order:	N010508	**Collection Date:**	7/1/2013 11:57:00 AM
Project:	Belmont Sinkhole, E8560-02-48	**Matrix:**	GROUNDWATER
Lab ID:	N010508-010		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
DISSOLVED MERCURY BY COLD VAPOR TECHNIQUE						
				EPA 7470A		
RunID: AA1_130703B	QC Batch: 43348			PrepDate:	7/3/2013	Analyst: **LCC**
Mercury	ND	0.20		µg/L	1	7/3/2013
DISSOLVED METALS BY ICP						
	EPA 3010A			**EPA 6010B**		
RunID: ICP2_130709B	QC Batch: 43368			PrepDate:	7/8/2013	Analyst: **WLS**
Antimony	ND	0.010		mg/L	1	7/9/2013 04:55 PM
Arsenic	ND	0.010		mg/L	1	7/9/2013 04:55 PM
Barium	0.11	0.0030		mg/L	1	7/9/2013 04:55 PM
Beryllium	ND	0.0030		mg/L	1	7/9/2013 04:55 PM
Cadmium	ND	0.0030		mg/L	1	7/9/2013 04:55 PM
Chromium	0.0050	0.0030		mg/L	1	7/9/2013 04:55 PM
Cobalt	ND	0.0030		mg/L	1	7/9/2013 04:55 PM
Copper	0.020	0.0050		mg/L	1	7/9/2013 04:55 PM
Lead	ND	0.010		mg/L	1	7/9/2013 04:55 PM
Molybdenum	ND	0.0050		mg/L	1	7/9/2013 04:55 PM
Nickel	ND	0.0050		mg/L	1	7/9/2013 04:55 PM
Selenium	ND	0.010		mg/L	1	7/9/2013 04:55 PM
Silver	0.0053	0.0030		mg/L	1	7/9/2013 04:55 PM
Thallium	ND	0.015		mg/L	1	7/9/2013 04:55 PM
Vanadium	ND	0.0030		mg/L	1	7/9/2013 04:55 PM
Zinc	ND	0.010		mg/L	1	7/9/2013 04:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-011

Client Sample ID: B3-0
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 03:17 PM
Arsenic	5.9	1.0		mg/Kg	1	7/8/2013 03:17 PM
Barium	120	1.0		mg/Kg	1	7/8/2013 03:17 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 03:17 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 03:17 PM
Chromium	37	1.0		mg/Kg	1	7/8/2013 03:17 PM
Cobalt	14	1.0		mg/Kg	1	7/8/2013 03:17 PM
Copper	32	2.0		mg/Kg	1	7/8/2013 03:17 PM
Lead	12	1.0		mg/Kg	1	7/8/2013 03:17 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 03:17 PM
Nickel	51	1.0		mg/Kg	1	7/8/2013 03:17 PM
Selenium	1.0	1.0		mg/Kg	1	7/8/2013 03:17 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 03:17 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 03:17 PM
Vanadium	33	1.0		mg/Kg	1	7/8/2013 03:17 PM
Zinc	56	1.0		mg/Kg	1	7/8/2013 03:17 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-012

Client Sample ID: B3-1.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 03:41 PM
Arsenic	7.8	1.0		mg/Kg	1	7/8/2013 03:41 PM
Barium	96	1.0		mg/Kg	1	7/8/2013 03:41 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 03:41 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 03:41 PM
Chromium	24	1.0		mg/Kg	1	7/8/2013 03:41 PM
Cobalt	12	1.0		mg/Kg	1	7/8/2013 03:41 PM
Copper	39	2.0		mg/Kg	1	7/8/2013 03:41 PM
Lead	12	1.0		mg/Kg	1	7/8/2013 03:41 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 03:41 PM
Nickel	39	1.0		mg/Kg	1	7/8/2013 03:41 PM
Selenium	1.1	1.0		mg/Kg	1	7/8/2013 03:41 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 03:41 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 03:41 PM
Vanadium	24	1.0		mg/Kg	1	7/8/2013 03:41 PM
Zinc	64	1.0		mg/Kg	1	7/8/2013 03:41 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-013

Client Sample ID: B3-3.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 04:22 PM
Arsenic	6.5	1.0		mg/Kg	1	7/8/2013 04:22 PM
Barium	120	1.0		mg/Kg	1	7/8/2013 04:22 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 04:22 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 04:22 PM
Chromium	85	1.0		mg/Kg	1	7/8/2013 04:22 PM
Cobalt	20	1.0		mg/Kg	1	7/8/2013 04:22 PM
Copper	34	2.0		mg/Kg	1	7/8/2013 04:22 PM
Lead	9.9	1.0		mg/Kg	1	7/8/2013 04:22 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 04:22 PM
Nickel	130	1.0		mg/Kg	1	7/8/2013 04:22 PM
Selenium	1.2	1.0		mg/Kg	1	7/8/2013 04:22 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 04:22 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 04:22 PM
Vanadium	40	1.0		mg/Kg	1	7/8/2013 04:22 PM
Zinc	60	1.0		mg/Kg	1	7/8/2013 04:22 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories, Inc.
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ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-014

Client Sample ID: B3-14.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 04:30 PM
Arsenic	3.1	1.0		mg/Kg	1	7/8/2013 04:30 PM
Barium	100	1.0		mg/Kg	1	7/8/2013 04:30 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 04:30 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 04:30 PM
Chromium	34	1.0		mg/Kg	1	7/8/2013 04:30 PM
Cobalt	8.3	1.0		mg/Kg	1	7/8/2013 04:30 PM
Copper	15	2.0		mg/Kg	1	7/8/2013 04:30 PM
Lead	5.7	1.0		mg/Kg	1	7/8/2013 04:30 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 04:30 PM
Nickel	41	1.0		mg/Kg	1	7/8/2013 04:30 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 04:30 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 04:30 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 04:30 PM
Vanadium	32	1.0		mg/Kg	1	7/8/2013 04:30 PM
Zinc	34	1.0		mg/Kg	1	7/8/2013 04:30 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-015

Client Sample ID: B4-0
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 04:36 PM
Arsenic	ND	1.0		mg/Kg	1	7/8/2013 04:36 PM
Barium	260	1.0		mg/Kg	1	7/8/2013 04:36 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 04:36 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 04:36 PM
Chromium	5.5	1.0		mg/Kg	1	7/8/2013 04:36 PM
Cobalt	6.5	1.0		mg/Kg	1	7/8/2013 04:36 PM
Copper	ND	2.0		mg/Kg	1	7/8/2013 04:36 PM
Lead	3.1	1.0		mg/Kg	1	7/8/2013 04:36 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 04:36 PM
Nickel	2.2	1.0		mg/Kg	1	7/8/2013 04:36 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 04:36 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 04:36 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 04:36 PM
Vanadium	35	1.0		mg/Kg	1	7/8/2013 04:36 PM
Zinc	82	1.0		mg/Kg	1	7/8/2013 04:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-016

Client Sample ID: B4-1.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 04:43 PM
Arsenic	7.1	1.0		mg/Kg	1	7/8/2013 04:43 PM
Barium	200	1.0		mg/Kg	1	7/8/2013 04:43 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 04:43 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 04:43 PM
Chromium	34	1.0		mg/Kg	1	7/8/2013 04:43 PM
Cobalt	15	1.0		mg/Kg	1	7/8/2013 04:43 PM
Copper	41	2.0		mg/Kg	1	7/8/2013 04:43 PM
Lead	11	1.0		mg/Kg	1	7/8/2013 04:43 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 04:43 PM
Nickel	44	1.0		mg/Kg	1	7/8/2013 04:43 PM
Selenium	1.4	1.0		mg/Kg	1	7/8/2013 04:43 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 04:43 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 04:43 PM
Vanadium	37	1.0		mg/Kg	1	7/8/2013 04:43 PM
Zinc	68	1.0		mg/Kg	1	7/8/2013 04:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	B4-5.5
Lab Order:	N010508	**Collection Date:**	7/1/2013
Project:	Belmont Sinkhole, E8560-02-48	**Matrix:**	SOIL
Lab ID:	N010508-017		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
EPA 7471				**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
EPA 3050B				**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 04:50 PM
Arsenic	3.0	1.0		mg/Kg	1	7/8/2013 04:50 PM
Barium	180	1.0		mg/Kg	1	7/8/2013 04:50 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 04:50 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 04:50 PM
Chromium	16	1.0		mg/Kg	1	7/8/2013 04:50 PM
Cobalt	8.5	1.0		mg/Kg	1	7/8/2013 04:50 PM
Copper	12	2.0		mg/Kg	1	7/8/2013 04:50 PM
Lead	8.2	1.0		mg/Kg	1	7/8/2013 04:50 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 04:50 PM
Nickel	29	1.0		mg/Kg	1	7/8/2013 04:50 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 04:50 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 04:50 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 04:50 PM
Vanadium	22	1.0		mg/Kg	1	7/8/2013 04:50 PM
Zinc	33	1.0		mg/Kg	1	7/8/2013 04:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-018

Client Sample ID: B4-14.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 04:56 PM
Arsenic	2.3	1.0		mg/Kg	1	7/8/2013 04:56 PM
Barium	99	1.0		mg/Kg	1	7/8/2013 04:56 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 04:56 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 04:56 PM
Chromium	12	1.0		mg/Kg	1	7/8/2013 04:56 PM
Cobalt	7.6	1.0		mg/Kg	1	7/8/2013 04:56 PM
Copper	8.6	2.0		mg/Kg	1	7/8/2013 04:56 PM
Lead	11	1.0		mg/Kg	1	7/8/2013 04:56 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 04:56 PM
Nickel	18	1.0		mg/Kg	1	7/8/2013 04:56 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 04:56 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 04:56 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 04:56 PM
Vanadium	21	1.0		mg/Kg	1	7/8/2013 04:56 PM
Zinc	27	1.0		mg/Kg	1	7/8/2013 04:56 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-019

Client Sample ID: B5-0
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 05:03 PM
Arsenic	ND	1.0		mg/Kg	1	7/8/2013 05:03 PM
Barium	210	1.0		mg/Kg	1	7/8/2013 05:03 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 05:03 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 05:03 PM
Chromium	6.2	1.0		mg/Kg	1	7/8/2013 05:03 PM
Cobalt	5.3	1.0		mg/Kg	1	7/8/2013 05:03 PM
Copper	ND	2.0		mg/Kg	1	7/8/2013 05:03 PM
Lead	5.1	1.0		mg/Kg	1	7/8/2013 05:03 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 05:03 PM
Nickel	4.9	1.0		mg/Kg	1	7/8/2013 05:03 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 05:03 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 05:03 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 05:03 PM
Vanadium	30	1.0		mg/Kg	1	7/8/2013 05:03 PM
Zinc	68	1.0		mg/Kg	1	7/8/2013 05:03 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-020

Client Sample ID: B5-2.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
EPA 7471				**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
EPA 3050B				**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43342			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 05:09 PM
Arsenic	4.6	1.0		mg/Kg	1	7/8/2013 05:09 PM
Barium	180	1.0		mg/Kg	1	7/8/2013 05:09 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 05:09 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 05:09 PM
Chromium	20	1.0		mg/Kg	1	7/8/2013 05:09 PM
Cobalt	20	1.0		mg/Kg	1	7/8/2013 05:09 PM
Copper	36	2.0		mg/Kg	1	7/8/2013 05:09 PM
Lead	10	1.0		mg/Kg	1	7/8/2013 05:09 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 05:09 PM
Nickel	33	1.0		mg/Kg	1	7/8/2013 05:09 PM
Selenium	1.2	1.0		mg/Kg	1	7/8/2013 05:09 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 05:09 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 05:09 PM
Vanadium	33	1.0		mg/Kg	1	7/8/2013 05:09 PM
Zinc	57	1.0		mg/Kg	1	7/8/2013 05:09 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-021

Client Sample ID: B5-3.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708B	QC Batch: 43338			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43343			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 06:02 PM
Arsenic	7.4	1.0		mg/Kg	1	7/8/2013 06:02 PM
Barium	110	1.0		mg/Kg	1	7/8/2013 06:02 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 06:02 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 06:02 PM
Chromium	39	1.0		mg/Kg	1	7/8/2013 06:02 PM
Cobalt	14	1.0		mg/Kg	1	7/8/2013 06:02 PM
Copper	38	2.0		mg/Kg	1	7/8/2013 06:02 PM
Lead	12	1.0		mg/Kg	1	7/8/2013 06:02 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 06:02 PM
Nickel	58	1.0		mg/Kg	1	7/8/2013 06:02 PM
Selenium	1.2	1.0		mg/Kg	1	7/8/2013 06:02 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 06:02 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 06:02 PM
Vanadium	28	1.0		mg/Kg	1	7/8/2013 06:02 PM
Zinc	70	1.0		mg/Kg	1	7/8/2013 06:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-022

Client Sample ID: B5-19.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708C	QC Batch: 43340			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43343			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 06:58 PM
Arsenic	2.8	1.0		mg/Kg	1	7/8/2013 06:58 PM
Barium	100	1.0		mg/Kg	1	7/8/2013 06:58 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 06:58 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 06:58 PM
Chromium	14	1.0		mg/Kg	1	7/8/2013 06:58 PM
Cobalt	7.0	1.0		mg/Kg	1	7/8/2013 06:58 PM
Copper	11	2.0		mg/Kg	1	7/8/2013 06:58 PM
Lead	6.8	1.0		mg/Kg	1	7/8/2013 06:58 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 06:58 PM
Nickel	18	1.0		mg/Kg	1	7/8/2013 06:58 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 06:58 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 06:58 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 06:58 PM
Vanadium	23	1.0		mg/Kg	1	7/8/2013 06:58 PM
Zinc	28	1.0		mg/Kg	1	7/8/2013 06:58 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-023

Client Sample ID: B6-0
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708C	QC Batch: 43340			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43343			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 07:05 PM
Arsenic	ND	1.0		mg/Kg	1	7/8/2013 07:05 PM
Barium	170	1.0		mg/Kg	1	7/8/2013 07:05 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 07:05 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 07:05 PM
Chromium	5.8	1.0		mg/Kg	1	7/8/2013 07:05 PM
Cobalt	4.6	1.0		mg/Kg	1	7/8/2013 07:05 PM
Copper	ND	2.0		mg/Kg	1	7/8/2013 07:05 PM
Lead	2.6	1.0		mg/Kg	1	7/8/2013 07:05 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 07:05 PM
Nickel	4.8	1.0		mg/Kg	1	7/8/2013 07:05 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 07:05 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 07:05 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 07:05 PM
Vanadium	26	1.0		mg/Kg	1	7/8/2013 07:05 PM
Zinc	57	1.0		mg/Kg	1	7/8/2013 07:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories, Inc.
3151 W. Post Rd Las Vegas, NV 89118 Tel: 702-307-2659 Fax: 702-307-2691

ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-024

Client Sample ID: B6-2.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708C	QC Batch: 43340			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43343			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 07:11 PM
Arsenic	4.4	1.0		mg/Kg	1	7/8/2013 07:11 PM
Barium	150	1.0		mg/Kg	1	7/8/2013 07:11 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 07:11 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 07:11 PM
Chromium	39	1.0		mg/Kg	1	7/8/2013 07:11 PM
Cobalt	9.8	1.0		mg/Kg	1	7/8/2013 07:11 PM
Copper	26	2.0		mg/Kg	1	7/8/2013 07:11 PM
Lead	6.6	1.0		mg/Kg	1	7/8/2013 07:11 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 07:11 PM
Nickel	42	1.0		mg/Kg	1	7/8/2013 07:11 PM
Selenium	1.2	1.0		mg/Kg	1	7/8/2013 07:11 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 07:11 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 07:11 PM
Vanadium	43	1.0		mg/Kg	1	7/8/2013 07:11 PM
Zinc	39	1.0		mg/Kg	1	7/8/2013 07:11 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories, Inc.
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ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-025

Client Sample ID: B6-5.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708C	QC Batch: 43340			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43343			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 07:29 PM
Arsenic	6.7	1.0		mg/Kg	1	7/8/2013 07:29 PM
Barium	320	1.0		mg/Kg	1	7/8/2013 07:29 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 07:29 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 07:29 PM
Chromium	28	1.0		mg/Kg	1	7/8/2013 07:29 PM
Cobalt	13	1.0		mg/Kg	1	7/8/2013 07:29 PM
Copper	34	2.0		mg/Kg	1	7/8/2013 07:29 PM
Lead	12	1.0		mg/Kg	1	7/8/2013 07:29 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 07:29 PM
Nickel	44	1.0		mg/Kg	1	7/8/2013 07:29 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 07:29 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 07:29 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 07:29 PM
Vanadium	26	1.0		mg/Kg	1	7/8/2013 07:29 PM
Zinc	62	1.0		mg/Kg	1	7/8/2013 07:29 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-026

Client Sample ID: B6-19.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708C	QC Batch: 43340			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43343			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 07:36 PM
Arsenic	3.7	1.0		mg/Kg	1	7/8/2013 07:36 PM
Barium	89	1.0		mg/Kg	1	7/8/2013 07:36 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 07:36 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 07:36 PM
Chromium	15	1.0		mg/Kg	1	7/8/2013 07:36 PM
Cobalt	9.2	1.0		mg/Kg	1	7/8/2013 07:36 PM
Copper	11	2.0		mg/Kg	1	7/8/2013 07:36 PM
Lead	6.9	1.0		mg/Kg	1	7/8/2013 07:36 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 07:36 PM
Nickel	21	1.0		mg/Kg	1	7/8/2013 07:36 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 07:36 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 07:36 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 07:36 PM
Vanadium	23	1.0		mg/Kg	1	7/8/2013 07:36 PM
Zinc	31	1.0		mg/Kg	1	7/8/2013 07:36 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-027

Client Sample ID: B6-GW
Collection Date: 7/1/2013 2:31:00 PM
Matrix: GROUNDWATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
DISSOLVED MERCURY BY COLD VAPOR TECHNIQUE						
			EPA 7470A			
RunID: AA1_130703B	QC Batch: 43348			PrepDate:	7/3/2013	Analyst: **LCC**
Mercury	ND	0.20		µg/L	1	7/3/2013
DISSOLVED METALS BY ICP						
	EPA 3010A			**EPA 6010B**		
RunID: ICP2_130709B	QC Batch: 43368			PrepDate:	7/8/2013	Analyst: **WLS**
Antimony	ND	0.010		mg/L	1	7/9/2013 05:30 PM
Arsenic	0.013	0.010		mg/L	1	7/9/2013 05:30 PM
Barium	0.068	0.0030		mg/L	1	7/9/2013 05:30 PM
Beryllium	ND	0.0030		mg/L	1	7/9/2013 05:30 PM
Cadmium	ND	0.0030		mg/L	1	7/9/2013 05:30 PM
Chromium	0.0038	0.0030		mg/L	1	7/9/2013 05:30 PM
Cobalt	0.0070	0.0030		mg/L	1	7/9/2013 05:30 PM
Copper	0.023	0.0050		mg/L	1	7/9/2013 05:30 PM
Lead	ND	0.010		mg/L	1	7/9/2013 05:30 PM
Molybdenum	0.071	0.0050		mg/L	1	7/9/2013 05:30 PM
Nickel	ND	0.0050		mg/L	1	7/9/2013 05:30 PM
Selenium	ND	0.010		mg/L	1	7/9/2013 05:30 PM
Silver	0.0059	0.0030		mg/L	1	7/9/2013 05:30 PM
Thallium	ND	0.015		mg/L	1	7/9/2013 05:30 PM
Vanadium	ND	0.0030		mg/L	1	7/9/2013 05:30 PM
Zinc	ND	0.010		mg/L	1	7/9/2013 05:30 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-028

Client Sample ID: B7-0
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708C	QC Batch: 43340			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43343			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 07:43 PM
Arsenic	ND	1.0		mg/Kg	1	7/8/2013 07:43 PM
Barium	200	1.0		mg/Kg	1	7/8/2013 07:43 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 07:43 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 07:43 PM
Chromium	5.7	1.0		mg/Kg	1	7/8/2013 07:43 PM
Cobalt	5.5	1.0		mg/Kg	1	7/8/2013 07:43 PM
Copper	ND	2.0		mg/Kg	1	7/8/2013 07:43 PM
Lead	2.9	1.0		mg/Kg	1	7/8/2013 07:43 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 07:43 PM
Nickel	3.1	1.0		mg/Kg	1	7/8/2013 07:43 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 07:43 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 07:43 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 07:43 PM
Vanadium	31	1.0		mg/Kg	1	7/8/2013 07:43 PM
Zinc	67	1.0		mg/Kg	1	7/8/2013 07:43 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-029

Client Sample ID: B7-2.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708C	QC Batch: 43340			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43343			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 07:49 PM
Arsenic	5.0	1.0		mg/Kg	1	7/8/2013 07:49 PM
Barium	210	1.0		mg/Kg	1	7/8/2013 07:49 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 07:49 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 07:49 PM
Chromium	37	1.0		mg/Kg	1	7/8/2013 07:49 PM
Cobalt	12	1.0		mg/Kg	1	7/8/2013 07:49 PM
Copper	25	2.0		mg/Kg	1	7/8/2013 07:49 PM
Lead	7.5	1.0		mg/Kg	1	7/8/2013 07:49 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 07:49 PM
Nickel	48	1.0		mg/Kg	1	7/8/2013 07:49 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 07:49 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 07:49 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 07:49 PM
Vanadium	37	1.0		mg/Kg	1	7/8/2013 07:49 PM
Zinc	44	1.0		mg/Kg	1	7/8/2013 07:49 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-030

Client Sample ID: B7-5.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708C	QC Batch: 43340			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43343			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 07:55 PM
Arsenic	3.8	1.0		mg/Kg	1	7/8/2013 07:55 PM
Barium	160	1.0		mg/Kg	1	7/8/2013 07:55 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 07:55 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 07:55 PM
Chromium	17	1.0		mg/Kg	1	7/8/2013 07:55 PM
Cobalt	11	1.0		mg/Kg	1	7/8/2013 07:55 PM
Copper	18	2.0		mg/Kg	1	7/8/2013 07:55 PM
Lead	8.4	1.0		mg/Kg	1	7/8/2013 07:55 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 07:55 PM
Nickel	28	1.0		mg/Kg	1	7/8/2013 07:55 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 07:55 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 07:55 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 07:55 PM
Vanadium	24	1.0		mg/Kg	1	7/8/2013 07:55 PM
Zinc	40	1.0		mg/Kg	1	7/8/2013 07:55 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-031

Client Sample ID: B7-19.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708C	QC Batch: 43340			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43343			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 08:02 PM
Arsenic	2.1	1.0		mg/Kg	1	7/8/2013 08:02 PM
Barium	87	1.0		mg/Kg	1	7/8/2013 08:02 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 08:02 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 08:02 PM
Chromium	16	1.0		mg/Kg	1	7/8/2013 08:02 PM
Cobalt	5.6	1.0		mg/Kg	1	7/8/2013 08:02 PM
Copper	9.1	2.0		mg/Kg	1	7/8/2013 08:02 PM
Lead	6.1	1.0		mg/Kg	1	7/8/2013 08:02 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 08:02 PM
Nickel	20	1.0		mg/Kg	1	7/8/2013 08:02 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 08:02 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 08:02 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 08:02 PM
Vanadium	20	1.0		mg/Kg	1	7/8/2013 08:02 PM
Zinc	25	1.0		mg/Kg	1	7/8/2013 08:02 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	B8-0
Lab Order:	N010508	**Collection Date:**	7/1/2013
Project:	Belmont Sinkhole, E8560-02-48	**Matrix:**	SOIL
Lab ID:	N010508-032		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
EPA 7471				**EPA 7471A**		
RunID: AA1_130708C	QC Batch: 43340			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
EPA 3050B				**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43343			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 08:13 PM
Arsenic	2.1	1.0		mg/Kg	1	7/8/2013 08:13 PM
Barium	200	1.0		mg/Kg	1	7/8/2013 08:13 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 08:13 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 08:13 PM
Chromium	20	1.0		mg/Kg	1	7/8/2013 08:13 PM
Cobalt	8.1	1.0		mg/Kg	1	7/8/2013 08:13 PM
Copper	11	2.0		mg/Kg	1	7/8/2013 08:13 PM
Lead	12	1.0		mg/Kg	1	7/8/2013 08:13 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 08:13 PM
Nickel	37	1.0		mg/Kg	1	7/8/2013 08:13 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 08:13 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 08:13 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 08:13 PM
Vanadium	31	1.0		mg/Kg	1	7/8/2013 08:13 PM
Zinc	67	1.0		mg/Kg	1	7/8/2013 08:13 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories, Inc.

3151 W. Post Rd Las Vegas, NV 89118 Tel: 702-307-2659 Fax: 702-307-2691

ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-033

Client Sample ID: B8-1.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708C	QC Batch: 43340			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43343			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 08:44 PM
Arsenic	5.5	1.0		mg/Kg	1	7/8/2013 08:44 PM
Barium	200	1.0		mg/Kg	1	7/8/2013 08:44 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 08:44 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 08:44 PM
Chromium	44	1.0		mg/Kg	1	7/8/2013 08:44 PM
Cobalt	15	1.0		mg/Kg	1	7/8/2013 08:44 PM
Copper	29	2.0		mg/Kg	1	7/8/2013 08:44 PM
Lead	8.6	1.0		mg/Kg	1	7/8/2013 08:44 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 08:44 PM
Nickel	67	1.0		mg/Kg	1	7/8/2013 08:44 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 08:44 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 08:44 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 08:44 PM
Vanadium	40	1.0		mg/Kg	1	7/8/2013 08:44 PM
Zinc	50	1.0		mg/Kg	1	7/8/2013 08:44 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-034

Client Sample ID: B8-3.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708C	QC Batch: 43340			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43343			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 08:50 PM
Arsenic	6.6	1.0		mg/Kg	1	7/8/2013 08:50 PM
Barium	170	1.0		mg/Kg	1	7/8/2013 08:50 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 08:50 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 08:50 PM
Chromium	20	1.0		mg/Kg	1	7/8/2013 08:50 PM
Cobalt	13	1.0		mg/Kg	1	7/8/2013 08:50 PM
Copper	38	2.0		mg/Kg	1	7/8/2013 08:50 PM
Lead	9.9	1.0		mg/Kg	1	7/8/2013 08:50 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 08:50 PM
Nickel	31	1.0		mg/Kg	1	7/8/2013 08:50 PM
Selenium	ND	1.0		mg/Kg	1	7/8/2013 08:50 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 08:50 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 08:50 PM
Vanadium	27	1.0		mg/Kg	1	7/8/2013 08:50 PM
Zinc	56	1.0		mg/Kg	1	7/8/2013 08:50 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-035

Client Sample ID: B8-22.5
Collection Date: 7/1/2013
Matrix: SOIL

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
MERCURY BY COLD VAPOR TECHNIQUE						
	EPA 7471			**EPA 7471A**		
RunID: AA1_130708C	QC Batch: 43340			PrepDate:	7/2/2013	Analyst: **LCC**
Mercury	ND	0.10		mg/Kg	1	7/8/2013
ICP METALS						
	EPA 3050B			**EPA 6010B**		
RunID: ICP2_130708A	QC Batch: 43343			PrepDate:	7/2/2013	Analyst: **WLS**
Antimony	ND	2.0		mg/Kg	1	7/8/2013 08:57 PM
Arsenic	2.7	1.0		mg/Kg	1	7/8/2013 08:57 PM
Barium	120	1.0		mg/Kg	1	7/8/2013 08:57 PM
Beryllium	ND	1.0		mg/Kg	1	7/8/2013 08:57 PM
Cadmium	ND	1.0		mg/Kg	1	7/8/2013 08:57 PM
Chromium	110	1.0		mg/Kg	1	7/8/2013 08:57 PM
Cobalt	20	1.0		mg/Kg	1	7/8/2013 08:57 PM
Copper	35	2.0		mg/Kg	1	7/8/2013 08:57 PM
Lead	4.8	1.0		mg/Kg	1	7/8/2013 08:57 PM
Molybdenum	ND	1.0		mg/Kg	1	7/8/2013 08:57 PM
Nickel	130	1.0		mg/Kg	1	7/8/2013 08:57 PM
Selenium	1.2	1.0		mg/Kg	1	7/8/2013 08:57 PM
Silver	ND	1.0		mg/Kg	1	7/8/2013 08:57 PM
Thallium	ND	1.0		mg/Kg	1	7/8/2013 08:57 PM
Vanadium	54	1.0		mg/Kg	1	7/8/2013 08:57 PM
Zinc	45	1.0		mg/Kg	1	7/8/2013 08:57 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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ANALYTICAL RESULTS

Advanced Technology Laboratories, Inc.

Print Date: *10-Jul-13*

CLIENT: Geocon Consultants, Inc.
Lab Order: N010508
Project: Belmont Sinkhole, E8560-02-48
Lab ID: N010508-036

Client Sample ID: EB
Collection Date:
Matrix: WATER

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS						
	EPA 3010A			**EPA 6010B**		
RunID: ICP2_130703C	QC Batch: 43351				PrepDate: 7/3/2013	Analyst: **WLS**
Lead	ND	0.0050		mg/L	1	7/3/2013 03:05 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

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CLIENT: Geocon Consultants, Inc.
Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB1-43342** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **PBS** Batch ID: **43342** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606125**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.246	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	ND	1.0									
Chromium	ND	1.0									
Cobalt	ND	1.0									
Copper	ND	2.0									
Lead	ND	1.0									
Molybdenum	ND	1.0									
Nickel	ND	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	0.827	1.0									

Sample ID: **LCS-43342** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **LCSS** Batch ID: **43342** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606126**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	50.060	2.0	49.98	0	100	80	120				
Arsenic	47.066	1.0	49.98	0	94.2	80	120				
Barium	48.606	1.0	49.98	0	97.3	80	120				
Beryllium	46.421	1.0	49.98	0	92.9	80	120				
Cadmium	45.853	1.0	49.98	0	91.8	80	120				
Chromium	47.628	1.0	49.98	0	95.3	80	120				
Cobalt	45.567	1.0	49.98	0	91.2	80	120				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

Advanced Technology Laboratories, Inc.
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CLIENT: Geocon Consultants, Inc.
Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-43342** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **LCSS** Batch ID: **43342** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606126**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Copper	48.153	2.0	49.98	0	96.4	80	120				
Lead	47.776	1.0	49.98	0	95.6	80	120				
Molybdenum	47.908	1.0	49.98	0	95.9	80	120				
Nickel	44.134	1.0	49.98	0	88.3	80	120				
Selenium	41.197	1.0	49.98	0	82.4	80	120				
Silver	45.753	1.0	49.98	0	91.6	80	120				
Thallium	45.413	1.0	49.98	0	90.9	80	120				
Vanadium	48.523	1.0	49.98	0	97.1	80	120				
Zinc	44.821	1.0	49.98	0	89.7	80	120				

Sample ID: **N010508-001A-DUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **ZZZZZZ** Batch ID: **43342** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606128**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0						0	0	20	
Arsenic	3.790	1.0						3.374	11.6	20	
Barium	132.830	1.0						113.5	15.7	20	
Beryllium	0.350	1.0						0.3221	0	20	
Cadmium	ND	1.0						0	0	20	
Chromium	30.318	1.0						25.17	18.5	20	
Cobalt	9.498	1.0						7.832	19.2	20	
Copper	19.529	2.0						16.16	18.9	20	
Lead	10.369	1.0						8.068	25.0	20	R
Molybdenum	ND	1.0						0	0	20	
Nickel	39.488	1.0						31.14	23.6	20	R
Selenium	0.517	1.0						0.4694	0	20	
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	31.175	1.0						26.13	17.6	20	
Zinc	40.424	1.0						34.26	16.5	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

Advanced Technology Laboratories, Inc.
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CLIENT: Geocon Consultants, Inc.
Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **N010508-001A-MS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **ZZZZZZ** Batch ID: **43342** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606131**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	19.451	2.0	49.83	0	39.0	75	125				S
Arsenic	44.547	1.0	49.83	3.374	82.6	75	125				
Barium	183.807	1.0	49.83	113.5	141	75	125				S
Beryllium	42.150	1.0	49.83	0.3221	83.9	75	125				
Cadmium	38.279	1.0	49.83	0	76.8	75	125				
Chromium	71.864	1.0	49.83	25.17	93.7	75	125				
Cobalt	49.660	1.0	49.83	7.832	83.9	75	125				
Copper	64.325	2.0	49.83	16.16	96.7	75	125				
Lead	48.846	1.0	49.83	8.068	81.8	75	125				
Molybdenum	36.428	1.0	49.83	0	73.1	75	125				S
Nickel	77.998	1.0	49.83	31.14	94.0	75	125				
Selenium	36.892	1.0	49.83	0.4694	73.1	75	125				S
Silver	39.042	1.0	49.83	0	78.4	75	125				
Thallium	36.045	1.0	49.83	0	72.3	75	125				S
Vanadium	76.438	1.0	49.83	26.13	101	75	125				
Zinc	77.927	1.0	49.83	34.26	87.6	75	125				

Sample ID: **N010508-001A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **ZZZZZZ** Batch ID: **43342** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606132**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	17.025	2.0	49.93	0	34.1	75	125	19.45	13.3	20	S
Arsenic	43.278	1.0	49.93	3.374	79.9	75	125	44.55	2.89	20	
Barium	187.154	1.0	49.93	113.5	148	75	125	183.8	1.80	20	S
Beryllium	41.725	1.0	49.93	0.3221	82.9	75	125	42.15	1.01	20	
Cadmium	37.905	1.0	49.93	0	75.9	75	125	38.28	0.981	20	
Chromium	73.959	1.0	49.93	25.17	97.7	75	125	71.86	2.87	20	
Cobalt	48.789	1.0	49.93	7.832	82.0	75	125	49.66	1.77	20	
Copper	63.413	2.0	49.93	16.16	94.7	75	125	64.33	1.43	20	
Lead	47.904	1.0	49.93	8.068	79.8	75	125	48.85	1.95	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

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CLIENT: Geocon Consultants, Inc.
Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **N010508-001A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **ZZZZZZ** Batch ID: **43342** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606132**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	35.311	1.0	49.93	0	70.7	75	125	36.43	3.11	20	S
Nickel	76.642	1.0	49.93	31.14	91.1	75	125	78.00	1.75	20	
Selenium	36.549	1.0	49.93	0.4694	72.3	75	125	36.89	0.934	20	S
Silver	37.502	1.0	49.93	0	75.1	75	125	39.04	4.02	20	
Thallium	35.797	1.0	49.93	0	71.7	75	125	36.04	0.690	20	S
Vanadium	81.110	1.0	49.93	26.13	110	75	125	76.44	5.93	20	
Zinc	76.460	1.0	49.93	34.26	84.5	75	125	77.93	1.90	20	

Sample ID: **MB2-43342** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **PBS** Batch ID: **43342** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606146**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.351	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	ND	1.0									
Chromium	ND	1.0									
Cobalt	ND	1.0									
Copper	ND	2.0									
Lead	ND	1.0									
Molybdenum	0.460	1.0									
Nickel	ND	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	0.616	1.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Advanced Technology Laboratories, Inc.
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CLIENT: Geocon Consultants, Inc.
Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **N010508-012A-DUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **ZZZZZZ** Batch ID: **43342** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606148**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0						0	0	20	
Arsenic	8.302	1.0						7.763	6.71	20	
Barium	93.353	1.0						96.37	3.18	20	
Beryllium	0.465	1.0						0.4418	0	20	
Cadmium	ND	1.0						0	0	20	
Chromium	25.546	1.0						24.01	6.18	20	
Cobalt	14.927	1.0						12.49	17.8	20	
Copper	39.434	2.0						38.74	1.78	20	
Lead	12.704	1.0						12.02	5.53	20	
Molybdenum	ND	1.0						0	0	20	
Nickel	37.898	1.0						39.00	2.87	20	
Selenium	1.362	1.0						1.094	21.8	20	R
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	25.198	1.0						24.45	2.99	20	
Zinc	66.357	1.0						64.39	3.01	20	

Sample ID: **N010508-012A-MS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **ZZZZZZ** Batch ID: **43342** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606151**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	22.750	2.0	49.95	0	45.5	75	125				S
Arsenic	48.525	1.0	49.95	7.763	81.6	75	125				
Barium	157.942	1.0	49.95	96.37	123	75	125				
Beryllium	39.244	1.0	49.95	0.4418	77.7	75	125				
Cadmium	37.485	1.0	49.95	0	75.0	75	125				
Chromium	66.061	1.0	49.95	24.01	84.2	75	125				
Cobalt	51.340	1.0	49.95	12.49	77.8	75	125				
Copper	80.992	2.0	49.95	38.74	84.6	75	125				
Lead	50.382	1.0	49.95	12.02	76.8	75	125				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

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CLIENT: Geocon Consultants, Inc.
Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **N010508-012A-MS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **ZZZZZZ** Batch ID: **43342** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606151**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	36.683	1.0	49.95	0	73.4	75	125				S
Nickel	78.920	1.0	49.95	39.00	79.9	75	125				
Selenium	37.226	1.0	49.95	1.094	72.3	75	125				S
Silver	37.393	1.0	49.95	0	74.9	75	125				S
Thallium	34.445	1.0	49.95	0	69.0	75	125				S
Vanadium	69.746	1.0	49.95	24.45	90.7	75	125				
Zinc	106.858	1.0	49.95	64.39	85.0	75	125				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

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CLIENT: Geocon Consultants, Inc.
Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **MB1-43343** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **PBS** Batch ID: **43343** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606816**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.236	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	ND	1.0									
Chromium	ND	1.0									
Cobalt	ND	1.0									
Copper	ND	2.0									
Lead	ND	1.0									
Molybdenum	ND	1.0									
Nickel	ND	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	0.239	1.0									

Sample ID: **LCS-43343** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **LCSS** Batch ID: **43343** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606823**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	49.319	2.0	49.95	0	98.7	80	120				
Arsenic	48.259	1.0	49.95	0	96.6	80	120				
Barium	48.533	1.0	49.95	0	97.2	80	120				
Beryllium	47.547	1.0	49.95	0	95.2	80	120				
Cadmium	47.852	1.0	49.95	0	95.8	80	120				
Chromium	47.644	1.0	49.95	0	95.4	80	120				
Cobalt	46.716	1.0	49.95	0	93.5	80	120				
Copper	48.271	2.0	49.95	0	96.6	80	120				
Lead	49.455	1.0	49.95	0	99.0	80	120				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

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CLIENT: Geocon Consultants, Inc.
Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **LCS-43343** SampType: **LCS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **LCSS** Batch ID: **43343** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606823**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	49.393	1.0	49.95	0	98.9	80	120				
Nickel	45.961	1.0	49.95	0	92.0	80	120				
Selenium	43.504	1.0	49.95	0	87.1	80	120				
Silver	46.892	1.0	49.95	0	93.9	80	120				
Thallium	46.980	1.0	49.95	0	94.1	80	120				
Vanadium	48.809	1.0	49.95	0	97.7	80	120				
Zinc	47.219	1.0	49.95	0	94.5	80	120				

Sample ID: **N010508-021A-DUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **ZZZZZZ** Batch ID: **43343** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606827**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0						0	0	20	
Arsenic	7.130	1.0						7.351	3.05	20	
Barium	136.506	1.0						107.0	24.2	20	R
Beryllium	0.395	1.0						0.4032	0	20	
Cadmium	ND	1.0						0	0	20	
Chromium	39.493	1.0						39.34	0.390	20	
Cobalt	15.409	1.0						14.24	7.88	20	
Copper	37.931	2.0						38.16	0.594	20	
Lead	12.461	1.0						12.09	2.98	20	
Molybdenum	ND	1.0						0	0	20	
Nickel	59.814	1.0						58.22	2.70	20	
Selenium	1.236	1.0						1.248	0.942	20	
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	28.606	1.0						27.87	2.63	20	
Zinc	68.606	1.0						69.57	1.40	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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CLIENT: Geocon Consultants, Inc.
Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **N010508-021A-MS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **ZZZZZZ** Batch ID: **43343** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606829**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	21.137	2.0	49.85	0	42.4	75	125				S
Arsenic	44.927	1.0	49.85	7.351	75.4	75	125				
Barium	161.563	1.0	49.85	107.0	109	75	125				
Beryllium	36.454	1.0	49.85	0.4032	72.3	75	125				S
Cadmium	34.499	1.0	49.85	0	69.2	75	125				S
Chromium	65.643	1.0	49.85	39.34	52.8	75	125				S
Cobalt	49.186	1.0	49.85	14.24	70.1	75	125				S
Copper	76.342	2.0	49.85	38.16	76.6	75	125				
Lead	46.719	1.0	49.85	12.09	69.5	75	125				S
Molybdenum	34.313	1.0	49.85	0	68.8	75	125				S
Nickel	81.925	1.0	49.85	58.22	47.5	75	125				S
Selenium	34.710	1.0	49.85	1.248	67.1	75	125				S
Silver	34.998	1.0	49.85	0	70.2	75	125				S
Thallium	32.061	1.0	49.85	0	64.3	75	125				S
Vanadium	65.090	1.0	49.85	27.87	74.7	75	125				S
Zinc	97.409	1.0	49.85	69.57	55.8	75	125				S

Sample ID: **N010508-021A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **ZZZZZZ** Batch ID: **43343** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606830**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	22.338	2.0	49.90	0	44.8	75	125	21.14	5.53	20	S
Arsenic	44.873	1.0	49.90	7.351	75.2	75	125	44.93	0.122	20	
Barium	145.649	1.0	49.90	107.0	77.5	75	125	161.6	10.4	20	
Beryllium	37.459	1.0	49.90	0.4032	74.3	75	125	36.45	2.72	20	S
Cadmium	35.741	1.0	49.90	0	71.6	75	125	34.50	3.54	20	S
Chromium	82.543	1.0	49.90	39.34	86.6	75	125	65.64	22.8	20	R
Cobalt	48.795	1.0	49.90	14.24	69.2	75	125	49.19	0.797	20	S
Copper	75.366	2.0	49.90	38.16	74.6	75	125	76.34	1.29	20	S
Lead	46.553	1.0	49.90	12.09	69.1	75	125	46.72	0.356	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **N010508-021A-MSD** SampType: **MSD** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **ZZZZZZ** Batch ID: **43343** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606830**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	35.608	1.0	49.90	0	71.4	75	125	34.31	3.70	20	S
Nickel	96.611	1.0	49.90	58.22	76.9	75	125	81.93	16.5	20	
Selenium	35.650	1.0	49.90	1.248	68.9	75	125	34.71	2.67	20	S
Silver	35.811	1.0	49.90	0	71.8	75	125	35.00	2.30	20	S
Thallium	33.039	1.0	49.90	0	66.2	75	125	32.06	3.01	20	S
Vanadium	67.855	1.0	49.90	27.87	80.1	75	125	65.09	4.16	20	
Zinc	95.665	1.0	49.90	69.57	52.3	75	125	97.41	1.81	20	S

Sample ID: **MB2-43343** SampType: **MBLK** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **PBS** Batch ID: **43343** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606842**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.169	2.0									
Arsenic	ND	1.0									
Barium	ND	1.0									
Beryllium	ND	1.0									
Cadmium	ND	1.0									
Chromium	ND	1.0									
Cobalt	ND	1.0									
Copper	ND	2.0									
Lead	ND	1.0									
Molybdenum	ND	1.0									
Nickel	ND	1.0									
Selenium	ND	1.0									
Silver	ND	1.0									
Thallium	ND	1.0									
Vanadium	ND	1.0									
Zinc	ND	1.0									

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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CLIENT: Geocon Consultants, Inc.
Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **N010508-032A-DUP** SampType: **DUP** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **ZZZZZZ** Batch ID: **43343** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606844**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	2.0						0	0	20	
Arsenic	2.717	1.0						2.071	26.9	20	R
Barium	152.753	1.0						201.5	27.5	20	R
Beryllium	ND	1.0						0	0	20	
Cadmium	ND	1.0						0	0	20	
Chromium	20.390	1.0						20.45	0.273	20	
Cobalt	7.789	1.0						8.122	4.18	20	
Copper	10.847	2.0						10.88	0.296	20	
Lead	9.369	1.0						11.79	22.9	20	R
Molybdenum	ND	1.0						0	0	20	
Nickel	35.966	1.0						36.65	1.89	20	
Selenium	0.624	1.0						0.8897	0	20	
Silver	ND	1.0						0	0	20	
Thallium	ND	1.0						0	0	20	
Vanadium	29.312	1.0						31.49	7.17	20	
Zinc	59.510	1.0						66.77	11.5	20	

Sample ID: **N010508-032A-MS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **ZZZZZZ** Batch ID: **43343** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606845**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	15.055	2.0	50.08	0	30.1	75	125				S
Arsenic	46.089	1.0	50.08	2.071	87.9	75	125				
Barium	231.144	1.0	50.08	201.5	59.3	75	125				S
Beryllium	44.524	1.0	50.08	0	88.9	75	125				
Cadmium	41.022	1.0	50.08	0	81.9	75	125				
Chromium	70.887	1.0	50.08	20.45	101	75	125				
Cobalt	51.545	1.0	50.08	8.122	86.7	75	125				
Copper	61.361	2.0	50.08	10.88	101	75	125				
Lead	51.049	1.0	50.08	11.79	78.4	75	125				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

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CLIENT: Geocon Consultants, Inc.
Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_S

Sample ID: **N010508-032A-MS** SampType: **MS** TestCode: **6010_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89481**
Client ID: **ZZZZZZ** Batch ID: **43343** TestNo: **EPA 6010B** **EPA 3050B** Analysis Date: **7/8/2013** SeqNo: **1606845**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	40.779	1.0	50.08	0	81.4	75	125				
Nickel	86.960	1.0	50.08	36.65	100	75	125				
Selenium	40.340	1.0	50.08	0.8897	78.8	75	125				
Silver	40.868	1.0	50.08	0	81.6	75	125				
Thallium	38.287	1.0	50.08	0	76.5	75	125				
Vanadium	82.118	1.0	50.08	31.49	101	75	125				
Zinc	103.159	1.0	50.08	66.77	72.7	75	125				S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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CLIENT: Geocon Consultants, Inc.
Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_W

Sample ID: **LCS-43351** SampType: **LCS** TestCode: **6010_W** Units: **mg/L** Prep Date: **7/3/2013** RunNo: **89462**
Client ID: **LCSW** Batch ID: **43351** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **7/3/2013** SeqNo: **1605065**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.464	0.010	0.5000	0	92.9	85	115				
Barium	0.496	0.0030	0.5000	0	99.1	85	115				
Cadmium	0.483	0.0030	0.5000	0.0004390	96.4	85	115				
Chromium	0.483	0.0030	0.5000	0	96.7	85	115				
Lead	0.479	0.0050	0.5000	0	95.8	85	115				
Selenium	0.438	0.010	0.5000	0	87.6	85	115				
Silver	0.500	0.0030	0.5000	0	100	85	115				

Sample ID: **N010509-003A-MS** SampType: **MS** TestCode: **6010_W** Units: **mg/L** Prep Date: **7/3/2013** RunNo: **89462**
Client ID: **ZZZZZZ** Batch ID: **43351** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **7/3/2013** SeqNo: **1605070**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.483	0.010	0.5000	0.01733	93.1	75	125				
Barium	0.690	0.0030	0.5000	0.2140	95.2	75	125				
Cadmium	0.482	0.0030	0.5000	0	96.4	75	125				
Chromium	0.482	0.0030	0.5000	0.008130	94.9	75	125				
Lead	0.414	0.0050	0.5000	0	82.7	75	125				
Selenium	0.454	0.010	0.5000	0	90.8	75	125				
Silver	0.521	0.0030	0.5000	0.0005742	104	75	125				

Sample ID: **N010509-003A-MSD** SampType: **MSD** TestCode: **6010_W** Units: **mg/L** Prep Date: **7/3/2013** RunNo: **89462**
Client ID: **ZZZZZZ** Batch ID: **43351** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **7/3/2013** SeqNo: **1605077**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.550	0.010	0.5000	0.01733	107	75	125	0.4828	13.1	20	
Barium	0.693	0.0030	0.5000	0.2140	95.8	75	125	0.6899	0.423	20	
Cadmium	0.489	0.0030	0.5000	0	97.7	75	125	0.4821	1.36	20	
Chromium	0.483	0.0030	0.5000	0.008130	95.0	75	125	0.4824	0.100	20	
Lead	0.462	0.0050	0.5000	0	92.5	75	125	0.4136	11.1	20	
Selenium	0.534	0.010	0.5000	0	107	75	125	0.4539	16.3	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

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CLIENT: Geocon Consultants, Inc.
Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_W

Sample ID: **N010509-003A-MSD** SampType: **MSD** TestCode: **6010_W** Units: **mg/L** Prep Date: **7/3/2013** RunNo: **89462**
Client ID: **ZZZZZZ** Batch ID: **43351** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **7/3/2013** SeqNo: **1605077**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	0.533	0.0030	0.5000	0.0005742	106	75	125	0.5214	2.10	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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Work Order: N010508
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ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WD

Sample ID: **MB-43368** SampType: **MBLK** TestCode: **6010_WD** Units: **mg/L** Prep Date: **7/8/2013** RunNo: **89501**
Client ID: **PBW** Batch ID: **43368** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **7/9/2013** SeqNo: **1608163**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.010									
Arsenic	ND	0.010									
Barium	0.000474	0.0030									
Beryllium	ND	0.0030									
Cadmium	0.000438	0.0030									
Chromium	ND	0.0030									
Cobalt	ND	0.0030									
Copper	ND	0.0050									
Lead	ND	0.010									
Molybdenum	0.001	0.0050									
Nickel	ND	0.0050									
Selenium	ND	0.010									
Silver	ND	0.0030									
Thallium	ND	0.015									
Vanadium	ND	0.0030									
Zinc	0.001	0.010									

Sample ID: **LCS-43368** SampType: **LCS** TestCode: **6010_WD** Units: **mg/L** Prep Date: **7/8/2013** RunNo: **89501**
Client ID: **LCSW** Batch ID: **43368** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **7/9/2013** SeqNo: **1608164**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.502	0.010	0.5000	0	100	85	115				
Arsenic	0.502	0.010	0.5000	0	100	85	115				
Barium	0.518	0.0030	0.5000	0	104	85	115				
Beryllium	0.514	0.0030	0.5000	0	103	85	115				
Cadmium	0.516	0.0030	0.5000	0	103	85	115				
Chromium	0.504	0.0030	0.5000	0	101	85	115				
Cobalt	0.508	0.0030	0.5000	0	102	85	115				
Copper	0.519	0.0050	0.5000	0	104	85	115				
Lead	0.515	0.010	0.5000	0	103	85	115				

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

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Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WD

Sample ID: **LCS-43368** SampType: **LCS** TestCode: **6010_WD** Units: **mg/L** Prep Date: **7/8/2013** RunNo: **89501**
Client ID: **LCSW** Batch ID: **43368** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **7/9/2013** SeqNo: **1608164**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	0.519	0.0050	0.5000	0	104	85	115				
Nickel	0.510	0.0050	0.5000	0	102	85	115				
Selenium	0.477	0.010	0.5000	0	95.3	85	115				
Silver	0.521	0.0030	0.5000	0	104	85	115				
Thallium	0.513	0.015	0.5000	0	103	85	115				
Vanadium	0.521	0.0030	0.5000	0	104	85	115				
Zinc	0.507	0.010	0.5000	0	101	85	115				

Sample ID: **N010508-010B-DUP** SampType: **DUP** TestCode: **6010_WD** Units: **mg/L** Prep Date: **7/8/2013** RunNo: **89501**
Client ID: **ZZZZZZ** Batch ID: **43368** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **7/9/2013** SeqNo: **1608166**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.010						0	0	20	
Arsenic	0.009	0.010						0.006707	0	20	
Barium	0.112	0.0030						0.1104	1.50	20	
Beryllium	ND	0.0030						0	0	20	
Cadmium	ND	0.0030						0	0	20	
Chromium	0.005	0.0030						0.005024	0.686	20	
Cobalt	ND	0.0030						0	0	20	
Copper	0.020	0.0050						0.01992	0.352	20	
Lead	ND	0.010						0	0	20	
Molybdenum	0.002	0.0050						0.002618	0	20	
Nickel	ND	0.0050						0	0	20	
Selenium	ND	0.010						0	0	20	
Silver	0.005	0.0030						0.005330	0.760	20	
Thallium	ND	0.015						0	0	20	
Vanadium	0.002	0.0030						0.001645	0	20	
Zinc	0.010	0.010						0.009172	0	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WD

Sample ID: **N010508-010B-MS** SampType: **MS** TestCode: **6010_WD** Units: **mg/L** Prep Date: **7/8/2013** RunNo: **89501**
Client ID: **ZZZZZZ** Batch ID: **43368** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **7/9/2013** SeqNo: **1608169**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.509	0.010	0.5000	0	102	75	125				
Arsenic	0.535	0.010	0.5000	0.006707	106	75	125				
Barium	0.616	0.0030	0.5000	0.1104	101	75	125				
Beryllium	0.514	0.0030	0.5000	0	103	75	125				
Cadmium	0.501	0.0030	0.5000	0	100	75	125				
Chromium	0.499	0.0030	0.5000	0.005024	98.7	75	125				
Cobalt	0.490	0.0030	0.5000	0	98.1	75	125				
Copper	0.556	0.0050	0.5000	0.01992	107	75	125				
Lead	0.490	0.010	0.5000	0	97.9	75	125				
Molybdenum	0.524	0.0050	0.5000	0.002618	104	75	125				
Nickel	0.493	0.0050	0.5000	0	98.6	75	125				
Selenium	0.489	0.010	0.5000	0	97.9	75	125				
Silver	0.551	0.0030	0.5000	0.005330	109	75	125				
Thallium	0.481	0.015	0.5000	0	96.3	75	125				
Vanadium	0.524	0.0030	0.5000	0.001645	104	90	113				
Zinc	0.502	0.010	0.5000	0.009172	98.5	64	125				

Sample ID: **N010508-010B-MSD** SampType: **MSD** TestCode: **6010_WD** Units: **mg/L** Prep Date: **7/8/2013** RunNo: **89501**
Client ID: **ZZZZZZ** Batch ID: **43368** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **7/9/2013** SeqNo: **1608170**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	0.500	0.010	0.5000	0	100	75	125	0.5089	1.77	20	
Arsenic	0.527	0.010	0.5000	0.006707	104	75	125	0.5346	1.35	20	
Barium	0.611	0.0030	0.5000	0.1104	100	75	125	0.6155	0.703	20	
Beryllium	0.508	0.0030	0.5000	0	102	75	125	0.5136	1.13	20	
Cadmium	0.493	0.0030	0.5000	0	98.7	75	125	0.5007	1.48	20	
Chromium	0.493	0.0030	0.5000	0.005024	97.6	75	125	0.4987	1.19	20	
Cobalt	0.484	0.0030	0.5000	0	96.7	75	125	0.4904	1.42	20	
Copper	0.550	0.0050	0.5000	0.01992	106	75	125	0.5556	1.01	20	
Lead	0.483	0.010	0.5000	0	96.6	75	125	0.4897	1.38	20	

Qualifiers:

B Analyte detected in the associated Method Blank
ND Not Detected at the Reporting Limit
DO Surrogate Diluted Out
E Value above quantitation range
R RPD outside accepted recovery limits
Calculations are based on raw values
H Holding times for preparation or analysis exceeded
S Spike/Surrogate outside of limits due to matrix interference

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Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_WD

Sample ID: **N010508-010B-MSD** SampType: **MSD** TestCode: **6010_WD** Units: **mg/L** Prep Date: **7/8/2013** RunNo: **89501**
Client ID: **ZZZZZZ** Batch ID: **43368** TestNo: **EPA 6010B** **EPA 3010A** Analysis Date: **7/9/2013** SeqNo: **1608170**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Molybdenum	0.518	0.0050	0.5000	0.002618	103	75	125	0.5238	1.02	20	
Nickel	0.486	0.0050	0.5000	0	97.2	75	125	0.4928	1.39	20	
Selenium	0.485	0.010	0.5000	0	97.0	75	125	0.4895	0.921	20	
Silver	0.545	0.0030	0.5000	0.005330	108	75	125	0.5505	1.02	20	
Thallium	0.477	0.015	0.5000	0	95.3	75	125	0.4814	0.982	20	
Vanadium	0.518	0.0030	0.5000	0.001645	103	90	113	0.5241	1.20	20	
Zinc	0.495	0.010	1.000	0.009172	48.6	64	125	0.5017	1.31	20	S

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 7470_W_DISS

Sample ID: **MB-43348** SampType: **MBLK** TestCode: **7470_W_DIS** Units: **µg/L** Prep Date: **7/3/2013** RunNo: **89476**
Client ID: **PBW** Batch ID: **43348** TestNo: **EPA 7470A** Analysis Date: **7/3/2013** SeqNo: **1605428**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.20									

Sample ID: **N010508-010B-MS** SampType: **MS** TestCode: **7470_W_DIS** Units: **µg/L** Prep Date: **7/3/2013** RunNo: **89476**
Client ID: **ZZZZZZ** Batch ID: **43348** TestNo: **EPA 7470A** Analysis Date: **7/3/2013** SeqNo: **1605430**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	5.425	0.20	5.000	0	108	75	125				

Sample ID: **N010508-010B-MSD** SampType: **MSD** TestCode: **7470_W_DIS** Units: **µg/L** Prep Date: **7/3/2013** RunNo: **89476**
Client ID: **ZZZZZZ** Batch ID: **43348** TestNo: **EPA 7470A** Analysis Date: **7/3/2013** SeqNo: **1605431**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	5.147	0.20	5.000	0	103	75	125	5.425	5.25	20	

Sample ID: **LCS-43348** SampType: **LCS** TestCode: **7470_W_DIS** Units: **µg/L** Prep Date: **7/3/2013** RunNo: **89476**
Client ID: **LCSW** Batch ID: **43348** TestNo: **EPA 7470A** Analysis Date: **7/3/2013** SeqNo: **1605451**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	5.155	0.20	5.000	0	103	85	115				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **LCS-43338** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89477**
Client ID: **LCSS** Batch ID: **43338** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605482**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.435	0.10	0.4167	0	104	80	120				

Sample ID: **MB1-43338** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89477**
Client ID: **PBS** Batch ID: **43338** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605484**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **MB2-43338** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89477**
Client ID: **PBS** Batch ID: **43338** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605486**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **N010508-001A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89477**
Client ID: **ZZZZZZ** Batch ID: **43338** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605489**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10						0	0	20	

Sample ID: **N010508-001A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89477**
Client ID: **ZZZZZZ** Batch ID: **43338** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605490**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.454	0.10	0.4167	0	109	75	125				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **N010508-001A-MSD** SampType: **MSD** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89477**
Client ID: **ZZZZZZ** Batch ID: **43338** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605491**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.482	0.10	0.4167	0	116	75	125	0.4544	5.86	20	

Sample ID: **N010508-012A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89477**
Client ID: **ZZZZZZ** Batch ID: **43338** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605502**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.047	0.10						0.05559	0	20	

Sample ID: **N010508-012A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89477**
Client ID: **ZZZZZZ** Batch ID: **43338** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605503**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.491	0.10	0.4167	0.05559	104	75	125				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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CLIENT: Geocon Consultants, Inc.
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ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **LCS-43340** SampType: **LCS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89478**
Client ID: **LCSS** Batch ID: **43340** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605544**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.437	0.10	0.4167	0	105	80	120				

Sample ID: **MB1-43340** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89478**
Client ID: **PBS** Batch ID: **43340** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605546**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **MB2-43340** SampType: **MBLK** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89478**
Client ID: **PBS** Batch ID: **43340** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605548**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10									

Sample ID: **N010508-022A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89478**
Client ID: **ZZZZZZ** Batch ID: **43340** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605575**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.10						0	0	20	

Sample ID: **N010508-022A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89478**
Client ID: **ZZZZZZ** Batch ID: **43340** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605576**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.474	0.10	0.4167	0	114	75	125				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

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ANALYTICAL QC SUMMARY REPORT

TestCode: 7471_S

Sample ID: **N010508-022A-MSD** SampType: **MSD** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89478**
Client ID: **ZZZZZZ** Batch ID: **43340** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605577**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.469	0.10	0.4167	0	113	75	125	0.4739	1.03	20	

Sample ID: **N010508-033A-DUP** SampType: **DUP** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89478**
Client ID: **ZZZZZZ** Batch ID: **43340** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605588**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.050	0.10						0.03921	0	20	

Sample ID: **N010508-033A-MS** SampType: **MS** TestCode: **7471_S** Units: **mg/Kg** Prep Date: **7/2/2013** RunNo: **89478**
Client ID: **ZZZZZZ** Batch ID: **43340** TestNo: **EPA 7471A** **EPA 7471** Analysis Date: **7/8/2013** SeqNo: **1605589**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.514	0.10	0.4167	0.03921	114	75	125				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Advanced Technology Laboratories, Inc.
3151 W. Post Rd Las Vegas, NV 89118 Tel: 702-307-2659 Fax: 702-307-2691

CHAIN OF CUSTODY RECORD

ADVANCED TECHNOLOGY LABORATORIES
3151 W. Post Road, Las Vegas, NV 89118
Tel: (702) 307-2659 • Fax: (702) 307-2691

P.O. #: _____ Quote #: _____
Logged By: HSG Date: 7/2/13

NOTE: Please include your Quote No. to ensure proper pricing of your project.

FOR LABORATORY USE ONLY

Method of Transport
☐ Client ☐ ATL
☐ FedEx ☐ OnTrac
☑ GSO
☐ Other: _____

Sample Condition Upon Receipt 18.2°C
1. CHILLED IR#1 Y ☐ N ☐
2. HEADSPACE (VOA) Y ☐ N ☐
3. CONTAINER INTACT Y ☐ N ☐
4. SEALED Y ☐ N ☐
5. # OF SPLS MATCH COC Y ☐ N ☐
6. PRESERVED Y ☐ N ☐

Client: GEOCON
Attention: L. BEADLE
Address: 6671 BRISA ST
City: LIVERMORE State: CA Zip Code: 94550
Tel: 925-371-5900
Fax: " " 5915

Project Name: BELMONT SINKHOLE Project #: E8560-02-48 Sampler: D. WATTS (Signature) Watts

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Watts	7/1/13	1900	GSO	7/1/13	1900
			Holobrin	7/2/13	8:57

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter: Watts 7/1/13
Print Name Date
D. WATTS
Signature

Send Report To:
Attn:
Co: SEE "CLIENT"
Addr:
City: State: Zip:

Bill To:
Attn:
Co:
Addr:
City: State: Zip:

Special Instructions/Comments:
B2/6 OTW ≈ 14-16'
DO NOT COMPOSITE SAMPLE SETS
LAB to FILTER GW SAMPLES
*RUN EQUIP BLANK (EB) FOR total Pb

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample :$2.00 / sample /mo (after 45 days)
- Records: $1 /ATL workorder /mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

QA/QC: RTNE ☐ CT ☑ Legal ☐
SWRCB ☐ Logcode _____
OTHER _____

ITEM	LAB USE ONLY: Batch #: Lab No.	Sample Description: Sample ID / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8021 (BTEX)	8015B (DRO)	TITLE 22 / CAM 17 (6010 / 7000)	SEDIMENT	SOLID	SOIL	DRINKING WATER	GROUND WATER	WASTEWATER	STORMWATER	AQUEOUS	TAT	Container(s) #	Type	PRESERVATION	REMARKS
	N010508	B1-0, 1.5, 3.5 10.5	1 July 13	VAR								X			X						E	4	T P	C	
		B2-0, 2.5, 5.5, 10.5, 16 (GWI)		↓											↓							5	↓		
		B2-GW		1157													X					1	J P		
		B3-0, 1.5, 3.5, 14.5		VAR											X							4	T P		
		B4-0, 1.5, 5.5, 14.5																				4			
		B5-0, 2.5, 3.5 19.5																							
		B6-0, 2.5, 5.5, 19.5		↓											↓								↓		
		B6-GW		1431													X					1	J P		
		B7-0, 2.5, 5.5, 19.5		VAR											X							4	T P		
		B8-0, 1.5, 3.5, 22.5	↓	↓											↓							4	↓		

- TAT starts 8AM the following day if samples received after 5 PM

TAT: ☐ A = Overnight ≤ 24 hrs ☐ B = Emergency Next Workday ☐ C = Critical 2 Workdays ☐ D = Urgent 3 Workdays ☐ E = Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives:
H=HCl N=HNO_3 S=H_2SO_4 C=4°C
Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

Advanced Technology Laboratories, Inc.

Please review the checklist below. Any NO signifies non-compliance. Any non-compliance will be noted and must be understood as having an impact on the quality of the data. All tests will be performed as requested regardless of any compliance issues.

If you have any questions or further instruction, please contact our Project Coordinator at (702) 307-2659.

Cooler Received/Opened On:	7/2/2013	Workorder:	N010508
Rep sample Temp (Deg C):	18.2	IR Gun ID:	1
Temp Blank:	☐ Yes ☑ No		
Carrier name:	Golden State Overnight		
Last 4 digits of Tracking No.:	3149	Packing Material Used:	None
Cooling process:	☐ Ice ☐ Ice Pack ☐ Dry Ice ☐ Other ☑ None		

Sample Receipt Checklist

	Yes	No	Not Present / NA
1. Shipping container/cooler in good condition?	☑	☐	Not Present ☐
2. Custody seals intact, signed, dated on shippping container/cooler?	☐	☐	Not Present ☑
3. Custody seals intact on sample bottles?	☐	☐	Not Present ☑
4. Chain of custody present?	☑	☐	
5. Sampler's name present in COC?	☑	☐	
6. Chain of custody signed when relinquished and received?	☑	☐	
7. Chain of custody agrees with sample labels?	☑	☐	
8. Samples in proper container/bottle?	☑	☐	
9. Sample containers intact?	☑	☐	
10. Sufficient sample volume for indicated test?	☑	☐	
11. All samples received within holding time?	☑	☐	
12. Temperature of rep sample or Temp Blank within acceptable limit?	☐	☐	NA ☑
13. Water - VOA vials have zero headspace?	☐	☐	NA ☑
14. Water - pH acceptable upon receipt? Example: pH > 12 for (CN,S); pH<2 for Metals	☐	☑	NA ☐
15. Did the bottle labels indicate correct preservatives used?	☐	☑	NA ☐
16. Were there Non-Conformance issues at login?	☐	☐	NA ☑
Was Client notified?	☐	☐	NA ☑

Comments: Groundwater samples were lab filtered and was preserved accordingly. Equipment blank pH was adjusted to acceptable pH.

Checklist Completed B HG HSC 7/2/13

Reviewed By: _____

PLEASE PRESS FIRMLY

1 FROM

DATE 7/1/13

COMPANY GETCON

ADDRESS 6671 BRISA ST

ADDRESS

STE/ ROOM

CITY LIVERMORE, CA

ZIP CODE 94550

SENDER NAME D. WATTS

PHONE NUMBER 925-371-3900

2 TO

COMPANY IATL

NAME RECEIVING

PHONE NUMBER 702-307-2691

ADDRESS 3151 W. POST RD.

ADDRESS

STE/ ROOM

CITY LAS VEGAS, NV

ZIP CODE 89115

3 YOUR INTERNAL BILLING REFERENCE WILL APPEAR ON YOUR INVOICE E0560-02-4B

SPECIAL INSTRUCTIONS Conf # 5064256

GSO GOLDEN STATE OVERNIGHT

1-800-322-5555

WWW.GSO.COM

SHIPPING AIR BILL

PACKAGE LABEL

4 PACKAGE INFORMATION

- ☐ LETTER (MAX 8 OZ)
- ☐ PACKAGE (WT) _____
- ☐ DECLARED VALUE $_____
- ☐ COD AMOUNT $_____ (CASH NOT ACCEPTED)

5 DELIVERY SERVICE ☒ PRIORITY OVERNIGHT BY 10:30 AM ☐ EARLY PRIORITY BY 8:00 AM ☐ SATURDAY DELIVERY

*DELIVERY TIMES MAY BE LATER IN SOME AREAS • CONSULT YOUR SERVICE GUIDE OR CALL GOLDEN STATE OVERNIGHT.

6 RELEASE SIGNATURE _____ SIGN TO AUTHORIZE DELIVERY WITHOUT OBTAINING SIGNATURE

7

8 PICK UP INFORMATION _____ TIME DRIVER # ROUTE #

105613149

PEEL OFF HERE

105613149

9 GSO TRACKING NUMBER

July 18, 2013

Luann Beadle
Geocon Consultants, Inc.
6671 Brisa Street
Livermore, CA 94550

TEL: 925-371-5900 Ext 403
FAX: (925) 371-5915

CA-ELAP No.:2676
NV Cert. No.:NV-009222007A

Workorder No.: N010508

RE: Belmont Sinkhole, E8560-02-48

Attention: Luann Beadle

Enclosed are the results for sample(s) received on July 02, 2013 by Advanced Technology Laboratories, Inc. . The sample(s) are tested for the parameters as indicated in the enclosed chain of custody in accordance with the applicable laboratory certifications.

This is an addendum report. Please incorporate with documentation previously submitted.

Thank you for the opportunity to service the needs of your company.

Please feel free to call me at (702) 307-2659 if I can be of further assistance to your company.

Sincerely,

Jose Tenorio Jr.
Laboratory Director

The cover letter is an integral part of this analytical report. This Laboratory Report cannot be reproduced in part or in its entirety without written permission from the client and Advanced Technology Laboratories - Las Vegas.

CLIENT: Geocon Consultants, Inc.
Project: Belmont Sinkhole, E8560-02-48
Lab Order: N010508

CASE NARRATIVE

Analytical Comments for EPA 6010B_STLC:

Dilution was necessary due to matrix.

Advanced Technology Laboratories, Inc.
3151 W. Post Rd Las Vegas, NV 89118 Tel: 702-307-2659 Fax: 702-307-2691

Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *18-Jul-13*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	B3-3.5
Lab Order:	N010508	**Collection Date:**	7/1/2013
Project:	Belmont Sinkhole, E8560-02-48	**Matrix:**	SOIL
Lab ID:	N010508-013		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC						
WET/ EPA 6010B						
RunID: ICP2_130717C	QC Batch: R89617			PrepDate:		Analyst: **CEI**
Chromium	0.057	0.050		mg/L	5	7/17/2013 03:23 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
DO	Surrogate Diluted Out		

Advanced Technology Laboratories, Inc.

3151 W. Post Rd Las Vegas, NV 89118 Tel: 702-307-2659 Fax: 702-307-2691

Advanced Technology Laboratories, Inc.

ANALYTICAL RESULTS

Print Date: *18-Jul-13*

CLIENT:	Geocon Consultants, Inc.	**Client Sample ID:**	B8-22.5
Lab Order:	N010508	**Collection Date:**	7/1/2013
Project:	Belmont Sinkhole, E8560-02-48	**Matrix:**	SOIL
Lab ID:	N010508-035		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
ICP METALS BY STLC						
WET/ EPA 6010B						
RunID: ICP2_130717C	QC Batch: R89617			PrepDate:		Analyst: **CEI**
Chromium	0.59	0.050		mg/L	5	7/17/2013 03:49 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
	S	Spike/Surrogate outside of limits due to matrix interference		Results are wet unless otherwise specified
	DO	Surrogate Diluted Out		

Advanced Technology Laboratories, Inc.

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CLIENT: Geocon Consultants, Inc.
Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_ST

Sample ID: **MB-R89617** SampType: **MBLK** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **89617**
Client ID: **PBS** Batch ID: **R89617** TestNo: **WET/ EPA 60** Analysis Date: **7/17/2013** SeqNo: **1614534**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	ND	0.010									

Sample ID: **LCS-R89617** SampType: **LCS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **89617**
Client ID: **LCSS** Batch ID: **R89617** TestNo: **WET/ EPA 60** Analysis Date: **7/17/2013** SeqNo: **1614535**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.489	0.010	0.5000	0	97.7	85	115				

Sample ID: **MB-43436 STLC** SampType: **MBLK** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **89617**
Client ID: **PBS** Batch ID: **R89617** TestNo: **WET/ EPA 60** Analysis Date: **7/17/2013** SeqNo: **1614536**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.005	0.050									

Sample ID: **N010508-013A-DUP** SampType: **DUP** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **89617**
Client ID: **ZZZZZZ** Batch ID: **R89617** TestNo: **WET/ EPA 60** Analysis Date: **7/17/2013** SeqNo: **1614538**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.057	0.050						0.05726	0.104	20	

Sample ID: **N010508-013A-MS** SampType: **MS** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **89617**
Client ID: **ZZZZZZ** Batch ID: **R89617** TestNo: **WET/ EPA 60** Analysis Date: **7/17/2013** SeqNo: **1614540**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.467	0.050	2.500	0.05726	96.4	75	125				

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Advanced Technology Laboratories, Inc.
3151 W. Post Rd Las Vegas, NV 89118 Tel: 702-307-2659 Fax: 702-307-2691

CLIENT: Geocon Consultants, Inc.
Work Order: N010508
Project: Belmont Sinkhole, E8560-02-48

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010_ST

Sample ID: **N010508-013A-MSD** SampType: **MSD** TestCode: **6010_ST** Units: **mg/L** Prep Date: RunNo: **89617**
Client ID: **ZZZZZZ** Batch ID: **R89617** TestNo: **WET/ EPA 60** Analysis Date: **7/17/2013** SeqNo: **1614541**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	2.467	0.050	2.500	0.05726	96.4	75	125	2.467	0.00136	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits	S	Spike/Surrogate outside of limits due to matrix interference
DO	Surrogate Diluted Out		Calculations are based on raw values		

Advanced Technology Laboratories, Inc.
3151 W. Post Rd Las Vegas, NV 89118 Tel: 702-307-2659 Fax: 702-307-2691

Glen S. Gesmundo

From: Luann Beadle [beadle@geoconinc.com]
Sent: Friday, July 12, 2013 9:33 AM
To: Advanced Technology Labs, Inc.
Cc: keith.fang@dot.ca.gov
Subject: Lab Order N010508 Belmont Sinkhole

Hi ATL,

Please run WET chromium on the following two samples under a regular TAT:

N010508-013A	B3-3.5	Chromium	85
N010508-035A	B8-22.5	Chromium	110

Thank you,,
Luann

Luann Beadle | Senior Staff Scientist
Geocon Consultants, Inc.
6671 Brisa Street, Livermore, CA 94550
Office: 925.371.5900, ext. 403 Direct: 925.961.5272 Mobile: 925.395.1669
beadle@geoconinc.com

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Advanced Technology Laboratories, Inc.
3151 W. Post Rd Las Vegas, NV 89118 Tel: 702-307-2659 Fax: 702-307-2691

EMSL Analytical, Inc
2235 Polvorosa Ave , Suite 230, San Leandro, CA 94577
Phone/Fax: (510) 895-3675 / (510) 895-3680
http://www.emsl.com sanleandrolab@emsl.com

EMSL Order:	091310307
CustomerID:	GECN21
CustomerPO:	
ProjectID:	E8560-06-**

Attn: **Luann Beadle**
Geocon Consultants, Inc.
6671 Brisa Street

Livermore, CA 94550

Project: **E8560-02-48**

Phone:	(925) 371-5900
Fax:	(925) 371-5915
Received:	07/10/13 9:00 AM
Analysis Date:	7/10/2013
Collected:	7/2/2013

Test Report: PLM Analysis of Bulk Samples for Asbestos via EPA 600/R-93/116 Method with CARB 435 Prep (Milling) Level A for 0.25% Target Analytical Sensitivity

Sample	Description	Appearance	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
B1-1.5 *091310307-0001*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B1-5.5 *091310307-0002*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B1-10.5 *091310307-0003*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B2-1.5 *091310307-0004*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B2-5.5 *091310307-0005*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B2-10.5 *091310307-0006*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B3-1.5 *091310307-0007*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**

Analyst(s)

Adam C. Fink (12)
Jennifer Keeling (11)

Baojia Ke, Laboratory Manager
or other approved signatory

This report relates only to the samples listed above and may not be reproduced except in full, without EMSL's written approval. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. EMSL is not responsible for sample collection activities or method limitations. Some samples may contain asbestos fibers below the resolution limit of PLM. EMSL recommends that samples reported as none detected or less than the limit of detection undergo additional analysis via TEM.Samples received in good condition unless otherwise noted.

Samples analyzed by EMSL Analytical, Inc San Leandro, CA

Initial report from 07/10/2013 19:17:48

EMSL Analytical, Inc
2235 Polvorosa Ave , Suite 230, San Leandro, CA 94577
Phone/Fax: (510) 895-3675 / (510) 895-3680
http://www.emsl.com sanleandrolab@emsl.com

EMSL Order:	091310307
CustomerID:	GECN21
CustomerPO:	
ProjectID:	E8560-06-**

Attn: **Luann Beadle**
Geocon Consultants, Inc.
6671 Brisa Street

Livermore, CA 94550

Project: **E8560-02-48**

Phone:	(925) 371-5900
Fax:	(925) 371-5915
Received:	07/10/13 9:00 AM
Analysis Date:	7/10/2013
Collected:	7/2/2013

Test Report: PLM Analysis of Bulk Samples for Asbestos via EPA 600/R-93/116 Method with CARB 435 Prep (Milling) Level A for 0.25% Target Analytical Sensitivity

Sample	Description	Appearance	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
B3-5.5 *091310307-0008*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B3-14.5 *091310307-0009*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B4-1.5 *091310307-0010*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B4-5.5 *091310307-0011*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B4-14.5 *091310307-0012*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B5-1.5 *091310307-0013*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B5-5.5 *091310307-0014*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**

Analyst(s)

Adam C. Fink (12)
Jennifer Keeling (11)

Baojia Ke, Laboratory Manager
or other approved signatory

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Samples analyzed by EMSL Analytical, Inc San Leandro, CA

Initial report from 07/10/2013 19:17:48

EMSL Analytical, Inc
2235 Polvorosa Ave , Suite 230, San Leandro, CA 94577
Phone/Fax: (510) 895-3675 / (510) 895-3680
http://www.emsl.com sanleandrolab@emsl.com

EMSL Order:	091310307
CustomerID:	GECN21
CustomerPO:	
ProjectID:	E8560-06-**

Attn: **Luann Beadle**
Geocon Consultants, Inc.
6671 Brisa Street

Livermore, CA 94550

Project: **E8560-02-48**

Phone:	(925) 371-5900
Fax:	(925) 371-5915
Received:	07/10/13 9:00 AM
Analysis Date:	7/10/2013
Collected:	7/2/2013

Test Report: PLM Analysis of Bulk Samples for Asbestos via EPA 600/R-93/116 Method with CARB 435 Prep (Milling) Level A for 0.25% Target Analytical Sensitivity

Sample	Description	Appearance	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
B5-14.5 *091310307-0015*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B6-1.5 *091310307-0016*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B6-5.5 *091310307-0017*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B6-14.5 *091310307-0018*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B7-1.5 *091310307-0019*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B7-5.5 *091310307-0020*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B7-22.5 *091310307-0021*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**

Analyst(s)

Adam C. Fink (12)
Jennifer Keeling (11)

Baojia Ke, Laboratory Manager
or other approved signatory

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Samples analyzed by EMSL Analytical, Inc San Leandro, CA

Initial report from 07/10/2013 19:17:48

EMSL Analytical, Inc
2235 Polvorosa Ave , Suite 230, San Leandro, CA 94577
Phone/Fax: (510) 895-3675 / (510) 895-3680
http://www.emsl.com sanleandrolab@emsl.com

EMSL Order:	091310307
CustomerID:	GECN21
CustomerPO:	
ProjectID:	E8560-06-**

Attn: **Luann Beadle**
Geocon Consultants, Inc.
6671 Brisa Street

Livermore, CA 94550

Project: **E8560-02-48**

Phone:	(925) 371-5900
Fax:	(925) 371-5915
Received:	07/10/13 9:00 AM
Analysis Date:	7/10/2013
Collected:	7/2/2013

Test Report: PLM Analysis of Bulk Samples for Asbestos via EPA 600/R-93/116 Method with CARB 435 Prep (Milling) Level A for 0.25% Target Analytical Sensitivity

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
B8-1.5 *091310307-0022*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B8-5.5 *091310307-0023*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B8-22.5 *091310307-0024*		Brown			**Not Submitted**

Analyst(s)

Adam C. Fink (12)
Jennifer Keeling (11)

Baojia Ke, Laboratory Manager
or other approved signatory

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Samples analyzed by EMSL Analytical, Inc San Leandro, CA

Initial report from 07/10/2013 19:17:48

THIS IS THE LAST PAGE OF THE REPORT.

EMSL Analytical, Inc
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Attn: **Luann Beadle**
Geocon Consultants, Inc.
6671 Brisa Street

Livermore, CA 94550

Project: **E8560-02-48**

Phone:	(925) 371-5900
Fax:	(925) 371-5915
Received:	07/10/13 9:00 AM
Analysis Date:	7/16/2013
Collected:	7/2/2013

Test Report: PLM Analysis of Bulk Samples for Asbestos via EPA 600/R-93/116 Method with CARB 435 Prep (Milling) Level A for 0.25% Target Analytical Sensitivity

Sample	Description	Appearance	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
B1-1.5 *091310307-0001*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B1-5.5 *091310307-0002*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B1-10.5 *091310307-0003*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B2-1.5 *091310307-0004*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B2-5.5 *091310307-0005*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B2-10.5 *091310307-0006*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B3-1.5 *091310307-0007*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**

Analyst(s)

Adam C. Fink (12) *Jorge Leon (1)*
Jennifer Keeling (11)

Baojia Ke, Laboratory Manager
or other approved signatory

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Samples analyzed by EMSL Analytical, Inc San Leandro, CA

Report Amended: 07/16/2013 16:34:21 Replaces the Inital Report 07/10/2013 19:17:48. Reason Code: Client-Samples Added

EMSL Analytical, Inc
2235 Polvorosa Ave , Suite 230, San Leandro, CA 94577
Phone/Fax: (510) 895-3675 / (510) 895-3680
http://www.emsl.com sanleandrolab@emsl.com

EMSL Order:	091310307
CustomerID:	GECN21
CustomerPO:	
ProjectID:	E8560-06-**

Attn: **Luann Beadle**
Geocon Consultants, Inc.
6671 Brisa Street

Livermore, CA 94550

Project: **E8560-02-48**

Phone:	(925) 371-5900
Fax:	(925) 371-5915
Received:	07/10/13 9:00 AM
Analysis Date:	7/16/2013
Collected:	7/2/2013

Test Report: PLM Analysis of Bulk Samples for Asbestos via EPA 600/R-93/116 Method with CARB 435 Prep (Milling) Level A for 0.25% Target Analytical Sensitivity

Sample	Description	Appearance	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
B3-5.5 *091310307-0008*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B3-14.5 *091310307-0009*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B4-1.5 *091310307-0010*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B4-5.5 *091310307-0011*		Gray Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B4-14.5 *091310307-0012*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B5-1.5 *091310307-0013*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B5-5.5 *091310307-0014*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**

Analyst(s)

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Jennifer Keeling (11)

Baojia Ke, Laboratory Manager
or other approved signatory

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Phone/Fax: (510) 895-3675 / (510) 895-3680
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EMSL Order:	091310307
CustomerID:	GECN21
CustomerPO:	
ProjectID:	E8560-06-**

Attn: **Luann Beadle**
Geocon Consultants, Inc.
6671 Brisa Street

Livermore, CA 94550

Project: **E8560-02-48**

Phone:	(925) 371-5900
Fax:	(925) 371-5915
Received:	07/10/13 9:00 AM
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Collected:	7/2/2013

Test Report: PLM Analysis of Bulk Samples for Asbestos via EPA 600/R-93/116 Method with CARB 435 Prep (Milling) Level A for 0.25% Target Analytical Sensitivity

Sample	Description	Appearance	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
B5-14.5 *091310307-0015*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B6-1.5 *091310307-0016*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B6-5.5 *091310307-0017*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B6-14.5 *091310307-0018*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B7-1.5 *091310307-0019*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B7-5.5 *091310307-0020*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B7-22.5 *091310307-0021*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**

Analyst(s)

Adam C. Fink (12) *Jorge Leon (1)*
Jennifer Keeling (11)

Baojia Ke, Laboratory Manager
or other approved signatory

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Samples analyzed by EMSL Analytical, Inc San Leandro, CA

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CustomerID:	GECN21
CustomerPO:	
ProjectID:	E8560-06-**

Attn: **Luann Beadle**
Geocon Consultants, Inc.
6671 Brisa Street

Livermore, CA 94550

Project: **E8560-02-48**

Phone:	(925) 371-5900
Fax:	(925) 371-5915
Received:	07/10/13 9:00 AM
Analysis Date:	7/16/2013
Collected:	7/2/2013

Test Report: PLM Analysis of Bulk Samples for Asbestos via EPA 600/R-93/116 Method with CARB 435 Prep (Milling) Level A for 0.25% Target Analytical Sensitivity

Sample	Description	Appearance	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
B8-1.5 *091310307-0022*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B8-5.5 *091310307-0023*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**
B8-22.5 *091310307-0024*		Brown Non-Fibrous Homogeneous		100.00% Non-fibrous (other)	**None Detected**

Missing sample B8-22.5 was added.

Analyst(s)

Adam C. Fink (12) *Jorge Leon (1)*
Jennifer Keeling (11)

Baojia Ke, Laboratory Manager
or other approved signatory

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Samples analyzed by EMSL Analytical, Inc San Leandro, CA

Report Amended: 07/16/2013 16:34:21 Replaces the Inital Report 07/10/2013 19:17:48. Reason Code: Client-Samples Added

THIS IS THE LAST PAGE OF THE REPORT.

091310307

091310307

EMSL Analytical, Inc.

CHAIN OF CUSTODY

Asbestos

EMSL Rep: D. KOCHER

Your Company Name: GEOCON

Street: 6671 BRISA ST.

Box #:

City/State: LIVERMORE, CA Zip: 94550

~~Phone~~ EMAIL Results to:

Name: L. BEAGLE

Telephone #: 925-371-5900

Project Name/Number: E8560-02-48

Third Party Billing requires written authorization from third party

EMSL-Bill to:

Street: SAME

Box #:

City/State: Zip:

Fax Results to:

Name:

Fax #:

Purchase Order #:

MATRIX

☐ Air ☐ Floor Tile ☒ Soil

☐ Bulk ☐ Drinking Water ☐ Dust

☐ Wipe ☐ Wastewater ☐ Micro-Vac

TURNAROUND

☐ 3 hrs ☐ 6 Hours ☐ Same Day or 12 Hours* ☐ 24 Hours 1 day

☐ 48 Hours 2 days ☐ 72 Hours 3 days ☐ 96 Hours 4 days ☒ 120 Hours 5 Days

☐ 144+ hours 6-10 Days

TEM AIR, 3 hours, 6 hours, Please call ahead to schedule. There is a premium charge for 3 hour tat, please call 1-800-220-3675 for price prior to sending samples. You will be asked to sign and authorization form for this service. 12 hours (must arrive by 11:00 a.m Mon - Fri.). Please Refer to Price Quote

PCM - Air
- ☐ NIOSH 7400
- ☐ OSHA
- ☐ Other:

TEM AIR
- ☐ AHERA
- ☐ NIOSH 7402
- ☐ EPA Level II

TEM WATER
- ☐ Wastewater
- ☐ Drinking Water EPA 100.1
- ☐ Water - NY Wastewater
- ☐ Water-NY Drinking Water

PLM - Bulk
- ☐ EPA 600/R-93/116
- ☐ EPA Point Count
- ☐ NY Stratified Point Count
- ☐ PLM NOB (Gravimetric) NY 198.1
- ☐ Other:

TEM BULK/misc
- ☐ Drop Mount (Qualitative)
- ☐ Chatfield
- ☐ TEM NOB (Gravimetric) NY 198.4

TEM MICROVAC / WIPE
- ☐ ASTM D 5755-95 quantitative method

XRD
- ☐ Asbestos
- ☐ Silica

SEM Air or Bulk
- ☐ Qualitative
- ☐ Quantitative

OTHER
- ☒ CARB 435 (A)

SAMPLE NUMBER		LOCATION	VOLUME (If Applicable)

Client Sample # (s)

Total Samples #: 24

Relinquished: Date: 7/2/13 Time: 1311

Received: Date: 7/2/13 Time: 1311 W1

1

EMSL Analytical, Inc.
Revised 07/07/99

CHAIN OF CUSTODY

Asbestos

SAMPLE NUMBER	LOCATION	VOLUME (If Applicable)
B1 - 1.5		
- 5.5		
- 10.5		
B2 - 1.5		
- 5.5		
- 10.5		
B3 - 1.5		
- 5.5		
- 14.5		
B4 - 1.5		
- 5.5		
- 14.5		
B5 - 1.5		
- 5.5		
- 14.5		
B6 - 1.5		
- 5.5		
- 14.5		
B7 - 1.5		
- 5.5		
- 22.5		
B8 - 1.5		
- 5.5		
- 22.5		

2

1310307

091310307

091310307

EMSL Analytical, Inc.
Revised 07/07/99

CHAIN OF CUSTODY

Asbestos

EMSL Rep: D. KOCHER
Your Company Name: GEOCON
Street: 6671 BRISA ST.
Box #:
City/State: LIVERMORE, CA Zip: 94550
~~Phone~~ EMAIL Results to:
Name: L. BEADLE
Telephone #: 925-371-5900
Project Name/Number: E8560-02-48

Third Party Billing requires written authorization from third party
EMSL-Bill to:
Street: SAME
Box #:
City/State: Zip:
Fax Results to:
Name:
Fax #:
Purchase Order #:

MATRIX

☐ Air ☐ Floor Tile ☒ Soil
☐ Bulk ☐ Drinking Water ☐ Dust
☐ Wipe ☐ Wastewater ☐ Micro-Vac

TURNAROUND

☐ 3 hrs ☐ 6 Hours ☐ Same Day or 12 Hours* ☐ 24 Hours 1 day
☐ 48 Hours 2 days ☐ 72 Hours 3 days ☐ 96 Hours 4 days ☒ 120 Hours 5 Days
☐ 144+ hours 6-10 Days

TEM AIR, 3 hours, 6 hours. Please call ahead to schedule. There is a premium charge for 3 hour tat, please call 1-800-220-3675 for price prior to sending samples. You will be asked to sign and authorization form for this service. 12 hours (must arrive by 11:00 a.m Mon - Fri.), Please Refer to Price Quote

PCM - Air
☐ NIOSH 7400
☐ OSHA
☐ Other:

TEM AIR
☐ AHERA
☐ NIOSH 7402
☐ EPA Level II

TEM WATER
☐ Wastewater
☐ Drinking Water EPA 100.1
☐ Water - NY Wastewater
☐ Water-NY Drinking Water

PLM - Bulk
☐ EPA 600/R-93/116
☐ EPA Point Count
☐ NY Stratified Point Count
☐ PLM NOB (Gravimetric) NY 198.1
☐ Other:

TEM BULK/misc
☐ Drop Mount (Qualitative)
☐ Chatfield
☐ TEM NOB (Gravimetric) NY 198.4

TEM MICROVAC / WIPE
☐ ASTM D 5755-95 quantitative method

XRD
☐ Asbestos
☐ Silica

SEM Air or Bulk
☐ Qualitative
☐ Quantitative

OTHER
☒ CARB 435 (A)

SAMPLE NUMBER	LOCATION	VOLUME (If Applicable)

Total Samples #: 24

Client Sample # (s)

Relinquished: Date: 7/2/13 Time: 1311

Received: Date: 7/2/13 Time: 1311 W1

1

EMSL Analytical, Inc.
Revised 07/07/99

CHAIN OF CUSTODY

Asbestos

SAMPLE NUMBER	LOCATION	VOLUME (If Applicable)
B1 - 1.5		
- 5.5		
- 10.5		
B2 - 1.5		
- 5.5		
- 10.5		
B3 - 1.5		
- 5.5		
- 14.5		
B4 - 1.5		
- 5.5		
- 14.5		
B5 - 1.5		
- 5.5		
- 14.5		
B6 - 1.5		
- 5.5		
- 14.5		
B7 - 1.5		
- 5.5		
- 22.5		
B8 - 1.5		
- 5.5		
- 22.5		

2

RECEIVED JUL 10 2013

MISSING SAMPLE ENCLOSED

9am FedX Angel

091310307

FedEx Express NEW Package US Airbill

FedEx Tracking Number 8030 0677 1538

Form ID No. 0200

Recipient's Copy

1 From

Date 7-9-13 [redacted]

Sender's Name CHRIS MERRITT Phone 925 371-5400

Company GEOCON

Address 6671 BRISA'S ST Dept./Floor/Suite/Room

City LIVERMORE State CA ZIP 94550

2 Your Internal Billing Reference

3 To

Recipient's Name SAMPLE RECEIVING Phone 510 895-3675

Company EMSL

Address 2235 POLVOROSA AVE #230 Dept./Floor/Suite/Room

We cannot deliver to P.O. boxes or P.O. ZIP codes.

Address

Use this line for the HOLD location address or for continuation of your shipping address.

City SAN LEANDRO State CA ZIP 94577

☐ HOLD Weekday FedEx location address REQUIRED. **NOT available for** FedEx First Overnight.

☐ HOLD Saturday FedEx location address REQUIRED. **Available ONLY for** FedEx Priority Overnight and FedEx 2Day to select locations.

1 Order

8030 0677 1538

4 Express Package Service * To most locations.

NOTE: Service order has changed. Please select carefully.

Packages up to 150 lbs. *For packages over 150 lbs., use the new FedEx Express Freight US Airbill.*

Next Business Day

☐ FedEx First Overnight — Earliest next business morning delivery to select locations. Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

☒ FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

☐ FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.

2 or 3 Business Days

☐ FedEx 2Day A.M. — Second business morning.* Saturday Delivery NOT available.

☐ FedEx 2Day — Second business afternoon.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

☐ FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

5 Packaging * Declared value limit $500.

☐ FedEx Envelope* ☐ FedEx Pak* ☐ FedEx Box ☐ FedEx Tube ☒ Other

6 Special Handling and Delivery Signature Options

☐ SATURDAY Delivery — **NOT available for** FedEx Standard Overnight, FedEx 2Day A.M., or FedEx Express Saver.

☐ No Signature Required — Package may be left without obtaining a signature for delivery.

☒ Direct Signature — Someone at recipient's address may sign for delivery. ***Fee applies.***

☐ Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only. ***Fee applies.***

Does this shipment contain dangerous goods?

One box must be checked.

☐ No ☐ Yes — As per attached Shipper's Declaration. ☐ Yes — Shipper's Declaration not required. ☐ Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or placed in a FedEx Express Drop Box.

☐ Cargo Aircraft Only

7 Payment *Bill to:*

Enter FedEx Acct. No. or Credit Card No. below.

Obtain recip. Acct. No. ☐

☐ Sender — Acct. No. in Section 1 will be billed. ☒ Recipient ☐ Third Party ☐ Credit Card ☐ Cash/Check

[redacted] 10 [redacted]

Total Packages 1 Total Weight 1 lbs. Credit Card Auth.

†Our liability is limited to US$100 unless you declare a higher value. See the current FedEx Service Guide for details.

644

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fedex.com 1.800.GoFedEx 1.800.463.3339

fedex.com 1.800.GoFedEx 1.800.463.3339

APPENDIX C

Arsenic

Number of Valid Observations	33
Number of Distinct Observations	25
Minimum	0.5
Maximum	7.8
Mean	3.71
Median	3.4
SD	2.12
Variance	4.493
Coefficient of Variation	0.572
Skewness	0.24
Mean of log data	1.062
SD of log data	0.839
95% Standard Bootstrap UCL	**4.30**

04-4G591 Tunnel Safety Orders-Underground Classification, dated January 2, 2015

STATE OF CALIFORNIA EDMUND G. BROWN, JR., Governor

DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT
2424 Arden Way, Suite 125
Sacramento, California 95825
doshM&Tsac@dir.ca.gov

Telephone (916) 574-2540
FAX (916) 574-2542

January 2, 2015

State of California Dept. of Transportation
Geotechnical Services – MS#16
111 Grand Ave
Oakland, CA 94612

Attention: Christopher Risden, Branch Chief

Subject: Project: 15049 – Storm Culvert Replacement, San Mateo County
Classification: Potentially Gassy With Special Conditions
Number Attached: 1(A)

The information provided to this office relative to the above project has been reviewed. On the basis of this analysis, an Underground Classification of "Potentially Gassy With Special Conditions" has been assigned to the tunnel identified on your submittal. Please retain the original Classification for your records and deliver a true and correct copy of the Classification to the tunnel contractor for posting at the job site.

When the contractor who will be performing the work is selected, please advise them to notify this office to schedule the mandated Pre-Job Conference with the Division prior to commencing any activity associated with boring of the tunnel. A Pre-Job Request Form is enclosed.

Should you have another bore under construction that is not required to have an Underground Classification (i.e.: less than 30 inches in diameter), please contact the Mining and Tunneling Unit prior to any employee entry of such a space.

If you have any questions on this subject, please contact this office at your earliest convenience.

Sincerely,

Rich Brockman
Acting Senior Engineer

enc: Classification
Pre-Job Request Form

cc: rifaat.nashed@dot.ca.gov
rbrockman@dir.ca.gov

State of California

Department of Industrial Relations

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH
MINING AND TUNNELING UNIT

Underground Classification

15049A081CT STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

of GEOTECHNICAL SERVICES - MS#16, 111 GRAND AVE; OAKLAND, CA 94612

at STORM CULVERT REPLACEMENT

has been classified as *** POTENTIALLY GASSY WITH SPECIAL CONDITIONS ***

as required by the California Labor Code § 7955.

The Division shall be notified if sufficient quantities of flammable gas or vapors have been encountered underground. Classifications are based on the California Labor Code Part 9, Tunnel Safety Orders and Mine Safety Orders.

SPECIAL CONDITIONS

1. A Certified Gas Tester shall perform pre-entry and continuous monitoring of the underground environment to measure Oxygen and detect explosive, flammable, and toxic gasses whenever an employee is working in the underground environment.
2. Mechanical ventilation shall provide for continuous exhaust of fumes and air at any time an employee is working in the underground environment. The primary ventilation fans must be located outside of the underground environment and shall be reversible by a single switch near the fan location.
3. The Division shall be notified immediately if any **Flammable Gas** or **Petroleum Vapor** exceeds 5% of the Lower Explosive Limit.
4. All utilities that may be in conflict with the project shall be identified and physically located (potholed) prior to the start of project operations.

The 60-inch-diameter 510-foot-long tunnel bore near and parallel to Southbound Route 280 located approximately 1.0 southeast of the Route 92 & Canada Road intersection in Belmont, San Mateo County

This classification shall be conspicuously posted at the place of employment.

Rich Brockman, Acting Senior Engineer

January 2, 2015

State of California
Department of Industrial Relations
Division of Occupational Safety & Health

REQUEST FOR PRE-JOB (TUNNEL)

ATTACH COPY OF CLASSIFICATION AND DIESEL PERMIT

Company Name: _____

Phone _____ FAX: _____

DATE FAXED: _____

PLEASE NOTE: THE BORING CONTRACTOR SHOULD SCHEDULE THE PREJOB AS FAR IN ADVANCE AS POSSIBLE – AT LEAST 3-4 DAYS IN ADVANCE. THE DIVISION REQUIRES THE JOB TO BE SET UP WHEN THE FIELD ENGINEER ARRIVES FOR THE PREJOB. THIS MEANS THAT THE BORE PIT HAS BEEN DUG AND PROPERLY GUARDED, THE CRANE IS IN PLACE AND READY TO LIFT, THE BORING MACHINE IS IN THE PIT AND READY TO GO, AND THE CREW IS READY TO BEGIN BORING THE TUNNEL. IF THERE IS A DELAY IN SETTING UP THE JOB, THE BORING CONTRACTOR SHOULD CONTACT THE DIVISION IMMEDIATELY.

PRE-JOB REQUEST DATE & TIME: _____

ON-SITE SUPERVISOR & CELL NO.: _____

CLASSIFICATION #: _____ **DIESEL PERMIT #:** _____

BORE DIAMETER AND LENGTH: _____ (Diameter) _____ (Length)

IS BORE ENTRY ANTICIPATED? YES NO
(Circle One)

You MUST contact the Division if entry is planned, REGARDLESS of the bore diameter.

MANNER OF EXCAVATION: _____

_____

JOB-SITE LOCATION AND DIRECTIONS: _____

_____

_____

GENERAL CONTRACTOR: _____

SUBMITTED BY: _____

REVIEWED BY: _____ **DATE:** _____

☐ *Mining & Tunneling Unit, District 1*
2424 Arden Way, Suite 125
Sacramento, California 95825-2400
(916) 574-2540; ***FAX: (916) 574-2542***

☐ *Mining & Tunneling Unit, District 2*
6150 Van Nuys Blvd., Suite 310
Van Nuys, California 91401-3333
(818) 901-5420; ***FAX: (818) 901-5579***

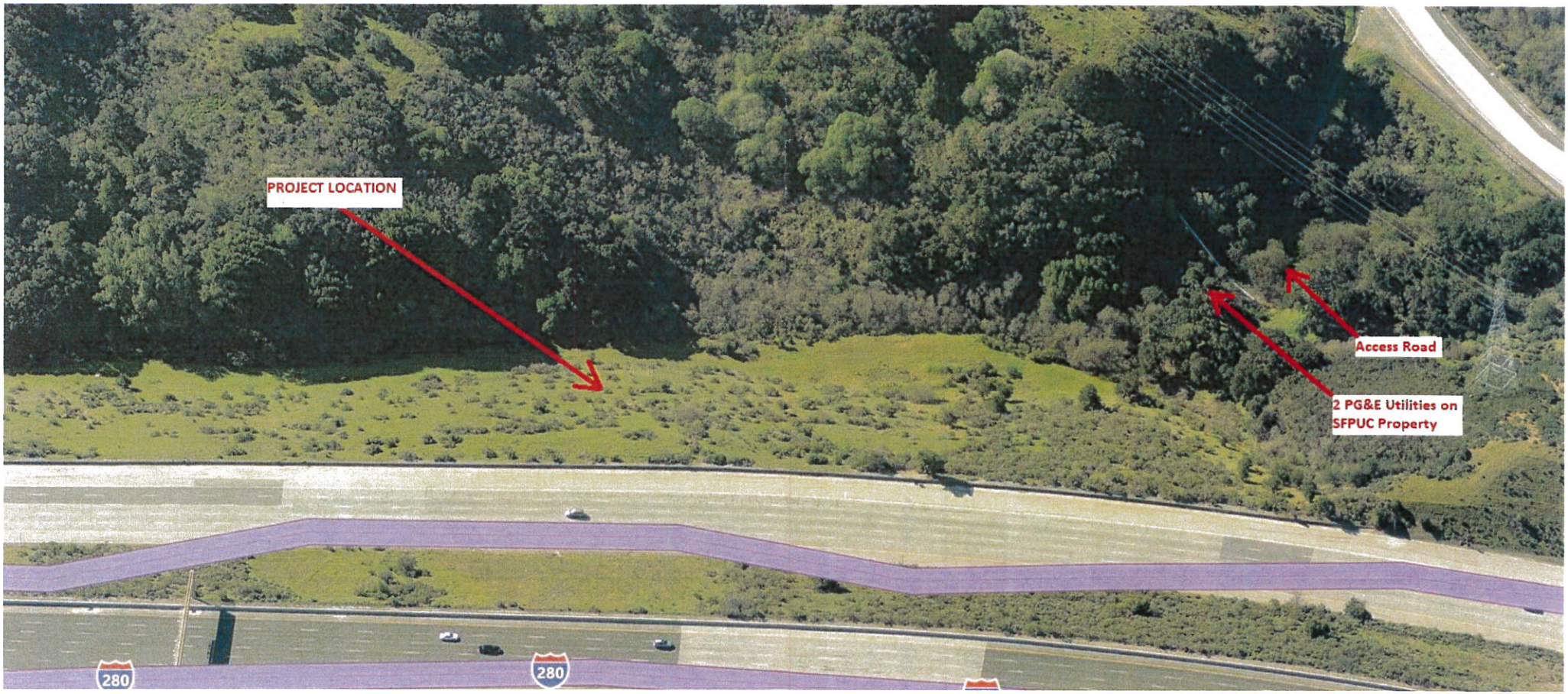
☐ *Mining & Tunneling Unit, District 3*
464 West Fourth Street, Suite 354
San Bernardino, California 92401-1442
(909) 383-6782; ***FAX: (909) 388-7132***

04-4G591 PG&E Natural Gas Pipeline - Maximum Loading

CONTRACT No.: 04-4G5914

Dist-Co-Rte-PM: 04-SM-280-9.4

PG&E Natural Gas Pipeline - Maximum Loading


PROJECT LOCATION
Access Road
2 PG&E Utilities on
SFPUC Property
280
280

From: Fannin, Scott R (Gas Ops) [mailto:SRFa@pge.com]
Sent: Thursday, September 05, 2013 9:27 AM
To: Wood, Brian@DOT; Engle, Elizabeth@DOT; Zlatunich, Thomas
Cc: Zaccardelli, Kristina
Subject: RE: 4G5900: Verification of Load Rating for PG&E Lines under Access Road

Hi Brian,

Good question, we can actually model the specific situation of "Wheel Interaction" in better detail. Dually-type wheels on a semi are typically modeled as a single point load, since the impact footprints of the tires are so close together on the ground surface (12" or less).

For initial calculations of multiple axle vehicles such as a semi-truck, we typically use 10,500 lbs as the **max** half-axle weight, which is consistent with the value given in 3550.(a) of your link below. In your situation, if we divided the total max gross vehicle weight of 80,000 lbs/10 tire impact footprints, we would have 8,000 lbs/wheel.

Attached is a sample snapshot of a quick calculation of "wheel interaction" that I ran using 6-ft of wheel spacing on the semi axles. At the peak you will notice there is an approximately 5% increase due to the interaction of the opposite wheel on the axle, which would put the equivalent weight per wheel at ~8,400 lbs/wheel. Let me know if you have the specifics for your vehicle, and I can perform a more detailed calculation of the forces transmitted to the gas transmission pipeline. We can also discuss options for protection of the pipeline if necessary, as these weights are outside the limits in the Table below.

Thanks
Scott

From: Wood, Brian@DOT [mailto:brian.wood@dot.ca.gov]
Sent: Thursday, September 05, 2013 8:25 AM
To: Fannin, Scott R (Gas Ops); Engle, Elizabeth@DOT; Zlatunich, Thomas
Cc: Zaccardelli, Kristina
Subject: RE: 4G5900: Verification of Load Rating for PG&E Lines under Access Road

Hi Scott,
I would just like to get a confirmation regarding the weight restriction below. The weight restriction is based on pounds per wheel, but is there any restriction based on axel loading (i.e., for wheels in close proximity)? For example, a loaded semi-truck at 80,000 lbs/18 wheels = approx. 4,444 lbs/wheel. Could you please confirm if this meets the loading criteria?

http://www.dot.ca.gov/hq/traffops/trucks/trucksize/weight.htm

Thanks, much.

Brian Wood, P.E.

Transportation Engineer (Civil)
California Dept. of Transportation
Office of Toll Bridge Design
Ph: (510) 622-8752

From: Fannin, Scott R (Gas Ops) [mailto:SRFa@pge.com]
Sent: Wednesday, July 31, 2013 8:56 AM
To: Engle, Elizabeth@DOT; Zlatunich, Thomas
Cc: Wood, Brian@DOT; Zaccardelli, Kristina
Subject: RE: 4G5900: Verification of Load Rating for PG&E Lines under Access Road

My apologies, I had a photo I wanted to attach as well...here it is.

Thanks
Scott

From: Fannin, Scott R (Gas Ops)
Sent: Wednesday, July 31, 2013 8:52 AM
To: 'Engle, Elizabeth@DOT'; Zlatunich, Thomas; Lui, Calvin
Cc: Wood, Brian@DOT; Zaccardelli, Kristina
Subject: RE: 4G5900: Verification of Load Rating for PG&E Lines under Access Road

Hi Tom, Elizabeth,

The PG&E maintenance work in this area (L-109 MP 27.05 Canada Rd s/o Hwy 92) was completed in June, however, our Environmental Monitoring of the site will continue for some time.

As for wheel loading over the pipelines in this area, please adhere to the table below. I am familiar with this area from our recent maintenance work, so I know the L-109 crossing of the access road will be the limiting factor. This pipeline was installed in 1936 (slated for replacement next year), so the allowable weights are fairly low. Equipment greater than 7,500 pounds per wheel will require a temporary bridging structure to be installed over the 22" pipeline (samples attached).

Wheel Weight Restrictions – L-109/132 MP 27.1 Canada Rd so Hwy 92	
COVER	Pounds per wheel
less than 1 ft	**1,500**
2 ft	3,000
3 ft	7,500
4 ft	7,500

Let me know if there are any questions/concerns with this information.

Thanks,
Scott

Scott Fannin, P.E. | Gas Transmission Pipeline Engineer
66 Ranch Dr, Milpitas CA 95035
Desk: 925-244-3316 | Internal: 244-3316

From: Engle, Elizabeth@DOT [mailto:elizabeth.engle@dot.ca.gov]
Sent: Wednesday, July 31, 2013 8:11 AM
To: Zlatunich, Thomas; Lui, Calvin; Fannin, Scott R (Gas Ops)
Cc: Wood, Brian@DOT
Subject: RE: 4G5900: Verification of Load Rating for PG&E Lines under Access Road

Thanks Tom. Let me know if you want to arrange a field meeting, and I'll arrange it with Caltrans' staff.

Elizabeth Engle
510 286-5335
Caltrans R/W Utilities
111 Grand Ave 13th Fl
Oakland, Ca 94612

From: Zlatunich, Thomas [mailto:TLZ2@pge.com]
Sent: Wednesday, July 31, 2013 7:47 AM
To: Lui, Calvin; Fannin, Scott R (Gas Ops)
Cc: Engle, Elizabeth@DOT; Wood, Brian@DOT
Subject: FW: 4G5900: Verification of Load Rating for PG&E Lines under Access Road
Importance: High

Scott,

Looks like you're standing in for Calvin.

CalTrans will be performing some work in the area shown in the attached pictures. They need to know what the maximum loads are allowed over PG&E's Gas Transmission lines in this area.

I believe there is some construction going on in this area. Is PG&E working there already? That would also be SFPUC/SAFWD property as well.

We may need to schedule a site visit with CalTrans to coordinate this work.

Tom
408.315.5732 mobile

From: Engle, Elizabeth@DOT [mailto:elizabeth.engle@dot.ca.gov]
Sent: Monday, July 29, 2013 7:10 AM
To: Zlatunich, Thomas
Cc: Wood, Brian@DOT
Subject: FW: 4G5900: Verification of Load Rating for PG&E Lines under Access Road

Hi Tom,

Can you verify the maximum load that PG&E's facilities can withstand on the underground lines shown in the attached info. The State's construction vehicles will be using the access road, and we need to know the PG&E lines will be safe in place.

Thanks,

Elizabeth Engle
510 286-5335
Caltrans R/W Utilities
111 Grand Ave 13th Fl
Oakland, Ca 94612

From: Wood, Brian@DOT
Sent: Friday, July 26, 2013 3:10 PM
To: Engle, Elizabeth@DOT
Cc: Zandipour, Bob@DOT; Perez, Richelle P@DOT
Subject: 4G5900: Verification of Load Rating for PG&E Lines under Access Road

Hi Elizabeth,
There are 2 PG&E lines that are adjacent to the 4g5900 project. These lines are located underneath the maintenance access road that will be utilized to access the project site. We need to verify the load rating for these PG&E lines to ensure that they can withstand the weight of the construction equipment used in the project. Are you the right person to contact to obtain this information from PG&E?

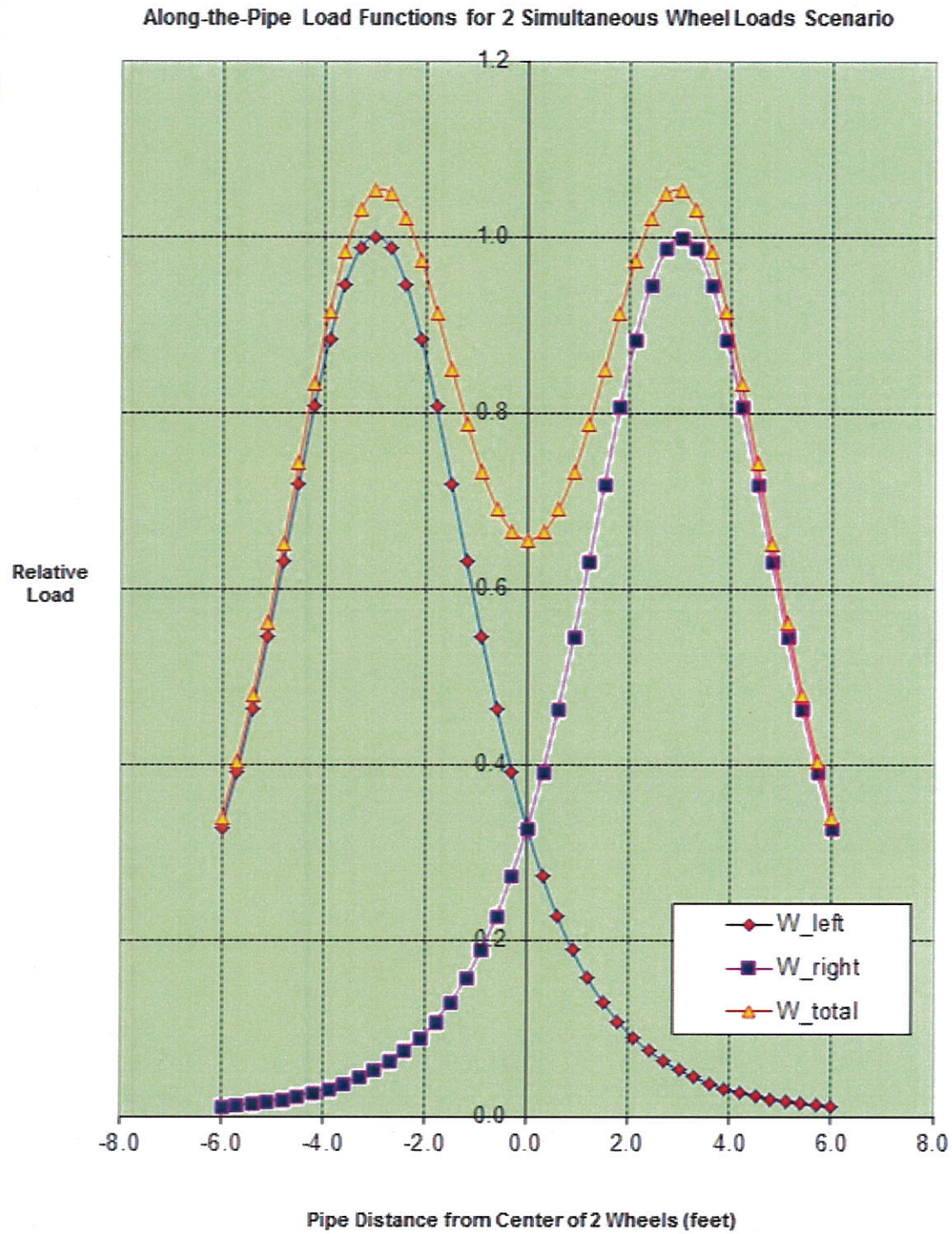
Thanks for your help,

Brian Wood, P.E.
Transportation Engineer (Civil)
California Dept. of Transportation
Office of Toll Bridge Design
Ph: (510) 622-8752

PG&E is committed to protecting our customers' privacy.
To learn more, please visit http://www.pge.com/about/company/privacy/customer/

x_local	s_left	W_left	s_right	W_right	W_total
-6.000	5.000	0.328	9.849	0.011	0.339
-5.700	4.826	0.391	9.575	0.013	0.404
-5.400	4.665	0.464	9.304	0.015	0.478
-5.100	4.518	0.544	9.034	0.017	0.561
-4.800	4.386	0.631	8.766	0.020	0.650
-4.500	4.272	0.720	8.500	0.023	0.743
-4.200	4.176	0.806	8.237	0.027	0.833
-3.900	4.100	0.884	7.976	0.032	0.916
-3.600	4.045	0.946	7.718	0.037	0.983
-3.300	4.011	0.986	7.463	0.044	1.030
-3.000	4.000	1.000	7.211	0.053	1.053
-2.700	4.011	0.986	6.963	0.063	1.049
-2.400	4.045	0.946	6.720	0.075	1.021
-2.100	4.100	0.884	6.482	0.090	0.973
-1.800	4.176	0.806	6.248	0.108	0.914
-1.500	4.272	0.720	6.021	0.129	0.849
-1.200	4.386	0.631	5.800	0.156	0.787
-0.900	4.518	0.544	5.587	0.188	0.732
-0.600	4.665	0.464	5.381	0.227	0.690
-0.300	4.826	0.391	5.186	0.273	0.664
0.000	5.000	0.328	5.000	0.328	0.655
0.300	5.186	0.273	4.826	0.391	0.664
0.600	5.381	0.227	4.665	0.464	0.690
0.900	5.587	0.188	4.518	0.544	0.732
1.200	5.800	0.156	4.386	0.631	0.787
1.500	6.021	0.129	4.272	0.720	0.849
1.800	6.248	0.108	4.176	0.806	0.914
2.100	6.482	0.090	4.100	0.884	0.973
2.400	6.720	0.075	4.045	0.946	1.021
2.700	6.963	0.063	4.011	0.986	1.049
3.000	7.211	0.053	4.000	1.000	1.053
3.300	7.463	0.044	4.011	0.986	1.030
3.600	7.718	0.037	4.045	0.946	0.983
3.900	7.976	0.032	4.100	0.884	0.916
4.200	8.237	0.027	4.176	0.806	0.833
4.500	8.500	0.023	4.272	0.720	0.743
4.800	8.766	0.020	4.386	0.631	0.650
5.100	9.034	0.017	4.518	0.544	0.561
5.400	9.304	0.015	4.665	0.464	0.478
5.700	9.575	0.013	4.826	0.391	0.404
6.000	9.849	0.011	5.000	0.328	0.339

aximum Relative Load Compared to Single Wheel: 1.053



PROTECTION REQUIRED IF
EQUIPMENT > 7,500 lb/wheel
crossing this area