APPENDIX A

Mitigation Monitoring and Reporting Plan

APPENDIX A –MITIGATION MONITORING AND REPORTING PROGRAM

Table 1 Mitigation Monitoring and Reporting Program

Impact Area	Mitigation Measure	Responsibility for Implementation	Responsibility for Monitoring and/or Enforcement	Timing of Implementation
Air Quality				
Impact AIR-B: Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	**Mitigation Measure AQ-1: Dust Control** The contractor shall implement the following dust control measures consistent with BAAQMD Guidelines: • All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph. • All trucks and equipment, including their tires, shall be washed off prior to leaving the site. • Unpaved roads providing access to sites located 100 feet or further from a paved road shall be treated with a 6- to 12-inch layer of compacted wood chips, mulch, or gravel.	• Contractor	• Valley Water	• Construction
Impact AIR-C: Would the project expose sensitive receptors to substantial pollutant concentrations?	**Mitigation Measure AQ-2: Construction Equipment Air Quality Standards** The contractor shall implement the following measures during construction to reduce construction exhaust emissions: • All construction equipment larger than 50 horsepower used at the project site for more than two continuous days or 20 hours total shall utilize diesel engines that are USEPA certified "Tier 4 final" emission standards for particulate matter and equipped with CARB-certified Level 3 Diesel Particulate Filters. The construction contractor shall submit specifications of the equipment to be used during construction and Valley Water shall confirm the equipment meets this requirement/standard. • Equipment such as air compressors, concrete/industrial saws, forklifts, light stands, manlifts, pumps, and welders shall be electric or alternative-fueled (i.e., non-diesel), where feasible. Pole power shall be utilized at the earliest feasible point in time and shall be used to the maximum extent feasible in lieu of generators. If stationary construction equipment, such as diesel-powered generators, must be operated continuously, such equipment must be Tier 4 Final construction equipment or better and located at least 100 feet from air quality sensitive land uses (e.g., residences, schools, childcare centers, hospitals, parks, or similar uses), whenever possible. • At a minimum, construction vendors, contractors, and/or haul truck operators commit to using 2010 model year trucks (e.g., material delivery trucks and soil import/export with a gross vehicle weight rating of at least 14,001 pounds), that meet CARB's 2010 engine emissions standards or newer, cleaner trucks.	• Contractor	• Valley Water	• Construction
Biological Resources				
Impact BIO-A: Would the Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	**Mitigation Measure BIO-1: Off-Site Staging Areas** Valley Water shall conduct a pre-activity biological resource survey of any off-site staging area containing vegetation. The pre-activity survey will document the presence or absence of suitable habitat for special status plants and wildlife, riparian areas, sensitive vegetation communities, or native wildlife nursery sites. Any suitable habitat for special status plants or wildlife, riparian areas, sensitive vegetation communities, wetlands, or wildlife nursery sites within the staging area shall be delineated for avoidance by staging activities. If any breeding activity for special status wildlife species is observed within or in proximity to the staging area, a no activity buffer from the special status species shall be defined by a qualified biologist. Staging activities shall not be allowed within the no activity buffer until the nesting activity has ceased as documented by a qualified biologist.	• Valley Water	• Qualified Biologist	• Prior to Construction
Impact BIO-A: Would the Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	**Mitigation Measure BIO-2:** Crotch's Bumble Bee Avoidance Two nesting surveys shall be conducted for Crotch's bumble bee with focus on detecting active nesting colonies within one week and 24-hours immediately prior to ground disturbing activities during the flight season (February to October). If an active Crotch's bumble bee nest is detected, an appropriate no disturbance buffer zone (including foraging resources and flight corridors essential for supporting the colony) shall be established around the nest to reduce the risk of disturbance or accidental take. Nest avoidance buffers may be removed at the completion of the flight season and/or once the qualified biologist deems the nesting colony is no longer active and CDFW has provided concurrence of that determination. If no nests are found but the species is present, a full-time qualified biological monitor shall be present during vegetation removal or ground disturbing activities that are scheduled to occur during the queen flight period (February through March), colony active period (March through September), and/or gyne flight period (September through October).	• Valley Water	• Qualified Biologist	• Prior to Construction

Impact Area	Mitigation Measure	Responsibility for Implementation	Responsibility for Monitoring and/or Enforcement	Timing of Implementation
Impact BIO-A: Would the Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	**Mitigation Measure BIO-3: San Francisco Dusky Footed Woodrat Avoidance** A preconstruction survey will be performed by a qualified biologist within seven days prior to the start of ground-disturbing activities to identify the locations of active San Francisco dusky-footed woodrat nests within the project boundary. Any woodrat nests detected will be mapped and flagged for avoidance by the qualified biologists. If active nests are determined to be present, avoidance measures will be implemented first. Because San Francisco dusky-footed woodrats are year-round residents, avoidance mitigation is limited to restricting project activities to avoid direct impacts to San Francisco dusky-footed woodrats and their active nests to the extent feasible. A minimum 10-foot buffer should be maintained between project construction activities and each nest to avoid disturbance. In some situations, a smaller buffer may be allowed if, in the opinion of the qualified biologist, removing the nest would be a greater impact than that anticipated as a result of project activities. If an unoccupied woodrat nest is found within the site and it cannot be avoided, the nest should be disassembled by hand by the qualified biologist. The nest materials should be relocated off site outside of the wildlife exclusion fencing to prevent rebuilding. If occupied nests are found within the site, and a litter of young is found or suspected, the nest shall be left alone for two to three weeks before a recheck to verify that young are capable of independent survival before proceeding with nest dismantling. Dismantling shall be done by hand, allowing any animals to escape either along existing woodrat trails or toward other available habitat. Valley Water will notify CDFW of any nests, unoccupied or occupied, before they are dismantled.	• Valley Water	• Qualified Biologist	• Prior to Construction
Impact BIO-B: Would the Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	**Mitigation Measure BIO-1: Off-Site Staging Areas** See Impact BIO-A.	• Valley Water	• Qualified Biologist	• Prior to Construction
Impact BIO-C: Would the Project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	**Mitigation Measure BIO-1: Off-Site Staging Areas** See Impact BIO-A.	• Valley Water	• Qualified Biologist	• Prior to Construction
Impact BIO-D: Would the Project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	**Mitigation Measure BIO-1: Off-Site Staging Areas** See Impact BIO-A.	• Valley Water	• Qualified Biologist	• Prior to Construction
Cultural Resources				
Impact CUL-A: Would the Project cause a substantial adverse change in the significance of a historical resource pursuant to section 15064.5?	**Mitigation Measure CUL-1 Pre-Activity Survey of Off-Site Staging Area**: Prior to use of any undeveloped off-site staging area, a qualified archaeologist shall conduct a pedestrian cultural resource survey of the staging area. If any archaeological resources including historic era or pre-contact resources are identified within the staging area, an environmentally sensitive area, including a minimum 15-foot buffer from the outer limits of any cultural resource, shall be delineated and excluded from staging activities. The environmentally sensitive area shall be staked and marked for avoidance to ensure avoidance of damage to cultural resources	• Valley Water	• Qualified Archeologist	• Prior to Construction
Impact CUL-B: Would the Project cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	**Mitigation Measure CUL-1 Pre-Activity Survey of Off-Site Staging Area**: See Impact CUL-A.	• Valley Water	• Qualified Archeologist	• Prior to Construction
Geology and Soils				
Impact GEO-F: Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	**MM GEO-1: Unanticipated Discovery of Paleontological Resources** Preconstruction worker awareness training will be conducted for the awareness and accidental discovery of paleontological resources during construction. If paleontological resources are discovered during construction, all work must halt within a 100-foot radius of the discovery, and a qualified paleontologist will be retained to evaluate the find. The paleontologist shall notify Valley Water if the find is significant. The paleontologist shall evaluate the	• Contractor	• Valley Water	• Prior to Construction

Impact Area	Mitigation Measure	Responsibility for Implementation	Responsibility for Monitoring and/or Enforcement	Timing of Implementation
	significance of the find and shall have the authority to modify the no-work radius as appropriate, using professional judgment. The qualified paleontologist will evaluate the significance of the find and recommend appropriate measures for the disposition of the find (e.g., fossil recovery, curation, data recovery, monitoring). Construction activities may continue on other parts of the construction site while evaluation and treatment of the paleontological resource takes place.			
Hazards and Hazardous Materials				
Impact HAZ-A: Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials? and **Impact HAZ-B**: Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	**Mitigation Measure HAZ-1 – Sampling and Waste Management:** The project would adhere to the following testing, sampling, and handling procedures during construction: • A soil and groundwater quality investigation shall be conducted to evaluate subsurface conditions in any proposed excavation or construction area to evaluate potential impacts from the project, including evaluation of soil management options for materials produced during exaction and construction and potential health and safety impacts to the project workers. Samples shall be analyzed for petroleum hydrocarbons (including gasoline, diesel, and oil), VOCs, polychlorinated biphenyls, semi-volatile organic compounds, PCBs, organochlorine pesticides, and metals. If groundwater is encountered prior to the final depth, then a groundwater sample shall be taken. Groundwater samples collected from the borings should be analyzed for petroleum hydrocarbons, VOCs, dissolved metals, and pH. • The results of the soil and groundwater investigation shall be reported to Valley Water. Excavated soil will be segregated, staged, labeled/marked, and properly managed as appropriate per the result of the soil and groundwater investigation in a manner that complies with applicable regulations and to facilitate proper disposal. • Valley Water will give contractor written notice to dispose of all or a portion of the waste material at a Class I disposal site if the Engineer determines that such disposal is required based on review of contractors waste characterization and the analytical results of samples collected. • Transport materials and/or wastes in accordance with all local, State, and federal laws, rules, and regulations. • Contractor shall not assume any soil is approved for offsite reuse. Off-site reuse is only permitted with explicit approval from Valley Water after a careful review of the contractor's proposed reuse and soil testing results.	• Contractor	• Valley Water	• Construction

Impact Area	Mitigation Measure	Responsibility for Implementation	Responsibility for Monitoring and/or Enforcement	Timing of Implementation
Impact HAZ-A: Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials? and **Impact HAZ-B**: Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	**Mitigation Measure HAZ-2 - Asbestos and Lead-based Paint:** Demolition of the project structures and facilities shall comply with the OSHA Standard 1926.6 related to lead abatement and all other applicable State and federal requirements for the safe handling and disposal of lead-based paint, ACM, and universal wastes. The project contractor shall implement the measures described below. ***Lead-based Paint*** As lead was identified in the paints on existing PWTP facilities, all coated surfaces shall be considered to contain some lead and require demolition dust control procedures and presumed respiratory protection usage for compliance with Cal/OSHA's Construction Lead Standard under 8 CCR section 1532.1. The aforementioned regulation contains requirements for lead air monitoring, work practices, respiratory protection, etc., that are triggered by the detected presence of any levels of lead. None of the applicable regulations require removal of lead paint prior to demolition if the paints are securely adhered to the substrates (i.e., non-flaking or non-peeling). Disposal of the demolition debris in this case can be handled as non-hazardous and non-RCRA waste after the loose and flaking paint have been removed as long as demolition practices do not compromise worker safety and waste stream characterization testing has been performed by the contractor on the entire waste stream for verification. Conventional demolition techniques shall be employed for all painted surfaces, with the Contractor complying with applicable OSHA and Cal/OSHA statutes regarding the following: • Worker awareness training • Exposure monitoring, as needed • Medical examinations, which may include blood lead level testing • Establishing a written respiratory protection program ***Asbestos*** Any suspected asbestos material at the project site not sampled or not visually identified as negative by the testing and sampling procedures shall be assumed to contain asbestos and require destructive testing prior to demolition. Inspections in California are required to be conducted by a Certified Asbestos Consultant (CAC) or by a Certified Site Surveillance Technician (CSST) working under a CAC. In the absence of testing, the materials should be assumed to contain asbestos and disposed of in accordance with OSHA standard 1926.6.	• Contractor	• Valley Water	• Construction

Impact Area	Mitigation Measure	Responsibility for Implementation	Responsibility for Monitoring and/or Enforcement	Timing of Implementation
Impact HAZ-C: Would the Project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	**Mitigation Measure HAZ-2 - Asbestos and Lead-based Paint:** See Impact HAZ-A and Impact HAZ-B.	• Contractor	• Valley Water	• Construction
Hydrology and Water Quality				
Impact HYD-A: Would the Project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?	**Mitigation Measure HAZ-1 – Sampling and Waste Management:** The project would adhere to the following testing, sampling, and handling procedures during construction: • A soil and groundwater quality investigation shall be conducted to evaluate subsurface conditions in any proposed excavation or construction area to evaluate potential impacts from the project, including evaluation of soil management options for materials produced during exaction and construction and potential health and safety impacts to the project workers. Samples shall be analyzed for petroleum hydrocarbons (including gasoline, diesel, and oil), VOCs, polychlorinated biphenyls, semi-volatile organic compounds, PCBs, organochlorine pesticides, and metals. If groundwater is encountered prior to the final depth, then a groundwater sample shall be taken. Groundwater samples collected from the borings should be analyzed for petroleum hydrocarbons, VOCs, dissolved metals, and pH. • The results of the soil and groundwater investigation shall be reported to Valley Water. Excavated soil will be segregated, staged, labeled/marked, and properly managed as appropriate per the result of the soil and groundwater investigation in a manner that complies with applicable regulations and to facilitate proper disposal. • Valley Water will give contractor written notice to dispose of all or a portion of the waste material at a Class I disposal site if the Engineer determines that such disposal is required based on review of contractors waste characterization and the analytical results of samples collected. • Transport materials and/or wastes in accordance with all local, State, and federal laws, rules, and regulations. • Contractor shall not assume any soil is approved for offsite reuse. Off-site reuse is only permitted with explicit approval from Valley Water after a careful review of the contractor's proposed reuse and soil testing results.	• Contractor	• Valley Water	• Construction
Noise				
Impact NOI-A: Would the project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	**Mitigation Measure NOI-1: Noise Barriers** Prior to demolition occurring at the Washwater Recovery Ponds, Valley Water will install a temporary 12-foot-tall construction noise barrier as close as feasible to the southernmost Washwater Recovery Pond demolition and construction activities to shield the residential receptors to the south on El Grande Drive. The noise barrier shall be equipped with exterior-rated quilted sound blankets that are a minimum of 2 inches thick. There may be some periods of construction when the noise barrier may be temporarily moved or dismantled to accommodate the movement of heavy equipment and work crews within the immediate project construction area. Valley Water will schedule any dismantling or moving of the noise barrier to coincide with periods when construction activities will occur within the adopted construction hours of the City of San Jose (7:00 a.m. to 7:00 p.m.) and fall within the local noise requirements. The location of the temporary noise barrier is shown on Figure 4.2-9 or functional equivalent.	• Contractor	• Valley Water	• Prior to Construction

Impact Area	Mitigation Measure	Responsibility for Implementation	Responsibility for Monitoring and/or Enforcement	Timing of Implementation
Impact NOI-A: Would the project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	**Mitigation Measure NOI-2: Notification** Prior to the start of construction activities (major phases), Valley Water will provide written notification to all residents within 500 feet of the construction site. The notice shall include information on the estimated start date and duration of construction activities, hours of construction, and contact information (i.e., telephone number and email address)for the VW Construction Manager or assigned staff (e.g., Construction Noise Coordinator).Additional written notification to all residential units within 500 feet of the construction site shall be provided prior to nighttime construction activities (before 7:00 a.m. or after 7:00 p.m.) informing them of the estimated start date, duration, and hours of construction for nighttime construction activities. Written notification shall be provided at least one week prior to any nighttime construction activity. The VW Construction Manager or assigned staff (Construction Noise Coordinator) will be responsible for responding to any local complaints about construction noise or vibration. Contact information (i.e., telephone number and email address) for the Construction Noise Coordinator shall be conspicuously posted along public roads adjacent to the construction site in addition to any written notifications to area residents.	• Valley Water	• Valley Water	• Prior to Construction
Impact NOI-B: b) Would the project generate excessive groundborne vibration or groundborne noise levels?	**Mitigation Measure NOI-3: Impact Pile Driver Setback** Impact pile driver use shall be limited to locations 125 feet or greater from any off-site structure. Prior to use of any impact pile driver at the site, the contractor shall submit a pile driving plan to Valley Water that includes information on the type of pile drivers to be used and the location of the pile driver to demonstrate that the pile driver will be greater than 125 feet from any off-site residence. This measure does not apply to Vibratory Pile Drivers, Caisson Drilling, or Roller/Paving equipment.	• Contractor	• Valley Water	• Prior to Construction

Figure 4.2-1 Noise Monitoring Locations and Noise Barrier

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APPENDIX B

Air Quality and Greenhouse Gas Modeling

Appendix B

Construction and Operational Emissions Inventory Supporting Information

- Construction Summary
- Construction Employee and Haul Trucks
- Construction Offroad Equipment – Unmitigated
- Construction Offroad Equipment – Mitigated
- Operational Generator

Daily Unmitigated Emissions (pounds) - 2025

	ROG	CO	NOX	PM10	PM2.5
Offroad	0.23	5.26	4.13	0.21	0.19
Onroad	0.01	0.98	0.19	0.04	0.02
Fugitive	16.0			45.7	9.56
Total	16.3	6.23	4.32	46.0	9.76
CEQA Thresholds	54		54	82	54
	No		No	No	No

Daily Mitigated Emissions (pounds) - 2025

	ROG	CO	NOX	PM10	PM2.5
Offroad	0.20	20.1	2.57	0.06	0.05
Onroad	0.01	0.98	0.19	0.04	0.02
Fugitive	16.0			11.7	2.43
Total	16.2	21.1	2.76	11.8	2.50
CEQA Thresholds	54		54	82	54
	No		No	No	No

Daily Unmitigated Emissions (pounds) - 2026

	ROG	CO	NOX	PM10	PM2.5
Offroad	0.36	4.93	3.06	0.16	0.15
Onroad	0.01	0.98	0.19	0.04	0.02
Fugitive	16.0			45.7	9.56
Total	16.4	5.90	3.25	45.9	9.72
CEQA Thresholds	54		54	82	54
	No		No	No	No

Daily Mitigated Emissions (pounds) - 2026

	ROG	CO	NOX	PM10	PM2.5
Offroad	0.33	17.7	2.33	0.05	0.04
Onroad	0.01	0.98	0.19	0.04	0.02
Fugitive	16.0			11.7	2.43
Total	16.4	18.7	2.52	11.8	2.49
CEQA Thresholds	54		54	82	54
	No		No	No	No

Daily Unmitigated Emissions (pounds) - 2027

	ROG	CO	NOX	PM10	PM2.5
Offroad	0.20	5.42	3.18	0.16	0.14
Onroad	0.01	0.98	0.19	0.04	0.02
Fugitive	16.0			45.7	9.56
Total	16.2	6.40	3.37	45.9	9.72
CEQA Thresholds	54		54	82	54
	No		No	No	No

Daily Mitigated Emissions (pounds) - 2027

	ROG	CO	NOX	PM10	PM2.5
Offroad	0.19	19.5	2.52	0.06	0.05
Onroad	0.01	0.98	0.19	0.04	0.02
Fugitive	16.0			11.7	2.43
Total	16.2	20.5	2.71	11.8	2.50
CEQA Thresholds	54		54	82	54
	No		No	No	No

Daily Unmitigated Emissions (pounds) - 2028

	ROG	CO	NOX	PM10	PM2.5
Offroad	0.27	4.13	1.98	0.10	0.09
Onroad	0.01	0.98	0.19	0.04	0.02
Fugitive	16.0			45.7	9.56
Total	16.3	5.11	2.17	45.9	9.66
CEQA Thresholds	54		54	82	54
	No		No	No	No

Daily Mitigated Emissions (pounds) - 2028

	ROG	CO	NOX	PM10	PM2.5
Offroad	0.28	14.7	2.37	0.04	0.03
Onroad	0.01	0.98	0.19	0.04	0.02
Fugitive	16.0			11.7	2.43
Total	16.3	15.7	2.56	11.8	2.48
CEQA Thresholds	54		54	82	54
	No		No	No	No

Unmitigated	ROG	CO	NOX	PM10	PM2.5
2025	16.3	6.23	4.32	46.0	9.76
2026	16.4	5.90	3.25	45.9	9.72
2027	16.2	6.40	3.37	45.9	9.72
2028	16.3	5.11	2.17	45.9	9.66

Mitigated	ROG	CO	NOX	PM10	PM2.5
2025	16.2	21.1	2.76	11.8	2.50
2026	16.4	18.7	2.52	11.8	2.49
2027	16.2	20.5	2.71	11.8	2.50
2028	16.3	15.7	2.56	11.8	2.48

Motor Vehicle Combustion Emissions

			Emission Factor (g/mile)								Daily Emissions (pounds/day)					Annual Emissions (tons/year)								Annual Emissions (metric tons/year)
	Vehicles	VMT	ROG	CO	NOX	CO2	CH4	N2O	PM10	PM2.5	ROG	CO	NOX	PM10	PM2.5	ROG	CO	NOX	CO2	CH4	N2O	PM10	PM2.5	CO2e
Pickup Trucks	3	60	0.01	0.81	0.07	327	0.00	0.01	0.02	0.01	0.00	0.11	0.01	0.00	0.00	0.00	0.05	0.00	19	0.00	0.00	0.00	0.00	17
Employee Vehicles	30	648	0.01	0.68	0.05	272	0.00	0.00	0.02	0.01	0.01	0.97	0.07	0.02	0.01	0.01	0.42	0.03	167	0.00	0.00	0.01	0.00	152
Haul Trucks	4	152	0.01	0.03	0.37	1,036	0.00	0.16	0.06	0.02	0.00	0.01	0.12	0.02	0.01	0.00	0.00	0.05	149	0.00	0.02	0.01	0.00	141
Total											0.01	0.98	0.19	0.04	0.02	0.01	0.42	0.08	316	0.00	0.03	0.02	0.01	293

Project Construction Emissions

Project Phase	Project activity (Stage)	Equipment	ID	No. of equipment	Average hours/day	Equipment size (horsepower/ each)	Off-road equipment (yes/no)	Average duration (months)	Overall	Overall	Year	Days	Emission Factor (g/hp-hr or g/mile)							Emissions (tons/yr)						
All-Phases								36	Start Date	End Date			ROG	CO	NOx	CO2	PM10	PM2.5	SOx	ROG	CO	NOx	CO2	PM10	PM2.5	SOx
	General: project management	Pickup trucks		3	2	300	No	12	1/1/2025	12/31/2025	2025	288	0.01	0.81	0.07	327.32	0.02	0.01	0.00	0.00	0.02	0.00	6.23	0.00	0.00	0.00
		Generator sets	10	1	1	84	Yes	1.8	1/1/2025	12/31/2025	2025	43	0.19	2.04	1.89	318.64	0.05	0.04	0.00	0.00	0.01	0.01	1.27	0.00	0.00	0.00
		Forklift	9	1	3	89	Yes	12	1/1/2025	12/31/2025	2025	288	0.05	0.66	0.48	117.95	0.03	0.03	0.00	0.00	0.06	0.04	10.00	0.00	0.00	0.00
		Welders	14	3	1	46	Yes	7.2	1/1/2025	12/31/2025	2025	173	0.10	0.90	0.74	118.21	0.02	0.02	0.00	0.00	0.02	0.02	3.11	0.00	0.00	0.00
		Construction equipment (other)	5	1	2	172	Yes	12	1/1/2025	12/31/2025	2025	288	0.10	1.25	0.80	218.90	0.04	0.03	0.00	0.01	0.14	0.09	23.91	0.00	0.00	0.00
	General: project management	Pickup trucks		3	2	300	No	12	1/1/2026	5/15/2026	2026	288	0.01	0.76	0.06	319.42	0.02	0.01	0.00	0.00	0.01	0.00	6.08	0.00	0.00	0.00
		Generator sets	10	1	1	84	Yes	1.8	1/1/2026	5/15/2026	2026	43	0.17	2.02	1.84	318.55	0.04	0.04	0.00	0.00	0.01	0.01	1.27	0.00	0.00	0.00
		Forklift	9	1	3	89	Yes	12	1/1/2026	5/15/2026	2026	288	0.05	0.67	0.42	121.25	0.03	0.03	0.00	0.00	0.06	0.04	10.28	0.00	0.00	0.00
		Welders	14	3	1	46	Yes	7.2	1/1/2026	5/15/2026	2026	173	0.09	0.90	0.72	118.17	0.02	0.02	0.00	0.00	0.02	0.02	3.11	0.00	0.00	0.00
		Construction equipment (other)	5	1	2	172	Yes	12	1/1/2026	5/15/2026	2026	288	0.08	1.25	0.66	221.62	0.03	0.03	0.00	0.01	0.14	0.07	24.20	0.00	0.00	0.00
Phase 1								16.5					ROG	CO	NOx	CO2	PM10	PM2.5	SOx	ROG	CO	NOx	CO2	PM10	PM2.5	SOx
	Demolition and excavation	10-yard dump trucks		2	7	450	No	0.3	1/1/2025	2/15/2025	2025	7	0.01	0.03	0.37	1,036.21	0.06	0.02	0.01	0.00	0.00	0.00	1.15	0.00	0.00	0.00
		Excavator	8	1	8	158	Yes	0.45	1/1/2025	2/15/2025	2025	11	0.08	1.17	0.56	195.39	0.02	0.02	0.00	0.00	0.02	0.01	2.94	0.00	0.00	0.00
		Haul trucks		8	2	450	No	0.3	1/1/2025	2/15/2025	2025	7	0.01	0.03	0.37	1,036.21	0.06	0.02	0.01	0.00	0.00	0.00	1.32	0.00	0.00	0.00
		Water truck		1	1	400	No	0.15	1/1/2025	2/15/2025	2025	4	0.01	0.03	0.37	1,036.21	0.06	0.02	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00
		Plate compactors	12	1	2	8	Yes	0.15	1/1/2025	2/15/2025	2025	4	0.28	23.53	0.48	254.36	0.02	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	4	97	Yes	1.2	1/1/2025	2/15/2025	2025	29	0.11	1.27	0.98	212.98	0.07	0.06	0.00	0.00	0.02	0.01	2.62	0.00	0.00	0.00
		Pyle Driver	13	1	8	300	Yes	0.15	1/1/2025	2/15/2025	2025	4	0.12	0.60	1.08	255.82	0.05	0.04	0.00	0.00	0.01	0.01	2.44	0.00	0.00	0.00
	Install slabs and walls	Crane	6	1	7	231	Yes	2	2/16/2025	7/15/2025	2025	48	0.04	0.27	0.47	149.07	0.02	0.01	0.00	0.00	0.02	0.04	12.75	0.00	0.00	0.00
		Concrete mixer trucks		15	3	450	No	0.5	2/16/2025	7/15/2025	2025	12	0.01	0.03	0.37	1,036.21	0.06	0.02	0.01	0.00	0.00	0.00	6.17	0.00	0.00	0.00
		Cement and mortar mixers	2	1	3	89	Yes	0.5	2/16/2025	7/15/2025	2025	12	0.10	1.78	0.60	287.86	0.03	0.02	0.00	0.00	0.01	0.00	1.02	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	3	97	Yes	3	2/16/2025	7/15/2025	2025	72	0.11	1.27	0.98	212.98	0.07	0.06	0.00	0.00	0.03	0.02	4.92	0.00	0.00	0.00
	Install structures and equipment (other)	Crane	6	1	3	231	Yes	2.6	7/16/2025	12/31/2025	2025	62	0.04	0.27	0.47	149.07	0.02	0.01	0.00	0.00	0.01	0.02	7.11	0.00	0.00	0.00
		Haul trucks		1	2	450	No	1.3	7/16/2025	12/31/2025	2025	31	0.01	0.03	0.37	1,036.21	0.06	0.02	0.01	0.00	0.00	0.00	0.71	0.00	0.00	0.00
		Flatbed truck (For delivery of centrifuge, chem tanks, etc.)		1	1	400	No	0.65	7/16/2025	12/31/2025	2025	16	0.01	0.03	0.37	1,036.21	0.06	0.02	0.01	0.00	0.00	0.00	0.18	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	2	97	Yes	3.9	7/16/2025	12/31/2025	2025	94	0.11	1.27	0.98	212.98	0.07	0.06	0.00	0.00	0.03	0.02	4.26	0.00	0.00	0.00
	Install structures and equipment (other)	Crane	6	1	3	231	Yes	2.6	1/1/2026	1/31/2026	2026	62	0.04	0.28	0.43	149.07	0.02	0.01	0.00	0.00	0.01	0.02	7.11	0.00	0.00	0.00
		Haul trucks		1	2	450	No	1.3	1/1/2026	1/31/2026	2026	31	0.01	0.03	0.34	1,015.04	0.06	0.02	0.01	0.00	0.00	0.00	0.70	0.00	0.00	0.00
		Flatbed truck (For delivery of centrifuge, chem tanks, etc.)		1	1	400	No	0.65	1/1/2026	1/31/2026	2026	16	0.01	0.03	0.34	1,015.04	0.06	0.02	0.01	0.00	0.00	0.00	0.17	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	2	97	Yes	3.9	1/1/2026	1/31/2026	2026	94	0.10	1.27	0.86	215.92	0.06	0.06	0.00	0.00	0.03	0.02	4.32	0.00	0.00	0.00
	Yard piping and utilities	10-yard dump truck		1	3	450	No	0.4	2/1/2026	3/31/2026	2026	10	0.01	0.03	0.34	1,015.04	0.06	0.02	0.01	0.00	0.00	0.00	0.32	0.00	0.00	0.00
		Haul truck		1	2	450	No	0.4	2/1/2026	3/31/2026	2026	10	0.01	0.03	0.34	1,015.04	0.06	0.02	0.01	0.00	0.00	0.00	0.21	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	5	97	Yes	1.2	2/1/2026	3/31/2026	2026	29	0.10	1.27	0.86	215.92	0.06	0.06	0.00	0.00	0.02	0.01	3.32	0.00	0.00	0.00
	Site grading and drainage	Dozer	7	1	4	97	Yes	0.1	4/1/2026	4/30/2026	2026	2	0.15	1.44	1.18	245.81	0.10	0.09	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00
		Compactor	3	1	4	45	Yes	0.1	4/1/2026	4/30/2026	2026	2	0.19	1.73	1.43	245.73	0.04	0.03	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	5	97	Yes	0.6	4/1/2026	4/30/2026	2026	14	0.10	1.27	0.86	215.92	0.06	0.06	0.00	0.00	0.01	0.01	1.66	0.00	0.00	0.00
	Site paving	Paving equipment	11	1	7	132	Yes	0.25	5/1/2026	5/15/2026	2026	6	0.06	1.10	0.40	186.11	0.02	0.02	0.00	0.00	0.01	0.00	1.14	0.00	0.00	0.00
		Compactor/roller	4	1	7	80	Yes	0.25	5/1/2026	5/15/2026	2026	6	0.12	1.34	1.04	233.47	0.08	0.07	0.00	0.00	0.00	0.00	0.86	0.00	0.00	0.00
		Asphalt haul trucks		3	4	450	No	0.25	5/1/2026	5/15/2026	2026	6	0.01	0.03	0.34	1,015.04	0.06	0.02	0.01	0.00	0.00	0.00	0.81	0.00	0.00	0.00
		Cement and mortar mixers	2	1	3	89	Yes	0.25	5/1/2026	5/15/2026	2026	6	0.10	1.79	0.56	287.86	0.03	0.02	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00
All-Phases								36	Start Date	End Date			ROG	CO	NOx	CO2	PM10	PM2.5	SOx	ROG	CO	NOx	CO2	PM10	PM2.5	SOx
	General: project management	Pickup trucks		3	2	300	No	12	1/1/2027	12/31/2027	2027	288	0.01	0.72	0.05	312.10	0.02	0.01	0.00	0.00	0.01	0.00	5.94	0.00	0.00	0.00
		Generator sets	10	1	1	84	Yes	1.8	1/1/2027	12/31/2027	2027	43	0.16	2.01	1.78	318.50	0.03	0.03	0.00	0.00	0.01	0.01	1.27	0.00	0.00	0.00
		Forklift	9	1	3	89	Yes	12	1/1/2027	12/31/2027	2027	288	0.04	0.67	0.37	120.54	0.03	0.02	0.00	0.00	0.06	0.03	10.22	0.00	0.00	0.00
		Welders	14	3	1	46	Yes	7.2	1/1/2027	12/31/2027	2027	173	0.08	0.89	0.69	118.13	0.01	0.01	0.00	0.00	0.02	0.02	3.11	0.00	0.00	0.00
		Construction equipment (other)	5	1	2	172	Yes	12	1/1/2027	12/31/2027	2027	288	0.08	1.26	0.60	221.10	0.03	0.03	0.00	0.01	0.14	0.07	24.15	0.00	0.00	0.00
	General: project management	Pickup trucks		3	2	300	No	12	1/1/2028	5/15/2028	2028	288	0.01	0.69	0.05	305.38	0.02	0.01	0.00	0.00	0.01	0.00	5.82	0.00	0.00	0.00
		Generator sets	10	1	1	84	Yes	1.8	1/1/2028	5/15/2028	2028	43	0.15	1.99	1.73	318.38	0.03	0.02	0.00	0.00	0.01	0.01	1.27	0.00	0.00	0.00
		Forklift	9	1	3	89	Yes	12	1/1/2028	5/15/2028	2028	288	0.04	0.70	0.30	131.80	0.02	0.02	0.00	0.00	0.06	0.03	11.17	0.00	0.00	0.00
		Welders	14	3	1	46	Yes	7.2	1/1/2028	5/15/2028	2028	173	0.08	0.89	0.68	118.10	0.01	0.01	0.00	0.00	0.02	0.02	3.10	0.00	0.00	0.00
		Construction equipment (other)	5	1	2	172	Yes	12	1/1/2028	5/15/2028	2028	288	0.07	1.27	0.46	226.79	0.02	0.02	0.00	0.01	0.14	0.05	24.77	0.00	0.00	0.00
Phase 2								16.5					ROG	CO	NOx	CO2	PM10	PM2.5	SOx	ROG	CO	NOx	CO2	PM10	PM2.5	SOx
	Demolition and excavation	10-yard dump trucks		2	7	450	No	0.3	1/1/2027	2/15/2027	2027	7	0.01	0.03	0.31	991.14	0.06	0.02	0.01	0.00	0.00	0.00	1.10	0.00	0.00	0.00
		Excavator	8	1	8	158	Yes	0.45	1/1/2027	2/15/2027	2027	11	0.08	1.18	0.45	195.50	0.02	0.02	0.00	0.00	0.02	0.01	2.94	0.00	0.00	0.00
		Haul trucks		8	2	450	No	0.3	1/1/2027	2/15/2027	2027	7	0.01	0.03	0.31	991.14	0.06	0.02	0.01	0.00	0.00	0.00	1.26	0.00	0.00	0.00
		Water truck		1	1	400	No	0.15	1/1/2027	2/15/2027	2027	4	0.01	0.03	0.31	991.14	0.06	0.02	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00
		Backhoe/tractors/loaders	12	1	4	97	Yes	0.15	1/1/2027	2/15/2027	2027	4	0.22	18.45	0.37	198.58	0.01	0.01	0.00	0.00	0.03	0.00	0.31	0.00	0.00	0.00
		Flatbed truck (For haul off of belt press, chem tanks, etc.)	1	1	1	400	No	1.2	1/1/2027	2/15/2027	2027	29	0.09	1.27	0.77	215.45	0.06	0.05	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00
		Pyle Driver	13	1	8	300	Yes	0.15	1/1/2027	2/15/2027	2027	4	0.11	0.58	0.77	254.22	0.03	0.03	0.00	0.00	0.01	0.01	2.42	0.00	0.00	0.00
	Install slabs and walls	Crane	6	1	7	231	Yes	2	2/16/2027	7/15/2027	2027	48	0.04	0.28	0.40	149.07	0.01	0.01	0.00	0.00	0.02	0.03	12.75	0.00	0.00	0.00
		Concrete mixer trucks		15	3	450	No	0.5	2/16/2027	7/15/2027	2027	12	0.01	0.03	0.31	991.14	0.06	0.02	0.01	0.00	0.00	0.00	5.90	0.00	0.00	0.00
		Cement and mortar mixers	2	1	3	89	Yes	0.5	2/16/2027	7/15/2027	2027	12	0.10	1.79	0.53	287.86	0.03	0.02	0.00	0.00	0.01	0.00	1.02	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	3	97	Yes	3	2/16/2027	7/15/2027	2027	72	0.09	1.27	0.77	215.45	0.06	0.05	0.00	0.00	0.03	0.02	4.98	0.00	0.00	0.00
	Install structures and equipment (other)	Crane	6	1	3	231	Yes	2.6	7/16/2027	12/31/2027	2027	62	0.04	0.28	0.40	149.07	0.01	0.01	0.00	0.00	0.01	0.02	7.11	0.00	0.00	0.00
		Haul trucks		1	2	450	No	1.3	7/16/2027	12/31/2027	2027	31	0.01	0.03	0.31	991.14	0.06	0.02	0.01	0.00	0.00	0.00	0.68	0.00	0.00	0.00
		Flatbed truck (for delivery of plate settlers, chem tanks, etc.)		1	1	400	No	0.65	7/16/2027	12/31/2027	2027	16	0.01	0.03	0.31	991.14	0.06	0.02	0.01	0.00	0.00	0.00	0.17	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	2	97	Yes	3.9	7/16/2027	12/31/2027	2027	94	0.09	1.27	0.77	215.45	0.06	0.05	0.00	0.00	0.03	0.02	4.31	0.00	0.00	0.00
	Install structures and equipment (other)	Crane	6	1	3	231	Yes	2.6	1/12028	1/31/2028	2028	62	0.04	0.28	0.37	149.07	0.01	0.01	0.00	0.00	0.01	0.02	7.11	0.00	0.00	0.00
		Haul trucks		1	2	450	No	1.3	1/12028	1/31/2028	2028	31	0.01	0.03	0.29	963.43	0.06	0.02	0.01	0.00	0.00	0.00	0.66	0.00	0.00	0.00
		Flatbed truck (for delivery of plate settlers, chem tanks, etc.)		1	1	400	No	0.65	1/12028	1/31/2028	2028	16	0.01	0.03	0.29	963.43	0.06	0.02	0.01	0.00	0.00	0.00	0.17	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	2	97	Yes	3.9	1/12028	1/31/2028	2028	94	0.08	1.29	0.63	224.12	0.05	0.04	0.00	0.00	0.03	0.01	4.49	0.00	0.00	0.00
	Yard piping and utilities	10-yard dump truck		1	3	450	No	0.6	2/1/2028	3/31/2028	2028	14	0.01	0.03	0.29	963.43	0.06	0.02	0.01	0.00	0.00	0.00	0.46	0.00	0.00	0.00
		Haul truck		1	2	450	No	0.4	2/1/2028	3/31/2028	2028	10	0.01	0.03	0.29	963.43	0.06	0.02	0.01	0.00	0.00	0.00	0.20	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	5	97	Yes	1.2	2/1/2028	3/31/2028	2028	29	0.08	1.29	0.63	224.12	0.05	0.04	0.00	0.00	0.02	0.01	3.45	0.00	0.00	0.00
	Site grading and drainage	Dozer	7	1	4	97	Yes	0.1	4/1/2028	4/30/2028	2028	2	0.11	1.45	0.76	263.12	0.06	0.06	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00
		Compactor	3	1	4	45	Yes	0.1	4/1/2028	4/30/2028	2028	2	0.19	1.78	1.41	245.73	0.03	0.03	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	5	97	Yes	0.6	4/1/2028	4/30/2028	2028	14	0.08	1.29	0.63	224.12	0.05	0.04	0.00	0.00	0.01	0.00	1.73	0.00	0.00	0.00
	Site paving	Paving equipment	11	1	7	132	Yes	0.4	5/1/2028	5/15/2028	2028	10	0.06	1.10	0.30	186.82	0.01	0.01	0.00	0.00	0.01	0.00	1.83	0.00	0.00	0.00
		Compactor/roller	4	1	7	80	Yes	0.4	5/1/2028	5/15/2028	2028	10	0.10	1.38	0.76	250.90	0.06	0.05	0.00	0.00	0.01	0.00	1.49	0.00	0.00	0.00
		Asphalt haul trucks		3	4	450	No	0.4	5/1/2028	5/15/2028	2028	10	0.01	0.03	0.29	963.43	0.06	0.02	0.01	0.00	0.00	0.00	1.22	0.00	0.00	0.00
		Cement and mortar mixers	2	1	3	89	Yes	0.4	5/1/2028	5/15/2028	2028	10	0.10	1.80	0.49	287.86	0.02	0.02	0.00	0.00	0.01	0.00	0.81	0.00	0.00	0.00
Closeout								3																		
	General: project management	Pickup trucks		3	2	300	No	3	5/16/2028	8/15/2028	2028	72	0.01	0.69	0.05	305.38	0.02	0.01	0.00	0.00	0.00	0.00	1.45	0.00	0.00	0.00
		Generator sets	10	1	1	84	Yes	1.8	5/16/2028	8/15/2028	2028	43	0.15	1.99	1.73	318.38	0.03	0.02	0.00	0.00	0.01	0.01	1.27	0.00	0.00	0.00
		Forklift	9	1	3	89	Yes	3	5/16/2028	8/15/2028	2028	72	0.04	0.70	0.30	131.80	0.02	0.02	0.00	0.00	0.01	0.01	2.79	0.00	0.00	0.00
		Welders	14	3	1	46	Yes	7.2	5/16/2028	8/15/2028	2028	173	0.08	0.89	0.68	118.10	0.01	0.01	0.00	0.00	0.02	0.02	3.10	0.00	0.00	0.00
		Construction equipment (other)	5	1	2	172	Yes	3	5/16/2028	8/15/2028	2028	72	0.07	1.27	0.46	226.79	0.02	0.02	0.00	0.00	0.03	0.01	6.19	0.00	0.00	0.00

tons per year		0.11	1.52	0.93	333	0.05	0.04	0.00	302
pounds per day		0.28	3.83	2.35	842	0.12	0.11	0.01	
		ROG	CO	NOx	CO2	PM10	PM2.5	SOx	CO2e
tpy	2025	0.03	0.38	0.30	92	0.02	0.01	0.00	84
ppd	2025	0.23	5.26	4.13	1,280	0.21	0.19	0.01	
tpy	2026	0.02	0.33	0.20	66	0.01	0.01	0.00	60
ppd	2026	0.36	4.93	3.06	1,007	0.16	0.15	0.01	
tpy	2027	0.03	0.39	0.23	90	0.01	0.01	0.00	81
ppd	2027	0.20	5.42	3.18	1,246	0.16	0.14	0.01	
tpy	2028	0.03	0.42	0.20	85	0.01	0.01	0.00	77
ppd	2028	0.27	4.13	1.98	833	0.10	0.09	0.01	

Project Construction Emissions

Project Phase	Project activity (Stage)	Equipment	ID	No. of equipment	Average hours/day	Equipment size (horsepower/ each)	Off-road equipment (yes/no)	Average duration (months)	Overall	Overall	Year	Days														
																Emission Factor (g/hp-hr or g/mile)							Emissions (tons/yr)			
All-Phases								**36**	Start Date	End Date			ROG	CO	NOx	CO2	PM10	PM2.5	SOx	ROG	CO	NOx	CO2	PM10	PM2.5	SOx
	General: project management	Pickup trucks		3	2	300	No	12	1/1/2025	12/31/2025	2025	288	0.01	0.81	0.07	327.32	0.02	0.01	0.00	0.00	0.02	0.00	6.23	0.00	0.00	0.00
		Generator sets	10	1	1	84	Yes	1.8	1/1/2025	12/31/2025	2025	43	0.06	3.70	0.26	318.64	0.01	0.01	0.00	0.00	0.01	0.00	1.27	0.00	0.00	0.00
		Forklift	9	1	3	89	Yes	12	1/1/2025	12/31/2025	2025	288	0.06	3.70	0.26	117.95	0.01	0.01	0.00	0.01	0.31	0.02	10.00	0.00	0.00	0.00
		Welders	14	3	1	46	Yes	7.2	1/1/2025	12/31/2025	2025	173	0.12	4.10	2.75	118.21	0.01	0.01	0.00	0.00	0.11	0.07	3.11	0.00	0.00	0.00
		Construction equipment (other)	5	1	2	172	Yes	12	1/1/2025	12/31/2025	2025	288	0.06	3.70	0.26	218.90	0.01	0.01	0.00	0.01	0.40	0.03	23.91	0.00	0.00	0.00
	General: project management	Pickup trucks		3	2	300	No	12	1/1/2026	5/15/2026	2026	288	0.01	0.76	0.06	319.42	0.02	0.01	0.00	0.00	0.01	0.00	6.08	0.00	0.00	0.00
		Generator sets	10	1	1	84	Yes	1.8	1/1/2026	5/15/2026	2026	43	0.06	3.70	0.26	318.64	0.01	0.01	0.00	0.00	0.01	0.00	1.27	0.00	0.00	0.00
		Forklift	9	1	3	89	Yes	12	1/1/2026	5/15/2026	2026	288	0.06	3.70	0.26	117.95	0.01	0.01	0.00	0.01	0.31	0.02	10.00	0.00	0.00	0.00
		Welders	14	3	1	46	Yes	7.2	1/1/2026	5/15/2026	2026	173	0.12	4.10	2.75	118.21	0.01	0.01	0.00	0.00	0.11	0.07	3.11	0.00	0.00	0.00
		Construction equipment (other)	5	1	2	172	Yes	12	1/1/2026	5/15/2026	2026	288	0.06	3.70	0.26	218.90	0.01	0.01	0.00	0.01	0.40	0.03	23.91	0.00	0.00	0.00
Phase 1								**16.5**					ROG	CO	NOx	CO2	PM10	PM2.5	SOx	ROG	CO	NOx	CO2	PM10	PM2.5	SOx
	Demolition and excavation	10-yard dump trucks		2	7	450	No	0.3	1/1/2025	2/15/2025	2025	7	0.01	0.03	0.37	1,036.21	0.06	0.02	0.01	0.00	0.00	0.00	1.15	0.00	0.00	0.00
		Excavator	8	1	8	158	Yes	0.45	1/1/2025	2/15/2025	2025	11	0.06	3.70	0.26	195.39	0.01	0.01	0.00	0.00	0.06	0.00	2.94	0.00	0.00	0.00
		Haul trucks		8	2	450	No	0.3	1/1/2025	2/15/2025	2025	7	0.01	0.03	0.37	1,036.21	0.06	0.02	0.01	0.00	0.00	0.00	1.32	0.00	0.00	0.00
		Water truck		1	1	400	No	0.15	1/1/2025	2/15/2025	2025	4	0.01	0.03	0.37	1,036.21	0.06	0.02	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00
		Plate compactors	12	1	2	8	Yes	0.15	1/1/2025	2/15/2025	2025	4	0.28	23.53	0.48	254.36	0.02	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	4	97	Yes	1.2	1/1/2025	2/15/2025	2025	29	0.06	3.70	0.26	212.98	0.01	0.01	0.00	0.00	0.05	0.00	2.62	0.00	0.00	0.00
		Pyle Driver	13	1	8	300	Yes	0.15	1/1/2025	2/15/2025	2025	4	0.06	2.20	0.26	255.82	0.01	0.01	0.00	0.00	0.02	0.00	2.44	0.00	0.00	0.00
	Install slabs and walls	Crane	6	1	7	231	Yes	2	2/16/2025	7/15/2025	2025	48	0.06	2.20	0.26	149.07	0.01	0.01	0.00	0.01	0.19	0.02	12.75	0.00	0.00	0.00
		Concrete mixer trucks		15	3	450	No	0.5	2/16/2025	7/15/2025	2025	12	0.01	0.03	0.37	1,036.21	0.06	0.02	0.01	0.00	0.00	0.00	6.17	0.00	0.00	0.00
		Cement and mortar mixers	2	1	3	89	Yes	0.5	2/16/2025	7/15/2025	2025	12	0.06	3.70	0.26	287.86	0.01	0.01	0.00	0.00	0.01	0.00	1.02	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	3	97	Yes	3	2/16/2025	7/15/2025	2025	72	0.06	3.70	0.26	212.98	0.01	0.01	0.00	0.00	0.09	0.01	4.92	0.00	0.00	0.00
	Install structures and equipment (other)	Crane	6	1	3	231	Yes	2.6	7/16/2025	12/31/2025	2025	62	0.06	2.20	0.26	149.07	0.01	0.01	0.00	0.00	0.10	0.01	7.11	0.00	0.00	0.00
		Haul trucks		1	2	450	No	1.3	7/16/2025	12/31/2025	2025	31	0.01	0.03	0.37	1,036.21	0.06	0.02	0.01	0.00	0.00	0.00	0.71	0.00	0.00	0.00
		Flatbed truck (For delivery of centrifuge, chem tanks, etc.)		1	1	400	No	0.65	7/16/2025	12/31/2025	2025	16	0.01	0.03	0.37	1,036.21	0.06	0.02	0.01	0.00	0.00	0.00	0.18	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	2	97	Yes	3.9	7/16/2025	12/31/2025	2025	94	0.06	3.70	0.26	212.98	0.01	0.01	0.00	0.00	0.07	0.01	4.26	0.00	0.00	0.00
	Install structures and equipment (other)	Crane	6	1	3	231	Yes	2.6	1/1/2026	1/31/2026	2026	62	0.06	2.20	0.26	149.07	0.01	0.01	0.00	0.00	0.10	0.01	7.11	0.00	0.00	0.00
		Haul trucks		1	2	450	No	1.3	1/1/2026	1/31/2026	2026	31	0.01	0.03	0.34	1,015.04	0.06	0.02	0.01	0.00	0.00	0.00	0.70	0.00	0.00	0.00
		Flatbed truck (For delivery of centrifuge, chem tanks, etc.)		1	1	400	No	0.65	1/1/2026	1/31/2026	2026	16	0.01	0.03	0.34	1,015.04	0.06	0.02	0.01	0.00	0.00	0.00	0.17	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	2	97	Yes	3.9	1/1/2026	1/31/2026	2026	94	0.06	3.70	0.26	212.98	0.01	0.01	0.00	0.00	0.07	0.01	4.26	0.00	0.00	0.00
	Yard piping and utilities	10-yard dump truck		1	3	450	No	0.4	2/1/2026	3/31/2026	2026	10	0.01	0.03	0.34	1,015.04	0.06	0.02	0.01	0.00	0.00	0.00	0.32	0.00	0.00	0.00
		Haul truck		1	2	450	No	0.4	2/1/2026	3/31/2026	2026	10	0.01	0.03	0.34	1,015.04	0.06	0.02	0.01	0.00	0.00	0.00	0.21	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	5	97	Yes	1.2	2/1/2026	3/31/2026	2026	29	0.06	3.70	0.26	212.98	0.01	0.01	0.00	0.00	0.06	0.00	3.28	0.00	0.00	0.00
	Site grading and drainage	Dozer	7	1	4	97	Yes	0.1	4/1/2026	4/30/2026	2026	2	0.06	3.70	0.26	240.87	0.01	0.01	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00
		Compactor	3	1	4	45	Yes	0.1	4/1/2026	4/30/2026	2026	2	0.12	4.10	2.75	245.73	0.01	0.01	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	5	97	Yes	0.6	4/1/2026	4/30/2026	2026	14	0.06	3.70	0.26	212.98	0.01	0.01	0.00	0.00	0.03	0.00	1.64	0.00	0.00	0.00
	Site paving	Paving equipment	11	1	7	132	Yes	0.25	5/1/2026	5/15/2026	2026	6	0.06	3.70	0.26	185.63	0.01	0.01	0.00	0.00	0.02	0.00	1.13	0.00	0.00	0.00
		Compactor/roller	4	1	7	80	Yes	0.25	5/1/2026	5/15/2026	2026	6	0.06	3.70	0.26	224.69	0.01	0.01	0.00	0.00	0.01	0.00	0.83	0.00	0.00	0.00
		Asphalt haul trucks		3	4	450	No	0.25	5/1/2026	5/15/2026	2026	6	0.01	0.03	0.34	1,015.04	0.06	0.02	0.01	0.00	0.00	0.00	0.81	0.00	0.00	0.00
		Cement and mortar mixers	2	1	3	89	Yes	0.25	5/1/2026	5/15/2026	2026	6	0.06	3.70	0.26	287.86	0.01	0.01	0.00	0.00	0.01	0.00	0.51	0.00	0.00	0.00
All-Phases								**36**	Start Date	End Date			ROG	CO	NOx	CO2	PM10	PM2.5	SOx	ROG	CO	NOx	CO2	PM10	PM2.5	SOx
	General: project management	Pickup trucks		3	2	300	No	12	1/1/2027	12/31/2027	2027	288	0.01	0.72	0.05	312.10	0.02	0.01	0.00	0.00	0.01	0.00	5.94	0.00	0.00	0.00
		Generator sets	10	1	1	84	Yes	1.8	1/1/2027	12/31/2027	2027	43	0.06	3.70	0.26	318.64	0.01	0.01	0.00	0.00	0.01	0.00	1.27	0.00	0.00	0.00
		Forklift	9	1	3	89	Yes	12	1/1/2027	12/31/2027	2027	288	0.06	3.70	0.26	117.95	0.01	0.01	0.00	0.01	0.31	0.02	10.00	0.00	0.00	0.00
		Welders	14	3	1	46	Yes	7.2	1/1/2027	12/31/2027	2027	173	0.12	4.10	2.75	118.21	0.01	0.01	0.00	0.00	0.11	0.07	3.11	0.00	0.00	0.00
		Construction equipment (other)	5	1	2	172	Yes	12	1/1/2027	12/31/2027	2027	288	0.06	3.70	0.26	218.90	0.01	0.01	0.00	0.01	0.40	0.03	23.91	0.00	0.00	0.00
	General: project management	Pickup trucks		3	2	300	No	12	1/1/2028	5/15/2028	2028	288	0.01	0.69	0.05	305.38	0.02	0.01	0.00	0.00	0.01	0.00	5.82	0.00	0.00	0.00
		Generator sets	10	1	1	84	Yes	1.8	1/1/2028	5/15/2028	2028	43	0.06	3.70	0.26	318.64	0.01	0.01	0.00	0.00	0.01	0.00	1.27	0.00	0.00	0.00
		Forklift	9	1	3	89	Yes	12	1/1/2028	5/15/2028	2028	288	0.06	3.70	0.26	117.95	0.01	0.01	0.00	0.01	0.31	0.02	10.00	0.00	0.00	0.00
		Welders	14	3	1	46	Yes	7.2	1/1/2028	5/15/2028	2028	173	0.12	4.10	2.75	118.21	0.01	0.01	0.00	0.00	0.11	0.07	3.11	0.00	0.00	0.00
		Construction equipment (other)	5	1	2	172	Yes	12	1/1/2028	5/15/2028	2028	288	0.06	3.70	0.26	218.90	0.01	0.01	0.00	0.01	0.40	0.03	23.91	0.00	0.00	0.00
Phase 2								**16.5**					ROG	CO	NOx	CO2	PM10	PM2.5	SOx	ROG	CO	NOx	CO2	PM10	PM2.5	SOx
	Demolition and excavation	10-yard dump trucks		2	7	450	No	0.3	1/1/2027	2/15/2027	2027	7	0.01	0.03	0.31	991.14	0.06	0.02	0.01	0.00	0.00	0.00	1.10	0.00	0.00	0.00
		Excavator	8	1	8	158	Yes	0.45	1/1/2027	2/15/2027	2027	11	0.06	3.70	0.26	195.39	0.01	0.01	0.00	0.00	0.06	0.00	2.94	0.00	0.00	0.00
		Haul trucks		8	2	450	No	0.3	1/1/2027	2/15/2027	2027	7	0.01	0.03	0.31	991.14	0.06	0.02	0.01	0.00	0.00	0.00	1.26	0.00	0.00	0.00
		Water truck		1	1	400	No	0.15	1/1/2027	2/15/2027	2027	4	0.01	0.03	0.31	991.14	0.06	0.02	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00
		Backhoe/tractors/loaders	12	1	4	97	Yes	0.15	1/1/2027	2/15/2027	2027	4	0.06	3.70	0.26	254.36	0.01	0.01	0.00	0.00	0.01	0.00	0.39	0.00	0.00	0.00
		Flatbed truck (For haul off of belt press, chem tanks, etc.)	1	1	1	400	No	1.2	1/1/2027	2/15/2027	2027	29	0.09	1.27	0.77	215.45	0.06	0.05	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00
		Pyle Driver	13	1	8	300	Yes	0.15	1/1/2027	2/15/2027	2027	4	0.06	2.20	0.26	255.82	0.01	0.01	0.00	0.00	0.02	0.00	2.44	0.00	0.00	0.00
	Install slabs and walls	Crane	6	1	7	231	Yes	2	2/16/2027	7/15/2027	2027	48	0.06	2.20	0.26	149.07	0.01	0.01	0.00	0.01	0.19	0.02	12.75	0.00	0.00	0.00
		Concrete mixer trucks		15	3	450	No	0.5	2/16/2027	7/15/2027	2027	12	0.01	0.03	0.31	991.14	0.06	0.02	0.01	0.00	0.00	0.00	5.90	0.00	0.00	0.00
		Cement and mortar mixers	2	1	3	89	Yes	0.5	2/16/2027	7/15/2027	2027	12	0.06	3.70	0.26	287.86	0.01	0.01	0.00	0.00	0.01	0.00	1.02	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	3	97	Yes	3	2/16/2027	7/15/2027	2027	72	0.06	3.70	0.26	212.98	0.01	0.01	0.00	0.00	0.09	0.01	4.92	0.00	0.00	0.00
	Install structures and equipment (other)	Crane	6	1	3	231	Yes	2.6	7/16/2027	12/31/2027	2027	62	0.06	2.20	0.26	149.07	0.01	0.01	0.00	0.00	0.10	0.01	7.11	0.00	0.00	0.00
		Haul trucks		1	2	450	No	1.3	7/16/2027	12/31/2027	2027	31	0.01	0.03	0.31	991.14	0.06	0.02	0.01	0.00	0.00	0.00	0.68	0.00	0.00	0.00
		Flatbed truck (for delivery of plate settlers, chem tanks, etc.)		1	1	400	No	0.65	7/16/2027	12/31/2027	2027	16	0.01	0.03	0.31	991.14	0.06	0.02	0.01	0.00	0.00	0.00	0.17	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	2	97	Yes	3.9	7/16/2027	12/31/2027	2027	94	0.06	3.70	0.26	212.98	0.01	0.01	0.00	0.00	0.07	0.01	4.26	0.00	0.00	0.00
	Install structures and equipment (other)	Crane	6	1	3	231	Yes	2.6	1/12028	1/31/2028	2028	62	0.06	2.20	0.26	149.07	0.01	0.01	0.00	0.00	0.10	0.01	7.11	0.00	0.00	0.00
		Haul trucks		1	2	450	No	1.3	1/12028	1/31/2028	2028	31	0.01	0.03	0.29	963.43	0.06	0.02	0.01	0.00	0.00	0.00	0.66	0.00	0.00	0.00
		Flatbed truck (for delivery of plate settlers, chem tanks, etc.)		1	1	400	No	0.65	1/12028	1/31/2028	2028	16	0.01	0.03	0.29	963.43	0.06	0.02	0.01	0.00	0.00	0.00	0.17	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	2	97	Yes	3.9	1/12028	1/31/2028	2028	94	0.06	3.70	0.26	212.98	0.01	0.01	0.00	0.00	0.07	0.01	4.26	0.00	0.00	0.00
	Yard piping and utilities	10-yard dump truck		1	3	450	No	0.6	2/1/2028	3/31/2028	2028	14	0.01	0.03	0.29	963.43	0.06	0.02	0.01	0.00	0.00	0.00	0.46	0.00	0.00	0.00
		Haul truck		1	2	450	No	0.4	2/1/2028	3/31/2028	2028	10	0.01	0.03	0.29	963.43	0.06	0.02	0.01	0.00	0.00	0.00	0.20	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	5	97	Yes	1.2	2/1/2028	3/31/2028	2028	29	0.06	3.70	0.26	212.98	0.01	0.01	0.00	0.00	0.06	0.00	3.28	0.00	0.00	0.00
	Site grading and drainage	Dozer	7	1	4	97	Yes	0.1	4/1/2028	4/30/2028	2028	2	0.06	3.70	0.26	240.87	0.01	0.01	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00
		Compactor	3	1	4	45	Yes	0.1	4/1/2028	4/30/2028	2028	2	0.12	4.10	2.75	245.73	0.01	0.01	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00
		Backhoe/tractors/loaders	1	1	5	97	Yes	0.6	4/1/2028	4/30/2028	2028	14	0.06	3.70	0.26	212.98	0.01	0.01	0.00	0.00	0.03	0.00	1.64	0.00	0.00	0.00
	Site paving	Paving equipment	11	1	7	132	Yes	0.4	5/1/2028	5/15/2028	2028	10	0.06	3.70	0.26	185.63	0.01	0.01	0.00	0.00	0.04	0.00	1.82	0.00	0.00	0.00
		Compactor/roller	4	1	7	80	Yes	0.4	5/1/2028	5/15/2028	2028	10	0.06	3.70	0.26	224.69	0.01	0.01	0.00	0.00	0.02	0.00	1.33	0.00	0.00	0.00
		Asphalt haul trucks		3	4	450	No	0.4	5/1/2028	5/15/2028	2028	10	0.01	0.03	0.29	963.43	0.06	0.02	0.01	0.00	0.00	0.00	1.22	0.00	0.00	0.00
		Cement and mortar mixers	2	1	3	89	Yes	0.4	5/1/2028	5/15/2028	2028	10	0.06	3.70	0.26	287.86	0.01	0.01	0.00	0.00	0.01	0.00	0.81	0.00	0.00	0.00
Closeout								**3**																		
	General: project management	Pickup trucks		3	2	300	No	3	5/16/2028	8/15/2028	2028	72	0.01	0.69	0.05	305.38	0.02	0.01	0.00	0.00	0.00	0.00	1.45	0.00	0.00	0.00
		Generator sets	10	1	1	84	Yes	1.8	5/16/2028	8/15/2028	2028	43	0.06	3.70	0.26	318.64	0.01	0.01	0.00	0.00	0.01	0.00	1.27	0.00	0.00	0.00
		Forklift	9	1	3	89	Yes	3	5/16/2028	8/15/2028	2028	72	0.06	3.70	0.26	117.95	0.01	0.01	0.00	0.00	0.08	0.01	2.50	0.00	0.00	0.00
		Welders	14	3	1	46	Yes	7.2	5/16/2028	8/15/2028	2028	173	0.12	4.10	2.75	118.21	0.01	0.01	0.00	0.00	0.11	0.07	3.11	0.00	0.00	0.00
		Construction equipment (other)	5	1	2	172	Yes	3	5/16/2028	8/15/2028	2028	72	0.06	3.70	0.26	218.90	0.01	0.01	0.00	0.00	0.10	0.01	5.98	0.00	0.00	0.00

tons per year		0.11	5.51	0.76	329	0.02	0.01	0.00	298
pounds per day		0.27	13.9	1.92	831	0.04	0.04	0.01	
		ROG	CO	NOx	CO2	PM10	PM2.5	SOx	CO2e
tpy	2025	0.03	1.45	0.18	92	0.00	0.00	0.00	84
ppd	2025	0.20	20.1	2.57	1,280	0.06	0.05	0.01	
tpy	2026	0.02	1.17	0.15	66	0.00	0.00	0.00	60
ppd	2026	0.33	17.7	2.33	996	0.05	0.04	0.01	
tpy	2027	0.03	1.40	0.18	89	0.00	0.00	0.00	81
ppd	2027	0.19	19.5	2.52	1,240	0.06	0.05	0.01	
tpy	2028	0.03	1.50	0.24	82	0.00	0.00	0.00	74
ppd	2028	0.28	14.7	2.37	801	0.04	0.03	0.01	

Tier 4	EF (g/hp-hr)	HP	Annual Emissions (tons)	Daily Emissions (lbs)		
NOx	0.50	670	0.04	1.48	100	hours per year
CO	2.60	670	0.19	7.68	2	hours per day
SOx	1.84	670	0.14	5.42		
PM10/PM2.5	0.03	670	0.00	0.09		
CO2	526	670	38.9	1,554	35.3	metric tons
TOC (ROG)	0.19	670	0.01	0.56		

Source:
http://www.ourair.org/dice/emission-factors-2/
Nonroad CI Engine Emission Standards from Title 13, California Code of Regulations, Section 2423

	EF (lb/hp-hr)	EF (g/hp-hr)		
			3,473	gallons
NOx (Uncontrolled)	0.024	10.88623		
NOx (Controlled)	0.013	5.896708	10.15	kg/CO2/gal
CO	0.0055	2.494761		
SOx	0.000809	0.366957		
PM10/PM2.5	0.0007	0.317515		
CO2	1.16	526.1678		
TOC (ROG)	0.000705	0.319783		

Source: USEPA AP-42 Section 3.4

Attachment B

Health Risk Assessment Results

- **Construction - Unmitigated**
- **Construction – Mitigated**
- **Operations – Generator**

Attachment B

Health Risk Assessment Methodology and Assumptions

A health risk assessment (HRA) is accomplished in four steps: 1) hazards identification, 2) exposure assessment, 3) toxicity assessment, and 4) risk characterization. These steps cover the estimation of air emissions, the estimation of the air concentrations resulting from a dispersion analysis, the incorporation of the toxicity of the pollutants emitted, and the characterization of the risk based on exposure parameters such as breathing rate, age adjustment factors, and exposure duration; each depending on receptor type (i.e., residence, school, daycare centers, hospitals, senior care facilities, recreational areas, adult, infant, child).

This HRA was conducted in accordance with technical guidelines developed by federal, state, and regional agencies, including U.S. Environmental Protection Agency (USEPA), California Environmental Protection Agency (CalEPA), California Office of Environmental Health Hazard Assessment (OEHHA) *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*[1] and the Bay Area Air Quality Management District (BAAQMD) *Health Risk Screening Analysis Guidelines*.[2] This HRA addresses the emissions from construction activities including onsite equipment and haul trucks. Specific focus is on diesel particulate matter (DPM) and particulate matter equal to or less than 2.5 micrometers (fine particulate or $PM_{2.5}$) emissions. Gasoline-fueled vehicles emit air toxics in much smaller quantities and toxicity levels compared to DPM. Thus, gasoline-fueled emission sources were not included in the HRA. Secondly, air toxics emissions from project operations is not expected to be substantial (as shown in Section 7 of the Air Quality Technical Report incremental increases in operational emissions due to employee vehicles, and delivery trucks would be well below significance thresholds and not a large source of air toxics) and thus, the HRA focused on construction equipment emissions of DPM.

According to CalEPA, a HRA should not be interpreted as the expected rates of cancer or other potential human health effects, but rather as estimates of potential risk or likelihood of adverse effects based on current knowledge, under a number of highly conservative assumptions and the best assessment tools currently available.

TERMS AND DEFINITIONS

As the practice of conducting an HRA is particularly complex and involves concepts that are not altogether familiar to most people, several terms and definitions are provided that are considered essential to the understanding of the approach, methodology and results:

> *Acute effect* – a health effect (non-cancer) produced within a short period of time (few minutes to several days) following an exposure to toxic air contaminants (TAC).

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[1] Office of Environmental Health Hazard Assessment, *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*, March 6, 2015, http://oehha.ca.gov/air/hot_spots/hotspots2015.html.

[2] Bay Area Air Quality Management District, *Health Risk Screening Analysis Guidelines*, January 2010, http://www.baaqmd.gov/~/media/Files/Engineering/Air%20Toxics%20Programs/hrsa_guidelines.ashx

Cancer risk – the probability of an individual contracting cancer from a lifetime (i.e., 70 year) exposure to TAC such as DPM in the ambient air.

Chronic effect – a health effect (non-cancer) produced from a continuous exposure occurring over an extended period (weeks, months, years).

Hazard Index (HI) – the unitless ratio of an exposure level over the acceptable reference dose. The HI can be applied to multiple compounds in an additive manner.

Hazard Quotient (HQ) – the unitless ratio of an exposure level over the acceptable reference dose. The HQ is applied to individual compounds.

Toxic Air Contaminants – any air pollutant that can cause short-term (acute) and/or long-term (chronic or carcinogenic, i.e., cancer causing) adverse human health effects (i.e., injury or illness). The current California list of TAC lists approximately 200 compounds, including particulate emissions from diesel-fueled engines.

Human Health Effects - comprise disorders such as eye watering, respiratory or heart ailments, and other (i.e., non-cancer) related diseases.

Health Risk Assessment – an analysis designed to predict the generation and dispersion of TAC in the outdoor environment, evaluate the potential for exposure of human populations, and to assess and quantify both the individual and population-wide health risks associated with those levels of exposure.

Incremental – under CEQA, the net difference (or change) in conditions or impacts when comparing the baseline to future year project conditions.

Maximum exposed individual (MEI) – an individual assumed to be located at the point where the highest concentrations of TAC, and therefore, health risks are predicted to occur.

Non-cancer risks – health risks such as eye watering, respiratory or heart ailments, and other non-cancer related diseases.

Receptors – the locations where potential health impacts or risks are predicted (i.e., schools, residences, and recreational sites).

LIMITATIONS AND UNCERTAINTIES

There are several important limitations and uncertainties commonly associated with an HRA due to the wide variability of human exposures to TAC, the extended timeframes over which the exposures are evaluated, and the inability to verify the results. Limitations and uncertainties associated with the HRA and identified by the CalEPA include: (a.) lack of reliable monitoring data; (b.) extrapolation of toxicity data in animals to humans; (c.) estimation errors in calculating TAC emissions; (d.) concentration prediction errors with dispersion models; and (e.) the variability in lifestyles, fitness and other confounding factors of the human population. This HRA was performed using the best available data and methodologies, notwithstanding the following uncertainties:

- There are uncertainties associated with the estimation of emissions from project activities. Where project-specific data, such as emission factors, are not available, default assumptions in emission models were used.
- The limitations of the air dispersion model provide a source of uncertainty in the estimation of exposure concentrations. According to USEPA, errors due to the limitation of the algorithms implemented in the air dispersion model in the highest estimated concentrations of +/- 10 percent to 40 percent are typical.[3]
- The source parameters used to model emission sources add uncertainty. For all emission sources, the source parameters used source-specific, recommended as defaults, or expected to produce more conservative results. Discrepancies might exist in actual emissions characteristics of an emission source and its representation in the dispersion model.
- The exposure duration estimates do not consider that people do not usually reside at the same location for 30 years and that other exposures (i.e., school children) are also of much shorter durations than was assumed in this HRA. This exposure duration is a highly conservative assumption, since most people do not remain at home all day and on average residents change residences every 11 to 12 years. In addition, this assumption adopts that residents are experiencing outdoor concentrations for the entire exposure period.
- For the risk and hazards calculations as well as the cumulative health impact, numerous assumptions must be made in order to estimate human exposure to pollutants. These assumptions include parameters such as breathing rates, exposure time and frequency, exposure duration, and human activity patterns. While a mean value derived from scientifically defensible studies is the best estimate of central tendency, most of the exposure variables used in this HRA are high-end estimates. The combination of several high-end estimates used as exposure parameters may substantially overestimate pollutant intake. The excess lifetime cancer risks calculated in this HRA are therefore likely to be higher than may be required to be protective of public health.
- The Cal/EPA cancer potency factor for DPM was used to estimate cancer risks associated with exposure to DPM emissions from construction activities. However, the cancer potency factor derived by Cal/EPA for DPM is highly uncertain in both the estimation of response and dose. In the past, due to inadequate animal test data and epidemiology data on diesel exhaust, the International Agency for Research on Cancer (IARC), a branch of the World Health Organization, had classified DPM as Probably Carcinogenic to Humans (Group 2); the USEPA had also concluded that the existing data did not provide an adequate basis for quantitative risk assessment.[4] However, based on two recent scientific studies,[5] IARC recently re-classified DPM

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[3] US Environmental Protection Agency, *Guideline on Air Quality Models (Revised), 40 Code of Federal Regulations, Part 51, Appendix W,* November 2005, https://www3.epa.gov/scram001/guidance/guide/appw_05.pdf

[4] US Environmental Protection Agency, *Health Assessment Document for Diesel Engine Exhaust*, May 2002, https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=29060

as Carcinogenic to Humans to Group 1,[6] which means that the agency has determined that there is "sufficient evidence of carcinogenicity" of a substance in humans and represents the strongest weight-of-evidence rating in IARC's carcinogen classification scheme. This determination by the IARC may provide additional impetus for the USEPA to identify a quantitative dose-response relationship between exposure to DPM and cancer.

In summary, the estimated health impacts are based primarily on a series of conservative assumptions related to predicted environmental concentrations, exposure, and chemical toxicity. The use of conservative assumptions tends to produce upper-bound estimates of risk. BAAQMD acknowledges this uncertainty by stating: "the methods used [to estimate risk] are conservative, meaning that the real risks from the source may be lower than the calculations, but it is unlikely that they will be higher." The USEPA notes that the conservative assumptions used in a HRA are intended to assure that the estimated risks do not underestimate the actual risks posed by a site and that the estimated risks do not necessarily represent actual risks experienced by populations at or near a site.[7]

HAZARDS IDENTIFICATION

California Air Resources Board (CARB) has developed a list of TAC, where a TAC is "an air pollutant which may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health (California Health and Safety Code Section 39655). All USEPA hazardous air pollutants are TAC. CARB administers the Air Toxics "Hot Spots" program under Assembly Bill 2588 "Hot Spots" Information and Assessment Act, which requires periodic local review of facilities which emit TAC. Local air agencies periodically must prioritize stationary sources of TAC and prepare health risk assessments for high-priority sources.

Diesel exhaust is a complex mixture of numerous individual gaseous and particulate compounds emitted from diesel-fueled combustion engines. Diesel particulate matter is formed primarily through the incomplete combustion of diesel fuel. DPM is removed from the atmosphere through physical processes including atmospheric fall-out and washout by rain. Humans can be exposed to airborne DPM by deposition on water, soil, and vegetation; although the main pathway of exposure is inhalation. Cal/EPA has concluded that potential cancer risk from inhalation exposure to whole diesel exhaust outweigh the multi-pathway cancer risk from the speciated components.

In August 1998, the CARB identified DPM as an air toxic. CARB developed the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel- Fueled Engines and Vehicles* and *Risk Management Guidance for the Permitting of New Stationary Diesel-Fueled Engines* and approved these documents on

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[5] Attfield MD, Schleiff PL, Lubin JH, Blair A, Stewart PA, Vermeulen R, Coble JB, Silverman DT, *The Diesel Exhaust in Miners Study: A Nested Case-Control Study of Lung Cancer and Diesel Exhaust*, June 2012, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3369553/

[6] International Agency for Research on Cancer, *Diesel Engine Exhaust Carcinogenic*, June 2012, https://www.iarc.fr/en/media-centre/pr/2012/pdfs/pr213_E.pdf

[7] US Environmental Protection Agency, *Risk Assessment Guidance for Superfund Human Health Risk Assessment*, December 1989, https://www.epa.gov/sites/production/files/2015-09/documents/rags_a.pdf

September 28, 2000.[8] [9] The documents represent proposals to reduce DPM emissions, with the goal of reducing emissions and the associated health risk by 75 percent in 2010 and by 85 percent in 2020. The program aimed to require the use of state-of-the-art catalyzed DPM filters and ultra-low-sulfur diesel fuel.

In 2001, CARB assessed the state-wide health risks from exposure to diesel exhaust and to other toxic air contaminants. It is difficult to distinguish the health risks of diesel emissions from those of other air toxics, since diesel exhaust contains approximately 40 different TAC. The CARB study detected diesel exhaust by using ambient air carbon soot measurements as a surrogate for diesel emissions. The study reported that the state-wide cancer risk from exposure to diesel exhaust was about 540 per million population as compared to a total risk for exposure to all ambient air toxics of 760 per million. This estimate, which accounts for about 70 percent of the total risk from TAC, included both urban and rural areas in the state. The estimate can also be considered an average worst-case for the state, since it assumes constant exposure to outdoor concentrations of diesel exhaust and does not account for expected lower concentrations indoors, where most of time is spent. DPM is estimated to increase statewide cancer risk by 520 cancers per million residents exposed over a lifetime.[10]

Exposure to DPM results in a greater incidence of chronic non-cancer health effects, such as cough, labored breathing, chest tightness, wheezing, and bronchitis. Individuals particularly vulnerable to DPM are children, whose lung tissue is still developing, the elderly and people with illnesses who may have other serious health problems that can be aggravated by exposure to DPM. In general, children are more vulnerable than adults to air pollutants because they have higher inhalation rates, narrower airways, and less mature immune systems. In addition, children with allergies may have an enhanced allergic response when exposed to diesel exhaust.

EXPOSURE ASSESSMENT

Dispersion is the process by which atmospheric pollutants disseminate due to wind and vertical stability. The results of a dispersion analysis are used to assess pollutant concentrations at or near an emission source. The results of an analysis allow predicted concentrations of pollutants to be compared directly to air quality standards and other criteria such as health risks based on modeled concentrations.

A rising pollutant plume reacts with the environment in several ways before it levels off. First, the plume's own turbulence interacts with atmospheric turbulence to entrain ambient air. This mixing process reduces and eventually eliminates the density and momentum differences that cause the plume to rise. Second, the wind transports the plume during its rise and entrainment process. Higher winds mix the plume more rapidly, resulting in a lower final rise. Third, the plume interacts with the vertical temperature stratification of the atmosphere, rising as a result of buoyancy in the unstable-to-neutrally

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[8] California Air Resources Board, *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles,* October 2000, http://www.arb.ca.gov/diesel/documents/rrpfinal.pdf

[9] California Air Resources Board, *Risk Management Guidance for the Permitting of New Stationary Diesel-Fueled Engines,* October 2000, https://www.arb.ca.gov/diesel/documents/rmgFinal.pdf

[10] California Air Resources Board, *Summary: Diesel Particulate Matter Health Impacts*, April 12, 2016, https://www.arb.ca.gov/research/diesel/diesel-health_summ.htm

stratified mixed layer. However, after the plume encounters the mixing lid and the stably stratified air above, its vertical motion is dampened.

Molecules of gas or small particles injected into the atmosphere will separate from each other as they are acted on by turbulent eddies. The Gaussian mathematical model such as AERMOD simulates the dispersion of the gas or particles within the atmosphere. The formulation of the Gaussian model is based on the following assumptions:

- The predictions are not time-dependent (all conditions remain unchanged with time)
- The wind speed and direction are uniform, both horizontally and vertically, throughout the region of concern
- The rate of diffusion is not a function of position
- Diffusion in the direction of the transporting wind is negligible when compared to the transport flow

Dispersion Modeling Approach

Air dispersion modeling was performed to estimate the downwind dispersion of DPM exhaust emissions resulting from construction activities. The following sections present the fundamental components of an air dispersion modeling analysis including air dispersion model selection and options, receptor locations, meteorological data, and source exhaust parameters.

Model Selection and Options

AERMOD (Version 23132)[11] was used for the dispersion analysis. AERMOD is the USEPA preferred atmospheric dispersion modeling system for general industrial sources. The model can simulate point, area, volume, and line sources. AERMOD is the appropriate model for this analysis based on the coverage of simple, intermediate, and complex terrain. It also predicts both short-term and long-term (annual) average concentrations. The model was executed using the regulatory default options (stack-tip downwash, buoyancy-induced dispersion, and final plume rise), default wind speed profile categories, default potential temperature gradients, and assuming no pollutant decay.

The selection of the appropriate dispersion coefficients depends on the land use within three kilometers (km) of the project site. The types of land use were based on the classification method defined by Auer (1978); using pertinent United States Geological Survey (USGS) 1:24,000 scale (7.5 minute) topographic maps of the area. If the Auer land use types of heavy industrial, light-to-moderate industrial, commercial, and compact residential account for 50 percent or more of the total area, the USEPA *Guideline on Air Quality Models*[12] recommends using urban dispersion coefficients; otherwise, the appropriate rural coefficients can be used. Based on observation of the area surrounding the project

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[11] US Environmental Protection Agency, AERMOD Modeling System, https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models

[12] US Environmental Protection Agency, *Guideline on Air Quality Models (Revised), 40 Code of Federal Regulations, Part 51, Appendix W*, November 2005, https://www3.epa.gov/scram001/guidance/guide/appw_05.pdf

site, rural (urban is only designated within dense city centers such as downtown San Francisco) dispersion coefficients were applied within AERMOD.

Receptor Locations

Some receptors are considered more sensitive to air pollutants than others, because of preexisting health problems, proximity to the emissions source, or duration of exposure to air pollutants. Land uses such as primary and secondary schools, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because the very young, the old, and the infirm are more susceptible to respiratory infections and other air quality-related health problems than the general public. Residential areas are also considered sensitive to poor air quality because people in residential areas are often at home for extended periods. Recreational land users are moderately sensitive to air pollution because vigorous exercise associated with recreation places having a high demand on respiratory system function.

BAAQMD considers the relevant zone of influence for an assessment of air quality health risks to be within 1,000 feet of a project site. The WTP is in proximity to residential zoned land. The project site is within 1,000 feet of residence to the south, west, and northwest. Toyon Elementary School is located within 0.6 miles to the southwest of the project site. **Figure B-1** displays the sensitive receptors within 1,000 feet of the project site. The sensitive receptors include residences, school, assisted living facilities, and day care. Receptors were placed at a height of 1.8 meters (typical breathing height). No school, assisted living facilities, and day care are located within 1,000 feet of the project site. Terrain elevations for receptor locations were used based on available USGS information for the area.

Meteorological Data

Hourly meteorological data from San Jose International Airport (surface data), located approximately 5.7 miles to the west-southwest of the proposed project, and Oakland International Airport (upper air) were used in the dispersion modeling analysis. **Figure B-3** displays the annual wind rose. Wind directions are predominantly from the northwest and southeast with a low frequency of calm wind speed conditions (1.2 percent), as shown in **Figure B-4**. The average annual wind speed is 7.1 miles per hour (3.2 meters per second).

Figure B-1
Health Risk Assessment Sensitive Receptors

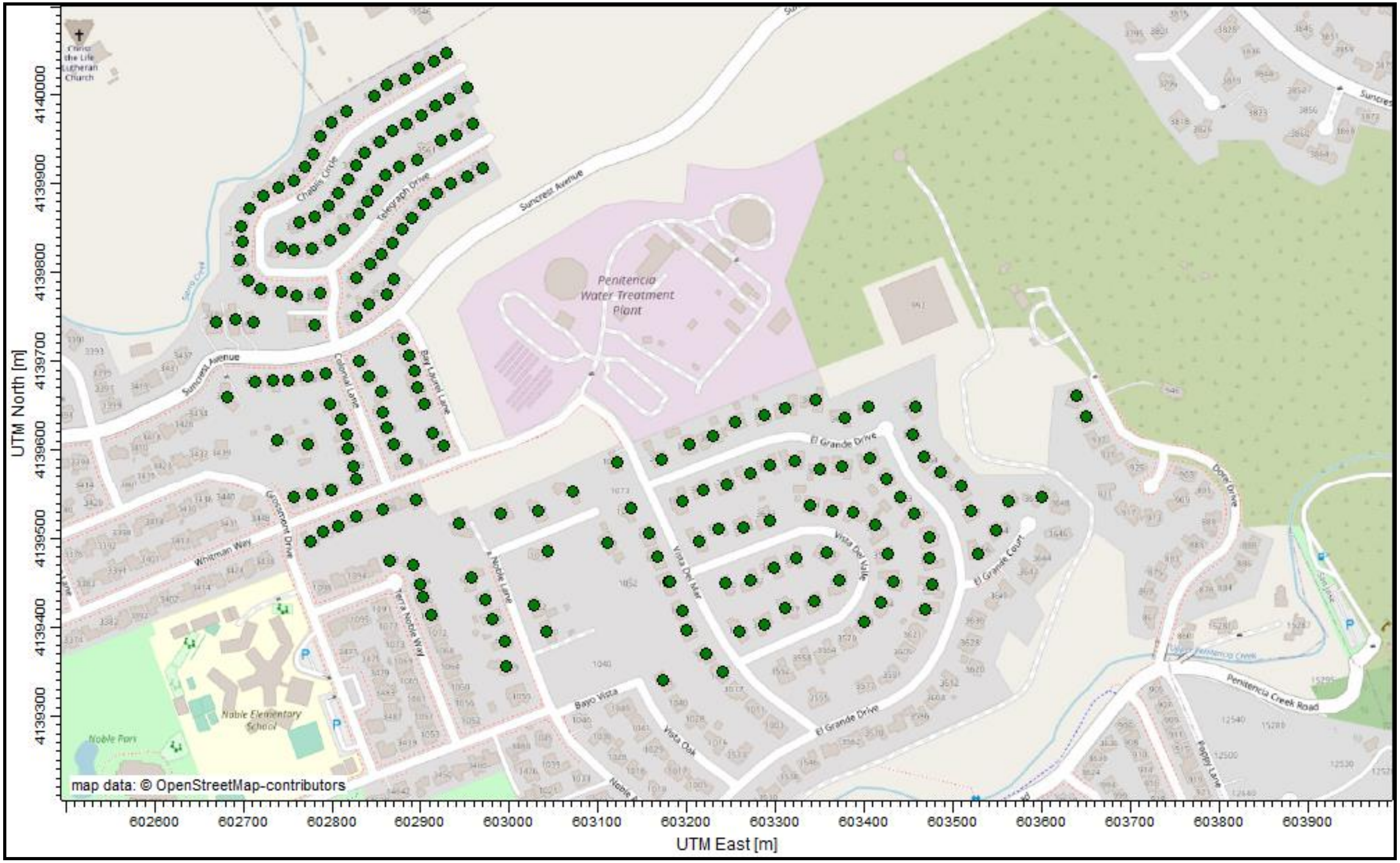


Figure B-2
Windrose for San Jose International Airport

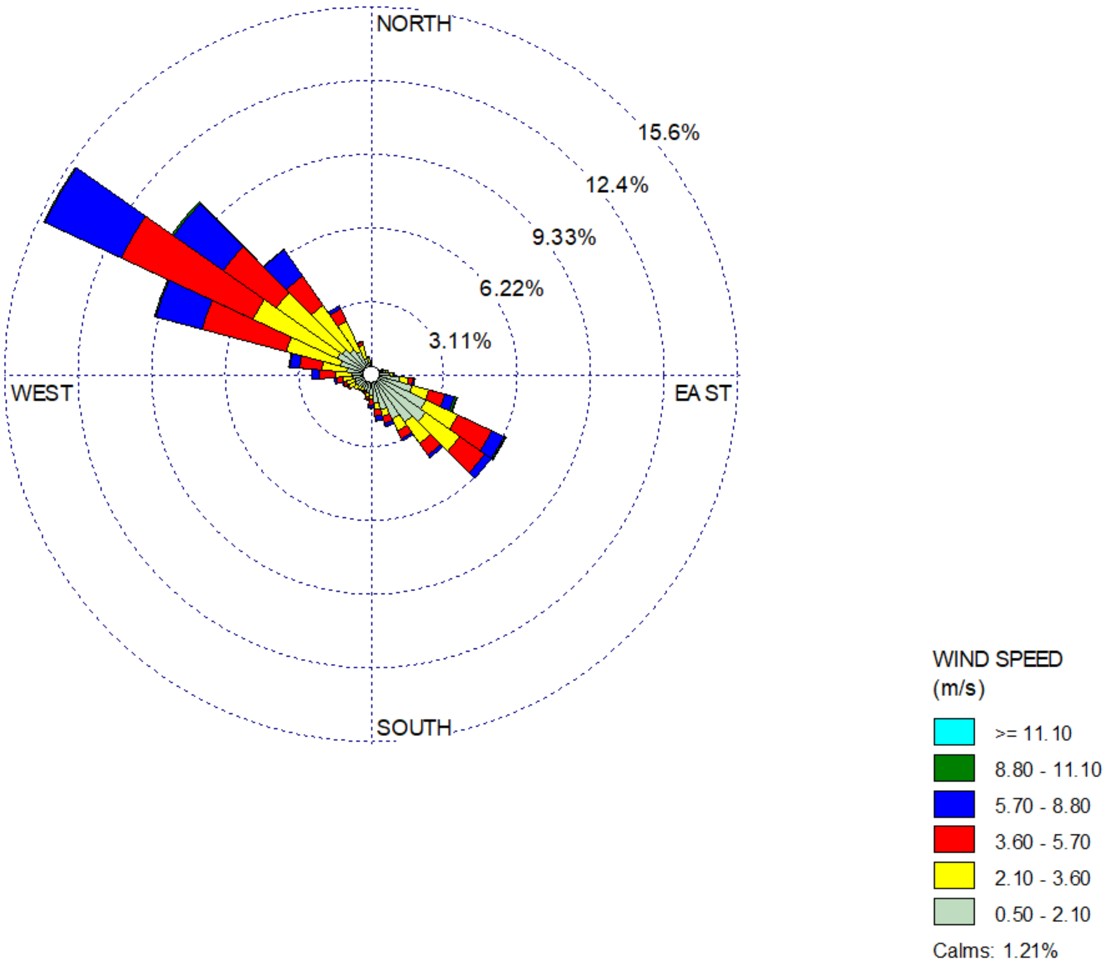
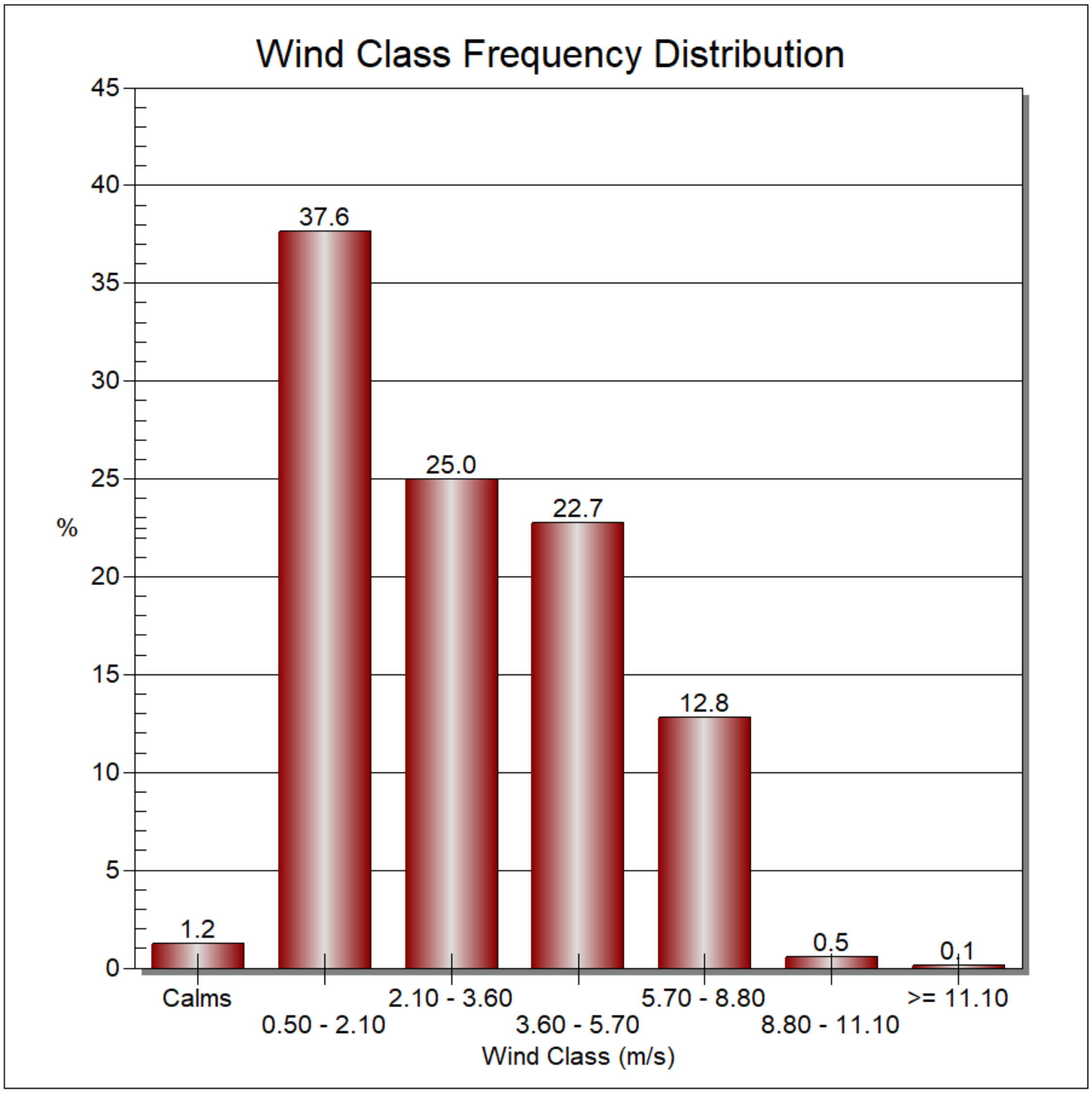


Figure B-4
Wind Speed Distribution for San Jose International Airport



Source Release Characteristics

Construction equipment activities were treated as an area source. The release height of the off-road equipment exhaust was 5.0 meters (16.4 feet) and an initial vertical dimension of 1.4 meters (4.6 feet), which reflects the height of the equipment plus an additional height of the exhaust plume above the exhaust point to account for plume rise due to buoyancy and momentum. Fugitive dust-generating activities were treated as an area source. The release height of the fugitive dust was 0.0 meters (0.0 feet) and an initial vertical dimension of 1.0 meter (3.3 feet). Haul trucks were treated as a line source (i.e., volume sources placed at regular intervals) located along an access road. The haul trucks were assigned a release height of 5.0 meters (16.4 feet) and an initial vertical dimension of 1.4 meters (4.6 feet), which accounts for dispersion from the movement of vehicles.[13] [14]

Construction activities would be conducted from 7 a.m. to 7 p.m. Monday through Friday and from 8:00 a.m. to 5:00 p.m. on Saturday. Construction could occur during early morning hours or outside normal working hours for specified construction activities such as concrete delivery and pours for proposed structures and buildings, during outages, or to respond to unplanned disruptions in plant operations. The extended workdays would be approximately 16 hours long, and the total number of extended workdays would occur for a total of three weeks, nonconsecutively over the course of the construction period.

A new separate standby generator, rated at 500 kilowatts, would provide backup power for critical equipment in the event of power interruptions, for the sludge holding and dewatering facilities. The new standby generator would be located in the electrical building to the northeast of the washwater recovery ponds. The standby generators would be tested monthly for two hours. The new standby generator used during operations was assigned a stack with a height of 10 feet (3.0 meters), a diameter of 0.75 foot (0.2 meter), an exit temperature of 850 Fahrenheit (454 Celsius), and an exhaust flow of 3,500 cubic feet (99 cubic meters) per minute.

Terrain elevations for emission source locations were used based on available USGS information for the area. AERMAP (Version 18081)[15] was used to develop the terrain elevations.

EXPOSURE PARAMETERS

This HRA was conducted following methodologies in OEHHA's *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*.[16] This was accomplished by applying the estimated

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[13] While haul truck emissions contribute substantially to overall project emissions, they are spread over many miles. Hence, the portion of trucking emissions that would impact one receptor is much smaller than the emissions that the clustered off-road activity at the project site would impact a receptor near the site. For example, the DPM emissions from truck travel within 1,000 feet of the project are less than one percent of the total off-road DPM emissions.

[14] South Coast Air Quality Management District, Final Localized Significance Threshold Methodology. July 2008, http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/final-lst-methodology-document.pdf?sfvrsn=2

[15] US Environmental Protection Agency, AERMAP, https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models

concentrations at the receptors analyzed to the established cancer risk estimates and acceptable reference concentrations for non-cancer health effects.

OEHHA's revisions to its *Guidance Manual* were primarily designed to ensure that the greater sensitivity of children to cancer and other health risks is reflected in HRAs. For example, OEHHA now recommends that risks be analyzed separately for multiple age groups, focusing especially on young children and teenagers, rather than the past practice of analyzing risks to the general population, without distinction by age. OEHHA also now recommends that statistical "age sensitivity factors" be incorporated into an HRA, and that children's relatively high breathing rates be accounted for. On the other hand, the *Guidance Manual* revisions also include some changes that would reduce calculated health risks. For example, under the former guidance, OEHHA recommended that residential cancer risks be assessed by assuming 70 years of exposure at a residential receptor; under the *Guidance Manual*, this assumption is lessened to 30 years.

OEHHA has developed exposure factors (e.g., daily breathing rates) for six age groups including the last trimester to birth, birth to 2 years, 2 to 9 years, 2 to 16 years, 16 to 30 years, and 16 to 70 years. These age bins allow for more refined exposure information to be used when estimating exposure and the potential for developing cancer over a lifetime. This means that exposure variates are needed for the third trimester, ages zero to less than two, ages two to less than nine, ages two to less than 16, ages 16 to less than 30, and ages 16 to 70. Residential receptors utilize the 95th percentile breathing rate values. The breathing rates are age-specific and are 1,090 liters per kilogram-day for ages less than 2 years, 745 liters per kilogram-day for ages 2 to 16 years, 335 liters per kilogram-day for ages 16 to 30 years, and 290 liters per kilogram-day for ages 30 to 70 years. A school child breathing rate is 520 liters per kilogram-day and an off-site worker breathing rate is 230 liters per kilogram-day.

OEHHA developed age sensitivity factors (ASF) to consider the increased sensitivity to carcinogens during early-in-life exposures. OEHHA recommends that cancer risks be weighted by a factor of 10 for exposures that occur from the third trimester of pregnancy to 2 years of age, and by a factor of 3 for exposures from 2 years through 15 years of age.

Based on OEHHA recommendations, the cancer risk to residential receptors assumes exposure occurs 24 hours per day for 350 days per year while accounting for a percentage of time at home. OEHHA evaluated information from activity pattern databases to estimate the fraction of time at home (FAH) during the day. This information was used to adjust exposure duration and cancer risk based on the assumption that a person is not present at home continuously for 24 hours and therefore exposure to emissions is not occurring when a person is away from their home. In general, the FAH factors are age-specific and are 0.85 for ages less than 2 years, 0.72 for ages 2 to 16 years, and 0.73 for ages 30 to 70 years.

OEHHA has decreased the exposure duration currently being used for estimating cancer risk at the maximum exposed individual resident from 70 years to 30 years. This is based on studies showing that 30 years is a reasonable estimate of the 90th to 95th percentile of residency duration in the population.

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[16] Office of Environmental Health Hazard Assessment, *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*, March 6, 2015, http://oehha.ca.gov/air/hot_spots/hotspots2015.html

Additionally, OEHHA recommends using the 9 and 70-year exposure duration to represent the potential impacts over the range of residency periods.

Given the exposure durations of less than 24 hours, sensitive recreational receptors were evaluated for acute impacts only. Based on OEHHA recommendations, for children at school sites, exposure is assumed to occur 10 hours per day for 180 days (or 36 weeks) per year. Cancer risk estimates for children at school sites are calculated based on 9-year exposure duration. School sites also include teachers and other adult staff which are treated as off-site workers.

RISK CHARACTERIZATION

Cancer risk is defined as the lifetime probability of developing cancer from exposure to carcinogenic substances. Cancer risks are expressed as the chance in one million of getting cancer (i.e., number of cancer cases among one million people exposed). The cancer risks are assumed to occur exclusively through the inhalation pathway. The cancer risk can be estimated by using the cancer potency factor (milligrams per kilogram of body weight per day [mg/kg-day]), the 30-year annual average concentration (microgram per cubic meter [$\mu g/m^3$]), and the lifetime exposure adjustment.

Following guidelines established by OEHHA, the incremental cancer risks attributable to the proposed project were calculated by applying exposure parameters to modeled DPM concentrations in order to determine the inhalation dose (mg/kg-day) or the amount of pollutants inhaled per body weight mass per day. The cancer risks occur exclusively through the inhalation pathway; therefore, the cancer risks can be estimated from the following equation:

$$\text{Dose-inh} = \frac{C_{air} * \{DBR\} * A * ASF * FAH * EF * ED * 10^{-6}}{AT}$$

where:

Dose-inh = Dose of the toxic substance through inhalation in mg/kg-day

10^{-6} = Micrograms to milligrams conversion, Liters to cubic meters conversion

C_{air} = Concentration in air in microgram (μg)/cubic meter (m^3)

{DBR} = Daily breathing rate in liter (L)/kg body weight – day

A = Inhalation absorption factor, 1.0

ASF = Age Sensitivity Factor

EF = Exposure frequency (days/year)

ED = Exposure duration (years)

FAH = Fraction of Time at Home

AT = Averaging time period over which exposure is averaged in days (25,550 days for a 70-year cancer risk)

To determine incremental cancer risk, the estimated inhalation dose attributed to the proposed project was multiplied by the cancer potency slope factor (cancer risk per mg/kg-day). The cancer potency slope factor is the upper bound on the increased cancer risk from a lifetime exposure to a pollutant. These slope factors are based on epidemiological studies and are different values for different pollutants. This allows the estimated inhalation dose to be equated to a cancer risk.

Non-cancer adverse health impacts, acute (short-term) and chronic (long-term), are measured against a hazard index (HI), which is defined as the ratio of the predicted incremental exposure concentration from the proposed project to a published reference exposure level (REL) that could cause adverse health effects as established by OEHHA. The ratio (referred to as the Hazard Quotient [HQ]) of each non-carcinogenic substance that affects a certain organ system is added to produce an overall HI for that organ system. The overall HI is calculated as the total for each organ system. If the overall HI for the highest-impacted organ system is greater than one, then the impact is significant.

The HI is an expression used for the potential for non-cancer health effects. The relationship for the non-cancer health effects is given by the annual concentration (in $\mu g/m^3$) and the REL (in $\mu g/m^3$). The acute hazard index was determined using the “simple” concurrent maximum approach, which tends to be conservative (i.e., overpredicts).

The relationship for the non-cancer health effects is given by the following equation:

$$HI = C/REL$$

where:

HI = Hazard index; an expression of the potential for non-cancer health effects.

C = Annual average concentration ($\mu g/m^3$) during the 70-year exposure period.

REL = Concentration at which no adverse health effects are anticipated.

The chronic REL for DPM was established by the California OEHHA as 5 $\mu g/m^3$.[17] There is no acute REL for DPM.

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[17] Office of Environmental Health Hazards Assessment - Acute, 8-hour, and Chronic Reference Exposure Levels, June 2014, http://www.oehha.ca.gov/air/allrels.html

Health Risk Assessment Assumptions

5	Chronic Reference Exposure Level (ug/m3) for DPM	
1.1	Cancer Potency Slope Factor (cancer risk per mg/kg-day) for DPM	
350	days per year	
25,550	days per lifetime	
1,090	95th Percentile Daily Breathing Rates (L/kg-day)	0<2 Years
861	95th Percentile Daily Breathing Rates (L/kg-day)	2<9 Years
745	95th Percentile Daily Breathing Rates (L/kg-day)	2<16 Years
335	95th Percentile Daily Breathing Rates (L/kg-day)	16<30 Years
290	95th Percentile Daily Breathing Rates (L/kg-day)	30<70 Years
0.85	fraction of	0<2 Years
0.72	fraction of	2<16 Years
0.73	fraction of	16<70 Years

Project:	Penitencia Water Treatment Plant
Date:	5/7/2024
Condition:	Unmitigated Construction
Receptor:	Existing Residence
Year:	2025

Exposure Year	Calender Year	Annual DPM Concentration (ug/m3)	Annual PM2.5 Concentration (ug/m3)	Daily Breathing Rates (L/kg-day)	Exposure Factor	fraction of time at home	Cancer Risk
1	2025	0.06	0.24	1,090	10.0	0.85	8.24
2	2026	0.05	0.22	1,090	10.0	0.85	6.48
3	2027	0.05	0.22	745	4.75	0.72	1.75
4	2028	0.03	0.20	745	3.00	0.72	0.67
5	2029			745	3.00	0.72	
6	2030			745	3.00	0.72	
7	2031			745	3.00	0.72	
8	2032			745	3.00	0.72	
9	2033			745	3.00	0.72	
10	2034			745	3.00	0.72	
11	2035			745	3.00	0.72	
12	2036			745	3.00	0.72	
13	2037			745	3.00	0.72	
14	2038			745	3.00	0.72	
15	2039			745	3.00	0.72	
16	2040			745	3.00	0.72	
17	2041			335	1.70	0.73	
18	2042			335	1.00	0.73	
19	2043			335	1.00	0.73	
20	2044			335	1.00	0.73	
21	2045			335	1.00	0.73	
22	2046			335	1.00	0.73	
23	2047			335	1.00	0.73	
24	2048			335	1.00	0.73	
25	2049			335	1.00	0.73	
26	2050			335	1.00	0.73	
27	2051			335	1.00	0.73	
28	2052			335	1.00	0.73	
29	2053			335	1.00	0.73	
30	2054			335	1.00	0.73	

0.24	Maximum Annual PM2.5 Concentration (ug/m3)
0.3	Significance Threshold (ug/m3)
No	Significant?
0.01	Chronic Hazard Impact
1	Significance Threshold
No	Significant?
17.1	Cancer Risk (Child)
10	Significance Threshold
Yes	Significant?
1.12	Cancer Risk (Adult)
10	Significance Threshold
No	Significant?

Health Risk Assessment Assumptions

5	Chronic Reference Exposure Level (ug/m3) for DPM	
1.1	Cancer Potency Slope Factor (cancer risk per mg/kg-day) for DPM	
350	days per year	
25,550	days per lifetime	
1,090	95th Percentile Daily Breathing Rates (L/kg-day)	0<2 Years
861	95th Percentile Daily Breathing Rates (L/kg-day)	2<9 Years
745	95th Percentile Daily Breathing Rates (L/kg-day)	2<16 Years
335	95th Percentile Daily Breathing Rates (L/kg-day)	16<30 Years
290	95th Percentile Daily Breathing Rates (L/kg-day)	30<70 Years
0.85	fraction of	0<2 Years
0.72	fraction of	2<16 Years
0.73	fraction of	16<70 Years

Project: Penitencia Water Treatment Plant
Date: 5/7/2024
Condition: Unmitigated Construction
Receptor: Existing Residence
Year: 2026

Exposure Year	Calender Year	Annual DPM Concentration (ug/m3)	Annual PM2.5 Concentration (ug/m3)	Daily Breathing Rates (L/kg-day)	Exposure Factor	fraction of time at home	Cancer Risk
1	2026	0.05	0.22	1,090	10.0	0.85	6.48
2	2027	0.05	0.22	1,090	10.0	0.85	6.38
3	2028	0.03	0.20	745	4.75	0.72	1.06
4	2029			745	3.00	0.72	
5	2030			745	3.00	0.72	
6	2031			745	3.00	0.72	
7	2032			745	3.00	0.72	
8	2033			745	3.00	0.72	
9	2034			745	3.00	0.72	
10	2035			745	3.00	0.72	
11	2036			745	3.00	0.72	
12	2037			745	3.00	0.72	
13	2038			745	3.00	0.72	
14	2039			745	3.00	0.72	
15	2040			745	3.00	0.72	
16	2041			745	3.00	0.72	
17	2042			335	1.70	0.73	
18	2043			335	1.00	0.73	
19	2044			335	1.00	0.73	
20	2045			335	1.00	0.73	
21	2046			335	1.00	0.73	
22	2047			335	1.00	0.73	
23	2048			335	1.00	0.73	
24	2049			335	1.00	0.73	
25	2050			335	1.00	0.73	
26	2051			335	1.00	0.73	
27	2052			335	1.00	0.73	
28	2053			335	1.00	0.73	
29	2054			335	1.00	0.73	
30	2055			335	1.00	0.73	

0.22	Maximum Annual PM2.5 Concentration (ug/m3)
0.3	Significance Threshold (ug/m3)
No	Significant?
0.01	Chronic Hazard Impact
1	Significance Threshold
No	Significant?
13.9	Cancer Risk (Child)
10	Significance Threshold
Yes	Significant?
0.75	Cancer Risk (Adult)
10	Significance Threshold
No	Significant?

Health Risk Assessment Assumptions

5	Chronic Reference Exposure Level (ug/m3) for DPM	
1.1	Cancer Potency Slope Factor (cancer risk per mg/kg-day) for DPM	
350	days per year	
25,550	days per lifetime	
1,090	95th Percentile Daily Breathing Rates (L/kg-day)	0<2 Years
861	95th Percentile Daily Breathing Rates (L/kg-day)	2<9 Years
745	95th Percentile Daily Breathing Rates (L/kg-day)	2<16 Years
335	95th Percentile Daily Breathing Rates (L/kg-day)	16<30 Years
290	95th Percentile Daily Breathing Rates (L/kg-day)	30<70 Years
0.85	fraction of	0<2 Years
0.72	fraction of	2<16 Years
0.73	fraction of	16<70 Years

Project: Penitencia Water Treatment Plant
Date: 5/7/2024
Condition: Unmitigated Construction
Receptor: Existing Residence
Year: 2027

Exposure Year	Calender Year	Annual DPM Concentration (ug/m3)	Annual PM2.5 Concentration (ug/m3)	Daily Breathing Rates (L/kg-day)	Exposure Factor	fraction of time at home	Cancer Risk
1	2027	0.05	0.22	1,090	10.0	0.85	6.54
2	2028	0.03	0.20	1,090	10.0	0.85	4.00
3	2029			745	4.75	0.72	
4	2030			745	3.00	0.72	
5	2031			745	3.00	0.72	
6	2032			745	3.00	0.72	
7	2033			745	3.00	0.72	
8	2034			745	3.00	0.72	
9	2035			745	3.00	0.72	
10	2036			745	3.00	0.72	
11	2037			745	3.00	0.72	
12	2038			745	3.00	0.72	
13	2039			745	3.00	0.72	
14	2040			745	3.00	0.72	
15	2041			745	3.00	0.72	
16	2042			745	3.00	0.72	
17	2043			335	1.70	0.73	
18	2044			335	1.00	0.73	
19	2045			335	1.00	0.73	
20	2046			335	1.00	0.73	
21	2047			335	1.00	0.73	
22	2048			335	1.00	0.73	
23	2049			335	1.00	0.73	
24	2050			335	1.00	0.73	
25	2051			335	1.00	0.73	
26	2052			335	1.00	0.73	
27	2053			335	1.00	0.73	
28	2054			335	1.00	0.73	
29	2055			335	1.00	0.73	
30	2056			335	1.00	0.73	

0.22	Maximum Annual PM2.5 Concentration (ug/m3)
0.3	Significance Threshold (ug/m3)
No	Significant?
0.01	Chronic Hazard Impact
1	Significance Threshold
No	Significant?
10.5	Cancer Risk (Child)
10	Significance Threshold
Yes	Significant?
0.47	Cancer Risk (Adult)
10	Significance Threshold
No	Significant?

Health Risk Assessment Assumptions

5	Chronic Reference Exposure Level (ug/m3) for DPM	
1.1	Cancer Potency Slope Factor (cancer risk per mg/kg-day) for DPM	
350	days per year	
25,550	days per lifetime	
1,090	95th Percentile Daily Breathing Rates (L/kg-day)	0<2 Years
861	95th Percentile Daily Breathing Rates (L/kg-day)	2<9 Years
745	95th Percentile Daily Breathing Rates (L/kg-day)	2<16 Years
335	95th Percentile Daily Breathing Rates (L/kg-day)	16<30 Years
290	95th Percentile Daily Breathing Rates (L/kg-day)	30<70 Years
0.85	fraction of	0<2 Years
0.72	fraction of	2<16 Years
0.73	fraction of	16<70 Years

Project: Penitencia Water Treatment Plant
Date: 5/7/2024
Condition: Unmitigated Construction
Receptor: Existing Residence
Year: 2028

Exposure Year	Calender Year	Annual DPM Concentration (ug/m3)	Annual PM2.5 Concentration (ug/m3)	Daily Breathing Rates (L/kg-day)	Exposure Factor	fraction of time at home	Cancer Risk
1	2028	0.03	0.20	1,090	10.0	0.85	3.84
2	2029			1,090	10.0	0.85	
3	2030			745	4.75	0.72	
4	2031			745	3.00	0.72	
5	2032			745	3.00	0.72	
6	2033			745	3.00	0.72	
7	2034			745	3.00	0.72	
8	2035			745	3.00	0.72	
9	2036			745	3.00	0.72	
10	2037			745	3.00	0.72	
11	2038			745	3.00	0.72	
12	2039			745	3.00	0.72	
13	2040			745	3.00	0.72	
14	2041			745	3.00	0.72	
15	2042			745	3.00	0.72	
16	2043			745	3.00	0.72	
17	2044			335	1.70	0.73	
18	2045			335	1.00	0.73	
19	2046			335	1.00	0.73	
20	2047			335	1.00	0.73	
21	2048			335	1.00	0.73	
22	2049			335	1.00	0.73	
23	2050			335	1.00	0.73	
24	2051			335	1.00	0.73	
25	2052			335	1.00	0.73	
26	2053			335	1.00	0.73	
27	2054			335	1.00	0.73	
28	2055			335	1.00	0.73	
29	2056			335	1.00	0.73	
30	2057			335	1.00	0.73	

0.20	Maximum Annual PM2.5 Concentration (ug/m3)
0.3	Significance Threshold (ug/m3)
No	Significant?
0.01	Chronic Hazard Impact
1	Significance Threshold
No	Significant?
3.84	Cancer Risk (Child)
10	Significance Threshold
No	Significant?
0.17	Cancer Risk (Adult)
10	Significance Threshold
No	Significant?

Health Risk Assessment Assumptions

5	Chronic Reference Exposure Level (ug/m3) for DPM	
1.1	Cancer Potency Slope Factor (cancer risk per mg/kg-day) for DPM	
350	days per year	
25,550	days per lifetime	
1,090	95th Percentile Daily Breathing Rates (L/kg-day)	0<2 Years
861	95th Percentile Daily Breathing Rates (L/kg-day)	2<9 Years
745	95th Percentile Daily Breathing Rates (L/kg-day)	2<16 Years
335	95th Percentile Daily Breathing Rates (L/kg-day)	16<30 Years
290	95th Percentile Daily Breathing Rates (L/kg-day)	30<70 Years
0.85	fraction of	0<2 Years
0.72	fraction of	2<16 Years
0.73	fraction of	16<70 Years

Project: Penitencia Water Treatment Plant
Date: 5/7/2024
Condition: Mitigated Construction
Receptor: Existing Residence
Year: 2025

Exposure Year	Calender Year	Annual DPM Concentration (ug/m3)	Annual PM2.5 Concentration (ug/m3)	Daily Breathing Rates (L/kg-day)	Exposure Factor	fraction of time at home	Cancer Risk
1	2025	0.02	0.11	1,090	10.0	0.85	2.39
2	2026	0.01	0.10	1,090	10.0	0.85	1.89
3	2027	0.02	0.11	745	4.75	0.72	0.65
4	2028	0.01	0.10	745	3.00	0.72	0.27
5	2029			745	3.00	0.72	
6	2030			745	3.00	0.72	
7	2031			745	3.00	0.72	
8	2032			745	3.00	0.72	
9	2033			745	3.00	0.72	
10	2034			745	3.00	0.72	
11	2035			745	3.00	0.72	
12	2036			745	3.00	0.72	
13	2037			745	3.00	0.72	
14	2038			745	3.00	0.72	
15	2039			745	3.00	0.72	
16	2040			745	3.00	0.72	
17	2041			335	1.70	0.73	
18	2042			335	1.00	0.73	
19	2043			335	1.00	0.73	
20	2044			335	1.00	0.73	
21	2045			335	1.00	0.73	
22	2046			335	1.00	0.73	
23	2047			335	1.00	0.73	
24	2048			335	1.00	0.73	
25	2049			335	1.00	0.73	
26	2050			335	1.00	0.73	
27	2051			335	1.00	0.73	
28	2052			335	1.00	0.73	
29	2053			335	1.00	0.73	
30	2054			335	1.00	0.73	

0.11	Maximum Annual PM2.5 Concentration (ug/m3)
0.3	Significance Threshold (ug/m3)
No	Significant?
0.00	Chronic Hazard Impact
1	Significance Threshold
No	Significant?
5.19	Cancer Risk (Child)
10	Significance Threshold
No	Significant?
0.37	Cancer Risk (Adult)
10	Significance Threshold
No	Significant?

Health Risk Assessment Assumptions

5	Chronic Reference Exposure Level (ug/m3) for DPM	
1.1	Cancer Potency Slope Factor (cancer risk per mg/kg-day) for DPM	
350	days per year	
25,550	days per lifetime	
1,090	95th Percentile Daily Breathing Rates (L/kg-day)	0<2 Years
861	95th Percentile Daily Breathing Rates (L/kg-day)	2<9 Years
745	95th Percentile Daily Breathing Rates (L/kg-day)	2<16 Years
335	95th Percentile Daily Breathing Rates (L/kg-day)	16<30 Years
290	95th Percentile Daily Breathing Rates (L/kg-day)	30<70 Years
0.85	fraction of	0<2 Years
0.72	fraction of	2<16 Years
0.73	fraction of	16<70 Years

Project: Penitencia Water Treatment Plant
Date: 5/7/2024
Condition: Mitigated Construction
Receptor: Existing Residence
Year: 2026

Exposure Year	Calender Year	Annual DPM Concentration (ug/m3)	Annual PM2.5 Concentration (ug/m3)	Daily Breathing Rates (L/kg-day)	Exposure Factor	fraction of time at home	Cancer Risk
1	2026	0.01	0.10	1,090	10.0	0.85	1.89
2	2027	0.02	0.11	1,090	10.0	0.85	2.35
3	2028	0.01	0.10	745	4.75	0.72	0.42
4	2029			745	3.00	0.72	
5	2030			745	3.00	0.72	
6	2031			745	3.00	0.72	
7	2032			745	3.00	0.72	
8	2033			745	3.00	0.72	
9	2034			745	3.00	0.72	
10	2035			745	3.00	0.72	
11	2036			745	3.00	0.72	
12	2037			745	3.00	0.72	
13	2038			745	3.00	0.72	
14	2039			745	3.00	0.72	
15	2040			745	3.00	0.72	
16	2041			745	3.00	0.72	
17	2042			335	1.70	0.73	
18	2043			335	1.00	0.73	
19	2044			335	1.00	0.73	
20	2045			335	1.00	0.73	
21	2046			335	1.00	0.73	
22	2047			335	1.00	0.73	
23	2048			335	1.00	0.73	
24	2049			335	1.00	0.73	
25	2050			335	1.00	0.73	
26	2051			335	1.00	0.73	
27	2052			335	1.00	0.73	
28	2053			335	1.00	0.73	
29	2054			335	1.00	0.73	
30	2055			335	1.00	0.73	

0.11	Maximum Annual PM2.5 Concentration (ug/m3)
0.3	Significance Threshold (ug/m3)
No	Significant?
0.00	Chronic Hazard Impact
1	Significance Threshold
No	Significant?
4.65	Cancer Risk (Child)
10	Significance Threshold
No	Significant?
0.26	Cancer Risk (Adult)
10	Significance Threshold
No	Significant?

Health Risk Assessment Assumptions

5	Chronic Reference Exposure Level (ug/m3) for DPM	
1.1	Cancer Potency Slope Factor (cancer risk per mg/kg-day) for DPM	
350	days per year	
25,550	days per lifetime	
1,090	95th Percentile Daily Breathing Rates (L/kg-day)	0<2 Years
861	95th Percentile Daily Breathing Rates (L/kg-day)	2<9 Years
745	95th Percentile Daily Breathing Rates (L/kg-day)	2<16 Years
335	95th Percentile Daily Breathing Rates (L/kg-day)	16<30 Years
290	95th Percentile Daily Breathing Rates (L/kg-day)	30<70 Years
0.85	fraction of	0<2 Years
0.72	fraction of	2<16 Years
0.73	fraction of	16<70 Years

Project: Penitencia Water Treatment Plant
Date: 5/7/2024
Condition: Mitigated Construction
Receptor: Existing Residence
Year: 2027

Exposure Year	Calender Year	Annual DPM Concentration (ug/m3)	Annual PM2.5 Concentration (ug/m3)	Daily Breathing Rates (L/kg-day)	Exposure Factor	fraction of time at home	Cancer Risk
1	2027	0.02	0.11	1,090	10.0	0.85	2.35
2	2028	0.01	0.10	1,090	10.0	0.85	1.54
3	2029			745	4.75	0.72	
4	2030			745	3.00	0.72	
5	2031			745	3.00	0.72	
6	2032			745	3.00	0.72	
7	2033			745	3.00	0.72	
8	2034			745	3.00	0.72	
9	2035			745	3.00	0.72	
10	2036			745	3.00	0.72	
11	2037			745	3.00	0.72	
12	2038			745	3.00	0.72	
13	2039			745	3.00	0.72	
14	2040			745	3.00	0.72	
15	2041			745	3.00	0.72	
16	2042			745	3.00	0.72	
17	2043			335	1.70	0.73	
18	2044			335	1.00	0.73	
19	2045			335	1.00	0.73	
20	2046			335	1.00	0.73	
21	2047			335	1.00	0.73	
22	2048			335	1.00	0.73	
23	2049			335	1.00	0.73	
24	2050			335	1.00	0.73	
25	2051			335	1.00	0.73	
26	2052			335	1.00	0.73	
27	2053			335	1.00	0.73	
28	2054			335	1.00	0.73	
29	2055			335	1.00	0.73	
30	2056			335	1.00	0.73	

0.11	Maximum Annual PM2.5 Concentration (ug/m3)
0.3	Significance Threshold (ug/m3)
No	Significant?
0.00	Chronic Hazard Impact
1	Significance Threshold
No	Significant?
3.88	Cancer Risk (Child)
10	Significance Threshold
No	Significant?
0.17	Cancer Risk (Adult)
10	Significance Threshold
No	Significant?

Health Risk Assessment Assumptions

5	Chronic Reference Exposure Level (ug/m3) for DPM	
1.1	Cancer Potency Slope Factor (cancer risk per mg/kg-day) for DPM	
350	days per year	
25,550	days per lifetime	
1,090	95th Percentile Daily Breathing Rates (L/kg-day)	0<2 Years
861	95th Percentile Daily Breathing Rates (L/kg-day)	2<9 Years
745	95th Percentile Daily Breathing Rates (L/kg-day)	2<16 Years
335	95th Percentile Daily Breathing Rates (L/kg-day)	16<30 Years
290	95th Percentile Daily Breathing Rates (L/kg-day)	30<70 Years
0.85	fraction of	0<2 Years
0.72	fraction of	2<16 Years
0.73	fraction of	16<70 Years

Project: Penitencia Water Treatment Plant
Date: 5/7/2024
Condition: Mitigated Construction
Receptor: Existing Residence
Year: 2028

Exposure Year	Calender Year	Annual DPM Concentration (ug/m3)	Annual PM2.5 Concentration (ug/m3)	Daily Breathing Rates (L/kg-day)	Exposure Factor	fraction of time at home	Cancer Risk
1	2028	0.01	0.10	1,090	10.0	0.85	1.54
2	2029			1,090	10.0	0.85	
3	2030			745	4.75	0.72	
4	2031			745	3.00	0.72	
5	2032			745	3.00	0.72	
6	2033			745	3.00	0.72	
7	2034			745	3.00	0.72	
8	2035			745	3.00	0.72	
9	2036			745	3.00	0.72	
10	2037			745	3.00	0.72	
11	2038			745	3.00	0.72	
12	2039			745	3.00	0.72	
13	2040			745	3.00	0.72	
14	2041			745	3.00	0.72	
15	2042			745	3.00	0.72	
16	2043			745	3.00	0.72	
17	2044			335	1.70	0.73	
18	2045			335	1.00	0.73	
19	2046			335	1.00	0.73	
20	2047			335	1.00	0.73	
21	2048			335	1.00	0.73	
22	2049			335	1.00	0.73	
23	2050			335	1.00	0.73	
24	2051			335	1.00	0.73	
25	2052			335	1.00	0.73	
26	2053			335	1.00	0.73	
27	2054			335	1.00	0.73	
28	2055			335	1.00	0.73	
29	2056			335	1.00	0.73	
30	2057			335	1.00	0.73	

0.10	Maximum Annual PM2.5 Concentration (ug/m3)
0.3	Significance Threshold (ug/m3)
No	Significant?
0.00	Chronic Hazard Impact
1	Significance Threshold
No	Significant?
1.54	Cancer Risk (Child)
10	Significance Threshold
No	Significant?
0.07	Cancer Risk (Adult)
10	Significance Threshold
No	Significant?

Health Risk Assessment Assumptions

5	Chronic Reference Exposure Level (ug/m3) for DPM	
1.1	Cancer Potency Slope Factor (cancer risk per mg/kg-day) for DPM	
350	days per year	
25,550	days per lifetime	
1,090	95th Percentile Daily Breathing Rates (L/kg-day)	0<2 Years
861	95th Percentile Daily Breathing Rates (L/kg-day)	2<9 Years
745	95th Percentile Daily Breathing Rates (L/kg-day)	2<16 Years
335	95th Percentile Daily Breathing Rates (L/kg-day)	16<30 Years
290	95th Percentile Daily Breathing Rates (L/kg-day)	30<70 Years
0.85	fraction of	0<2 Years
0.72	fraction of	2<16 Years
0.73	fraction of	16<70 Years

Project: Penitencia Water Treatment Plant
Date: 3/21/2024
Condition: Operation
Receptor: Existing Residence

Exposure Year	Calender Year	Annual DPM Concentration (ug/m3)	Annual PM2.5 Concentration (ug/m3)	Daily Breathing Rates (L/kg-day)	Exposure Factor	fraction of time at home	Cancer Risk
1	2025	1.13E-03	1.13E-03	1,090	10.0	0.85	0.16
2	2026	1.13E-03	1.13E-03	1,090	10.0	0.85	0.16
3	2027	1.13E-03	1.13E-03	745	4.75	0.72	0.04
4	2028	1.13E-03	1.13E-03	745	3.00	0.72	0.03
5	2029	1.13E-03	1.13E-03	745	3.00	0.72	
6	2030	1.13E-03	1.13E-03	745	3.00	0.72	
7	2031	1.13E-03	1.13E-03	745	3.00	0.72	
8	2032	1.13E-03	1.13E-03	745	3.00	0.72	
9	2033	1.13E-03	1.13E-03	745	3.00	0.72	
10	2034	1.13E-03	1.13E-03	745	3.00	0.72	
11	2035	1.13E-03	1.13E-03	745	3.00	0.72	
12	2036	1.13E-03	1.13E-03	745	3.00	0.72	
13	2037	1.13E-03	1.13E-03	745	3.00	0.72	
14	2038	1.13E-03	1.13E-03	745	3.00	0.72	
15	2039	1.13E-03	1.13E-03	745	3.00	0.72	
16	2040	1.13E-03	1.13E-03	745	3.00	0.72	
17	2041	1.13E-03	1.13E-03	335	1.70	0.73	
18	2042	1.13E-03	1.13E-03	335	1.00	0.73	
19	2043	1.13E-03	1.13E-03	335	1.00	0.73	
20	2044	1.13E-03	1.13E-03	335	1.00	0.73	
21	2045	1.13E-03	1.13E-03	335	1.00	0.73	
22	2046	1.13E-03	1.13E-03	335	1.00	0.73	
23	2047	1.13E-03	1.13E-03	335	1.00	0.73	
24	2048	1.13E-03	1.13E-03	335	1.00	0.73	
25	2049	1.13E-03	1.13E-03	335	1.00	0.73	
26	2050	1.13E-03	1.13E-03	335	1.00	0.73	
27	2051	1.13E-03	1.13E-03	335	1.00	0.73	
28	2052	1.13E-03	1.13E-03	335	1.00	0.73	
29	2053	1.13E-03	1.13E-03	335	1.00	0.73	
30	2054	1.13E-03	1.13E-03	335	1.00	0.73	

0.00	Maximum Annual PM2.5 Concentration (ug/m3)
0.3	Significance Threshold (ug/m3)
No	Significant?
0.00	Chronic Hazard Impact
1	Significance Threshold
No	Significant?
0.39	Cancer Risk (Child)
10	Significance Threshold
No	Significant?
0.21	Cancer Risk (Adult)
10	Significance Threshold
No	Significant?

Control Pathway

AERMOD

Dispersion Options

Titles

C:\Users\W7MRATTELT\Documents\Projects\EBMUD Sobrante WTP EIR\AERMOD

Dispersion Options

☒ Regulatory Default ☐ Non-Default Options

Dispersion Coefficient

Rural

Output Type

- ☒ Concentration
- ☐ Total Deposition (Dry & Wet)
- ☐ Dry Deposition
- ☐ Wet Deposition

Plume Depletion

- ☐ Dry Removal
- ☐ Wet Removal

Output Warnings

- ☐ No Output Warnings
- ☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - DPM

Averaging Time Options

Hours ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 ☐ 8 ☐ 12 ☐ 24

☐ Month ☒ Period ☐ Annual

Exponential Decay

Option not available

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters

RE: Meters

TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 1.80 m

Optional Files

☐ Re-Start File ☐ Init File ☐ Multi-Year Analyses ☐ Event Input File ☒ Error Listing File

Detailed Error Listing File

Filename: AERMOD.err

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	STCK1	603140.25	4139698.90	122.31	0.91	1.00000	727.59	52.58	0.20

Source Pathway - Source Inputs

Polygon Area Sources

Source Type: AREA POLY

Source: PHASE2

Base Elevation (Optional)	Release Height [m]	Emission Rate [g/ (s-m^2)]	Initial Vertical Dim. [m]	Number of Vertices (or sides)	X Coordinate for Vertices [m]	Y Coordinate for Vertices [m]
120.38	3.05	0.00012	1.26	11	603006.25	4139783.59
		0.00012			603058.64	4139755.90
		0.00012			603096.29	4139736.29
		0.00012			603080.51	4139721.19
		0.00012			603130.43	4139703.72
		0.00012			603180.35	4139661.28
		0.00012			603164.13	4139632.57
		0.00012			603104.84	4139681.25
		0.00012			603044.31	4139704.34
		0.00012			602997.51	4139744.90
		0.00012			602989.40	4139764.87

Source Type: AREA POLY

Source: PHASE1

Base Elevation (Optional)	Release Height [m]	Emission Rate [g/ (s-m^2)]	Initial Vertical Dim. [m]	Number of Vertices (or sides)	X Coordinate for Vertices [m]	Y Coordinate for Vertices [m]
120.38	3.05	0.00012	1.26	11	603006.25	4139783.59
		0.00012			603058.43	4139755.74
		0.00012			603095.60	4139736.57
		0.00012			603080.51	4139721.19
		0.00012			603130.43	4139703.72
		0.00012			603180.35	4139661.28
		0.00012			603164.13	4139632.57
		0.00012			603104.84	4139681.25
		0.00012			603044.31	4139704.34
		0.00012			602997.51	4139744.90
		0.00012			602989.40	4139764.87

Source Pathway - Source Inputs

AERMOD

Source Type: AREA POLY

Source: PHAS1FUG

Base Elevation (Optional)	Release Height [m]	Emission Rate [g/ (s-m^2)]	Initial Vertical Dim. [m]	Number of Vertices (or sides)	X Coordinate for Vertices [m]	Y Coordinate for Vertices [m]
120.38	0.00	0.00012	0.30	11	603006.25	4139783.59
		0.00012			603058.43	4139755.74
		0.00012			603095.60	4139736.57
		0.00012			603080.51	4139721.19
		0.00012			603130.43	4139703.72
		0.00012			603180.35	4139661.28
		0.00012			603164.13	4139632.57
		0.00012			603104.84	4139681.25
		0.00012			603044.31	4139704.34
		0.00012			602997.51	4139744.90
		0.00012			602989.40	4139764.87

Source Type: AREA POLY

Source: PHAS2FUG

Base Elevation (Optional)	Release Height [m]	Emission Rate [g/ (s-m^2)]	Initial Vertical Dim. [m]	Number of Vertices (or sides)	X Coordinate for Vertices [m]	Y Coordinate for Vertices [m]
120.38	0.00	0.00012	0.30	11	603006.25	4139783.59
		0.00012			603058.64	4139755.90
		0.00012			603096.29	4139736.29
		0.00012			603080.51	4139721.19
		0.00012			603130.43	4139703.72
		0.00012			603180.35	4139661.28
		0.00012			603164.13	4139632.57
		0.00012			603104.84	4139681.25
		0.00012			603044.31	4139704.34
		0.00012			602997.51	4139744.90
		0.00012			602989.40	4139764.87

Source Pathway

Building Downwash Information

Option not in use

Emission Rate Units for Output

For Concentration

Unit Factor:	1E6
Emission Unit Label:	GRAMS/SEC
Concentration Unit Label:	MICROGRAMS/M**3

Source Groups

Source Group ID:	List of Sources in Group (Source Range or Single Sources)
STCK1	STCK1
PHASE2	PHASE2
PHASE1	PHASE1
PHAS2FUG	PHAS2FUG
PHAS1FUG	PHAS1FUG

Variable Emissions

Hour-of-Day / Day-of-Week Emission Rate Variation

Scenario: Scenario 1

Source ID: **PHASE2**

Weekdays

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	1.00	1.00	1.00	1.00
Day	13 - 18	1.00	1.00	1.00	1.00	1.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Saturday

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	1.00	1.00	1.00	1.00
Day	13 - 18	1.00	1.00	1.00	1.00	1.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Sunday

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	0.00	0.00	0.00	0.00
Day	13 - 18	0.00	0.00	0.00	0.00	0.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Source ID: **PHASE1**

Weekdays

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	1.00	1.00	1.00	1.00
Day	13 - 18	1.00	1.00	1.00	1.00	1.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Saturday

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	1.00	1.00	1.00	1.00
Day	13 - 18	1.00	1.00	1.00	1.00	1.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Sunday

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	0.00	0.00	0.00	0.00
Day	13 - 18	0.00	0.00	0.00	0.00	0.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Source ID: **PHAS1FUG**

Weekdays

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	1.00	1.00	1.00	1.00
Day	13 - 18	1.00	1.00	1.00	1.00	1.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Saturday

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	1.00	1.00	1.00	1.00
Day	13 - 18	1.00	1.00	1.00	1.00	1.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Sunday

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	0.00	0.00	0.00	0.00
Day	13 - 18	0.00	0.00	0.00	0.00	0.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Source ID: **PHAS2FUG**

Weekdays

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	1.00	1.00	1.00	1.00
Day	13 - 18	1.00	1.00	1.00	1.00	1.00	0.00

Scenario: Scenario 1

Source ID: **PHAS2FUG**

	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00
Saturday							
Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	1.00	1.00	1.00	1.00
Day	13 - 18	1.00	1.00	1.00	1.00	1.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00
Sunday							
Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	0.00	0.00	0.00	0.00
Day	13 - 18	0.00	0.00	0.00	0.00	0.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Scenario: Scenario 2

Source ID: **STCK1**

Weekdays							
Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	0.00	0.00	0.00	0.00
Day	13 - 18	0.00	0.00	0.00	0.00	0.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00
Saturday							
Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	0.00	0.00	0.00	0.00
Day	13 - 18	1.00	0.00	0.00	0.00	0.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00
Sunday							
Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	0.00	0.00	0.00	0.00
Day	13 - 18	0.00	0.00	0.00	0.00	0.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Receptor Pathway

AERMOD

Receptor Networks

Note: Terrain Elavations and Flagpole Heights for Network Grids are in Page RE2 - 1 (If applicable)
Generated Discrete Receptors for Multi-Tier (Risk) Grid and Receptor Locations for Fenceline Grid are in Page RE3 - 1 (If applicable)

Discrete Receptors

Discrete Cartesian Receptors

Record Number	X-Coordinate [m]	Y-Coordinate [m]	Group Name (Optional)	Terrain Elevations	Flagpole Heights [m] (Optional)
1	602969.73	4139917.35		124.06	
2	602958.55	4139968.15		125.22	
3	602940.26	4139955.96		123.32	
4	602922.99	4139949.86		121.82	
5	602952.46	4139908.20		122.32	
6	602934.17	4139900.08		120.91	
7	602917.91	4139889.92		119.64	
8	602903.69	4139876.71		118.51	
9	602889.46	4139861.47		117.48	
10	602879.30	4139848.26		116.87	
11	602868.13	4139833.02		116.12	
12	602870.16	4139792.38		115.16	
13	602862.03	4139776.12		114.38	
14	602880.32	4139725.32		113.51	
15	602886.41	4139706.01		113.09	
16	602893.53	4139689.76		112.76	
17	602896.57	4139670.45		112.23	
18	602904.70	4139651.15		111.92	
19	602913.85	4139618.64		111.22	
20	602926.04	4139604.41		111.24	
21	602990.05	4139528.21		111.31	
22	603042.88	4139485.54		112.04	
23	603031.71	4139531.26		113.09	
24	603071.33	4139552.59		115.01	
25	603122.13	4139586.12		117.47	
26	603137.37	4139535.32		116.21	
27	603110.96	4139495.70		114.21	
28	603157.69	4139505.86		115.79	
29	603166.84	4139479.44		115.17	
30	603213.57	4139497.73		117.01	

31	603195.29	4139542.43	117.99
32	603170.90	4139589.17	118.87
33	603202.40	4139606.44	120.28
34	603228.81	4139615.59	121.62
35	603254.22	4139630.83	123.79
36	603287.74	4139638.96	126.01
37	603311.11	4139647.08	127.89
38	603345.66	4139657.24	130.50
39	603378.17	4139635.91	129.46
40	603404.59	4139649.12	131.94
41	603458.44	4139649.12	132.14
42	603406.62	4139591.20	126.76
43	603374.11	4139581.04	125.05
44	603349.72	4139577.99	124.04
45	603322.29	4139588.16	123.49
46	603293.84	4139583.07	122.24
47	603271.49	4139572.91	121.08
48	603245.07	4139560.72	119.92
49	603218.65	4139554.63	119.01
50	603235.93	4139510.94	118.04
51	603263.36	4139512.97	118.84
52	603292.82	4139521.10	119.92
53	603339.56	4139538.37	121.95
54	603363.95	4139531.26	122.33
55	602928.36	4140047.54	132.31
56	602914.13	4140038.39	129.34
57	602897.88	4140030.27	126.42
58	602881.62	4140018.07	123.74
59	602862.32	4140011.98	122.04
60	602847.07	4139999.78	120.39
61	602816.59	4139981.49	118.27
62	602799.32	4139969.30	117.43
63	602786.11	4139953.05	116.64
64	602779.00	4139933.74	115.90
65	602769.85	4139919.52	115.19
66	602756.65	4139904.27	114.26
67	602739.37	4139896.15	113.39
68	602722.10	4139885.99	112.59

69	602706.86	4139871.76	111.78
70	602697.71	4139851.44	110.94
71	602698.73	4139835.18	110.50
72	602695.68	4139813.85	109.77
73	602669.27	4139743.74	106.84
74	602690.60	4139747.80	107.80
75	602710.92	4139743.74	108.39
76	602780.02	4139741.71	110.66
77	602826.75	4139750.85	112.43
78	602841.99	4139765.08	113.33
79	602855.20	4139820.96	115.35
80	602843.01	4139809.78	114.59
81	602827.77	4139793.52	113.51
82	602786.11	4139776.25	111.79
83	602760.71	4139773.20	110.98
84	602742.42	4139778.28	110.58
85	602720.07	4139781.33	109.80
86	602705.84	4139791.49	109.52
87	602952.74	4140007.91	129.83
88	602931.41	4139996.74	126.17
89	602917.18	4139987.59	123.72
90	602900.93	4139977.43	121.19
91	602883.65	4139968.29	119.68
92	602868.41	4139960.16	119.10
93	602853.17	4139947.96	118.42
94	602835.90	4139935.77	117.69
95	602826.75	4139921.55	117.13
96	602817.61	4139905.29	116.52
97	602806.43	4139889.03	115.72
98	602796.27	4139874.81	114.94
99	602780.02	4139862.62	113.97
100	602762.74	4139857.54	113.19
101	602743.44	4139828.07	111.83
102	602756.65	4139825.02	112.19
103	602777.98	4139827.05	112.93
104	602797.29	4139836.20	113.83
105	602812.53	4139849.41	114.77
106	602829.80	4139865.66	115.85

Receptor Pathway

107	602839.96	4139879.89	116.56
108	602850.12	4139893.10	117.13
109	602860.28	4139910.37	117.78
110	602876.54	4139919.52	118.42
111	602895.85	4139927.64	119.29
112	602681.46	4139659.41	105.14
113	602712.96	4139676.68	106.61
114	602733.28	4139677.69	107.23
115	602750.55	4139677.69	107.77
116	602772.90	4139682.77	108.74
117	602792.21	4139686.84	109.60
118	602830.82	4139700.05	111.38
119	602841.99	4139682.77	111.15
120	602856.22	4139665.50	110.97
121	602857.24	4139643.15	110.26
122	602861.30	4139624.86	109.77
123	602869.43	4139606.57	109.39
124	602883.65	4139589.30	109.20
125	602798.30	4139652.29	108.82
126	602810.50	4139635.02	108.70
127	602815.58	4139616.73	108.27
128	602818.63	4139602.51	107.90
129	602823.71	4139582.19	107.37
130	602827.77	4139566.94	106.98
131	602799.32	4139554.75	105.82
132	602776.97	4139550.69	105.09
133	602757.66	4139546.62	104.44
134	602772.90	4139606.57	106.78
135	602738.36	4139611.65	105.83
136	602774.93	4139496.84	103.41
137	602790.18	4139508.01	104.06
138	602806.43	4139514.11	104.68
139	602826.75	4139525.29	105.59
140	602857.24	4139533.41	106.67
141	602894.83	4139544.59	108.04
142	602942.58	4139517.16	109.04
143	602890.77	4139470.42	105.94
144	602864.35	4139475.50	105.34

145	602899.91	4139449.08	105.75
146	602902.96	4139433.84	105.53
147	602911.09	4139413.52	105.35
148	602957.82	4139456.19	108.25
149	602972.05	4139430.79	108.25
150	602980.18	4139409.46	107.90
151	602994.40	4139384.05	107.55
152	602996.43	4139356.62	106.81
153	603042.16	4139395.23	109.34
154	603027.93	4139425.71	109.68
155	603179.32	4139451.11	114.57
156	603180.34	4139451.11	114.60
157	603194.57	4139418.60	113.91
158	603199.65	4139397.26	113.35
159	603222.00	4139370.85	113.08
160	603240.29	4139350.53	112.90
161	603173.23	4139340.36	110.78
162	603259.59	4139395.23	114.88
163	603243.34	4139450.10	116.25
164	603271.79	4139453.15	117.11
165	603298.20	4139467.37	118.28
166	603323.60	4139478.55	119.32
167	603357.13	4139484.64	120.34
168	603387.62	4139529.35	122.91
169	603424.19	4139567.96	125.71
170	603413.02	4139515.13	122.88
171	603454.68	4139617.75	128.76
172	603638.58	4139661.44	132.85
173	603649.76	4139637.05	129.42
174	603287.03	4139403.36	115.88
175	603311.41	4139422.66	117.17
176	603342.91	4139429.78	118.21
177	603372.37	4139453.15	119.49
178	603426.23	4139483.63	121.52
179	603433.34	4139451.11	120.11
180	603419.11	4139427.75	119.10
181	603399.81	4139406.41	118.19
182	603468.90	4139419.62	118.79

183	603476.01	4139448.07		119.95	
184	603473.98	4139477.53		121.23	
185	603473.98	4139501.92		122.28	
186	603455.69	4139528.33		123.54	
187	603440.45	4139547.64		124.60	
188	603467.88	4139592.35		127.00	
189	603485.16	4139575.07		126.05	
190	603509.54	4139559.83		124.90	
191	603519.70	4139531.38		123.22	
192	603527.83	4139483.63		121.12	
193	603549.17	4139510.05		121.84	
194	603562.38	4139542.56		123.21	
195	603599.97	4139547.64		122.95	

Plant Boundary Receptors

Meteorology Pathway

AERMOD

Met Input Data

Surface Met Data

Filename: ..\Met Data\AERMOD.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: ..\Met Data\AERMOD.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 10.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2013			
Upper Air		2013			OAKLAND/WSO AP

Data Period

Data Period to Process

Start Date: 1/1/2013 Start Hour: 1 End Date: 12/31/2017 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Results Summary

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DPM - Concentration - Source Group: PHAS1FUG

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
PERIOD		28.03632	ug/m^3	603228.81	4139615.59	121.62	1.80	671.00	

DPM - Concentration - Source Group: PHAS2FUG

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
PERIOD		27.99595	ug/m^3	603228.81	4139615.59	121.62	1.80	671.00	

DPM - Concentration - Source Group: PHASE1

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
PERIOD		25.31193	ug/m^3	603202.40	4139606.44	120.28	1.80	671.00	

DPM - Concentration - Source Group: PHASE2

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
PERIOD		25.27234	ug/m^3	603202.40	4139606.44	120.28	1.80	671.00	

Results Summary

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DPM - Concentration - Source Group: STCK1

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
PERIOD		0.20190	ug/m^3	603254.22	4139630.83	123.79	1.80	671.00	

APPENDIX C

Biological Resources Report

H. T. HARVEY & ASSOCIATES
Ecological Consultants

Penitencia Water Treatment Plant Residuals Management Project Biological Resources Report

Project #3364-07

Prepared for:

Susanne Heim
Panorama Environmental, Inc.
717 Market Street, Suite 400
San Francisco, CA 94103

Prepared by:

H. T. Harvey & Associates

May 30, 2024

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List of Preparers

Steve Rottenborn, Ph.D., Principal/Senior Wildlife Ecologist
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Craig Fosdick, M.S., Senior Wildlife Ecologist
Katherine Marlin, M.S., Plant/Wetlands Ecologist

Section 1. Introduction

This report describes the biological resources present in the vicinity of the proposed Penitencia Water Treatment Plant (WTP) Residuals Management Project, for use by Panorama Environmental, Inc. and the Santa Clara Valley Water District (Valley Water) in future planning of the project. This assessment is based on the project footprint provided to H. T. Harvey & Associates by Panorama Environmental, Inc. through May 2024.

1.1 Project Location

The project site is located on portions of the Penitencia WTP east-northeast of the intersection of Whitman Way and Vista Del Mar, within the City of San Jose, California (Figures 1 and 2). The approximately 19.2-acre WTP is bounded by undeveloped land and Suncrest Avenue to the north; Bay Laurel Lane, Whitman Way, and Vista Del Mar to the west; single-family residential development to the south; and undeveloped lands to the east. Surrounding areas to the north, south, and west are occupied primarily by single-family residential development. Open space areas of the Diablo Range lie adjacent to and east of the project site. The Residuals Management Project proposes impacts in approximately 4.4 acres of the larger WTP (Figure 2). The project site is located on the *Calaveras Reservoir*, *California* 7.5-minute United States Geological Survey (USGS) quadrangle.

The project site is located within the Santa Clara Valley Habitat Plan (VHP) permit area, and the proposed project is a *covered project* under the VHP (ICF International 2012).

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Figure 1. Vicinity Map

Penitencia Water Treatment Plant Residuals Management Project

Biological Resources Report (3364-07)

May 2024

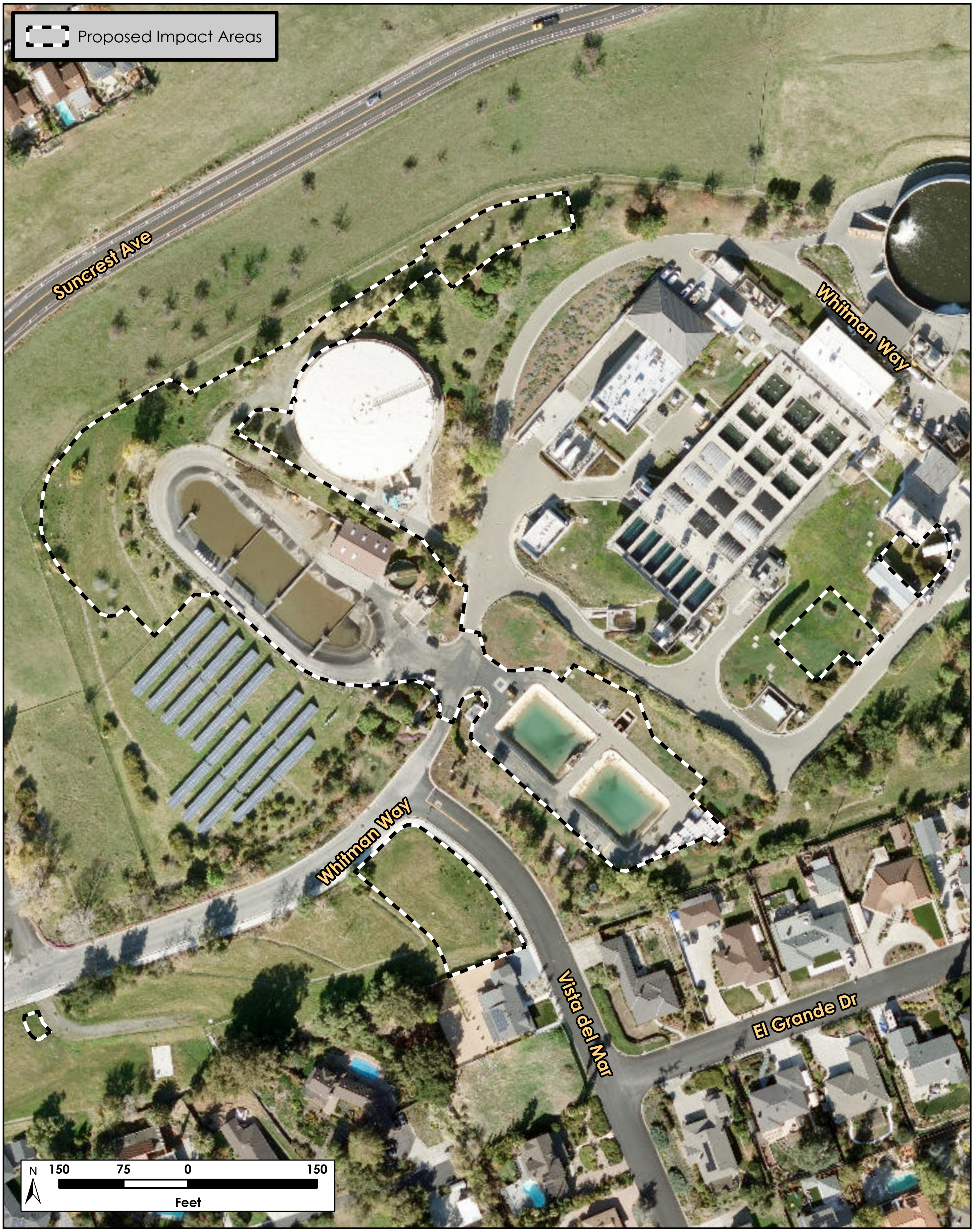

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Figure 2. Proposed Impact Areas

Penitencia Water Treatment Plant Residuals Management Project
Biological Resources Report (3364-07)
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Section 2. Methods

2.1 Background Review

Prior to conducting a site visit, H. T. Harvey and Associates ecologists reviewed the proposed project footprint provided by Panorama Environmental, Inc.; aerial images (Google LLC 2024); a USGS topographic map; the California Department of Fish and Wildlife's (CDFW's) California Natural Diversity Database (CNDDB) (2024); U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory Maps (2024); habitat and species information from the VHP (ICF International 2012); the VHP Geobrowser (SCVHA 2024); iNaturalist (iNaturalist 2024); and eBird (Cornell Laboratory of Ornithology 2024). For the purposes of this report, the *project vicinity* is defined as the area within a 5-mile radius surrounding the project site, and the *project footprint* refers to the areas where project activities are proposed to occur.

In addition, for plants, we reviewed all species on current California Native Plant Society (CNPS) California Rare Plant Rank (CRPR) 1A, 1B, 2A, 2B, 3, and 4 lists (CNPS 2024) occurring in the project region, which is defined as the *Calaveras Reservoir, California* USGS 7.5-minute quadrangle and surrounding eight quadrangles (*La Costa Valley, Mendenhall Springs, Mount Day, Lick Observatory, San Jose East*, *San Jose West, Milpitas,* and *Niles*). In addition, we queried the CNDDB (2024) for natural communities of special concern that occur on the project site.

2.2 Site Visits

H. T. Harvey & Associates senior wildlife ecologist Craig Fosdick, M.S. and plant/wetlands ecologist Katherine Marlin, M.S. conducted a reconnaissance-level survey of the project site on May 21, 2024. Specifically, surveys were conducted to (1) assess existing biotic habitats and plant and animal communities on the project site, (2) assess the project site for its potential to support special-status species and their habitats, including VHP-covered species, and (3) determine whether any potential jurisdictional and sensitive habitats, such as waters of the U.S./state and riparian habitat, are present on the site.

Because the proposed project is a covered project under the VHP (ICF International 2012), VHP mapping of land cover types was field-verified and modified as necessary based upon site conditions observed during the survey. According to the VHP Geobrowser (SCVHA 2024), no mapped wildlife survey areas for VHP-covered species are present on the project site. However, the Geobrowser does map plant survey areas on the site. Therefore, K. Marlin assessed habitat suitability for special-status plants on the project site. K. Marlin also conducted a focused survey for potentially occurring special-status plants that would have been detectable at the time of the surveys, including Santa Clara Valley dudleya (*Dudleya abramsii* ssp. *setchellii*), big-scale balsamroot (*Balsamorhiza macrolepis*), Monterey ceanothus (*Ceanothus rigidus*), and Satan's goldenbush (*Isocoma menziesii* var. *diablolica*) on the project site.

Section 3. Environmental Setting

3.1 General Project Area Description

The project site is located in San Jose in Santa Clara County, California (Figure 1). The climate in the project vicinity is coastal Mediterranean, with most rain falling in the winter and spring. Mild cool temperatures are common in the winter. Hot to mild temperatures are common in the summer. Climate conditions in the vicinity include a 30-year average of 16.22 inches of annual precipitation with a monthly average temperature range from 50ºF to 70.3ºF (PRISM Climate Group 2024). Elevations on the project site range from 350-450 feet above mean sea level (Google LLC 2024). The Natural Resource Conservation Service (NRCS) has mapped one soil unit on the project site: Montara-Santerhill complex, 15 to 30 percent slopes (NRCS 2024). This complex is a mosaic of deep, well drained soils formed from ultramafic and serpentine materials, mixed fine magnesic, thermic Aridic Haploxererts and loamy, magnesic, thermic Haploxerolls (NRCS 2024).

3.2 Land Cover

As described above, biotic habitats on the project site were classified according to the land cover classification system described in the VHP (ICF International 2012), with modifications to their mapped extent in the VHP based upon site conditions verified during the 2024 field survey. The reconnaissance-level survey identified four land cover types on the project site: California annual grassland, serpentine bunchgrass grassland, urban-suburban, and pond (Figure 3). These land cover types on the project site contain a number of plant species ranked by the California Invasive Plant Council (Cal-IPC) as being moderately and highly invasive (Cal-IPC 2024); these species are discussed further in Section 4.3.5 below. The land cover types are described in detail below.

3.2.1 California Annual Grassland

Vegetation. California annual grassland (1.68 acres) is the dominant land cover type on the project site (Photo 1). Scattered trees within this grassland include native valley oak (*Quercus lobata*) and coast live oak (*Quercus agrifolia*), and nonnative Aleppo pine (*Pinus halepensis*). Ornamental native and non-native species are also present in the shrub layer, and include rosemary (*Rosmarinus officinalis*), bottlebrush (*Melaleuca* sp.), toyon (*Heteromeles arbutifolia*), and coyote brush (*Baccharis pilularis*). Nonnative grasses such as wild oat (*Avena barbata*), ripgut brome (*Bromus diandrus*), Italian ryegrass (*Festuca perennis*), red brome (*Bromus rubens*), Harding grass (*Phalaris aquatica*), beardless wild rye (*Elymus triticoides*), and foxtail barley (*Hordeum murinum*), as well as weedy nonnative forbs such as yellow sweetclover (*Melilotus officinalis*), redstem filaree (*Erodium cicutarium*), Italian thistle (*Carduus pycnocephalus*), milk thistle (*Silybum marianum*), prickly lettuce (*Lactuca serriola*), and spiny sow thistle (*Sonchus asper*), are present within this habitat. Native species such as California poppy (*Eschscholzia californica*) and nodding needlegrass (*Stipa cernua*) are distributed sparsely throughout this habitat. Habitat with a higher percent cover of nodding needlegrass is described in more detail in Section 3.2.2.

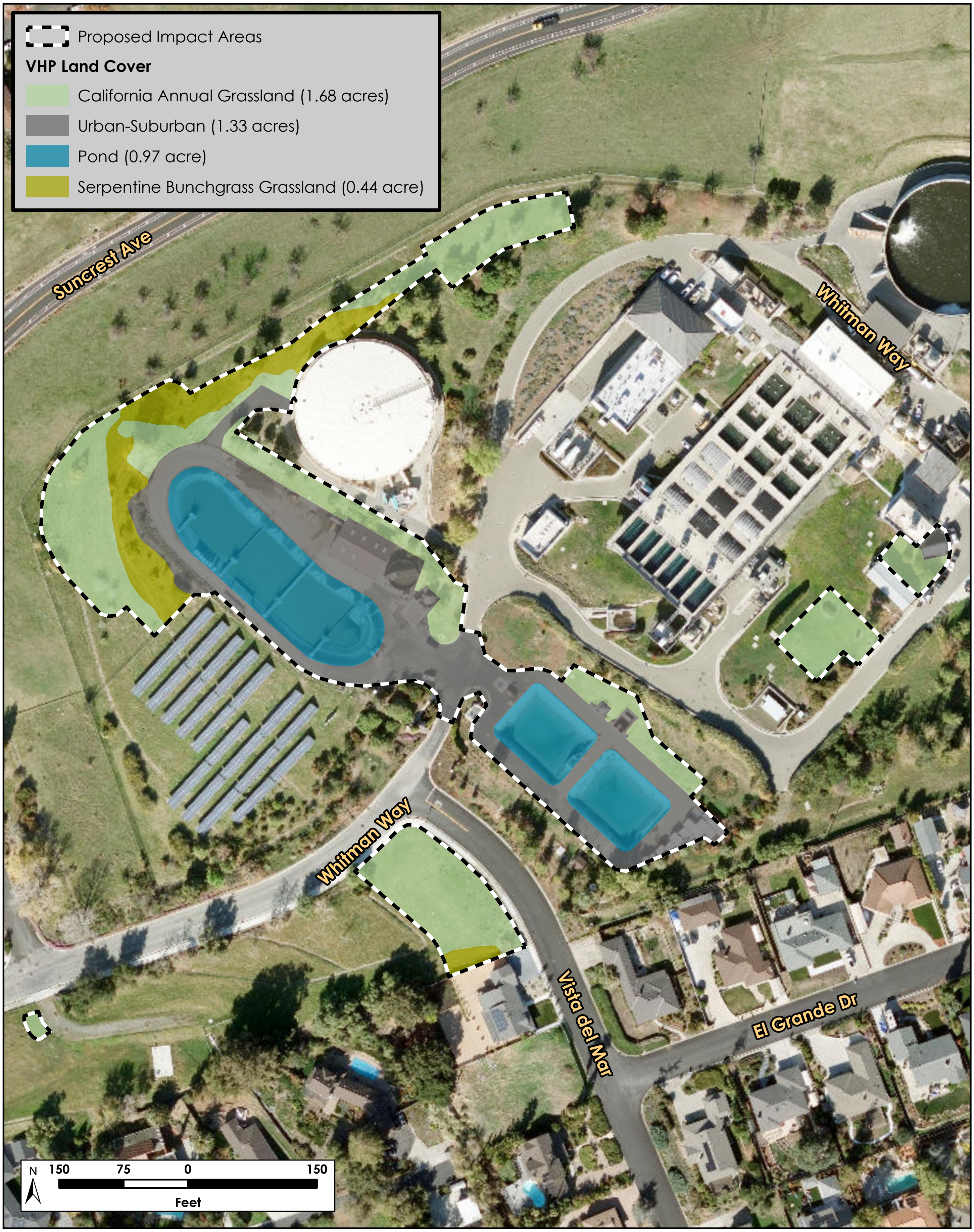

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Figure 3. VHP Land Cover Verification Map
Penitencia Water Treatment Plant Residuals Management Project
Biological Resources Report (3364-07)
May 2024

Photo 1. **California annual grassland looking east, taken May 21, 2024.**

Wildlife. Wildlife use of California annual grassland habitat on the project site is limited due to the relatively small extent of the grassland, its position on the periphery of the project site, and the developed, residential land uses that surround the site on three sides. As a result, wildlife species associated with extensive grasslands in the South Bay, such as the grasshopper sparrow (*Ammodramus savannarum*), would not nest in grasslands on the project site, although they are found in more extensive, contiguous grasslands approximately 2.0 miles east of the project site (Cornell Lab of Ornithology 2024).

Although grassland-associated bird species are expected to occur on the project site in low numbers, if at all, a number of resident bird species associated with the adjacent developed, ornamental woodland, and use the grasslands on the site for foraging. Such species include the house finch (*Haemorhous mexicanus*), dark-eyed junco (*Junco hyemalis*), lesser goldfinch (*Spinus psaltria*), and California towhee (*Melozone crissalis*), which forage on seeds in grassland areas, and the black phoebe (*Sayornis nigricans*) and cliff swallow (*Petrochelidon pyrrhonota*), which forage aerially over grassland habitats for insects. Several other species of birds use the California annual grassland during the nonbreeding season. These species, which include the golden-crowned sparrow (*Zonotrichia atricapilla*) and white-crowned sparrow (*Zonotrichia leucophrys*), forage on the ground or in herbaceous vegetation, primarily for seeds.

California ground squirrels (*Otospermophilus beecheyi*) are an important component of grassland communities, and where these fossorial mammal species do occur, they provide a prey base for diurnal raptors and terrestrial predators, and their burrows provide refugia for other vertebrates. However, no ground squirrels were observed during the site visit, and only four California ground squirrels burrows were found on the project site. Moreover, the four burrows that were present did not show signs of recent use, suggesting that ground squirrels may be currently absent from the project site. Other rodent species expected to occur in the grassland habitat on the project site include the California vole (*Microtus californicus*) and deer mouse (*Peromyscus maniculatus*). Diurnal raptors such as red-tailed hawks (*Buteo jamaicensis*) and red-shouldered hawks (*Buteo lineatus*) forage for these small mammals over grasslands during the day, and at night nocturnal raptors, such as barn owls (*Tyto alba*), will forage for nocturnal rodents, such as deer mice. Additionally, common bat species such as the Mexican free-tailed bat (*Tadarida brasiliensis*), Yuma myotis (*Myotis yumanensis*), and California myotis (*Myotis californicus*) will forage aerially for insects over the annual grasslands on the project site.

Several reptile species regularly occur in grassland habitats, including the western fence lizard (*Sceloporus occidentalis*), gopher snake (*Pituophis catenifer*), and southern alligator lizard (*Elgaria multicarinata*). Burrows of California ground squirrels, where present, provide refuges for these reptile species, as well as for common amphibians that may occur in adjacent riparian habitat such as the western toad (*Anaxyrus boreas*) and Pacific tree frog (*Hyliola regilla*). Mammals such as the native striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), and black-tailed jackrabbit (*Lepus californicus*), as well as the nonnative Virginia opossum (*Didelphis virginiana*) and feral cat (*Felis catus*) use the grassland habitats on the project site for foraging. Black-tailed deer (*Odocoileus hemionus*) are also common in this habitat due to the site's location adjacent to extensive undeveloped open space areas to the east and northeast. At least eight black-tailed deer, including several does, a fawn, and a buck with velvet antlers were observed on site during the May 2024 reconnaissance survey. Several of these were observed using the California annual grassland, where they were bedded down under the extensive solar panel infrastructure, using it as shade.

3.2.2 Serpentine Bunchgrass Grassland

Vegetation. Patches of serpentine bunchgrass grassland (0.44 acres) are present on the project site, primarily along the northwestern margin (Figure 3, Photo 2). Native plants present within this habitat include nodding needlegrass, which provides greater than 30% cover within this land cover type. This greater cover of native bunchgrasses is associated with a reduction in overall cover and canopy height of non-native grasses, and these areas are situated over serpentine-influenced Montara-Santerhill soils. Nodding needlegrass is occasionally present, but much more sparsely, throughout surrounding areas mapped as California annual grassland, as discussed in Section 3.2.1. Additionally, unlike areas mapped as California annual grassland, there tended to be little to no tree or shrub canopy layer within the serpentine bunchgrass grassland.

Photo 2. Nodding needlegrass and overall lower vegetation cover and height within the serpentine bunchgrass grassland in the foreground, compared to the higher and denser wild oats-dominated canopy of the California annual grassland in the background, taken May 21, 2024.

Wildlife. Wildlife use of serpentine bunchgrass grasslands on the project is similar to wildlife use of California annual grasslands, as described above.

3.2.3 Urban-Suburban

Vegetation. A 1.33-acre portion of the project site consists of existing developed areas, which fall within the VHP's urban-suburban land cover type (Photo 3). These areas include paved roadways and existing infrastructure within the project site, such as buildings and associated equipment. Vegetation within the urban-suburban areas consists of small patches of sparse California annual grassland, as described in Section 3.2.1.

Photo 3. **Paved developed habitat looking southeast, taken May 21, 2024.**

Wildlife. Urban-suburban areas of the project site serve as wildlife habitat only in a very limited capacity, and most wildlife species that occur in these areas are tolerant of frequent human disturbances. Wildlife that are present in the adjacent habitats may move along or across roadways when moving between habitat patches, and reptiles such as gopher snakes and western fence lizards may bask on these surfaces in order to raise their body temperature. A black phoebe was observed carrying nesting material to an existing piece of treatment infrastructure on the project site, and several other bird species may also use existing buildings and treatment infrastructure as nest sites or foraging perches.

3.2.4 Pond

Vegetation. Pond habitat comprises 0.97 acres in the center of the project site and includes two separate treatment ponds that are components of the water treatment plants infrastructure (Photo 4). Although this habitat is a human-made, perennial water body, lacks submerged or floating wetland vegetation, and is not connected to any natural waterbodies they provide perennial water, the VHP (page 3-86) classifies water-treatment ponds as "ponds", even though they may provide only marginal-quality aquatic habitat for plants and animals.

Photo 4. **Artificial pond habitat at the south end of the project site.**

Wildlife. The two artificial ponds on the site support a very limited suite of common wildlife species. Songbirds normally associated with marsh or pond habitats would not use the ponds for foraging or nesting, given the lack of emergent vegetation or adjacent weedy vegetation in and around the ponds. Neither pond was observed to support any turtles or fish, nonnative or otherwise, during the May 2024 reconnaissance survey. No amphibians, such as Pacific treefrogs and western toads, were observed during the May 2024 reconnaissance survey, and it is unlikely that either pond would suitable habitat for amphibians given the lack of vegetation. However, the ponds may occasionally host waterbirds such as Canada goose (*Branta canadensis*) or mallards (*Anas platyrhynchos*), which may nest in grassland habitats around these ponds. A killdeer (*Charadrius vociferus*) was observed foraging in the shallow water around the edge of the northern pond during the May 2024 reconnaissance survey. Barn swallows

(*Hirundo rustica*), cliff swallows, northern rough-winged swallows (*Stelgidopteryx serripennis*), and violet-green swallows (*Tachycineta thalassina*) may forage over the ponds. Common, generalist odonates may forage over and near both ponds, such as the common green darner (*Anax junius*) observed during the May 2024 reconnaissance surveys.

3.3 Wildlife Movement

Wildlife movement within and in the vicinity of the project site takes many forms and is different for the various suites of species associated with these lands. Bird and bat species move readily over the landscape in the project vicinity, foraging over and within both natural lands and landscaped areas. Mammals of different species move within their home ranges, but also disperse between patches of habitat. Generally, reptiles and amphibians similarly settle within home ranges, sometimes moving to central breeding areas, upland refugia, or hibernacula in a predictable manner, but also dispersing to new areas. Some species, especially birds and bats, are migratory, moving into or through the project vicinity during specific seasons. Aside from bats, there are no other mammal species in the vicinity of the site that are truly migratory. However, the young of many mammal species disperse from their natal home ranges, sometimes moving over relatively long distances in search of new areas in which to establish.

Movement corridors are segments of habitat that provide linkage for wildlife through the mosaic of suitable and unsuitable habitat types found within a landscape while also providing cover. On a broader level, corridors also function as paths along which wide-ranging animals can travel, populations can move in response to environmental changes and natural disasters, and genetic interchange can occur. In California, environmental corridors often consist of riparian areas along streams, rivers, or other natural features. However, no riparian corridor is present in or adjacent to the project site.

The project site is located along the eastern boundary of suburban development associated with the city of San Jose. The open habitats of the project site are contiguous with extensive open habitats of the Diablo Range to the east, and some dispersal of animals between the project site and undeveloped lands in immediately adjacent areas occurs. However, to the west of the project site, the city of San Jose and the larger metropolitan complex of South Bay cities form a nearly impassable barrier to long-range, east-west movements by non-flying animals. Although the Diablo Range to the east of the project site provides extensive natural habitats that support long-range movements by a variety of animals, the project site is not situated within this movement corridor. Therefore, the project site is not located within a particularly important area for regional wildlife movement.

Most larger animals that stray into the suburban matrix near the project site during dispersal events are not likely to remain there for long, as many of these species, such as bobcats, coyotes, and mountain lions (*Puma concolor*), are averse to interaction with humans. In contrast, wildlife residing on or near the project site are accustomed to human disturbance, such as the numerous black-tailed deer (including fawns, does, and bucks) observed on the project site during the site visit. Many of these species will navigate readily through the matrix of suburban, agricultural, and rural-residential landscapes. Thus, while small-scale, local movement of wildlife may occur throughout the project site, we do not expect animals to use the project site during regionally important, landscape-level dispersal.

Section 4. Special-Status Species and Sensitive Habitats

For purposes of this analysis, "special-status" plants are considered plant species that meet one or more of the following criteria:

- Listed under FESA as threatened, endangered, proposed threatened, proposed endangered, or a candidate species.
- Listed under CESA as threatened, endangered, rare, or a candidate species.
- Listed by the CNPS as CRPR 1A, 1B, 2, 3, or 4.

For purposes of this analysis, "special-status" animals are considered animal species that meet one or more of the following criteria:

- Listed under FESA as threatened, endangered, proposed threatened, proposed endangered, or a candidate species.
- Listed under CESA as threatened, endangered, or a candidate threatened or endangered species.
- Designated by the CDFW as a California species of special concern.
- Listed in the California Fish and Game Code as fully protected species (fully protected birds are provided in Section 3511, mammals in Section 4700, reptiles and amphibians in Section 5050, and fish in Section 5515).

Information concerning threatened, endangered, and other special-status species that potentially occur on the project site was collected from several sources and reviewed by H. T. Harvey & Associates biologists as described in Section 2.1 above. Figure 4 depicts CNDDB records of special-status plant species in the general vicinity of the project site and Figure 5 depicts CNDDB records of special-status animal species. These generalized maps show areas where special-status species are known to occur or have occurred historically.

4.1 Special-Status Plant Species

The CNPS (2024) and CNDDB (2024) identify 70 special-status plant species as potentially occurring in at least one of the nine USGS 7.5-minute quadrangles containing or surrounding the project site (Appendix A). Of the 70 potentially occurring special-status plant species, 65 were determined to be absent from the project site for at least one of the following reasons: (1) absence of suitable habitat types, (2) lack of specific microhabitat or edaphic requirements, (3) the elevation range of the species is outside of the range of the project site, and/or (4) the project site is outside the species' known geographic range and/or there are no nearby extant records (Appendix A).

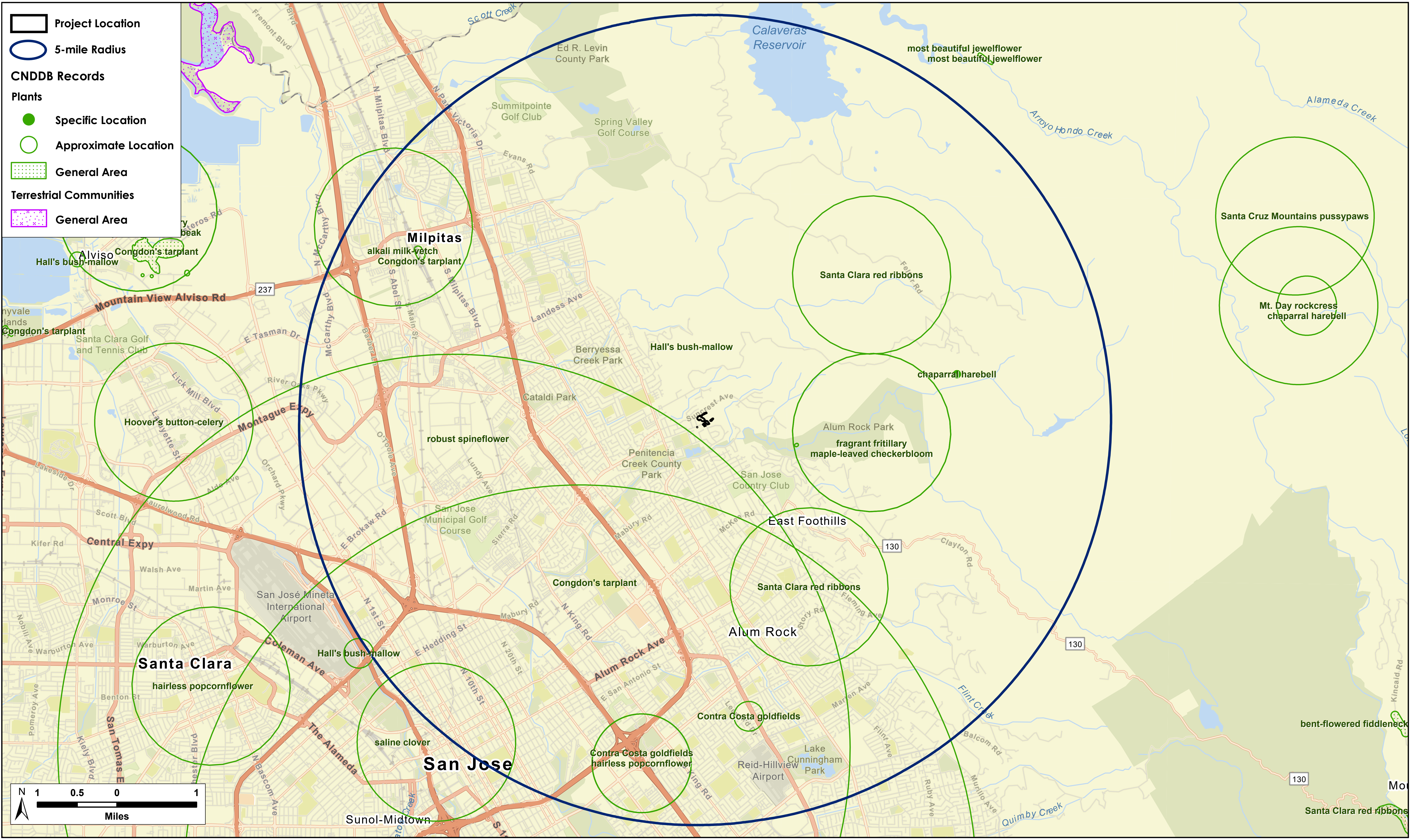

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Figure 4. CNDDB-Mapped Records of Special-Status Plants
Penitencia Water Treatment Plant Residuals Management Project
Biological Resources Report (3364-07)
May 2024

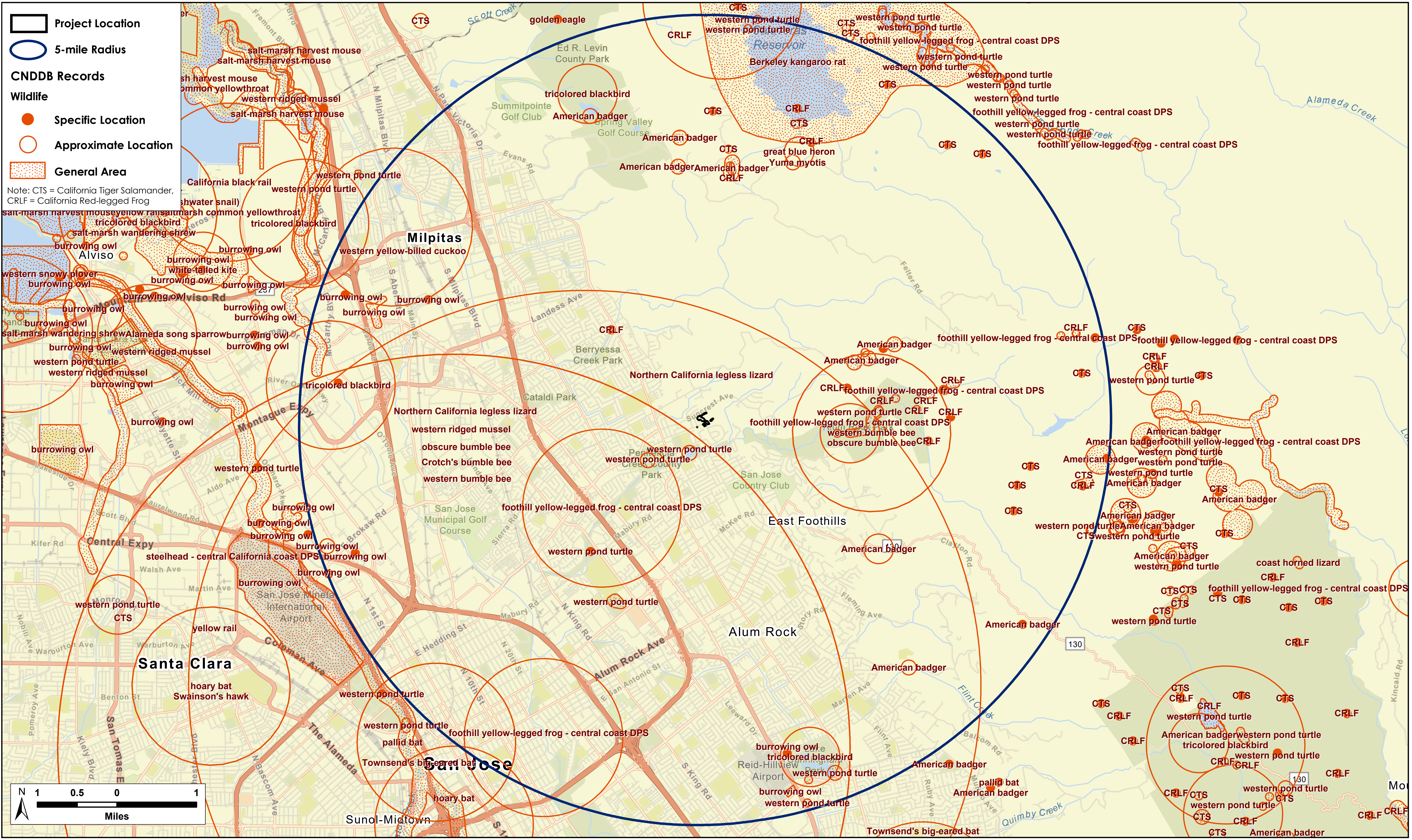

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Figure 5. CNDDB-Mapped Records of Special-Status Animals
Penitencia Water Treatment Plant Residuals Management Project
Biological Resources Report (3364-07)
May 2024

Suitable habitat, edaphic requirements, and elevation range are present on the project site for 5 special-status plant species; these species are addressed in greater detail in Table 1 below. Of the 5 special-status plant species for which suitable habitat is present on the site, focused surveys conducted during the reconnaissance site visit on May 21, 2024 determined that all are absent from the site.

4.2 Special-Status Animal Species

The legal status and likelihood of occurrence on the project site of special-status animal species known to occur, or potentially occurring, in the surrounding region are presented in Table 2. Most of the special-status species listed in Table 2 are not expected to occur on the project site because it lacks suitable habitat, is outside the known range of the species, and/or is isolated from the nearest known extant populations by development or otherwise unsuitable habitat.

A number of special-status animal species that are present in less urbanized settings in the South Bay or in specialized habitats in the South Bay, or that occurred in the South Bay historically but are no longer present, are absent from the project site due to a lack of suitable habitat and/or isolation of the site from populations by urbanization or agricultural development. The federally endangered bay checkerspot butterfly (*Euphydryas editha bayensis*) occurs in native serpentine bunchgrass grassland communities that support dense stands of its primary larval food plant, dwarf plantain (*Plantago erecta*). Although native serpentine bunchgrass grassland communities are present on the project site, dwarf plantain is not present, and the closest known occurrence of bay checkerspot butterflies is located approximately 7.15 miles south of the project site, a historical population formerly known to be present at Silver Creek Hills, adjacent to U.S. 101 (CNDDB 2024).

While golden eagles (*Aquila chrysaetos*), bald eagles (Haliaeetus leucocephalus), and Swainson's hawks (*Buteo swainsoni*) may fly over or briefly forage on the project site, none of these species are expected to nest in, or make substantial use of any resources on the project site. The Bryant's savannah sparrow (*Passerculus sandwichensis alaudinus*), a California species of special concern, and the grasshopper sparrow and northern harrier (*Circus hudsonius*), both considered California species of special concern only when nesting, may occur occasionally in grasslands on the project site as nonbreeding transients, foragers, or migrants, but no suitable nesting habitat for these species occurs on the project site. Similarly, the tricolored blackbird, a state threatened species, may forage on the project site, but it is not expected to nest there. The mountain lion, a candidate for listing under CESA, as well as the pallid bat (*Antrozous pallidus*) and American badger, which are California species of special concern, may also forage on or disperse through the project site. These species are not expected to den, nest, roost, or breed in or immediately adjacent to the project site due to a lack of suitable denning, nesting, roosting, or breeding habitat, and will be affected very little, if at all, by the proposed project. No badger dens were found during the reconnaissance survey in May 2024. The monarch butterfly (*Danaus plexippus*), a federal candidate species, may occur on the project site in small numbers, especially during spring and fall migration, but the species is not known to form wintering roosts anywhere in Santa Clara County. No milkweeds (*Asclepias* spp.), the species' larval hostplant, were detected during the May 2024 reconnaissance surveys.

Table 1. Special-Status Plant Species, Their Status, and Potential for Occurrence on the Project Site

Name	*Status	Habitat and Blooming Period	Potential for Occurrence on the Project Site
Federal or State Endangered, Threatened, or Candidate Species			
CNPS-Listed Plant Species			
Bent-flowered fiddleneck (*Amsinckia lunaris*)	CRPR 1B.2	Cismontane woodland, coastal bluff scrub and valley and foothill grassland (blooming period March to June).	**Absent.** Suitable valley and foothill grassland habitat to support this species is present on the project site. A record from 1998 is located 9.6 miles southeast on near Mt. Hamilton (CNDDB 2024). However, the survey performed in May 2024 did not detect this species.
San Francisco wallflower (*Erysimum franciscanum*)	CRPR 4.2	8.2	**Absent.** Suitable valley and foothill grassland habitat to support this species is present on the project site. A record from 2022 is located 13 miles southeast near Coyote ridge (Calflora 2024). However, the survey performed in May 2024 did not detect this species.
Large-flowered leptosiphon (*Leptosiphon grandiflorus*)	CRPR 4.2	Usually sandy soils in cismontane woodland, closed-cone coniferous forest, coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub, valley and foothill grassland (blooming period April to August).	**Absent.** Suitable valley and foothill grassland habitat to support this species is present on the project site. A record from 1985 is located 10 miles southeast near Mt. Hamilton (Calflora 2024). However, the survey performed in May 2024 did not detect this species.
Metcalf Canyon jewelflower (*Streptanthus albidus* ssp. *albidus*)	CRPR 1B.2	Serpentine valley and foothill grassland (blooming period April to July).	**Absent.** Suitable valley and foothill grassland habitat to support this species is present on the project site. A record from 2016 is located 9.6 miles south in east San Jose (CNDDB 2024). However, the survey performed in May 2024 did not detect this species.
Most beautiful jewelflower (*Streptanthus albidus* ssp. *peramoenus*)	CRPR 1B.2	Chaparral, cismontane woodland, and valley and foothill grassland (blooming period April to September).	**Absent.** Suitable valley and foothill grassland habitat to support this species is present on the project site. A record from 2009 is located 6 miles north near Calaveras reservoir (CNDDB 2024). However, the survey performed in May 2024 did not detect this species.

*Key to Status Abbreviations: Federally Endangered (FE); State Threatened (ST); VHP Covered Species (VHP); California Rare Plant Rank (CRPR).

CRPR 1B = Rare, Threatened, or Endangered in California and elsewhere

CRPR 3 = Plants about which more information is needed (a review list)

CRPR 4 = Plants of limited distribution - Watch list

.1 = Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)

.2 = Moderately threatened in California (20-80% of occurrences threatened)

Table 2. Special-Status Animal Species, Their Status, and Potential for Occurrence on the Project Site

Name	*Status	Habitat	Potential for Occurrence on the Project Site
Federal or State Endangered, Threatened, or Candidate Species			
Bay checkerspot butterfly (*Euphydryas editha bayensis*)	FT, VHP	Native grasslands on serpentine soils. Larval host plants are *Plantago erecta* and/or *Castilleja* spp.	**Absent.** This species has not been recorded on the project site, and the closest records are approximately 7.15 miles south of the project site, from a historical population formerly known to be present at Silver Creek Hills, adjacent to U.S. 101 (CNDDB 2024). Although there is a small amount of native grassland on serpentine soil located on the project site, no larval host plants were observed during the reconnaissance survey. Moreover, there are no known nearby populations, thus precluding this species presence.
Monarch butterfly (*Danaus plexippus*)	FC	Requires milkweeds (*Asclepias* spp.) for egg-laying and larval development, but adults obtain nectar from a wide variety of flowering plants in many habitats. Individuals congregate in winter roosts, primarily in Mexico and in widely scattered locations on the central and southern California coast.	**Absent as Breeder.** The monarch butterfly occurs in the project region primarily as a migrant, and no current or historical overwintering sites are known in Santa Clara County. No larval host plants (i.e. milkweeds) were observed on the project site during the May 2024 reconnaissance surveys. While small numbers of individuals may forage on the project site, especially during spring and fall migration, the site does not provide high-quality foraging habitat for this species due to a lack of abundant floral resources.
Crotch's bumble bee (*Bombus crotchii*)	SC	Open grassland and scrub habitats with abundant flowers providing nectar and pollen and with subterranean nest sites (such as animal burrows).	**May be Present.** Although this species was historically found throughout the southern two-thirds of California, including the project vicinity, population declines and range contractions (25% relative to its historical range) have made this species very scarce in the region (CDFW 2019). Since 2019, however, there have been a number of records of small numbers of individuals from scattered locations in Santa Clara County as close to the project site as Sierra Vista Open Space, approximately 2.1 miles to the east, where the species was recorded in June 2023 and May 2024 (Bumble Bee Watch 2024), indicating that the species is still extant in the county. The project site does not provide high-quality habitat for this species, as the project site is dominated by nonnative grasses, and flowering plants are not abundant. However, individuals may occur occasionally and in small numbers as foragers, and the possibility that nesting could occur on the site (e.g., in a ground squirrel burrow) cannot be ruled out.

Name	*Status	Habitat	Potential for Occurrence on the Project Site
Western bumble bee (*Bombus occidentalis*)	SC	Occurs in a variety of grassland, scrub, and open woodland habitats.	**Absent.** Although the species was historically found throughout much of central and northern California, including the project vicinity, it has been extirpated from much of its former range, and there are no recent records from Santa Clara County or nearby areas (CNDDB 2024, Bumble Bee Watch 2024, iNaturalist 2024). Therefore, this species is absent from the project site.
Central California Coast steelhead (*Oncorhynchus mykiss*)	FT	Cool streams with suitable spawning habitat and conditions allowing migration between spawning and marine habitats.	**Absent**. No suitable aquatic habitat is present on the project site.
Northwestern pond turtle (*Actinemys marmorata*)	CSSC, FT(P), VHP	Permanent or intermittent/seasonal water in a variety of habitats. Nests in uplands surrounding aquatic habitats, typically within 600 feet, but up to 0.25 miles away, depending on habitat conditions.	**May be Present.** Northwestern pond turtles are known in the project vicinity, with the closest CNDDB-mapped occurrence in a pond approximately 0.32 mile west-southwest of the project site (CNDDB 2024). The ponds on site are not natural, not connected to natural waterbodies, lack emergent vegetation and basking sites, likely lack a prey base, and provide low-quality habitat at best. However, we cannot eliminate the possibility that a dispersing northwestern pond turtle (e.g., from nearby ponds or creeks) could occasionally occur in these ponds.
California tiger salamander (*Ambystoma californiense*)	FT, ST, VHP	Breeds in seasonal and perennial pools/ponds in grasslands or open woodlands; spends most time in subterranean refugia such as small mammal burrows or deep rock crevices.	**Absent.** Currently, California tiger salamanders are extirpated from the Santa Clara Valley floor, and are now known primarily from populations in the Diablo Range, and to the south of the project vicinity, in the Coyote Valley and surrounding foothills (CNDDB 2024). Historically, there is an 1895 record of California tiger salamander located to the west-southwest of the project site on the Santa Clara Valley floor, mapped to a nonspecific record in San Jose (CNDDB 2024). The closest extant population is located approximately 1.95 mile east of the project site (CNDDB 2024). Ostensibly suitable upland dispersal and refugial habitat is present on the project site in the form of a handful of small mammal burrows. However, suitable breeding habitat is not present on the project site – both artificial ponds lack emergent vegetation, and both may be drained and refilled on a regular basis. The southernmost pond precludes access by salamanders, as it has an approximately 2-ft tall vertical wall surrounding its periphery which would prevent easy access by salamanders, and the same wall would prevent salamanders from exiting the pond.

Name	*Status	Habitat	Potential for Occurrence on the Project Site
California red-legged frog (*Rana draytonii*)	FT, CSSC, VHP	Streams, freshwater pools, and ponds with emergent or overhanging vegetation.	**May be Present.** California red-legged frogs are known in the project vicinity; the closest records of the species to the project site are from Sierra Vista Open Space Preserve, approximately 1.63 miles to the east (CNDDB 2024). While the closest known occurrences to the project site near the limits of the dispersal capabilities of the species, there are no substantial barriers to dispersal between these known populations and the project site. However, the project site lacks suitable breeding habitat, although ostensibly suitable dispersal, and foraging habitat is present on the project site. Aside from the two artificial ponds, the project site lacks suitable aquatic habitat, but given that populations exist within the known dispersal distance of this species and that dispersal from nearby ponds or creeks is possible, the presence of California red-legged frogs, at least occasionally and in small numbers, cannot be ruled out.
Foothill yellow-legged frog (*Rana boylii*)	SE, FT, VHP	Partially shaded, shallow, perennial streams and riffles with a rocky substrate. Also occasionally occurs in intermittent streams and small instream impoundments. Occurs in a variety of habitats in coast ranges.	**Absent.** This species is very closely associated with water, and there are no creeks, streams, or rivers are present on the project site. CNDDB records are known from Alum Rock Park, approximately 0.60 miles southeast of the project site (CNDDB 2024), and there is a historical record (1904) from Berryessa Creek in San Jose, at a non-specific location approximately 0.67 miles from the project site (CNDDB 2024). Although presumably robust populations exist in Arroyo Hondo Creek approximately 5.0 miles east, and in Penitencia Creek, approximately 2.8 miles east-southeast of the project site (CNDDB 2024), this species has been extirpated from Valley floor areas of Santa Clara County, and given that the site lacks suitable habitat, the species is not expected to occur on the project site. Determined to be absent.

Name	*Status	Habitat	Potential for Occurrence on the Project Site
Swainson's hawk (*Buteo swainsoni*)	ST	Nests in trees surrounded by extensive marshland or agricultural foraging habitat	**Absent as Breeder.** This species is a rare breeder in Santa Clara County; however, two pairs of Swainson's hawks have nested in Santa Clara County in recent years. Each year from 2013 to 2020, a pair of Swainson's hawks nested near Coyote Creek in northern Coyote Valley, providing the first County nesting record since the 1890s (Phillips et al. 2014). The only other modern record of nesting Swainson's hawk in Santa Clara County has been along State Route 152 southeast of Gilroy, from 2020 to the present (Klein et al. 2022). Although nesting Swainson's hawks may be increasing in the region, they are not expected to nest on or adjacent to the project site due to the absence of high-quality, valley-floor foraging habitat in the immediate vicinity of the site. The project site provides limited foraging habitat for this species due to its small size, and Swainson's hawks are expected to forage on the site rarely, if at all.
Bald eagle (*Haliaeetus leucocephalus*)	SE, SP	Occurs mainly along seacoasts, rivers, and lakes; nests in tall trees or in cliffs, occasionally on electrical towers. Feeds mostly on fish.	**Absent as Breeder.** Known to nest (or to have recently nested) in Santa Clara County in at least 10 locations, mostly near reservoirs (Bousman 2007, Ventana Wildlife Society 2012). Due to the absence of high-quality foraging habitat (e.g., a large lake) from the project vicinity, this species is unlikely to nest on or near the site and given the apparent lack of large concentrations of suitable prey on the project site (e.g., small mammals, waterfowl) it is not expected to occur on site.
Least Bell's vireo (*Vireo bellii pusillus*)	FE, SE, VHP	Nests in heterogeneous riparian habitat, often dominated by cottonwoods and willows.	**Absent.** No suitable habitat for the least Bell's vireo is present on the project site. The only breeding records in Santa Clara County are from Llagas Creek southeast of Gilroy in 1997 and the Pajaro River south of Gilroy in 1932 (Rottenborn 2007a), and the only other confirmed records of the species in the project vicinity are of one or two singing males along lower Llagas Creek in May 2001. Although least Bell's vireos may increase in number and distribution in Santa Clara County as core populations increase, no individuals have been recorded in southern Santa Clara County since 2001. Thus, the species is unlikely to be more than a rare and very locally occurring breeder in higher quality, less urbanized, and more extensive early successional riparian habitats along streams well south of the project site.

Name	*Status	Habitat	Potential for Occurrence on the Project Site
Tricolored blackbird (*Agelaius tricolor*)	ST, VHP	Highly colonial nester that establishes dense breeding colonies in emergent vegetation, grain fields, fallow fields, extensive thickets of blackberry, ruderal vegetation such as mustard or thistle, and occasionally in early-successional riparian habitat. Nesting colonies usually are located near fresh water. Tricolored blackbirds are itinerant nesters, and because their nesting habitat is ephemeral, it is possible for this species to colonize or recolonize an area as suitable breeding habitat becomes available.	**May be Present as Nonbreeder.** In Santa Clara County, the species has bred in only a few scattered locations, and is absent from, or occurs only as a nonbreeder in most of the County (Rottenborn 2007b). The species typically nests in flooded, thorny, or spiny vegetation such as blackberry, cattails, willows, thistles, or nettles, none of which is present on or adjacent to the project site. No cattails are present at either pond, and no large patches of thistles or other spiny vegetation are present on the project site. The scattered trees present on the project site do not provide suitable nesting habitat for this species. Therefore, suitable nesting habitat is absent from the project site. Furthermore, this species (whose colonies are loud and conspicuous) has never been recorded nesting within or adjacent to the site (Cornell lab of Ornithology 2024, CNDDB 2024) and the VHP does not map the project site as habitat for the species (ICF 2012). Tricolored blackbirds forage in agricultural fields, grasslands, and other open habitats, and small numbers could occasionally forage in the grassland and wetland habitats on the project site during either the breeding or nonbreeding season.
San Joaquin kit fox (*Vulpes macrotis mutica*)	FE, ST, VHP	Annual grassland or mixed shrub and grassland habitats throughout low, rolling hills and in valleys.	**Absent.** This species has not been recorded on or near the project site (iNaturalist 2024; CNDDB 2024), and the VHP does not map the project site as habitat for the species. The closest area of potential occurrence (based on VHP mapping) is approximately 32 miles south of the project site in the vicinity of State Route 152, where it may occur infrequently and in low numbers during dispersal (ICF International 2012). Determined to be absent.
Mountain lion (Southern California/Central Coast ESU) (*Puma concolor*)	SC	Has a large home range size and occurs in a variety of habitats. Natal dens are typically located in remote, rugged terrain far from human activity. May occasionally occur in areas near human development, especially during dispersal.	**May be Present as Nonbreeder.** In the project vicinity, there are verified sightings (Bay Area Puma Project 2024) and numerous unpublished reports. Occurs widely, though at low densities, throughout the Santa Cruz Mountains and Diablo Range, and may disperse into lowland/valley floor areas. Mountain lions are not expected to regularly use the project site or establish a den on the site due to high levels of human activity and a lack of suitable denning habitat, but individuals may occur on the site as rare dispersants due to the site's location on the periphery of the Valley floor, as well as during hunting events, as multiple deer were observed using the project site during the reconnaissance survey.
California Species of Special Concern			

Name	***Status**	**Habitat**	**Potential for Occurrence on the Project Site**
Northern harrier (*Circus hudsonius*)	CSSC (nesting)	Nests in marshes and moist fields with tall vegetation and sufficient moisture to inhibit accessibility of nest sites to predators. Forages over open areas.	**May be Present as Nonbreeder.** This species, which is considered special-status only when breeding, occurs year-round in the project vicinity (Cornell Lab of Ornithology 2024). There are no wetlands present on the project site, this precluding this species presence as a breeder. However, the species may occur as an occasional forager.
Burrowing owl (*Athene cunicularia*)	CSSC, VHP	Nests and roosts in open grasslands and ruderal habitats with suitable burrows, usually those made by California ground squirrels.	**May be Present as Nonbreeder.** Burrows of California ground squirrels on the project site provide ostensibly suitable nesting and roosting habitat for this species, and grasslands on the site provide ostensibly suitable foraging habitat. However, only three ground squirrel burrows were observed during the survey, burrowing owls are not known to occur on the project site, and no individuals were observed during the May 2024 reconnaissance surveys. The VHP does not map the project site as occupied breeding habitat (ICF International 2012). It is possible, however, that burrowing owls may occur on the site as infrequent transients or foragers in low numbers during winter and migration, and nonbreeders could occasionally roost in the handful of ground squirrel burrows on the project site.
Loggerhead shrike (*Lanius ludovicianus*)	CSSC (nesting)	Nests in tall shrubs and dense trees; forages in grasslands, marshes, and ruderal habitats.	**May be Present as Breeder.** Loggerhead shrikes are known to nest in the project vicinity where open grassland, ruderal, or agricultural habitat with scattered brush, chaparral, or trees providing perches and nesting sites are present (Bousman 2007a). Moderately suitable nesting habitat is present on the project site, and up to one pair may nest in trees on or adjacent to the Project site. However, due to recent declines in this species' South Bay populations, the probability of nesting is low.
Yellow warbler (*Setophaga petechia*)	CSSC (nesting)	Nests in riparian woodlands.	**May be Present as Nonbreeder.** Yellow warblers are not known to breed in the vicinity of the project site (Cornell Lab of Ornithology 2024), and no suitable habitat is present on the project site. However, migrants may occur on the project site during spring and fall migration.

Name	*Status	Habitat	Potential for Occurrence on the Project Site
Grasshopper sparrow (*Ammodramus savannarum*)	CSSC (nesting)	Nests and forages in grasslands, meadows, fallow fields, and pastures.	**May be Present as Nonbreeder.** Known to occur in the region primarily in grasslands and less frequently disturbed agricultural habitats, mostly in the foothills. This species does not breed in grasslands on the Santa Clara Valley floor. Small numbers of individuals may forage in grasslands in the project site during migration. No suitable nesting habitat occurs on the project site and no individuals were observed during the reconnaissance survey in May 2024.
Bryant's savannah sparrow (*Passerculus sandwichensis alaudinus*)	CSSC	Nests in pickleweed dominant salt marsh and adjacent ruderal habitat.	**May be Present as Nonbreeder.** In the South San Francisco Bay, nests primarily in short pickleweed-dominated portions of diked/muted tidal salt marsh habitat and in adjacent ruderal habitats, though small numbers nest in extensive grasslands within the Santa Cruz Mountains as well (Rottenborn 2007c). No suitable nesting habitat occurs on the project site and no individuals were observed during the reconnaissance survey in May 2024.
Pallid bat (*Antrozous pallidus*)	CSSC	Forages over many habitats; roosts in caves, rock outcrops, buildings, and hollow trees.	**May be Present as Nonbreeder.** Historically, pallid bats were likely present in a number of locations throughout the project region, but their populations have declined in recent decades. The species is not known in the project vicinity. The closest record is a 2007 record in the vicinity of Vista Point Court, located approximately 5.87 miles south-southeast of the project site (CNDDB 2024). No known maternity colonies of this species are present in the vicinity of the project site. No suitable roosting habitat was identified during the May 2024 reconnaissance survey. No large tree cavities or suitable artificial structures suitable to support a roost of this species were observed during the reconnaissance survey. It is unlikely that the species occurs on the site at all due to nearby urbanization; however, individuals from distant colonies (especially in the Diablo Range to the east) could occasionally forage on the project site.

Name	*Status	Habitat	Potential for Occurrence on the Project Site
Townsend's big-eared bat (*Corynorhinus townsendii*)	CSSC	Roosts in caves and mine tunnels, and occasionally in deep crevices in trees such as redwoods or in abandoned buildings, in a variety of habitats.	**Absent.** No known extant populations of the Townsend's big-eared bat are present in the project vicinity. The closest record of the species is a 1943 record mapped to the general vicinity of San Jose (CNDDB 2024), approximately 4 miles west of the project site. The closest presumed extant records of the species are a cluster of three records approximately 14 miles south-southeast of the project site, all day roosts located on a former rocket production facility (CNDDB 2024). No suitable roosting habitat was observed on the project site during the May 2024 reconnaissance surveys. Determined to be absent.
San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*)	CSSC	Nests in a variety of habitats including riparian areas, oak woodlands, and scrub.	**Present.** Suitable habitat for this species is present in the southern side of the project site, where at least one occupied nest was observed during the May 2024 reconnaissance survey. Food plants (e.g., toyon (*Heteromeles arbutifolia*) and coast live oak (*Quercus agrifolia*) are also present on the project site.
American badger (*Taxidea taxus*)	CSSC	Burrows in grasslands and occasionally in infrequently disked agricultural areas.	**May be Present as Nonbreeder.** Known to occur in the project vicinity, as close as Sierra Vista Open Space Preserve, located approximately 1.88 miles east of project site (iNaturalist 2024). Found primarily in extensive grasslands and agricultural habitats in the Diablo Range. Badgers are not expected to regularly use the project site or establish a den on the site due to high levels of human activity, but individuals may occur on the site as infrequent dispersants or foragers due to the site's location in close proximity to known populations.

State Fully Protected Species			
Golden eagle (*Aquila chrysaetos*)	SP	Breeds on cliffs or in large trees (rarely on electrical towers); forages in open areas.	**May be Present as Nonbreeder.** No suitable nesting habitat for golden eagles is present on the project site. This species occurs in the project vicinity as an occasional forager, primarily during migration and winter. The project site provides only very limited foraging habitat for this species due to its small size, as well as the lack of suitable prey (no California ground squirrels were observed, and only three old CAGS burrows were found), and golden eagles are expected to forage on the site rarely, if at all.
White-tailed kite (*Elanus leucurus*)	SP	Nests in tall shrubs and trees; forages in grasslands, marshes, and ruderal habitats.	**May be Present as Breeder.** White-tailed kites are common residents in open areas in the project vicinity. Some of the larger trees along the project site (e.g., along the fence line) may provide suitable nesting habitat for this species. No white-tailed kites or nests of this species were observed on or adjacent to the site during the May 2024 reconnaissance surveys; however, up to one pair of white-tailed kites may nest in trees on or adjacent to the project site. Individuals may forage in open habitats on and adjacent to the site year-round.

Key to Abbreviations: Status: Federally Endangered (FE); Federally Threatened (FT); Federally Proposed as Threatened [FT(P)]; Federal Candidate for Listing (FC); State Endangered (SE); State Threatened (ST); State Candidate for Listing (SC); State Fully Protected (SP); California Species of Special Concern (CSSC); Santa Clara Valley Habitat Plan Covered Species (VHP).

The northwestern pond turtle, a California species of special concern and candidate for listing under FESA, is not known to be present in either pond on the project site, nor is it known to breed in the upland habitats surrounding the pond. As discussed above in Section 3.2.4, the two ponds present on the project site are likely not suitable habitat for this species as they are not natural habitats, do not contain emergent vegetation, are not connected to any natural water body, and likely do not contain any prey items that turtles might consume. Nevertheless, given that turtles are known from a location 0.32 miles west-southwest of the project site (CNDDB 2024), it is possible that turtles may occasionally disperse onto the project site, and may use the north pond for refuge. The south pond cannot be accessed by turtles or amphibians, as it is surrounded by an approximately 2-foot vertical wall that rings the entire perimeter (see Photo 4). California red-legged frogs (*Rana draytonii*) could occasionally occur on the project site during dispersal events, as the project site is within the species dispersal distance from known occurrences (CNDDB 2024), but the species is not expected to use habitat on the project site on a regular basis, if it occurs at all.

At least one nest of the San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*), a California species of special concern, was detected in an olive hedge, a somewhat atypical habitat for this species, on the project site during the May 2024 reconnaissance. However, both toyon and oaks, two known woodrat food plants, are present and abundant in the area.

Suitable nesting and foraging habitat for the loggerhead shrike (*Lanius ludovicianus*) and Crotch's bumble bee (*Bombus crotchii*) is present on the project site. Although there is some potential for these species to nest on the site, the probability of nesting by either species is very low given the scarce nature of these species, which are present in the region in low densities. The burrowing owl (*Athene cunicularia*), a California species of special concern, may occur on the project site as an occasional nonbreeding winter resident or dispersant. While burrowing owls are not expected to breed in the project vicinity, they may forage on the site, and nonbreeding individuals could potentially roost in ground squirrel burrows on the project site during migration and winter.

4.3 Sensitive Natural Communities, Vegetation Alliances, and Habitats

Natural communities have been considered part of the Natural Heritage Conservation triad, along with plants and animals of conservation significance, since the state inception of the Natural Heritage Program in 1979. The CDFW determines the level of rarity and imperilment of vegetation types, and tracks sensitive communities in its Rarefind database (CNDDB 2024). Global rankings (G) of natural communities reflect the overall condition (rarity and endangerment) of a habitat throughout its range, whereas state (S) rankings are a reflection of the condition of a habitat within California. Natural communities are defined using NatureServe’s standard heritage program methodology as follows (Faber-Langendoen et al. 2012):

G1/S1:	Critically imperiled
G2/S2:	Imperiled
G3/S3:	Vulnerable.

G4/S4:	Apparently secure
G5/S4:	Secure

In addition to tracking sensitive natural communities, the CDFW also ranks vegetation alliances, defined by repeating patterns of plants across a landscape that reflect climate, soil, water, disturbance, and other environmental factors (CDFW 2022). If an alliance is marked G1-G3, all of the vegetation associations within it will also be of high priority (CDFW 2022). The CDFW provides VegCAMP's currently accepted list of vegetation alliances and associations (CDFW 2022).

Impacts on CDFW sensitive natural communities, vegetation alliances/associations, or any such community identified in local or regional plans, policies, and regulations, are typically considered and evaluated under the California Environmental Quality Act (Title 14, Division 6, Chapter 3, Appendix G of the California Code of Regulations). Furthermore, aquatic, wetland and riparian habitats are also protected under applicable federal, state, or local regulations, and are generally subject to regulation, protection, or consideration by the USACE, RWQCB, CDFW, and/or the USFWS.

4.3.1 Sensitive Natural Communities

A query of sensitive habitats in the CNDDB (CDFW 2022) identified three sensitive natural communities as occurring within the nine 7.5-minute USGS quadrangles containing or surrounding the project site: serpentine bunchgrass (Rank G2/S2.2), sycamore alluvial woodland (Rank G1/S1.1), and northern coastal salt marsh (Rank G3/S3.2),. Serpentine bunchgrass grassland within the project site meets the definition of the *serpentine bunchgrass* natural community type, which is described as an open grassland dominated by perennial bunchgrasses (Holland 1986). No other sensitive natural communities are present on the project site.

4.3.2 Sensitive Vegetation Alliances

Non-serpentine bunchgrass grassland on the project site likely qualifies as the "*Nassella pulchra* – *Avena* spp. – *Bromus* spp." Alliance (41.150.05). This alliance is ranked as G3/S3? (CDFW 2022) and is therefore ranked as apparently secure at the globally and statewide level (CDFW 2022), with some uncertainty on the statewide ranking. While this alliance is not considered a sensitive vegetation alliance by this definition, it is still tracked by the CNDDB and considered a sensitive alliance by the CDFW in VegCAMP (CDFW 2022).

4.3.3 CDFW Riparian Habitat

Due to its rarity and disproportionately high habitat values and functions to wildlife, the CDFW considers riparian habitat to be sensitive. However, no riparian habitat is present on the project site.

4.3.4 Waters of the U.S./State

Wetlands or other waters of the U.S./state do not occur on the project site. Hydrophytic vegetation, including water beard grass (*Polypogon viridis*) and tall flatsedge (*Cyperus eragrostis*), was observed near a structure outside the project site within the WTP facility (37.39772, -121.83471). However, the area was less than 2 square feet in size, and this vegetation was apparently supported by a water leak. Therefore, we do not consider this area to constitute waters of the U.S. or waters of the state.

4.3.5 Nonnative and Invasive Species

Many nonnative, invasive plant species occur on the project site. Species with a "high" invasive rating by the Cal-IPC have the potential to cause severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment, and most are widely distributed ecologically (Cal-IPC 2024). On the project site, red brome, a species with a "high" rating, was observed.

Ten species observed on the project site have a "moderate" rating by Cal-IPC, indicating that they have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure, and that their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment would be generally dependent upon ecological disturbance (Cal-IPC 2024). These species include tall sock-destroyer (*Torilis arvensis*), bull thistle, artichoke (*Cynara cardunculus*), wild oat, ripgut brome, rattail sixweeks grass (*Festuca myuros*), Italian rye grass, wall barley, fountain grass (*Pennisetum* sp.), and Harding grass.

Ten other species observed on the project site have a "limited" invasive rating, indicating that they are invasive by their ecological impact are minor on a statewide level (Cal IPC 2024). These species include pepper tree (*Schinus molle* and *Schinus terebinthifolius*), bristly ox-tongue (*Helminthotheca echinoides*), smooth cat's-ear (*Hypochaeris glabra*), milk thistle, blackwood acacia (*Acacia melanoxylon*), redstem filaree, Canary Island palm (*Phoenix canariensis*), annual beard grass (*Polypogon monspeliensis*), and smilo grass (*Stipa milacea*).

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Appendix A. Special-Status Plants Considered but Rejected for Occurrence

Common Name	Scientific Name	No Suitable Habitat	Edaphic Conditions Absent	Outside the Elevation Range	Outside of Known Geographic Range/No Nearby Extant Records	Not Observed during Appropriately-Timed Survey
Acanthomintha lanceolata	Santa Clara thorn-mint	X				
Amsinckia lunaris	bent-flowered fiddleneck					X
Androsace elongata ssp. *acuta*	California androsace				X	
Astragalus tener var. tener	alkali milk-vetch	X	X	X		
Atriplex depressa	brittlescale		X			
Atriplex minuscula	lesser saltscale		X			
Balsamorhiza macrolepis	big-scale balsamroot					
Boechera rubicundula	Mt. Day rockcress	X		X		
Calandrinia breweri	Brewer's calandrinia	X				
Calochortus umbellatus	Oakland star-tulip					
Calyptridium parryi var. hesseae	Santa Cruz Mountains pussypaws	X		X		
Calystegia collina ssp. *venusta*	South Coast Range morning-glory			X		
Castilleja affinis var. neglecta	Tiburon paintbrush				X	
Castilleja rubicundula var. rubicundula	pink creamsacs				X	
Ceanothus ferrisiae	Coyote ceanothus				X	
Centromadia parryi ssp. *congdonii*	Congdon's tarplant	X				
Chlorogalum pomeridianum var. minus	dwarf soaproot			X		
Chloropyron maritimum ssp. *palustre*	Point Reyes salty bird's-beak	X		X		
Chorizanthe douglasii	Douglas' spineflower	X				
Chorizanthe robusta var. robusta	robust spineflower	X	X		X	
Cirsium fontinale var. campylon	Mt. Hamilton thistle		X			
Clarkia breweri	Brewer's clarkia	X		X		

Common Name	**Scientific Name**	**No Suitable Habitat**	**Edaphic Conditions Absent**	**Outside the Elevation Range**	**Outside of Known Geographic Range/No Nearby Extant Records**	**Not Observed during Appropriately-Timed Survey**
Clarkia concinna ssp. automixa	Santa Clara red ribbons	X				
Clarkia lewisii	Lewis' clarkia	X				
Collinsia multicolor	San Francisco collinsia	X				
Convolvulus simulans	small-flowered morning-glory		X			
Dirca occidentalis	western leatherwood	X	X			
Dudleya abramsii ssp. setchellii	Santa Clara Valley dudleya		X			
Eleocharis parvula	small spikerush	X				
Eriogonum argillosum	clay buckwheat	X				
Eriogonum umbellatum var. bahiiforme	bay buckwheat	X	X	X		
Eriophyllum jepsonii	Jepson's woolly sunflower	X		X		
Eryngium aristulatum var. hooveri	Hoover's button-celery	X		X		
Erysimum franciscanum	San Francisco wallflower					X
Extriplex joaquinana	San Joaquin spearscale		X			
Fritillaria liliacea	fragrant fritillary					
Galium andrewsii ssp. gatense	phlox-leaf serpentine bedstraw	X	X			
Grindelia hirsutula var. maritima	San Francisco gumplant		X			
Hoita strobilina	Loma Prieta hoita	X				
Iris longipetala	coast iris	X	X			
Isocoma menziesii var. diabolica	Satan's goldenbush	X				
Lasthenia conjugens	Contra Costa goldfields		X			
Leptosiphon ambiguus	serpentine leptosiphon	X				
Leptosiphon aureus	bristly leptosiphon	X				
Leptosiphon grandiflorus	large-flowered leptosiphon					X
Leptosyne hamiltonii	Mt. Hamilton coreopsis	X		X		
Lessingia hololeuca	woolly-headed lessingia		X			

Common Name	**Scientific Name**	**No Suitable Habitat**	**Edaphic Conditions Absent**	**Outside the Elevation Range**	**Outside of Known Geographic Range/No Nearby Extant Records**	**Not Observed during Appropriately-Timed Survey**
Lessingia micradenia var. glabrata	smooth lessingia		X			
Lessingia tenuis	spring lessingia	X		X		
Lomatium observatorium	Mt. Hamilton lomatium	X		X		
Lomatium parvifolium	small-leaved lomatium	X				
Malacothamnus arcuatus var. arcuatus	arcuate bushmallow	X				
Malacothamnus hallii	Hall's bushmallow	X				
Mielichhoferia elongata	elongate copper moss	X				
Monolopia gracilens	woodland woollythreads					
Navarretia prostrata	prostrate vernal pool navarretia	X	X			
Penstemon rattanii var. kleei	Santa Cruz Mountains beardtongue	X		X		
Phacelia phacelioides	Mt. Diablo phacelia	X		X		
Plagiobothrys chorisianus var. hickmanii	Hickman's popcornflower	X				
Plagiobothrys glaber	hairless popcornflower	X				
Puccinellia simplex	California alkali grass		X			
Ravenella exigua	chaparral harebell	X		X		
Sagittaria sanfordii	Sanford's arrowhead	X				
Sanicula saxatilis	rock sanicle			X		
Senecio aphanactis	chaparral ragwort	X	X			
Sidalcea malachroides	maple-leaved checkerbloom	X				
Streptanthus albidus ssp. albidus	Metcalf Canyon jewelflower					X
Streptanthus albidus ssp. peramoenus	most beautiful jewelflower					X
Suaeda californica	California seablite	X		X		
Trifolium hydrophilum	saline clover	X				

APPENDIX D

Geotechnical Investigation Report

RESIDUALS MANAGEMENT PROJECT
PENITENCIA WATER TREATMENT PLANT
SAN JOSE, CALIFORNIA

GEOTECHNICAL REPORT FOR FINAL DESIGN

SUBMITTED TO
Stantec Consulting Services, Inc.
1340 Treat Boulevard, Suite 300
Walnut Creek, CA 94597

PREPARED BY
ENGEO Incorporated

April 29, 2024

PROJECT NO.
19990.000.001

ENGEO
Expect Excellence

GEOTECHNICAL
ENVIRONMENTAL
WATER RESOURCES
CONSTRUCTION SERVICES
COASTAL/MARINE GEOTECHNICS

Project No.
19990.000.001

April 29, 2024

Mr. Kurt Condie, PE
Stantec Consulting Services, Inc.
1340 Treat Boulevard, Suite 300
Walnut Creek, CA 94597

Subject: Residuals Management Project
Penitencia Water Treatment Plant
San Jose, California

GEOTECHNICAL REPORT FOR FINAL DESIGN

Dear Mr. Condie:

We have prepared this geotechnical report for the use of Stantec Consulting Services, Inc. (Stantec) and Valley Water, as outlined in our subconsultant agreement dated January 18, 2024. The purpose of this report is to provide geotechnical recommendations to support the final design of the Residuals Management Project (RMP) at Valley Water's Penitencia Water Treatment Plant (PWTP).

The recommendations provided in this report are based upon our review of existing available published geotechnical and geological information and data, including a site-specific geotechnical exploration at the RMP project site performed by Kleinfelder in August 2023, and previous geotechnical reports for various past PWTP projects provided by Stantec.

From a geotechnical engineering viewpoint, the site is suitable for the proposed structures, provided that the recommendations contained in this report are incorporated into the project design and implemented during construction.

Please contact us if you have any questions or comments regarding this report.

Sincerely,

ENGEO Incorporated

Siobhan O'Reilly-Shah, PE Joseph N. Seibold, GE

sos/jns/nn/ar

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LIST OF ABBREVIATIONS AND ACRONYMS

Projects, Reports, and Facilities

PWTP	Penitencia Water Treatment Plant
RMP	Residuals Management Project
RMF	Residuals Management Facility
WRF	Washwater Recovery Facility

Units of Measurement

g	gravitational acceleration (32.1 ft/s^2)
ksf	kips per square foot
pcf	pounds per cubic foot
pci	pounds per cubic inch
psf	pounds per square foot

Common Engineering Terms

bgs	Below Ground Surface
CLSM	Controlled Low Strength Material
GW	Groundwater
PGA	Peak Ground Acceleration
MCE	Maximum Considered Earthquake

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

This geotechnical report presents our geologic and geotechnical interpretations, analyses, and recommendations to support the final design of the Residuals Management Project (RMP) at the Santa Clara Valley Water District's (Valley Water's) Penitencia Water Treatment Plant (PWTP) in San Jose, California. Our scope was carried out as outlined under Task 9.1.6 of our agreement dated January 18, 2024. The RMP will comprise the demolition or improvement of select existing structures and construction of new residuals management structures and facilities.

For the preparation of this geotechnical report, as outlined in our agreement, we were authorized to conduct the following scope of services.

- Review plans, aerial photographs, geologic maps, and other available historical information
- Review available relevant previous geotechnical exploration reports
- Analyze and interpret geological and geotechnical data
- Report our findings, conclusions, and geotechnical design recommendations

This report was prepared for the exclusive use of Stantec and their consultants for the design of this project. If any changes are made to the character, design, or layout of the project, we should be contacted to review the conclusions and recommendations contained in this report to evaluate whether modifications are .

1.2 PROJECT LOCATION AND DESCRIPTION

The PWTP is located south of Suncrest Avenue near the toe of the east foothills of San Jose, California, as shown in Figure 1 - Vicinity Map, The RMP includes a proposed Residuals Management Facility (RMF) and a proposed Washwater Recovery Facility (WRF) at two existing basin sites along the southwestern edge of the PWTP. The RMP is one component of Valley Water's planned treatment modifications to the PWTP aimed at meeting increasing population demands, extend the useful life of the plant, improve treatment efficiency, improve reliability, and reduce risk of discharge violations. The RMP includes demolition of select existing facilities, including sludge holding ponds, washwater recovery ponds, belt press building, and other sludge management facilities, and construction of new residual management structures, piping, access roads, and other appurtenant facilities. The currently proposed layout of the planned residuals management improvements is shown in Figure 2 - Site Plan. Elevations referenced in this report are with respect to the NAVD88 datum, as described in Section 1.3.

Per our discussions with the design team and our review of the 30 percent plans and details provided to us, our focus in this geotechnical report is the design and construction of the following planned RMP structures and facilities.

- <u>Sludge Storage Tanks</u> – Two 45-foot-diameter below-grade sludge storage tanks are planned within the western footprint of the existing sludge holding ponds (that will be decommissioned and demolished). The bottom elevations of the concrete tanks are planned to range from approximately Elevation 377 feet at the outer perimeter of the tanks to Elevation 372 feet at the tank center sumps.

- Centrifuge Building, Solids Load-Out Structure, and Sludge Transfer Pump Station – These near-grade structures are planned within the center of the existing sludge holding ponds (that will be decommissioned and demolished). The centrifuge building is planned to be three-stories with the solids load-out structure as an attached canopy structure, and the adjacent sludge transfer pump station is a one-story structure.
- Gravity Thickener Tanks – Two 54-foot-diameter below-grade gravity thickener tanks are planned within the eastern footprint of the existing sludge ponds (that will be decommissioned). The bottom elevations of the gravity thickener tanks are planned to range from approximately Elevation 376 feet at the outside of the structures to Elevation 366 feet at the center.
- Washwater Flocculation/Sedimentation Basins – The below-grade washwater flocculation/sedimentation basin facility is planned as a series of rectangular tanks constructed within the footprint of the existing western washwater recovery pond (that will be decommissioned). The bottom elevation is approximately Elevation 374 feet.
- Washwater Equalization Basins and Pump Station – The washwater equalization basins and pump station facility is planned as a series of rectangular tanks constructed footprint of the existing eastern washwater recovery pond (that will be decommissioned). The bottom elevation ranges from approximately Elevation 368 to Elevation 364 feet.
- Appurtenant Facilities - Includes the electrical building, decant pump station, centrifuge wet well, pipe vaults, and distribution structures.
- Yard Piping - Several new large-diameter pipelines will traverse the RMP project site connecting wastewater streams.
- Site Access Roads - The RMP project will include paved roadways to provide access to, and around, the new treatment facilities.

1.3 ELEVATION DATUM

The elevation datum used for this project is the North American Vertical Datum of 1988 (NAVD88). Elevations in this report refer to this datum unless otherwise noted.

2.0 GEOTECHNICAL EXPLORATIONS AND TESTING

2.1 SITE-SPECIFIC FIELD EXPLORATION AND LABORATORY TESTING

Kleinfelder was retained by Valley Water to collect geotechnical data for the RMP project site at PWTP. They performed 11 borings (of 12 planned borings, one of which was obstructed) at the site between August 17 and 23, 2023, using hollow-stem auger drilling method. The borings were drilled to depths ranging between approximately 48½ to 50 feet below existing grade. The locations of Kleinfelder's exploratory borings are shown in Figure 2 - Site Plan. The data from that exploration is presented in the following report.

- Kleinfelder. 2023. Geotechnical Investigation Report, Penitencia Water Treatment Plant, Residuals Management Project, 3959 Whitman Way, San Jose, California. December 12, 2023.

A summary of the recent RMP project-specific explorations is shown in Table 2.1-1. The boring logs for these explorations are included in Appendix A.

TABLE 2.1-1: Summary of 2023 Project-Specific Subsurface Explorations

BORING ID	COMPANY	TYPE	DATE	GROUND SURFACE ELEVATION (feet)	DEPTH OF EXPLORATION (feet)	GROUNDWATER DEPTH (feet)
KB-1	Kleinfelder	HSA	8/22/2023	389	50	NE
KB-2	Kleinfelder	HSA	8/23/2023	388	50	NE
KB-4	Kleinfelder	HSA	8/18/2023	386	50	NE
KB-5	Kleinfelder	HSA	8/17/2023	387	50	NE
KB-6	Kleinfelder	HSA	8/17/2023	387	50	NE
KB-7	Kleinfelder	HSA	8/22/2023	388	50	NE
KB-8	Kleinfelder	HSA	8/15/2023	386	48½	NE
KB-9	Kleinfelder	HSA	8/16/2023	387	50	NE
KB-10	Kleinfelder	HSA	8/23/2023	387	50	NE
KB-11	Kleinfelder	HSA	8/16/2023	387	50	NE
KB-12	Kleinfelder	HSA	8/21/2023	387	50	NE

Notes: NE = not encountered; HSA = hollow-stem auger
KB-3 not drilled due to obstruction.

Kleinfelder performed laboratory tests shown in Table 2.1-2 on select soil samples to evaluate their engineering index properties. The laboratory test results from their 2023 exploration are included in Appendix B.

TABLE 2.1-2: Laboratory Testing

TEST	DESIGNATION
Moisture Content and Unit Weight	ASTM D7263
Determination of Moisture Content Only	ASTM D2216
Amount of Material in Soil Finer than No. 200 Sieve	ASTM D1140
Particle-Size Analysis of Soil	ASTM D422
Atterberg Limits	ASTM D4318

2.2 REVIEW OF PREVIOUS INVESTIGATIONS

We reviewed available published geologic reports by the California Geological Survey (CGS) and U.S. Geological Survey (USGS), as well as geotechnical reports prepared for previous work at the PWTP. The previous reports containing geotechnical information and data that we used for developing geotechnical design recommendations for the RMP are listed below.

- Lettis Consultants International, Inc. (LCI). 2015. Characterization of the Penitencia Creek Landslide Deformation models for the Penitencia Delivery Main and Penitencia Force Main Retrofit Project, San Jose, California. November 10, 2015.
- LCI/Cal Engineering and Geology (CE&G). 2015. Revised Landslide Displacement Estimated for the Penitencia Delivery Main and Penitencia Force Main Seismic Retrofit Project, San Jose, California: Technical Memorandum; April 9, 2015.
- CE&G. 2015. Geotechnical Design Report – Prepared for Carollo Engineers and Santa Clara Valley Water District in Support of the Penitencia Delivery Main and Penitencia Force Main Retrofit Project. July 10, 2015, Revised November 9, 2015.
- LCI/CE&G. 2014. Technical Memorandum – Landslide and Seismic Hazards Evaluation of the Penitencia Creek Landslide, Santa Clara County, California. June 24, 2014.

- Harza Consulting Engineers and Scientists. 2000. Geotechnical Investigation, SCVWD Treated Water Improvement Project – Stage 2, Penitencia Water Treatment Plant (WTP). November 3, 2000.
- CH2M Hill. 1987. Geotechnical Exploration, Santa Clara Valley Water District Sludge Dewatering Project, Penitencia Water Treatment Plant, San Jose, California. December 1987.

The series of 2014/2015 reports prepared by LCI and CG&E provide the most up-to-date characterization of the Penitencia Creek Landslide (PCL), including seismic-hazard evaluation to estimate the behavior of the PCL over the next 50 years. These reports focus on an area within the PWTP traversed by several major pipelines (including a delivery main, force main, and the south bay aqueduct) that span from the western landslide toe near the penvault up to the finished water meter, which is near the center of the proposed RMP project site. The findings and displacement predictions from these reports are further discussed in Section 3.3.

The Geotechnical Report prepared by Harza (2000) was in support of the now completed sulfuric acid, ozone generation, ozone contactor/destruct, hydrogen peroxide/ozone quenching, and liquid oxygen facilities. To support the design of these structures, Harza performed three hollow-stem auger (HSA) borings and two cone penetration tests (CPTs). Their report also included select borings from the following historic explorations at the project site: Harza (1998), Woodward Clyde (1993), Dames & Moore (1971), and Robert S. Cooper (1964).

The Geotechnical Report prepared by CH2M Hill (1987) was in support of the now existing belt press facility and neat polymer tank. The explorations performed for that study included four HSA borings. The CH2M Hill report provided a discussion of the existing landslide, as well as recommendations for mat slabs and conventional foundations.

Relevant borings from the past subsurface explorations cited above are shown in the Site Plan, Figure 2. The most relevant borings in the vicinity of the proposed RMP sites are summarized in Table 2.2-1. The previous exploration logs are included in Appendix C, and data from laboratory tests are included in Appendix D.

TABLE 2.2-1: Summary of Relevant Previous Subsurface Explorations

BORING ID	COMPANY	TYPE	DATE	GROUND SURFACE ELEVATION (feet)	DEPTH OF EXPLORATION (feet)	GROUNDWATER DEPTH (feet)
BH-8	CE&G	HSA	11/11/2014	382	30	NE
BH-9	CE&G	HSA	11/12/2014	393	40½	30½
B-1	CH2M Hill	HSA	9/8/1987	390	31½	NM
B-2	CH2M Hill	HSA	9/8/1987	400	31½	NM
B-3	CH2M Hill	HSA	9/8/1987	390	21½	NM
B-4	CH2M Hill	HSA	9/8/1987	400	21½	NM
EB-1	Harza	HSA	5/17/2000	391	50	23
EB-2	Harza	HSA	5/17/2000	395	50	NM
CPT-1	Harza	CPT	7/14/2000	400	65	NR
B-10	Robert S. Cooper	NR	1964	409	45	NR
B-11	Robert S. Cooper	NR	1964	NR	22	NR

Notes: GW = groundwater, NE = not encountered, NM = not measured, NR= not reported, HSA = hollow-stem auger, CPT = cone penetration test

The ground surface elevations listed for the borings in Table 2.2-1 above are as reported in the reviewed geotechnical reports, and the datum used was not specified in the reports.

3.0 SITE CONDITIONS

3.1 REGIONAL GEOLOGY

The PWTP is situated on the eastern margin of the Santa Clara Valley, just west of the Hayward fault on the western flanks of the Diablo range, which lies within the Coast Ranges geomorphic province. The Coast Ranges comprise a system of northwest-trending, fault-bounded mountain ranges and intervening valleys that trend approximately parallel to the right-lateral transform boundary between the North American and Pacific Plates. Bedrock in the Coast Ranges consists of igneous, metamorphic, and sedimentary rocks that range in age from Jurassic to Pleistocene. Bedrock is overlain by Quaternary deposits that consist of the alluvial, fluvial, lacustrine, and eolian sediments that fill the Santa Clara Valley. Regional geologic mapping indicates the site is underlain by landslide deposits (Qls) associated with a large landslide complex (Wentworth et al, 1999), as shown in the Regional Geologic Map, Figure 3.

3.2 SEISMICITY

The site is located in a seismically active area of Northern California that contains numerous active faults. Small earthquakes occur every year in the San Francisco Bay and Santa Clara Valley region and larger earthquakes have been recorded and can be expected to occur in the future. Faults have been cataloged and mapped by the United States Geological Survey (USGS) in the Quaternary Fault and Fold Database of the United States. An active fault is defined by the California Geologic Survey as one that experienced surface displacement within Holocene time (about the last 11,700 years) (CGS, 2018). In Figure 4 - Regional Faulting and Seismicity Map, we show the approximate locations of known active faults, along with other Quaternary faults, based on the USGS Quaternary Fault and Fold Database, as well as significant historical earthquakes recorded within San Francisco Bay Region.

The 2015 Working Group on California Earthquake Probabilities evaluated the 30-year probability of a Moment Magnitude 6.7 or greater earthquake occurring on the known active fault systems in the Bay Area as part of the Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3), The UCERF3 model estimates an overall probability of 72 percent for the Bay Area as a whole, and a probability of 14.3 percent for the Hayward fault and 7.4 percent for the Calaveras fault.

Based on the historic seismicity, the proximity of known active faults, and the estimated earthquake probabilities for the Bay Area, it is our opinion that the site should be expected to experience strong seismic ground shaking during the service lifetime of the proposed RMP improvements. To characterize the seismic hazard at the proposed RMP site, we performed a site-specific seismic-hazard analysis, which is presented in Appendix E. The 1,000 highest probability fault sources from the UCERF3 contributing to the hazard deaggregations are also provided in Appendix E.

3.3 PENITENCIA CREEK LANDSLIDE

The entire PWTP is located within the large and deep-seated Penitencia Creek Landslide (PCL). The PCL occupies about 240 acres at the base of the eastern foothills of the Santa Clara Valley. According to the Landslide Inventory Map of the Calaveras Reservoir Quadrangle (2011), the PCL is indicated as “active or historic” and the confidence of interpretation is classified as “definite.” The site is also located in an area of earthquake-induced landslides according to the State of California Seismic Zones Map dated October 17, 2001, as shown in Figure 5 - Seismic Hazards Zone Map. Ongoing creep movement of the PCL has been monitored as early as 1972, when the Department of Water Resources (DWR) installed survey markers to monitor surface ground movement. In the early 1970s, Valley Water also installed an initial series of 6 inclinometers and 12 piezometers in areas of the PCL where ground instability was evident. By 1975, Valley Water identified the need for a more extensive long-term monitoring program when the original 6 inclinometers had already sheared and could no longer be used. Since that time, Valley Water has installed extensive instrumentation to monitor movement of the PCL, including inclinometers, piezometers, and electronic distance measurement (EDM) points. Over the years, new instrumentation has been added to replace instruments that have been monitored through their service life, and to gather more focused information to aid in the retrofit and/or replacement of plant facilities that have been impacted by the PCL movement.

A seismic-hazard evaluation of the deep-seated landslide was not included in the scope of this report. Our assessment of the landslide’s impact on the proposed project is based on review of: (1) the latest (2016) and historical PCL surveillance reports and (2) landslide and seismic-hazard evaluations of the PCL performed in 2014/2015 by Lettis Consultants International, Inc. (LCI) and Cal Engineering & Geology (CEG). These reports provide extensive and detailed information regarding the instrumentation, monitoring, and surveillance findings of historical movement of the PCL within the PWTP and predicted future PCL movement from continuous creep and potential seismic triggering. Our assessment aims at presenting findings from these studies that best characterizes the ongoing creep movement, future creep movement, and potential seismically induced movement of the PCL at the planned RMP project site. A more extensive characterization of the overall PWTP movement within the PCL can be found in the referenced surveillance reports and landslide studies.

3.3.1 Landslide Creep Movement

The Santa Clara Valley Water District (Valley Water) has performed surveillance monitoring of long-term creep movement of the PCL dating back to 1972, when 6 inclinometers and 12 piezometers were installed to monitor movement around the planned future treatment plant. Over time, additional inclinometers, piezometers, and other monitoring instrumentation (survey monuments, electronic distance measurement (EDM) monuments, time domain reflectometry, etc.) have been installed and monitored. The monitoring data has been compiled, summarized, and analyzed in a series of surveillance reports published between 2001 and as recent as 2016.

The 2016 surveillance report indicates that landslide movement and groundwater piezometric data remain generally consistent with previous surveillance reports. The 2016 report also includes data from new survey monuments installed in 2012 to add focused monitoring near the toe of the PCL in the vicinity of the plant delivery main, force main, and associated penvault, overflow bypass structure (OFBS), and finished water meter vault (FWMV). PCL movement at the FWMV is of particular interest to the RMP because it is located near the center of the proposed RMF and WRF sites.

Utilizing data from the surveillance reports and other available geotechnical and geological data, Lettis Consultants International (LCI) and Cal Engineering & Geology (CE&G) performed a Landslide and Seismic Hazards Evaluation of the PCL in 2014, with subsequent technical memorandums providing revisions and updates in 2015. Key findings from these studies, as they pertain to the anticipated creep movement of the PCL in the vicinity of the proposed RMP site over the next 50 years (2014-2064), are summarized below.

- Direction of PCL Movement – The PCL moves in a general southwest direction at an azimuth of 220 degrees (i.e., South-40 degrees-West), plus-or-minus 20 degrees.
- Rate of Landslide Creep Displacement – The rate of movement at the FWMV (i.e., planned RMP site) appears to be less than the average rate of movement of the larger PCL landslide mass.
- Magnitude of PCL Creep Movement – Based on past monitored creep movement of the PCL, about 12 inches of creep movement is anticipated to occur at the FWMV (i.e., planned RMP site) over a 50-year period.

3.3.2 Seismic-Landslide Movement

In addition to the ongoing (and relatively steady state) creep movement of the PCL discussed above, the PCL may also potentially undergo larger displacements related to a singular seismic event on one of the nearby active faults discussed in our seismic-hazards analysis presented in Appendix E. The magnitude of the seismic-landslide displacement is generally related to the intensity of the seismic event (e.g., earthquake magnitude, site-to-source distance, duration, peak ground acceleration, Arias Intensity, etc.) and is typically quantified in relation to seismic events with a specific probability of occurrence over a 50-year period.

A landslide seismic-hazards analysis of the PCL was performed by Lettis Consultants International (LCI) and Cal Engineering & Geology (CE&G) in 2014, with subsequent technical memorandums providing updates in 2015. These studies were performed to predict seismically induced landslide movements to establish design objectives for retrofit of existing PWTP pipelines between the landslide toe and the finish water meter vault (FWMV). As previously discussed, landslide movement at the FWMV is of particular interest for the RMP since it is located between the proposed RMF and WRF sites. While previous studies have also been performed (e.g., WCC, 1993; T&R, 2011) the 2014 LCI/CEG study (with 2015 revisions) provide the most up-to-date landslide hazard analysis that utilizes updated seismic-hazard maps and focuses on PCL movement in the vicinity of the proposed RMP site.

The 2014 LCI/CEG study included deaggregation of the 2008 United States Geological Survey (USGS) seismic-hazard maps (via the online USGS Unified Hazard Tool) to estimate peak ground accelerations for 10 percent in 50-year probability of exceedance (475-year return period) and 5 percent in 50-year probability of exceedance (975-year return period) seismic events. The study also considered the PGA associated with the 84th percentile deterministic seismic event for a hypothetical magnitude M 7.0 earthquake on the nearby Hayward Fault. These PGAs were used to scale select ground motion time-history records for landslide displacement hazard analysis (LDHA). The scaled time histories were utilized for performing both simplified “Newmark-type” sliding block analyses (based on Bray and Travasarou, 2007, and Jibson and Jibson, 2003), and more rigorous two-dimensional finite element analysis using GeoStudio modeling software developed by Geo-Slope International, Inc. A detailed description of the time history selection and scaling, the modeled PCL geometry, model calibrations, soil dynamic properties, etc., are provided in the 2014 LCI/CE&G report.

The study found that both simplified Newmark-type methods substantially over-predicted landslide displacement in comparison to the historical events used for model calibration. The finite element analysis indicated highly varied displacements over the eight time histories evaluated, with total displacements ranging from about and 1 to 3 feet for the 475-year return period event and 1 to 4½ feet for the 975-year return period seismic event. The two 84th percentile scaled time histories representing the deterministic Hayward Fault M7.0 earthquake resulted in displacement ranging from about 2¼ to 5¾ feet. These displacement results represent an average total displacement that the PCL would move if it behaved as a singular intact block (which is not the true displacement behavior of the PCL). Further evaluation of the finite element strain vectors permitted the estimation of relative movements within the non-rigid landslide PCL mass. Based on evaluation of the strain vectors from the finite element analysis nodes, LCI/CEG estimated the range of PCL movements at the FWMV location as summarized in the following Table 3.3.2-1, which includes the total combined displacements by adding the range of creep movement discussed in Section 3.3.1.

TABLE 3.3.2-1: Summary of LCI/CEG 2014 LDHA at the FWMV Site

DESIGN EQ EVENT	PGA	NO. OF GROUND-MOTION RECORDS EVALUATED ESTIMATED	DISPLACEMENT RANGE AT FWMV SITE	ESTIMATED COMBINED CREEP+SEISMIC DISPLACEMENT
5% Probability of Exceedance in 50 Years	0.84g	8	0.8 to 3.6 feet	1.6 to 4.6 feet
10% Probability of Exceedance in 50 Years	0.70g	8	0.8 to 2.5 feet	1.6 to 3.5 feet
84th- Percentile Deterministic, Hayward Fault	1.05g	2	1.7 to 4.8 feet	2.5 to 5.8 feet

Based on the findings from their 2014 study, LCI/CEG recommended that the retrofit design of the PWTP pipelines consider up to 7.3 feet combined displacement at the PCL toe and up to 4 feet combined displacement at the FWMV (near the RMP site).

LCI/CEG updated their analysis in 2015 by incorporating the latest USGS 2014 National Seismic Hazard Mapping (NSHM) into the LDHA. The 2014 NSHM include two updates to the 2008 hazard maps that contributes to a higher seismic hazard at the PWTP: (1) development of a revised seismic source model for California called the Uniform California Earthquake Rupture Forecast (UCERF3) and (2) new NGA2-West ground-motion prediction equations (GMPEs). For the updated analysis, LCI/CE&G were provided with site-specific probabilistic seismic-hazards analysis (PSHA) data directly from the USGS, which included uniform horizontal response spectra (UHRS) and deaggregation information for the 5 precent in 50 years (975-year return period) probabilistic seismic event. The updated PSHA increased the ground shaking hazard at the site by 30 to 40 percent across the response spectrum, with the 975-year return period PGA increasing from 0.84g (as shown in Table 3.3.2-1) to 1.16 g. Using the increased PGA, LCI/CE&G selected a suite of 15 time history records that were reflective of the increased intensity of the shaking represented by the updated UHRS. A detailed discussion of the rationale for time history selecting, scaling, consideration of pulse-like characteristics, etc., are provided in the revised 2015 LCI/CE&G letter report. The findings of the 2015 revised LDHA for the 975-year return period seismic event in comparison to their 2014 LDHA is summarized in the following Table 3.3.2-2.

TABLE 3.3.2-2: Comparison of LCI/CEG 2015 Updated LDHA Results to 2014 LDHA Results

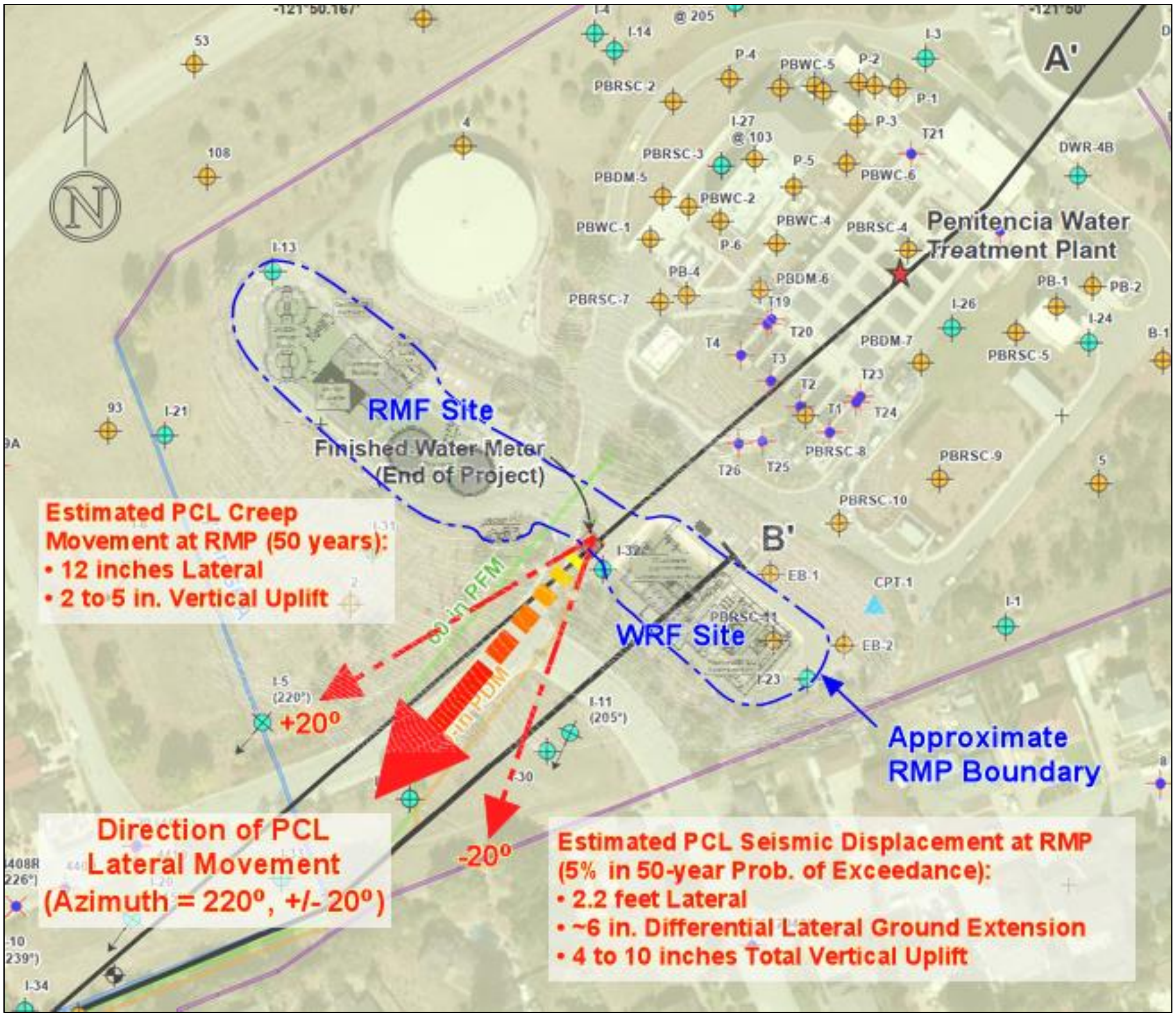
PARAMETER	2014 LDHA	2015 REVISED LDHA
Probabilistic Event	5% Probability of Exceedance in 50 Years (975-year Return Period)	
Seismic-Hazard Map	2008 Hazard Maps (UCERF2 Model)	2014 NSHM (UCERF3 Model)
GMPE	NGA-West	NGA2-West
PGA	0.84g	1.16g
No. of Time Histories	8	15
Combined Displacement at PCL Toe (over 50 years)	7.3 feet	9.4 feet
Combined Displacement at the FWMV (over 50 years)	4 feet	3.1 feet

Note in Table 3.3.2-2 that, although the 2015 revised study evaluated the effects of the increased ground shaking intensity associated with the updated seismic-hazard maps and GMPEs, the 2015 revised estimate of combined displacement at the FWMV is lower than in the 2014 study. LCI/CE&G reports this as the result of a more detailed re-evaluation of the finite element nodes in the 2015 study.

Table 3.3.2-2 also indicates that there will be considerable differential movement between the FWMV and the toe of the PCL in the form of ground extension (i.e., pulling apart). When considering only the estimated seismic displacements, the differential movement between the FWMV and the PCL toe is approximately 0.5 percent, or about ½ foot of ground extension per 100 linear feet (in the azimuth direction of overall movement). Although the LCI/CE&G analysis considers the alignment between the FWMV and toe of PCL, it is reasonable to assume that the differential ground extension would also propagate through the proposed RMP site. Considering the width and orientation of the proposed RMP site, we estimate that about 6 inches of differential ground movement, in the form of ground extension (pulling apart), can occur across the site.

The magnitude and orientation of the estimated PCL creep movement and potential seismically induced landslide displacement near the planned RMP site is illustrated in the following Exhibit 3.3.2-1.

EXHIBIT 3.3.2-1: Orientation and Magnitude of PCL Creep Movement and Seismically Induced Landslide Movement at Finished Water Meter Vault (FWMV)



(Base Map Reference: LCI/CEG, 2014)

3.4 EXISTING STRUCTURES AND SURFACE CONDITIONS

The proposed RMP will consist of the new RMF and WRF to be constructed within an area of the PTWP currently occupied by the existing residuals management and washwater recovery facilities.

The proposed RMF will be situated along the southwestern edge of the PWTP in an area currently occupied by the existing sludge drying beds, the belt press facility with adjoining polymer tank, sludge blending and neat polymer facilities, and surrounding paved access ways. From our review of the as-built plans, we understand that the drying beds are approximately 6 feet deep relative to the surrounding pavement. Site grades are generally flat in this area, at Elevation 394 feet. To the southwest of the RMF, the PWTP site continues to slope downward at a grade of approximately 6:1 (horizontal:vertical), and to the northeast of the RMF, surface grades increase by approximately 10 feet at a 3:1 slope.

The proposed WRF is located on the southwestern edge of the PWTP (southeast of the RMF) in an area currently occupied by two existing washwater recovery ponds and surrounding paved access roadways. From our review of the as-built plans, the washwater recovery ponds are approximately 12 feet deep, relative to the surrounding pavement. Around the pond perimeters, site grades are generally flat, at Elevation 394 feet. To the southwest, the PWTP site continues to slope downward at a grade of approximately 5:1, and to the northeast, grades increase at a 3½:1 slope.

3.5 SUBSURFACE CONDITIONS

We reviewed data from the 2023 project-specific exploration by Kleinfelder, as well as previous PWTP explorations performed by CE&G (2014), CH2M Hill (1987), Harza (2000), and Robert S. Cooper (1964) to inform our understanding of the subsurface conditions at the proposed RMF and WRF sites. These explorations reveal that within the upper 20 to 30 feet below ground surface, the RMF and WRF sites are underlain by predominantly very stiff fat and lean clay with varying amounts of sand and gravel. The fat clay encountered typically consists of the site fill that forms the embankments and bottoms of the existing basins and ponds at the site, while the lean clay forms the underlying native PCL landslide deposits. This upper clayey zone also includes intermittent and discontinuous layers and pockets of sandy soil that includes poorly graded sand and clayey sand with varying amounts of gravel. These sandy soil zones are typically about 5 feet thick, medium dense (with some loose pockets noted), fine-to-coarse grained, and dry to moist.

At depths greater than 20 feet below ground surface, extending to the maximum depths of exploration (approximately 65 feet bgs), the lean clay is interbedded with sandy soil layers that are thicker, more prevalent, and apparently more continuous than encountered in the upper 20 to 30 feet bgs. These deeper sandy layers consist of poorly graded sand and clayey sand with varying amount of gravel that are typically medium dense to dense, fine- to coarse-grained, and moist.

3.6 GROUNDWATER

Groundwater levels have been monitored at the PWTP since the 1970s as part of ongoing monitoring of the PCL. Various pneumatic piezometers (PP), open standpipe wells (OSW), and vibrating wire piezometers (VWP) have been installed and monitored over the years. In Table 3.6-1 we present groundwater data from these monitoring sources that are generally in the vicinity of the main water treatment structures at the PWTP. The locations of these monitoring points are shown in Figure 6 - Groundwater Monitoring Locations, and the points nearest to the RMF and WMP sites are shown in Figure 2 – Site Plan.

TABLE 3.6-1: Historic Groundwater Monitoring Summary

ID	TYPE	MONITORING DATES	APPROXIMATE SURFACE ELEVATION (feet)	EQUILIBRATED GROUNDWATER ELEVATION (feet)	EQUILIBRATED GROUNDWATER DEPTH (feet)
P-1	PP	1972-1983	401	361-366	35-40
P-16	PP	1986-2016	390	290-301	89-100
P-17	PP	1986-2016	390	313-317	73-77
P-18	PP	1986-2016	405	262-275	130-143
P-19	PP	1986-2016	405	378-385	20-27
OW-28	OSW	2002-2016	445	420-440	5-25

ID	TYPE	MONITORING DATES	APPROXIMATE SURFACE ELEVATION (feet)	EQUILIBRATED GROUNDWATER ELEVATION (feet)	EQUILIBRATED GROUNDWATER DEPTH (feet)
OW-29	OSW	2002-2016	415	390-410	5-25
VWP-1 (1-30)	VWP	2009-2016	382	255-258	124-127
VWP-2 (1-30)	VWP	2009-2016	382	318	64
VWP-3 (1-30)	VWP	2009-2016	382	332-347	35-50
VWP-4 (1-31)	VWP	2009-2016	375	234-240	135-141
VWP-5 (1-31)	VWP	2009-2016	375	325-340	35-50
VWP-6 (1-31)	VWP	2009-2016	375	372	3
KB-4	OSW	2023	392	NE	NE
KB-12	OSW	2023	392	NE	NE

NE= not encountered

The groundwater data presented in the above table indicates the presence of a deep zone of groundwater confined beneath the landslide slip surface. The groundwater within the PCL landslide mass appears to consist of multiple isolated perched aquifers rather than one large, continuous phreatic aquifer.

Based on information from Valley Water, we understand that groundwater intrusion has previously affected underground construction at the PWTP site. It is likely that these instances of groundwater intrusion resulted from perched and/or transient groundwater stored within more permeable sandy soil within the PCL mass. Consequently, dewatering for intermittent groundwater intrusion of below-grade excavations can be considered during construction of the RMP. Our dewatering considerations are further discussed in Section 6.5.

4.0 GEOTECHNICAL CONSTRAINTS AND GEOLOGIC HAZARDS

From a geotechnical engineering and engineering geology viewpoint, the site is suitable for the planned development; however, several geotechnical constraints and geologic hazards should be considered, assessed, and mitigated for the success of the project design. Key geologic hazards and geotechnical issues for the proposed project include:

- Highly to critically expansive soil.
- Strong ground motions at the site due to its proximity to major active faults.
- Lateral and vertical deformations associated with active landslide creep and potential seismically induced landslide displacements.

These geotechnical constraints and potential geologic hazards are further discussed in the following sections.

4.1 EXPANSIVE SOIL

As discussed in Section 3.5, expansive fat clay was encountered in explorations at the proposed RMF and WRF sites. Laboratory testing results indicate that the shallow soil at the project sites generally has a plasticity index between 22 and 47, which indicates highly to critically expansive clay may be present in the near-surface soil. Generally, a PI between 25 and 35 is considered highly expansive, and a PI above 35 is considered critically expansive.

Expansive soil shrinks and swells when subjected to fluctuations in moisture content. Such soil movement may cause heaving and cracking of slabs-on-grade, pavements, and structures founded on shallow foundations. We recommend mitigating building damage due to volume changes associated with expansive soil by underlaying shallow foundations with a layer of material having a low expansion potential. We further discuss expansive soil mitigation in Section 5.3. We also provide subgrade preparation recommendations for the expansive clay soil at the site in Section 5.2; the purpose of these recommendations is to reduce the swell potential of the clay by compacting the soil at a high moisture content.

4.2 SEISMIC HAZARDS

Potential seismic hazards resulting from a moderate to strong earthquake centered near the RMP site include surface fault rupture, ground shaking, liquefaction, lateral spreading, and seismically induced landsliding. The following sections present our assessment of these potential hazards and the level of risk they impose on the RMP.

4.2.1 Surface Fault Rupture

The proposed improvements at the PWTP are not mapped within the State of California Alquist-Priolo Earthquake Fault Zone and are not mapped within Santa Clara County (SCC) Fault Rupture Hazard Zone (SCC, 2015). Since there are no known active faults crossing the PWTP property, and the proposed RMP site is not located within an Earthquake Fault Special Study Zone, surface fault rupture hazard is considered very low.

4.2.2 Ground Shaking

An earthquake of moderate to high magnitude generated within the region could cause considerable ground shaking at the site, similar to that which has occurred in past major seismic events. To mitigate the shaking effects, structures should be designed using sound engineering judgment and the prescriptive requirements of the latest (2022) California Building Code (CBC), as a minimum.

Seismic design provisions of current building codes generally prescribe minimum lateral forces, applied statically to the structure, combined with the gravity forces of dead and live loads. The code-prescribed lateral forces are generally aimed at preventing building collapse and loss of life, but do not guarantee that structural damage will not occur in the event of a maximum magnitude earthquake. As such, the design of the proposed RMP structures for seismic resiliency should also consider the plant's post-earthquake performance objectives and level-of-service goals and accordingly develop site-specific ground-motions for appropriate design seismic events. Our site-specific seismic-hazard analysis for the RMP design is presented in Appendix E.

4.2.3 Liquefaction

Soil liquefaction results from loss of strength during cyclic loading, such as imposed by earthquakes. Soil most susceptible to liquefaction is clean, loose, saturated, and uniformly graded fine-grained sand. Based on the findings of the 2023 site-specific subsurface exploration, the RMP site is underlain predominantly by stiff to very stiff cohesive soil (lean to fat clay) formed within the PCL mass. The borings also identify interbedded zones of granular soil ranging from medium dense to dense in consistency. This granular soil was typically logged as dry to moist and does not appear to lie within a zone of groundwater saturation. Furthermore, groundwater was not encountered in the upper 50 feet below ground surface in any of the 2023 exploratory borings for at the RMP site. Consequently, we consider the potential for liquefaction to occur at the RMP site to be very low.

4.2.4 Lateral Spreading

Due to the generally stiff cohesive soil and unsaturated medium dense to dense granular soil beneath the RMP study area, and the absence of shallow groundwater, the potential for lateral spread is considered very low.

4.2.5 Seismically Induced Landsliding

As discussed in Section 3.3, the entire PWTP site is underlain by the existing deep-seated Penitencia Creek Landslide (PCL). Potential seismically induced displacements of the PCL triggered by probabilistic seismic events was evaluated by LCI and GE&G in 2014, with revised analysis performed in 2015 utilizing newly released USGS 2014 National Seismic Hazard Maps. The 2015 revised analysis estimates a geometric mean landslide displacement of 6.7 feet over the entire PCL slide mass underlying the PWTP. Further evaluation of the finite element nodes within the displacement model indicates that the landslide movement varies at different locations throughout the slide mass, and that movement at the RMP site (based on analysis at the existing Finish Water Meter Vault (FWMV)) are generally much less than the average movement. LCI/CE&G reports an estimated lateral displacement of 2.2 feet at the FWMV resulting from a PCL slide triggered by a 5 percent in 50 year (975-year return period) probabilistic seismic event. When combining the potential seismic displacement with the anticipated long-term creep of the PCL, LCI/CE&G reports a total estimated lateral displacement of 3.1 feet at the FWMV, and hence the proposed RMP site. The LCI/CE&G study did not quantitatively assess the vertical component of the landslide displacement but reported that the distribution of horizontal and vertical strains throughout the seismically displaced landslide mass agreed well with the characteristics of the ongoing horizontal and vertical creep movement presented in the 2011 PCL surveillance report (Nelson, 2011).

4.3 CORROSIVE SOIL

Harza (2000) and Kleinfelder (2023) performed corrosion testing as part of their studies near the planned RMP site. The results are summarized in Table 4.3-1.

TABLE 4.3-1: Corrosion Potential Test Results

EXPLORATION ID	DEPTH (feet)	Redox (mV)	Ph	CHLORIDE (mg/kg)	SULFATE (mg/kg)	SULFIDE (mg/kg)	ELECTRICAL RESISTIVITY (ohms-cm)
EB-1	2	210	6.7	--	--	ND	820
EB-2	14	250	7.8	--	--	ND	1,100
KB-8	1 to 3	120	9.1	ND	19	ND	920-1000

Notes: Non-Detect (ND)

The 2022 CBC references the American Concrete Institute Manual, ACI 318-14 for structural concrete requirements. According to Table 19.3.1.1, this soil is categorized as S0 sulfate exposure class. Note that ASTM Test Method D4327 was used in lieu of the ACI designated sulfate test methods as it provides more repeatable test results. We recommend a corrosion consultant be retained if specific corrosion recommendations are desired for the project.

5.0 EARTHWORK

Based on our understanding of the project, we anticipate that the main earthwork components for the construction of the proposed RMP facilities will include:

1. Site preparation, including demolition of the existing drying beds, ponds, and other facilities, as needed, and overexcavation and removal of any existing fill, soft subsoil, and or any other unsuitable material, if encountered.
2. Site grading, including backfilling of the existing ponds and any other excavation areas.
3. As-needed overexcavation of potentially expansive subgrade soil and replacement with compacted non-expansive fill.
4. Excavation of pipeline trenches, followed by placement of pipe bedding, pipe zone backfill, and trench backfill.

Our geotechnical considerations and recommendations for these earthwork aspects of the project are presented in the following sections.

5.1 SITE PREPARATION

Site preparation is expected to include the following activities.

- Decommission and demolition of existing drying beds and washwater recovery ponds
- Overexcavation of any subsoil from beneath the beds and ponds that may have been impacted by leakage of stored water (e.g. softened, loosened, etc.)
- Backfilling of beds and ponds, and overexcavations with compacted fill up to subgrade (for structures or paving)
- Demolition of other existing structures, utilities, pavement, etc., as needed, to prepare subgrade for new facilities

Any creation of holes during demolition of existing facilities or removal of subgrade soil should be backfilled with engineered fill (or controlled low strength material (CLSM) as an alternative). Recommendations for engineered fill and its placement and compaction are provided in Sections 5.4 and 5.5, respectively, and recommendations for CLSM provided in Section 5.7. Also, as part of site preparation, the location of active underground utilities should be determined and, if affected by construction activities, should be relocated or protected. The ends of abandoned pipes or ducts that extend outside the PMP improvement limits should be capped and sealed to prevent transmission of water into the site.

5.2 SUBGRADE PREPARATION

Soil supporting shallow spread footings, slabs-on-grade, or mat foundations should be prepared to provide a flat, relatively dry, and firm working surface that provides a relatively uniform distribution to structural loads. The subgrade should be free of objectionable materials such as soft clay, or soil containing organic material, debris, or other deleterious material. If any of these materials are encountered at subgrade, they should be removed (overexcavated) and brought back to grade with engineered fill in accordance with Sections 5.4 and 5.5. Clay is considered “soft” if it exhibits unstable behavior, such as pumping and/or being easily depressed when subjected to pressure loads.

Where potentially expansive soil is exposed at subgrade level, it should be mitigated as described in Section 5.3 below.

5.3 EXPANSIVE SOIL MITIGATION

The recent 2023 project-specific and previous explorations encountered moderately to highly expansive soil at the planned RMP site, which could cause heaving and cracking of slabs-on-grade, pavements, and structures founded on shallow foundations.

At-Grade Structures - Expansive soil should be mitigated for the centrifuge building, the solids load-out structure, and the sludge transfer pump station structure, which will be supported by shallow foundations. For these structures, we recommend that the upper 36 inches of building pad subgrade consist of non-expansive fill. The slab subgrade treatment area should consist of the building pad and an area extending 5 feet out from the building perimeters. Non-expansive import material should conform to the specifications in Section 5.4 and be placed in accordance with Section 5.5. Prior to backfilling the overexcavation, the upper 8 inches of expansive soil subgrade should be scarified, moisture conditioned to a minimum 4 percent above optimum moisture, and compacted between 87 and 92 percent relative compaction per ASTM D1557. There are portions of these buildings that will be constructed outside the location of the existing drying beds, and in these areas, the existing grade should be overexcavated to comply with these requirements to provide a uniform bearing surface for the RMP structures.

Below-Grade Structures - The foundations of below-grade structures, such as sludge storage tanks, gravity thickener tanks, washwater flocculation/sedimentation basins, washwater equalization basins and pump station, centrifuge wet well, and decant pump station, will not be subject to wetting and drying cycles; therefore, no mitigation is likely necessary for these structures. The subgrades for these structures should be moisture conditioned and compacted in accordance with Table 5.5-1 for “on-site subgrade material.”

Site Improvements - Improvements such as concrete walkways and pavement can also be subject to damage due to shrinking and swelling of expansive soil. Damage to these surface features can be repaired over time. Alternatively, the mitigation discussed above for at-grade structures can extend to improvement areas.

5.4 ACCEPTABLE FILL

Material for engineered fill should be inorganic, free of rocks or clods greater than 3 inches in greatest dimension or any other deleterious material and have a low potential for expansion. The material should have a liquid limit of less than 35, a plasticity index less than 12, and no more than 25 percent passing the No. 200 sieve.

Based on our review of the previous subsurface exploration information and laboratory testing results, we anticipate that reuse of on-site excavated material will <u>not be</u> suitable for engineered fill under and adjacent to proposed structures. We also consider the on-site material is not well suited for blending with granular material to create engineered fill because of the very high fines content and high to critical plasticity of the soil.

5.5 ENGINEERED FILL PLACEMENT AND COMPACTION

Engineered fill should be placed in loose lifts that do not exceed 8 inches or the depth of penetration of the compaction equipment used, whichever is less, moisture conditioned, and compacted in accordance with Table 5.5-1.

TABLE 5.5-1: Subgrade and Engineered Fill Compaction and Moisture Content Requirements

MATERIAL	MINIMUM RELATIVE COMPACTION (%)	MINIMUM RELATIVE COMPACTION (%) – UPPER 12 INCHES OF FILL IN BUILDING AND PAVEMENT AREAS	MINIMUM MOISTURE CONTENT (percentage points above optimum)
On-site Subgrade Material	87 to 92	--	4
Non-expansive Import Fill	90	95	1
Pavement AB*	95	--	0

** Class 2 aggregate base material with minimum R-Value = 78*

The relative compaction and optimum moisture content of soil and aggregate base referred to in this report are based on the most recent ASTM D1557 test method. Compacted soil is not acceptable if it is unstable. It should exhibit only minimal flexing or pumping, as observed by our field representative. As used in this report, the term "moisture condition" refers to adjusting the moisture content of the soil by either drying if too wet or adding water if too dry.

Successful construction on expansive soil requires special attention during grading. It is imperative to keep exposed soil moist by occasional wetting. If the soil dries, it is extremely difficult to remoisturize the soil (because of their clayey nature) without ripping/discing, moisture conditioning, and recompaction.

All compaction should be performed using mechanical compaction means; flooding or jetting should not be used as a means to achieve compaction. The ASTM D1557 laboratory compaction tests should be performed at the time of construction to provide a proper basis for compaction control.

5.6 STRUCTURE/RETAINING WALL BACKFILL

Due to the anticipated highly to critically expansive nature of the near-surface soil at the RMP sites, we recommend retaining walls and/or structure elements extending below the ground surface be backfilled with non-expansive material. Structure backfill should be inorganic, free of rocks or clods greater than 3 inches in greatest dimension or any other deleterious material, and have a low potential for expansion. To preclude material binding and allow ease of compaction, we recommend that the structure or retaining wall backfill material meet the gradation presented in Table 5.6-1.

TABLE 5.6-1: Structure / Retaining Wall Backfill Gradation

SIEVE SIZE	PERCENT PASSING
3 inches	100
1½ inches	80 to 100
#4	50 to 100
#16	40 to 90
#50	10 to 60
#200	0 to 10

Structure or retaining wall backfill should be placed in layers not exceeding 8 inches in uncompacted thickness, moisture conditioned to a minimum of 2 percent above optimum, and mechanically compacted to 90 percent relative compaction per ASTM D1557. We anticipate that on-site soil excavated during construction will not be suitable for structure or retaining wall backfill.

5.7 CONTROLLED LOW-STRENGTH MATERIAL

In lieu of mechanically compacted granular material, a flowable fill such as CLSM may be used for pipe bedding, engineered fill, and structure backfill, subject to the approval of the design engineer. CLSM is a low-strength (1,200 psi (pounds per square inch) or less), self-leveling concrete material comprising a combination of cement, fly ash, aggregate, and water. The primary advantages of using CLSM as a flowable fill include the following.

- Self-leveling
- Self-compacting
- Better control over engineering properties such as unit weight, compressive strength, etc.
- Ease of placement
- Uniformity of support provided to pipelines when used as bedding
- Reduction in required trench widths for pipelines
- Pipe support is generally better and greater values of the soil modulus (E') can sometimes be used to design the pipe
- Reduced risk of damaging the pipe or pipe coating with mechanical compaction equipment

These advantages should be weighed against other impacts, such as cost and required measures, to prevent flotation of buried facilities (pipelines, tanks, vaults, etc.) resulting from their buoyancy within the uncured CLSM.

The CLSM should be proportioned to produce a flowable, non-segregating, self-consolidating, low-shrink slurry. Where it is desired for the CLSM to be excavatable (e.g., pipe trench backfill or backfill over other buried structures), the unconfined 28-day compressive strength should be from 100 psi to no greater than 250 psi. CLSM can also be designed for greater strengths (up to 1,200 psi) for specific engineering purposes, but cannot be easily excavated at compressive strengths greater than 250 psi. The CLSM should have a unit weight of no greater than 130 pcf (pounds per cubic foot) to preclude inducement of consolidation settlement of native clay at the site (if unit weights greater than 130 pounds per square foot (psf) are proposed in a design mix, the mix should be reviewed and approved by Valley Water's representative geotechnical engineer prior to use). The contractor should determine the material and proportions used to meet the requirements of CLSM. At a minimum, material used for CLSM should conform to the following requirements.

- Portland Cement: ASTM C150, Types II or V
- Aggregate: Durable sand with or without fine gravel, where 100 percent by total weight passes the 1-inch (25-millimeter) screen and having less than 15 percent passing the No. 200 sieve. Sound aggregate should be free of foreign material and organics.
- Water: potable
- Fly ash: Class F or Class C, ASTM C618, unless otherwise approved

We recommend that the aggregate used in CLSM complies with the following gradation requirements, as shown in Table 5.7-1.

TABLE 5.7-1: CLSM Aggregate Gradation Requirements

SIEVE SIZE	PERCENT PASSING
½ inch	100
⅜ inch	70–100
No. 200	0–15

If more than 5 percent of the aggregate passes the No. 200 sieve, the material passing the No. 200 sieve should have a plasticity index of less than 15. We anticipate that most of the excavated soil at the WPCF site will not be suitable for CLSM aggregate.

The contractor should devise and employ a method during CLSM placement to prevent flotation of the pipes or other structures while curing. If the designer opts to use CLSM for pipe trench fill, we recommend that it be placed in a zone extending from at least 6 inches below the bottom of the pipe to a height at least 0.7 outside diameter (O.D.) above the bottom of the pipe. The trench backfill with CLSM bedding is shown in the Pipe Trench Detail, Figure 7.

5.8 TRENCHING AND BEDDING FOR PIPELINES AND UTILITIES

We anticipate that trench widths for pipes/utilities will depend on several factors, including pipe diameter and material, as well as the number of pipes laid in a single trench. We recommend that pipe trench widths extend a minimum of 12 inches beyond each outer edge of the pipeline (or outer edge of the outermost exterior pipes if multiple pipes are laid in a single trench) to allow for hand compaction of pipe bedding (and shading in joint utility trenches). If soft or otherwise unsuitable soil is exposed in the bottom of the trench excavation, it should be overexcavated and replaced with compacted engineered fill.

Care should be exercised where utility trenches are located beside foundation areas. Utility trenches constructed parallel to foundations should be located entirely above a plane extending down from the lower edge of the footing at an angle of 45 degrees.

Unless concrete bedding/easement is required around utility lines, we recommend that material for bedding and shading assume a well-graded sand or a sand-gravel mixture, with a maximum gravel size of ½ inch and having less than 12 percent passing the No. 200 sieve. Uniformly graded material, such as pea gravel, should not be used as pipe/utility bedding or shading material. Bedding should have a minimum thickness of 6 inches beneath the pipe/utility line and shading a minimum 6 inches above the pipe/utility line. All pipe bedding and shading should be placed to achieve uniform contact with the pipe/utility line, moisture conditioned to a minimum of optimum moisture, and compacted to a minimum relative compaction of 90 percent per ASTM D1557. Compaction by means of jetting or flooding should not be allowed.

5.9 PIPELINES AND UTILITIES TRENCH BACKFILL

Pipe/utility line trenches should be backfilled above the pipe or utility shading with material meeting the specifications for engineered fill, as discussed in Sections 5.4 and 5.5. Care should be taken to not damage the utilities during backfill placement and compaction.

5.10 THRUST BLOCKS

Resistance to lateral thrust forces at pipe bends may be provided by thrust blocks. Thrust blocks provide resistance by transferring the pipe thrust force to the adjacent native soil through the larger bearing area of the block, such that the resulting pressure is less than the safe horizontal bearing capacity of the soil. Based on the data from the previous investigations, we anticipate that the thrust blocks for the pipelines will likely provide bearing resistance, primarily against expansive clay soil. For thrust block design, we assumed a minimum width of 1 foot, length of 1 foot, and 4 feet of embedment in native soil. A horizontal bearing capacity of 1,500 psf may be used for thrust block design. Thrust blocks may also provide resistance to lateral loads developed by base friction on subgrade soil and may be calculated using an ultimate coefficient of friction of 0.35.

6.0 EXCAVATION CONSIDERATIONS

6.1 EXCAVATION CHARACTERISTICS

Excavations for planned PWTP improvements will encounter predominantly clayey fill and native clayey deposits and can be carried out using conventional heavy equipment (e.g., excavators, backhoes, dozers, etc.). Measures such as heavy ripping, hammering, or blasting of soil/rock are not anticipated for the project. Groundwater is not anticipated within the expected depths of excavation for the project, although unforeseen perched water stored in sandy soil and/or transient flow of infiltration water may impact excavations and necessitate temporary dewatering measures.

6.2 OPEN EXCAVATIONS

Where space permits, excavations for the new structures, yard piping, or electrical duct banks may allow for unshored open excavations with adequately sloped sidewalls. Excavation sloping and benching should be configured and constructed in accordance with the current California Division of Occupational Safety and Health (Cal/OSHA) regulations (Title 8, California Code of Regulations) pertaining to excavations. We expect that temporary slopes will be stable for configurations described in Title 8 for Type C soil, and excavations of 20 feet or less should be cut back no steeper than 1½:1 (horizontal:vertical).

6.3 SHORING CONSIDERATIONS

If excavations for below-grade structures require some form of vertical shoring to accommodate space constraints, the shoring design and installation should be the responsibility of the construction contractor. The type and design of the shoring will depend on factors, including, but not limited to: (1) depth of excavation (2) excavation method bracing sequence, (3) surcharge loads, (4) tolerances of adjacent ground and/or structures movement, and (5) requirements to mitigate bottom instability.

The shoring and bracing should accommodate surcharge loads that may be imposed by adjacent structures, traffic, soil stockpiles, or other construction-related activities. Shoring walls should extend beneath the toe of excavation, as needed, to preclude excavation base heave. Base heave occurs where excavations expose weak clay that is unable to support the bearing load of the soil and surcharge loads outside the shoring wall. Base heave is typically accompanied by vertical and lateral movements of the adjacent ground and excavation shoring systems. Any potential for base heave, and providing adequate shoring to prevent excessive ground deformation, should be evaluated by the contractor.

Possible shoring schemes include steel soldier pile and timber lagging, driven interlocking steel sheet piles, soil-cement mix walls, etc., which may include internal bracing struts or external tiebacks to add restraint and to limit lateral deflections. Such braced and shored excavations will be subjected to lateral earth pressures.

The stability of excavations will also depend upon the depth and dimension of the excavation and the duration of the excavation. Proposed excavation shoring plans should be developed by a civil or geotechnical engineer hired by the construction contractor and should be reviewed by us prior to construction. All excavations should be monitored during construction to detect any evidence of instability.

6.4 BOTTOM STABILITY

Excavations for proposed RMP improvements structures, yard piping, duct banks, etc. may expose clayey subgrade soil that is saturated and softened by perched water. In these cases, a stable working surface should be constructed before subsequent engineered fill or pipe bedding is placed and compacted. Common methods for constructing a stable working surface include:

- Overexcavate the unstable soil (minimum 12 inches); place a stabilizing geotextile fabric over the unstable area; and cover it with a layer of clean, open graded, angular gravel or crushed rock. The thickness of the rock layer should be determined in the field, but a minimum 12-inch-thick layer may be assumed for preliminary planning.
- Construct a lean-mix concrete working “mud-slab” over the unstable subgrade.

6.5 DEWATERING CONSIDERATIONS

As discussed in Section 3.6, groundwater within the landslide mass consists of multiple isolated perched aquifers. Although the measured groundwater levels at the RMP site are well below the planned below-grade improvements, transient groundwater flowing through coarse-grained deposits from local infiltrating rainfall or irrigation water could affect below-grade construction. Where these conditions are encountered, some form of dewatering should be considered to maintain a relatively dry stable work environment and a firm subgrade for the preparation for pipeline bedding and appurtenant structure foundation construction. We anticipate that any required dewatering can be achieved by implementing a system of sumps and pumps within the excavations. Conditions requiring dewatering by means of widespread drawdown of the groundwater aquifer using well points are not anticipated.

7.0 LATERAL EARTH PRESSURES AND PASSIVE RESISTANCE

Structural components that extend below the ground surface, such as concrete vaults and below-grade walls, will experience lateral earth pressure from the soil resting against them. We recommend backfill soils in contact with below-grade structures consist of non-expansive structural backfill in accordance with Section 5.6. Recommendations for lateral earth pressures and coefficient of base friction to resist active and at-rest loads are summarized on Table 7.0-1 and discussed in the following sections. The recommended distribution of lateral earth pressures is also shown in Figure 8 - Lateral Earth Pressure Diagram.

TABLE 7.0-1. Summary of Lateral Earth Pressures

MATERIAL TYPE	ACTIVE EARTH PRESSURE [1]	AT-REST EARTH PRESSURE [1]	ULTIMATE PASSIVE RESISTANCE [1,2]	PASSIVE EARTH RESISTANCE (3%) [1,2]	PASSIVE EARTH RESISTANCE (1%) [1,2]	SEISMIC EARTH PRESSURE INCREMENT [3]	SURCHARGE PRESSURE INCREMENT [4]
	EFP_A (pcf)	EFP_O (pcf)	EFP_{P6} (pcf)	EFP_{P3} (pcf)	EFP_{P1} (pcf)	EFP_S (psf)	q_s (psf)
Structural Backfill	35	55	450	380	250	45	100

Notes:

1. *These earth pressures and passive resistance are calculated as a triangular pressure distribution based on the equivalent fluid pressures shown, and assuming level ground surface.*
2. *Ultimate passive resistance is typically fully mobilized at a wall deflection of approximately 6% of the wall height, H, that retains soil. Passive pressures at lower deflections (3% and 1% of H) are provided for use if 6% deflection exceeds the tolerances for the structure.*
3. *The seismic earth pressure shown is for rigid, non-yielding walls. This should be added to active earth pressure for walls greater than 6 feet in retained height.*
4. *Surcharge load shown is for HS20 loading approximately 5 feet from the trench wall face. This load should be applied as a rectangular distribution over the upper 10 feet of the trench wall height. Other surcharge loads, such as construction equipment, stockpiles, and existing facilities, should be evaluated by the design engineer based on anticipated conditions.*

Active and at-rest forces assume structural backfill is present within the backfill zone. Passive resisting forces assume acceptable engineered fill is present at the base and in front of the retaining structures. If retaining wall construction does not consist of an open-cut excavation with backfill of select structural backfill (e.g., walls formed directly against in situ soil), we should provide revised earth pressure recommendations as appropriate.

The lateral earth pressures presented above are for the RMP design team's use and are not intended as prescriptive parameters for the contractor's shoring design. The contractor should be responsible for the design and construction of all shoring systems. If this geotechnical report is made available to the construction contractor as a reference document, they are still responsible for development of design lateral earth pressures, even if they choose to adopt the parameters provided in this report.

7.1 ACTIVE EARTH PRESSURE

Active earth pressures are imposed by the soil on walls that are unrestrained so that the top of the wall is free to translate or rotate at least 0.004 H, where H is the height of the wall. Such relatively "yielding" structures may include temporary shoring systems for excavations or other cantilever type walls. Active earth pressure may be calculated using a design equivalent fluid pressure (EFP) of 35 pcf. Groundwater is not expected within the depths of the proposed structure foundations, so the effects of soil buoyancy and hydrostatic pressures on the wall are not anticipated. Active earth pressures on flexible walls should be applied in a triangular distribution beginning at the ground surface/wall interface.

7.2 AT-REST EARTH PRESSURE

At-rest pressures should be used for design of walls that are rigid or restrained such that the deflections required to develop active earth pressures cannot occur or are undesirable. The at-rest earth pressure may be calculated using a design EFP of 55 pcf. Groundwater is not expected within the depths of the proposed structure foundations, so the effects of soil buoyancy and hydrostatic pressures on the wall are not considered. At-rest earth pressures on rigid or non-yielding walls should be applied in a triangular distribution beginning at the ground surface/wall interface.

7.3 PASSIVE RESISTANCE

Lateral loads on structures can be counteracted by passive resistance that mobilizes as the sides of below-grade structures, such as walls or footing keys push against the surrounding soil. The mobilization of passive resistance depends on the lateral displacement of the wall or footing. Ultimate passive resistance is typically mobilized at a wall displacement of approximately 6 percent of the wall height in contact with the soil. As shown in Table 7.0-1, the ultimate passive resistance may be calculated using a design EFP of 450 pcf. The 3 percent and 1 percent passive resistance values presented in Table 7.0-1 can be used at the discretion of the structural engineer in order for the available passive resistance to be compatible with the tolerable movement that the wall can undergo. The wall movement required to develop the specified passive resistance is expressed as a percentage of the wall height **(H)**, which only includes the portion of the total wall height that is in contact with the retained soil. The movement should be assumed to act as a rotational movement of the top of wall for cantilever type walls, and as a translational movement for rigid wall structures. The appropriate displacement-compatible passive resistance may be combined with the base friction mobilized at the concrete-soil interface to resist lateral loading.

Groundwater is not expected within the depths of the proposed structure foundations, so the effects of soil buoyancy and hydrostatic pressures on the wall are not considered. Passive resistance should be applied in a triangular distribution and should be ignored within the upper 1 foot from the ground surface.

7.4 SURCHARGE LOADING

Additional surface-applied live and dead surcharge loads may also impose an increase to lateral earth pressures against the wall. For design, we recommend the additional lateral earth pressure of 100 psf be applied to permanent walls for the upper 10 feet of the wall (i.e., in a rectangular pressure distribution) where long-term vehicle live loads are expected. This surcharge load represents an H20-44 or HS20-44 truck loading adjacent to the top of the wall. Additional surcharge loading from other loads, including heavy construction equipment, stockpiles, and temporary/permanent structures, should be calculated and applied to the wall design on a case-by-case basis.

7.5 SEISMIC ACTIVE EARTH PRESSURE

In addition to static (active or at-rest) pressures, permanent walls extending below grade and or retaining walls above grade more than 6 feet in exposed height should be designed to consider additional earth pressures due to earthquake loading. The earth pressure due to seismic loading with level backfill may be calculated using a using a design EFP of 45 pcf. This earth pressure should be applied as a fluid pressure in a triangular distribution and should be added to active earth pressure for all wall types.

7.6 BASE FRICTION

A coefficient of friction of 0.35 may be used for estimating the resistance due to base friction for mass concrete interfaced with subgrades prepared in accordance with the recommendations of this report. The base friction mobilized at the concrete-soil interface may be combined with the passive resistance shown in Table 7.0-1 (for the desired displacement limit) to resist lateral loading.

8.0 FOUNDATION DESIGN RECOMMENDATIONS

The selection and design of foundations for the proposed new RMP structures should satisfy the following primary objectives.

- Provide an acceptable factor of safety against bearing capacity failure of foundation soil under maximum design loads, including transient inertial loading induced by seismic ground shaking.
- Settlements of the foundation must be of a low magnitude sufficient to prevent structural damage, breach of pipe and other utility connections, or impair the operational integrity of the PWTP facility.
- Accommodate potential highly to critically expansive soil at the site.
- Accommodate lateral and vertical movements associated with the deep-seated PCL, which is further discussed in Section 8.1.

Based on our assessment of the subsurface conditions at the RMF and WTP sites, we recommend that the proposed structures be supported by reinforced structural slabs or footing foundations. Where estimated ground movements from landslide creep or seismically induced deformations exceed design tolerances, structural slab/mat foundations should be considered in lieu of isolated spread footings.

8.1 LANDSLIDE MOVEMENT CONSIDERATIONS

As discussed in Section 3.3, the entire PWTP is situated on the large deep-seated Penitencia Creek Landslide (PCL) that has experienced ongoing slow and relatively steady creep movement since the construction of the PWTP in the 1970s. The PCL creep movement has been monitored by Valley Water and reported in a series of annual surveillance reports that are routinely updated with accumulated monitoring data, including readings from inclinometers, piezometers, and electronic distance measurement (EDM) equipment.

Anticipated seismic displacement of the PCL resulting from a major earthquake on one of the active nearby faults has also been analyzed and estimated in past studies, including Woodward Clyde Consultants (WCC) in 1993, Treadwell & Rollo (T&R) in 2011, and LCI/CE&G in 2014 (with revisions in 2015). The LCI/CE&G study focuses on total and differential lateral movement between the toe of the PCL and the finish water meter vault (FWMV) for the purpose of mitigation/retrofit of a series of existing pipelines extending between these points. Since the FWMV is located near the center of the proposed RMP site (between the proposed RMF and WRF sites), the LCI/CE&G study provides the most refined and up-to-date estimates regarding anticipated seismic PCL displacements near the planned RMP site.

Based on our review of the available PCL surveillance reports and the LCI/CE&G landslide and seismic-hazards evaluations, we recommend that the structural design of RMF and WRF facilities, including interconnecting pipelines and utilities, consider the following ground displacements associated with ongoing creep movement and potential seismic displacement of the PCL.

- **Ongoing Lateral Creep Movement** - The planned RMP site should consider an ongoing average lateral creep movement of ¼-inch per year, or about 12 inches total over a 50-year period. The movement has an azimuth direction of 220 degrees, plus-or-minus 20 degrees (as illustrated in Exhibit 3.3.2-1). Differential lateral creep movement within the planned RMP site, such as beneath new facility foundations, or between adjacent facilities that have structural, pipeline, or other utility connections, is expected to be of a very low magnitude (i.e., less than a ¼ inch).
- **Ongoing Vertical Creep Movement** - The PCL surveillance data (Nelson, 2011) indicates that the planned RMP site undergoes minor uplifting resulting from PCL creep movement, ranging from about 0.05 to 0.1 inches per year, or about 2 to 5 inches over a 50-year period. The lifting increases from the northwestern to southeastern end of the RMP site and is greatest near the eastern end of the planned WRF site where the washwater EQ basins and pump station are proposed. When considering landslide creep, we recommend that the RMP design consider a total uplift ranging from 2 to 5 inches over a 50-year period, and a differential vertical movement of ¼ inch over a 50-foot span.
- **Seismic-Landslide Displacement** - The planned RMP site should consider 2.2 feet of total landslide displacement corresponding to a design seismic event with a 5 percent probability of exceedance in a 50-year period. The movement is primarily lateral in nature with an azimuth direction of 220 degrees, plus-or-minus 20 degrees (as illustrated in Exhibit 3.3.2-1) but will include an uplift component characteristic of the surveillance report uplift observations. Differential lateral movement within the planned RMP site, such as beneath new facility foundations, or between adjacent facilities that have structural, pipeline, or other utility connections, will manifest as ground extension/elongation in the azimuth direction of movement (as illustrated in Exhibit 3.3.2-1) and may be as high as 6 inches over the width of the RMP site. The 2014 and 2015 LCI/CE&G studies did not quantify the anticipated vertical seismic displacement of the PCL, but noted that their finite element analysis results agreed well with the horizontal and vertical strain distributions characterized by the instrumentation monitoring presented in the 2011 surveillance report (Nelson, 2011). Based on this information, we estimate that the vertical landslide displacement caused by a design seismic event with a 5 percent probability of exceedance in a 50-year period will be approximately twice the displacement that results from long-term creep movement. We therefore recommend that the RMP design consider a total site uplift ranging from 4 to 10 inches (increasing from northwest to southeast) with a differential vertical movement of ½ inch over a 50-foot span.
- **Total Displacements for Design** - As described above, anticipated lateral and vertical ground displacements from movement of the PCL can occur in two distinctive modes: (1) creep-related deformation that will occur gradually over a period of 50 years with a relatively high degree of certainty and (2) seismic-induced deformation that could occur instantaneously at any time over a 50-year period, but with a much lower degree of certainty. These aspects of the potential PCL deformation over the design life of the RMP should be considered when assessing the degree of conservatism to be incorporated into the design. For example, considering only the ground deformations related to creep movement of the PCL may be considered under-conservative, while combining the creep-related and seismic-related displacements may be considered overconservative relative to the

performance objectives of the RMP facilities. We consider it reasonable for the RMP design to consider the seismically induced PCL displacements without combining the creep-related displacements because the magnitude of the creep displacements is within the upper bound of the estimated seismic displacement (which may, or may not, occur within the RMP design life). With this approach, post-earthquake assessments of the RMF and WRF can be made on a case-by-case basis, and suitable repairs, retrofits, and other mitigations can be determined as needed.

8.2 STRUCTURAL SLABS/MATS

A mat-slab foundation is a large reinforced concrete slab designed by a structural engineer to interface one or more columns, walls, or pieces of equipment with the foundation soil. It may encompass the entire structure footprint or only the portion where loads are concentrated. The mat contact stresses are generally lower than other shallow foundation types, which limits the settlement induced by the distribution of stress over a larger area.

8.2.1 Subgrade Preparation for Slabs/Mats

We anticipate that most new structures for the RMP will be situated completely, or partially, within the footprint of the existing sludge drying basins or existing washwater recovery ponds to be decommissioned such that: (1) the structure foundation will be placed partially on native soil and partially on pond/basin engineered backfill, or (2) the structure foundation will be situated beneath the bottom of the decommissioned pond/basin bottom, but will expose dissimilar clayey and sandy native soil across the structure footprint. In either of these scenarios, we recommend that the in situ soil exposed at the foundation subgrade be overexcavated a minimum of 1 foot and be replaced with a uniform compacted engineered fill meeting the requirements in Sections 5.4 and 5.5. The placement and compaction of the engineered fill sub-layer will provide a more uniform support, elastic response, and load distribution of the mat or slab to the subsoil.

8.2.2 Design Parameters for Slabs/Mats

For slabs/mats placed on subgrades prepared as described above in Section 8.2.1, we recommend the slabs/mats be designed for an allowable dead-plus-normal-live load of 2,000 psf. These values may be increased by ⅓ for transient loading from wind or seismic. Mat/slab foundations typically experience some deflection because of loads placed on the mat and the reaction of the subgrade soil underlying the mat. For mat foundations bearing on engineered fill, a static vertical modulus of subgrade reaction ($\mathbf{K_{v1}}$) equal to 150 pounds per cubic inch (pci) may be used. This $\mathbf{K_{v1}}$ value is based on a square foot area and should be adjusted for the planned mat size. The coefficient of subgrade reaction, $\mathbf{K_B}$, for a mat of a specific dimension may be evaluated using the following equation.

$$\mathbf{K_B = K_{v1}\ [(B+1)/2B]^2}$$

Where **B** is the width or diameter of the foundation mat measured in feet. For a rectangular mat, the $\mathbf{K_B}$ value calculated above should be reduced by 25 percent.

8.3 SPREAD FOOTING FOUNDATION RECOMMENDATIONS

We provide allowable bearing capacities for isolated or continuous spread footing foundation systems for various load combinations in Table 8.3-1, and we provide minimum dimensions for interior and perimeter spread footings in Table 8.3-2.

TABLE 8.3-1: Allowable Bearing Capacity

LOAD COMBINATION	ALLOWABLE BEARING CAPACITY (psf)
Dead Load + Normal Live	3,000
Dead + Live + Wind or Seismic Loads	4,000

Notes: These allowable bearing capacities should be taken as net capacities.

TABLE 8.3-2: Minimum Dimensions

FOOTING TYPE	MINIMUM DEPTH (inches)	MINIMUM WIDTH (inches)
Continuous	18	18
Isolated	18	18

The minimum depth should be taken from adjacent finished grade. The minimum thickness of non-expansive engineered fill below the footing should be at least 36 inches.

Because RMP improvement areas are underlain by very stiff and over-consolidated clay, we anticipate that grade settlement of structures supported on shallow foundations will be limited to end-of-construction elastic compression of subsoils in response to the allowable bearing pressures in Table 8.3-1. For design, end-of-construction elastic settlement may be taken as ½ inch total settlement and ¼ inch differential settlement across the span of mat foundations or between isolated spread footings.

8.4 SHEAR KEYS

Shear keys may also be designed to provide additional passive resistance to lateral loads using the passive resistance values provided in Section 7.0. The surcharge imposed by the structural dead load acting on the mat/slab foundation may also be included in determining the magnitude of available passive resistance against interior shear keys. Exterior shear keys (i.e., shear keys near the outer edge of the structure) should not consider any surcharge from the dead load pressure of the mat and should ignore the upper 1 foot of passive resistance. For shear keys placed beneath the mat at least a distance 2*H away from the exterior edge of the building, where H is the height of the shear key, the initial passive resistance at the top of the key may be taken as 2.5*q, where q is the surcharge pressure at the base of the mat due to the floor level dead load. We do not recommend that side friction acting along the face of the shear keys be relied upon for resistance to lateral inertial loads.

8.5 INTERIOR FLOOR SLABS

Floor slabs can be designed as structural slabs or as slabs-on-grade at the discretion of the structural engineer and architect. Interior floor slabs should be supported by at least 36 inches of non-expansive fill meeting the criteria for engineered fill in Section 5.4 and placed and compacted in accordance with Section 5.5. Concrete thickness and reinforcement should be determined by the structural engineer.

8.6 SLAB MOISTURE VAPOR REDUCTION

When buildings are constructed with concrete slab-on-grade or structural mat foundations, water vapor from beneath the slab will migrate through the slab and into the building. This water vapor can be reduced but not stopped. Vapor transmission can negatively affect floor coverings and lead to increased moisture within a building. When water vapor migrating through the slab would be undesirable, we recommend the following to reduce, but not stop, water vapor transmission upward through the slab-on-grade.

1. Install a vapor retarder membrane directly beneath the slab. Seal the vapor retarder at all seams and pipe penetrations. Vapor retarders shall conform to Class A vapor retarder in accordance with ASTM E 1745, latest edition, "Standard Specification for Plastic Water Vapor Retarders used in Contact with Soil or Granular Fill under Concrete Slabs."
2. Concrete should have a concrete water-cement ratio of no more than 0.50.
3. Provide inspection and testing during concrete placement to check that the proper concrete and water-cement ratio are used.
4. Moist cure slabs for a minimum of 3 days or use other equivalent curing specified by the structural engineer.

If a non-structural slab-on-grade floor is used, we recommend placing a 4-inch-thick layer of ¾-inch clean, crushed rock between pad subgrade and the vapor retarding membrane to act as a capillary break. The structural engineer should be consulted as to the use of a layer of clean sand or pea gravel (less than 5 percent passing the U.S. Standard No. 200 Sieve) placed on top of the vapor retarder membrane to assist in concrete curing. If the structural engineer specifies a thin layer under structural mats, then the mat foundation should have a thickened edge that is at least 12 inches wide to cut off the flow of water between the bottom of the mat and the vapor retarding membrane. The edge should be thickened at least by the thickness of sand or gravel specified.

8.7 WATERPROOFING

Several of the major RMP improvement structures are anticipated to be constructed partly or completely below grade. While the groundwater surface at the RMP site has been measured well below the elevation of any of the planned improvements, transient groundwater flowing through coarse-grained deposits from local infiltrating rainfall or irrigation water could lead to water intrusion in the below-grade structures. Therefore, we recommend that waterproofing be implemented for the below-grade structures.

We recommend that an engineer or architect familiar with the design and installation of waterproofing systems for slabs and walls below grade be consulted. For wall and/or slab penetrations at pipe/conduit locations, seals that limit the amount of seepage to an acceptable level should be designed and installed. Water stops should be used at horizontal and vertical construction joints to reduce the likelihood of water infiltration. Waterproofing should be protected from being damaged by compaction equipment and other construction vehicles after installation, and any damage should be repaired prior to resuming backfilling operations.

9.0 PAVEMENT DESIGN

We anticipate the proposed improvements will include the paving of access roadways around the new RMP facilities. Harza (2000) performed an R-value test to provide data for pavement design. The test result indicates an R-value of 3, which we judged to be appropriate. We provide pavement sections in Table 9.0-1.

TABLE 9.0-1: Flexible Pavement Design

TRAFFIC INDEX (TI)	PAVEMENT SECTION	
	AB (inches)	AC (inches)
4.0	8	2½
5.0	11	3
6.0	13	3½
7.0	16	4

Notes: AB is aggregate base Class 2 Material with minimum R = 78
AC is asphalt concrete

The traffic index should be determined by the civil engineer or by Valley Water. These sections are for estimating purposes only; actual sections should be based on R-Value tests performed on samples of actual subgrade material recovered at the time of grading. Pavement construction material should comply with the requirements of the civil engineer and Valley Water.

Aggregate base material should meet the requirements of Class 2 Aggregate Base in Section 26 of the Standard Specifications. The aggregate base should be compacted to at least 95 percent of the maximum dry density as evaluated by ASTM D1557. Prior to placement of base material, the top 6 inches of subgrade soil should be scarified, moisture conditioned, and compacted to at least 95 percent relative compaction.

10.0 CLOSURE

This report presents geotechnical recommendations for design of the improvements discussed in Section 1.2 for the RMP at the PWTP. If changes occur in the nature or design of the project, we should be allowed to review this report and provide additional recommendations, if any. It is the responsibility of the owner to transmit the information and recommendations of this report to the appropriate organizations or people involved in design of the project, including but not limited to developers, owners, buyers, architects, engineers, and designers. The conclusions and recommendations contained in this report are solely professional opinions and are valid for a period of no more than 2 years from the date of report issuance.

We strive to perform our professional services in accordance with generally accepted principles and practices currently employed in the area; there is no warranty, express or implied. There are risks of earth movement and property damages inherent in building on or with earth material. We are unable to eliminate all risks; therefore, we are unable to guarantee or warrant the results of our services.

We developed this report with limited subsurface exploration data described in available historical geotechnical reports. We assumed that the subsurface exploration data provided to us are representative of the actual subsurface conditions across the site.

This document must not be subject to unauthorized reuse, that is, reusing without written authorization of ENGEO. Such authorization is essential because it requires ENGEO to evaluate the document’s applicability given new circumstances, not the least of which is passage of time.

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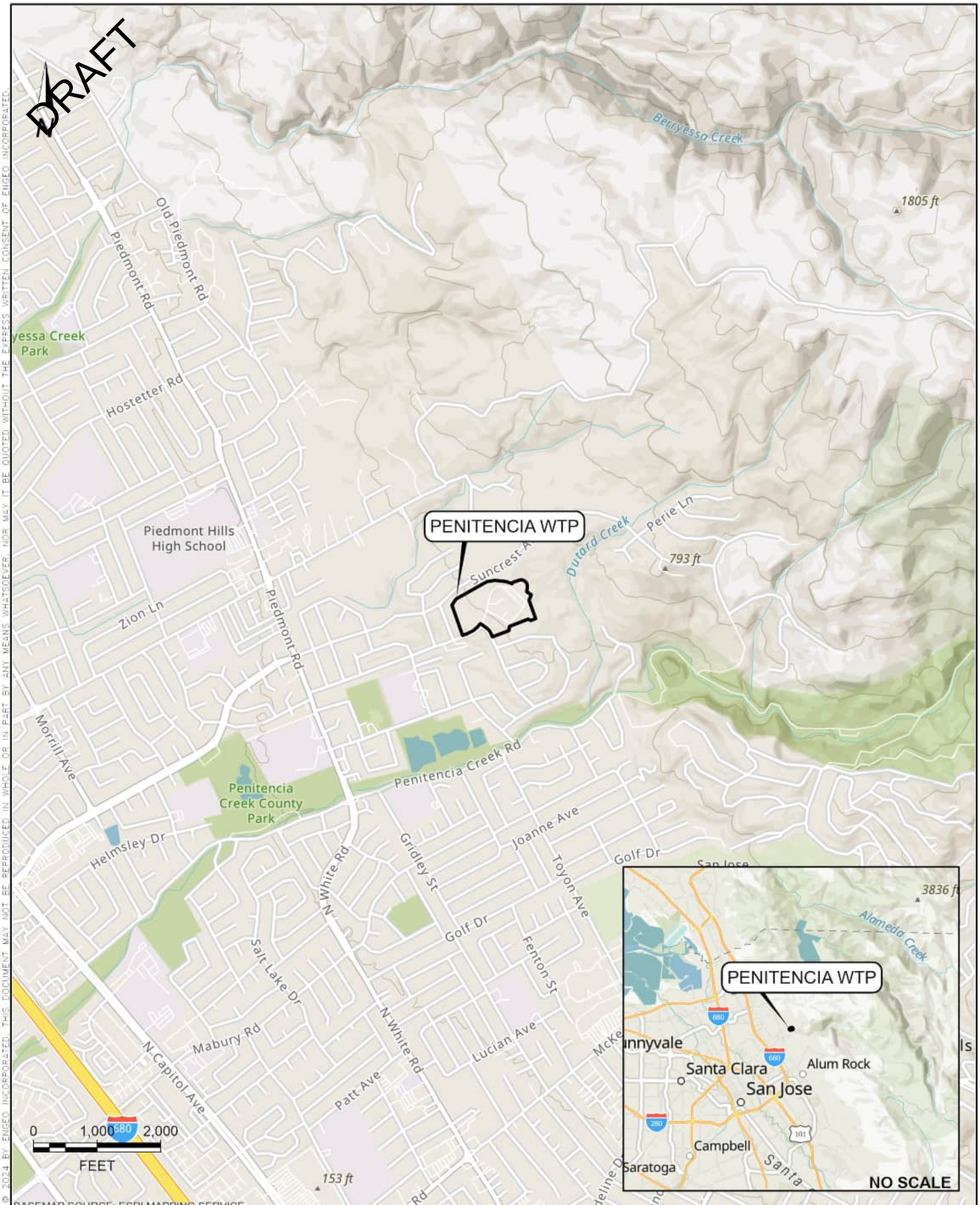
FIGURES



BASEMAP SOURCE: ESRI MAPPING SERVICE

VICINITY MAP
PENITENCIA WATER TREATMENT PLANT
RESIDUALS MANAGEMENT PROJECT
SAN JOSE, CALIFORNIA

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PROJECT NO. : 19990.000.001
SCALE: AS SHOWN
DRAWN BY: NWC
CHECKED BY: NN
FIGURE NO.
1

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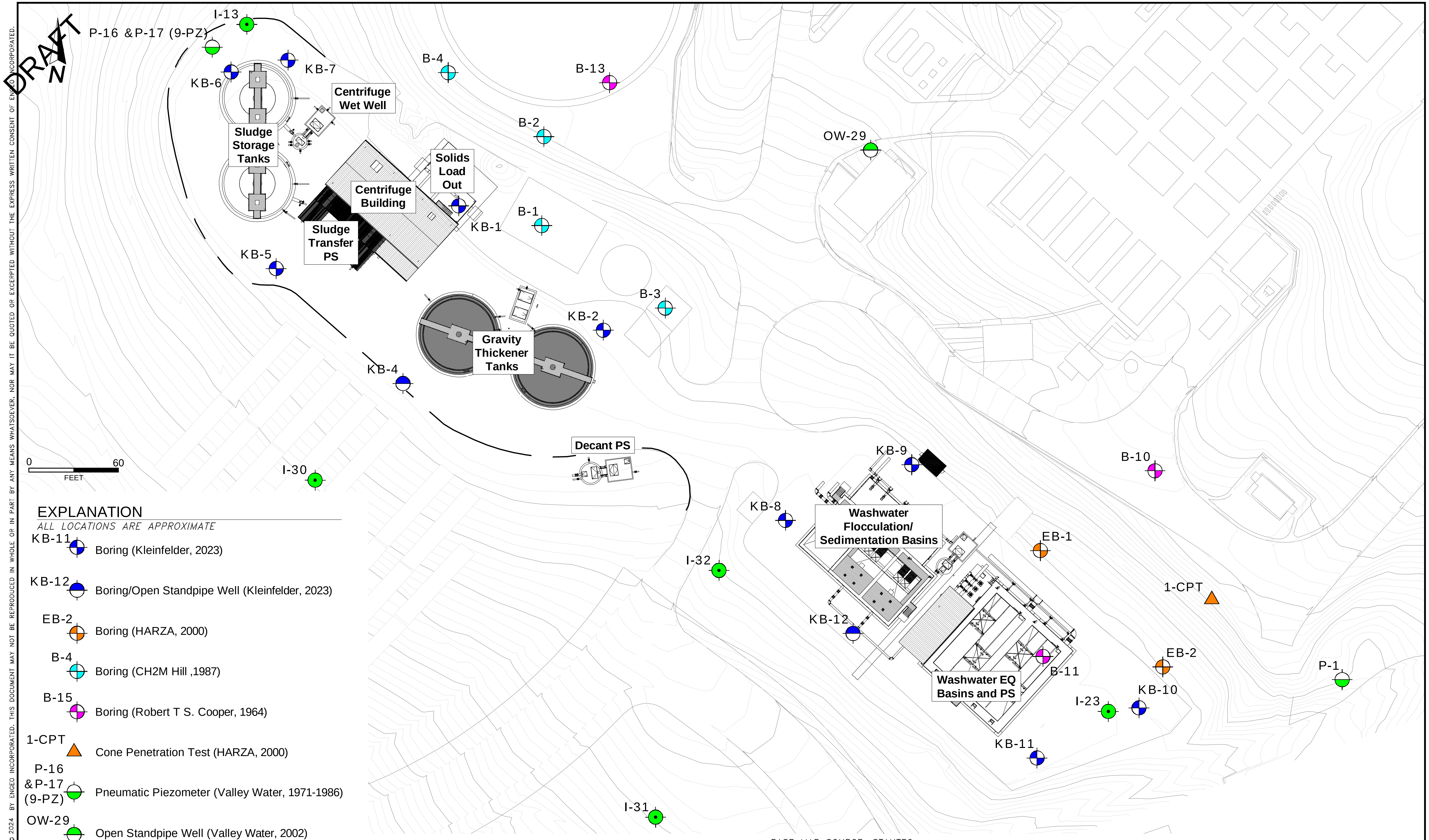

EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

KB-11 ⊕	Boring (Kleinfelder, 2023)
KB-12 ⊖	Boring/Open Standpipe Well (Kleinfelder, 2023)
EB-2 ⊕	Boring (HARZA, 2000)
B-4 ⊕	Boring (CH2M Hill ,1987)
B-15 ⊕	Boring (Robert T S. Cooper, 1964)
1-CPT ▲	Cone Penetration Test (HARZA, 2000)
P-16 &P-17 (9-PZ) ⊖	Pneumatic Piezometer (Valley Water, 1971-1986)
OW-29 ⊖	Open Standpipe Well (Valley Water, 2002)
I-13 ●	Inclinometer (Valley Water, 1985-2014)

BASE MAP SOURCE: STANTEC

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SITE PLAN
PENITENCIA WATER TREATMENT PLANT
RESIDUALS MANAGEMENT PROJECT
SAN JOSE, CALIFORNIA

PROJECT NO.: 19990.000.001
SCALE: AS SHOWN
DRAWN BY: SPPE
CHECKED BY: SOS

FIGURE NO.
2

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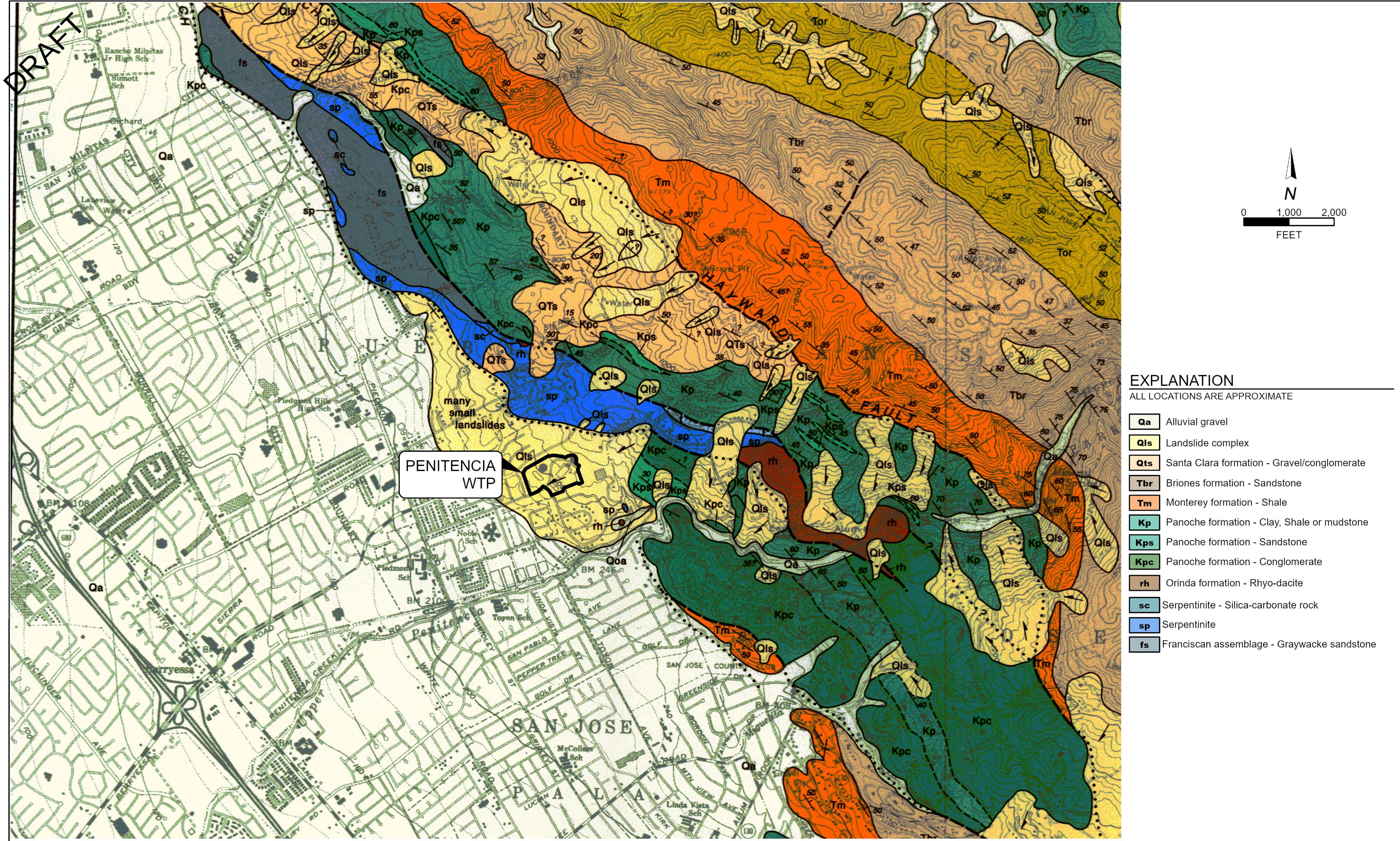

BASE MAP SOURCE: DIBBLEE, 2005

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REGIONAL GEOLOGIC MAP
PENITENCIA WATER TREATMENT PLANT
RESIDUALS MANAGEMENT PROJECT
SAN JOSE, CALIFORNIA

PROJECT NO.: 19990.000.001
SCALE: AS SHOWN
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FIGURE NO. 3

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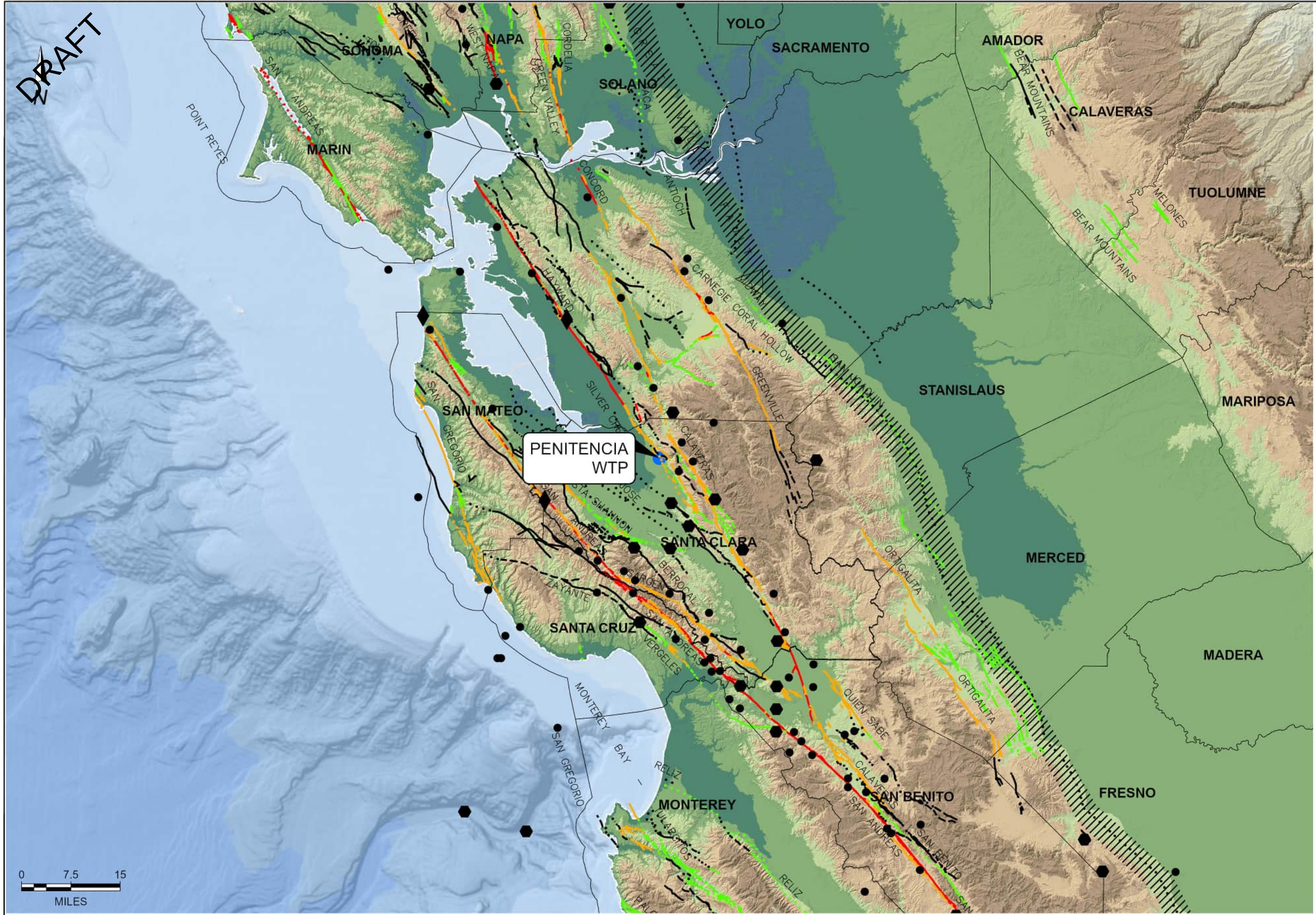

EXPLANATION

● Project Site

HISTORIC EARTHQUAKE EPICENTERS

● Magnitude 5-6

⬢ Magnitude 6-7

◆ Magnitude 7+

▨ Historic Blind Thrust Fault Zone

QUATERNARY FAULTS 2020

Based on time of most recent surface deformation

- Historical (<150 Years), Well Constrained Location
- Historical (<150 Years), Moderately Constrained Location
- Historical (<150 Years), Inferred Location
- Latest Quaternary (<15,000 Years), Well Constrained Location
- Latest Quaternary (<15,000 Years), Moderately Constrained Location
- Latest Quaternary (<15,000 Years), Inferred Location
- Latest Quaternary (<15,000 Years), Inferred Location
- Late Quaternary (<130,000 Years), Moderately Constrained Location
- Late Quaternary (<130,000 Years), Inferred Location
- Middle And Late Quaternary (<750,000 Years), Well Constrained Location
- Middle And Late Quaternary (<750,000 Years), Moderately Constrained Location
- Middle And Late Quaternary (<750,000 Years), Inferred Location
- Undifferentiated Quaternary(<1.6 Million Years), Well Constrained Location
- Undifferentiated Quaternary(<1.6 Million Years), Moderately Constrained Location
- Undifferentiated Quaternary(<1.6 Million Years), Inferred Location
- Class B (Various Age), Well Constrained Location
- Class B (Various Age), Moderately Constrained Location
- Class B (Various Age), Inferred Location

BASE MAP SOURCE:
CSUMB, ESRI, GARMIN, NATURALVUE, ESRI, GEBCO, GARMIN, NATURALVUE
COLOR HILLSHADE IMAGE BASED ON THE NATIONAL ELEVATION DATA SET (NED) AT 30 METER RESOLUTION
U.S.G.S. QUATERNARY FAULT DATABASE, 2020
C.G.S. HISTORIC EARTHQUAKE DATABASE

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REGIONAL FAULTING AND SEISMICITY MAP
PENITENCIA WATER TREATMENT PLANT
RESIDUALS MANAGEMENT PROJECT
SAN JOSE, CALIFORNIA

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FIGURE NO.
4

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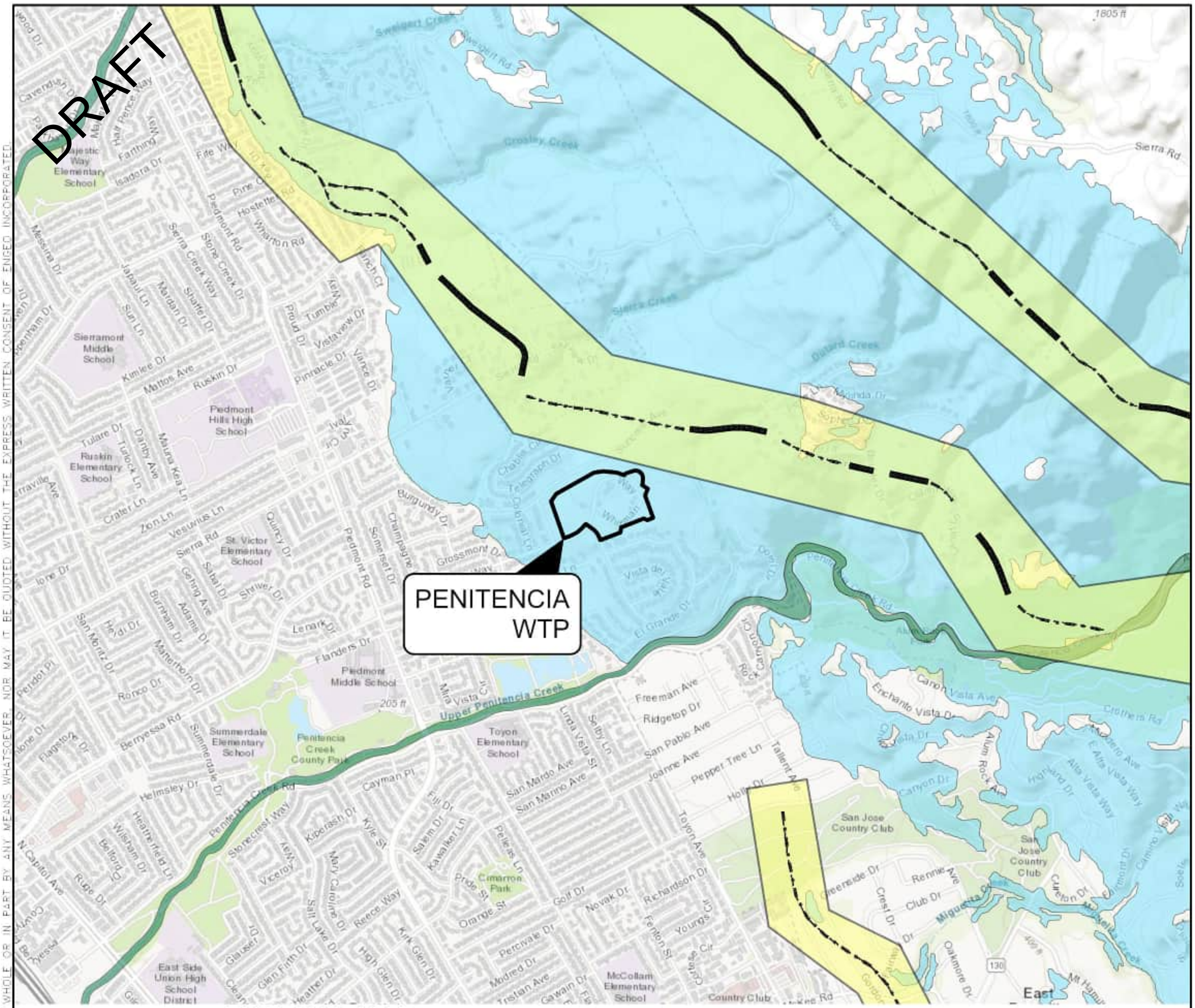

EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

FAULT TRACES

- · - · APPROXIMATELY LOCATED ▬ CONCEALED - - - INFERRED

🟨 **Earthquake Fault Zone**
Zone boundaries are delineated by straight-line segments; the boundaries define the zone encompassing active faults that constitute a potential hazard to structures from surface faulting or creep such that avoidance as described in Public Resources Code Section 2621.5(a) would be required

🟦 **Earthquake-Induced Landslide Zones**
Areas where the previous occurrence of landslide movement, or local topographic, geological, Geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

🟩 **Liquefaction Zone**
Areas where the historical occurrence of liquefaction, or local geological, geotechnical and ground water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required

N

0 1,000 2,000
FEET

BASEMAP SOURCE: ESRI MAPPING SERVICE AND GOOGLE MAP MAPPING SERVICE
CALIFORNIA DEPARTMENT OF CONSERVATION, CALIFORNIA GEOLOGICAL SURVEY

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SEISMIC HAZARDS ZONE MAP
PENITENCIA WATER TREATMENT PLANT
RESIDUALS MANAGEMENT PROJECT
SAN JOSE, CALIFORNIA

PROJECT NO.: 19990.000.001	
SCALE: AS SHOWN	
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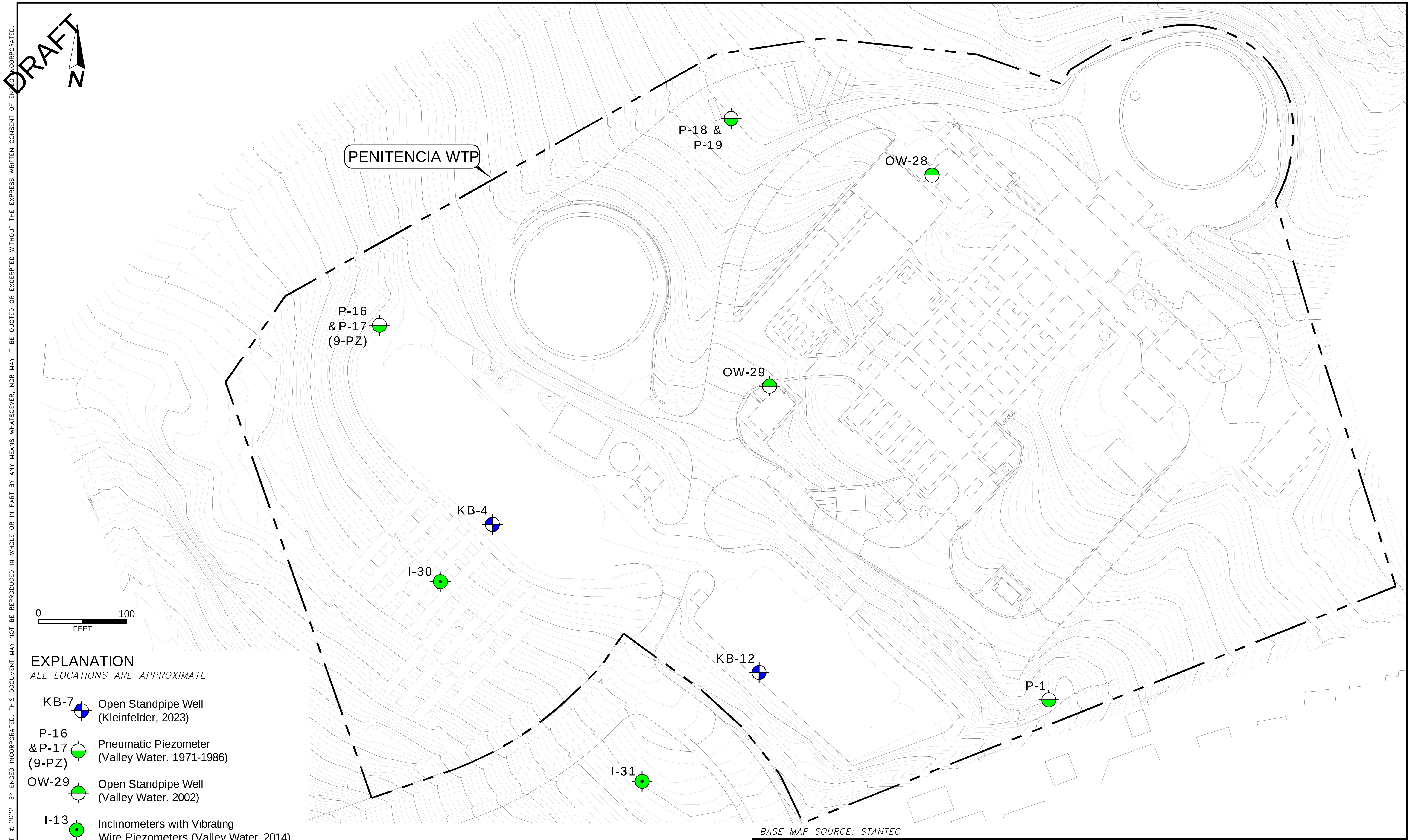
FIGURE NO.
5

PATH: G:\DRAFTING\PROJECTS_18000 TO 19999\19990\19990000001\GEOTECHNICAL\GEX\19990000001_RESIDUALSMANAGEMENTPROJECT_GEX – GEX.APRX
LAYOUT: SEISMIC HAZARD USER: NCLOUGH
ORIGINAL FIGURE PRINTED IN COLOR



EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

KB-7 — Open Standpipe Well (Kleinfelder, 2023)

P-16 &P-17 (9-PZ) — Pneumatic Piezometer (Valley Water, 1971-1986)

OW-29 — Open Standpipe Well (Valley Water, 2002)

I-13 — Inclinometers with Vibrating Wire Piezometers (Valley Water, 2014)
- VWP-1, VWP-2, and VWP-3 installed in I-30
- VWP-4, VWP-5, and VWP-6 installed in I-31

BASE MAP SOURCE: STANTEC

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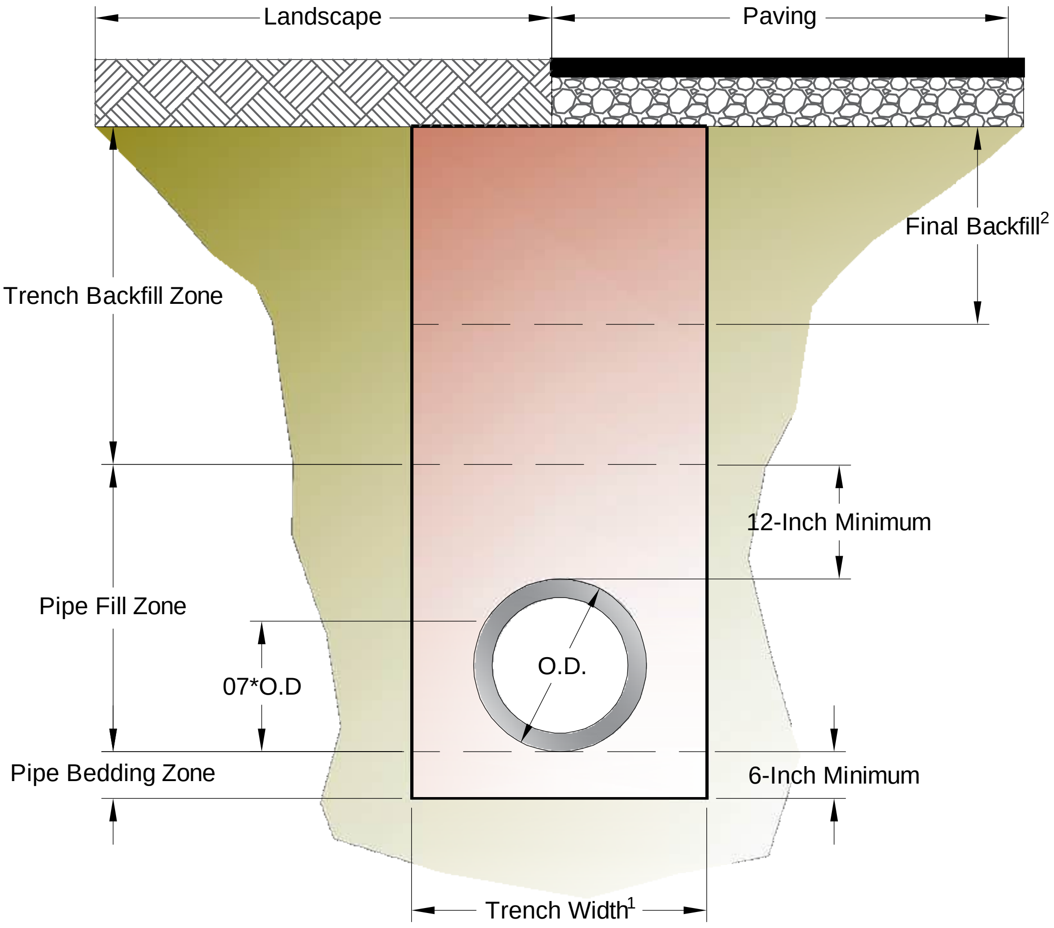
GROUNDWATER MONITORING LOCATIONS
PENITENCIA WATER TREATMENT PLANT
RESIDUALS MANAGEMENT PROJECT
SAN JOSE, CALIFORNIA

PROJECT NO.: 19990.000.001
SCALE: AS SHOWN
DRAWN BY: SPPE
CHECKED BY: SOS
FIGURE NO. 6



Notes:

1. Minimum trench width for granular pipe zone backfill = Outside Diameter (O.D.) + 36 inches. Trench width for CLSM pipe zone backfill = O.D. + 18 inches.

2. Final Backfill shall be compacted to 95% relative compaction per ASTM D1557 when supporting either traffic or foundation loads.

3. If CLSM is used, it should be placed above the bottom of the pipe to at least 0.7*O.D. The remaining pipe zone fill should comply with the recommendations for pipe zone fill.

PIPE TRENCH DETAIL

PENITENCIA WATER TREATMENT PLANT
RESIDUALS MANAGEMENT PROJECT
SAN JOSE, CALIFORNIA

PROJECT NO.: 19990.000.001
SCALE: NO SCALE
DRAWN BY: LL
CHECKED BY: SOS
FIGURE NO. 7

ORIGINAL FIGURE PRINTED IN COLOR

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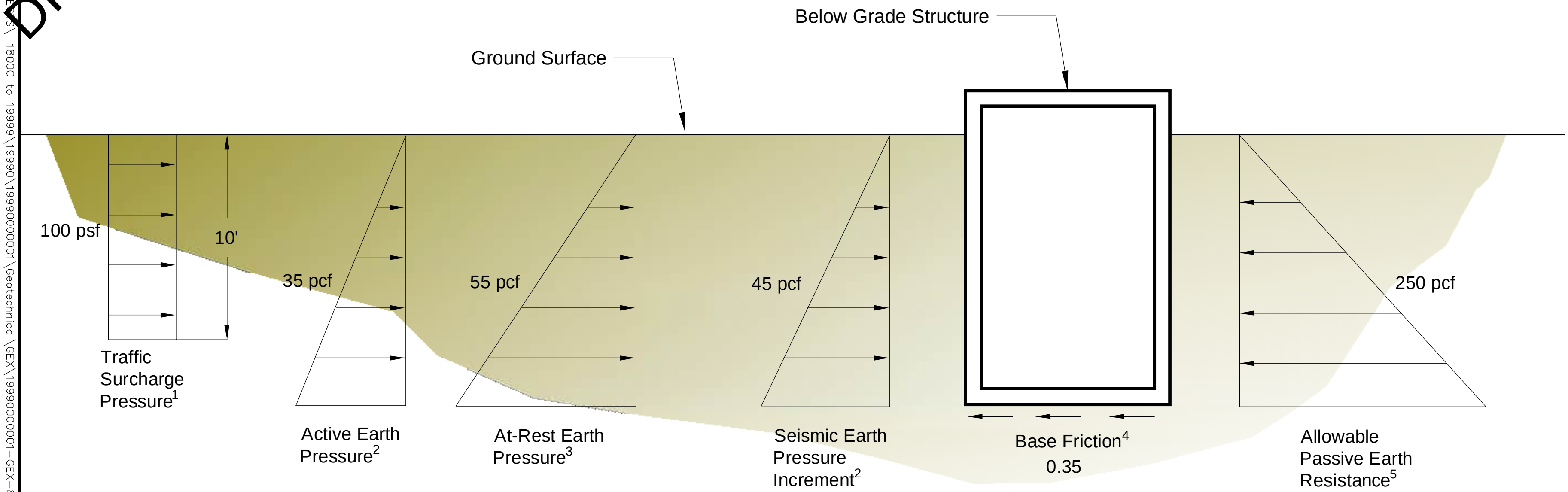

Notes:

1. Traffic surcharge pressure is based on AASHTO HS20 loading.
2. For the seismic case use the active pressure (plus hydrostatic) added to the seismic earth pressure increment.
3. For the static case, use the at-rest earth pressure for rigid non-yielding walls (e.g. most treatment facilities) and the active earth pressure for flexible unrestrained walls (e.g. retaining walls, etc.).
4. The base friction should be reduced to 0.30 if a foundation design includes a waterproofing membrane.
5. Mobilization of allowable passive resistance is based on wall movement of 1 percent of wall height.

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LATERAL EARTH PRESSURE DIAGRAM

PENITENCIA WATER TREATMENT PLANT
RESIDUALS MANAGEMENT PROJECT
SAN JOSE, CALIFORNIA

PROJECT NO.: 19990.000.001
SCALE: NO SCALE
DRAWN BY: LL
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FIGURE NO. 8

ORIGINAL FIGURE PRINTED IN COLOR

APPENDIX A

CURRENT BORING LOGS
(Kleinfelder, 2023)

SAMPLE/SAMPLER TYPE GRAPHICS

- ☒ BULK SAMPLE
- CALIFORNIA SAMPLER
(3 in. (76.2 mm.) outer diameter)
- STANDARD PENETRATION SPLIT SPOON SAMPLER
(2 in. (50.8 mm.) outer diameter and 1-3/8 in. (34.9 mm.) inner diameter)

GROUND WATER GRAPHICS

- ▽ WATER LEVEL (level where first observed)
- ▼ WATER LEVEL (level after exploration completion)
- ▼ WATER LEVEL (additional levels after exploration)
- ≋ OBSERVED SEEPAGE

NOTES

- The report and graphics key are an integral part of these logs. All data and interpretations in this log are subject to the explanations and limitations stated in the report.
- Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual or differ from those shown.
- No warranty is provided as to the continuity of soil or rock conditions between individual sample locations.
- Logs represent general soil or rock conditions observed at the point of exploration on the date indicated.
- In general, Unified Soil Classification System designations presented on the logs were based on visual classification in the field and were modified where appropriate based on gradation and index property testing.
- Fine grained soils that plot within the hatched area on the Plasticity Chart, and coarse grained soils with between 5% and 12% passing the No. 200 sieve require dual USCS symbols, ie., GW-GM, GP-GM, GW-GC, GP-GC, GC-GM, SW-SM, SP-SM, SW-SC, SP-SC, SC-SM.
- If sampler is not able to be driven at least 6 inches then 50/X indicates number of blows required to drive the identified sampler X inches with a 140 pound hammer falling 30 inches.

ABBREVIATIONS

WOH - Weight of Hammer
WOR - Weight of Rod

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

COARSE GRAINED SOILS (More than half of material is larger than the #200 sieve)	**GRAVELS** (More than half of coarse fraction is larger than the #4 sieve)	CLEAN GRAVEL WITH <5% FINES	Cu≥4 and 1≤Cc≤3	**GW**	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			Cu<4 and/ or 1>Cc>3	**GP**	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GRAVELS WITH 5% TO 12% FINES	Cu≥4 and 1≤Cc≤3	**GW-GM**	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES
				GW-GC	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES
			Cu<4 and/ or 1>Cc>3	**GP-GM**	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES
				GP-GC	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES
		GRAVELS WITH > 12% FINES		**GM**	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
				GC-GM	CLAYEY GRAVELS, GRAVEL-SAND-CLAY-SILT MIXTURES
	SANDS (Half or more of coarse fraction is smaller than the #4 sieve)	CLEAN SANDS WITH <5% FINES	Cu≥6 and 1≤Cc≤3	**SW**	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
			Cu<6 and/ or 1>Cc>3	**SP**	POORLY GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
		SANDS WITH 5% TO 12% FINES	Cu≥6 and 1≤Cc≤3	**SW-SM**	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES
				SW-SC	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES
			Cu<6 and/ or 1>Cc>3	**SP-SM**	POORLY GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES
				SP-SC	POORLY GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES
		SANDS WITH > 12% FINES		**SM**	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-GRAVEL-CLAY MIXTURES
				SC-SM	CLAYEY SANDS, SAND-SILT-CLAY MIXTURES

FINE GRAINED SOILS (Half or more of material is smaller than the #200 sieve)	SILTS AND CLAYS (Liquid Limit less than 50)	**ML**	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, SILTS WITH SLIGHT PLASTICITY
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		CL-ML	INORGANIC CLAYS-SILTS OF LOW PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (Liquid Limit 50 or greater)	**MH**	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
		OH	ORGANIC CLAYS & ORGANIC SILTS OF MEDIUM-TO-HIGH PLASTICITY

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PROJECT NO.: 20201694.018A
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CHECKED BY: MK
DATE: 10/4/2023

GRAPHICS KEY

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX

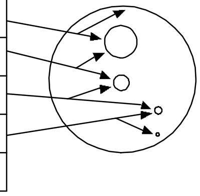
C-1

PLOTTED: 10/18/2023 08:58 PM BY: DArakkal

gINT FILE: Klf_gint_master_2020 PROJECT NUMBER: 20201694.018A OFFICE FILTER: SAN JOSE
gINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2020.GLB [_KLF_GEO-LEG1 (GRAPHICS KEY) WITH USCS]

GRAIN SIZE

DESCRIPTION		SIEVE SIZE	GRAIN SIZE	APPROXIMATE SIZE
Boulders		>12 in. (304.8 mm.)	>12 in. (304.8 mm.)	Larger than basketball-sized
Cobbles		3 - 12 in. (76.2 - 304.8 mm.)	3 - 12 in. (76.2 - 304.8 mm.)	Fist-sized to basketball-sized
Gravel	coarse	3/4 -3 in. (19 - 76.2 mm.)	3/4 -3 in. (19 - 76.2 mm.)	Thumb-sized to fist-sized
	fine	#4 - 3/4 in. (#4 - 19 mm.)	0.19 - 0.75 in. (4.8 - 19 mm.)	Pea-sized to thumb-sized
Sand	coarse	#10 - #4	0.079 - 0.19 in. (2 - 4.9 mm.)	Rock salt-sized to pea-sized
	medium	#40 - #10	0.017 - 0.079 in. (0.43 - 2 mm.)	Sugar-sized to rock salt-sized
	fine	#200 - #40	0.0029 - 0.017 in. (0.07 - 0.43 mm.)	Flour-sized to sugar-sized
Fines		Passing #200	<0.0029 in. (<0.07 mm.)	Flour-sized and smaller



SECONDARY CONSTITUENT

	AMOUNT	
Term of Use	Secondary Constituent is Fine Grained	Secondary Constituent is Coarse Grained
Trace	<5%	<15%
With	≥5 to <15%	≥15 to <30%
Modifier	≥15%	≥30%

MOISTURE CONTENT

DESCRIPTION	FIELD TEST
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

CEMENTATION

DESCRIPTION	FIELD TEST
Weakly	Crumbles or breaks with handling or slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

CONSISTENCY - FINE-GRAINED SOIL

CONSISTENCY	SPT - N_{60} (# blows / ft)	Pocket Pen (tsf)	UNCONFINED COMPRESSIVE STRENGTH (Q_u)(psf)	VISUAL / MANUAL CRITERIA
Very Soft	<2	PP < 0.25	<500	Thumb will penetrate more than 1 inch (25 mm). Extrudes between fingers when squeezed.
Soft	2 - 4	0.25 ≤ PP <0.5	500 - 1000	Thumb will penetrate soil about 1 inch (25 mm). Remolded by light finger pressure.
Medium Stiff	4 - 8	0.5 ≤ PP <1	1000 - 2000	Thumb will penetrate soil about 1/4 inch (6 mm). Remolded by strong finger pressure.
Stiff	8 - 15	1 ≤ PP <2	2000 - 4000	Can be imprinted with considerable pressure from thumb.
Very Stiff	15 - 30	2 ≤ PP <4	4000 - 8000	Thumb will not indent soil but readily indented with thumbnail.
Hard	>30	4 ≤ PP	>8000	Thumbnail will not indent soil.

FROM TERZAGHI AND PECK, 1948; LAMBE AND WHITMAN, 1969; FHWA, 2002; AND ASTM D2488

REACTION WITH HYDROCHLORIC ACID

DESCRIPTION	FIELD TEST
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately

APPARENT / RELATIVE DENSITY - COARSE-GRAINED SOIL

APPARENT DENSITY	SPT-N_{60} (# blows/ft)	MODIFIED CA SAMPLER (# blows/ft)	CALIFORNIA SAMPLER (# blows/ft)	RELATIVE DENSITY (%)
Very Loose	<4	<4	<5	0 - 15
Loose	4 - 10	5 - 12	5 - 15	15 - 35
Medium Dense	10 - 30	12 - 35	15 - 40	35 - 65
Dense	30 - 50	35 - 60	40 - 70	65 - 85
Very Dense	>50	>60	>70	85 - 100

FROM TERZAGHI AND PECK, 1948

PLASTICITY

DESCRIPTION	LL	FIELD TEST
Non-plastic	NP	A 1/8-in. (3 mm.) thread cannot be rolled at any water content.
Low (L)	< 30	The thread can barely be rolled and the lump or thread cannot be formed when drier than the plastic limit.
Medium (M)	30 - 50	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump or thread crumbles when drier than the plastic limit.
High (H)	> 50	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump or thread can be formed without crumbling when drier than the plastic limit.

STRUCTURE

DESCRIPTION	CRITERIA
Stratified	Alternating layers of varying material or color with layers at least 1/4-in. thick, note thickness.
Laminated	Alternating layers of varying material or color with the layer less than 1/4-in. thick, note thickness.
Fissured	Breaks along definite planes of fracture with little resistance to fracturing.
Slickensided	Fracture planes appear polished or glossy, sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness.

ANGULARITY

DESCRIPTION	CRITERIA
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces.
Subangular	Particles are similar to angular description but have rounded edges.
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges.
Rounded	Particles have smoothly curved sides and no edges.

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PROJECT NO.:
20201694.018A

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DATE: 10/4/2023

SOIL DESCRIPTION KEY

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX

C-2

BORING LOG KB-1

Date Begin - End: 8/22/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny
Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.
Hammer Type - Drop: 140 lb. Auto - 30 in.

FIELD EXPLORATION / LABORATORY RESULTS

Approximate Ground Surface Elevation (ft.): 389.00
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
		■	5.5-inch Asphalt over 6.5-inch Aggregate Base											Hand Auger to 5 feet below existing grade
		▨	**Fat CLAY with Sand (CH)**: high plasticity, olive gray, moist, (FILL)	☒			CH	26.1			78	56	36	
385		▨		☒										
	5	▨	very stiff	■	BC=4 7 10 PP=2.75	11"								
		▨		■	BC=4 6 10 PP=2.0	9"								
380		▨												
	10	▨	**Lean CLAY with Sand (CL)**: medium-grained sand, medium plasticity, olive yellow, moist, very stiff	■	BC=4 8 9 PP=2.0 PP=2.5	16"	CL	24.2	101.7		80	47	29	
375		▨												
	15	▨		■	BC=9 12 13 PP=3.75 PP=3.5	17"								
370		▨												
	20	▨	**Sandy Lean CLAY (CL)**: fine to medium-grained sand, low plasticity, olive yellow, moist, very stiff	■	BC=5 11 18	17"		21.4						
365		▨												
	25	▨	pale olive	■	BC=6 10 14 PP=3.5	18"								
360		▨	medium plasticity, with fine grained sand, yellowish brown											
	30	▨		■	BC=4 8 14	18"								
		▨	**Clayey SAND with Gravel (SC)**: fine to coarse-grained sand, fine-grained gravel, low plasticity, gray and light brownish gray, moist, medium dense											
355		▨												

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PROJECT NO.: 20201694.018A
DRAWN BY: DA
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DATE: 8/24/2023

BORING LOG KB-1

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-3a

Date Begin - End: 8/22/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny
Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.
Hammer Type - Drop: 140 lb. Auto - 30 in.

BORING LOG KB-1

Approximate Ground Surface Elevation (ft.): 389.00
Surface Condition: Asphalt

		FIELD EXPLORATION				LABORATORY RESULTS							
Approximate Elevation (feet)	Depth (feet)	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
350		**Clayey SAND (SC)**: fine-grained sand, non-plastic, reddish and yellowish brown, moist, dense	■	BC=11 18 23	18"								
345	40	**Poorly Graded SAND with Clay (SP-SC)**: fine-grained sand, non-plastic, bluish gray, moist, dense	■	BC=19 21 29	18"								
	45	**Lean CLAY with Sand (CL)**: fine-grained sand, medium plasticity, olive brown, moist, very stiff to hard	■	BC=9 16 22 PP=3.0 PP=3.5	18"								
340			■	BC=9 12 21 PP=3.75 PP=4.5+	17"								
	50												
335	55												
330	60												
325	65												
320													

The boring was terminated at approximately 50 ft. below ground surface. The boring was backfilled with Portland cement grount, capped with concrete and black dye on August 22, 2023.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.

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PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-1

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-3b

Date Begin - End: 8/23/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny

Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.

Hammer Type - Drop: 140 lb. Auto - 30 in.

BORING LOG KB-2

Approximate Ground Surface Elevation (ft.): 388.00
Surface Condition: Asphalt

FIELD EXPLORATION							LABORATORY RESULTS							
Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			4-inch Asphalt											Hand Auger to 5 feet below existing grade
			Sandy Fat CLAY (CH): high plasticity, pale olive to olive gray, moist, (FILL)	☒			CH	27.2			60	65	43	
385														
	5		stiff to very stiff	■	BC=5 7 9	14"		30.4	92.2					
380				■	BC=4 7 9 PP=2.0 PP=2.5	10"								
	10			■	BC=4 5 8	18"				88	63			
			Sandy Lean CLAY (CL): medium to coarse-grained sand, trace fine-grained gravel, angular gravel, medium plasticity, moist, stiff											
375														
			Clayey SAND (SC): fine to medium-grained sand, non-plastic, light brownish and bluish gray, moist											
	15		**Lean CLAY with Sand (CL)**: fine to medium-grained sand, pale olive, moist, very stiff	■	BC=6 9 14 PP=3.5	18"	CL				85	44	25	
370														
	20		**Sandy Lean CLAY (CL)**: fine-grained sand, medium plasticity, yellowish brown lamintaed with light brownish gray, moist, very stiff	■	BC=4 7 12 PP=3.5	18"								
365														
	25		fine to coarse-grained sand, reddish brown and yellowish brown, trace fine gravel	■	BC=6 13 18	18"		19.4			63			
360														
	30		**Clayey SAND with Gravel (SC)**: fine to medium-grained sand, low plasticity, yellowish brown laminated with light brownish and bluish gray, moist, medium dense	■	BC=6 11 14	18"								
355			**Sandy Lean CLAY (CL)**: fine to medium-grained sand, medium plasticity, yellowish brown laminated with light brownish gray, moist, very stiff											

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BORING LOG KB-2

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX

C-4a

Date Begin - End: 8/23/2023
Drilling Company: EGI
BORING LOG KB-2
Logged By: C. Conti
Drill Crew: Loren, Lyle, Gabriel
Hor.-Vert. Datum: Not Available
Drilling Equipment: B-53B
Hammer Type - Drop: 140 lb. Auto - 30 in.
Plunge: -90 degrees
Drilling Method: Hollow Stem Auger
Weather: Sunny
Exploration Diameter: 8" in. O.D.

FIELD EXPLORATION | LABORATORY RESULTS

Approximate Ground Surface Elevation (ft.): 388.00
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
		▨	**Sandy Lean CLAY (CL)**: fine to medium-grained sand, medium plasticity, yellowish brown laminated with light brownish gray, moist, very stiff	■	BC=8 9 13 PP=3.75	18"								
350		▨												
	40	▨	fine-grained sand, low plasticity, brown	■	BC=6 9 13 PP=3.25 PP=3.0	18"								
345		▨												
	45	▨	medium plasticity, increase in fine gravel, hard	■	BC=6 13 19 PP=4.5+ PP=4.0	18"								
340		▨												
		▨	decrease in gravel content	■	BC=9 16 28 PP=4.0 PP=4.5+	18"								
	50													
335														
	55													
330														
	60													
325														
	65													
320														

The boring was terminated at approximately 50 ft. below ground surface. The boring was backfilled with Portland cement grount, capped with concrete and black dye on August 23, 2023.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.

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PROJECT NO.: 20201694.018A
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BORING LOG KB-2

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-4b

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PROJECT NUMBER: 20201694.018A

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BORING LOG KB-4

Date Begin - End: 8/18/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny
Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.
Hammer Type - Drop: 140 lb. Auto - 30 in.

Approximate Ground Surface Elevation (ft.): 386.00
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
		FIELD EXPLORATION					LABORATORY RESULTS							
		■	4.5-inch Asphalt over 10.5-inch Aggregate Base											Hand Auger to 5 feet below existing grade
385		▨	**Clayey SAND (SC)**: fine to coarse-grained sand, olive, moist (FILL)	☒			SC	20.7			45	57	35	
380	5	▨	**Sandy Lean CLAY (CL)**: fine to medium-grained sand, medium plasticity, olive, moist, stiff	■	BC=3 6 7 PP=1.25	18"		24.3	94.2					
		▨		■	BC=1 4 7 PP=1.5	13"					69			
375	10	▨	very stiff	■	BC=2 6 8 PP=2.0	18"								
		▨	**Lean CLAY with Sand (CL)**: fine to coarse-grained sand, medium plasticity, olive brown, moist, very stiff											
370	15	▨		■	BC=3 7 10 PP=2.5	12"					74			
365	20	▨		■	BC=5 8 6 PP=2.0	18"								
		▨	fine-grained sand, pale olive, very stiff to hard											
360	25	▨		■	BC=6 10 17 PP=4.5+ PP=3.75	18"								
355	30	▨	hard	■	BC=6 11 16 PP=4.5+ PP=4.25	18"								

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PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-4

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX

C-5a

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PROJECT NUMBER: 20201694.018A

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gINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2020.GLB [_KLF_BORING/TEST PIT SOIL LOG]

BORING LOG KB-4

Date Begin - End: 8/18/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny
Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.
Hammer Type - Drop: 140 lb. Auto - 30 in.

FIELD EXPLORATION

Approximate Ground Surface Elevation (ft.): 386.00
Surface Condition: Asphalt

LABORATORY RESULTS

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
350			**Sandy Lean CLAY (CL)**: fine to medium-grained sand, low to medium plasticity, pale olive with interbedded/lense of light brownish gray, moist, hard	■	BC=7 11 17 PP=4.0 PP=4.5+	18"								
345	40		**Sandy Lean CLAY with Gravel (CL)**: fine to coarse-grained sand, low plasticity, pale olive, moist, very stiff to hard, with fine gravel	■	BC=8 10 17 PP=4.25 PP=3.75 PP=4.5+	18"								
340	45		**Clayey SAND with Gravel (SC)**: fine to coarse-grained sand, low plasticity, yellow to dark reddish brown, moist, medium dense, pale olive fines, with gravel up to 2"	■	BC=7 12 18	18"								
	50		**Sandy Lean CLAY (CL)**: fine to medium-grained sand, low to medium plasticity, dark brown, moist, hard, with fine gravel	■	BC=7 13 21 PP=4.5+	15"								
335														
330	55													
325	60													
320	65													

The boring was terminated at approximately 50 ft. below ground surface. The boring was converted to a monitoring well, see Figure 3 in the main report for construction details.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.

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PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-4

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX

C-5b

BORING LOG KB-5

Date Begin - End: 8/17/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny
Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.
Hammer Type - Drop: 140 lb. Auto - 30 in.

Approximate Ground Surface Elevation (ft.): 387.00
Surface Condition: Asphalt

FIELD EXPLORATION							LABORATORY RESULTS							
Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
	0	■	4-inch Asphalt											Hand Auger to 5 feet below existing grade
385		▨	**Sandy Fat CLAY (CH)**: fine to medium-grained sand, high plasticity, olive brown and olive, moist, (FILL)	☒										
380	5	▨	medium-grained sand, stiff	■	BC=3 4 5	18"	CH	20.8	101.5		70	52	34	
		▨		■	BC=4 6 8 PP=1.5	18"								
375	10	▨	fine to medium-grained sand, very stiff	■	BC=5 7 12 PP=2.5	18"								
370	15	▨	olive gray	■	BC=2 6 9 PP=2.75	18"		24.6						
365	20	▨	fine-grained sand, pale olive	■	BC=4 8 10 PP=3.5	18"		23.5	101.1		80			
360	25	▨	hard	■	BC=4 9 12 PP=4.0	18"								
355	30	▨	**Clayey SAND with Gravel (SC)**: fine to coarse-grained sand, pale olive and olive, moist, medium dense, with gravel up to 2"	■	BC=4 7 10	18"								

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PROJECT NO.: 20201694.018A
DRAWN BY: DA
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DATE: 8/24/2023

BORING LOG KB-5

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-6a

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PROJECT NUMBER: 20201694.018A
gINT FILE: Klf_gint_master_2020
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Date Begin - End: 8/17/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny
Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.
Hammer Type - Drop: 140 lb. Auto - 30 in.

BORING LOG KB-5

Approximate Ground Surface Elevation (ft.): 387.00
Surface Condition: Asphalt

			FIELD EXPLORATION				LABORATORY RESULTS							
Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			Lean CLAY (CL): medium plasticity, olive, moist, very stiff	■	BC=12 5 10 PP=2.0	18"								
350														
	40			■	BC=4 12 18	18"								
			Clayey SAND (SC): fine to coarse-grained sand, non-plastic, yellowish brown, moist, medium dense											
345			**Sandy Lean CLAY (CL)**: fine-grained sand, medium plasticity, olive, moist, hard											
			light brownish gray											
	45			■	BC=7 15 17 PP=4.5+	18"								
340			**Clayey SAND (SC)**: fine-grained sand, low plasticity, olive, moist, medium dense											
				■	BC=9 12 15	18"								
	50													
335														
	55													
330														
	60													
325														
	65													
320														

The boring was terminated at approximately 50 ft. below ground surface. The boring was backfilled with Portland cement grount, capped with concrete and black dye on August 17, 2023.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.

KLEINFELDER
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PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-5

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-6b

PLOTTED: 10/18/2023 08:48 PM BY: DArakkal
OFFICE FILTER: SAN JOSE
PROJECT NUMBER: 20201694.018A
gINT FILE: Klf_gint_master_2020
gINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2020.GLB [__KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End: 8/17/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny
Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.
Hammer Type - Drop: 140 lb. Auto - 30 in.

BORING LOG KB-6

FIELD EXPLORATION | LABORATORY RESULTS

Approximate Ground Surface Elevation (ft.): 387.00
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			5-inch Asphalt											Hand Auger to 5 feet below existing grade
385			**Clayey SAND (SC)**: fine to medium-grained sand, high plasticity, olive, moist, (FILL)				SC	21.7			46	60	38	
	5		**Sandy Fat CLAY (CH)**: fine to medium-grained sand, medium to high plasticity, olive and olive gray, moist, very stiff, (FILL)		BC=5 7 9 PP=2.75 PP=2.25	18"		20.7	104.0		67			
380			fine-grained sand, olive and pale olive		BC=5 7 9 PP=2.5	18"								
	10				BC=5 7 10	2"								
375														
	15		**Poorly Graded SAND with Gravel (SP)**: reddish brown, dry, medium dense, strongly cemented Sandstone		BC=7 11 16	NR								
370														
	20		**Sandy Lean CLAY (CL)**: fine to coarse-grained sand, low plasticity, pale olive, moist, very stiff to hard		BC=12 16 20 PP=4.5+	13"		19.2			53			
365														
	25		yellowish brown		BC=7 11 14 PP=4.5+ PP=3.0	18"								
360														
	30		medium-grained sand, olive brown		BC=11 14 19 PP=4.5+ PP=4.0	18"								
355														

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PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-6

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-7a

Date Begin - End: 8/17/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny

Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.

BORING LOG KB-6

Hammer Type - Drop: 140 lb. Auto - 30 in.

FIELD EXPLORATION

LABORATORY RESULTS

Approximate Ground Surface Elevation (ft.): 387.00
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
350			**Clayey SAND (SC)**: fine to coarse-grained sand, non-plastic, pale olive, moist, medium dense	■	BC=9 14 21	18"								
345	40		**Lean CLAY (CL)**: medium plasticity, yellowish brown, moist, hard	■	BC=12 15 20 PP=4.5+	18"								
340	45		**Clayey SAND (SC)**: fine to coarse-grained sand, non-plastic, light brownish gray and bluish gray, moist, medium dense	■	BC=10 15 23	18"								
			Lean CLAY (CL): olive brown, moist, hard	■	BC=17 28 36 PP=4.5+	18"								
335	50													
330	55													
325	60													
320	65													

The boring was terminated at approximately 50 ft. below ground surface. The boring was backfilled with Portland cement grount, capped with concrete and black dye on August 17, 2023.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.

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PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-6

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX

C-7b

PLOTTED: 10/18/2023 08:49 PM BY: DArakkal

OFFICE FILTER: SAN JOSE

PROJECT NUMBER: 20201694.018A

gINT FILE: Klf_gint_master_2020
gINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2020.GLB [__KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End: 8/22/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny

Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.

BORING LOG KB-7

Hammer Type - Drop: 140 lb. Auto - 30 in.

Approximate Ground Surface Elevation (ft.): 388.00
Surface Condition: Asphalt

			FIELD EXPLORATION				LABORATORY RESULTS							
Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			4-inch Asphalt over 6-inch Aggregate Base											Hand Auger to 5 feet below existing grade
385			**Sandy Fat CLAY (CH)**: medium to coarse-grained sand, olive, moist, trace fine gravel (FILL)				CH	27.5		92	61	68	44	
	5		fine to medium-grained sand, high plasticity, olive gray, stiff		BC=3 4 8 PP=2.0	12"		25.3	95.8		69			
380			**Sandy Lean CLAY with Gravel (CL)**: fine to coarse-grained sand, low plasticity, light brownish gray, moist, hard		BC=6 9 11	18"								
	10		**Lean CLAY with Sand (CL)**: medium plasticity, light brownish gray, moist, very stiff		BC=5 8 13 PP=3.5	12"								
375														
	15		**Sandy Lean CLAY (CL)**: fine to coarse-grained sand, low plasticity, pale olive, moist, very stiff		BC=6 8 12 PP=3.5	18"		17.3			50			
370			**Clayey SAND with Gravel (SC)**: fine to coarse-grained, non-plastic, plae olive, yellowish brown and reddish brown, moist, medium dense, with fine gravel											
	20				BC=7 12 18	16"				92	42			
365			**Clayey SAND (SC)**: fine-grained sand, non-plastic, yellowish brown, moist, dense											
	25				BC=11 24 33	18"								
360														
	30		yellowish brown and reddish brown		BC=9 16 24	14"								
355														
			Poorly Graded SAND with Gravel (SP): non-plastic, bluish gray, moist											

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PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-7

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX

C-8a

PLOTTED: 10/18/2023 08:49 PM BY: DArakkal
OFFICE FILTER: SAN JOSE
PROJECT NUMBER: 20201694.018A
gINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2020.GLB [_KLF_BORING/TEST PIT SOIL LOG]
gINT FILE: Klf_gint_master_2020

Date Begin - End:	8/22/2023	**Drilling Company:**	EGI		**BORING LOG KB-7**
Logged By:	C. Conti	**Drill Crew:**	Loren, Lyle, Gabriel		
Hor.-Vert. Datum:	Not Available	**Drilling Equipment:**	B-53B	**Hammer Type - Drop:**	140 lb. Auto - 30 in.
Plunge:	-90 degrees	**Drilling Method:**	Hollow Stem Auger		
Weather:	Sunny	**Exploration Diameter:**	8" in. O.D.		

Approximate Ground Surface Elevation (ft.): 388.00
Surface Condition: Asphalt

FIELD EXPLORATION							LABORATORY RESULTS								
Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
	35			■	BC=6 12 16 PP=4.25	18"								
	36	▨	**Sandy Lean CLAY (CL)**: fine-grained sand, medium plasticity, pale olive, moist, hard											
350	38		**Clayey SAND with Gravel (SC)**: low plasticity, pale olive and light brownish gray, moist, dense, with fine gravel											
	40			■	BC=12 27 31	18"								
345														
	45			■	BC=10 15 21 PP=4.5+	18"								
	46	▨	**Sandy Lean CLAY (CL)**: fine-grained sand, low to medium plasticity, olive brown, moist, hard											
340														
	48.5		light brownish gray and yellowish brown	■	BC=9 14 23 PP=4.5+	18"								
	50													

The boring was terminated at approximately 50 ft. below ground surface. The boring was backfilled with Portland cement grount, capped with concrete and black dye on August 22, 2023.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.

Depth (feet): 40, 45, 50, 55, 60, 65
Approximate Elevation (feet): 350, 345, 340, 335, 330, 325, 320

KLEINFELDER Bright People. Right Solutions.	PROJECT NO.: 20201694.018A	BORING LOG KB-7	APPENDIX
	DRAWN BY: DA	Penitencia Water Treatment Plant 3959 Whitman Way San Jose, California	C-8b
	CHECKED BY: CC		
	DATE: 8/24/2023		PAGE: 2 of 2

PLOTTED: 10/18/2023 08:50 PM BY: DArakkal

PROJECT NUMBER: 20201694.018A OFFICE FILTER: SAN JOSE

gINT FILE: Klf_gint_master_2020 gINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2020.GLB [_KLF_BORING/TEST PIT SOIL LOG]

BORING LOG KB-8

Date Begin - End: 8/15/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny
Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.
Hammer Type - Drop: 140 lb. Auto - 30 in.

Approximate Ground Surface Elevation (ft.): 386.00
Surface Condition: Asphalt

FIELD EXPLORATION							LABORATORY RESULTS							
Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
385			5-inch Asphalt over 13-inch Aggregate Base											Hand Auger to 5 feet below existing grade
			Sandy Fat CLAY (CH): coarse-grained, olive brown, moist, trace fine gravel (FILL)				CH	19.1			57	53	34	
380	5		fine to coarse-grained sand, yellowish brown, very stiff, with fine gravel		BC=3 5 9 PP=2.5	11"		22.0	102.3		73			
					BC=4 8 12 PP=3.5	12"								
			Sandy Lean CLAY with Gravel (CL): fine to coarse-grained sand, medium plasticity, light brownish gray, moist, very stiff											
375	10		**Sandy Lean CLAY (CL)**: fine to coarse-grained sand, medium plasticity, yellowish brown, moist, very stiff, trace fine gravel		BC=3 7 9 PP=3.0	17"		17.1			53			
370	15		increase in fine to coarse gravel content		BC=9 17 14	2"								
365	20		yellowish brown clayey sand layer at 20'		BC=6 15 15	17"								
360	25				BC=7 9 14 PP=2.5	17"		17.1			64			
			Clayey SAND with Gravel (SC): fine to coarse-grained sand, low plasticity, pale olive and olive, moist, medium dense, with angular to sub-angular gravel											
355	30				BC=12 16 22	17"								

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PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-8

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-9a

PLOTTED: 10/18/2023 08:50 PM BY: DArakkal

gINT FILE: Klf_gint_master_2020 PROJECT NUMBER: 20201694.018A OFFICE FILTER: SAN JOSE
gINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2020.GLB [__KLF_BORING/TEST PIT SOIL LOG]

BORING LOG KB-8

Date Begin - End: 8/15/2023
Drilling Company: EGI
Logged By: C. Conti
Drill Crew: Loren, Lyle, Gabriel
Hor.-Vert. Datum: Not Available
Drilling Equipment: B-53B
Hammer Type - Drop: 140 lb. Auto - 30 in.
Plunge: -90 degrees
Drilling Method: Hollow Stem Auger
Weather: Sunny
Exploration Diameter: 8" in. O.D.

FIELD EXPLORATION | LABORATORY RESULTS

Approximate Ground Surface Elevation (ft.): 386.00
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
350		▨	**Clayey SAND with Gravel (SC)**: fine to coarse-grained sand, low plasticity, pale olive and olive, moist, medium dense, with angular to sub-angular gravel	■	BC=9 14 18	18"								
345	40	▨	dense	■	BC=14 25 42	17"								
340	45	▨	**Lean CLAY (CL)**: medium plasticity, yellowish brown, moist, hard	■	BC=14 23 32 PP=4.5+	16"								
				■	BC=13 22 34 PP=4.5+	16"								
335	50													
330	55													
325	60													
320	65													

The boring was terminated at approximately 48.5 ft. below ground surface. The boring was backfilled with Portland cement grount, capped with concrete and black dye on August 15, 2023.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.

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PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-8

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-9b

Date Begin - End: 8/22/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny

Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.

Hammer Type - Drop: 140 lb. Auto - 30 in.

BORING LOG KB-9

Approximate Ground Surface Elevation (ft.): 387.00
Surface Condition: Asphalt

FIELD EXPLORATION							LABORATORY RESULTS							
Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			4-inch Asphalt over 8-inch Aggregate Base											Hand Auger to 5 feet below existing grade
385			**Fat CLAY with Sand (CH)**: fine-grained sand, yellowish brown, moist, (FILL)				CH	22.9			78	58	38	
	5		medium-grained sand, stiff to very stiff		BC=3 5 10	17"		20.7	102.9					
380														
			trace fine gravel		BC=2 5 10 PP=2.5	18"								
	10		**Clayey SAND with Gravel (SC)**: angular, non-plastic, pale olive, moist, medium dense, trace intensely weathered to decomposed sandstone		BC=7 9 14	18"		14.2			40			
375			**Sandy Lean CLAY (CL)**: fine-grained sand, medium plasticity, light brownish gray with lenses of yellowish brown, moist, very stiff					19.9			62			
	15		increase in medium to coarse grained sand		BC=5 11 14 PP=3.0 PP=3.5	17"								
370														
	20		yellowish brown, trace fine gravel		BC=5 9 18 PP=3.5	18"								
365														
	25		yellowish brown and dark reddish brown, hard, trace intensely weathered to decomposed claystone		BC=11 18 30 PP=4.5+	18"								
360														
	30		increase in sand content		BC=11 12 22 PP=4.5+	18"								
355														

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PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-9

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-10a

PLOTTED: 10/18/2023 08:50 PM BY: DArakkal
OFFICE FILTER: SAN JOSE
PROJECT NUMBER: 20201694.018A
gINT FILE: Klf_gint_master_2020
gINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2020.GLB [_KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End: 8/22/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny

Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.

BORING LOG KB-9

Hammer Type - Drop: 140 lb. Auto - 30 in.

			FIELD EXPLORATION				LABORATORY RESULTS							
Approximate Elevation (feet)	Depth (feet)	Graphical Log	Approximate Ground Surface Elevation (ft.): 387.00 Surface Condition: Asphalt Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
350			**Sandy Lean CLAY (CL)**: fine-grained sand, medium plasticity, light brownish gray with lenses of yellowish brown, moist, very stiff		BC=10 20 32 PP=4.5+	18"								
345	40		fine to medium-grained sand, yellowish brown, trace intensely weathered to decomposed claystone		BC=11 24 40 PP=4.5+	18"								
340	45		**Clayey SAND (SC)**: medium to coarse-grained sand, angular, non-plastic, olive and olive brown, moist, very dense		BC=16 32 47 PP=4.5+	18"								
			Lean CLAY (CL): medium plasticity, yellowish brown and reddish brown, moist, hard, strongly cemented claystone		BC=15 35 50/4" PP=4.5+	18"								
	50													
335														
330	55													
325	60													
320	65													

The boring was terminated at approximately 50 ft. below ground surface. The boring was backfilled with Portland cement grount, capped with concrete and black dye on August 22, 2023.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.

KLEINFELDER
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PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-9

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-10b

PLOTTED: 10/18/2023 08:50 PM BY: DArakkal

BORING LOG KB-10

Date Begin - End: 8/23/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny
Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.
Hammer Type - Drop: 140 lb. Auto - 30 in.

Approximate Ground Surface Elevation (ft.): 387.00
Surface Condition: Asphalt

FIELD EXPLORATION							LABORATORY RESULTS							
Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			3.5-inch Asphalt over 5.5-inch Aggregate Base											Hand Auger to 5 feet below existing grade
385			**Sandy Fat CLAY (CH)**: fine to medium-grained sand, medium to high plasticity, gray, moist, (FILL)											
	5		olive, very stiff		BC=2 4 7 PP=2.0	6"	CH	25.7			53	55	29	
380														
			yellow		BC=5 8 10	NR								
	10		**Sandy Lean CLAY (CL)**: fine to medium-grained sand, medium plasticity, yellowish brown, moist, very stiff		BC=4 6 8 PP=2.5	18"								
375														
	15		fine-grained sand, yellowish brown with laminated gray and light brownish gray		BC=6 10 13 PP=3.5	18"		18.0						
370														
	20		**Clayey SAND (SC)**: fine to coarse-grained sand, low plasticity, yellowish brown and reddish brown, moist, medium dense		BC=4 7 11	18"	SC	15.3			41	41	24	
365														
	25		**Sandy Lean CLAY (CL)**: fine to medium-grained sand, medium plasticity, brown and olive brown, moist, very stiff, trace gravel		BC=5 10 16	18"				99	71			
360														
	30		increase in fine to coarse gravel		BC=11 16 15	18"								
355														

KLEINFELDER
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PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-10

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-11a

gINT FILE: Klf_gint_master_2020 PROJECT NUMBER: 20201694.018A OFFICE FILTER: SAN JOSE
gINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2020.GLB [__KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End: 8/23/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny
Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.
Hammer Type - Drop: 140 lb. Auto - 30 in.

BORING LOG KB-10

Approximate Ground Surface Elevation (ft.): 387.00
Surface Condition: Asphalt

Approximate Elevation (feet)	Depth (feet)	Graphical Log	FIELD EXPLORATION Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	LABORATORY RESULTS USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			Poorly Graded GRAVEL with Sand (GP): fine-grained gravel, non-plastic, moist		BC=6 9 13	18"								
350			**Sandy Lean CLAY (CL)**: fine-grained sand, medium plasticity, dark reddish brown, moist, very stiff											
	40		increase in sand content		BC=10 15 21 PP=4.5+	15"								
345			**Sandy Lean CLAY with Gravel (CL)**: fine-grained sand, medium plasticity, yellowish brown, moist, very stiff to hard											
	45		fine to coarse-grained sand, increase in fine gravel		BC=10 11 16 PP=3.0 PP=4.0	18"								
340														
			fine to medium-grained sand, brown and yellowish brown		BC=8 12 17 PP=4.5+ PP=2.5	17"								
	50													
335														
	55													
330														
	60													
325														
	65													
320														

The boring was terminated at approximately 50 ft. below ground surface. The boring was backfilled with Portland cement grount, capped with concrete and black dye on August 23, 2023.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-10

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-11b

BORING LOG KB-11

Date Begin - End: 8/15/2023 - 8/16/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny
Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.
Hammer Type - Drop: 140 lb. Auto - 30 in.

FIELD EXPLORATION

Approximate Ground Surface Elevation (ft.): 387.00
Surface Condition: Asphalt

LABORATORY RESULTS

Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			4-inch Asphalt over 8-inch Aggregate Base											Hand Auger to 5 feet below existing grade
			Fat CLAY with Sand (CH): olive gray, moist, (FILL)				CH	24.5			77	66	47	
385														
	5		medium-grained sand, olive brown, moist, very stiff		BC=3 7 13	12"								
							CH	21.9	100.9		75	56	34	
380														
			Sandy Lean CLAY (CL): fine to medium-grained sand, medium plasticity, olive, very stiff		BC=4 8 12	18"								
	10		increase in fine-grained sand		BC=4 9 14	10"								
375														
			Clayey SAND (SC): fine to coarse-grained sand, low plasticity, moist, loose											
	15				BC=2 5 6	18"					37			
370														
	20		**Sandy Lean CLAY (CL)**: medium to coarse-grained sand, low to medium plasticity, yellowish brown, moist, very stiff to hard, angular gravel		BC=5 12 19 PP=4.25	18"								
365														
	25				BC=7 9 13 PP=3.0 PP=2.0	18"								
360														
	30		**Sandy Lean CLAY with Gravel (CL)**: medium to coarse-grained sand, low plasticity, yellowish brown, moist, hard		BC=11 18 30 PP=4.5+	18"								
355														

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PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-11

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-12a

BORING LOG KB-11

Date Begin - End: 8/15/2023 - 8/16/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny
Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.
Hammer Type - Drop: 140 lb. Auto - 30 in.

Approximate Ground Surface Elevation (ft.): 387.00
Surface Condition: Asphalt

FIELD EXPLORATION							LABORATORY RESULTS							
Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
		▨	**Sandy Lean CLAY (CL)**: fine-grained sand, low plasticity, yellowish brown, moist, hard	■	BC=5 10 24 PP=4.5+	18"								
350		▨												
	40	▨	fine to medium-grained sand, low to medium plasticity, pale olive and olive	■	BC=10 25 30 PP=4.5+	18"								
345		▨												
	45	▨	fine to coarse-grained sand, reddish brown and dark reddish brown	■	BC=12 22 27 PP=4.5+	18"								
340		▨												
		▨	medium-grained sand, olive brown	■	BC=9 16 30 PP=4.5+	17"								
	50													
335														
	55													
330														
	60													
325														
	65													
320														

The boring was terminated at approximately 50 ft. below ground surface. The boring was backfilled with Portland cement grount, capped with concrete and black dye on August 16, 2023.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-11

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-12b

PLOTTED: 10/18/2023 08:51 PM BY: DArakkal
OFFICE FILTER: SAN JOSE
PROJECT NUMBER: 20201694.018A
gINT FILE: Klf_gint_master_2020
gINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2020.GLB [__KLF_BORING/TEST PIT SOIL LOG]

Date Begin - End: 8/21/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny

Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.

Hammer Type - Drop: 140 lb. Auto - 30 in.

BORING LOG KB-12

Approximate Ground Surface Elevation (ft.): 387.00
Surface Condition: Asphalt

FIELD EXPLORATION							LABORATORY RESULTS							
Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
			4-inch Asphalt over 20-inch Aggregate Base											Hand Auger to 5 feet below existing grade
385			**Sandy Fat CLAY with Gravel (CH)**: fine to coarse-grained sand, pale olive, moist, with fine gravel (FILL)				CH	24.1			66	56	35	
	5		fine to medium-grained sand, olive brown											
380			**Sandy Lean CLAY (CL)**: fine to coarse-grained sand, low to medium plasticity, olive gray and olive yellow, moist, very stiff, trace fine gravel											
	10				BC=3 3 6	10"		19.5	104.3					
375														
	15		fine-grained sand, olive yellow and yellowish brown		BC=4 7 11 PP=2.25 PP=3.5	18"								
370														
	20		yellowish brown with lenses of light brownish gray and gray		BC=5 7 8 PP=3.25 PP=2.0	17"								
365														
	25		**Fat CLAY with Sand (CH)**: fine-grained sand, yellowish and reddish brown, moist, very stiff		BC=7 10 16 PP=3.5	18"	CH	15.9			71	51	34	
360														
	30		**Clayey SAND (SC)**: fine to coarse-grained sand, low plasticity, pale olive, moist, medium dense to dense		BC=6 9 16	18"								
355														
			yellowish brown											

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PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-12

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-13a

BORING LOG KB-12

Date Begin - End: 8/21/2023
Logged By: C. Conti
Hor.-Vert. Datum: Not Available
Plunge: -90 degrees
Weather: Sunny
Drilling Company: EGI
Drill Crew: Loren, Lyle, Gabriel
Drilling Equipment: B-53B
Drilling Method: Hollow Stem Auger
Exploration Diameter: 8" in. O.D.
Hammer Type - Drop: 140 lb. Auto - 30 in.

Approximate Ground Surface Elevation (ft.): 387.00
Surface Condition: Asphalt

			FIELD EXPLORATION				LABORATORY RESULTS							
Approximate Elevation (feet)	Depth (feet)	Graphical Log	Lithologic Description	Sample Type	Blow Counts(BC)= Uncorr. Blows/6 in. Pocket Pen(PP)= tsf	Recovery (NR=No Recovery)	USCS Symbol	Water Content (%)	Dry Unit Wt. (pcf)	Passing #4 (%)	Passing #200 (%)	Liquid Limit	Plasticity Index (NP=NonPlastic)	Additional Tests/ Remarks
		▨	**Clayey SAND (SC)**: fine to coarse-grained sand, low plasticity, pale olive, moist, medium dense to dense	■	BC=8 16 21	18"								
350		▨												
	40	▨	fine to coarse-grained sand, non-plastic, olive yellow and reddish yellow	■	BC=12 19 24	18"								
345		▨												
	45	▨		■	BC=7 14 19	14"								
340		▨												
		▨	fine-grained sand, olive yellow, increase in gravel content	■	BC=10 16 23	15"								
	50													
335														
	55													
330														
	60													
325														
	65													
320														

The boring was terminated at approximately 50 ft. below ground surface. The boring was converted to a monitoring well, see Figure 3 in the main report for construction details.

GROUNDWATER LEVEL INFORMATION:
Groundwater was not observed during drilling or after completion.

GENERAL NOTES:
The exploration location and elevation are approximate and were estimated by Kleinfelder.

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.: 20201694.018A
DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

BORING LOG KB-12

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX
C-13b

APPENDIX B

CURRENT LABORATORY TEST DATA
(Kleinfelder, 2023)

Exploration ID	Depth (ft.)	Sample Description	Water Content (%)	Dry Unit Wt. (pcf)	Sieve Analysis (%)			Atterberg Limits			Additional Tests
					Passing 3/4"	Passing #4	Passing #200	Liquid Limit	Plastic Limit	Plasticity Index	
KB-1	1.0 - 2.0	FAT CLAY WITH SAND (CH)	26.1				78	56	20	36	
KB-1	11.0	LEAN CLAY WITH SAND (CL)	24.2	101.7			80	47	18	29	
KB-1	21.0		21.4								
KB-2	1.0 - 5.0	SANDY FAT CLAY (CH)	27.2				60	65	22	43	
KB-2	6.0		30.4	92.2							
KB-2	11.0	SANDY LEAN CLAY (CL)			97	88	63				
KB-2	16.0	LEAN CLAY WITH SAND (CL)					85	44	19	25	
KB-2	26.0	SANDY LEAN CLAY (CL)	19.4				63				
KB-4	1.0 - 3.0	CLAYEY SAND (SC)	20.7				45	57	22	35	
KB-4	6.0		24.3	94.2							
KB-4	8.5	SANDY LEAN CLAY (CL)					69				
KB-4	16.0	LEAN CLAY WITH SAND (CL)					74				
KB-5	6.0	SANDY FAT CLAY (CH)	20.8	101.5			70	52	18	34	
KB-5	16.0		24.6								
KB-5	21.0	LEAN CLAY WITH SAND (CL)	23.5	101.1			80				
KB-6	1.0 - 3.0	CLAYEY SAND WITH GRAVEL (SC)	21.7				46	60	22	38	
KB-6	6.0	SANDY LEAN CLAY (CL)	20.7	104.0			67				
KB-6	21.0	SNADY LEAN CLAY (CL)	19.2				53				
KB-7	1.0 - 5.0	SANDY FAT CLAY (CH)	27.5		100	92	61	68	24	44	
KB-7	6.0	SANDY LEAN CLAY (CL)	25.3	95.8			69				
KB-7	16.0	CLAYEY SAND WITH GRAVEL (SC)	17.3				50				
KB-7	21.0	CLAYEY SAND (SC)			100	92	42				
KB-8	1.0 - 3.0	SANDY FAT CLAY (CH)	19.1				57	53	19	34	
KB-8	6.0	LEAN CLAY WITH SAND (CL)	22.0	102.3			73				
KB-8	11.0	SANDY LEAN CLAY (CL)	17.1				53				
KB-8	26.0	SANDY LEAN CLAY (CL)	17.1				64				
KB-9	1.0 - 5.0	FAT CLAY WITH SAND (CH)	22.9				78	58	20	38	
KB-9	6.0		20.7	102.9							

Refer to the Geotechnical Evaluation Report or the supplemental plates for the method used for the testing performed above.
NP = NonPlastic

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:
20201694.018A

DRAWN BY: DA
CHECKED BY: MK
DATE: 10/4/2023

LABORATORY TEST
RESULT SUMMARY

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX

D-1a

Exploration ID	Depth (ft.)	Sample Description	Water Content (%)	Dry Unit Wt. (pcf)	Sieve Analysis (%)			Atterberg Limits			Additional Tests
					Passing 3/4"	Passing #4	Passing #200	Liquid Limit	Plastic Limit	Plasticity Index	
KB-9	10.0	CLAYEY SAND WITH GRAVEL (SC)	14.2				40				
KB-9	11.0	SANDY LEAN CLAY (CL)	19.9				62				
KB-10	6.0	SANDY FAT CLAY (CH)	25.7				53	55	26	29	
KB-10	16.0		18.0								
KB-10	21.0	CLAYEY SAND WITH GRAVEL (SC)	15.3				41	41	17	24	
KB-10	26.0	LEAN CLAY WITH SAND (CL)				99	71				
KB-11	1.0 - 5.0	FAT CLAY WITH SAND (CH)	24.5				77	66	19	47	
KB-11	6.0	FAT CLAY WITH SAND (CH)	21.9	100.9			75	56	22	34	
KB-11	15.0	CLAYEY SAND (SC)					37				
KB-12	2.0 - 5.0	SANDY FAT CLAY (CH)	24.1				66	56	21	35	
KB-12	11.0		19.5	104.3							
KB-12	26.0	FAT CLAY WITH SAND (CH)	15.9				71	51	17	34	

Refer to the Geotechnical Evaluation Report or the supplemental plates for the method used for the testing performed above.
NP = NonPlastic

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:
20201694.018A

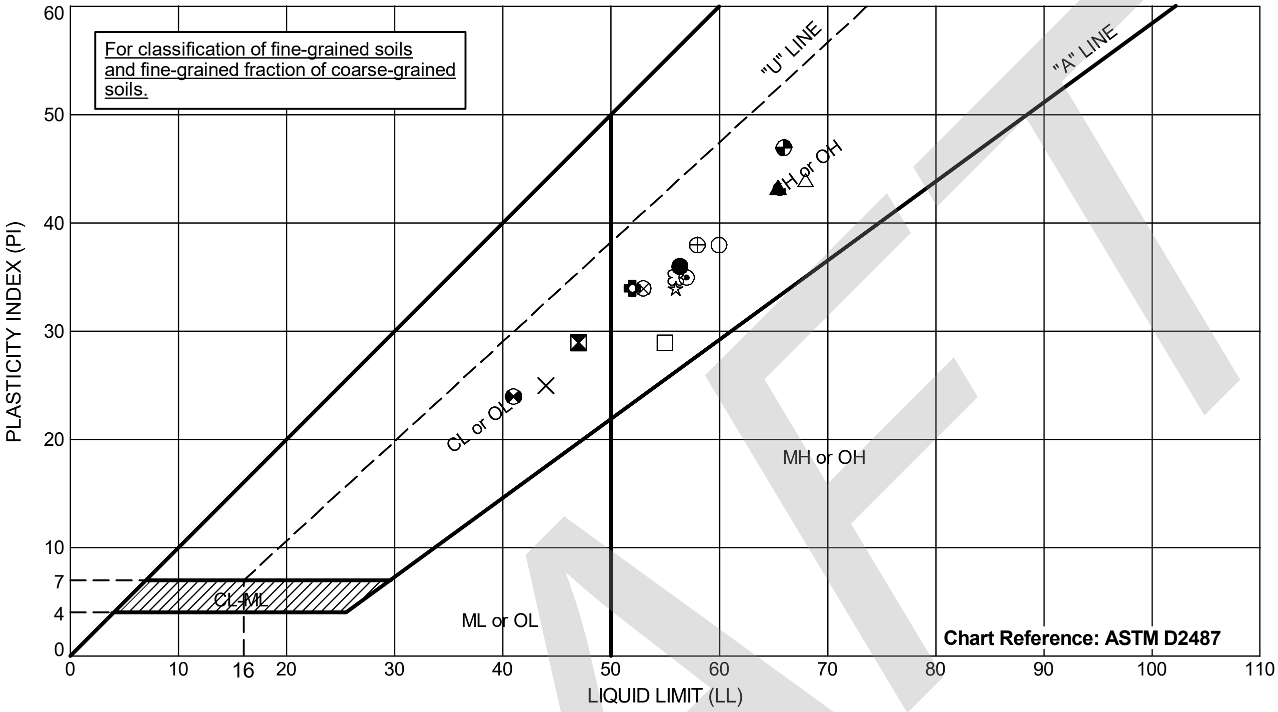
DRAWN BY: DA
CHECKED BY: MK
DATE: 10/4/2023

LABORATORY TEST
RESULT SUMMARY

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX

D-1b



	Exploration ID	Depth (ft.)	Sample Description	Passing #200	LL	PL	PI
●	KB-1	1 - 2	FAT CLAY WITH SAND (CH)	78	56	20	36
⊠	KB-1	11	LEAN CLAY WITH SAND (CL)	80	47	18	29
▲	KB-2	1 - 5	SANDY FAT CLAY (CH)	60	65	22	43
×	KB-2	16	LEAN CLAY WITH SAND (CL)	85	44	19	25
⊙	KB-4	1 - 3	CLAYEY SAND (SC)	45	57	22	35
✤	KB-5	6	SANDY FAT CLAY (CH)	70	52	18	34
○	KB-6	1 - 3	CLAYEY SAND WITH GRAVEL (SC)	46	60	22	38
△	KB-7	1 - 5	SANDY FAT CLAY (CH)	61	68	24	44
⊗	KB-8	1 - 3	SANDY FAT CLAY (CH)	57	53	19	34
⊕	KB-9	1 - 5	FAT CLAY WITH SAND (CH)	78	58	20	38
□	KB-10	6	SANDY FAT CLAY (CH)	53	55	26	29
⊛	KB-10	21	CLAYEY SAND WITH GRAVEL (SC)	41	41	17	24
◑	KB-11	1 - 5	FAT CLAY WITH SAND (CH)	77	66	19	47
☆	KB-11	6	FAT CLAY with SAND (CH)	75	56	22	34
✿	KB-12	2 - 5	SANDY FAT CLAY (CH)	66	56	21	35

Testing performed in general accordance with ASTM D4318.
NP = Nonplastic
NM = Not Measured

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:
20201694.018A

DRAWN BY: DA

CHECKED BY: CC

DATE: 8/24/2023

ATTERBERG LIMITS

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX

D-2a

PLOTTED: 10/06/2023 12:38 AM BY: DArakkal

OFFICE FILTER: SAN JOSE

PROJECT NUMBER: 20201694.018A

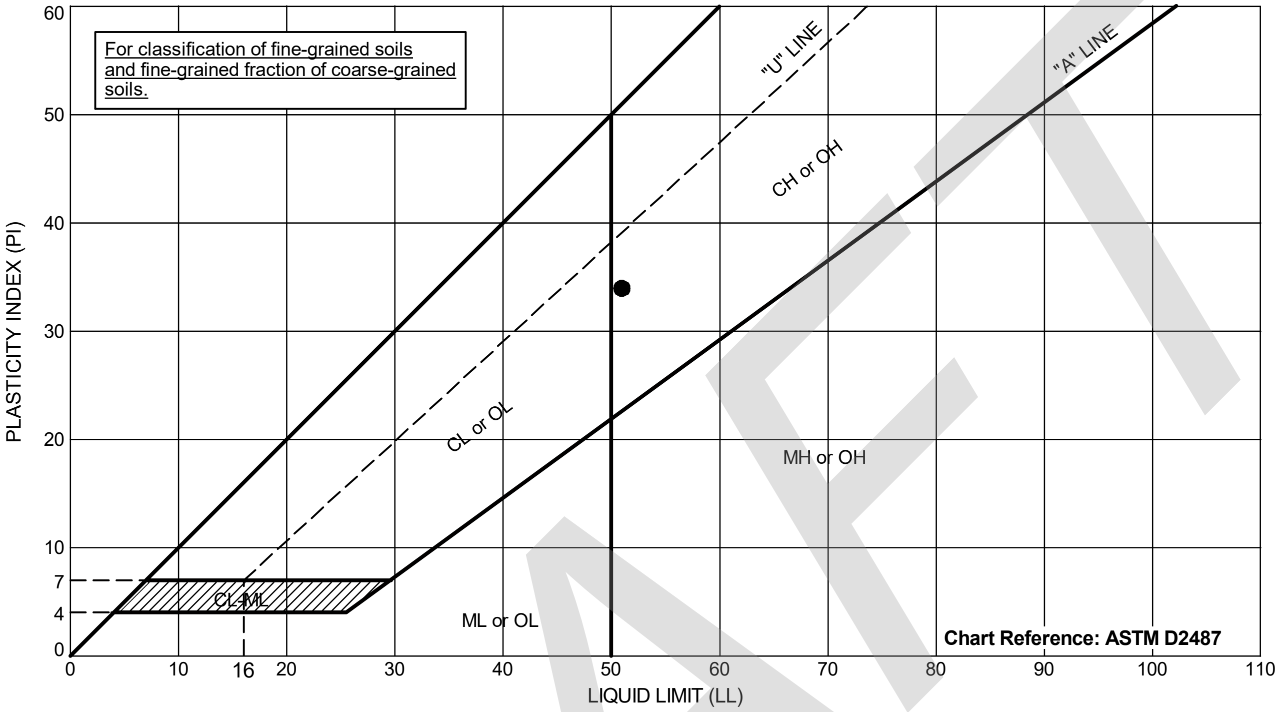
gINT FILE: Klf_gint_master_2020
gINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2020.GLB [_KLF_ATTERBERG (ASTM)]

PLOTTED: 10/06/2023 12:38 AM BY: DArakkal

OFFICE FILTER: SAN JOSE

PROJECT NUMBER: 20201694.018A

gINT FILE: Klf_gint_master_2020
gINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2020.GLB [_KLF_ATTERBERG (ASTM)]



	Exploration ID	Depth (ft.)	Sample Description	Passing #200	LL	PL	PI
●	KB-12	26	FAT CLAY WITH SAND (CH)	71	51	17	34

Testing performed in general accordance with ASTM D4318.
NP = Nonplastic
NM = Not Measured

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:
20201694.018A

DRAWN BY: DA

CHECKED BY: CC

DATE: 8/24/2023

ATTERBERG LIMITS

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX

D-2b

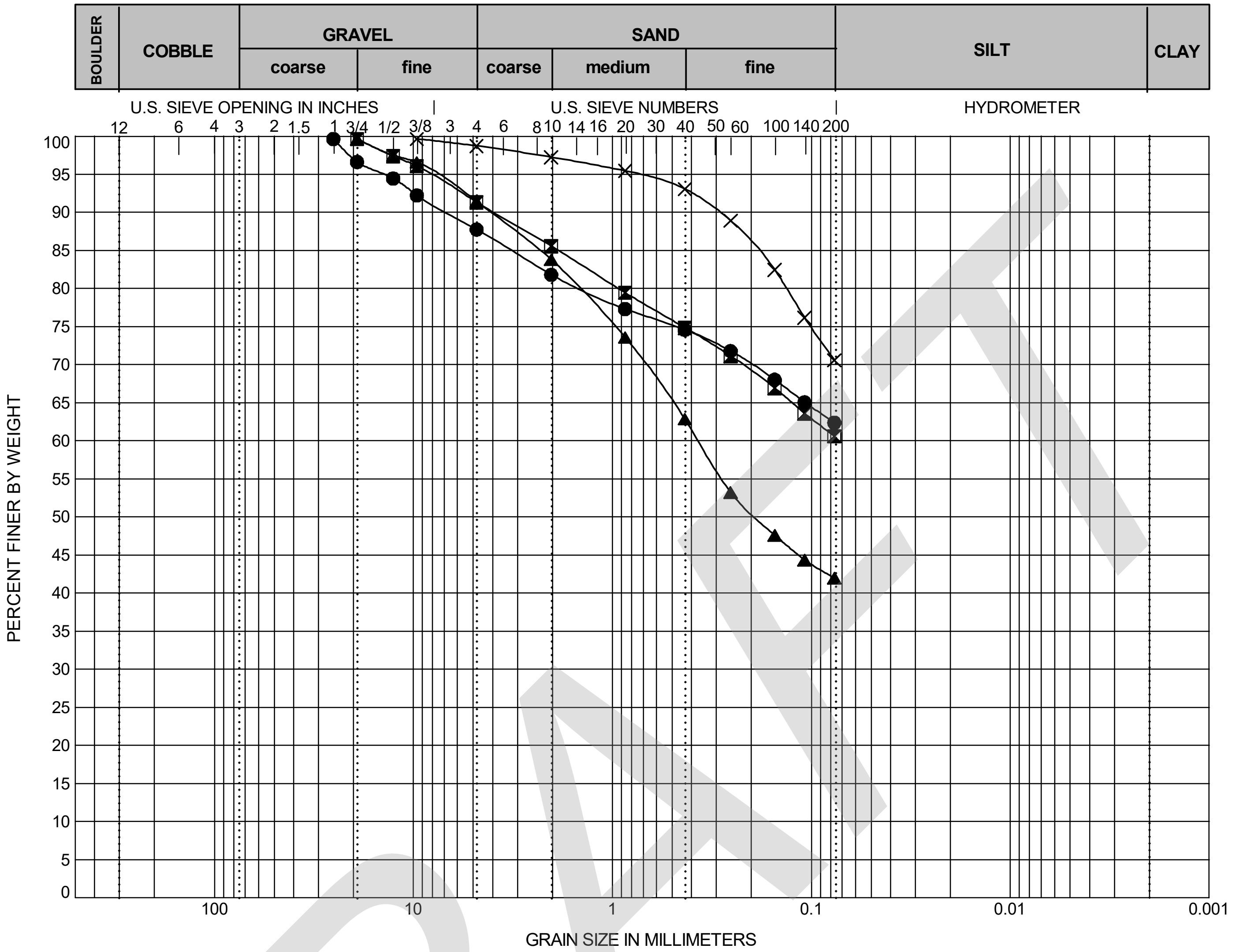
PLOTTED: 10/06/2023 12:41 AM BY: DArakkal

OFFICE FILTER: SAN JOSE

PROJECT NUMBER: 20201694.018A

gINT FILE: Klf_gint_master_2020

gINT TEMPLATE: E:KLF_STANDARD_GINT_LIBRARY_2020.GLB [_KLF_SIEVE ANALYSIS]



Exploration ID		Depth (ft.)	Sample Description	LL	PL	PI
●	KB-2	11	SANDY LEAN CLAY (CL)	NM	NM	NM
⧗	KB-7	1 - 5	SANDY FAT CLAY (CH)	68	24	44
▲	KB-7	21	CLAYEY SAND (SC)	NM	NM	NM
×	KB-10	26	LEAN CLAY WITH SAND (CL)	NM	NM	NM

Exploration ID		Depth (ft.)	D_{100}	D_{60}	D_{30}	D_{10}	Cc	Cu	Passing 3/4"	Passing #4	Passing #200	%Silt*	%Clay*
●	KB-2	11	25	NM	NM	NM	NM	NM	97	88	63	NM	NM
⧗	KB-7	1 - 5	19	NM	NM	NM	NM	NM	100	92	61	NM	NM
▲	KB-7	21	19	0.358	NM	NM	NM	NM	100	92	42	NM	NM
×	KB-10	26	9.5	NM	NM	NM	NM	NM		99	71	NM	NM

*These numbers represent silt-sized and clay-sized content but may not indicate the percentage of the material with the engineering properties of silt or clay. Sieve Analysis and Hydrometer Analysis testing performed in general accordance with ASTM D6913(Sieve Analysis) and ASTM D7928 (Hydrometer Analysis).
NP = Nonplastic
NM = Not Measured

Coefficients of Uniformity - $C_u = D_{60} / D_{10}$
Coefficients of Curvature - $C_C = (D_{30})^2 / D_{60} D_{10}$
D_{60} = Grain diameter at 60% passing
D_{30} = Grain diameter at 30% passing
D_{10} = Grain diameter at 10% passing

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:
20201694.018A

DRAWN BY: DA
CHECKED BY: CC
DATE: 8/24/2023

SIEVE ANALYSIS

Penitencia Water Treatment Plant
3959 Whitman Way
San Jose, California

APPENDIX

D-3

CERCO
analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client: Kleinfelder
Client's Project No.: 20201694.018A
Client's Project Name: Penitencia Water Treatment Plant
Date Sampled: 21-Aug-23
Date Received: 28-Sep-23
Matrix: Soil
Authorization: Chain of Custody

Date of Report: 2-Oct-2023

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Resistivity (As Received) (ohms-cm)	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
2309046-001	KB-8 Bulk 1 @ 1-3'	+120	9.10	1,000	920	N.D.	N.D.	19

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	-	-	50	15	15
Date Analyzed:	28-Sep-2023	29-Sep-2023	28-Sep-2023	28-Sep-2023	28-Sep-2023	29-Sep-2023	29-Sep-2023

* Results Reported on "As Received" Basis

N.D. - None Detected

Julia Clauson
Chemist

Quality Control Summary - **All laboratory quality control parameters were found to be within established limits**

APPENDIX C

PREVIOUS BORING LOGS

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions		grf	ltr	Description
Coarse Grained Soils	Gravel And Gravelly Soils	▤	GW	Well-graded gravels or gravel sand mixtures, little or no fines
		▤	GP	Poorly-graded gravels or gravel sand mixture, little or no fines
		▤	GM	Silty gravels, gravel-sand-silt mixtures
		▨	GC	Clayey gravels, gravel-sand-clay mixtures
	Sand And Sandy Soils	▤	SW	Well-graded sands or gravelly sands, little or no fines
			SP	Poorly-graded sands or gravelly sands, little or no fines
		▥	SM	Silty sands, sand-silt mixtures
		▨	SC	Clayey sands, and-clay mixtures

Major Divisions		grf	ltr	Description
Fine Grained Soils	Silts And Clays LL < 50	▥	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		▨	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		▨	OL	Organic silts and organic silt-clays of low plasticity
	Silts And Clays LL > 50	▥	MH	Inorganic silts, micaceous or diatomaceous fine or silty soils, elastic silts
		▨	CH	Inorganic clays of high plasticity, fat clays
		▨	OH	Organic clays of medium to high plasticity
Highly Organic Soils		▤	PT	Peat and other highly organic soils

GRAIN SIZES

U.S. STANDARD SERIES SIEVE: 200 40 10 4

CLEAR SQUARE SIEVE OPENINGS: 3/4" 3" 12"

Silts and Clays	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

RELATIVE DENSITY

Sands and Gravels	Blows/Foot*
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Over 50

CONSISTENCY

Silts and Clays	Blows/Foot*	Strength (tsf)**
Very Soft	0 - 2	0 - 1/4
Soft	2 - 4	1/4 - 1/2
Firm	4 - 8	1/2 - 1
Stiff	8 - 16	1 - 2
Very Stiff	16 - 32	2 - 4
Hard	Over 32	Over 4

*Number of Blows for a 140-pound hammer falling 30 inches, driving a 2-inch O.D. (1-3/8" I.D.) split spoon sampler.

**Unconfined compressive strength.

SYMBOLS

▯ Standard Penetration sample

☒ Modified California sample

▱ Shelby Tube sample

▽ Ground Water level during drilling

▼ Stabilized Ground Water level

Increasing Visual Moisture Content

↓
Dry
Damp
Moist
Wet
Saturated

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KEY TO EXPLORATORY BORING LOGS

WATER TREATMENT IMPROV. PROJECT, STAGE 2
Penitencia WTP, San Jose, CA

PROJECT NO.	DATE	FIGURE NO.
17319-CA	November 2000	A-1

DRILL RIG	**Mobile B-61, HSA**	SURFACE ELEVATION	**391 Feet**
LOGGED BY	**VWC**	DEPTH TO GROUND WATER	**23 feet**
BORING DIAMETER	**8-inch**	DATE DRILLED	**5/17/00**

DESCRIPTION AND CLASSIFICATION			DEPTH	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT(%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE	(FEET)						
CLAY (CH): gray brown, silty, trace sand (fine-grained), moist	Stiff	▨							
		▨		☒	21				R-Value = 3
		▨	5	☒	23	27	92	2.4	Atterberg Limits: LL=93 PI=80 Passing #200 sieve = 98%
at 6 feet, color to rust brown, trace gravel (fine, subangular), moist		▨							
	Very Stiff	▨	10	☒	26	22	102	7.1	
at 12 feet, grade to sandy		▨							
	Very Stiff	▨							
SAND (SC): reddish brown, fine to coarse-grained, some clay, trace gravel (fine, subangular)	Medium Dense	▧	15	☒	30	14	111	2.2	Atterberg Limits: LL=41 PI=29 Passing #200 sieve = 27%
at 19 feet, gravelly	Dense	▧	20	☒	55				
		▧				▽			
at 24-1/2 feet, clayey		▧	25	⌶	30				Passing #200 sieve = 42%
		▧	30	⌶	30				

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EXPLORATORY BORING LOG

WATER TREATMENT IMPROV. PROJECT, STAGE 2
Penitencia WTP, San Jose, CA

PROJECT NO.	DATE	BORING NO.
17319-CA	**November 2000**	**EB-1**

DRILL RIG	**Mobile B-61, HSA**	SURFACE ELEVATION	**391 Feet**	LOGGED BY	**VWC**
DEPTH TO GROUND WATER	**23 feet**	BORING DIAMETER	**8-inch**	DATE DRILLED	**5/17/00**

DESCRIPTION AND CLASSIFICATION			DEPTH	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT(%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE	(FEET)						TESTS
SAND (SC): Continued	Dense	▨							
		▨	40		38				
		▨	45						
		▨	50		45				

Bottom of Boring = 50 Feet

Notes:
1. The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.
2. For an explanation of penetration resistance values, see the first page of Appendix A.
3. Ground water was encountered at about 23 feet at the time of drilling.
4. The boring was grouted with neat cement immediately upon completion.
5. LL= Liquid Limit, PI= Plasticity Index.

HARZA Engineering Company	EXPLORATORY BORING LOG		
	WATER TREATMENT IMPROV. PROJECT, STAGE 2 **Penitencia WTP, San Jose, CA**		
	PROJECT NO.	DATE	BORING NO.
	17319-CA	**November 2000**	**EB-1**

DRILL RIG	**Mobile B-61, HSA**	SURFACE ELEVATION	**395 Feet**	LOGGED BY	**VWC**
DEPTH TO GROUND WATER	**Not Encountered**	BORING DIAMETER	**8-inch**	DATE DRILLED	**5/17/00**

DESCRIPTION AND CLASSIFICATION			DEPTH	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT(%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE	(FEET)						
CLAY (CH): dark brown, silty, some sand (fine to coarse-grained), damp	Very Stiff	▨		☒	42				
at 4 feet, color to green gray, trace gravel, moist	Stiff	▨	5	☒	20	32	86	2.7	
		▨	10	☒	24	41	79	2.0	
CLAY (CL): yellowish brown mixed with light gray and white, some silt, some sand, moist	Very Stiff	▩	15	☒	24	24	102	4.4	
CLAY (CL): rust brown, some sand (fine to coarse-grained)	Hard	▨	20	☒	46	19	111	6.9	
		▨	25	▯	43				
SAND (SC): rust brown, fine to coarse-grained, some clay	Very Dense	▧	30	▯	50/6"				

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EXPLORATORY BORING LOG

WATER TREATMENT IMPROV. PROJECT, STAGE 2
Penitencia WTP, San Jose, CA

PROJECT NO.	DATE	BORING NO.
17319-CA	**November 2000**	**EB-2**

DRILL RIG	**Mobile B-61, HSA**	SURFACE ELEVATION	**395 Feet**	LOGGED BY	**VWC**
DEPTH TO GROUND WATER	**Not Encountered**	BORING DIAMETER	**8-inch**	DATE DRILLED	**5/17/00**

DESCRIPTION AND CLASSIFICATION			DEPTH	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT(%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE	(FEET)						
SAND (SC): Continued	Very Dense	▨							
at 39 feet, clayey	Dense	▨	40		37				Passing #200 sieve = 47%
		▨	45						
at 48-1/2 feet, grades to sandy clay	Very Stiff	▨	50		26				

Bottom of Boring = 50 Feet

Notes:
1. The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.
2. For an explanation of penetration resistance values, see the first page of Appendix A.
3. Ground water was not encountered at the time of drilling.
4. The boring was grouted with neat cement immediately upon completion.

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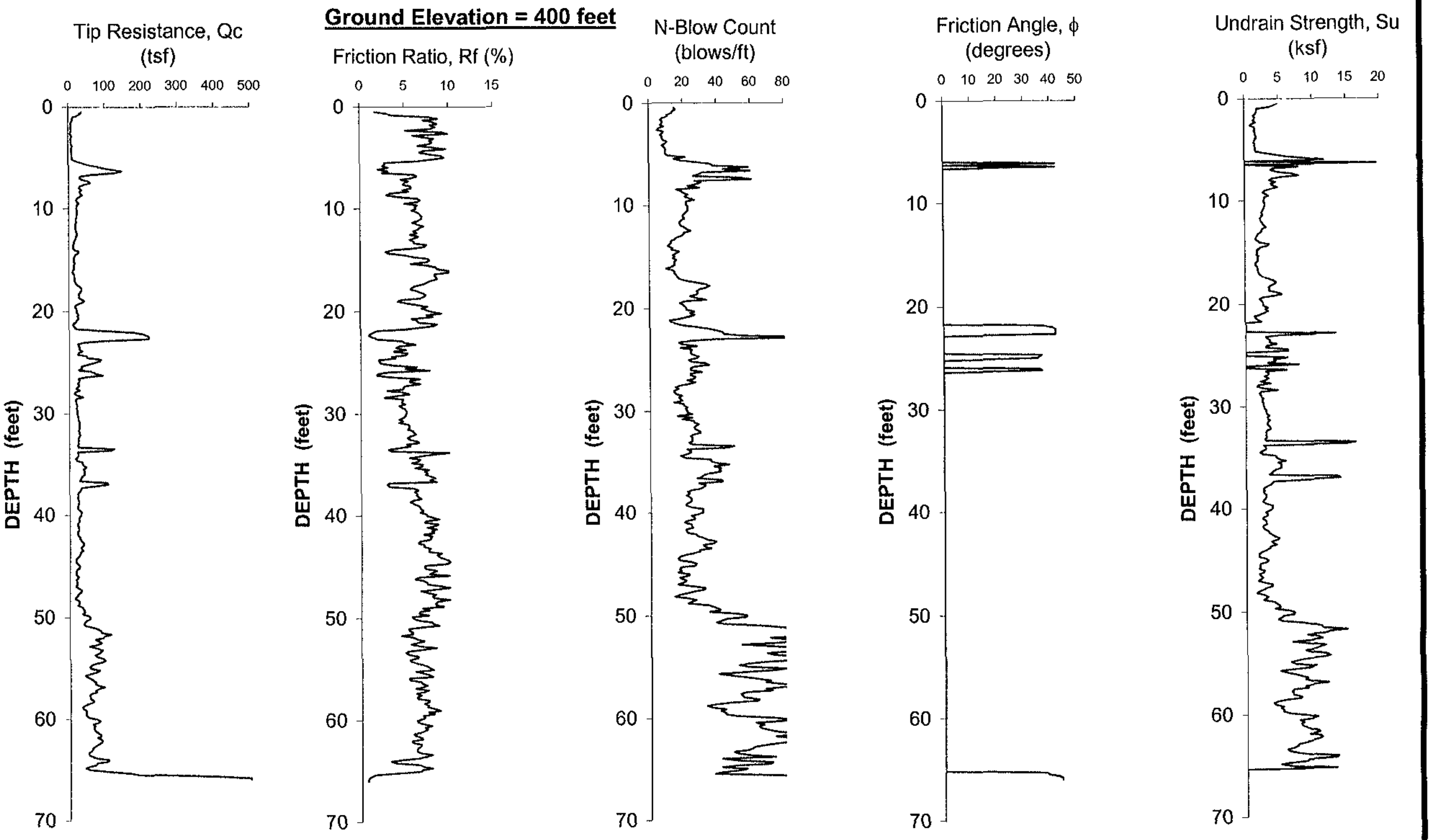
EXPLORATORY BORING LOG		
WATER TREATMENT IMPROV. PROJECT, STAGE 2 **Penitencia WTP, San Jose, CA**		
PROJECT NO.	DATE	BORING NO.
17319-CA	**November 2000**	**EB-2**



HARZA

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Drawn By	FDH
Prepared By	FDH
Approved By	SR
Scale	AS SHOWN
Date	14JUNY00
Drawing File	FDH

CONE PENETRATION TEST - 1

WATER TREATMENT IMPROVEMENT PROJECT, STAGE 2
PENITENCIA WTP
San Jose, CA

FIGURE
1

PROJECT NO.
17319-CA

BORING AND TEST PIT LOG LEGEND:

SAMPLE TYPE:

B - BAG SAMPLE
J - JAR SAMPLE
S - SPLIT BARREL (ASTM D1586 UNLESS OTHERWISE NOTED)
W - WASH SAMPLE
ST - SHELBY TUBE
OT - OSTERBERG TUBE
NX - DIAMOND CORE BARREL
MC - MODIFIED CALIFORNIA SAMPLER

PENETRATION TEST:

6" - 6" - 6" – THE NUMBER OF BLOWS FOR THREE 6-INCH INCREMENTS REQUIRED FROM A 140-LB HAMMER FALLING 30 INCHES TO DRIVE A STANDARD 2-INCH O.D. SPLIT-BARREL SAMPLER (ASTM D1586) OR A 2½-INCH I.D. MODIFIED CALIFORNIA SAMPLER.

(N) – THE SUM OF BLOWS FOR THE SECOND AND THIRD 6-INCH INCREMENTS OF A STANDARD 2-INCH O.D. SPLIT-BARREL SAMPLER (ASTM D1586).

SYMBOLIC LOG:

SEE SYMBOLIC LOG LEGEND FOR KEY TO GRAPHIC PATTERN

COMMENTS:

PPT - POCKET PENETROMETER TEST RESULTS.
TV - TORVANE TEST RESULTS.

NOTES:

1. THE BORING AND/OR TEST PIT LOGS AND RELATED INFORMATION DEPICT SUBSURFACE CONDITIONS ONLY AT THE SPECIFIC LOCATIONS AND DATES INDICATED. SOIL CONDITIONS AND WATER LEVELS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS OCCURRING AT THESE BORING AND/OR TEST PIT LOCATIONS. ALSO, THE PASSAGE OF TIME MAY RESULT IN A CHANGE IN THE CONDITIONS AT THESE LOCATIONS.

2. BORINGS AND/OR TEST PITS WERE LOGGED IN THE FIELD BY A CH2M HILL ENGINEERING GEOLOGIST OR GEOTECHNICAL ENGINEER. SAMPLES WERE EXAMINED AND VISUALLY CLASSIFIED IN APPROXIMATE ACCORDANCE WITH ASTM D2488.

3. THE BORING AND TEST PIT LOGS ARE A SIMPLIFIED REPRESENTATION OF SUBSURFACE CONDITIONS. THEY ARE AN INTEGRATION OF FIELD CLASSIFICATIONS AND LABORATORY CLASSIFICATION TESTS.

4. VISUAL CLASSIFICATION AND LAB CLASSIFICATION TESTS WERE PERFORMED ON THE SOIL SAMPLES. NOT ALL SOIL TYPES WERE SAMPLED AND NOT ALL SAMPLED SOILS WERE TESTED.

PROJECT NUMBER	BORING NUMBER
F22999.BO	B-1 SHEET 1 OF 2

SOIL BORING LOG

PROJECT SCVWD Sludge Dewatering, Penitencia LOCATION San Jose, CA

ELEVATION Approx. 390 DRILLING CONTRACTOR HEW Drilling Co., Inc.

DRILLING METHOD AND EQUIPMENT Hollow Stem Auger, CME-45, Safety Hammer

WATER LEVEL AND DATE water not encountered START 9-8-87 FINISH 9-8-87 LOGGER S. Goessling

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0							
	2.5						
	3.7	S-1	1.2	7-9-10 (19)	FAT CLAY, dark grey-brown, slightly moist, very stiff (CH)		PPT>4.5 tsf
5	5.0						
	5.1	S-2	1.1	6-7-10 (17)	FAT CLAY WITH SAND, mottled brown and dark brown, slightly moist, very stiff (CH)		
	7.0						
	8.5	S-3	1.5	7-10-13 (23)	FAT SANDY CLAY, brown, slightly moist, very stiff, some gravel (CH)		PPT>4.1 tsf
10	10.0						
	11.5	S-4	1.5	4-8-13 (21)	SANDY FAT CLAY, mixed gray and brown, moist, very stiff (CH/SC)		PPT>4.1 tsf
15	15.0						
	16.5	S-5	1.5	14-20-26 (46)	SANDY FAT CLAY, layered gray and brown, slightly moist, very stiff, occasional gravel (CH/SC)		(Drove through plug--10 blows) (rock in shoe)
20	20.0						
	21.5	S-6	1.5	15-11-14 (25)	SANDY FAT CLAY WITH GRAVEL, mixed brown and gray, slightly moist, very stiff (CH/SC)		(Cuttings hot--friction while drilling)
25	25.0				SANDY CLAY WITH GRAVEL, reddish brown, slightly moist, very stiff (CH/SC)		(Cuttings hot, steaming)
	26.5	S-7	1.5	5-11-22 (33)	SILTY CLAYEY GRAVEL, reddish brown and tan, slightly moist, very dense (GC)		
30							

PROJECT NUMBER	BORING NUMBER
F22999.BO	B- 1 SHEET 2 OF 2

SOIL BORING LOG

PROJECT SCVWD Sludge Dewatering, Penitencia LOCATION San Jose, CA
ELEVATION Approx. 390 DRILLING CONTRACTOR HEW Drilling Co., Inc.
DRILLING METHOD AND EQUIPMENT Hollow Stem Auger, CME-45, Safety Hammer
WATER LEVEL AND DATE water not encountered START 9-8-87 FINISH 9-8-87 LOGGER S. Goessling

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30	30 31.5	S-8	1.5 1.5	6-12-30 (42)	LEAN CLAY, reddish brown, moist, stiff, (CL) CLAYEY SANDY GRAVEL, gray brown with tan, slightly moist, (GC)		PPT=2.7 tsf
					END BORING @ 31.5 FT.		
35							

PROJECT NUMBER	BORING NUMBER
F22999.BO	B-2 SHEET 1 OF 2

SOIL BORING LOG

PROJECT SCVWD Sludge Dewatering, Penitencia LOCATION San Jose, CA
ELEVATION Approx. 400 DRILLING CONTRACTOR HEW Drilling Co., Inc.
DRILLING METHOD AND EQUIPMENT HSA, CME - 45
WATER LEVEL AND DATE none encountered START 9-8-87 FINISH 9-8-87 LOGGER S. GOESSLING

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS. TESTS AND INSTRUMENTATION
0							
5	5.0 6.1	S-1	1.1	5-7-9 (16)	SANDY FAT CLAY WITH GRAVEL, dark gray, slightly moist, very stiff (CH)		
10	10.0 11.5	S-2	1.5	4-8-11 (19)	SANDY FAT CLAY, dark gray, slightly moist, very stiff (CH) CLAYEY SAND, mottled tan, brown and gray, slightly moist (SC)		PPT=2.9 tsf
15	15.0 16.5	S-3	1.5	7-11-19 (30)	SANDY FAT CLAY WITH GRAVEL, mottled gray, brown and tan, slightly moist, very stiff (CH) SANDY FAT CLAY, mixed gray and brown, slightly moist (CH)		
20	20.0 21.5	S-4	1.5	11-19-27 (46)	LEAN CLAY WITH SAND, reddish brown, slightly moist, hard (CL)		(Hard pulling sample out of the ground) PPT>4.5 tsf
25	25.0 26.5	S-5	1.5	9-17-23 (40)	LEAN CLAY WITH SAND, mixed reddish brown and gray, dry, hard (CL) SANDY LEAN CLAY WITH GRAVEL, mixed brown, black, gray and tan, dry, hard (SC-CL)		
30							

PROJECT NUMBER	BORING NUMBER
F22999.BO	B-2 SHEET 2 OF 2

SOIL BORING LOG

PROJECT SCVWD Sludge Dewatering, Penitencia LOCATION San Jose, CA
ELEVATION Approx. 400 DRILLING CONTRACTOR HEW Drilling Company, Inc.
DRILLING METHOD AND EQUIPMENT HSA, CME - 45,
WATER LEVEL AND DATE not encountered START 9-8-87 FINISH 9-8-87 LOGGER S. GOESSLING

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30	30 31.5	S-6	1.5 1.5	14-28-38 (66)	SILTY CLAYEY GRAVEL WITH SAND, mixed gray white tan & brown, dry, very dense (GC)		
					END OF BORING @ 31.5 FT.		
35							

PROJECT NUMBER	BORING NUMBER
F22999.BO	B-3 SHEET 1 OF 1

SOIL BORING LOG

PROJECT SCVWD Sludge Dewatering, Penitencia

LOCATION San Jose, CA

ELEVATION Approx. 390

DRILLING CONTRACTOR HEW Drilling Co., Inc.

DRILLING METHOD AND EQUIPMENT Hollow Stem Auger, CME-45, Safety Hammer

WATER LEVEL AND DATE water not encountered

START 9-8-87

FINISH 9-8-87

LOGGER S. Goessling

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0							
	2.5						
	3.6	S-1	1.1	7-8-10 (18)	FAT CLAY WITH SAND, dark gray, dry, very stiff, trace roots (CH)		PPT>4.5 tsf
5							
	6.0						PPT>4.5 tsf
	7.1	S-2	1.1	5-9-11 (20)	FAT CLAY WITH SAND, dark gray, dry, very stiff, trace roots and occasional gravel (CH)		
	8.0						
	9.5	S-3	1.5	10-17-23 (40)	SILTY CLAYEY SAND, tan and gray, dry, very dense, occasional gravel (SC/SM)		
10	10.0						
	11.5	S-4	1.5	6-8-11 (19)	SILTY CLAYEY SAND WITH GRAVEL, tan and light gray, slightly moist, medium, gravel angular (SM)		
15	15.0						
	16.5	S-5	1.5	12-19-27 (46)	SILTY SAND WITH GRAVEL, tan and light gray, slightly moist, very dense, gravel angular (SM)		(difficulty pulling sample out)
20	20.0						
	21.2	S-6	1.2	16-19-15 (34)	SILTY CLAYEY SAND WITH GRAVEL, tan and light gray, slightly moist, dense, gravel platey and angular (SC/SM)		
					EOB=21.51		
25							
30							

PROJECT NUMBER	BORING NUMBER
F22999.BO	B-4 SHEET 1 OF 1

SOIL BORING LOG

PROJECT SCVWD Sludge Dewatering, Penitencia LOCATION San Jose, CA
ELEVATION Approx. 400 DRILLING CONTRACTOR HEW Drilling Company, Inc.
DRILLING METHOD AND EQUIPMENT HSA, CME - 45
WATER LEVEL AND DATE none encountered START 9-8-87 FINISH 9-8-87 LOGGER S. GOESSLING

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	SYMBOLIC LOG	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS. TESTS AND INSTRUMENTATION
0							
5	5.0 5.9	S-1	0.9 1.5	5-13-13 (26)	SILTY CLAYEY SAND, occasional gravel, tan and light gray, dry, medium (SC/SM)		
10	10.0 11.5	S-2	1.5 1.5	5-9-12 (21)	FAT CLAY WITH SAND, occasional gravel and wood fragments, dark gray, slightly moist, very stiff (CH)		PPT= 3.2 tsf
15	15.0 16.5	S-3	1.5 1.5	8-14-20 (34)	SILTY CLAYEY SAND, occasional gravel, tan and light gray, dry, dense (SC/SM)		
20	20.0 21.5	S-4	1.5 1.5	10-16-26 (42)	SILTY CLAYEY SAND, occasional gravel, mixed tan, gray, brown and red, slightly moist, dense (SC/SM)		difficult pulling sampler out of hole PPT= 3.tsf
					END OF BORING @ 21.5 FT.		
25							
30							

Project: Penitencia Water Treatment Plant Site Study

Project Location: San Jose, California

Log of Boring No. I-13

Sheet 1 of 3

Date(s) Drilled	7/18/85 -7/23/85	Boring Location	N corner of sludge drying bed area, ~210' SE of Sunset Ave		
Drilling Method	Rotary Wash	Drilling Company	Pitcher Drilling Co.	Driller	Roger Kostenko
Drill Rig Type	Failing 1500	Logged By	R. E. Kimmel	Completion Depth (feet)	178.5
North Coordinate 330155	East Coordinate 1612153	Approximate Ground Surface Elevation (feet)	390.6	Elevation Datum	
Apparent Ground-water Depth (feet)	Date Measured	Comments			

Depth, feet	SAMPLES Number	Type	Sampling Resistance	Graphic Log	DESCRIPTION	SOIL PROPERTIES Water Content, %	Dry Unit Weight, pcf	Qu, ksf	REMARKS
0					0-145.0 LANDSLIDE DEPOSIT 0-6.0 TOPSOIL				
5					6.0-145.0 DISPLACED SANTA CLARA FORMATION 6.0-35.0 CLAY, brown; sticky; pebbles				
10				▨					
15				▨					
20				▨					
25				▨					
30				▨					
35				▨	35.0-127.0 CLAY, gray to brown; sticky; pebbles				
40	B-1		30- 50/5"	▨	SANDY CLAY (SC-CL), gray; pebbles up to 3/4 inch diam; hard				
45				▨					
50				▨					
55				▨					
60									

Project: Penitencia Water Treatment Plant Site Study

Project Location: San Jose, California

Log of Boring No. I-13

Sheet 2 of 3

Depth, feet	SAMPLES Number	Type	Sampling Resistance	Graphic Log	DESCRIPTION	SOIL PROPERTIES Water Content, %	Dry Unit Weight, pcf	Qu, ksf	REMARKS
60				▨					
80	B-2		30- 50/5"	▨	CLAY (CL), gray to brown; mottled; pebbles; stiff; hard				
120	B-3		50/4"	▨	SANDY CLAY (CL); gray to brown; mottled; few pebbles; stiff; very hard				
127					127.0-145.0 interbeds of weathered bedrock				
130									

Project: Penitencia Water Treatment Plant Site Study

Project Location: San Jose, California

Log of Boring No. I-13

Sheet 3 of 3

Depth, feet	SAMPLES Number	Type	Sampling Resistance	Graphic Log	DESCRIPTION	SOIL PROPERTIES Water Content, %	Dry Unit Weight, pcf	Qu, ksf	REMARKS
135									
140	P-1	▨		▨	GRAVELLY CLAY (CL), greenish-gray; cobbles up to 1/2 inch diam; altered serpentinite; stiff (CL)*	26	105		17/30 = 57% recovery -#200 = 67%, +#4 = 10% LL = 42, PI = 26 * (classification given by lab data)
145					145.0-149.0 BASAL LANDSLIDE DEPOSIT				Principal landslide failure zone at 145-149 ft depth, with principal failure surface estimated at 146 ft depth based on subsequent inclinometer data
150					149.0-178.5 SANTA CLARA FORMATION				
155									
160									
165									
170	B-4		50/1"	▨	SANDY CLAY, brown; pebbles; cobbles up to 1 inch or more diam; sticky				50/1 inch = REFUSAL
175									
180					Bottom of Boring at 178-1/2 feet Installed 177 ft of inclinometer casing with 22-1/2 inches of stick-up A0 direction = S66W				revised 3/10/87 REK Laboratory test data from R. L. Volpe, November, 1985
185									
190									
195									
200									

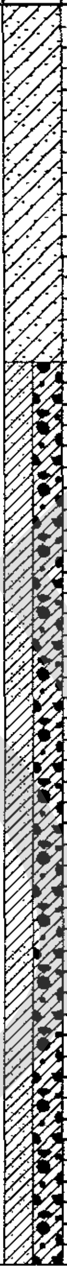
Project: Penitencia Water Treatment Plant Site Study

Project Location: San Jose, California

Log of Boring No. I-23

Sheet 1 of 3

Date(s) Drilled	6/20/91 -6/24/91	Boring Location	Next to recovery ponds		
Drilling Method	Rotary Wash	Drilling Company	Pitcher Drilling Co.	Driller	Brmalj/McKnight
Drill Rig Type	Failing 1500	Logged By	Trish Gomes	Completion Depth (feet)	158.0
North Coordinate	329686	East Coordinate	1612709	Approximate Ground Surface Elevation (feet)	391.0
Elevation Datum					
Apparent Ground-water Depth (feet)		Date Measured		Comments	



Depth, feet	SAMPLES Number	Type	Sampling Resistance	DESCRIPTION	SOIL PROPERTIES Water Content, %	Dry Unit Weight, pcf	Qu, ksf	REMARKS
0				0-6' - medium brown CLAYEY SAND, molds easily, some white, green weathered material, medium plasticity				0-25' Drag Bit
10				(SC)				
17				17' - same as above, increased black, dark green gravels 17-50' - sample gets progressively darker, more stiff and plastic, gravel content increases, still a CLAYEY SAND matrix				
30				(SC-GC)				
60								

Project: Penitencia Water Treatment Plant Site Study

Project Location: San Jose, California

Log of Boring No. I-23

Sheet 2 of 3

Depth, feet	SAMPLES			Graphic Log	DESCRIPTION	SOIL PROPERTIES			REMARKS
	Number	Type	Sampling Resistance			Water Content, %	Dry Unit Weight, pcf	Qu, ksf	
60					same				
65									
70									
75									
80					80' - some gravels, color lightens (GC)				Drill chatter, change to tri-cone
85					85' - same sample with larger s.s. chips				
90									
					91' - same sample with increasing green pebbles of serpentine and some gray clay				
95									
					97' - increased serpentinite weathered CLAY				
100	PB-1	▨			light yellow brown CLAYEY SAND with small particles of serpentine and red clay and pebbles, stiff and plastic				100% recovery
	PB-2	▨							100% recovery, PP=3.5, 4, 4.5
105	PB-3	▨			*SANDY CLAY (CH) Very stiff to hard, moist, yellowish brown (10YR 5/8), trace to some fine to coarse subangular gravel	23	109		30/36 = 83% recovery
	PB-4	▨			same as PB-2	20	110		100% recovery, PP=3.2, 4.5, 4.2 LL=67, PI=50, -#200=38%
110	PB-5	▨			*CLAYEY SAND (SC) Very dense, moist, dark yellowish brown (10YR 4/6), trace fine to coarse angular and subangular gravel	20	116		PP=4.5, 3.2, >4.5 LL=63, PI=39
					*SILTY CLAY (CH) Hard, moist, yellowish brown (10YR 5/6), trace fine to coarse sand, trace fine to coarse gravel, slickensides noted in near-vertical orientation				
115									
120									
125					126' - increasing light yellow brown CLAY with GRAVEL				
					128-158' - GRAVEL				
130									

Project: Penitencia Water Treatment Plant Site Study

Project Location: San Jose, California

Log of Boring No. I-23

Sheet 3 of 3

Depth, feet	SAMPLES Number	Type	Sampling Resistance	Graphic Log	DESCRIPTION	SOIL PROPERTIES Water Content, %	Dry Unit Weight, pcf	Qu, ksf	REMARKS
135									
140									
145									
150									
155					(GC)				
160					Bottom of Boring at 158 feet Casing to 160', 2' stickup				Reamed hole 80' to bottom before setting casing * Descriptions of PB-2, PB-4 and PB-5 by Woodward-Clyde Consultants, 1992.
165									
170									
175									
180									
185									
190									
195									
200									

Project: Penitencia Water Treatment Plant Site Study

Project Location: San Jose, California

Log of Boring No. 9-PZ

Sheet 1 of 3

Date(s) Drilled	8/19/86 - 8/20/86			Boring Location	aprox. 35' w of #I-13, N end of sludge beds		
Drilling Method	Rotary Wash			Drilling Company	Pitcher Drilling Co.	Driller	Steve Brmalj
Drill Rig Type	Failing 1500			Logged By	R.E Kimmel	Completion Depth (feet)	148.5
North Coordinate	330141	East Coordinate	1612125	Approximate Ground Surface Elevation (feet)	389.1	Elevation Datum	
Apparent Ground-water Depth (feet)		Date Measured		Comments			

Depth, feet	SAMPLES Number	SAMPLES Type	SAMPLES Sampling Resistance	Graphic Log	DESCRIPTION	SOIL PROPERTIES Water Content, %	SOIL PROPERTIES Dry Unit Weight, pcf	SOIL PROPERTIES Qu, ksf	REMARKS
0					0.0 - 146.0 LANDSLIDE DEPOSIT 0.0 - 4.0 (est.) TOPSOIL 4.0 (est.) - 146.0 DISPLACED SANTA CLARA FORMATION 4.0 - 83.0 SILTY/GRAVELLY CLAY				* classifications with an asterisk are from laboratory reports of examination; others are field estimates. Soil sample descriptions are based on limited field examination, supplemented by laboratory examination in some cases.
5									
10									
15									
20									
25	P-1	▨		▨	CLAY (CH*), mod. yellowish-brown (10YR 5/4) to dark yellowish-brown (10 YR 4/2); <10% sand; pebbles up to 1/2 inch diam. of varying composition; nearly horizontal internal bedding; hard; damp.	20	110		22/30 = 73% recovery
30									
35									
40									
45									
50	P-2	▨		▨	SANDY CLAY (CH*), dark yellowish-brown (10 YR 4/2); grayish olive layer above (10 Y 4/2); hard; damp	17	113		30/30 = 100% recovery LL=51, PI=31 -#200=85%, +#4=0%
55									
60									

Project: Penitencia Water Treatment Plant Site Study

Project Location: San Jose, California

Log of Boring No. 9-PZ

Sheet 2 of 3

Depth, feet	SAMPLES Number	Type	Sampling Resistance	Graphic Log	DESCRIPTION	SOIL PROPERTIES Water Content, %	Dry Unit Weight, pcf	Qu, ksf	REMARKS
60									
65									
70									
75									
80	P-3	▨		▨	CLAY (SC*) dark yellowish-brown (10 YR 4/2); interlayered with gravel of varying composition; hard; moist to very moist	16			30/30 = 100% recovery NOTE: Sampler only driven 1.5 ft, but 2.5 ft of sample returned -#200 = 26%, +#4 = 27%
					83.0 - 132.0 SILTY/SANDY CLAY, gravel				
85									
90									
95									
100									
					104.0 - 105.0 COBBLY LAYER				
105									
	P-4	▨		▨	CLAY (CL*), dark yellowish-brown (10 YR 4/2); homogenous; 20% sand; hard; dense; slightly damp	14	121		24/24 = 100% recovery NOTE: Sampler only driven 2 ft
110									
115									
120									
125									
130									

Project: Penitencia Water Treatment Plant Site Study

Project Location: San Jose, California

Log of Boring No. 9-PZ

Sheet 3 of 3

Depth, feet	SAMPLES Number	SAMPLES Type	SAMPLES Sampling Resistance	Graphic Log	DESCRIPTION	SOIL PROPERTIES Water Content, %	SOIL PROPERTIES Dry Unit Weight, pcf	SOIL PROPERTIES Qu, ksf	REMARKS
				▨	132.0 - 146.0 SILTY CLAY AND SERPENTINITE				
135				▨					
140				▨					
145				▨	146.0 - 148.5 SANTA CLARA FORMATION				principal basal landslide shear zone at 144-150 feet; principal failure surface at 146 feet, based on adjacent inclinometer #I-13
	P5	▨		▨	SANDY SERPENTINITE (CH*), olive-gray (5 Y 4/1); pebbles; stiff; damp	19	111		30/30 = 100% recovery
150					Bottom of Boring at 148-1/2 feet				LL = 56, PI = 34 -#200 = 74%, +#4 = 3% installed piezometer #16 at 144 ft, and piezometer #17 at 80 ft
155									
160									
165									
170									
175									
180									
185									
190									
195									
200									

Project: Penitencia Water Treatment Plant Site Study
Project Location: San Jose, California
Log Source: Dames & Moore; March, 1972

Log of Boring No. B-3

Sheet 1 of 3

Date(s) Drilled	11/29/71 -11/30/71		Boring Location		
Drilling Method	Rotary Wash		Drilling Company		Driller
Drill Rig Type	Failing 750		Logged By		Completion Depth (feet) 100.0
North Coordinate	329975	East Coordinate 1612435	Approximate Ground Surface Elevation (feet)	392.0	Elevation Datum
Apparent Ground-water Depth (feet)		Date Measured	Comments	Designated as "Boring 3" in original report	

Depth, feet	SAMPLES Number	Type	Sampling Resistance	Graphic Log	DESCRIPTION	SOIL PROPERTIES Water Content, %	Dry Unit Weight, pcf	Qu, ksf	REMARKS
0				▨	dark brown plastic SILTY CLAY (CH) with occasional pebbles, dry, (hard)				
	1	▥	64			71	58		
					(grading medium brown - moist - with some sand)				
5									
					(grading with some rounded gravel to 1/2" diameter)				
	2	▥	30			25	102		
				▨	mottled green & brown plastic SILTY SANDY CLAY (CH) with some angular gravel (very stiff)				
10									
	3	▥	52		(contains microfractures)	23	105		LL = 60, PI = 22
15									
					(grading slightly sandier)				
	4	▥	64			23	105		
					(with occasional orange oxidation stains on fracture surfaces)				
20									
	5	▥	82			20	110		
25									
30									

Project: Penitencia Water Treatment Plant Site Study
Project Location: San Jose, California
Log Source: Dames & Moore; March, 1972

Log of Boring No. B-3

Sheet 2 of 3

Depth, feet	SAMPLES Number	SAMPLES Type	SAMPLES Sampling Resistance	Graphic Log	DESCRIPTION	SOIL PROPERTIES Water Content, %	SOIL PROPERTIES Dry Unit Weight, pcf	SOIL PROPERTIES Qu, ksf	REMARKS
30				▨	mottled grayish green & reddish brown SANDY SILTY CLAY (CL) with occasional gravel & decomposed rocks (hard)				
35	6	▥	102	▨		19	113		
40				▨					
				▨	(variable amount of gravel interbedded with reddish brown silty sandy clay)				
45	7	▥	211	▨		16	119		
50				▨					
55	8	▥	222/ 10"	▨		16	119		
60				▨					
65				▨					

Project: Penitencia Water Treatment Plant Site Study
Project Location: San Jose, California
Log Source: Dames & Moore; March, 1972

Log of Boring No. B-3

Sheet 3 of 3

Depth, feet	SAMPLES Number	Type	Sampling Resistance	Graphic Log	DESCRIPTION	SOIL PROPERTIES Water Content, %	Dry Unit Weight, pcf	Qu, ksf	REMARKS
70	9	▥	164	▨		19	113		
75				▨					
80				▨					
85	10	▥	240	▨		16	119		
				●	(gravel layer)				
90				▨					
95				▨	(joint surface with faint slickensides)				
				▨	(occasional charcoal fragments & calcareous nodules)				
	11	▥	50/2"	▨		31	93		
100					Bottom of Boring at 100 feet				

APPENDIX D

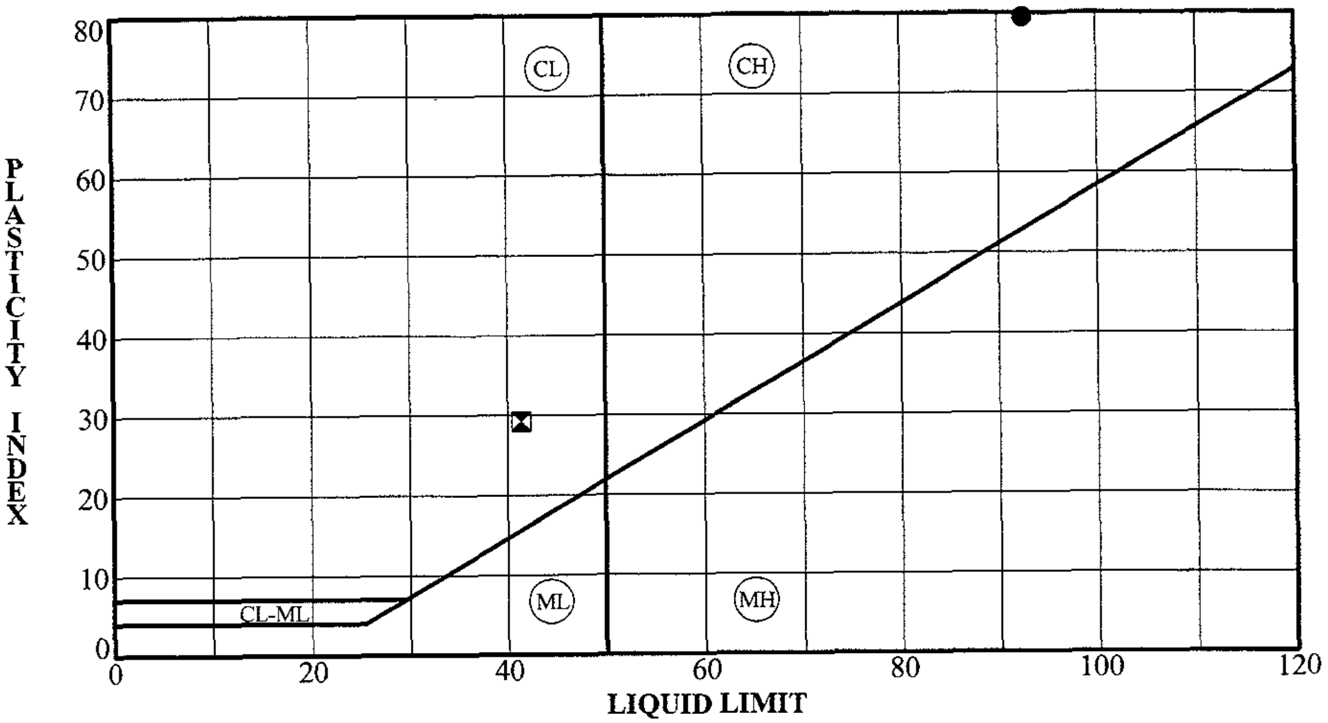
PREVIOUS LABORATORY TEST DATA

A resistance "R" value test was performed on a representative sample of the surface soils on-site to provide data for pavement design. The test was performed in accordance with California Test Method 301-F and indicated an "R" value of 3 at an exudation pressure of 300 pounds per square inch. The results of the tests are presented below:

RESULTS OF R-VALUE TEST

Description of Material	Dry Density (pcf)	Water Content (%)	Exudation Pressure (psi)	Expansion Pressure (psf)	"R" Value
Light Brown Silty Clay	95.4	26.5	159	61	1
	96.5	24.3	302	79	3
	98.9	22	382	96	7

R-Value = 3 at Exudation pressure of 300 psi



Key Symbol	Boring No.	Depth (Feet)	Liquid Limit	Plasticity Index	Liquidity Index	Water Content (%)	% Passing #200 Sieve	USCS
●	EB-1	4.5	93	80	0.175	27	98	CH
☒	EB-1	14.0	41	29	0.051	14	27	SC

File Name. G \ENGINEER\GINTW\PROJECTS\17319P-1.GPJ Report Template ATT B Output Date 7/31/00

HARZA
Engineering Company

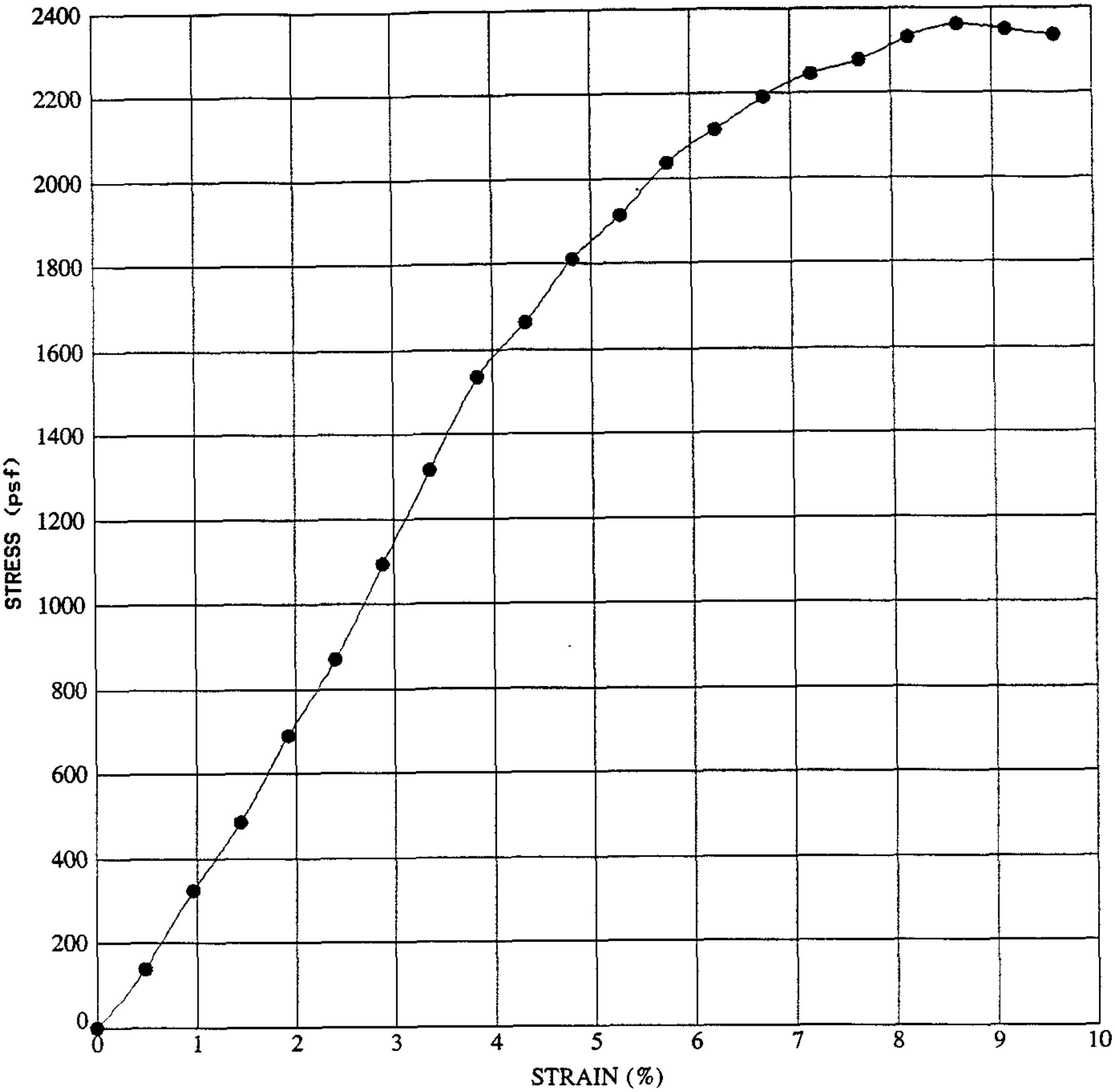
PREP'D BY FDH
APP'D BY
DATE 7/31/00
DWG FILE 17319P-1.GPJ

PLASTICITY CHART AND DATA

WATER TREATMENT IMPROV. PROJECT, STAGE 2
Penitencia WTP, San Jose, CA

FIGURE
B-1

PROJECT No
17319-CA



Key Symbol	Location	Depth (Feet)	Sample Description (USCS)	Dry Density (pcf)	Water Content (%)	Unconfined Strength (psf)
●	EB-1	4.5	Gray brown clayey SILT (MH-OH)	92.0	27.1	2359

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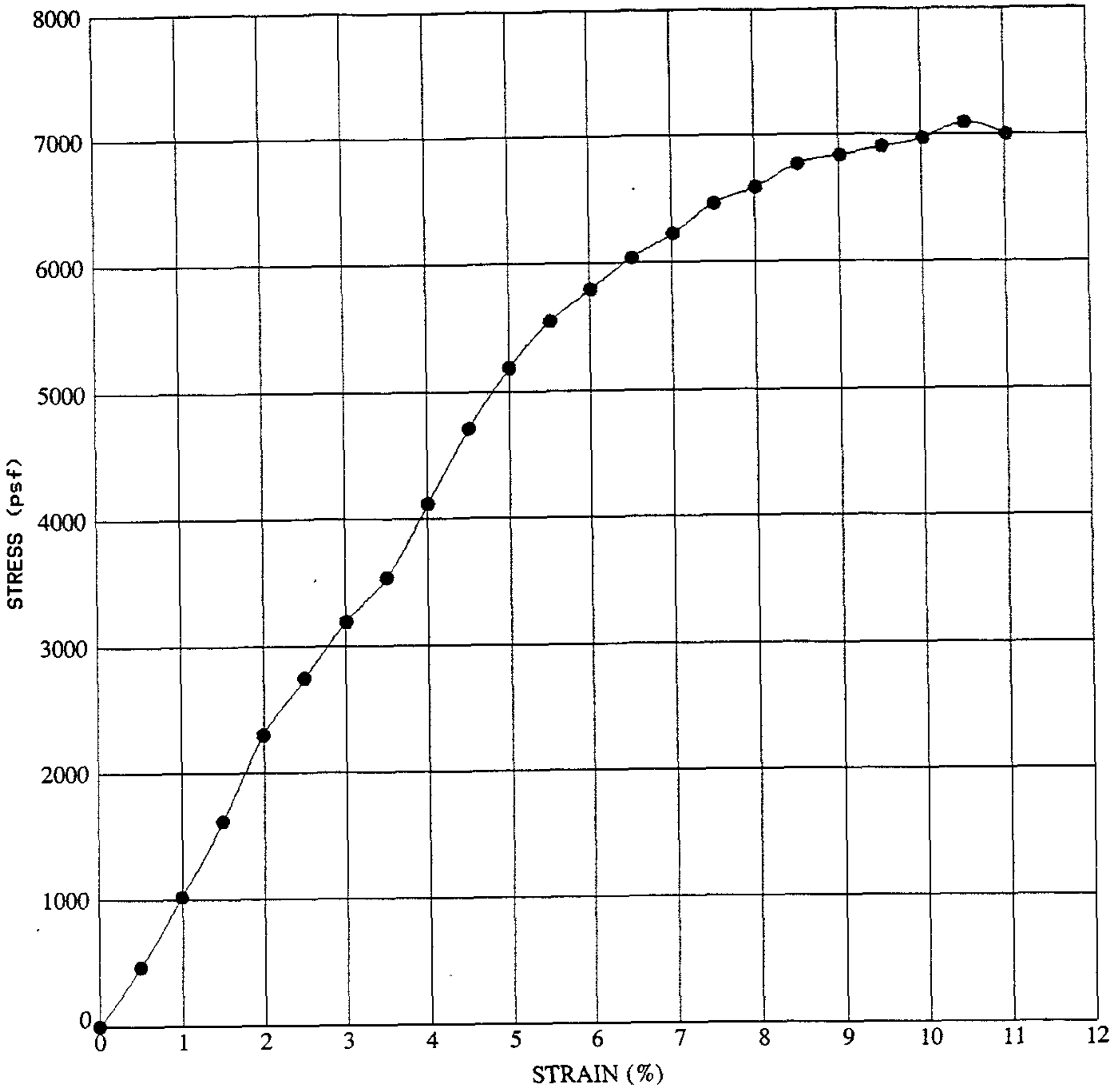
UNCONFINED COMPRESSION TEST DATA

PENITENTIA WATER TREATMENT PLANT
San Jose, California

PROJECT NO.	DATE	FIGURE NO.
17319-CA	June 2000	B-2



Key Symbol	Location	Depth (Feet)	Sample Description (USCS)	Dry Density (pcf)	Water Content (%)	Unconfined Strength (psf)
●	EB-1	9.0	Rust brown silty CLAY, trace gravel (CL)	101.9	22.4	7090

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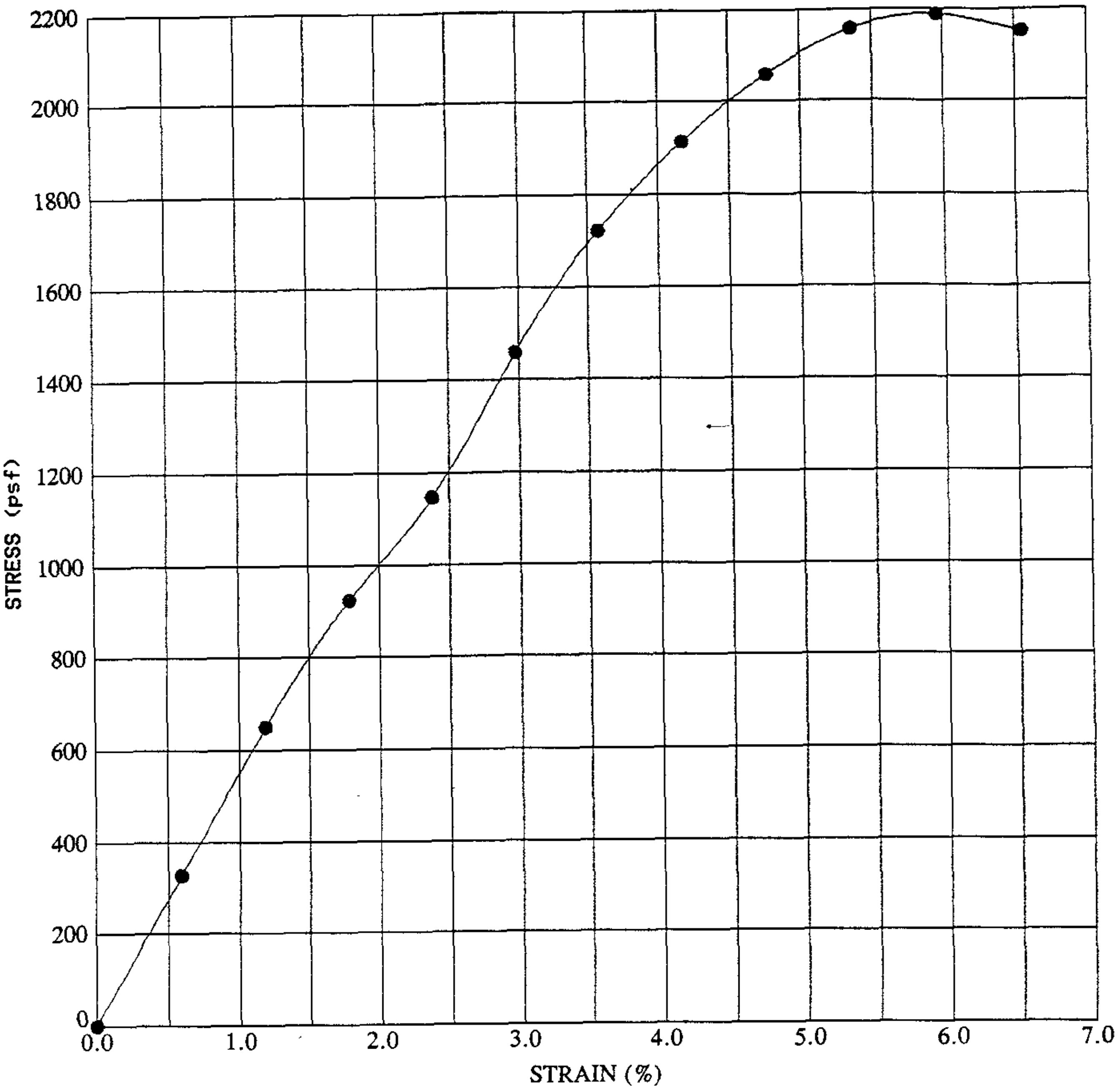
UNCONFINED COMPRESSION TEST DATA

PENITENTIA WATER TREATMENT PLANT
San Jose, California

PROJECT NO.	DATE	FIGURE NO.
17319-CA	**June 2000**	**B-3**



Key Symbol	Location	Depth (Feet)	Sample Description (USCS)	Dry Density (pcf)	Water Content (%)	Unconfined Strength (psf)
●	EB-1	14.0	Rust brown SAND, some clay, tr. gravel (SC)	110.9	13.7	2186

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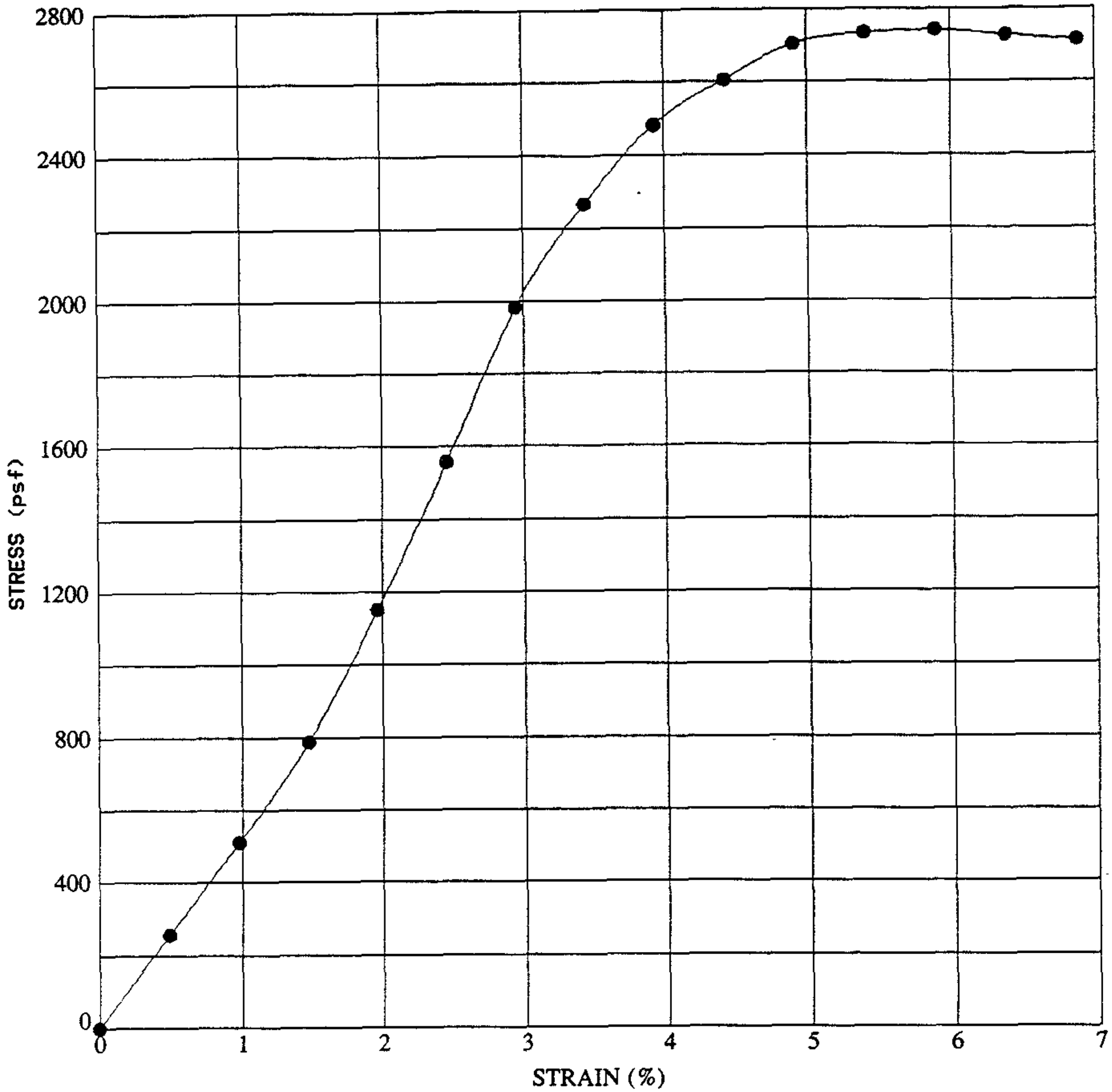
UNCONFINED COMPRESSION TEST DATA

PENITENTIA WATER TREATMENT PLANT
San Jose, California

PROJECT NO.	DATE	FIGURE NO.
17319-CA	**June 2000**	**B-4**



Key Symbol	Location	Depth (Feet)	Sample Description (USCS)	Dry Density (pcf)	Water Content (%)	Unconfined Strength (psf)
●	EB-2	4.5	Brown silty CLAY, trace sand (CL)	86.4	31.7	2740

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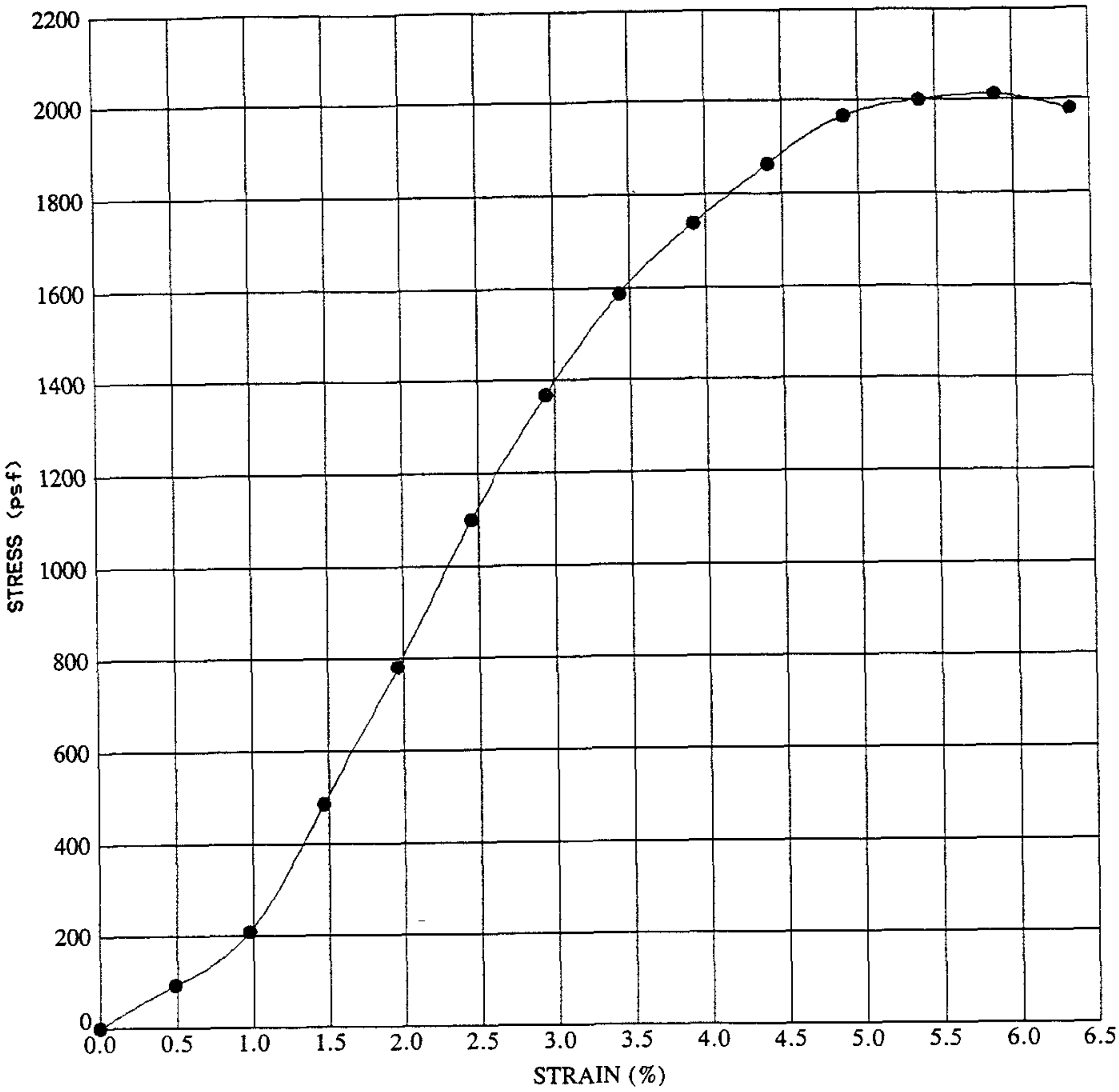
UNCONFINED COMPRESSION TEST DATA

PENITENTIA WATER TREATMENT PLANT
San Jose, California

PROJECT NO.	DATE	FIGURE NO.
17319-CA	**June 2000**	**B-5**



Key Symbol	Location	Depth (Feet)	Sample Description (USCS)	Dry Density (pcf)	Water Content (%)	Unconfined Strength (psf)
●	EB-2	9.5	Yellow green silty CLAY (CL)	79.1	40.5	2011

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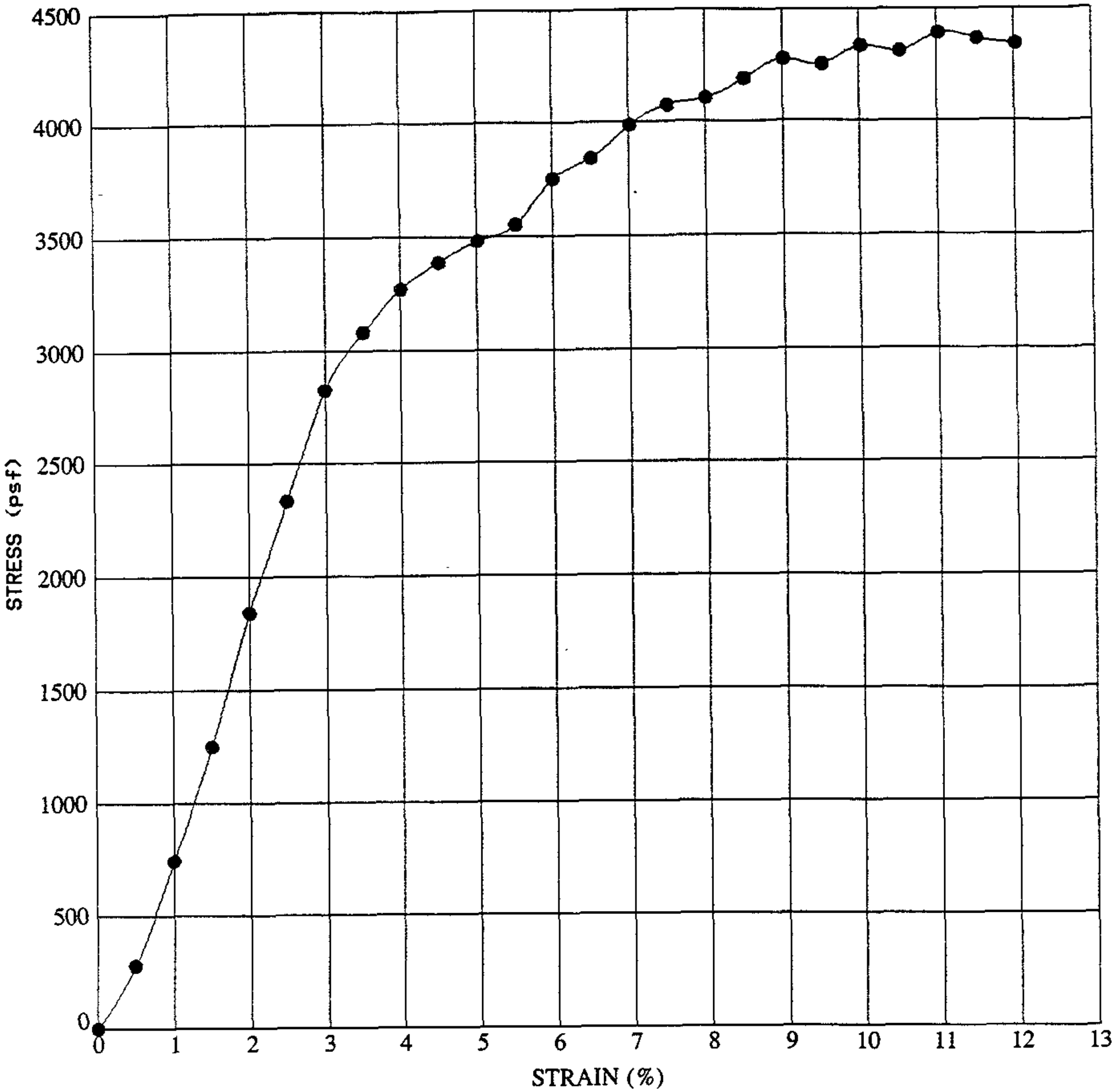
UNCONFINED COMPRESSION TEST DATA

PENITENTIA WATER TREATMENT PLANT
San Jose, California

PROJECT NO.	DATE	FIGURE NO.
17319-CA	**June 2000**	**B-6**



Key Symbol	Location	Depth (Feet)	Sample Description (USCS)	Dry Density (pcf)	Water Content (%)	Unconfined Strength (psf)
●	EB-2	14.5	Orange brown silty CLAY, some sand (CL)	102.4	24.3	4387

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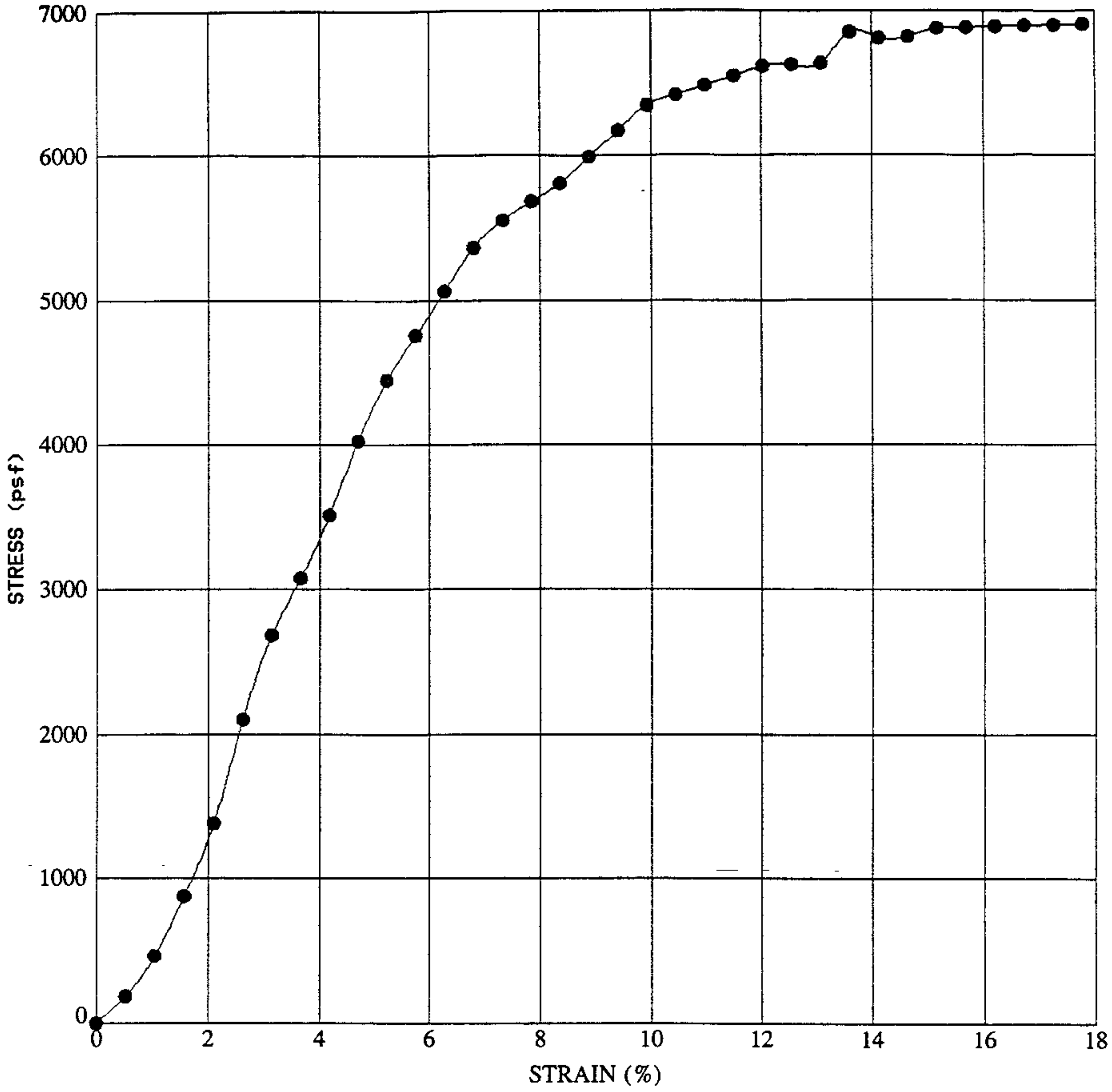
UNCONFINED COMPRESSION TEST DATA

PENITENTIA WATER TREATMENT PLANT
San Jose, California

PROJECT NO.	DATE	FIGURE NO.
17319-CA	**June 2000**	**B-7**



Key Symbol	Location	Depth (Feet)	Sample Description (USCS)	Dry Density (pcf)	Water Content (%)	Unconfined Strength (psf)
●	EB-2	19.5	Brown silty SAND, trace sand (CL)	111.3	19.2	6901

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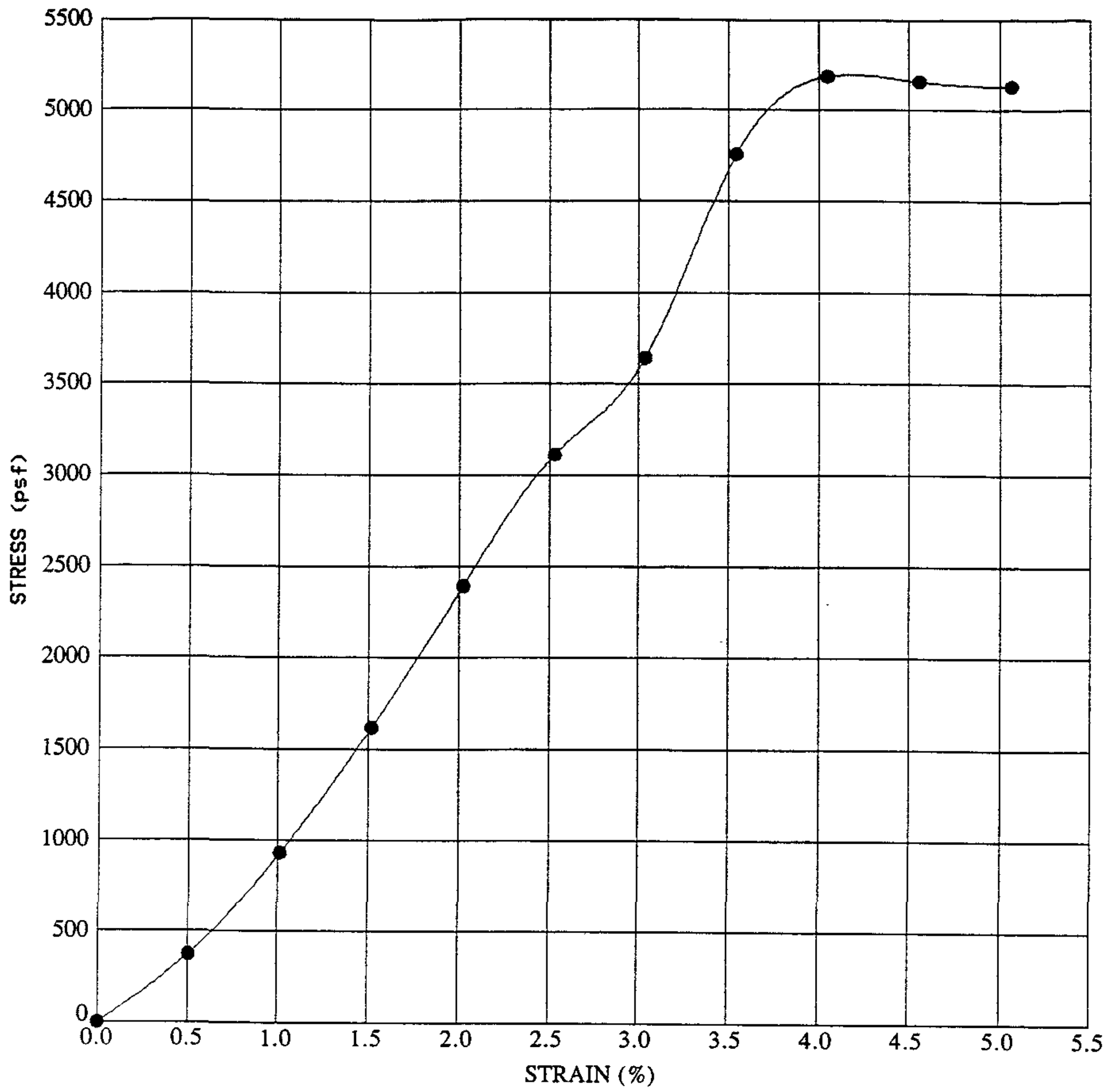
UNCONFINED COMPRESSION TEST DATA

PENITENTIA WATER TREATMENT PLANT
San Jose, California

PROJECT NO.	DATE	FIGURE NO.
17319-CA	**June 2000**	**B-8**



Key Symbol	Location	Depth (Feet)	Sample Description (USCS)	Dry Density (pcf)	Water Content (%)	Unconfined Strength (psf)
●	EB-3	9.5	Dark brown silty CLAY, trace sand (CL)	103.8	22.3	5181

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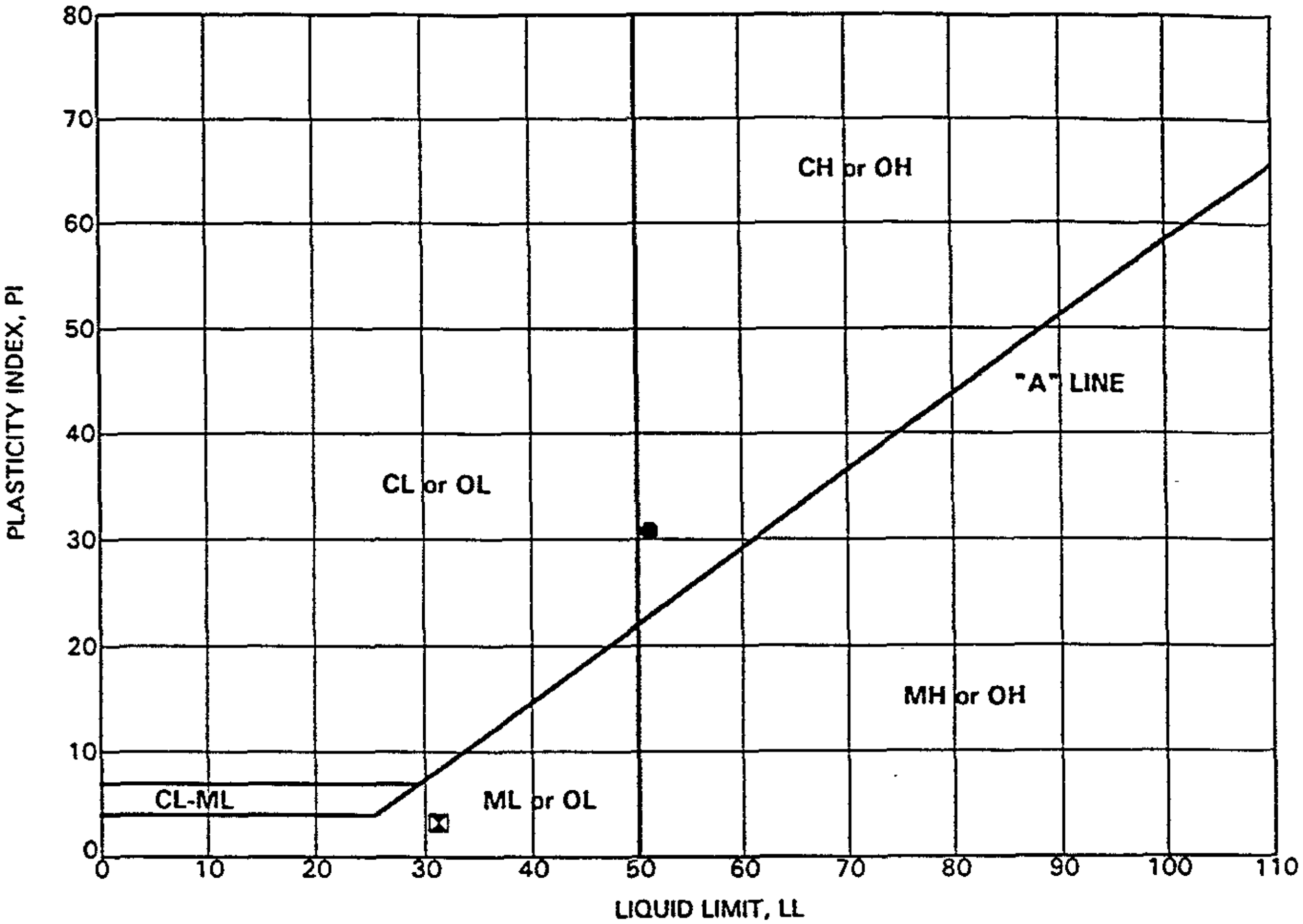
UNCONFINED COMPRESSION TEST DATA

PENITENTIA WATER TREATMENT PLANT
San Jose, California

PROJECT NO.	DATE	FIGURE NO.
17319-CA	**June 2000**	**B-9**



Boring Number	Sample Number	Depth (feet)	Test Symbol	Moisture Content (%)	LL	PL	PI	Description
P-2	2	5.0	●	24	51	20	31	
P-4	4	15.0	☒	36	31	28	3	

Project: Penitencia Water Treatment Plant
Project Number: 91C0682R

PLASTICITY CHART

Figure A-9

3/9/93 JATT SCVW4

BORING NUMBER	SAMPLE DEPTH (feet)	TEST DATA		DIRECT SHEAR		TRIAXIAL TEST/TORVANE		UNCONFINED COMPRESSIVE STRENGTH (psf)	STRENGTH PARAMETERS	
		TEST TYPE	PEAK/ RESIDUAL	NORMAL STRESS (psf)	SHEAR STRESS (psf)	CONFINING PRESSURE (PSF)	UNDRAINED STRENGTH (psf)		COHESION (psf)	FRICTION ANGLE (degrees)
	25.5	PP						9,000		
B-59	7	PP						9,000		
	12.5	PP						9,000		
B-60	3.5	PP						9,000		
	15.5	PP						9,000		
	17	PP						9,000		
B-64	5	DS							650	20
B-69	8	DS							600	21
B-76	5	TX/UD							600	13
	15	TX/UD							400	8
	20	TX/UD							1000	2
B-78	10	TX/UD							500	6
B-81	5	TX/UD							200	21
B-85	10	TX/UD							400	34
	25	TX/UD							600	26
I-3A	203	DS		1,000	1,258				800	10.5
				2,000	1,130					
				3,000	1,389					
				1,000	990					
I-10	42	DS	peak	4,320	2,070				0	22
			residual		2,070				860	16
			residual		2,090				860	16
			peak	8,640	2,720				0	22
			residual		2,910				860	16
			residual		2,720				860	16
I-11	102	DS	peak	10,800	4,450				0	22
			residual		4,610				860	16
			residual		4,160				860	16
			peak	18,000	7,630				0	22
			residual		6,970				860	16
			residual		5,800				860	16
I-14	202	DS	peak	21,600	10,180				0	22
			residual		12,020				860	16
			residual		12,990				860	16
8-PZ	30	TX/CD	peak			3,600	2,520		0	24
	97.5	TX/CD	peak			12,960	5,650		0	18
9-PZ	50	TX/CD	peak			7,200	6,480		0	28
	146	TX/CD	peak			10,800	3,600		0	15

TABLE B-2 (continued)

SUMMARY OF MATERIAL INDEX PROPERTIES

Borehole	Depth (feet)	Unconfined Compression (tsf)	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plas-ticity Index	<#200 Sieve (%)	>#4 Sieve (%)
B-16	8.5		19	104				
B-16	23.0		20	106				
B-17	1.0		14	100	42	27		
B-17	3.0		14	112				
B-17	5.0		16	110			36	100
B-17	10.0		14	111				
B-18	5.0		14	114				
B-19	2.0		38	78	82	55		
B-19	5.0		18	96				
B-2	2.0		47	75				
B-2	7.0		28	97				
B-2	12.0		24	104				
B-2	13.5		25	102				
B-2	20.0		26	100				
B-2	26.0		29	96				
B-2	30.0		21	105				
B-2	35.0		23	105				
B-2	40.0		27	99				
B-2	45.0		23	105				
B-2	50.0		21	105				
B-2	57.0		21	104				
B-2	64.0		19	112				
B-2	74.0		17	116				
B-2	85.0		39	83				
B-2	97.0		21	105				
B-21	2.0		14	109				
B-21	5.0		12	116				
B-22	3.5		20	102				
B-22	13.5		32					
B-22	33.5		19					
B-23	3.5		14					
B-23	14.0		18					
B-23	23.5		21					
B-24	18.5		18					
B-25	28.5		21					
B-26	25.0		36	88				
B-28	5.0		21	102				
B-3	2.0		71	58				
B-3	7.0		25	102				
B-3	12.0		23	105	60	22		
B-3	17.0		23	105				
B-3	23.5		20	110				
B-3	35.0		19	113				

TABLE B-2 (continued)

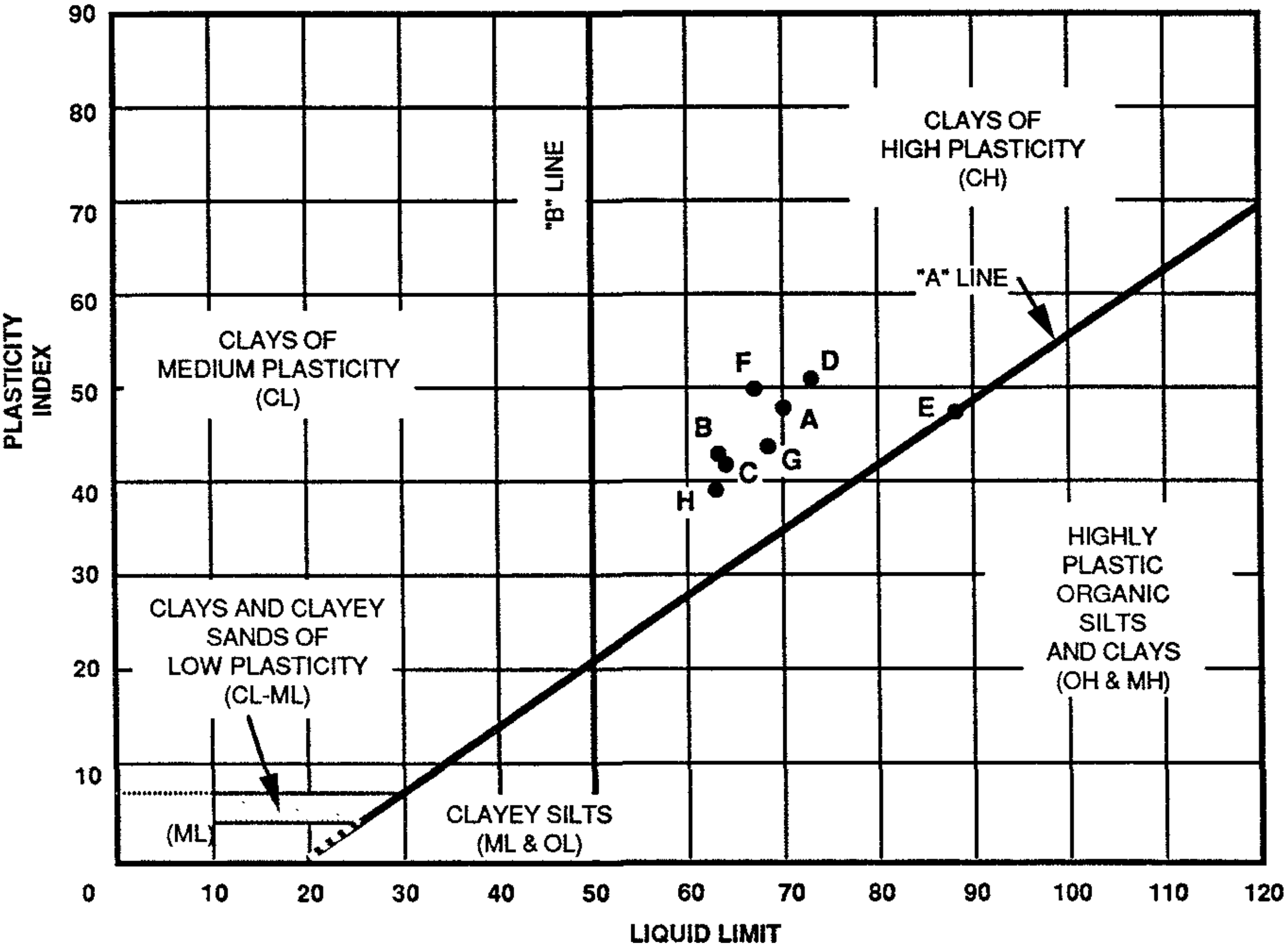
SUMMARY OF MATERIAL INDEX PROPERTIES

Borehole	Depth (feet)	Unconfined Compression (tsf)	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	<#200 Sieve (%)	>#4 Sieve (%)
B-3	45.0		16	119				
B-3	55.0		16	119				
B-3	70.0		19	113				
B-3	85.0		16	119				
B-3	98.0		31	93				
B-30	1.5		19					
B-35	2.0		41	83	88	50		
B-35	10.0		24	91				
B-35	20.0		13	102				
B-36	6.0	24	22	95				
B-36	9.0		13	116				
B-36	15.0		12	103				
B-37	3.0		11	95				
B-37	19.0		10	117				
B-38	2.0		30	61				
B-38	30.0		37	78				
B-38	40.0	3.1	42	78				
B-39	2.0		25	65				
B-39	30.0		34	87				
B-39	40.0		22	97				
B-4	2.5		18	84				
B-4	6.5		14	103				
B-4	11.0		24	98				
B-4	16.0		30	93				
B-4	21.0		32	91				
B-4	28.0		20	110	56	20		
B-4	36.5		21	108				
B-4	44.0		19	112				
B-4	52.0		17	118				
B-4	60.0		18	115				
B-40	10.0		21	107				
B-40	25.0		13	116				
B-40	30.0		14	116				
B-41	10.0		17	107				
B-41	15.0		15	116				
B-41	19.5		7					
B-42	1.5				58	39		
B-44	15.5		9					
B-44	25.0		13	122				
B-45	10.5		25	98				
B-45	20.5		18	112				
B-48	1.0				68	48		
B-48	15.5		21	107				

TABLE B-2 (continued)

SUMMARY OF MATERIAL INDEX PROPERTIES

Borehole	Depth (feet)	Unconfined Compression (tsf)	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	<#200 Sieve (%)	>#4 Sieve (%)
I-12	130.0		22	107	58	41	61	83
I-13	140.0		26	105	42	26	67	90
I-14	200.0		18	110	38	23	60	97
I-15	200.0		13	119			17	38
I-20	70.0		21	110				
I-21	120.0		25	104				
I-21	126.5		20	107				
I-23	105.0		23	109				
I-23	107.5		20	110				
I-23	110.0		20	116				
I-3A	198.0		16	120				
I-3A	200.0		15	119				
I-3A	203.0		22	105	69	52		
I-3A	203.0				75	60		
I-3A	205.0		18	112	74	58		
I-3A	207.0		65	55				
P-1	1.0	3700	34	87				
P-1	5.0		38	80				
P-1	10.0		41	78				
P-1	15.0	6210	25	99				
P-1	20.0	5170	24	102				
P-1	25.0	4690	24	101				
P-1	40.0	6340	18	113				
P-1	43.0	4820	18	110				
P-3	1.0	2490	31	119				
P-3	5.0	2200	28	94				
P-3	10.0		22					
P-3	20.0		29					
P-3	23.5	6340	18	112				
P-3	30.0	10590	17	115				
P-3	35.0		17	115				
P-3	40.0	9120	13	122				
P-3	43.0	4000	18	113				
P-4	1.0	1320	27	90				
P-4	5.0	3120	27	97				
P-4	10.0		14					
P-4	15.0	1990	36	86	31	3		
P-4	20.0	4630	15	117				
P-4	25.0	4690	20	106				
P-4	30.0	5860	23	103				
P-4	35.0	13250	18	114				
P-4	40.0	14200	17	114				
P-4	43.0	3840	14	117				



SAMPLE IDENTIFICATION				ATTERBERG LIMITS		
LETTER DESIG'N	BORING NO.	SAMPLE NO.	DEPTH, FT.	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
A	I-21	PB-1-1	120-123	70	0	48
B	I-21	PB-1-1	120-123	63	0	43
C	I-21	PB-1-4	120-123	64	0	42
D	I-21	PB-1-4	120-123	73	0	51
E	I-21	PB-1-3	120-123	88	0	47
F	I-23	PB-4-1	107.5-110	67	0	50
G	I-23	PB-4-3	107.5-110	68	0	44
H	I-23	PB-5-1	110-112.5	63	0	39

Project: 91C0682R **Woodward-Clyde Consultants**	PLASTICITY CLASSIFICATION Penitencia Water Treatment Plant Site Study San Jose, California	Figure B-1

PROJECT NO. 91C-0682R

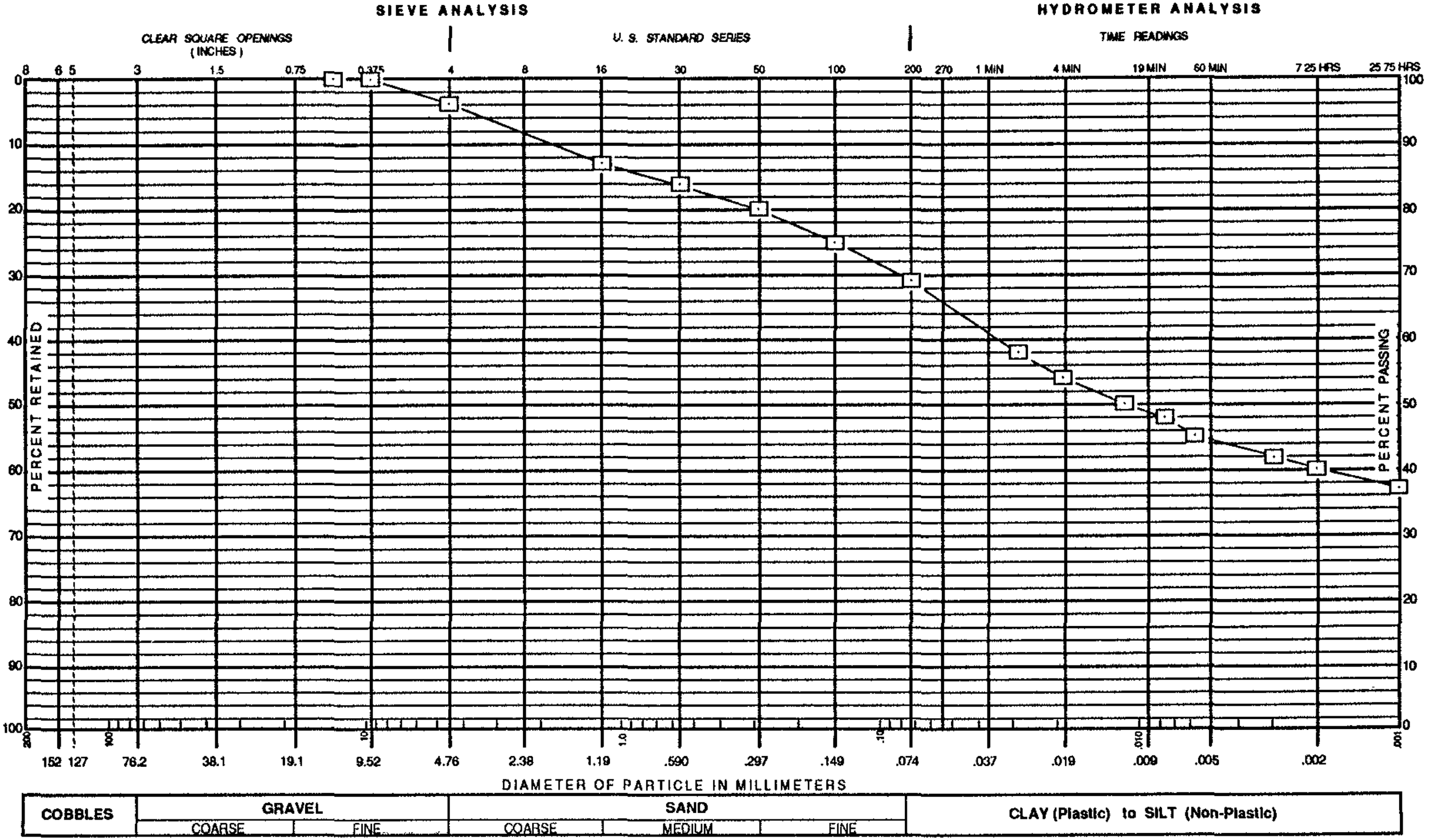
Woodward-Clyde Consultants

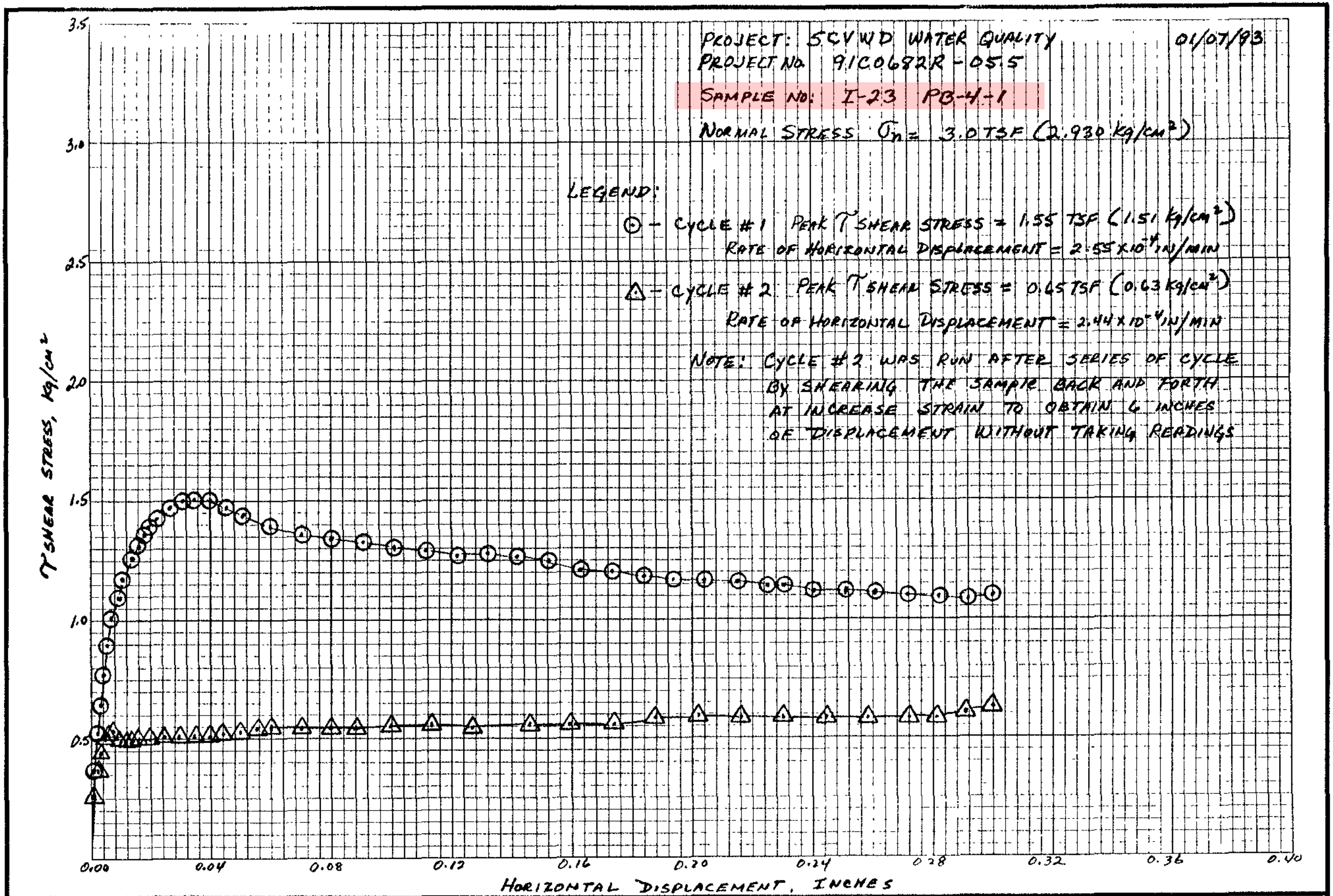
GRAIN-SIZE DISTRIBUTION CURVES

Penitencia Water Treatment Plant Site Study
San Jose, California

FIGURE B-3

BORING NO.	SAMPLE NO.	DEPTH, FT.	SYMBOL	LIQUID LIMIT	PLASTICITY INDEX	UNIFIED CLASSIFICATION
I-23	PB-4-4	107.5-110	⊡			(CH)



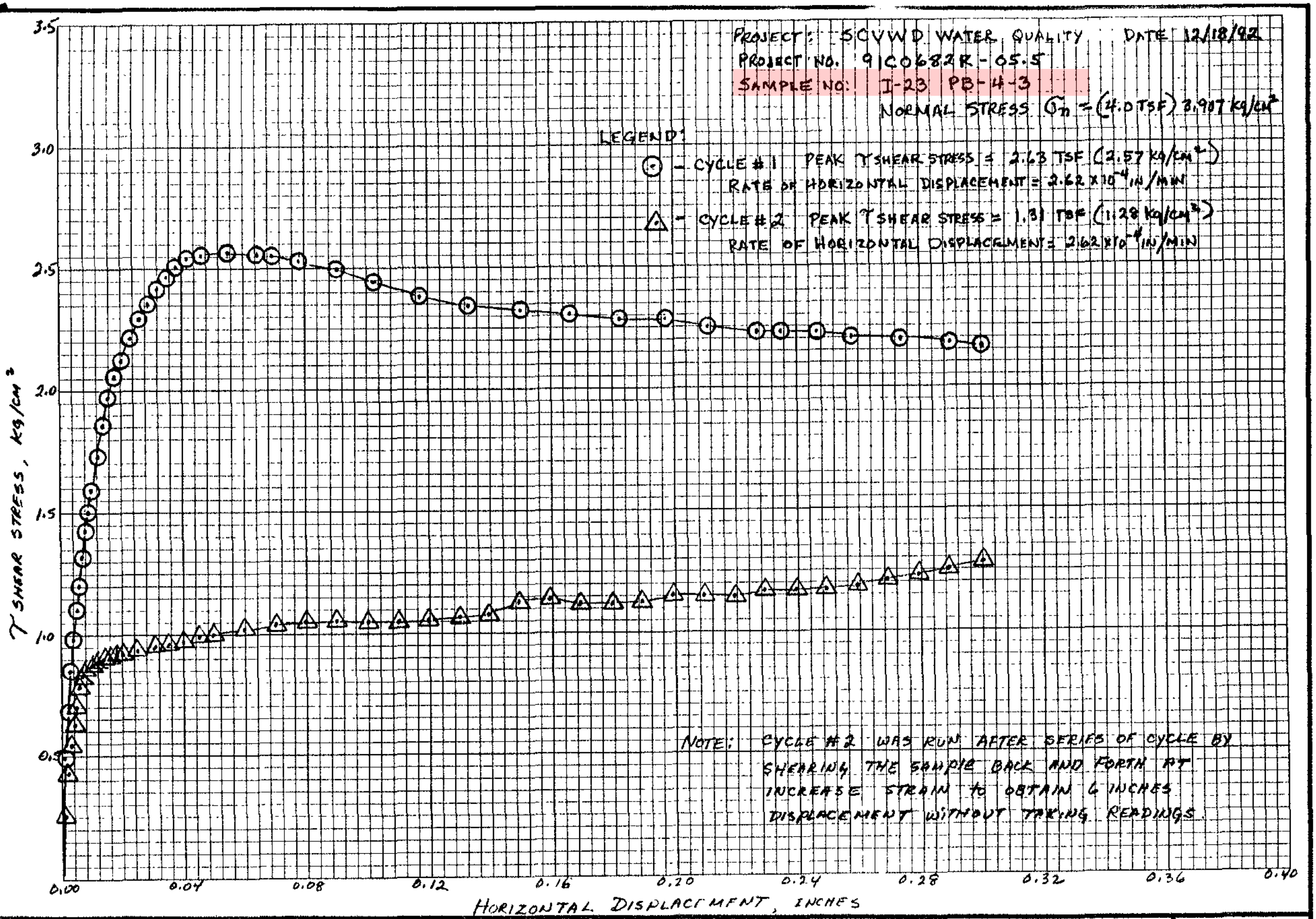


PROJECT: SCVWD WATER QUALITY 01/07/93
PROJECT No. 91C0682R-05.5
SAMPLE NO: I-23 PB-4-1
NORMAL STRESS σ_n = 3.0 TSF (2.930 kg/cm²)

LEGEND:
⊙ - CYCLE #1 PEAK τ SHEAR STRESS = 1.55 TSF (1.51 kg/cm²)
RATE OF HORIZONTAL DISPLACEMENT = 2.55 x 10⁻⁴ in/min
△ - CYCLE #2 PEAK τ SHEAR STRESS = 0.65 TSF (0.63 kg/cm²)
RATE OF HORIZONTAL DISPLACEMENT = 2.44 x 10⁻⁴ in/min

NOTE: CYCLE #2 WAS RUN AFTER SERIES OF CYCLE BY SHEARING THE SAMPLE BACK AND FORTH AT INCREASE STRAIN TO OBTAIN 6 INCHES OF DISPLACEMENT WITHOUT TAKING READINGS

Proposal No. 91C-0682R	PENITENCIA WATER TREATMENT PLANT SITE STUDY	DIRECT SHEAR TEST RESULTS	FIGURE B-4
04/20/93			
Woodward-Clyde Consultants			

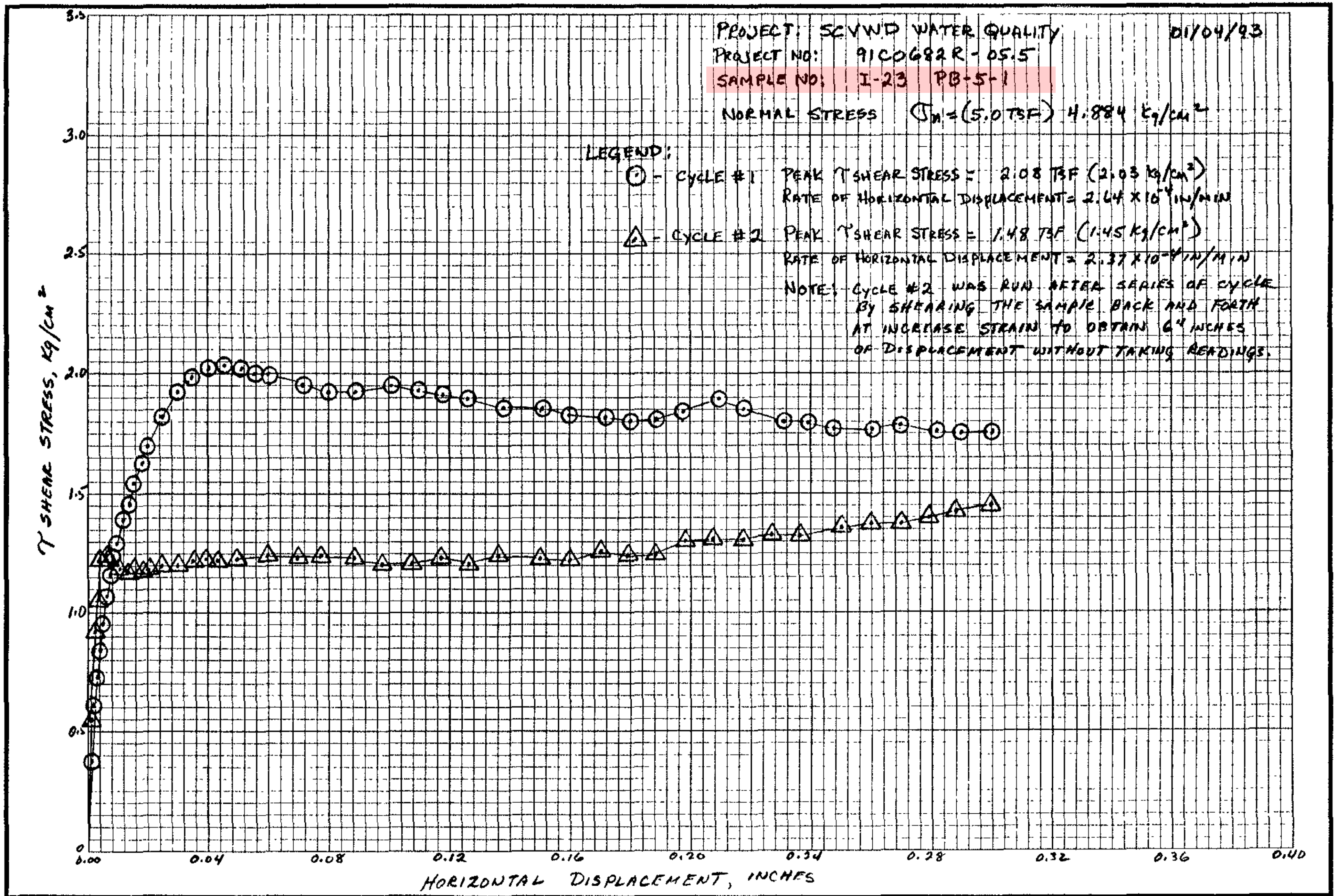


PROJECT: SCVWD WATER QUALITY DATE 12/18/92
PROJECT NO. 91C0682R-05.5
SAMPLE NO: I-23 PB-4-3
NORMAL STRESS σ_n = (4.0 TSF) 3.907 kg/cm²

LEGEND:
⊙ - CYCLE # 1 PEAK τ SHEAR STRESS = 2.63 TSF (2.57 kg/cm²)
RATE OF HORIZONTAL DISPLACEMENT = 2.62 x 10⁻⁴ IN/MIN
△ - CYCLE # 2 PEAK τ SHEAR STRESS = 1.31 TSF (1.28 kg/cm²)
RATE OF HORIZONTAL DISPLACEMENT = 2.62 x 10⁻⁴ IN/MIN

NOTE: CYCLE # 2 WAS RUN AFTER SERIES OF CYCLE BY SHEARING THE SAMPLE BACK AND FORTH AT INCREASE STRAIN to OBTAIN 6 INCHES DISPLACEMENT WITHOUT TAKING READINGS.

Proposal No. 91C-0682R	PENITENCIA WATER TREATMENT PLANT SITE STUDY	DIRECT SHEAR TEST RESULTS	FIGURE B-5
04/20/93			
Woodward-Clyde Consultants			



PROJECT: SCVWD WATER QUALITY 01/04/93
PROJECT NO: 91C0682R - 05.5
SAMPLE NO: I-23 PB-5-1
NORMAL STRESS $\sigma_n = (5.0 \text{ TSF})$ 4.884 Kg/CM^2

LEGEND:
⊙ - CYCLE #1 PEAK τ SHEAR STRESS = 2.08 TSF (2.03 Kg/CM^2)
RATE OF HORIZONTAL DISPLACEMENT = 2.64 × 10^{-4} IN/MIN
△ - CYCLE #2 PEAK τ SHEAR STRESS = 1.48 TSF (1.45 Kg/CM^2)
RATE OF HORIZONTAL DISPLACEMENT = 2.37 × 10^{-4} IN/MIN

NOTE: CYCLE #2 WAS RUN AFTER SERIES OF CYCLE BY SHEARING THE SAMPLE BACK AND FORTH AT INCREASE STRAIN TO OBTAIN 6" INCHES OF DISPLACEMENT WITHOUT TAKING READINGS.

Proposal No. 91C-0682R	PENITENCIA WATER TREATMENT PLANT SITE STUDY	DIRECT SHEAR TEST RESULTS	FIGURE B-6
04/20/93			
Woodward-Clyde Consultants			

APPENDIX E

SITE-SPECIFIC SEISMIC-HAZARD ANALYSIS

SITE-SPECIFIC SEISMIC-HAZARD ANALYSIS

PURPOSE AND SCOPE

In this appendix, we document the site-specific seismic-hazard analysis (SHA) that we performed for Valley Water's Penitencia Water Treatment Plant as part of the Residuals Management Project in San Jose, California. In this appendix, we describe the following.

- Probabilistic seismic hazard analysis (PSHA) and deterministic seismic-hazard analysis (DSHA).
- Horizontal, 5-percent damped, acceleration response spectra at the risk-targeted maximum considered earthquake (MCE_R) design earthquake (DE) levels.
- Development of damping scaling factors and resulting horizontal, 0.5-percent damped, acceleration response spectra at the risk-targeted maximum considered earthquake (MCE_R) design earthquake (DE) levels.
- Development of vertical-to-horizontal (V:H) ratios and resulting vertical, 5-percent damped, acceleration response spectra at the risk-targeted maximum considered earthquake (S_{aMv}) design earthquake (S_{av}) levels.

Depths discussed herein are measured below the existing ground surface (bgs) unless noted otherwise. Note that we provide significant figures for computing purposes, and the entries provided in the tables below do not necessarily reflect the precision of those values.

APPLICABLE DESIGN STANDARDS

We performed our analysis in accordance with the 2022 California Building Code (CBC 2022), which incorporates, by reference, the seismic-design criteria described in the 2016 version of the American Society of Civil Engineers document titled "Minimum Design Loads and Associated Criteria for Buildings and Other Structures," (ASCE 7-16).

Based on our discussions with the project design team, we understand the latest 2022 version of the ASCE 7 standard (ASCE 7-22) will also be considered in project planning and design. Therefore, we performed additional analyses in accordance with the seismic-design criteria described in ASCE 7-22. The ASCE 7-22 standard incorporates significant changes pertaining to site classification and SHA relative to the previous ASCE 7-16 standard, including the following.

- New site class definitions and exclusive use of shear-wave velocity for site classification
- Introduction of general multi-period response spectra
- Removal of requirements to perform site-specific SHA for Site Class D and E sites
- Updates to the definition of deterministic ground motions and associated lower limits
- New calculation procedure for calculation of site-specific spectral response acceleration parameters at a period of 1 second (S_{M1} and S_{D1})
- Updates to vertical response spectra calculation

In the following sections, we document our site-specific SHA in the context of both ASCE 7-16 and ASCE 7-22 design standards.

GROUND-MOTION MODELS AND SITE PARAMETERS

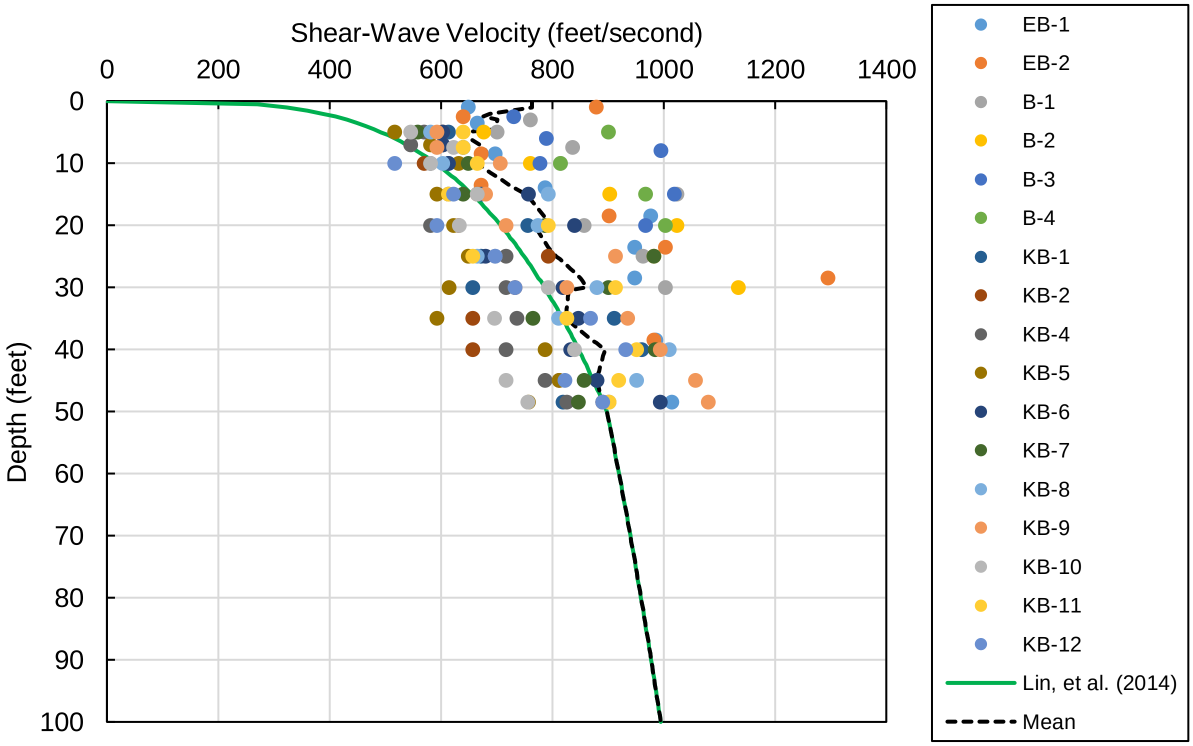
We used four semi-empirical ground-motion models (GMMs) from the Next Generation Attenuation West 2 (NGA West 2) project (Ancheta et al., 2014) in the performance of the SHA for this project. These models include Abrahamson et al. (2014) [ASK], Boore et al. (2014) [BSSA], Campbell and Bozorgnia (2014) [CB], and Chiou and Youngs (2014) [CY]. We performed our analysis using all four GMMs for a spectral damping of 5 percent of critical damping. We used a logic-tree approach and assigned equal weight (0.25) to the four GMMs in our analysis.

The ground-motion models incorporate "site parameters" to model how subsurface soil will amplify or attenuate ground motions as they propagate from underlying bedrock. These site parameters include the following.

- Time-averaged shear-wave velocity (V_S) over the top 100 feet or 30 meters (V_{S30})
- Depth at which V_S reaches 3,280 feet/sec or 1.0 kilometer/sec ($z_{1.0}$)
- Depth at which V_S reaches 8,200 feet/sec or 2.5 kilometer/sec ($z_{2.5}$)

A profile of shear-wave velocity is needed to compute V_{S30}. The shear-wave velocity was not measured during previous explorations of the site; therefore, we relied on a variety of standard penetration test (SPT) blow count correlations (Akin, et al. 2011) to estimate V_S to a depth of 50 feet below the existing ground surface, the maximum depth explored in previous explorations. Between depths of 50 and 100 feet, we assumed that the material is similar, and we extrapolated the mean V_S based on the assumption that V_S increases as a function of mean effective stress (Lin, et al. 2014). We then developed a representative "best estimate" V_S profile based on the mean of the estimated V_S data, with a resulting V_{S30} value of 861 feet/sec (262 meters/sec). We present the estimated V_S data and best estimate V_S profile in Exhibit E-1.

EXHIBIT E-1: Estimated Shear-Wave Velocity Data from Previous Explorations



Relative to the various geophysical testing methods used to measure shear-wave velocity directly, V_S correlations based on blow counts and mean effective stress exhibit significant scatter about the model estimates. As a result, the scatter in the V_S estimates in Exhibit E-1 are influenced by both model accuracy, as well as inherent variability at the site. To account for this uncertainty and variability in the V_S data, we estimated upper- and lower-bound V_{S30} values by multiplying and dividing the representative V_{S30} value by a factor of 1.3, respectively, in general accordance with Section 20.3 of ASCE 7-22. We considered the resulting upper- and lower-bound V_{S30} values of 1,119 feet/sec (341 meters/sec) and 662 feet/sec (202 meters/sec), respectively, in our analysis in addition to the best estimate.

To estimate the $z_{1.0}$ and $z_{2.5}$ parameters, we used USGS Bay Area Velocity Model Version 8.3.0 Basin Depth models as implemented in the USGS Site Data Application Software (OpenSHA). We applied $z_{1.0}$ and $z_{2.5}$ values of 1,094 and 6,535 feet (333 and 1,662 meters) in our analysis, respectively.

SITE CLASSIFICATION

Based on the subsurface conditions encountered during the investigation by Kleinfelder and as presented in their draft Geotechnical Investigation Report dated November 2, 2023, we classified the site as Site Class D in accordance with Chapter 20 of ASCE 7-16. This classification is based on the range of V_{S30} values that we estimated for the site, as previously discussed.

The best estimate, upper-, and lower-bound V_{S30} estimates fall within Site Classes DE, D, and CD, respectively, in accordance with Chapter 20 of ASCE 7-22. As discussed in Section 20.3 of ASCE 7-22, where the average velocities result in different site classes, the most critical of the site classes for ground motion analysis at each period shall be determined by the geotechnical engineer.

SEISMIC-SOURCE MODEL

We utilized the Third California Earthquake Rupture Forecast model or UCERF3 (Field et al. 2014 and 2015) as implemented in the OpenSHA software. This is the most up-to-date rupture forecast model for the state of California and, as such, is required by ASCE 7-16 and 7-22. Background seismicity, modeled as gridded point sources, is also included in the model. The implementation of the UCERF3 model in seismic-hazard codes considers many sources of epistemic uncertainty regarding alternate rupture scenarios, maximum magnitudes for individual faults, and alternate magnitude-recurrence relations. This uncertainty affects the mean hazard that is provided by hazard codes implementing UCERF3 and is used in typical applications, including this analysis.

DIRECTIVITY EFFECTS

Given the site's proximity to the Hayward and Calaveras faults, the site is considered to be a "near-fault" site in accordance with Section 11.4.1 of ASCE 7-16 and 7-22. Directivity effects can increase long-period ground motions at near-fault sites (Somerville et al., 1997; Abrahamson 2000). We used the period-dependent models by Chiu and Spudich (2013), Bayless and Somerville (2013), and Bayless et al. (2020) to consider directivity effects, as implemented in the Natural Hazard & Resiliency Research Center (NHR3) directivity-based PSHA interactive tool (Mazzoni et al., 2023), to estimate the period dependent directivity factors for a return period of 2,475 years. We calculated a weighted mean of the directivity factors obtained from these models, with weights of 0.5, 0.25, and 0.25, respectively, as recommended by NHR3.

PROBABILISTIC SEISMIC-HAZARD ANALYSIS

Methodology

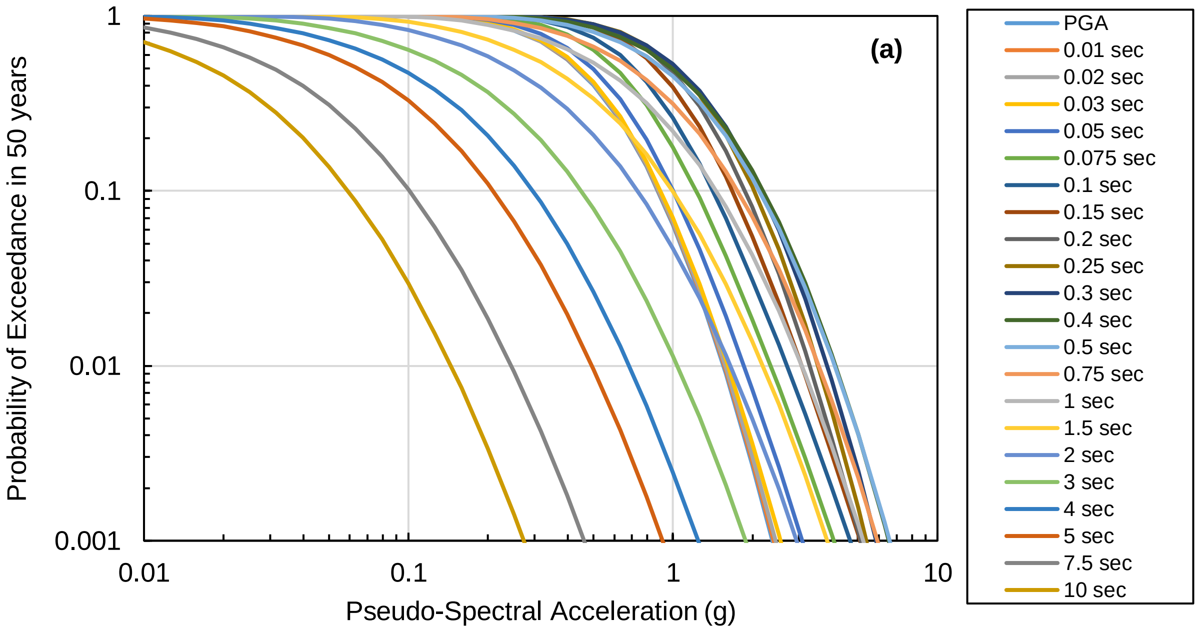
We performed a PSHA for the project site using OpenSHA Version 1.5.2 to develop a set of hazard curves and a resulting uniform hazard response spectrum (UHS) for the mean, upper-bound, and lower-bound V_{S30} values for a return period of 2,475 years. We calculated the seismic hazard using the standard methodology for hazard analysis (McGuire, 2004). The seismic-hazard calculations can be represented by the following equation, which is an application of the total-probability theorem.

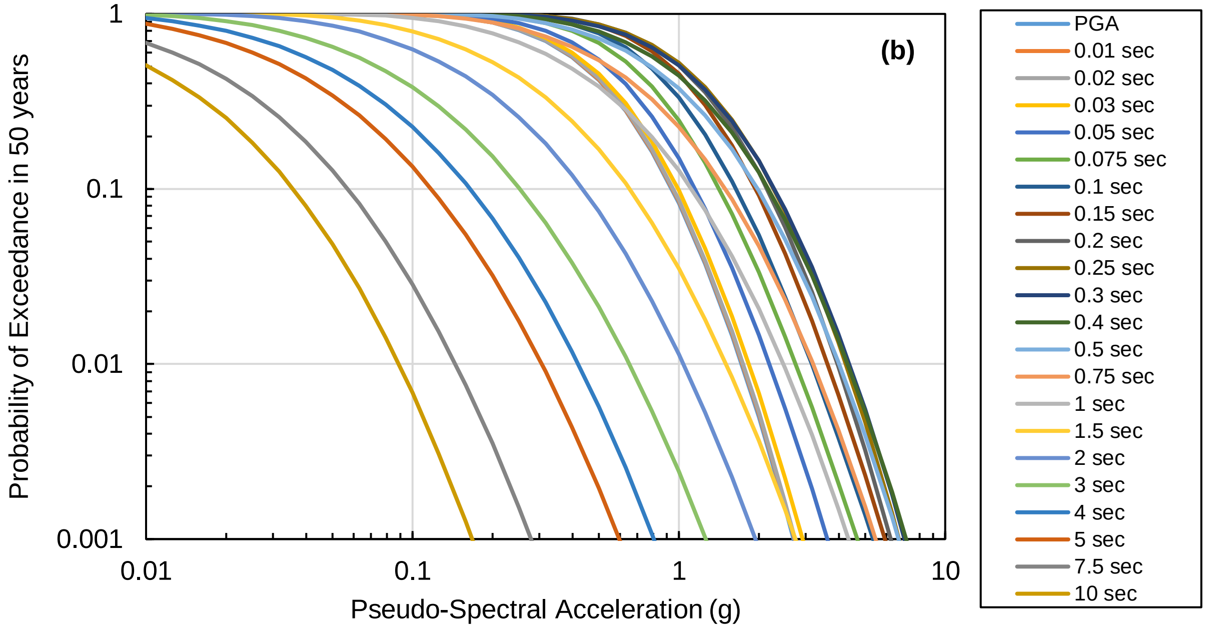
$$H(a) = \sum_{i}^{n} v_i \iint P[A > a|m,r]\, f_{Mi}(\mathrm{m})\, f_{Ri|Mi}(\mathrm{r},\mathrm{m})drdm$$

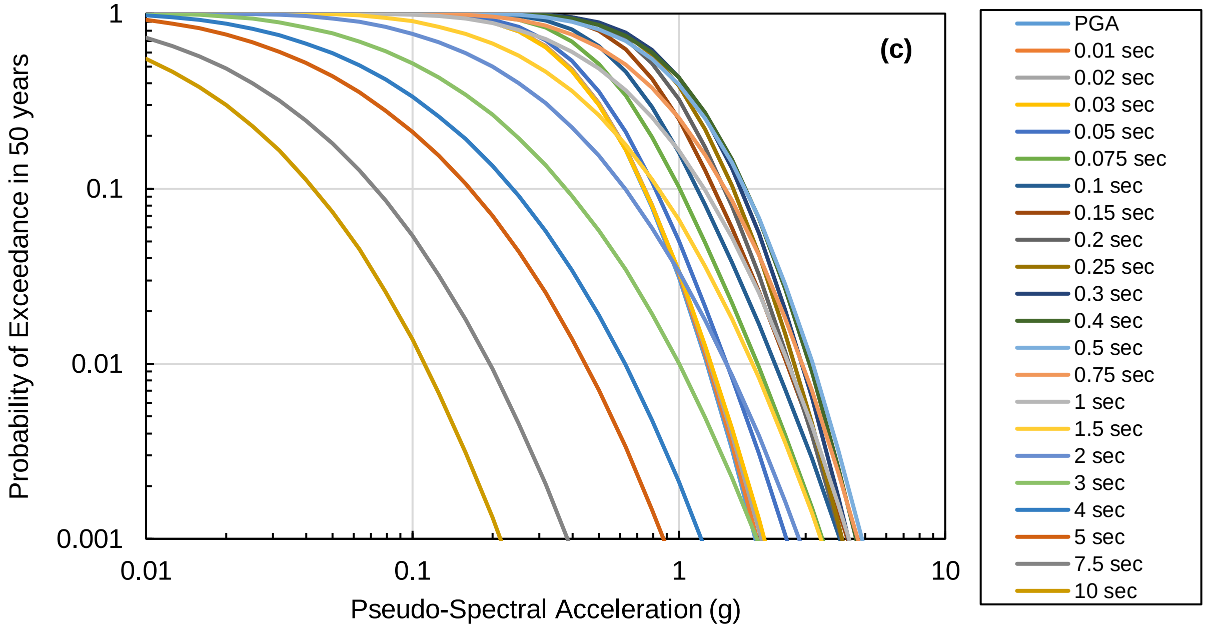
In this equation, the hazard **H*(a)*** is the annual frequency of earthquakes that produce a ground motion amplitude ***A*** higher than ***a***. Amplitude ***A*** may represent peak ground acceleration, velocity, or it may represent pseudo-spectral acceleration (PSa) at a given frequency. The summation in the equation shown extends over all sources (i.e., over all faults and areas). In the above equation, $\boldsymbol{v_i}$ is the annual rate of earthquakes (with magnitude higher than some threshold $\boldsymbol{M_i}$) in source ***i***, and $\boldsymbol{f_{Mi}(m)}$ and $\boldsymbol{f_{Ri|Mi}(r,m)}$ are the probability density functions on magnitude and distance, respectively. ***P[A > a|m, r]*** is the probability that an earthquake of magnitude ***m*** at distance ***r*** produces a ground-motion amplitude ***A*** at the site that is greater than ***a***. Seismic sources may be either faults or background sources; the specification of source geometries and the calculation of $\boldsymbol{f_{Ri}|_{Mi}}$, are performed differently for these two types of sources.

We present the median component (RotD50) hazard curves for the equally weighted mean of all GMMs for the mean, upper-bound, and lower-bound V_{S30} values in Exhibit E-2.

EXHIBIT E-2: Mean RotD50 Hazard Curves for V_{S30} of (a) 262, (b) 341, and (c) 202 m/s

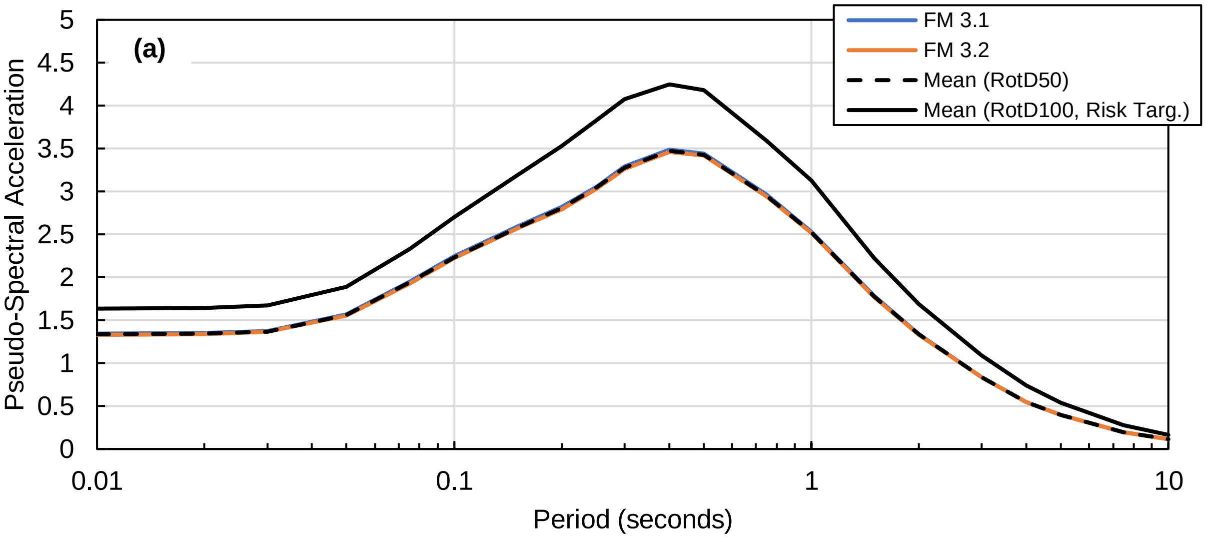


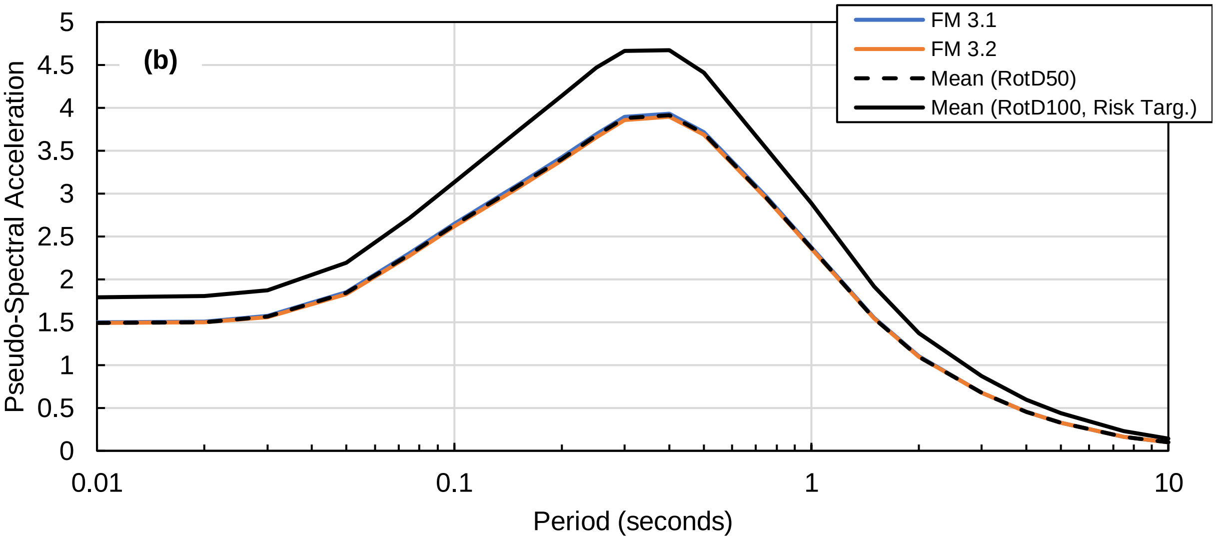

(b)
Probability of Exceedance in 50 years
1
0.1
0.01
0.001
0.01
0.1
1
10
Pseudo-Spectral Acceleration (g)
PGA
0.01 sec
0.02 sec
0.03 sec
0.05 sec
0.075 sec
0.1 sec
0.15 sec
0.2 sec
0.25 sec
0.3 sec
0.4 sec
0.5 sec
0.75 sec
1 sec
1.5 sec
2 sec
3 sec
4 sec
5 sec
7.5 sec
10 sec

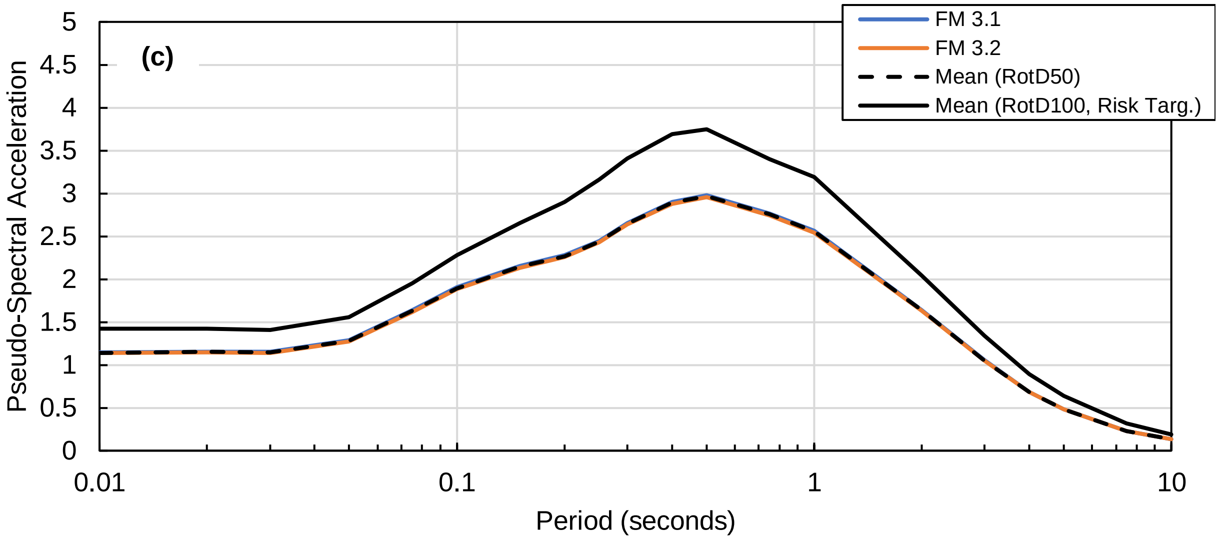

(c)
Probability of Exceedance in 50 years
1
0.1
0.01
0.001
0.01
0.1
1
10
Pseudo-Spectral Acceleration (g)
PGA
0.01 sec
0.02 sec
0.03 sec
0.05 sec
0.075 sec
0.1 sec
0.15 sec
0.2 sec
0.25 sec
0.3 sec
0.4 sec
0.5 sec
0.75 sec
1 sec
1.5 sec
2 sec
3 sec
4 sec
5 sec
7.5 sec
10 sec

We present the RotD50 2,475-year UHS for both branches of UCERF3 (FM3.1 and FM3.2) for the mean, upper-bound, and lower-bound V_{S30} values in Exhibit E-3, respectively. To convert the mean RotD50 response spectra to maximum-rotated (RotD100), directivity-adjusted response spectra, we applied the maximum rotation factors discussed in Shahi and Baker (2014) and the directivity-adjustment factors from the NHR3 tool. Finally, we developed risk coefficients as defined in Section 21.2.1 of ASCE 7-16 (Method 2) and ASCE 7-22 to develop the risk-targeted response spectrum. The maximum-rotated directivity-adjusted risk-targeted uniform hazard response spectra for a 2,475-year return period are also shown in Exhibit E-3.

EXHIBIT E-3: 2,475-year UHS for V_{S30} of (a) 262, (b) 341, and (c) 202 m/s

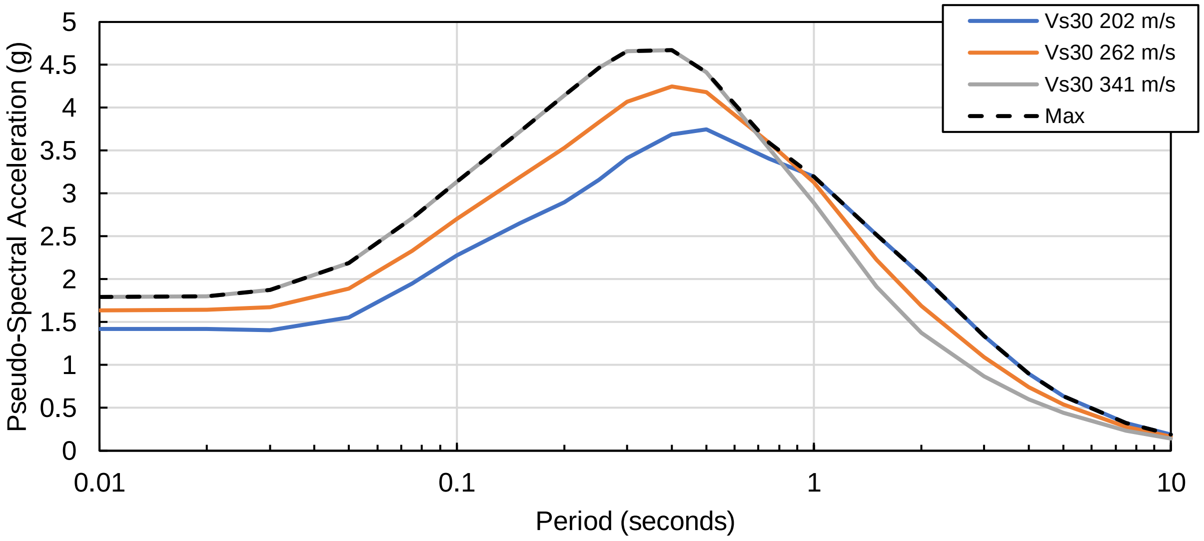






Considering the uncertainty in the site V_{S30}, we considered the maximum PSa of the resulting PSHA response spectra at each spectral period, as shown in Exhibit E-4.

EXHIBIT E-4: Maximum Uniform Hazard Response Spectra



Seismic-Hazard Disaggregation

We performed a disaggregation of the seismic hazard associated with the 2,475-year return period and a V_{S30} of 861 feet/sec (262 meters/sec) at the peak ground acceleration (PGA), and for spectral periods of 0.5, 1, and 2 seconds. We present the disaggregation results in Attachment A and summarize the dominant scenarios and their relative contributions to the hazard at each period in Table E-1.

TABLE E-1: Summary of Disaggregation Results for a 2,475-Year Return Period*

FAULT SOURCE	R_{RUP}		M_W	CONTRIBUTION (%)			
	(km)	(mi)		PGA	0.5 sec	1.0 sec	2.0 sec
Hayward (South) (0)	2.2	1.4	7.13	49.2	53.0	58.0	59.2
Calaveras (Center) (9)	4.7	2.9	7.21	25.9	28.0	28.4	29.1
Hayward (South, extension) (6)	5.0	3.1	6.08	4.8	3.4	1.1	<1
Hayward (South) (1)	5.1	3.2	6.90	5.4	5.7	5.4	4.8
San Andreas (Peninsula) (1)	27.5	17.1	8.07	<1	2.2	<1	2.8

*Based on the USGS Earthquake Hazard Toolbox: NSHM Conterminous U.S. 2018

These results represent known fault sources contributing at least 1 percent to the seismic hazard at the site for the spectral periods considered and for the given return period. Background seismicity zones, such as gridded or areal sources, are not presented. The rupture distances (R_{RUP}) and mean moment magnitudes (M_W) listed are based on values assigned according to UCERF3, and the numbers in parentheses after the fault names correspond to fault subsections assigned by UCERF3. Magnitudes vary slightly between the two fault models (FM 3.1 and 3.2) utilized by UCERF3 and from one spectral period to another. Therefore, for each source, we present the maximum mean magnitude of the spectral periods where that source contributes significantly to the hazard. Note that source magnitudes and relative contributions to the hazard also vary slightly by V_{S30}; we considered these variations in our analysis, but we present the mean V_{S30} case for conciseness.

DETERMINISTIC SEISMIC-HAZARD ANALYSIS

Methodology

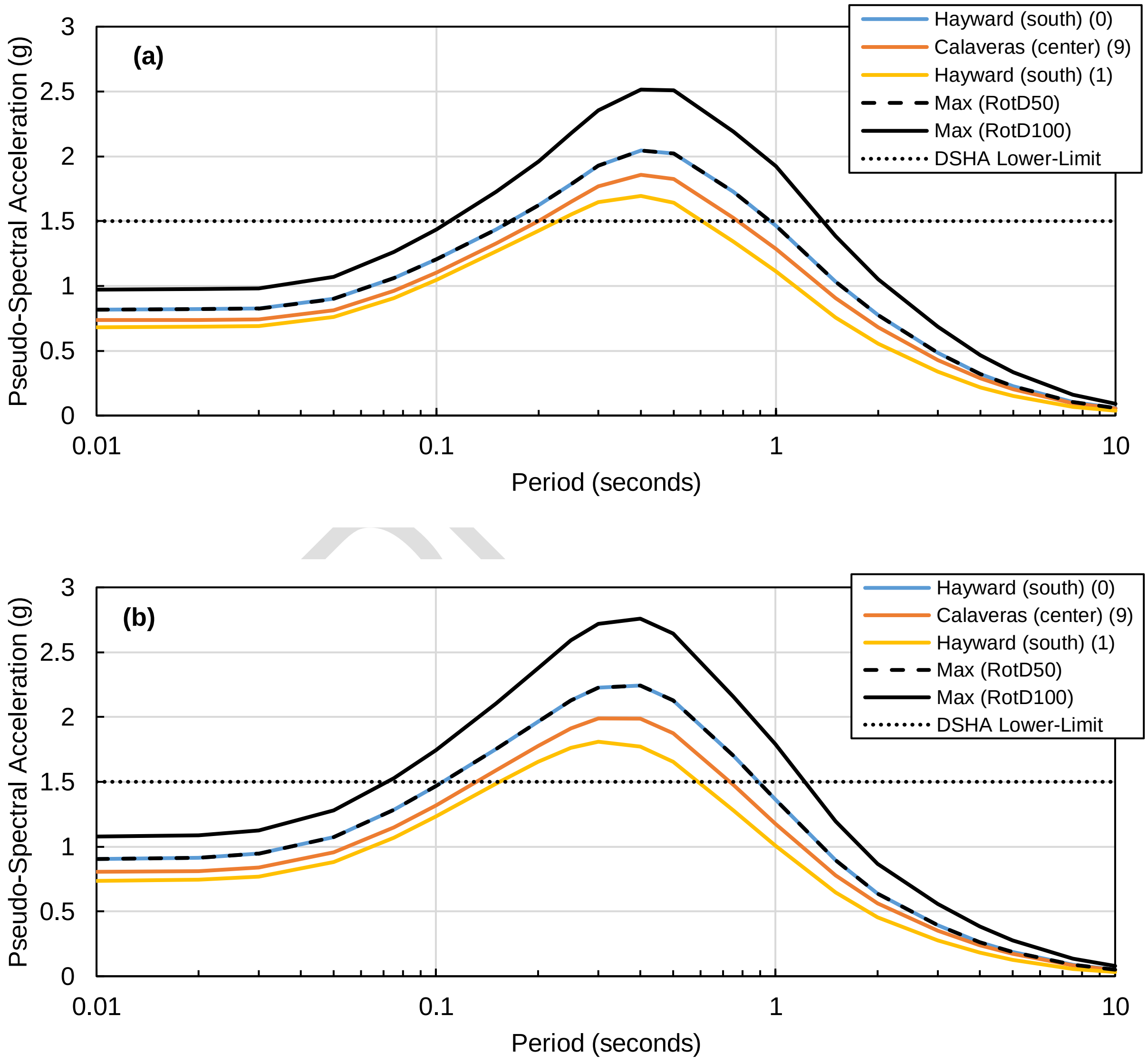
The DSHA involves developing the 84th-percentile (i.e., lognormal mean plus one standard deviation) maximum-rotated response spectrum for spectral damping of 5 percent of critical damping considering characteristic magnitudes of significant faults, without background seismicity, and utilizing the ground-motion models previously discussed. However, it is important to note that the definition of the characteristic magnitude is ambiguous when using the UCERF3 model due to its complexity. Based on the 2020 NEHRP Provisions and Section 21.2.2 of ASCE 7-22, in deterministic analyses, “scenario” earthquakes with significant contribution to hazard should be used in lieu of “characteristic” earthquakes when using UCERF3. We identified the scenario earthquakes by considering the results of the disaggregation of the PSHA results. Additionally, the 2020 NEHRP Provisions and Section 21.2.2 of ASCE 7-22 state that scenario earthquakes contributing less than 10 percent of the largest contributor at each spectral period shall be ignored, which validates omission of the San Andreas (Peninsula) (1) fault in the DSHA and for each value of V_{S30} considered. Accordingly, with the exception of this fault, we considered the scenarios in Table E-1, as described below.

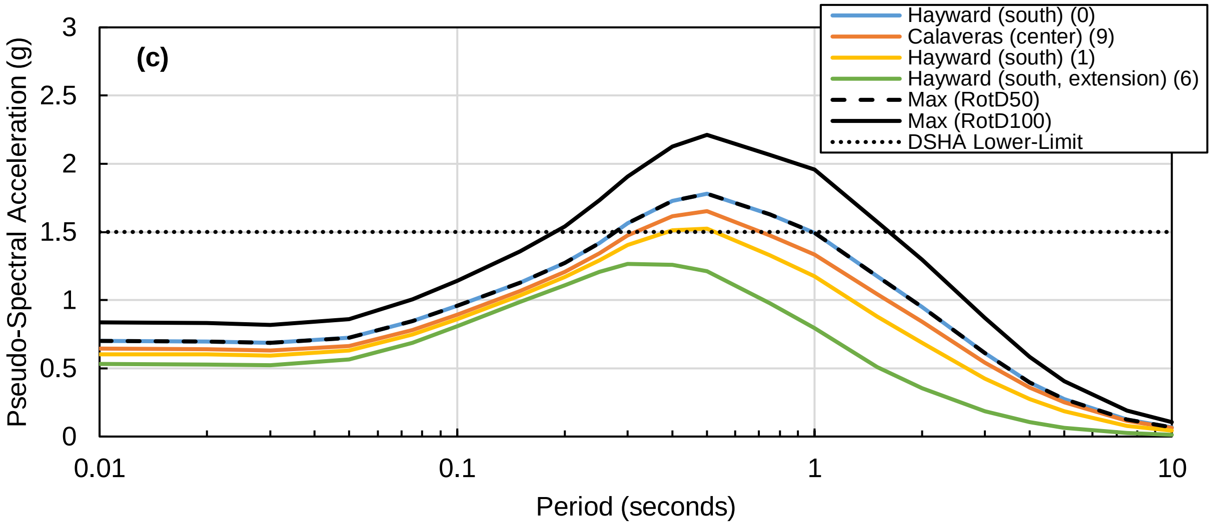
We considered the magnitudes shown in Table E-1 and associated distances (R_{RUP}, R_{JB}, R_X) to calculate the 84th-percentile deterministic response spectra. We estimated additional ground-motion model parameters (e.g., rupture width, depth to top of rupture, etc.) for each fault/scenario based on fault-specific information published on the United States Geologic Survey (USGS) website. Our analyses indicate a single controlling event on the Hayward (South) (0) fault for all spectral periods. Similar to the development of the probabilistic response spectrum, we applied the maximum rotation factors discussed in Shahi and Baker (2014) and the directivity adjustment factors from the NHR3 tool to develop a maximum-rotated directivity-adjusted 84th-percentile deterministic response spectrum.

ASCE 7-16 Deterministic Lower Limit

Section 21.2.2 and Supplement No. 1 of ASCE 7-16 stipulate that "the maximum PSa of the deterministic response spectrum shall not be less than the lower-limit defined as 1.5 Fa, where Fa is the short-period site coefficient corresponding to a short-period mapped acceleration (S_S) taken as 1.5." For Site Class D, the value of Fa is 1.0 and the lower limit is 1.5 g. Since the maximum PSa of the maximum-rotated directivity-adjusted 84th-percentile deterministic response spectrum is greater than 1.5 g, no additional scaling is required in accordance with ASCE 7-16. We show the final DSHA response spectra developed in accordance with ASCE 7-16 in Exhibit E-5.

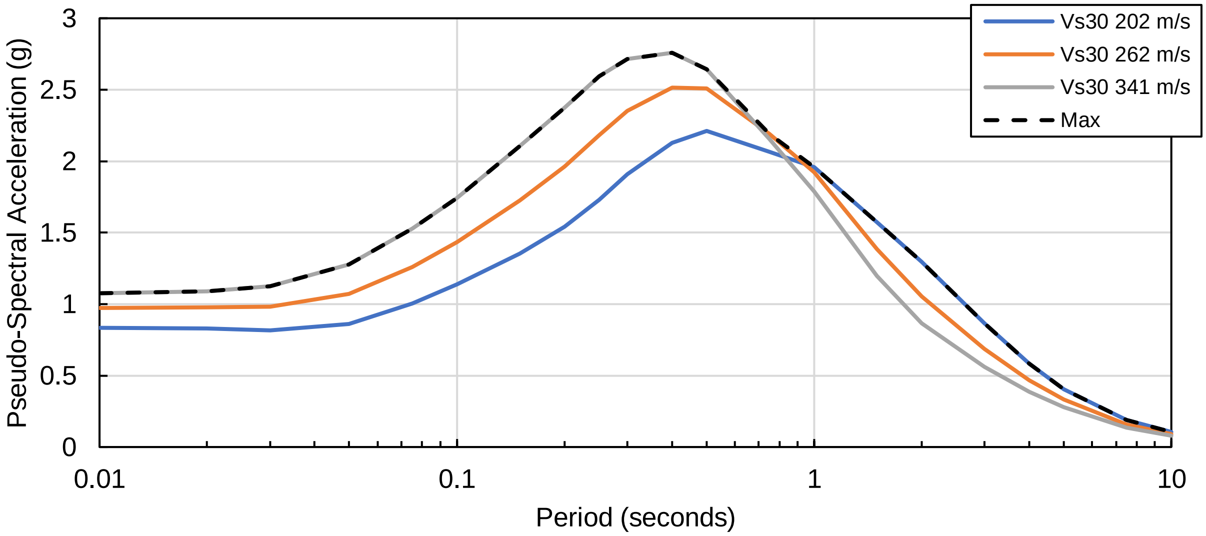
EXHIBIT E-5: ASCE 7-16 Deterministic Response Spectra for V_{S30} of (a) 262, (b) 341, and (c) 202 m/s





Considering the uncertainty in the site V_{S30}, we considered the maximum PSa of the resulting DSHA response spectra at each spectral period, as shown in Exhibit E-6.

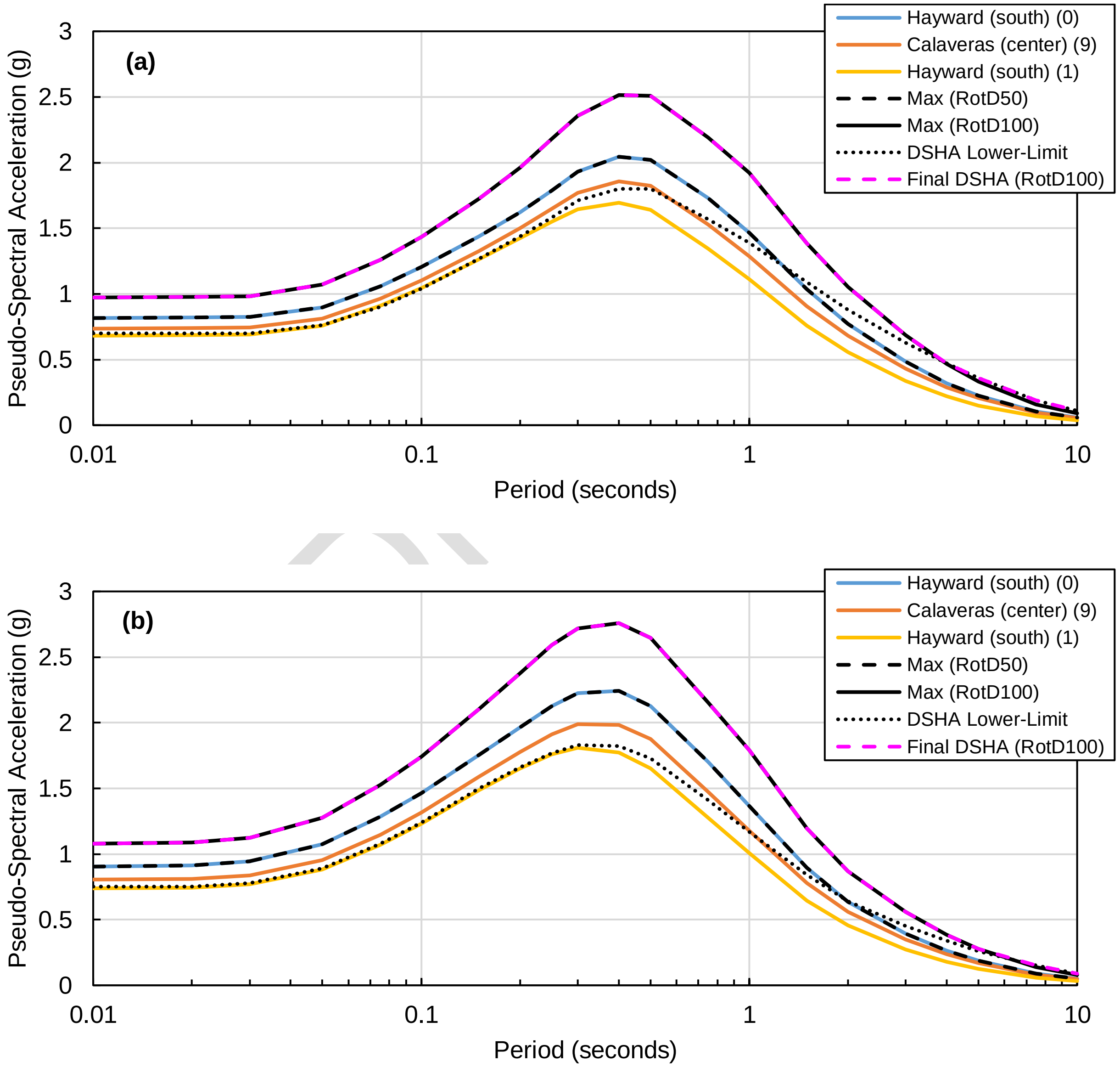
EXHIBIT E-6: Maximum RotD100 Deterministic Response Spectrum

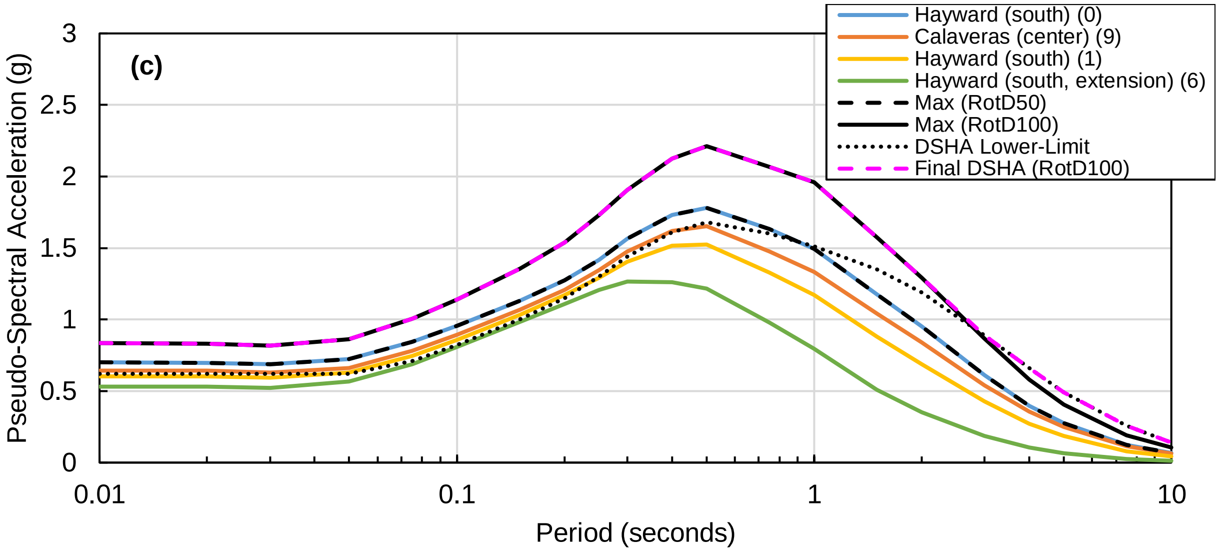


ASCE 7-22 Deterministic Lower Limit

Table 21.2-1 of ASCE 7-22 provides the deterministic lower limit response spectrum for each site class. These lower limit response spectra represent 84th-percentile ground motions of a magnitude M_W 8.0 shallow crustal earthquake at a distance of about 12.5 kilometers from the fault rupture. Our analysis indicates that the deterministic lower limit is higher than the maximum-rotated directivity-adjusted 84th-percentile deterministic response spectrum for spectral periods greater than or equal to 3 seconds, 4 seconds, and 7.5 seconds for Site Classes DE, D, and CD, respectively. Considering the uncertainty in the site V_{S30}, we considered the maximum PSa of the resulting DSHA response spectra at each spectral period, as shown in Exhibit E-7.

EXHIBIT E-7: ASCE 7-22 Deterministic Response Spectra for V_{S30} of (a) 262, (b) 341, and (c) 202 m/s





GROUND-SURFACE HORIZONTAL RESPONSE SPECTRA

According to Section 21.2.3 of ASCE 7-16 and ASCE 7-22, the MCE_R is controlled by the lesser of the maximum-rotated and risk-targeted probabilistic response spectrum and the 84th-percentile maximum-rotated deterministic response spectrum. At this site, the spectral accelerations associated with the deterministic response spectrum are less than the probabilistic response spectrum. Additionally, the MCE_R is not permitted to be lower than 80 percent of the general MCE_R response spectrum for the selected site class(s) (i.e., the code minimum(s)), as described in the following sections.

ASCE 7-16 Code Minimum and Results

The MCE_R is not permitted to be lower than 80 percent of the general MCE_R response spectrum for Site Class D. In Exhibit E-8, we present the site-specific MCE_R response spectrum. In addition, we calculated the DE response spectrum, which is defined as two-thirds of the MCE_R. We provide the recommended values for the site-specific MCE_R and DE response spectra in Table E-2. We provide the associated design acceleration parameters in accordance with Section 21.4 of ASCE 7-16 in Table E-3. In addition, we provide the site-specific, RotD50 peak ground acceleration (PGA_M) in Table E-3. The PGA_M does not include risk or maximum rotation factors and is governed by the DSHA.

EXHIBIT E-8: ASCE 7-16 5-Percent Damped Site-Specific MCE$_R$ Response Spectrum

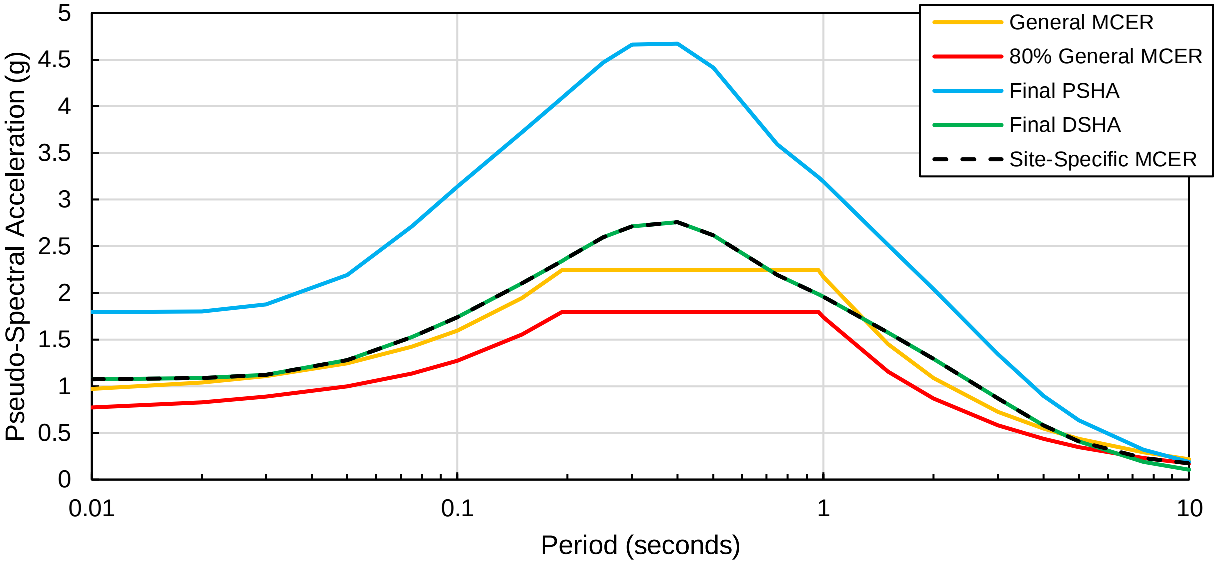


TABLE E-2: ASCE 7-16 5-Percent Damped Site-Specific Response Spectra

PERIOD (seconds)	PSEUDO-SPECTRAL ACCELERATION (g)	
	MCE$_R$	DE
0.01	1.078	0.719
0.02	1.088	0.726
0.03	1.125	0.750
0.05	1.278	0.852
0.075	1.528	1.019
0.10	1.743	1.162
0.15	2.106	1.404
0.194	2.345	1.564
0.20	2.376	1.584
0.25	2.594	1.729
0.30	2.716	1.811
0.40	2.759	1.839
0.50	2.619	1.746
0.75	2.189	1.459
0.968	1.985	1.323
1.0	1.959	1.306
1.5	1.575	1.050
2.0	1.294	0.863
3.0	0.868	0.578
4.0	0.582	0.388
5.0	0.406	0.271
7.5	0.232	0.155
10.0	0.174	0.116

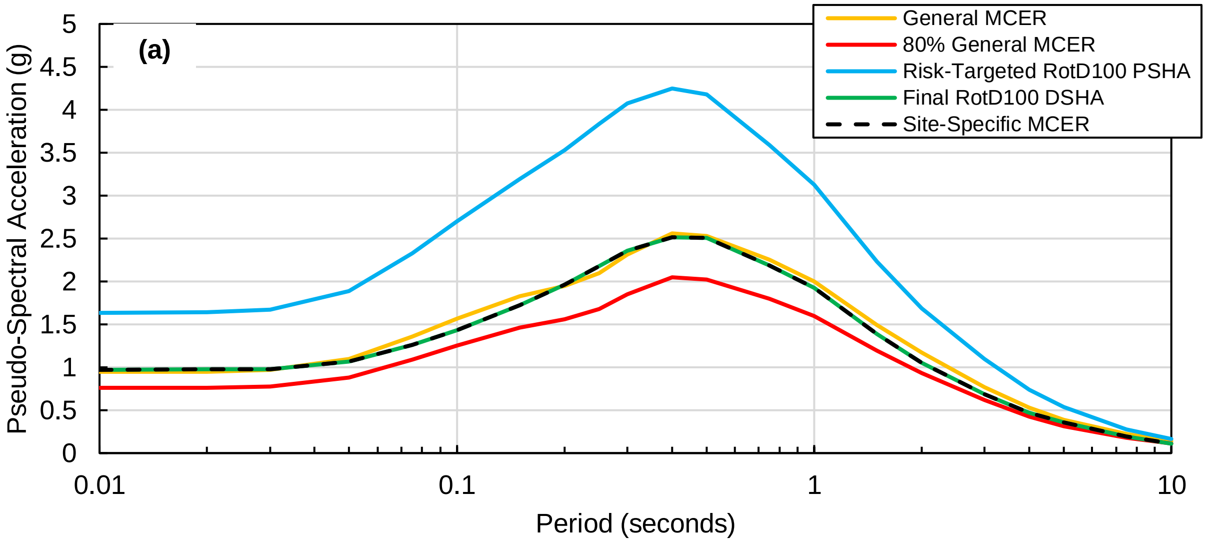
TABLE E-3: Design Acceleration Parameters based on ASCE 7-16 Sections 21.4 and 21.5 (Latitude: 37.3984, Longitude: -121.8352)

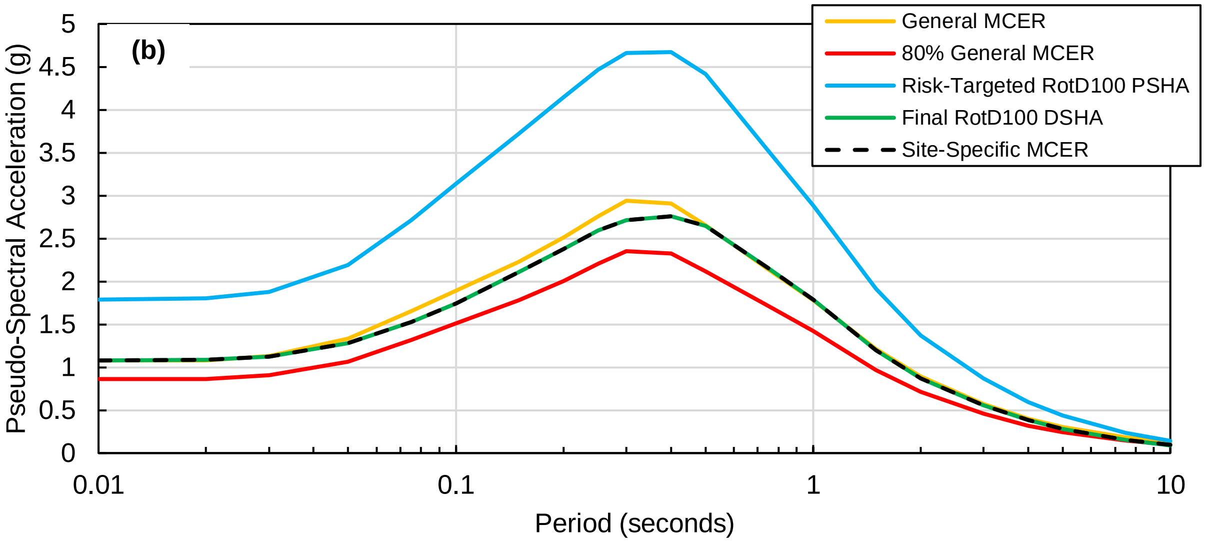
ACCELERATION PARAMETER	VALUE (g)
Mapped MCE_R Spectral Response Acceleration at Short Periods, S_S	2.25
Mapped MCE_R Spectral Response Acceleration at 1-second Period, S_1	0.87
MCE_R Spectral Response Acceleration at Short Periods, S_{MS}	2.48
MCE_R Spectral Response Acceleration at 1-second Period, S_{M1}	2.60
Design Spectral Response Acceleration at Short Periods, S_{DS}	1.66
Design Spectral Response Acceleration at 1-second Period, S_{D1}	1.74
MCE_G peak ground acceleration adjusted for site class effects, PGA_M	0.91

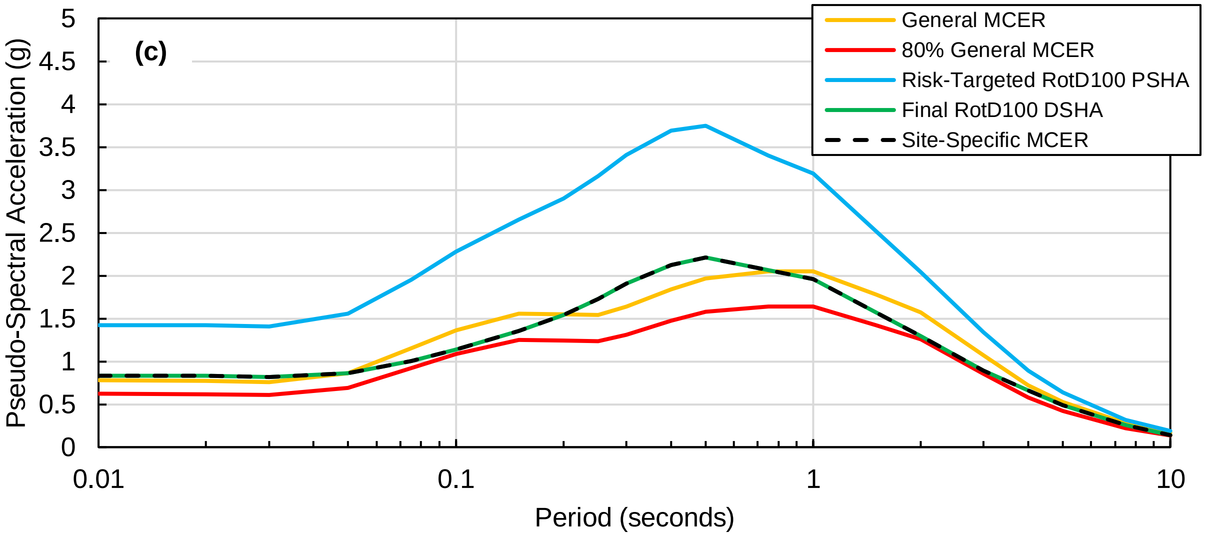
ASCE 7-22 Code Minimum and Results

The MCE_R is not permitted to be lower than 80 percent of the general MCE_R response spectrum for Site Classes DE, D, and CD. In Figure E-9, we present the site-specific MCE_R response spectra for each site class.

EXHIBIT E-9: ASCE 7-22 5-Percent Damped Site-Specific MCE_R Response Spectra for V_{S30} of (a) 262, (b) 341, and (c) 202 m/s

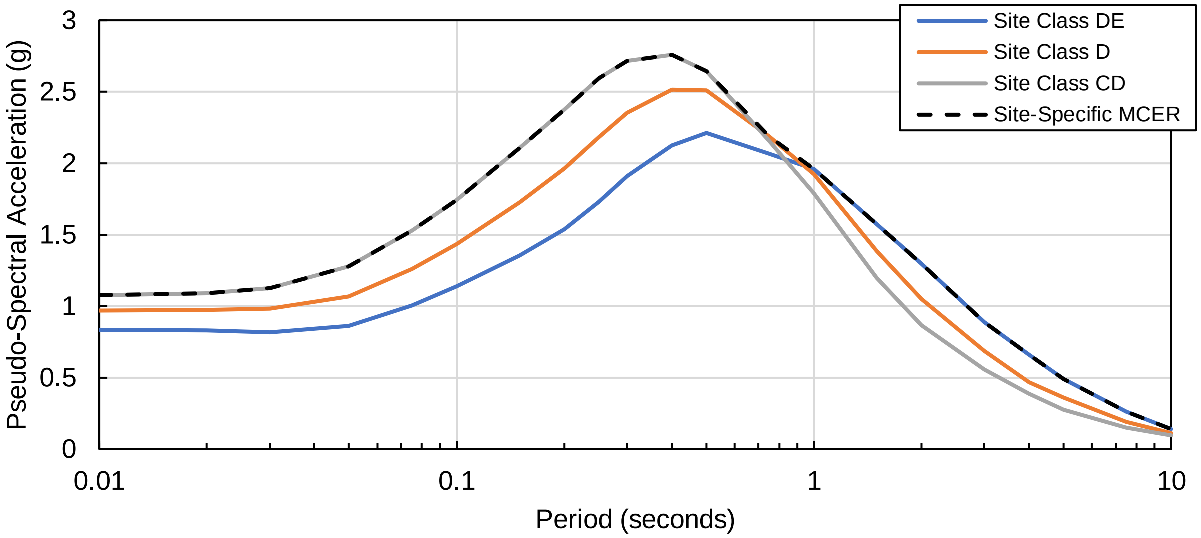






Considering the uncertainty in the site V_{S30}, we considered the maximum PSa across all three site classes to determine the final site-specific MCE_R response spectrum, as shown in Exhibit E-10.

EXHIBIT E-10: ASCE 7-22 5-Percent Damped Site-Specific MCE_R Response Spectrum



In addition, we calculated the DE (Design Earthquake) response spectrum, which is defined as two-thirds of the MCE_R. We provide the recommended values for the site-specific MCE_R and DE response spectra in Table E-4. We provide the associated design acceleration parameters in accordance with Section 21.4 of ASCE 7-22 in Table E-5. In addition, we provide the site-specific RotD50 peak ground acceleration (PGA_M) in Table E-5. The PGA_M does not include risk or maximum rotation factors and is governed by the DSHA.

TABLE E-4: ASCE 7-22 5-Percent Damped Site-Specific Response Spectra

PERIOD (seconds)	PSEUDO-SPECTRAL ACCELERATION (g)	
	MCE_R	DE
0.01	1.078	0.719
0.02	1.088	0.726
0.03	1.125	0.750
0.05	1.278	0.852
0.075	1.528	1.019
0.10	1.743	1.162
0.15	2.106	1.404
0.20	2.376	1.584
0.25	2.594	1.729
0.30	2.716	1.811
0.40	2.759	1.839
0.50	2.645	1.763
0.75	2.189	1.459
1.0	1.959	1.306
1.5	1.575	1.050
2.0	1.294	0.863
3.0	0.890	0.593
4.0	0.660	0.440
5.0	0.490	0.327

PERIOD (seconds)	PSEUDO-SPECTRAL ACCELERATION (g)	
	MCE_R	DE
7.5	0.260	0.173
10.0	0.140	0.093

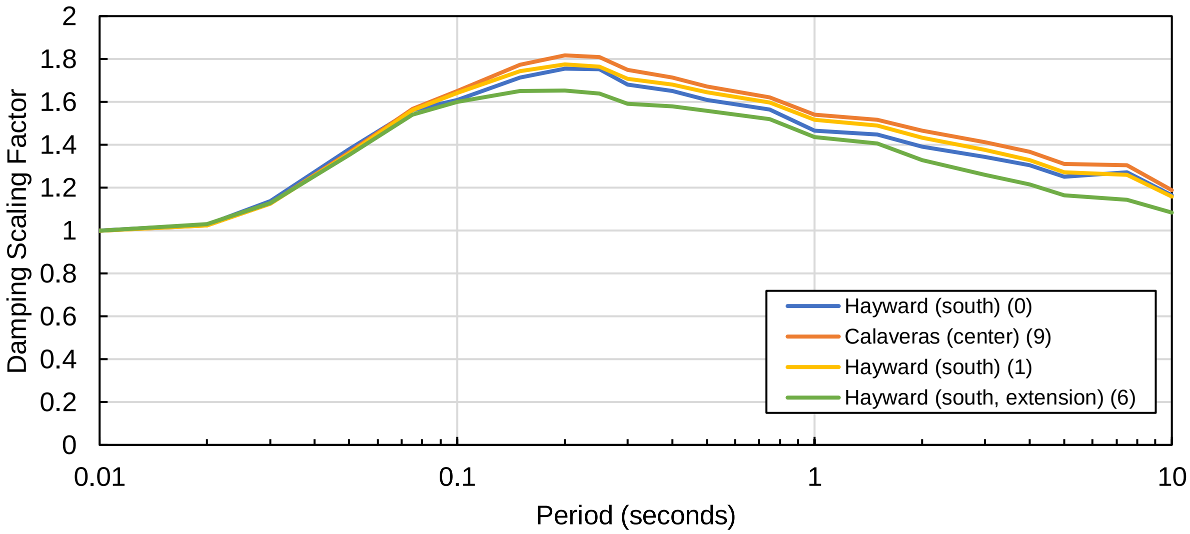
TABLE E-5: Design Acceleration Parameters based on ASCE 7-22 Sections 21.4 and 21.5 (Latitude: 37.3984, Longitude: -121.8352)

ACCELERATION PARAMETER	VALUE (g)
Mapped MCE_R Spectral Response Acceleration at Short Periods, S_S	2.54
Mapped MCE_R Spectral Response Acceleration at 1-second Period, S_1	1.01
MCE_R Spectral Response Acceleration at Short Periods, S_{MS}	2.48
MCE_R Spectral Response Acceleration at 1-second Period, S_{M1}	2.40
Design Spectral Response Acceleration at Short Periods, S_{DS}	1.66
Design Spectral Response Acceleration at 1-second Period, S_{D1}	1.60
MCE_G peak ground acceleration adjusted for site class effects, PGA_M	0.90

0.5-Percent Damped Response Spectra

We additionally developed the 0.5-percent damped MCE_R and DE response spectra by applying a damping scaling factor (DSF), as outlined in Rezaeian et al. (2014), to the 5-percent damped response spectra provided in Tables E-2 and E-4. The DSF is a period-dependent multiplier used to adjust the standard 5-percent damped spectral response based on the target damping, moment magnitude, and rupture distance of a deterministic event. We present the DSFs for the scenarios considered in the DSHA in Exhibit E-11.

EXHIBIT E-11: Damping Scaling Factors from DSHA



The DSF is independent of $V_{S30,}$ and the seismic-hazard analysis is deterministically controlled by the Hayward (South) (0) scenario for all spectral periods and for ASCE 7-16 and ASCE 7-22. Therefore, we considered the DSF corresponding to the controlling Hayward (South) (0) scenario and applied it to the final 5-percent damped MCE_R and DE response spectra for both ASCE 7-16 and ASCE 7-22 spectra. We present the resulting 0.5-percent damped MCE_R and DE response spectra calculated in accordance with ASCE 7-16 in Exhibit E-12 and Table E-6 below.

EXHIBIT E-12: ASCE 7-16 0.5-Percent Damped Site-Specific Response Spectra

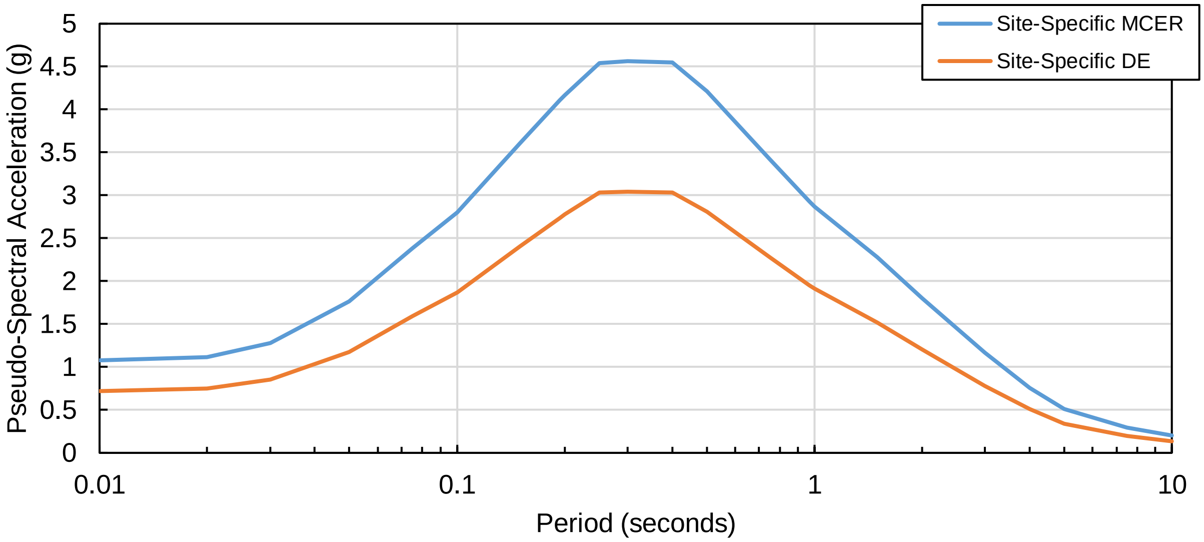


TABLE E-6: ASCE 7-16 0.5-Percent Damped Site-Specific Response Spectra

PERIOD (seconds)	PSEUDO-SPECTRAL ACCELERATION (g)	
	MCE_R	DE
0.01	1.078	0.719
0.02	1.119	0.746
0.03	1.279	0.852
0.05	1.763	1.175
0.075	2.386	1.590
0.10	2.803	1.869
0.15	3.607	2.405
0.194	4.105	2.737
0.20	4.171	2.780
0.25	4.544	3.029
0.30	4.563	3.042
0.40	4.552	3.035
0.50	4.216	2.811
0.75	3.424	2.283
0.968	2.932	1.954
1.0	2.871	1.914
1.5	2.280	1.520
2.0	1.802	1.201
3.0	1.165	0.776

PERIOD (seconds)	PSEUDO-SPECTRAL ACCELERATION (g)	
	MCE$_R$	DE
4.0	0.760	0.507
5.0	0.508	0.339
7.5	0.295	0.197
10.0	0.202	0.135

We present the resulting 0.5-percent damped MCE$_R$ and DE response spectra calculated in accordance with ASCE 7-22 in Figure E-13 and Table E-7 below.

EXHIBIT E-13: ASCE 7-22 0.5-Percent Damped Site-Specific Response Spectra

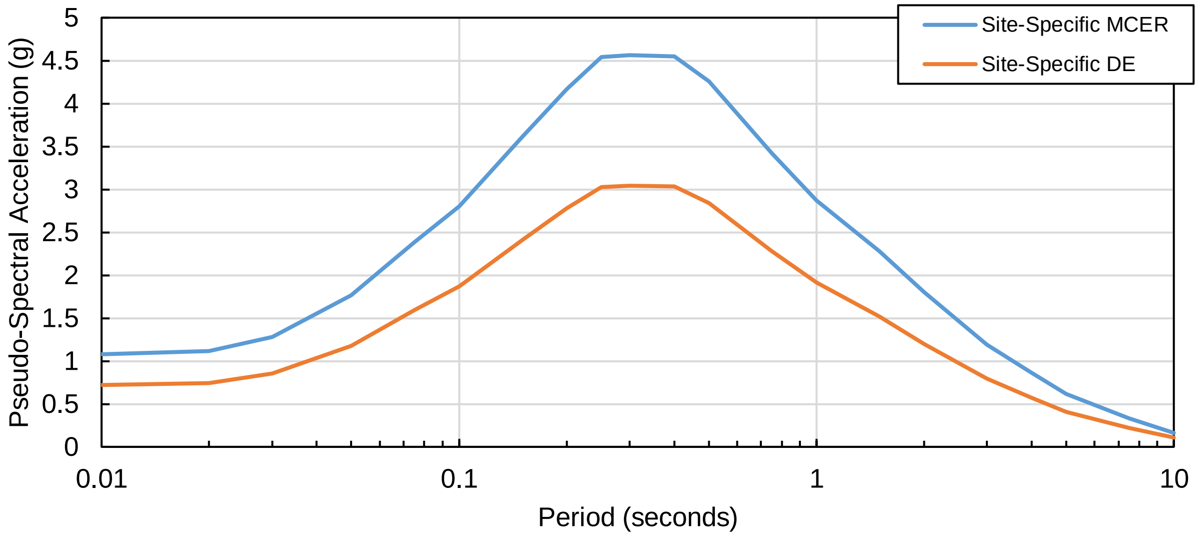


TABLE E-7: ASCE 7-22 0.5-Percent Damped Site-Specific Response Spectra

PERIOD (seconds)	PSEUDO-SPECTRAL ACCELERATION (g)	
	MCE$_R$	DE
0.01	1.078	0.719
0.02	1.119	0.746
0.03	1.279	0.852
0.05	1.763	1.175
0.075	2.386	1.590
0.10	2.803	1.869
0.15	3.607	2.405
0.20	4.171	2.780
0.25	4.544	3.029
0.30	4.563	3.042
0.40	4.552	3.035
0.50	4.258	2.839
0.75	3.424	2.283
1.0	2.871	1.914
1.5	2.280	1.520
2.0	1.802	1.201

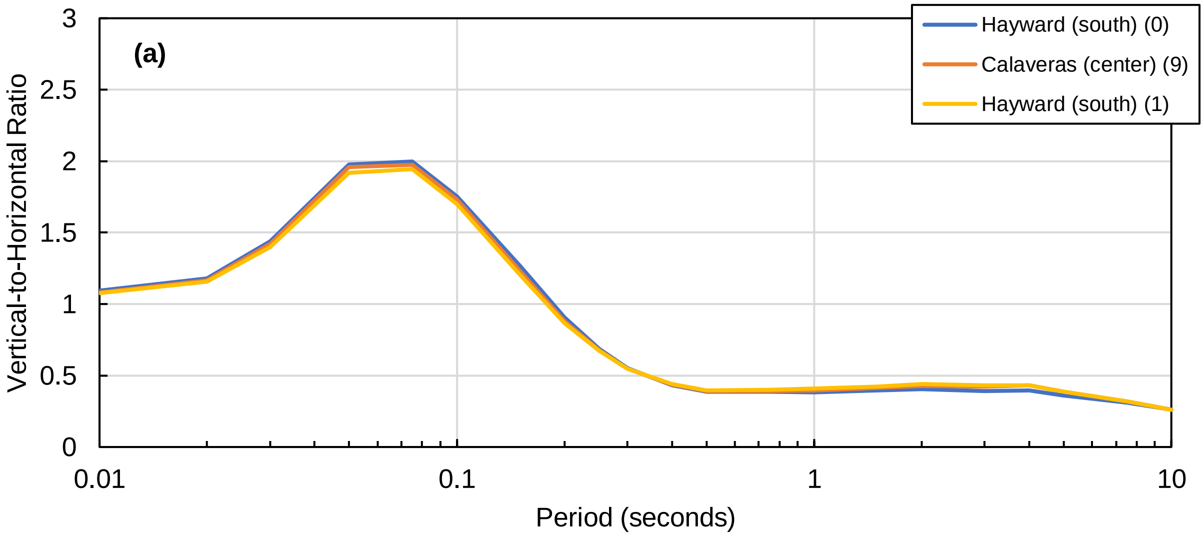
PERIOD (seconds)	PSEUDO-SPECTRAL ACCELERATION (g)	
	MCE_R	DE
3.0	1.194	0.796
4.0	0.862	0.575
5.0	0.613	0.409
7.5	0.331	0.220
10.0	0.163	0.109

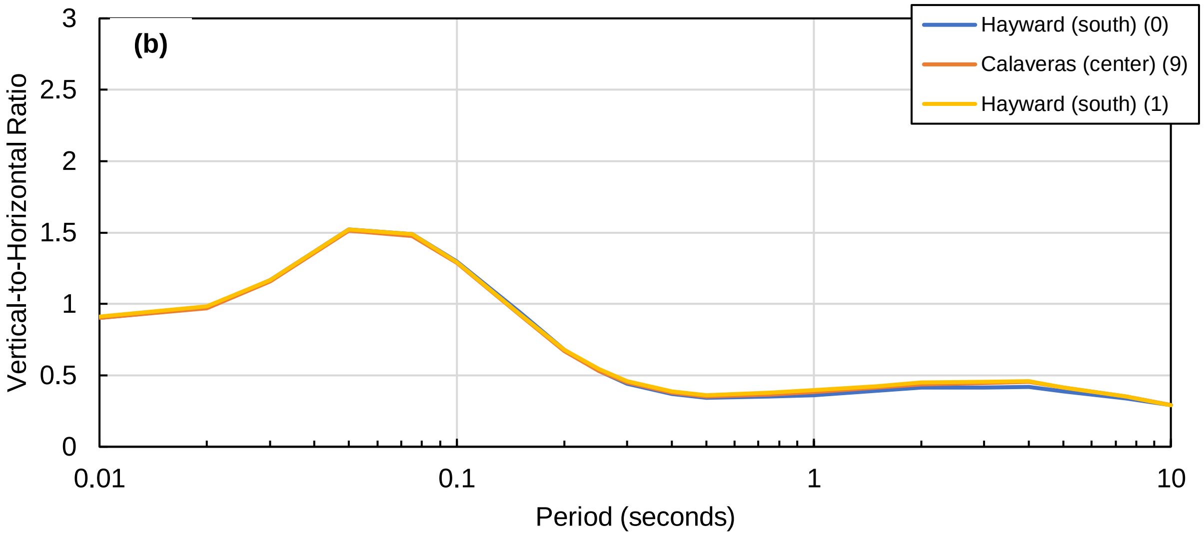
GROUND-SURFACE VERTICAL RESPONSE SPECTRA

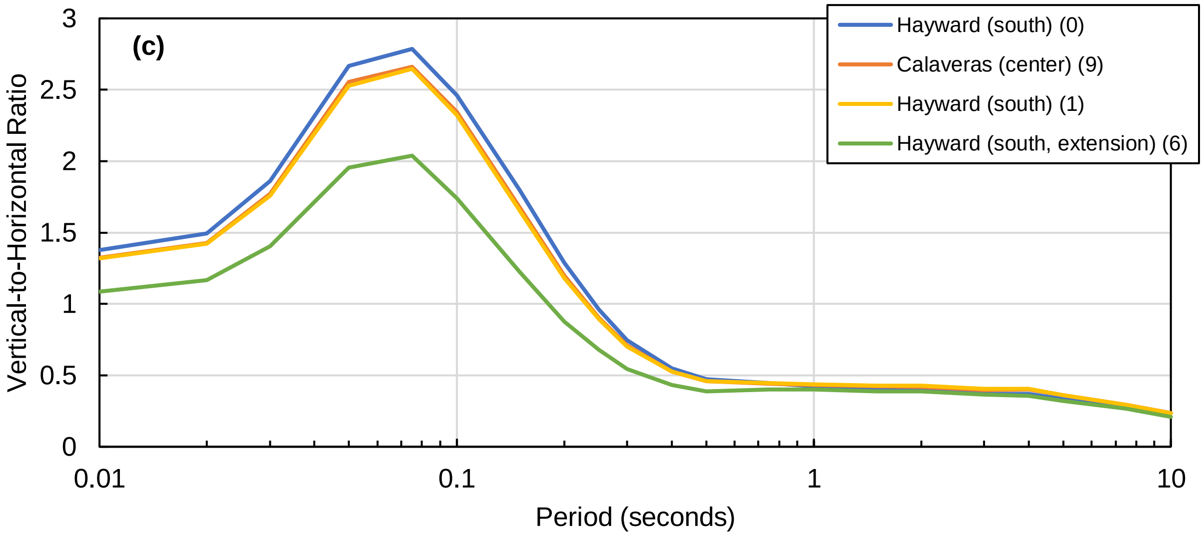
We developed vertical response spectra using the methodology by Bozorgnia and Campbell (2016) and Gülerce et al. (2017). These methodologies allow for the development of a vertical response spectrum that is consistent with the horizontal response spectrum through the application of a vertical-to-horizontal (V:H) spectral acceleration ratio. The V:H models were developed for the vertical "average" horizontal components of ground motion using a mathematical formation that accounts for the correlation between these two components. The V:H ratio can then be multiplied by the horizontal acceleration at each spectral period to obtain the site-specific MCE_R vertical response spectral acceleration (S_{aMv}). We assigned equal weight (0.50) to the two V:H GMMs in our analysis.

Similar to calculating the DSHA spectra, this methodology requires the input of specific fault parameters for each scenario. We calculated the V:H ratios for each of the scenarios and V_{S30} values considered in the DSHA, as shown in Exhibit E-14. Note that each V:H represents the weighted mean of the two V:H GMMs considered.

EXHIBIT E-14: Vertical-to-Horizontal Ratios from DSHA for V_{S30} of (a) 262, (b) 341, and (c) 202 m/s

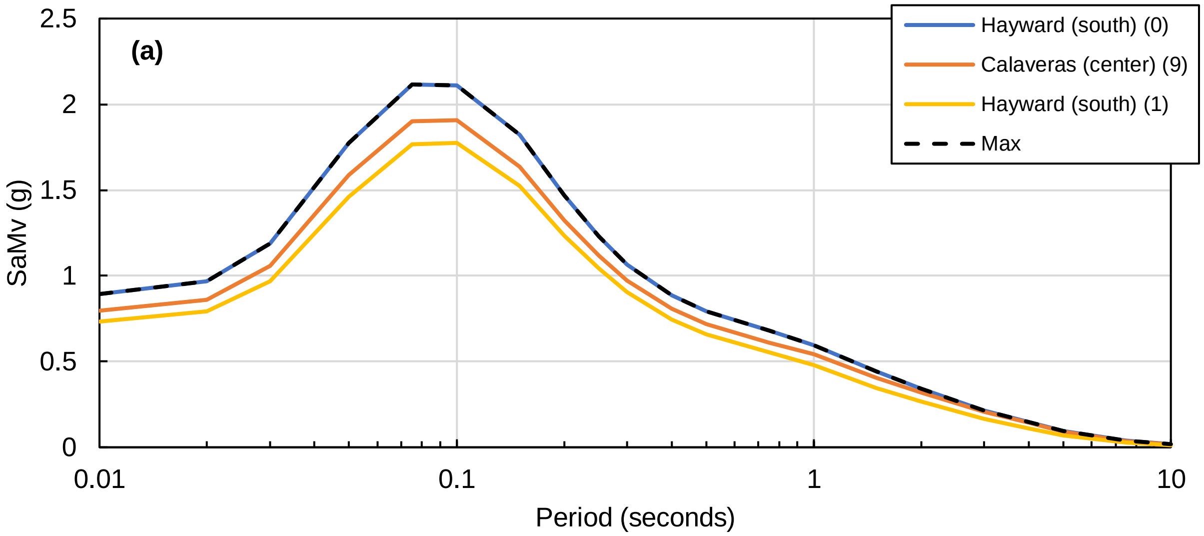


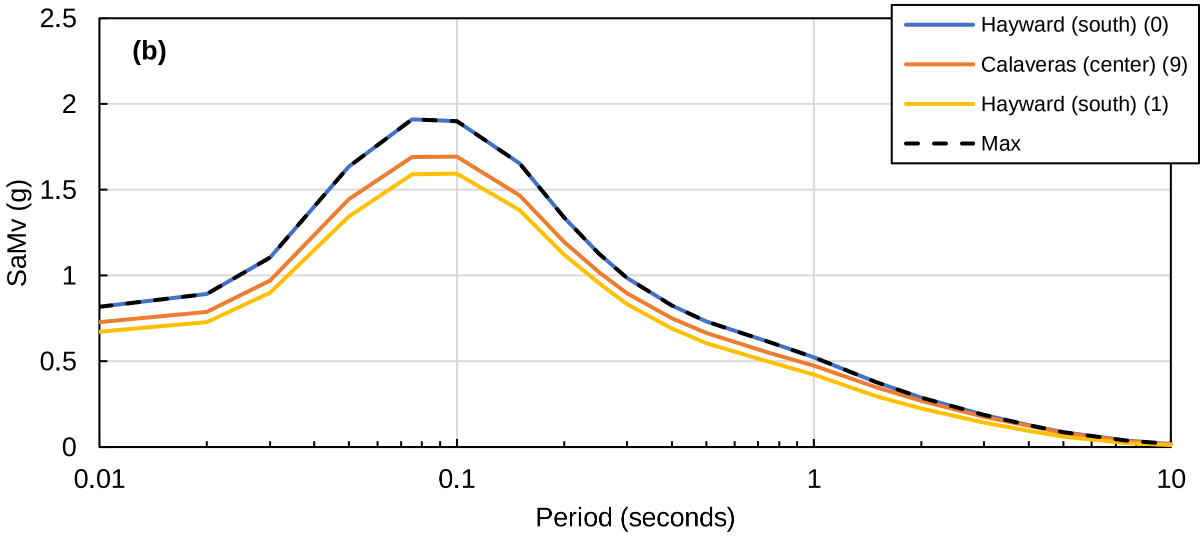


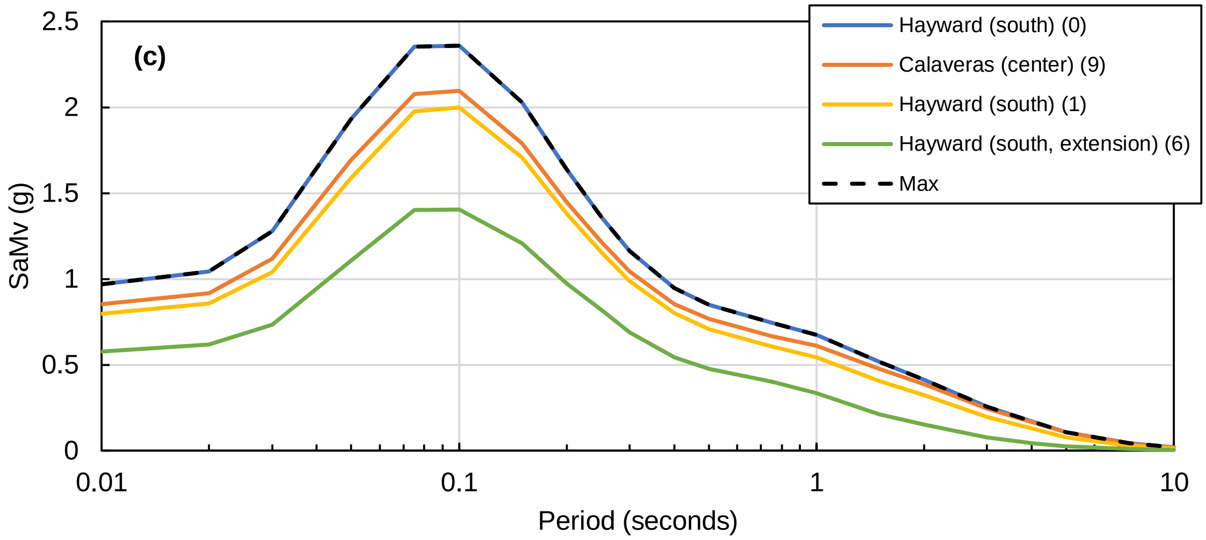


We then multiplied the V:H ratios for each scenario by the corresponding 5-percent damped RotD50 horizontal response spectra calculated in the DSHA, as shown in Exhibit E-15. We considered the maximum S_{aMv} value at each spectral period.

EXHIBIT E-15: Vertical Response Spectra from DSHA for V_{S30} of (a) 262, (b) 341, and (c) 202 m/s



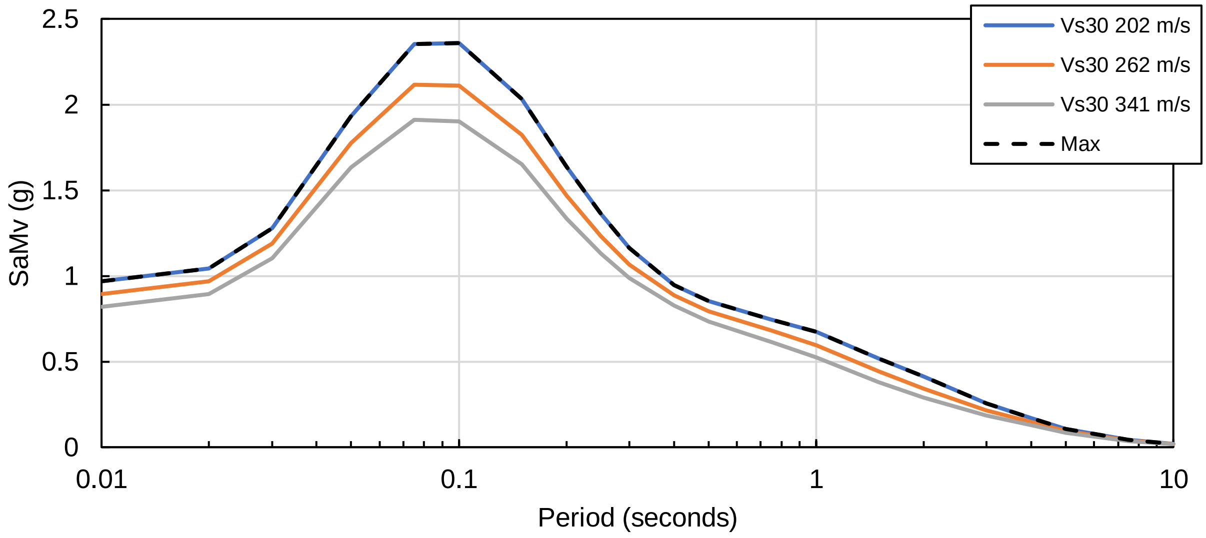




ASCE 7-16 Code Minimum

According to Section 11.9.2 of ASCE 7-16, the value of S_{aMv} is not to be lower than 80 percent of the general S_{aMv} for periods less than or equal to 2 seconds. Additionally, the S_{aMv} is not to be lower than 50 percent of the site-specific horizontal MCE_R response spectrum for periods greater than 2 seconds. Considering the uncertainty in the site V_{S30}, we also considered the maximum PSa of the vertical response spectra previously described at each spectral period, as shown in Exhibit E-16.

EXHIBIT E-16: ASCE 7-16 Maximum Vertical Response Spectrum



In Exhibit E-17, we present the development of the final 5-percent damped S_{aMv} response spectrum based on comparison of the site-specific vertical and ASCE 7-16 code-minimum response spectra. In addition, we calculated the design vertical response spectrum (S_{av}), which is defined as two-thirds of the S_{aMv}. We provide the site-specific S_{aMv} and S_{av} response spectra calculated in accordance with ASCE 7-16 in Table E-8.

EXHIBIT E-17: ASCE 7-16 5-Percent Damped Site-Specific S_{aMv} Response Spectrum

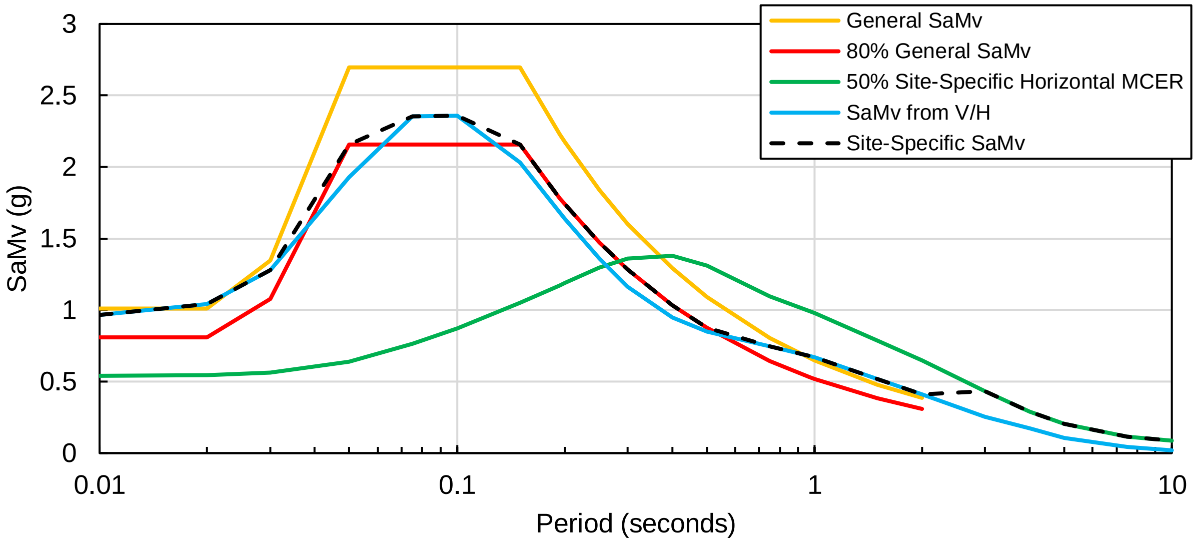


TABLE E-8: ASCE 7-16 Site-Specific S_{aMv} and S_{av} Response Spectra

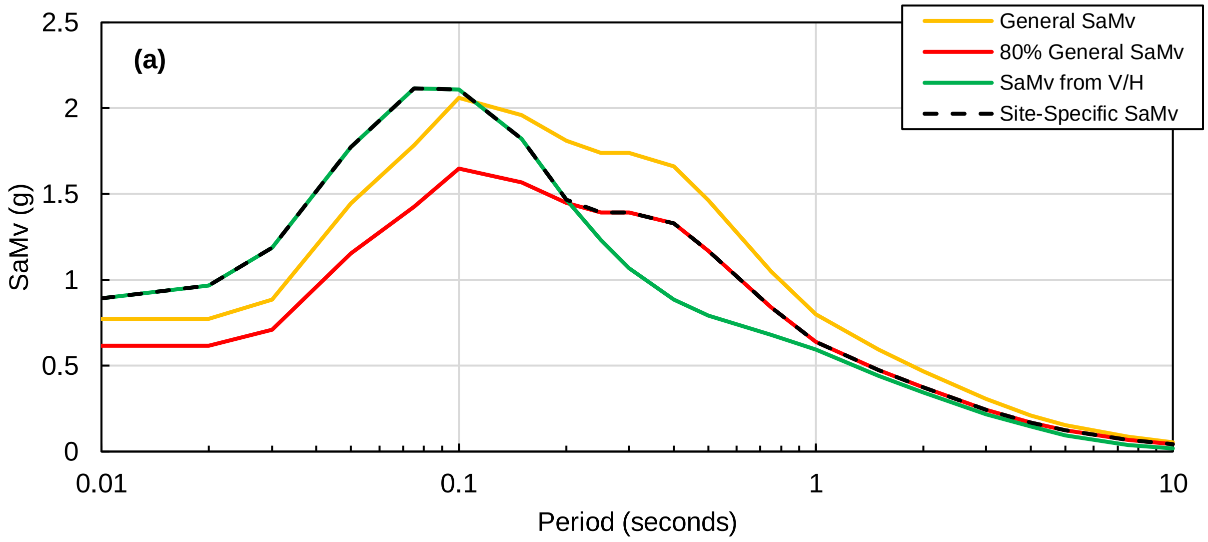
PERIOD (seconds)	VERTICAL SPECTRAL ACCELERATION (g)	
	S_{aMv}	S_{av}
0.01	0.967	0.645
0.02	1.043	0.695
0.03	1.277	0.852
0.05	2.157	1.438
0.075	2.353	1.569
0.10	2.359	1.572
0.15	2.157	1.438
0.194	1.781	1.188
0.20	1.738	1.159
0.25	1.471	0.980
0.30	1.283	0.855
0.40	1.034	0.689
0.50	0.874	0.583
0.75	0.745	0.497
0.968	0.681	0.454
1.0	0.672	0.448
1.5	0.518	0.345
2.0	0.412	0.275
3.0	0.434	0.289
4.0	0.291	0.194

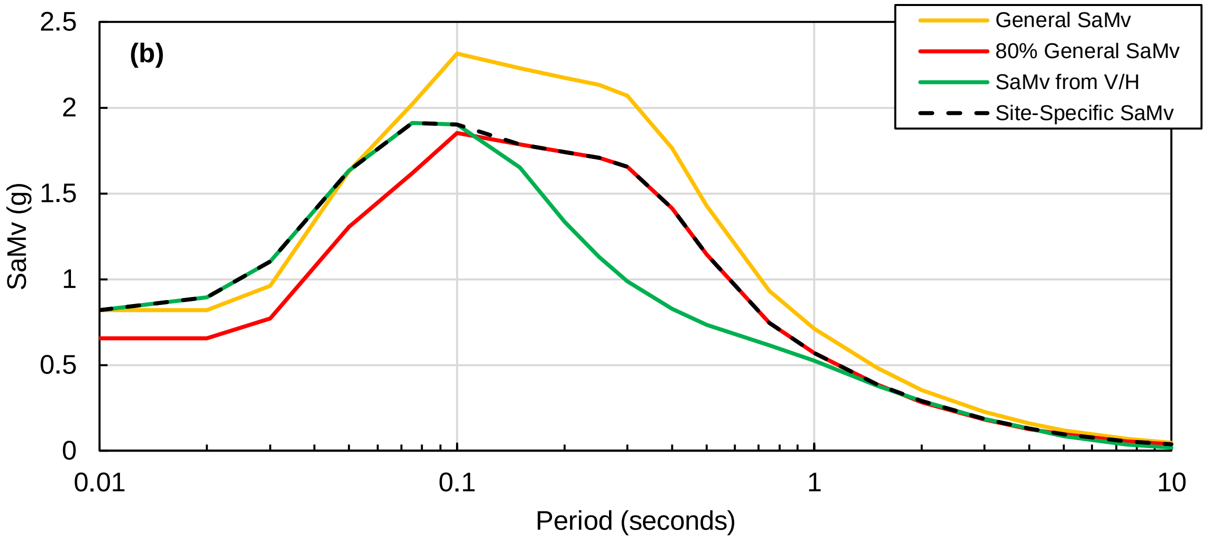
PERIOD (seconds)	VERTICAL SPECTRAL ACCELERATION (g)	
	S_{aMv}	S_{av}
5.0	0.203	0.135
7.5	0.116	0.077
10.0	0.087	0.058

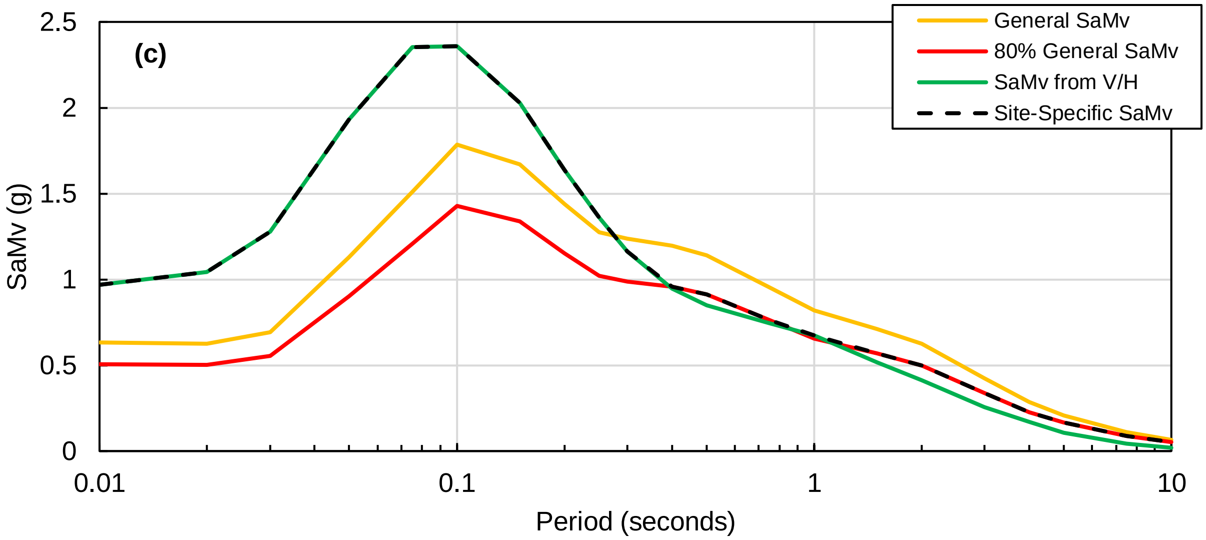
ASCE 7-22 Code Minimum

According to Section 11.9.2 of ASCE 7-16, the value of S_{aMv} is not to be lower than 80 percent of the general S_{aMv} for Site Classes DE, D, and CD. In Exhibit E-18, we present the development of the final S_{aMv} response spectrum based on comparison of the site-specific vertical and code-minimum response spectra.

EXHIBIT E-18: ASCE 7-22 5-Percent Damped Site-Specific S_{aMv} Response Spectra for V_{S30} of (a) 262, (b) 341, and (c) 202 m/s







Considering the uncertainty in the site V_{S30}, we considered the maximum PSa of the vertical response spectra previously described at each spectral period, as shown in Exhibit E-19. In addition, we calculated the design vertical response spectrum (S_{av}), which is defined as two-thirds of the S_{aMv}. We provide the site-specific S_{aMv} and S_{av} response spectra calculated in accordance with ASCE 7-22 in Table E-9.

EXHIBIT E-19: ASCE 7-22 5-Percent Damped Site-Specific S_{aMv} Response Spectrum

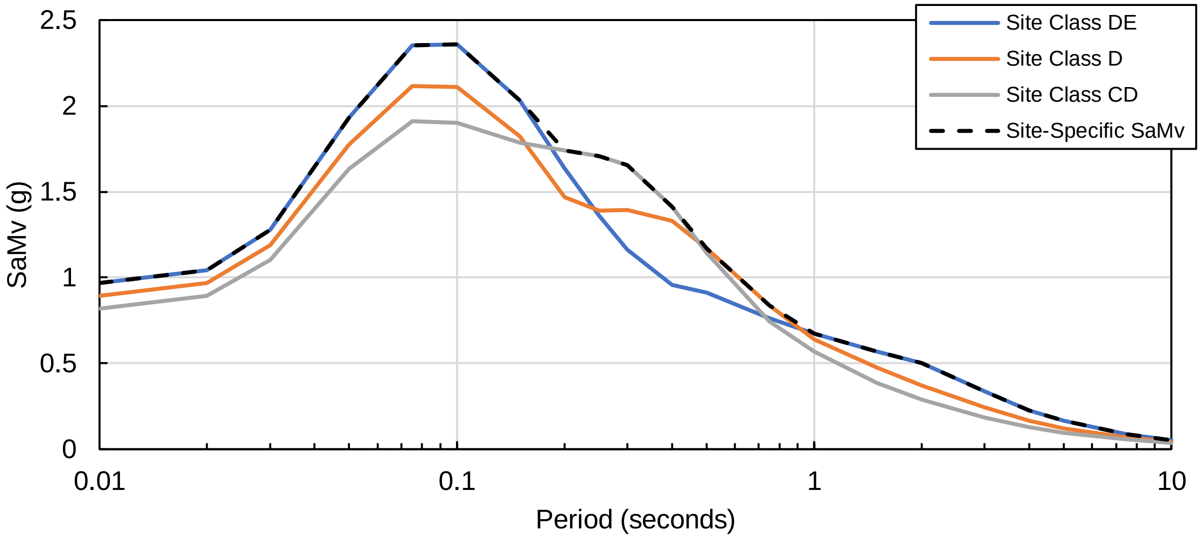


TABLE E-9: ASCE 7-22 Site-Specific Sa_{Mv} and Sa_v Response Spectra

PERIOD (seconds)	VERTICAL SPECTRAL ACCELERATION (g)	
	S_{aMv}	S_{av}
0.01	0.967	0.645
0.02	1.043	0.695
0.03	1.277	0.852
0.05	1.930	1.286
0.075	2.353	1.569
0.10	2.359	1.572
0.15	2.030	1.353
0.20	1.739	1.160
0.25	1.706	1.137
0.30	1.655	1.103
0.40	1.411	0.941
0.50	1.170	0.780
0.75	0.839	0.559
1.0	0.672	0.448
1.5	0.568	0.379
2.0	0.500	0.333
3.0	0.339	0.226
4.0	0.227	0.152
5.0	0.167	0.111
7.5	0.087	0.058
10.0	0.052	0.035

LIMITATIONS AND CLOSURE

We strive to perform our professional services in accordance with generally accepted principles and practices currently employed in the area; there is no warranty, express or implied. Although research on modeling seismic hazard and ground response continues to improve, seismologists and engineers cannot predict the exact timing, location, or magnitude of future earthquakes. For this reason, significant uncertainly remains regarding anticipated ground motions.

SELECTED REFERENCES

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ATTACHMENT A

DEAGGREGATION RESULTS

EXHIBIT E.1-1: Disaggregation Results for a 2,475-year Return Period at the PGA

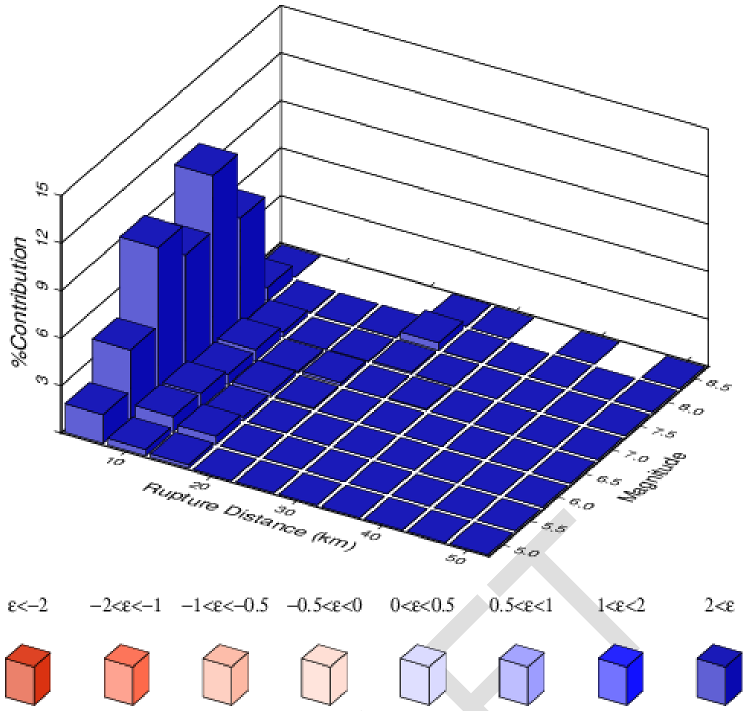


EXHIBIT E.1-2: Disaggregation Results for a 2,475-year Return Period at a 0.5 Second Period

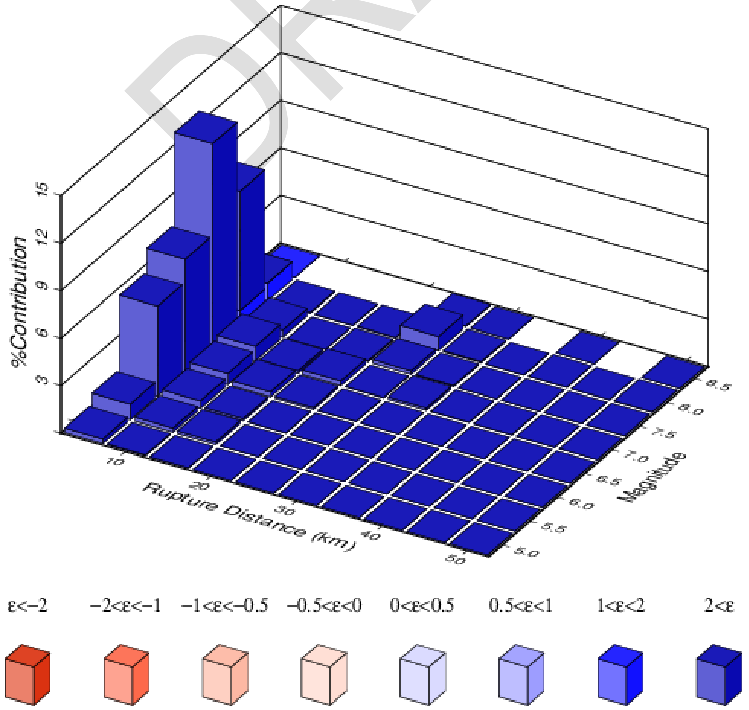


EXHIBIT E.1-3: Disaggregation results for a 2,475-year return period at a 1 second period

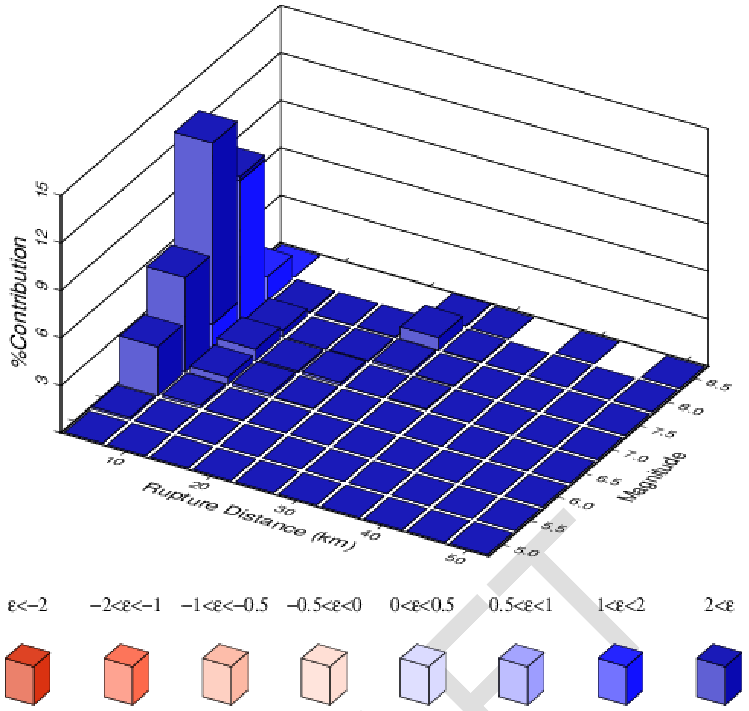
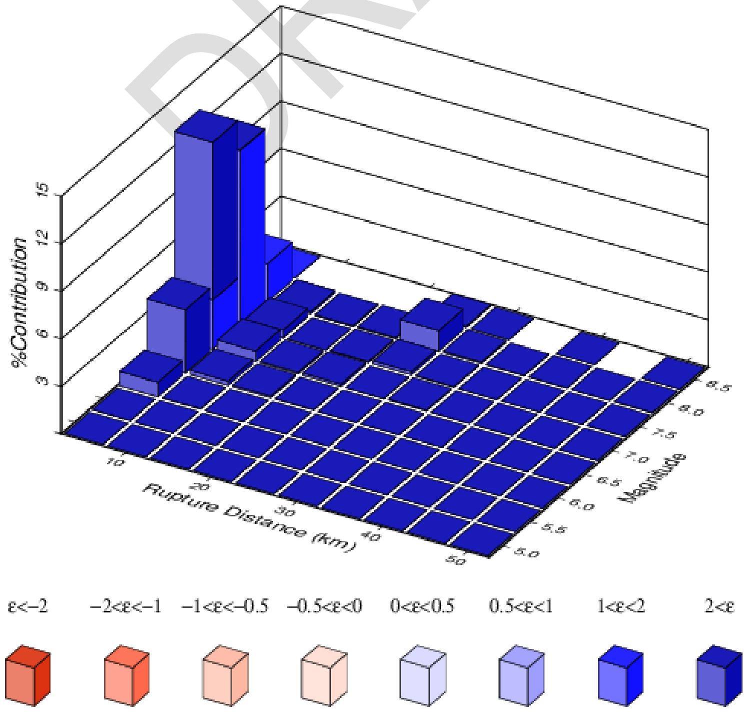


EXHIBIT E.1-4: Disaggregation Results for a 2,475-year Return Period at a 2 Second Period



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APPENDIX E

Phase 1 Hazardous Substance Liability Assessment

Final Report

Hazardous Substance Liability Assessment

Penitencia Water Treatment Plant (PWTP) Residuals Management

APN: 595-04-072

San Jose, California

Submitted to:	Valley Water	Submitted by:	David Wright
Reference:	29085-23-1170	Date:	16 October 2023

Locus Technologies
299 Fairchild Drive
Mountain View, CA 94043

(650) 960-1640

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Certification

I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in § 312.10 of 40 C.F.R. 312. I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I have developed and performed all appropriate inquiries in conformance with the standards and practices set forth in 40 C.F.R. Part 312.

Nancy-Jeanne LeFevre, PE

Date

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List of Acronyms and Abbreviations

ACRONYM	DESCRIPTION
ACM	Asbestos-containing materials
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CERS	California Environmental Reporting System
CHMIRS	California Hazardous Material Incident Reporting System
CIWQS	California Integrated Water Quality System
CUPA	Certified Unified Program Agency
DEH	Department of Environmental Health
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
ECHO	Enforcement and Compliance History Information
EDR	Environmental Data Resources
EMI	Emission Inventory Data
ENF	Enforcement Action Listing

ACRONYM	DESCRIPTION
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
ESL	Environmental Screening Limit
FINDS	Environmental Protection Agency Facility Index System
GIS	Geographic Information System
HAZNET	Hazardous Waste Information System
HMMP	Hazardous Materials Management Plan
HSLA	Hazardous Substance Liability Assessment
HSWA	Hazardous and Solid Waste Amendments
HWTS	Hazardous Waste Tracking System
HREC	Historical Recognized Environmental Condition
LBP	Lead-Based Paint
LDS	Land disposal sites listing
Locus	Locus Technologies
LUST	Leaking Underground Storage Tank
msl	Mean sea level
NOA	Naturally Occurring Asbestos
NONGEN	Non-Generators

ACRONYM	DESCRIPTION
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OEHHA	Office of Environmental Health Hazard Assessment
PCB	Polychlorinated Biphenyls
PFAS	Per- and Poly-Fluoroalkyl Substances
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
RESPONSE	Database that identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.
RWQCB	Regional Water Quality Control Board
SLIC	Spills, Leaks, Investigations, and Clean-Ups
SQG	Small Quantity Generator
SWEEPS UST	Statewide Environmental Evaluation and Planning System Underground Storage Tank
SWF/LF	Solid Waste Facility/Landfill
SWRCB	State Water Resources Control Board
USGS	United States Geological Survey
UST	Underground Storage Tank
Valley Water	Santa Clara Valley Water District

ACRONYM	DESCRIPTION
VOC	Volatile Organic Compounds
VCP	Voluntary Cleanup Program
WDS	Water Discharge System

Executive Summary

At the request of Santa Clara Valley Water District (Valley Water), Locus Technologies (Locus) conducted this Hazardous Substance Liability Assessment (Phase 1 HSLA) for the parcel located at 3959 Whitman Way, San Jose, California, APN 595-04-072 (Figure 1) (Subject Property), for the Penitencia Water Treatment Plant (PWTP) Residuals Management Project. The Subject Property is a 21.6-acre property comprised of the PWTP, which is owned by Valley Water. Valley Water's intent for performing this Phase 1 HSLA on the Subject Property is for the removal and replacement of the existing water treatment plant residuals management facilities, which includes demolition, excavation, and construction. This Phase 1 HSLA will be used by Valley Water to inform and support preparation of other environmental documents for the PWTP Residuals Management Project.

The Subject Property is on a hillside at the base of the Diablo range. The maximum elevation of the Subject Property is 472 feet above mean sea level (msl), and the elevation of the residuals management project site is at approximately 380 feet above msl. Adjoining Properties to the north and east of the Subject Property include rural rangeland. Residential neighborhoods are present to the south and west of the Subject Property.

On 18 July 2023, Locus conducted a site inspection of the Subject Property, and met with property representatives, including John Cook who has tenure with Valley Water and holds the title of Water Treatment Supervisor. According to Mr. Cook, the water treatment plant uses approximately 14 chemicals that are considered hazardous in their delivered concentrations. Diesel generators and fuel tanks are present at the Subject Property. These appeared in good condition with secondary containment; however, the facility began operations in 1974, and there is potential for a history of unknown diesel fuel leaks.

Valley Water personnel noted that during a previous project, serpentine rock was discovered at the property. These rocks may contain naturally occurring asbestos (NOA). A 1999 asbestos survey by Harding Lawson Associates of the property revealed that the transited panels in the roof eaves, olive floor tiles in the upper-level control room and exhaust insulation in the utility storage building contained various concentrations of Chrysotile (white asbestos). Mr. Cook stated that the floor tiles and roof eaves were replaced during a 2017 retrofit. Locus considers the potential presence of asbestos to be a REC. A 2000 lead survey by Harding Lawson Associates of the property revealed that the green paint on the flow meter and the beige paint chip on the flange contained 826 ppm of PBC-05 and 193 ppm of PBC-06 respectively. Dust in the pipe gallery, generator room and maintenance shop were also found to have lead. Locus considers the potential presence of lead to be a REC.

Of the 50 total listings within a one-mile radius of the Subject Property, the majority (34 database listings) were associated with the subject property, many of which are cross-listed.

There is one listing for a former LUST cleanup site associated with the PWTP (although due to an address change, this listing shows up as being 0.16 miles from the Subject Property). On July 22, 1986, a fuel leak from a 4,000-gallon diesel tank used to fuel vehicles was reported. A soil sample at the midpoint of the tank contained 41 mg/kg of total petroleum hydrocarbons. The case was closed in 1990 after the monitoring wells revealed that the leak did not pose a threat to groundwater. Locus considers this to be an HREC with respect to the potential migration of petroleum products into the soil, soil vapor, and groundwater underlying the property.

There are multiple listings associated with chemical spills at the PWTP. These include the following: in 2012, a pipeline break at PWTP caused the release of 9,000 gallon of chlorinated drinking water to a storm drain to Penitencia Creek which flows to San Francisco Bay. Dechlorination mats were deployed at the mouth of the storm drain during the release. This is listed under CHMIRS; in 2013, a ball valve ruptured during maintenance causing the release of

5,000 gallons of Sodium Hypochlorite, 12.5% concentration. The material flowed onto concrete in a secondary containment area, ACT handled containment and clean up. Given that the PWTP has operated since the 1970s, Locus considers the potential for historic chemical spills to be a REC with respect to the Subject Property. There is potential for migration of these chemicals into the soil, soil vapor, and groundwater underlying the Subject Property.

In 1999, the disposal of materials containing Asbestos and PCBs at the Santa Clara Valley Water district at 3959 Whitman Way, was reported. It is listed under the HWTS and HAZNET databases. The case was inactivated by the Department of Toxic Substances Control in February 2000. (DTSC, 2023). This case was also reported in the lead and asbestos survey reports by Harding Lawson Associates that Valley Water provided to Locus. Further discussion of these reports is presented in section 3. This is a REC with respect to the presence of hazardous building materials. The subject property is also listed under CERS due to several regulation violations, which were later brought back to code.

There are 16 listings in a one-mile radius of the Subject Property that have negligible to limited potential to impact the Subject Property for being hydraulically downgradient and/or distantness. The majority of the database listings are a business or entity that comes under RCRA NONGEN.

San Jose Water Company-Dutard Station, located on 992 Noble Avenue (0.381miles from the subject property), is a former ENVIROSOTR cleanup site. Elemental mercury was found at the Site during construction work. The site was contaminated with elemental mercury in soil at concentrations that exceed the California Human Health Screening Levels and U.S. Environmental Protection Agency Regional Screening Levels. In 2010, the Mercury impacted soil was excavated to below Site cleanup goal. Locus considers the potential migration of priority pollutant metals into the soil, soil vapor, and groundwater underlying the property to be a REC with respect to the Subject Property.

The records review located 6 active and former water wells within a 1-mile radius of the Subject Property. The closest water well was on Noble Avenue and is approximately 734 feet from the property. These wells are no longer sampled. All wells are periodically monitored under the applicable local or regional agency oversight. As such, the wells do not raise environmental concern with respect to the Subject Property.

Historic aerial photographs show that land use around the Subject Property was heavily agricultural, from as early as 1939 until around 1968. The adjoining parcels were also used for agriculture from as early as 1939 to between 1968 and 1974, when residential development began. Due to the agricultural use of the Subject Property over an approximate 29-year period, there is a strong likelihood that the land on and surrounding the Subject Property was applicated with agricultural chemicals such as pesticides and herbicides, including during a period when related material management and handling operations were unregulated (pre-1970s). Thus, Locus cannot eliminate the potential for adversely impacted shallow soil of Subject Property. This historical agricultural land use constitutes a REC in connection with the Subject Property.

Locus revealed the following in this Phase 1 HSLA inquiry:

1) One REC with respect to the release of chemicals involved in the water treatment process at the Subject Property and the potential migration of Sodium Hypochlorite and other halogenated VOCs into the soil, soil vapor, and groundwater underlying the Subject Property.
2) One REC with respect to the former ENVIROSOTR Cleanup Program due to Mercury at San Jose Water Company-Dutard Station, located on 992 Noble Avenue and the potential

migration of priority pollutant metals into the soil, soil vapor, and groundwater underlying the Subject Property.

3) One HREC with respect to the former diesel LUST Cleanup Program site Penitencia water treatment plant, located on 3559 Whitman Way and the potential migration of petroleum products into the soil, soil vapor, and groundwater underlying the Subject Property.
4) One REC with respect to hazardous building materials. Hazardous materials such as asbestos may be present within construction materials due to previous findings.
5) One REC with respect to naturally occurring chrysotile asbestos, which may be present due to weathering of the serpentine rock, during excavation work.
6) One REC with respect to lead due to previous findings and the fact that the treatment system was built before lead paint was regulated (pre-1978), and the potential migration of priority pollutant metals into the soil, soil vapor, and groundwater underlying the Subject Property.
7) One REC with respect to the historical agricultural land use of the area. Due to agricultural use of the Subject Property over an approximate 29-year period there is a strong likelihood that the land on and surrounding the Subject Property was applicated with agricultural chemicals such as pesticides and herbicides, including during a period when related material management and handling operations were unregulated (pre-1970s).

Upon consideration of the findings of this Phase 1 HSLA, Locus recommends the following with respect to the Subject Property:

1) A limited Phase 2 subsurface investigation at the Subject Property to test, see details below:
    a) Soils, groundwater, and soil vapor for petroleum hydrocarbons, associated with the former LUST cleanup sites.
    b) Soils, groundwater, and soil vapor for priority pollutant metals associated with mercury from the former ENVIROSTOR cleanup site at 992 Noble Avenue.

c) Soils, groundwater, and soil vapor for VOCs, halogenated VOCs and other chemicals associated with the water treatment process.

d) Shallow soils for pesticides and herbicides associated with historical agricultural land use.

e) Hazardous materials facilities survey to test for lead and naturally occurring Chrysotile asbestos and asbestos.

In the short-term, the results of this investigation should be compared against any applicable local, state, and federal guidelines, for example, RWQCB Environmental Screening Limits (ESLs), DTSC limits, and applicable hazardous materials standards, to ensure Valley Water employees and contractors are working in a safe environment during field activities. Other ESLs should be considered in relation to Valley's Water's intended long-term use and/or occupancy of the Subject Property.

Locus recommends that Valley Water perform a soil and groundwater quality investigation to evaluate subsurface conditions in any proposed excavation or construction area to evaluate potential impacts to Valley Water's proposed use of the Subject Property, including evaluation of soil management options for materials produced during exaction and construction and potential health and safety impacts to Valley Water workers. A typical investigation would consist of collecting representative soil and groundwater samples from three borings advanced in the proposed construction area of the Subject Property. One boring should be located adjacent to the Solids Handling and Dewatering facility to evaluate potential impacts related to its operations, off-site migration, and previous site uses, one boring should be located adjacent to the Washwater Handling and Treatment facility to evaluate potential impacts related to its operations, off-site migration, and previous site uses and the third boring should be located adjacent to the Sedimentation Basis Sludge Withdrawal facility to evaluate potential impacts related to its operations, off-site migration and previous site uses. Soil samples will be collected by direct push technologies at depths of 1, 5, and 25 feet below ground surface or before first encounter to groundwater. They should be analyzed for petroleum hydrocarbons (including gasoline, diesel, and oil), VOCs, polychlorinated biphenyls, semi-volatile organic compounds, PCBs, organochlorine pesticides, metals, and asbestos. If groundwater is encountered prior to the final depth, then a groundwater sample should be taken. Groundwater samples collected from the borings should be analyzed for petroleum hydrocarbons, VOCs, dissolved metals, and pH. Typical costs for an investigation of this type are in the range of $30,000 to $40,000.

Unless otherwise advised, recommendations included in the Phase 1 HSLA are not conditional to property transactions. Recommendations that call for additional investigation assist the user in making informed business decisions about the property. With regard to Superfund liability, the additional investigation would provide the user with a level of knowledge to satisfy the innocent landowner's defense under CERCLA.

1. Introduction

At the request of Santa Clara Valley Water District (Valley Water), Locus Technologies (Locus) conducted this Hazardous Substance Liability Assessment (Phase 1 HSLA) for the Subject Property located at 3959 Whitman Way, San Jose, California, APN 595-04-072 (Figure 1). Phase 1 HSLA was conducted in general accordance with the approved scope of work dated 22 May 2023 and ASTM International (ASTM) Standard E1527-21.

The Subject Property is a 21.6-acre property comprised of the Penitencia Water Treatment Plant (PWTP) owned by Valley Water. Valley Water's intent for performing this Phase 1 HSLA on the Subject Property is for the removal and replacement of existing water treatment plant residuals management facilities, which includes demolition, excavation, and construction. This Phase 1 HSLA will be used by Valley Water to inform and support preparation of other environmental documents for the PWTP Residuals Management Project.

1.1. Scope of Work and Purpose

The purpose of an Phase 1 HSLA is to identify:

1) Recognized environmental conditions and controlled recognized environmental conditions associated with the historical use of the property.

2) Recognized physical conditions of buildings and adjacent grounds; and

3) Recognized present operational practices.

ASTM E1527-21 defines a recognized environmental condition (REC) as: "(1) the presence of hazardous substances or petroleum products in, on, or at the Subject Property due to a release to the environment; (2) the likely presence of hazardous substances or petroleum products in, on, or at the subject property due to a release or likely release to the environment; or (3) the presence of hazardous substances or petroleum products in, on, or at the subject property under conditions that pose a material threat of a future release to the environment. A de minimis condition is not a recognized environmental condition."

ASTM E1527-21 defines Historical Recognized Environmental Condition (HREC) as: "a previous release of hazardous substances or petroleum products affecting the subject property that has been addressed to the satisfaction of the applicable regulatory authority or authorities and meeting unrestricted use criteria established by the applicable regulatory authority or authorities without subjecting the subject property to any controls (for example, activity and use limitations or other property use limitations). A historical recognized environmental condition is not a recognized environmental condition."

ASTM E1527-21 defines a Controlled Recognized Environmental Condition (CREC) as: "a recognized environmental condition affecting the subject property that has been addressed to the satisfaction of the applicable regulatory authority or authorities with hazardous substances or petroleum products allowed to remain in place subject to implementation of required controls (for example, activity and use limitations or other property use limitations)."

ASTM E1527-21 defines a de minimis condition as a condition: "related to a release that generally does not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies."

ASTM E1527-21 defines a Business Environmental Risk (BER) as: "a risk which can have a material environmental or environmentally driven impact on the business associated with the current or planned use of commercial real estate, not necessarily related to those environmental issues required to be investigated in this practice. Consideration of BER issues may involve addressing one or more non-scope considerations."

A Phase 1 HSLA consists of four general components: (1) a records review, (2) a site reconnaissance, (3) interviews, and (4) a report. This assessment report contains the results of reconnaissance of the Subject Property and surrounding properties, interviews, and a review of property, government, and historical records. Information used to complete the Phase 1 HSLA was reasonably ascertainable and physically observable.

Recommendations included in the Phase 1 HSLA are not conditional to property transactions. Recommendations that call for additional investigation assist the user in making informed business decisions about the property. With regard to Superfund liability, the additional investigation would provide the user with a level of knowledge to satisfy the innocent landowner's defense under CERCLA.

1.1.1. Special Terms and Conditions

Except as specified below, this document has been prepared by Locus solely for the use and benefit of Valley Water. Upon approval by Valley Water, Locus will provide express written consent to rely on this document to other entities requested by Valley Water. Any use of this document or information herein by persons or entities other than Valley Water, without the express written consent of Locus, will be at the sole risk and liability of said person or entity, and Locus will not be liable to Valley Water, or such persons or entities, for any damages resulting therefrom. It is understood that this document may not include all information pertaining to the described properties.

1.1.2. Limitations and Exceptions of Phase 1 HSLAs

ASTM E1527-21 acknowledges that "No environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with a property." The Phase 1 HSLA "is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions in connection with a property, and this practice recognizes reasonable limits of time and cost." Furthermore, the ASTM E1527-21 states that "There is a point at which the cost of information obtained, or the time required to gather it outweighs the usefulness of the information and, in fact, may be a material detriment to the orderly completion of transactions.”

1.1.3. Personnel Performing Phase 1 HSLAs and Qualifications

The qualifications of the environmental professional completing this Phase 1 HSLA, as defined by 40 CFR § 312.10, are presented in Appendix A. This Phase 1 HSLA was completed by the following Locus personnel:

1) Urmika Venkateshwaran, Environmental Engineering Assistant, Report Preparation.
2) David Wright, Senior Project Manager and Client Liaison, Technical Reviewer and Environmental Professional.
3) Nancy-Jeanne LeFevre, P.E., Senior Project Quality Assurance / Quality Control Manager and Environmental Professional, Technical Reviewer.

1.1.4. Phase 1 HSLA User Responsibilities

Section 6 of ASTM E1527-21 outlines the responsibilities of the user of an Phase 1 HSLA to assist in the identification of potential recognized environmental conditions. These responsibilities include the following:

1) A review of reasonably ascertainable land title records and liens that might be recorded against the property. These might include environmental liens, or activity and use limitations (deed recordations and/or deed restrictions). As part of this Phase 1 HSLA, Locus has not been notified of any such liens or restrictions. The site is present on an active landslide site, the Penitencia Creek Landslide. The Penitencia Creek landslide is a creeping landslide that probably developed about 18,000 to 20,000 years ago and is still active. The existing landslide occupies about 240 acres of land that includes the Valley Water's PWTP, DWR's Terminal Reservoir, and San Jose Water Company's Dutard Reservoir. Because the plant is essentially moving as a unit with the landslide, very little differential

movement is occurring. This explains why very limited structural damage has occurred at the plant since its original construction in 1973/74 (Thomas et al., 2019).

2) Communication to the environmental professional of any specialized knowledge or experience, or other information that might be material to the identification of recognized environmental conditions. The specialized knowledge Valley Water communicated to Locus with respect to this Phase 1 HSLA was background information on their PWTP Residuals Management Project, including 1999 Asbestos Survey Report, 2000 Lead Survey Report, 2000 TM-Hazardous Materials, Fire Code and Air Quality Evaluation.
3) Consideration of the purchase price to the fair market value of the property assuming the property has not been contaminated through past usage. No information regarding the purchase price or fair market value was provided to Locus.

1.1.5. Phase 1 HSLA Disclaimers

Locus has performed this Phase 1 HSLA in general conformance with the scope and limitations of the ASTM standard and subject to the conditions and limitations noted herein and in the Site Assessment Terms and Conditions, which were included with the proposal. The information from the site reconnaissance is based on the conditions existing on the date of Locus' visit to the property. The findings and conclusions presented herein are professional opinions based solely on visual observations of the facility and vicinity, and interpretation of information provided or reasonably available to Locus. Past conditions were considered based on observations, readily available records, interviews, and recollections.

Locus does not warrant or guarantee the correctness, completeness, and/or present-day applicability of the information obtained from third parties contained in the environmental record sources and recollections used for this assessment. Such information is the product of independent investigation by parties other than Locus and/or information maintained by government agencies.

Detailed indoor air quality, asbestos, lead-based paint (LBP), occupational health and safety, radon, and wetland surveys, were not requested, nor included, as part of this project with respect to Locus. As noted, Valley Water provided previously conducted asbestos and lead-based paint (LBP) surveys.

Information, limitations, and disclaimers provided in this general section apply to all the property-specific sections included in the remaining report.

1.2. Property Description

1.2.1. Geographical Location and Legal Description

The Subject Property is located at 3959 Whitman Way, San Jose, California and covers the parcel APN 595-04-072 (Figure 1). The recorded property size is 21.6 acres and is located within incorporated San Jose. The Subject Property is located on the eastern side of Santa Clara Valley about 5 miles northeast of downtown San Jose, California.

The Subject Property is situated on an approximately 240-acre creeping landslide known as Penitencia Creek Landslide (Valley Water, 2001a). Land use at the Subject Property is designated Public/Quasi-public (PQP) according to the City of San Jose’s 2020 General Plan.

1.2.2. Current and Prior Property Uses

The Subject Property is comprised of the Penitencia Water Treatment Plant (PWTP) owned by Valley Water. The facility treats 42 million-gallon per day (MGD) and first began operations in 1974. Prior to its current use, records suggest the property was used for agriculture from 1939 until around 1968.

1.2.3. Current Uses of Adjoining Properties

The adjoining properties to the north and east of the Subject Property are rural rangeland. Residential neighborhoods are present to the south and west of the subject property.

1.2.4. Physical Characteristics of the Property

1.2.4.1.1. Topography and Surface Hydrology

Based on the most recent USGS historical topographic map of, the Subject Property elevation is approximately 415 feet above mean sea level (msl). The Subject Property is on a hillside and the top elevation is 472 feet above msl and the bottom elevation is 381 feet above msl. The proposed residuals management project will occur at the bottom location, which is at elevation 381 feet above msl. The local topography indicates sloping towards the Baylands of the San Francisco Bay.

1.2.4.1.2. Geology

The subject property is situated within the Santa Clara Valley, east of the Santa Cruz Mountains in the State of California. The Santa Cruz Mountains are part of the Pacific Coast Ranges, which are northwest-trending mountain ranges (2,000 to 4,000, occasionally 6,000 feet elevation above sea level), and valleys. The ranges and valleys trend northwest, subparallel to the San Andreas Fault. Strata dip beneath alluvium of the Great Valley. To the west is the Pacific Ocean. The coastline is uplifted, terraced and wave-cut. The Coast Ranges are composed of thick Mesozoic and Cenozoic sedimentary strata. The northern and southern ranges are separated by a depression containing the San Francisco Bay and Santa Clara Valley. The northern Coast Ranges are dominated by irregular, knobby, landslide topography of the Franciscan Complex. The eastern border is characterized by strike-ridges and valleys in Upper Mesozoic strata. In several areas, Franciscan rocks are overlain by volcanic cones and flows of the Quien Sabe, Sonoma and Clear Lake volcanic fields. The Coast Ranges are subparallel to the active San Andreas Fault. The San Andreas is more than 600 miles long, extending from Point Arena to the Gulf of California. West of the San Andreas is the Salinian Block, a granitic core extending from the southern extremity of the Coast Ranges to the north of the Farallon Islands.

1.2.4.1.3. Hydrogeology

The Subject Property is located in the Santa Clara subbasin of the Santa Clara Valley groundwater basin. The water bearing formations of the Santa Clara subbasin include Pliocene to Holocene age continental deposits of unconsolidated to semi-consolidated gravel, sand, silt and clay. Two members form this group, the Santa Clara Formation of Plio-Pleistocene age and the younger alluvium of Pleistocene to Holocene age (DWR, 2004). Lithologic similarities make distinction between these two units difficult based on available boring data. The combined thickness of these two units probably exceeds 1,500 feet (DWR, 2004).

The Santa Clara Formation is of Plio-Pleistocene age and rests unconformably on impermeable base rock that marks the bottom of the groundwater subbasin (DWR, 2004). The Santa Clara Formation is exposed only on the west and east sides of the Santa Clara Valley. Where exposed, it is composed of poorly sorted deposits ranging in grain size from boulders to silt (DWR, 2004). Well logs indicate that permeability increases from west to east and that in the central part of the valley permeability and grain size decrease with depth (DWR, 2004).

Pleistocene to Holocene alluvium is the most important water bearing unit in the Santa Clara subbasin. The permeability of the valley alluvium is generally high and principally all large production wells derive their water from it (DWR, 2004). Comprised generally of unconsolidated gravel, sand, silt, and clay, it was deposited as series of convergent alluvial fans. It becomes progressively finer grained at the central portions of the valley. A confined zone is created in the northern portion of the subbasin where overlain by a low permeability clay layer (Valley Water, 2001b). The southern portion of the subbasin is generally unconfined and contains no thick clay layers (Valley Water, 2001b).

No local hydrogeological data within a search radius of 1 mile from the Subject Property was available for determining the depth to groundwater at the Subject Property. However, based on

Valley Water's Historical Groundwater Elevation GIS Portal, the Subject Property is in a region of the Santa Clara Subbasin where the generalized depth to first groundwater 5-10 ft-bgs, with a hydraulic gradient to the south (Valley Water, 2023).

1.2.4.1.4. Active Faulting and Seismicity

Information regarding faulting is based on digitized Quaternary fault lines prepared by the United States Geological Survey (USGS, 2023). The Southeast Extension of the Hayward fault (USGS Fault ID 55) is an active fault line roughly 4,500 feet northeast of the Subject Property.

2. Records Review

Locus relied on the following reports provided by Environmental Data Resources, Inc. (EDR) for information provided in this section:

1) *Radius Map with GeoCheck®* – An electronic search of standard environmental record sources. This report contains certain information obtained from a variety of public and other sources reasonably available to EDR. A copy of the report is provided in Appendix C.
2) *Aerial Photo Decade Package* – Historical aerial photographs were provided from a variety of sources reasonably available to EDR. This package contains digitally reproduced aerial photographs which can identify past structural features on the site and assist in evaluating potential liability on a target property resulting from past activities. A copy of the report is provided in Appendix D.
3) *Historical Topographic Map Report* – Topographic maps were provided from a variety of sources reasonably available to EDR. This report shows both natural and man-made features and assists in evaluating potential liability on a target property resulting from past activities. A copy of the report is provided in Appendix E.
4) *Sanborn Map Report* – Sanborn Maps were not available for the Subject Property (Appendix F). This report contains fire insurance maps covering the target property, which can be used to estimate fire insurance liabilities.
5) *City Directory Abstract* – No historical directory listings for the Subject Property were available for addresses within the Subject Property and at nearby addresses (Appendix G).

Summaries of each of the standard environmental record source reviews are provided in Section 3.2 through 3.4.

2.1. Physical Setting Review

2.1.1. Topography

Based on the most recent US Geological Survey (USGS) historical topographic map (2023), the Subject Property elevation is approximately 415 feet above mean sea level (msl). The site Subject Property is on a hillside and the top elevation is 472 feet above msl and the bottom elevation is 381 feet above msl. The proposed residuals management project will occur at the bottom location, which is at elevation 381 feet above msl. The local topography indicates sloping towards the Baylands of the San Francisco Bay.

2.1.2. Soil, Groundwater, Geology

According to the US Department of Agriculture's (USDA) National Resources Conservation Service (NRCS) Web Soil Survey (WSS), the dominant shallow soil types are Montara-Santerhill complex, 15 to 30 percent slope soils (303). The parent material of these soil types is primarily slope alluvium and Residuum weathered from serpentinite. Weathering of the serpentine rock may lead to naturally occurring chrysotile asbestos. Locus considers this to be a REC with respect to the threat of a future release to the environment due to the proposed subsurface excavation work as part of the residuals management project.

Regional groundwater flow direction in the vicinity is south (Valley Water, 2023).

The Subject Property is located along eastern boundary of the Santa Clara Valley where the bedrock consists of highly folded and faulted Jurassic-Cretaceous marine sedimentary rocks of the Berryessa Formation, and Miocene rocks of the Monterey Group and the Briones Formation. These rocks are in turn unconformably overlain by folded and poorly indurated, terrestrial clays, sands, and gravels of the Plio-Pleistocene Santa Clara Formation (Valley Water, 2001a). The PWTP is underlain by the well-documented Penitencia Creek Landslide, which presents geologic hazards with respect to the design and hillside development of the residuals management project.

2.1.3. Wetlands

There are no state or federal wetlands within a 1-mile radius of the Subject Property.

2.1.4. Surface Water

Dr. Robert gross ponds associated with the Penitencia Creek water system is present approximately 0.8 miles south from the Subject Property.

2.2. Federal, State and Tribal Environmental Database Review

2.2.1. Database Listings

Based on EDR's search radius at and adjacent to the Subject Property, no database listings were associated with the Subject Property. There were 50 database listings recorded within an approximate 1-mile radius of the Subject Property in the databases searched. EDR's database search results are summarized in the table below.

DATABASE	*LISTINGS BY SEARCH RADIUS*			
	SUBJECT PROPERTY	>0 – ¼ MI.	>¼ – ½ MI.	>½ – 1 MI.
CERS	2	0	0	0
CERS HAZ WASTE	1	0	0	0
CERS TANKS	1	0	0	0
CHMIRS	3	0	0	0
CIWQS	3	0	0	0
CORTESE	0	2	0	0
CUPA LISTINGS	1	0	0	0
ECHO	2	0	0	0
EMI	1	0	0	0

DATABASE	*LISTINGS BY SEARCH RADIUS*			
	SUBJECT PROPERTY	>0 – ¼ MI.	>¼ – ½ MI.	>½ – 1 MI.
ENF	1	0	0	0
ENVIROSTOR	0	1	0	0
ERNS	1	0	0	0
FINDS	2	0	0	0
HAZMAT	1	0	0	0
HAZNET	3	0	0	0
HIST CORTESE	0	0	1	0
HIST LUST	0	0	1	0
HIST UST	0	1	0	0
HWTS	5	0	0	0
LUST	0	2	0	0
NPDES	2	0	0	0
RCRA NONGEN / NLR	1	6	0	0
RCRA-SQG	2	0	0	0
SWEEPS UST	0	1	0	0
UST	2	0	0	0
VCP	0	0	1	0
TOTAL	**34**	**13**	**3**	**0**

Of the 50 total listings within a one-mile radius of the Subject Property, the majority (34 database listings) were associated with the subject property, many of which are cross-listed.

There is one listing for a former LUST cleanup site associated with the PWTP (although due to an address change, this listing shows up as being 0.16 miles from the Subject Property). On July 22, 1986, a fuel leak from a 4,000-gallon diesel tank used to fuel vehicles was reported. A soil sample at the midpoint of the tank contained 41 mg/kg of total petroleum hydrocarbons. The case was closed in 1990 after the monitoring wells revealed that the leak did not pose a threat to groundwater. Locus considers this to be a REC with respect to the potential migration of petroleum products into the soil, soil vapor, and groundwater underlying the property.

There are multiple listings associated with chemical spills or chlorinated water spills at the PWTP. These include the following:

(1) A listing in the CHMIRS database for a 2012 pipeline break at PWTP that caused the release of 9,000 gallon of chlorinated drinking water the drain into Penitencia Creek which flows to San Francisco Bay. Dechlorination mats were deployed at the mouth of the storm drain during the release.

(2) A listing in the CHMIRS database for a ball valve rupture in 2013 during maintenance causing the release of 5,000 gallons of Sodium Hypochlorite, 12.5% concentration, to flow onto concrete in a secondary containment area, which ACT handled through containment and clean up.

(3) A listing in the CHMIRS database for a 2015 mechanical failure that resulted in the release of approximately 250 gallons of chlorinated drinking water into a storm drain which leads to Sierra Creek.

Given that the PWTP has operated since the 1970s, Locus considers the potential for historic chemical spills to be a REC with respect to the Subject Property. There is potential for migration of these chemicals into the soil, soil vapor, and groundwater underlying the Subject Property.

There is one listing from 1999 in the HWTS and HAZNET databases for the disposal of materials containing Asbestos and PCBs at the Santa Clara Valley Water district at 3959 Whitman Way was reported. The case was inactivated in February 2000. This case was also reported in the lead and asbestos survey reports that Valley Water provided to Locus (HLA 1999, HLA 2000, TMS 2000). Further discussion of these reports is presented in Section 3. This is a REC with respect to the presence of hazardous building materials. The subject property is also listed under CERS due to several regulation violations, which were later brought back to code and have limited environmental risk to the Subject Property.

There are 16 listings in a one-mile radius of the Subject Property that have negligible to limited potential to impact the Subject Property for being hydraulically downgradient and/or distantness. The majority of the database listings are a business or entity that comes under RCRA NONGEN.

Notably, there are two former cleanup sites. Sid Sakane property, located on 1039 Noble Avenue (1,700 feet southwest of the subject property), is also a former LUST cleanup site. On October 3, 1995, holes were observed in a 350-gallon gasoline tank. At the time, the tank had not been in operation for fifteen years. A potential leak was reported. Discolored soil and significant levels of contamination were present, 260 ppm of total petroleum hydrocarbons was reported in the soil below the tank. After excavation of contaminated soil and backfilling with clean soil, the case was closed in 1995. However, since this site is hydraulically downgradient from the subject property, Locus considers this to be low concern with respect to the residuals management project at the Subject Property.

San Jose Water Company-Dutard Station, located on 992 Noble Avenue (2,000 feet upgradient from the subject property), is a former ENVIROSOTR cleanup site. Elemental mercury was found at the site during construction work to replace an altitude valve box. Upon discovery of mercury within the excavation, work was halted, and the excavation covered. The mercury likely originated from the altitude valve control mechanism used at this facility many decades ago. It is not known how or when the mercury was released from the valve control. The site was contaminated with elemental mercury in soil at concentrations that exceed the California Human Health Screening Levels and U.S. Environmental Protection Agency Regional Screening Levels. In 2010, the Mercury impacted soil was excavated to below Site cleanup goal. Locus considers the potential for similar unknown spills of mercury and/or the migration of priority pollutant metals into the soil, soil vapor, and groundwater underlying the property to be a REC with respect to the Subject Property.

2.2.2. Water Wells

The records review located 6 active and former water wells within a 1-mile radius of the Subject Property. The closest water well was on Noble Avenue and is approximately 730 feet from the property. These wells are no longer sampled. All wells are periodically monitored under the applicable local or regional agency oversight. As such, the wells do not raise environmental concern with respect to the Subject Property. Refer to Section 5.2 for findings associated with these wells.

Locus did not identify water wells on the Subject Property. Refer to Section 3.4 for further details.

2.2.3. Oil Production

No oil wells are located within a 1-mile radius of the Subject Property.

2.3. Historical Records Review

2.3.1. Aerial Photographs

Aerial photographs were provided by EDR (EDR, 2023). Copies of the aerial photographs are included in Appendix D. The aerial photographs were reviewed to evaluate development on the Subject Property and adjacent properties.

YEAR	DESCRIPTION
1939	Subject Property: The Subject property appears to be agricultural land, presumably for orchards. Adjacent Properties: The surrounding area is mostly undeveloped. Some areas are agricultural land, presumably for orchards. Trees are scattered throughout the area.
1940	Subject Property: Similar to the 1939 photo. Adjacent Properties: Similar to the 1939 photo.
1948	Subject Property: The agricultural land has expanded and appears to be more structured. Adjacent Properties: Similar to the 1939 photo.
1950	Subject Property: The resolution of this photo is lesser than the 1948 photo. What is seen appears similar to the 1948 photo. Adjacent Properties: Similar to the 1948 photo.
1956	Subject Property: Similar to the 1950 photo. Adjacent Properties: Similar to the 1950 photo.
1963	Subject Property: Similar to the 1956 photo. Adjacent Properties: Residential neighborhoods have been developed to the south and the west of the subject property.
1968	Subject Property: Agriculture is no longer present. A cylindrical tank is at the subject property. Adjacent Properties: More residential development to the south and west.

YEAR	DESCRIPTION
1974	Subject Property: There is a resolution issue with this photograph, only the top half of the photograph can be seen. What is seen is a water treatment plant at the subject property. Adjacent Properties: There is a resolution issue with this photograph, only the top half of the photograph can be seen. What is seen is residential development to the northwest and southwest of the property.
1979	Subject Property: There is a resolution issue with this photograph; a part of the right side of the photo is blacked out. What is seen appears to be similar to the 1974 photo. Adjacent Properties: There is a resolution issue with this photograph; a part of the right side of the photo is blacked out. What is seen appears to be similar to the 1974 photo, the north of property (which was blacked out in the previous photo) appears to be rangeland.
1982	Subject Property: Similar to 1979 photo. Adjacent Properties: Three water bodies are seen to the southwest, within the 1-mile radius of the property.
1993	Subject Property: Similar to 1982 photo. Adjacent Properties: Similar to 1982 photo.
1998	Subject Property: Similar to the 1991 photo. Adjacent Properties: Similar to the 1991 photo.
2006	Subject Property: Similar to the 1998 photo. Adjacent Properties: Similar to the 1998 photo.
2009	Subject Property: Similar to the 2006 photo. Adjacent Properties: Similar to the 2006 photo.
2012	Subject Property: Similar to the 2009 photo. Adjacent Properties: Similar to the 2009 photo.

YEAR	DESCRIPTION
2016	Subject Property: Similar to the 2012 photo. Adjacent Properties: Similar to the 2012 photo.
2020	Subject Property: Similar to the 2016 photo. Adjacent Properties: Similar to the 2016 photo.

Historic aerial photographs show that land use around the Subject Property was heavily agricultural, from as early as 1939 until around 1968. The adjoining parcels were also used for agriculture from as early as 1939 to between 1968 and 1974, when residential development began. Due to the agricultural use of the Subject Property over an approximate 29-year period, there is a strong likelihood that the land on and surrounding the Subject Property was applicated with agricultural chemicals such as pesticides and herbicides, including during a period when related material management and handling operations were unregulated (pre-1970s). Thus, Locus cannot eliminate the potential for adversely impacted shallow soil of Subject Property. This historical agricultural land use constitutes a REC in connection with the Subject Property.

2.3.2. Topographic Maps

Historic topographic maps were provided by EDR (EDR, 2023). Copies of the topographic maps are included in Appendix E. The topographic maps were reviewed to evaluate development on the Subject Property and adjacent properties. No RECs were identified based on Locus' review of historical topographic maps. The review is summarized below:

YEAR	DESCRIPTION
1889	Subject Property: There appears to be no development in the subject property. Adjacent Properties: There are some roads nearby

YEAR	DESCRIPTION
1897	Subject Property: Similar to the 1889 photo. Adjacent Properties: Similar to the 1889 photo.
1899	Subject Property: Similar to the 1897 photo. Adjacent Properties: Similar to the 1897 photo.
1953	Subject Property: There is agricultural land at the subject property. Adjacent Properties: There is agricultural land to the west and south of the subject property.
1961	Subject Property: Similar to the 1953 photo. Adjacent Properties: A denser road network is seen to the south of the property.
1968	Subject Property: Similar to the 1961 photo. Adjacent Properties: Residential buildings and more roads have been constructed on the properties to west and south of the subject property.
1973	Subject Property: Similar to the 1968 photo. Adjacent Properties: The road network has fully expanded on the entire west and south side adjoining the subject property.
1980	Subject Property: The water treatment plant is seen in the subject parcel. Adjacent Properties: Similar to the 1973 photo.
2012	Subject Property: Similar to the 1980 photo. Adjacent Properties: Road names are seen for all the adjoining land.
2015	Subject Property: Similar to the 2012 photo. Adjacent Properties: Similar to the 2012 photo.
2018	Subject Property: Similar to the 2015 photo. Adjacent Properties: Similar to the 2015 photo.

2.3.3. Sanborn Map

No Sanborn Maps are reported to exist for the Subject Property, according to EDR (EDR, 2023). This report contains fire insurance maps covering the target property, which can be used to estimate fire insurance liabilities. The certified report is included in Appendix F.

2.3.4. City Directory Records

The EDR City Directory Abstract is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. The City Directory Abstract includes a search and abstract of available city directory data at and surrounding the Subject Property. For each address, the directory lists the name of the corresponding occupant at five-year intervals. Business directories including city, cross reference and telephone directories were reviewed, if available, at approximately five-year intervals for the years spanning 1922 through 2020.

The Subject Property at 3959 Whitman way, in San Jose, CA is presently occupied by the Penitencia Water Treatment Plant. There is no indication in the City Directory Abstract results for the Subject Property that indicate an occupant that would have had adversely affect the Subject Property.

The surrounding properties appear to be mostly associated with private single-family and multi-family residents. There is one potential listing that could adversely affect the subject property and it is Ribbs Felix Plumbing and Heating located at 1065 Vista Del Mar Street IN 1996. Overall, the city directory findings reflect those from the EDR database listings.

The City Directory Abstract is included in Appendix G.

2.3.5. Chain of Title Records

A chain-of-title report, which records the historical transfers of title to a property, was not provided by Valley Water. Review of chain-of-title records are not a required component of completing a Phase 1 HSLA, per ASTM E1527-21.

2.3.6. Previously Prepared Environmental Reports

Previously prepared reports (Phase 1 or Phase 2 Environmental Site Assessments) were not provided by Valley Water, nor were they available for review on RWCQB's GeoTracker database or DTSC's Envirostor database.

2.3.7. Interview with Property Owner and/or Property Representative

On 18 July 2023, Locus met with Valley Water representative John Cook, Water Treatment Supervisor, who has tenure with the facility and was able to answer many of the questions on the questionnaire, refer to Appendix B. According to Mr. Cook, the water treatment plant uses approximately 14 chemicals that are considered hazardous in their delivered concentrations. Mr. Cook referred Locus to the Hazardous Business Plan (HMBP) that contains the local Certified Union Program Agencies (CUPA). He mentioned that waste oils from pumps and motors, which exceed 5 gallons, are stored in an approved storage facility until off hauled by a vendor. Mr. Cook noted that there are vent pipes, fill pipes and access ways at the chemical bulk storage tanks. He also mentioned that the adjacent properties have been used for residential purposes to the best of his knowledge. The complete notes from the on-site interview are available in Appendix B.

2.4. Local Agency Records Review

2.4.1. Santa Clara County

Locus searched the Santa Clara County Insite Portal, which is a search engine for permits and correspondence associated with planning, development, encroachment, and enforcement. The searches for the Subject Property using APN 595-04-072 did not return any result.

2.4.2. City of San Jose

Locus searched the City of San Jose's permit search tool for past and current permits issued on the Subject Property using APN 595-04-072 and the search returned 75 permit results from 1906-2022. The types of permits include new construction, alteration or repair, tenant improvement, site work, tree removals, zoning verification letters, customer service requests, over the counter, hazardous materials, new installations, grading and drainage, geologic clearance, fire protection, development permit (legacy), commercial/industrial and all other permits. The permits of interest are hazardous materials and geologic clearance. The hazardous material permits involve new installations, alterations and repairs and removals. Examples of these are installation of a tank liner in a 16,000-gallon sodium hypochlorite tank (tank 3) in 2013, installation 6100-gallon tanks for flurosilic acid storage and piping system in 2016, ammonia hydroxide tank modification in 2017, closure of a 7050-gallon polymer tank and removal of old potassium permanganate equipment.

2.4.3. Santa Clara County Department of Environmental Health

Fuel Leak Site Activity Reports are no longer maintained by Valley Water. The Fuel Leak Program was transferred to the Santa Clara County Department of Environmental Health (DEH) who maintains the most up-to-date information on fuel leak cases. The DEH uploads all case files to the GeoTracker environmental database (https://geotracker.waterboards.ca.gov/). The search for the Subject Property showed a former LUST cleanup site due to a leaking diesel tank at 3559 Whitman Way, which is discussed in Section 2.2.1.

3. Site Reconnaissance

3.1. Site Inspection Summary

On 18 July 2023, Locus conducted a walk-through inspection of the Subject Property. Locus met with Valley Water representatives John Cook, Water Treatment Supervisor, Donnalyn Steffani, Assistant Engineer, and Jonathan Lamb, Water Plant Supervisor at the Subject Property. The weather conditions were sunny and clear. Land use around the Subject Property is currently residential and rural rangeland. The site visit focused on the project area at the southwest portion of the treatment plant, shown in Figure 2.

Currently, there are three areas on the Subject Property that will be included in the residuals management Project. These are the solids handling and dewatering pits, the two filter wash water handling and treatment pits, and the sludge management building. Locus was allowed to capture limited photographs of the facility due to safety concerns.

3.2. Heating and Cooling

There were heating and cooling structures present in the sludge management building of the property. A mini split air conditioner and wall heater for the office.

3.3. Air Emission

No air emissions issues are expected for this area.

3.4. Potable Water

Potable water is supplied by PWTP.

3.5. Pits, Pools or Lagoons

The residuals management facility consists of two main areas. The solids handling and dewatering pits are located at the western end of PWTP, and the wash water handling and treatment facilities at the southeastern part of the treatment plant. Valley Water personnel described the construction materials of the existing ponds to be asphalt with an Endura-Flex coating.

3.6. Storm Water and Wastewater

Storm water is expected to drain in accordance with natural elevational gradient to the south of the Subject Property. The PWTP site's surface runoff goes to the city's storm water drain and is monitored periodically by the City of San Jose. There are sanitary sewer lines on the Subject Property.

3.7. Solid Waste

Solid waste is generated at the residuals management facilities at the Subject Property. The waste is dewatered sludge that is disposed off-site and carried away by trucks. No issue with debris, such as improper storage or disposal of potentially hazardous materials, on the Subject Property was noted.

3.8. Hazardous Waste

No hazardous waste was observed during the site reconnaissance.

3.9. Chemical Use and Storage

There are many areas of the PWTP that Locus did not have access to that may use and store chemicals. Near the residuals management facilities, there were five 5,000-gallon anionic polymer solution storage tanks present. Sodium hypochlorite (12.5%) solution storage tanks and ozone gas generators were also present in various areas of the facility. They appeared to be in good condition.

3.10. Storage Tanks

Diesel generators and fuel tanks were present at the Subject Property. These appeared in good condition with secondary containment, however, the facility is old and there is potential for unidentified diesel fuel leaks since the treatment plant began operations in the 1970s.

3.11. PCB-Containing Equipment

No obsolete electrical equipment, or other equipment that could potentially contain polychlorinated biphenyls (PCBs) was observed on-site.

3.12. Asbestos-Containing Materials (ACM)

A 1999 asbestos survey of the Subject Property provided to Locus by Valley Water revealed that the transite panels in the roof eaves, olive floor tiles in the upper-level control room, and exhaust insulation in the utility storage building contained various concentrations of Chrysotile (white asbestos). Mr. Cook stated that the floor tiles and roof eaves were replaced during a 2017 Penitencia Delivery Main and Penitencia Force Main Seismic Retrofit Project. Given that the treatment system was built during a time when asbestos was unregulated (early 1970s), Locus considers the potential presence of asbestos pipe insulation, plaster on pipe elbows and couplings, pipe connection hardware, and in other potential building materials to be a REC with respect to the subject property.

Valley Water personnel noted that during a previous project at the Subject Property, serpentine rock was discovered to contain naturally occurring asbestos. As noted in Section 2.1.2, this is a REC with respect to excavations proposed as part of the residuals management project.

3.13. Lead-Based Paint

A 2000 lead survey of the property revealed that the green paint on the flow meter and the beige paint chip on the flange contained 826 ppm of PBC-05 and 193 ppm of PBC-06 respectively. Dust in the pipe gallery, generator room and maintenance shop were also found to have lead.

Given that the treatment system was built before lead paint was regulated (pre-1978), Locus considers the potential presence of lead in building materials to be a REC.

3.14. Radon

No radon issue is expected for this area.

3.15. Fluorescent Lights

No fluorescent lights were observed on the Subject Property.

3.16. Indoor Air Quality Issues

No indoor air quality issues are expected for the Subject Property.

3.17. Monitoring Wells, Vent Pipes, Manhole Covers

Several infrastructure access points were present on site. They appeared to be well maintained and in good condition.

3.18. Stained Soil or Pavement

No surface stains were observed during the site inspection.

3.19. Stressed Vegetation

Water stressed grass was observed at the subject property.

3.20. Odors

No strong, pungent, or noxious odors were detected during the property visit.

3.21. Other

Valley Water personnel explained to Locus that the final design of the Residuals Management Project is not yet complete. Valley Water pointed out the potential project areas, however they were unsure of the excavation depths. Locus was not permitted to take photographs of the entire project area due to safety concerns.

4. Exceptions, Deletions, and Gaps

Locus has performed this Phase 1 HSLA in general conformance with the scope and limitations of ASTM E1527-21 for the Subject Property located at 3959 Whitman Way, San Jose, California, APN 595-04-072. No exceptions to, or deletions from, this practice were made.

5. Findings, Conclusion, and Recommendations

5.1. Property Description Findings

The following is a summary of findings related to the Property Description in Section 1.2:

1) At the request of Santa Clara Valley Water District (Valley Water), Locus Technologies (Locus) conducted this Hazardous Substance Liability Assessment (Phase 1 HSLA) for the parcel located at 3959 Whitman Way, San Jose, California, APN 595-04-072. The Phase 1 HSLA was conducted in general accordance with the approved scope of work dated 28 November 2022 and ASTM International (ASTM) Standard E1527-21.
2) The Subject Property is a 21.6-acre property comprised of the Penitencia Water Treatment Plant (PWTP) owned by Valley Water. Land use around the Subject Property is currently residential and rural rangeland.

5.2. Records Review Findings

The following is a summary of findings related to the Records Review described in Section 2:

1) Of the 50 total listings within a one-mile radius of the Subject Property, the majority (34 database listings) were associated with the subject property, many of which are cross-listed. There is one LUST listing associated with a leaking diesel tank, Locus considers this a HREC with respect to the potential migration of petroleum products into the soil, soil vapor, and groundwater underlying the property to be a REC with respect to the Subject Property.

   Penitencia treatment plant (0.157 miles from subject property) is a former LUST cleanup site. On July 22, 1986, a fuel leak from a 4000-gallon diesel tank was reported. A soil sample at the midpoint of the tank contained 41 mg/kg of total petroleum hydrocarbons. The case was closed in 1990 after the monitoring wells revealed that the leak did not pose a threat to groundwater.

There are multiple listings associated with chemical spills at the PWTP. These include the following: in 2012, a pipeline break at PWTP caused the release of 9,000 gallon of chlorinated drinking water to a storm drain to Penitencia Creek which flows to San Francisco Bay. Dechlorination mats were deployed at the mouth of the storm drain during the release. This is listed under CHMIRS; in 2013, a ball valve ruptured during maintenance causing the release of 5,000 gallons of Sodium Hypochlorite, 12.5% concentration. The material flowed onto concrete in a secondary containment area, ACT handled containment and clean up. This is listed under the CHMIRS database; and in 2015, a mechanical failure resulted in the release of approximately 250 gallons of chlorinated drinking water into a storm drain which leads to Sierra Creek. This is listed under the CHMIRS database. Given that the PWTP has operated since the 1970s, Locus considers the potential for historic chemical spills to be a REC with respect to the Subject Property. There is potential for migration of these chemicals into the soil, soil vapor, and groundwater underlying the Subject Property.

In 1999, the disposal of materials containing Asbestos and PCBs at the Santa Clara Valley Water district at 3959 Whitman Way, was reported. It is listed under the HWTS and HAZNET databases. The case was inactivated in February 2000. This case was also reported in the lead and asbestos survey reports that Valley Water provided to Locus. Further discussion of these reports is presented in section 3. This is a REC with respect to the presence of hazardous building materials. The subject property is also listed under CERS due to several regulation violations, which were later brought back to code.

There are 16 listings in a one-mile radius of the Subject Property that have negligible to limited potential to impact the Subject Property for being hydraulically downgradient and/or distantness. The majority of the database listings are a business or entity that comes under RCRA NONGEN.

San Jose Water Company-Dutard Station, located on 992 Noble Avenue (0.381miles from the subject property), is a former ENVIROSOTR cleanup site. Elemental mercury was found at the Site during construction work to replace an altitude valve box. Upon discovery of mercury within the excavation, work was halted, and the excavation covered. The mercury likely originated from the altitude valve control mechanism used at this facility many decades ago. It is not known how or when the mercury was released from the valve control. The site was contaminated with elemental mercury in soil at concentrations that exceed the California Human Health Screening Levels and U.S. Environmental Protection Agency Regional Screening Levels. In 2010, the Mercury impacted soil was excavated to below Site cleanup goal. Locus considers the potential migration of priority pollutant metals into the soil, soil vapor, and groundwater underlying the property to be a REC with respect to the Subject Property.

2) . The records review located 6 active and former water wells within a 1-mile radius of the Subject Property. The closest water well was on Noble Avenue and is approximately 734 feet from the property. These wells are no longer sampled. All wells are periodically monitored under the applicable local or regional agency oversight. As such, the wells do not raise environmental concern with respect to the Subject Property. All wells are periodically monitored under the applicable local or regional agency oversight. As such, the wells do not raise environmental concern with respect to the Subject Property. No oil wells are located within a 1-mile radius of the Subject Property.

3) Historic aerial photographs show that land use around the Subject Property was heavily agricultural, from as early as 1939 until around 1968. The adjoining parcels were also used for agriculture from as early as 1939 to between 1968 and 1974, when residential development began. Due to the agricultural use of the Subject Property over an approximate 29-year period, there is a strong likelihood that the land on and surrounding the Subject Property was applicated with agricultural chemicals such as pesticides and herbicides, including during a period when related material management and handling operations were unregulated (pre-1970s). Thus, Locus cannot eliminate the potential for adversely impacted shallow soil of Subject Property. This historical agricultural land use constitutes a REC in connection with the Subject Property. There are no Sanborn Maps available for the property.
4) Generally, land use around the Subject Property is currently residential and rural rangeland. Historically, the area was used for a mix of residential and agricultural purposes.

5.3. Site Reconnaissance Findings

The following is a summary of findings related to the Site Reconnaissance and Interviews described in Section 3:

1) Land use surrounding the Subject Property is residential and rural rangeland. The site visit focused on the project area at the southwest portion of the treatment plant. Currently, there are three areas on the Subject Property that will be included in the residuals management Project. These are the solids handling and dewatering pits, the two filter wash water handling and treatment pits, and the sludge management building. Valley

Water personnel described the construction materials of the existing ponds to be asphalt with an Endura-Flex coating.

2) Storm water is expected to drain in accordance with natural elevational gradient to the south of the Subject Property to storm drains along the driveway and in the street. Wastewater generated at the Subject Property is removed by public sewer. Potable water at the facility is generated at the facility itself.
3) No issue with debris was noted on the Subject Property.
4) Several infrastructure access vaults were observed in the southern portion of the Subject Property. They appeared to be well maintained and in good condition.
5) Valley Water personnel noted that during a previous project, serpentine rock was discovered at the property. These rocks may contain asbestos.

5.4. Conclusions

After completing this Phase 1 HSLA, this section summarizes Locus' conclusions in connection with the Subject Property's HSLA, with recommendations for further action as appropriate. Specifically, this Phase 1 HSLA inquiry has revealed:

1) One REC with respect to the release of chemicals involved in the water treatment process at the Subject Property and the potential migration of Sodium Hypochlorite and other halogenated VOCs into the soil, soil vapor, and groundwater underlying the Subject Property.
2) One REC with respect to the former ENVIROSOTR Cleanup Program due to Mercury at San Jose Water Company-Dutard Station, located on 992 Noble Avenue and the potential migration of priority pollutant metals into the soil, soil vapor, and groundwater underlying the Subject Property.

3) One HREC with respect to the former diesel LUST Cleanup Program site Penitencia water treatment plant, located on 3559 Whitman way and the potential migration of petroleum products into the soil, soil vapor, and groundwater underlying the Subject Property.
4) One REC with respect to hazardous building materials. Hazardous materials such as asbestos may be present within construction materials due to previous findings.
5) One REC with respect to naturally occurring chrysotile asbestos, which may be present due to weathering of the serpentine rock, during excavation work.
6) One REC with respect to lead due to previous findings and the fact that the treatment system was built before lead paint was regulated (pre-1978), and the potential migration of priority pollutant metals into the soil, soil vapor, and groundwater underlying the Subject Property.
7) One REC with respect to the historical agricultural land use of the area. Due to agricultural use of the Subject Property over an approximate 29-year period there is a strong likelihood that the land on and surrounding the Subject Property was applicated with agricultural chemicals such as pesticides and herbicides, including during a period when related material management and handling operations were unregulated (pre-1970s).

5.5. Recommendations

After completing this Phase 1 HSLA, Locus recommends the following with respect to the Subject Property:

1) A limited Phase 2 subsurface investigation at the Subject Property to test:
    a) Soils, groundwater, and soil vapor for petroleum hydrocarbons, associated with the former LUST cleanup site at the subject property.
    b) Soils, groundwater, and soil vapor for priority pollutant metals associated with mercury from the former ENVIROSTOR cleanup site at 992 Noble Avenue.

c) Soils, groundwater, and soil vapor for VOCs, halogenated VOCs and other chemicals associated with the water treatment process.

d) Shallow soils for pesticides and herbicides associated with historical agricultural land use.

e) Hazardous materials facilities survey to test for lead, naturally occurring Chrysotile asbestos and asbestos.

In the short-term, the results of this investigation should be compared against any applicable local, state, and federal guidelines, for example, RWQCB Environmental Screening Limits (ESLs), DTSC limits, and applicable hazardous materials standards, to ensure Valley Water employees and contractors are working in a safe environment during field activities. Other ESLs should be considered in relation to Valley's Water's intended long-term use and/or occupancy of the Subject Property. The estimated cost to perform the limited Phase 2 investigation would be $25,000 to $30,000.

Locus recommends that Valley Water perform a soil and groundwater quality investigation to evaluate subsurface conditions in any proposed excavation or construction area to evaluate potential impacts to Valley Waters proposed use of the Subject Property, including evaluation of soil management options for materials produced during exaction and construction and potential health and safety impacts to Valley Water workers. A typical investigation would consist of collecting representative soil and groundwater samples from three borings advanced in the proposed construction area of the Subject Property. One boring should be located adjacent to the Solids Handling and Dewatering facility to evaluate potential impacts related to its operations, off-site migration, and previous site uses, one boring should be located adjacent to the Washwater Handling and Treatment facility to evaluate potential impacts related to its operations, off-site migration, and previous site uses and the third boring should be located adjacent to the Sedimentation Basis Sludge Withdrawal facility to evaluate potential impacts related to its operations, off-site migration and previous site uses. Soil samples will be collected by direct push technologies at depths of 1, 5, and 25 feet below ground surface or before first encounter to groundwater. They should be analyzed for petroleum hydrocarbons (including gasoline, diesel, and oil), VOCs, polychlorinated biphenyls, semi-volatile organic compounds, PCBs, organochlorine pesticides, metals, and asbestos. If groundwater is encountered prior to the final depth, then a groundwater sample should be taken. Groundwater samples collected from the borings should be analyzed for petroleum hydrocarbons, VOCs, dissolved metals, and pH. Typical costs for an investigation of this type are in the range of $30,000 to $40,000.

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FIGURES

APPENDIX A

ENVIRONMENTAL PROFESSIONAL QUALIFICATIONS

APPENDIX B

SITE RECONNAISSANCE AND QUESTIONNAIRE FORMS

APPENDIX C

EDR RADIUS MAP

APPENDIX D

AERIAL PHOTOGRAPHS

APPENDIX E

TOPOGRAPHIC MAPS

APPENDIX F

SANBORN MAP REPORT

APPENDIX G

CITY DIRECTORY RECORDS

APPENDIX H

CHAIN OF TITLE REPORT

APPENDIX I

OTHER RELEVANT DOCUMENTS

APPENDIX J

SITE RECONNAISSANCE PHOTOLOG

APPENDIX F

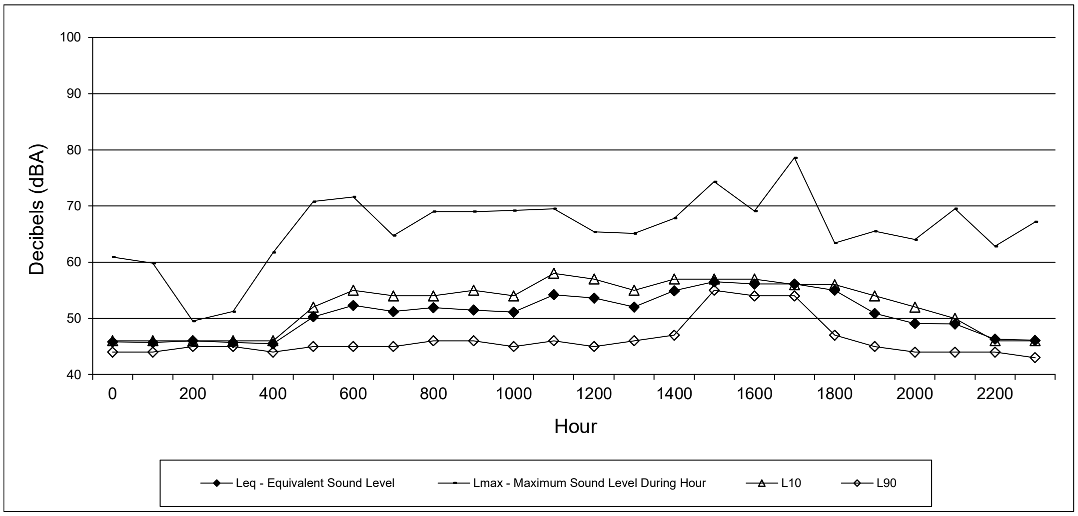
Noise Monitoring Data and Calculations

Noise Appendix

Long Term Noise Measurement Graphs for Sites 1 - 4

RCNM Noise Modeling Results (A1-A5)

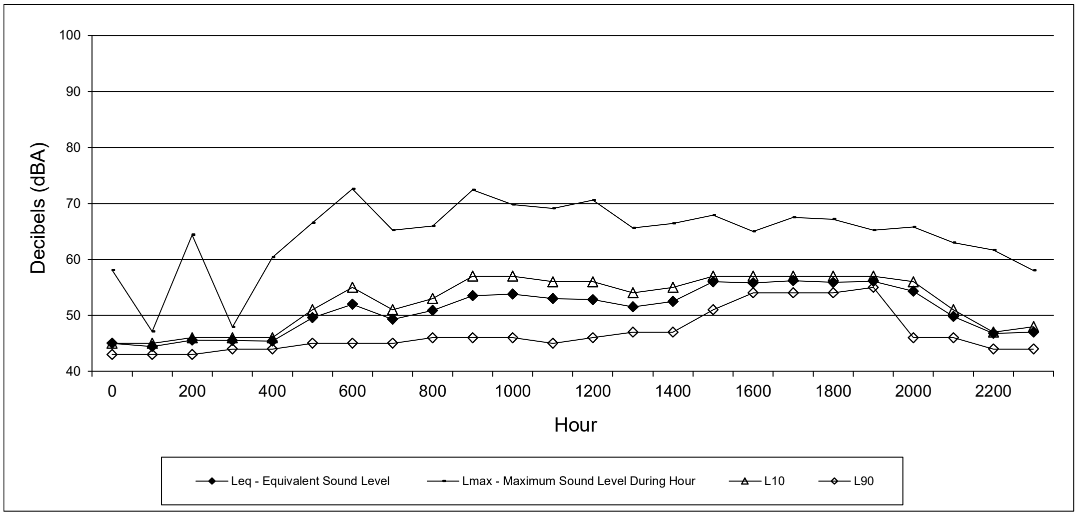
RCHGROUP
planning & environmental consulting



Site 1: Southwestern Project boundary, directly adjacent to Dutard pump enclosure
Tuesday June 27, 2023

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	46	61	46	44
100	46	60	46	44
200	46	50	46	45
300	46	51	46	45
400	46	62	46	44
500	50	71	52	45
600	52	72	55	45
700	51	65	54	45
800	52	69	54	46
900	52	69	55	46
1000	51	69	54	45
1100	54	70	58	46
1200	54	65	57	45
1300	52	65	55	46
1400	55	68	57	47
1500	57	74	57	55
1600	56	69	57	54
1700	56	79	56	54
1800	55	63	56	47
1900	51	66	54	45
2000	49	64	52	44
2100	49	70	50	44
2200	46	63	46	44
2300	46	67	46	43

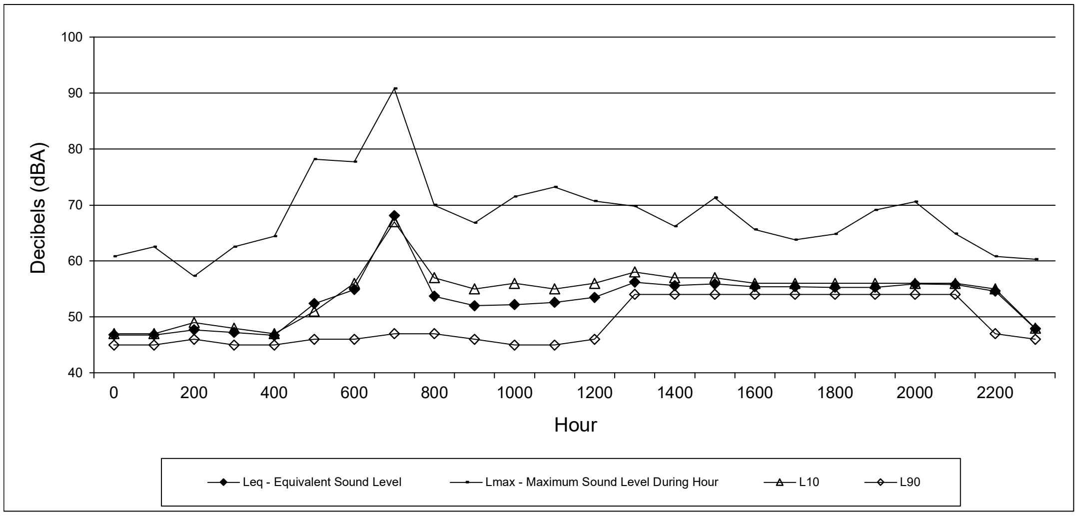
CNEL 56



Site 1: Southwestern Project boundary, directly adjacent to Dutard pump enclosure
Wednesday June 28, 2023

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	45	58	45	43
100	44	47	45	43
200	46	64	46	43
300	46	48	46	44
400	45	60	46	44
500	50	67	51	45
600	52	73	55	45
700	49	65	51	45
800	51	66	53	46
900	54	72	57	46
1000	54	70	57	46
1100	53	69	56	45
1200	53	71	56	46
1300	52	66	54	47
1400	53	66	55	47
1500	56	68	57	51
1600	56	65	57	54
1700	56	68	57	54
1800	56	67	57	54
1900	56	65	57	55
2000	54	66	56	46
2100	50	63	51	46
2200	47	62	47	44
2300	47	58	48	44

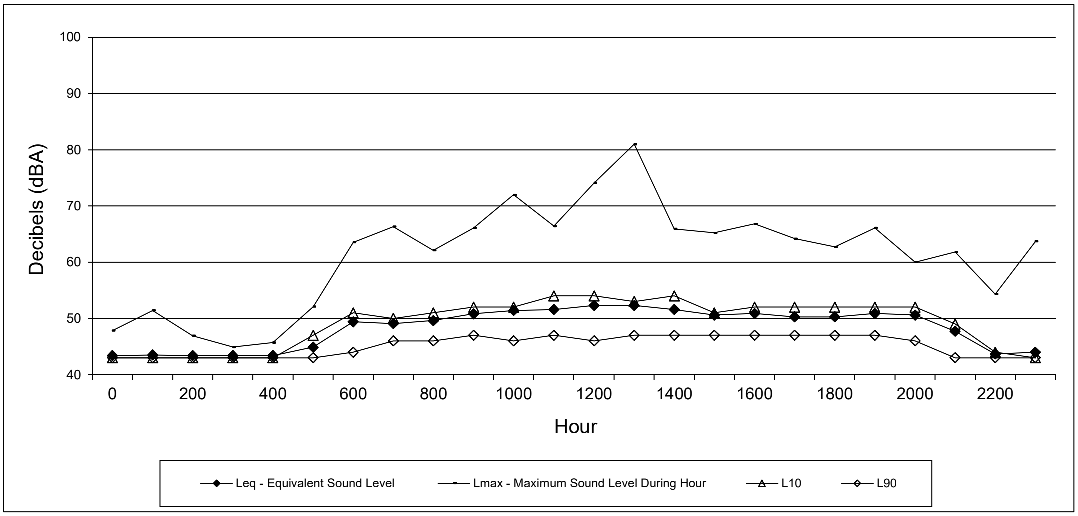
CNEL: 56



Site 1: Southwestern Project boundary, directly adjacent to Dutard pump enclosure
Thursday June 29, 2023

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	47	61	47	45
100	47	63	47	45
200	48	57	49	46
300	47	63	48	45
400	47	64	47	45
500	52	78	51	46
600	55	78	56	46
700	68	91	67	47
800	54	70	57	47
900	52	67	55	46
1000	52	72	56	45
1100	53	73	55	45
1200	54	71	56	46
1300	56	70	58	54
1400	56	66	57	54
1500	56	71	57	54
1600	55	66	56	54
1700	55	64	56	54
1800	55	65	56	54
1900	55	69	56	54
2000	56	71	56	54
2100	56	65	56	54
2200	55	61	55	47
2300	48	60	48	46

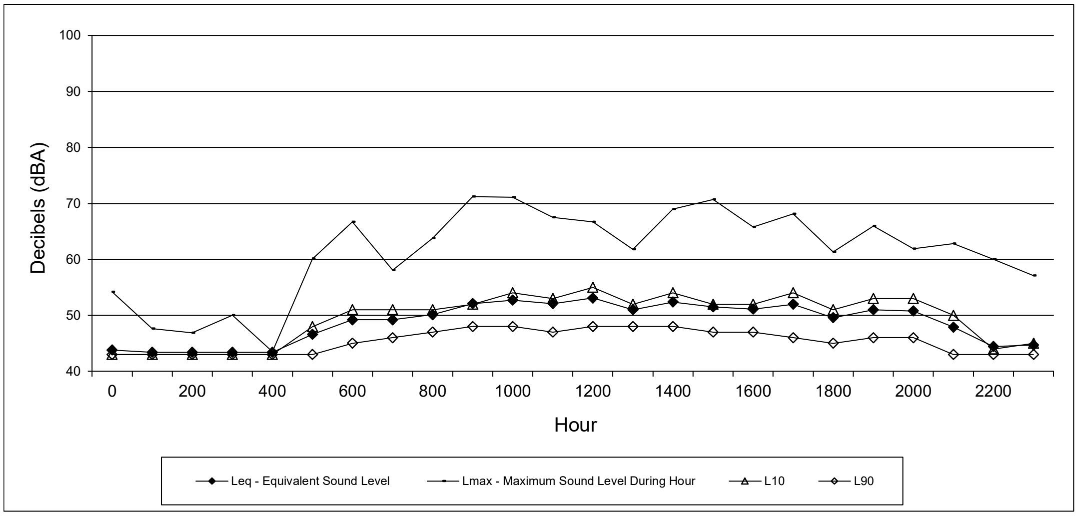
CNEL: 60



Site 2: Southern Project boundary, direcly north of residences on El Grande Dr.
Tuesday June 27, 2023

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	43	48	43	43
100	44	51	43	43
200	43	47	43	43
300	43	45	43	43
400	43	46	43	43
500	45	52	47	43
600	49	64	51	44
700	49	66	50	46
800	50	62	51	46
900	51	66	52	47
1000	51	72	52	46
1100	52	66	54	47
1200	52	74	54	46
1300	52	81	53	47
1400	52	66	54	47
1500	51	65	51	47
1600	51	67	52	47
1700	50	64	52	47
1800	50	63	52	47
1900	51	66	52	47
2000	51	60	52	46
2100	48	62	49	43
2200	44	54	44	43
2300	44	64	43	43

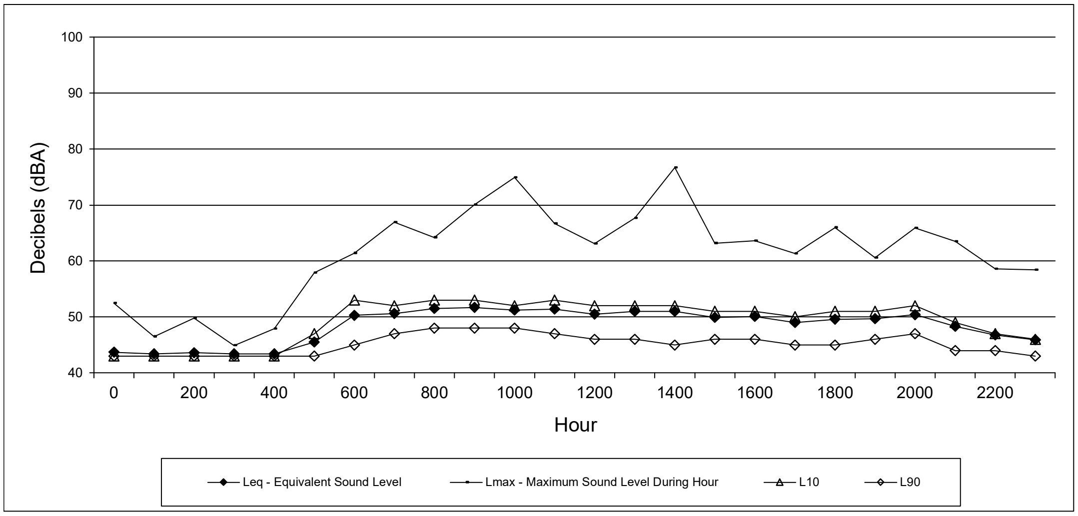
CNEL 53



Site 2: Southern Project boundary, direcly north of residences on El Grande Dr.
Wednesday June 28, 2023

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	44	54	43	43
100	43	48	43	43
200	43	47	43	43
300	43	50	43	43
400	43	44	43	43
500	47	60	48	43
600	49	67	51	45
700	49	58	51	46
800	50	64	51	47
900	52	71	52	48
1000	53	71	54	48
1100	52	68	53	47
1200	53	67	55	48
1300	51	62	52	48
1400	52	69	54	48
1500	52	71	52	47
1600	51	66	52	47
1700	52	68	54	46
1800	50	61	51	45
1900	51	66	53	46
2000	51	62	53	46
2100	48	63	50	43
2200	44	60	44	43
2300	45	57	45	43

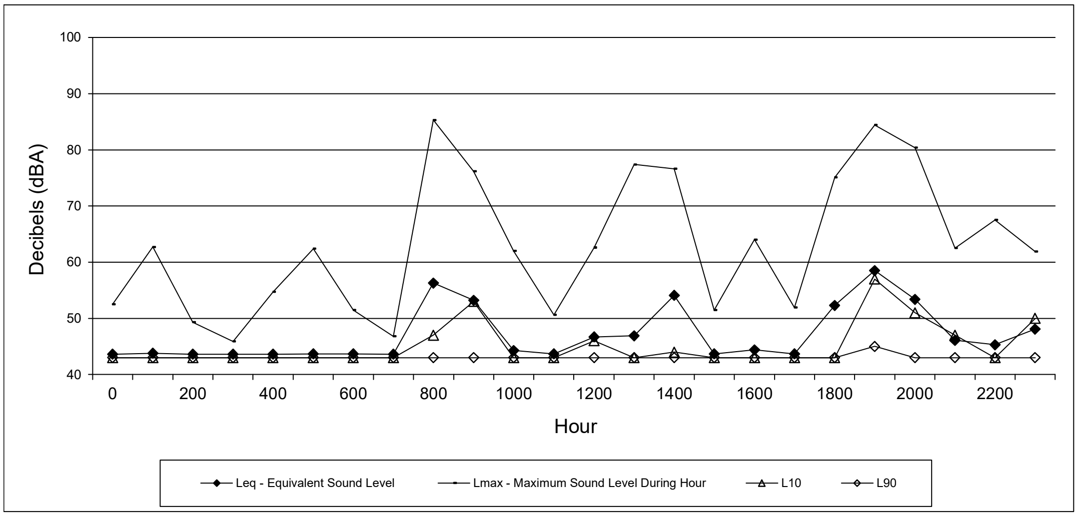
CNEL: 54



Site 2: Southern Project boundary, direcly north of residences on El Grande Dr.
Thursday June 29, 2023

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	44	53	43	43
100	43	47	43	43
200	44	50	43	43
300	43	45	43	43
400	43	48	43	43
500	46	58	47	43
600	50	61	53	45
700	51	67	52	47
800	52	64	53	48
900	52	70	53	48
1000	51	75	52	48
1100	51	67	53	47
1200	51	63	52	46
1300	51	68	52	46
1400	51	77	52	45
1500	50	63	51	46
1600	50	64	51	46
1700	49	61	50	45
1800	50	66	51	45
1900	50	61	51	46
2000	50	66	52	47
2100	48	64	49	44
2200	47	59	47	44
2300	46	58	46	43

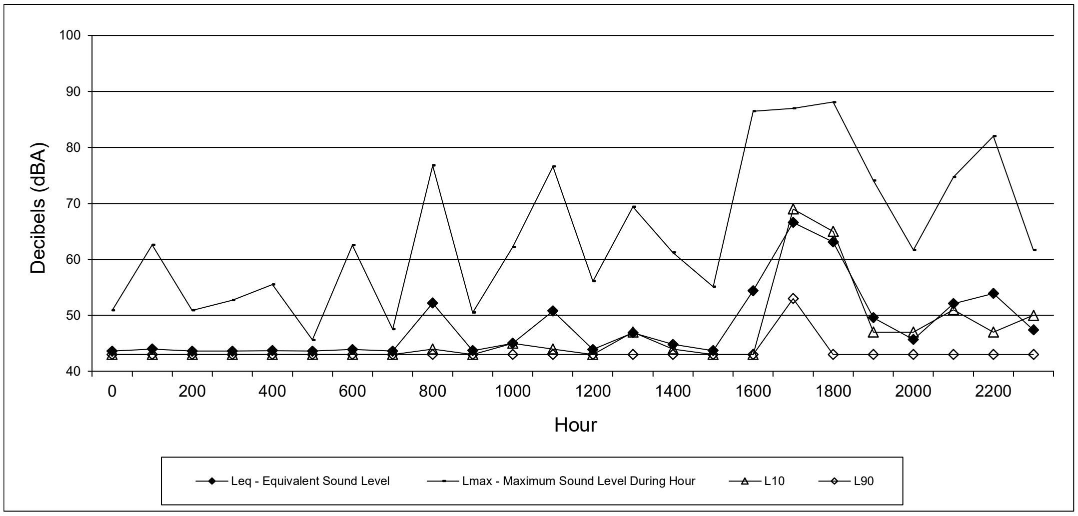
CNEL: 54



Site 3: Northwestern Project boundary, approximately 190 feet west of sludge holding ponds
Tuesday June 27, 2023

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	44	53	43	43
100	44	63	43	43
200	44	49	43	43
300	44	46	43	43
400	44	55	43	43
500	44	62	43	43
600	44	52	43	43
700	44	47	43	43
800	56	85	47	43
900	53	76	53	43
1000	44	62	43	43
1100	44	51	43	43
1200	47	63	46	43
1300	47	77	43	43
1400	54	77	44	43
1500	44	52	43	43
1600	44	64	43	43
1700	44	52	43	43
1800	52	75	43	43
1900	59	84	57	45
2000	53	80	51	43
2100	46	63	47	43
2200	45	68	43	43
2300	48	62	50	43

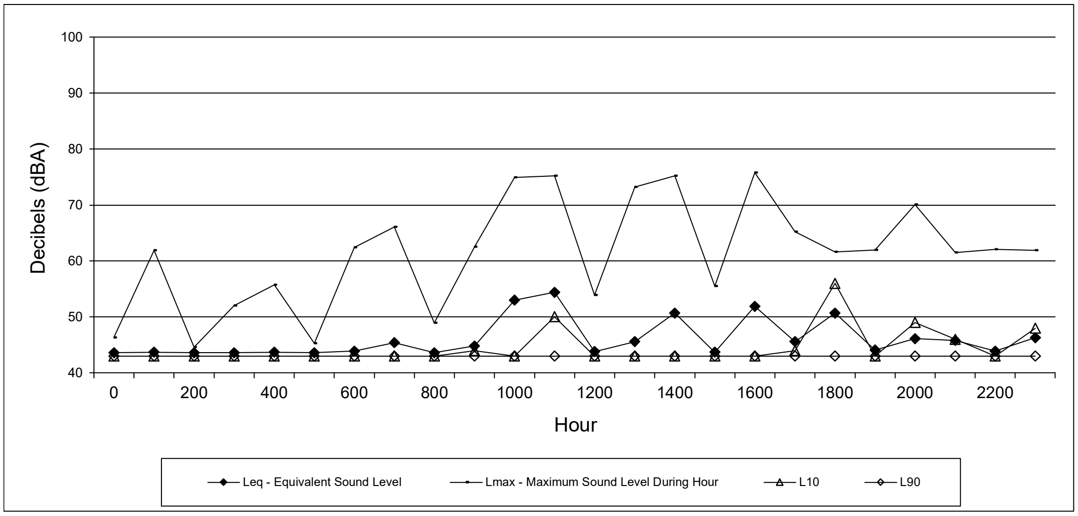
CNEL 55



Site 3: Northwestern Project boundary, approximately 190 feet west of sludge holding ponds
Wednesday June 28, 2023

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	44	51	43	43
100	44	63	43	43
200	44	51	43	43
300	44	53	43	43
400	44	56	43	43
500	44	46	43	43
600	44	63	43	43
700	44	48	43	43
800	52	77	44	43
900	44	51	43	43
1000	45	62	45	43
1100	51	77	44	43
1200	44	56	43	43
1300	47	69	47	43
1400	45	61	44	43
1500	44	55	43	43
1600	54	87	43	43
1700	67	87	69	53
1800	63	88	65	43
1900	50	74	47	43
2000	46	62	47	43
2100	52	75	51	43
2200	54	82	47	43
2300	47	62	50	43

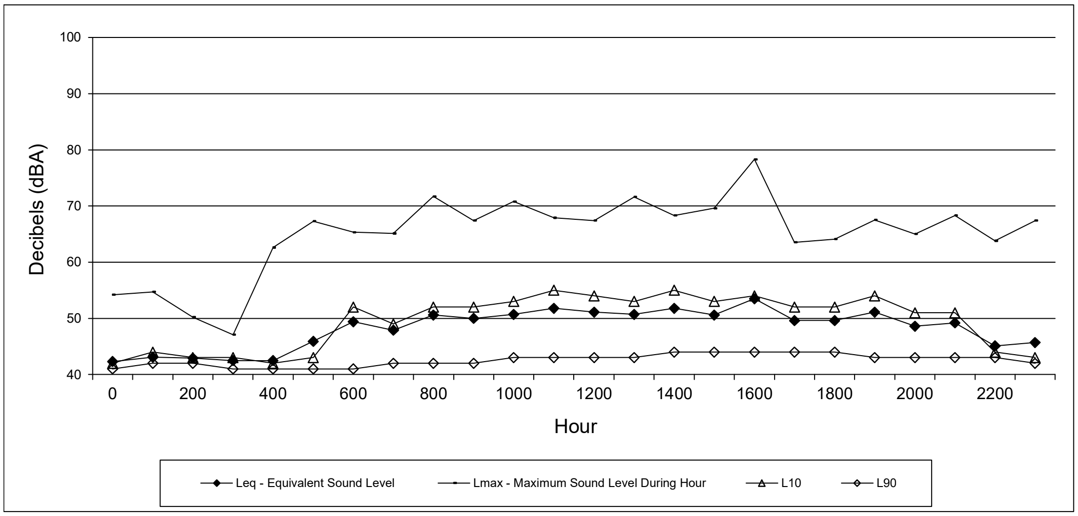
CNEL: 57



Site 3: Northwestern Project boundary, approximately 190 feet west of sludge holding ponds
Thursday June 29, 2023

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	44	46	43	43
100	44	62	43	43
200	44	45	43	43
300	44	52	43	43
400	44	56	43	43
500	44	45	43	43
600	44	62	43	43
700	45	66	43	43
800	44	49	43	43
900	45	63	44	43
1000	53	75	43	43
1100	54	75	50	43
1200	44	54	43	43
1300	46	73	43	43
1400	51	75	43	43
1500	44	56	43	43
1600	52	76	43	43
1700	46	65	44	43
1800	51	62	56	43
1900	44	62	43	43
2000	46	70	49	43
2100	46	62	46	43
2200	44	62	43	43
2300	46	62	48	43

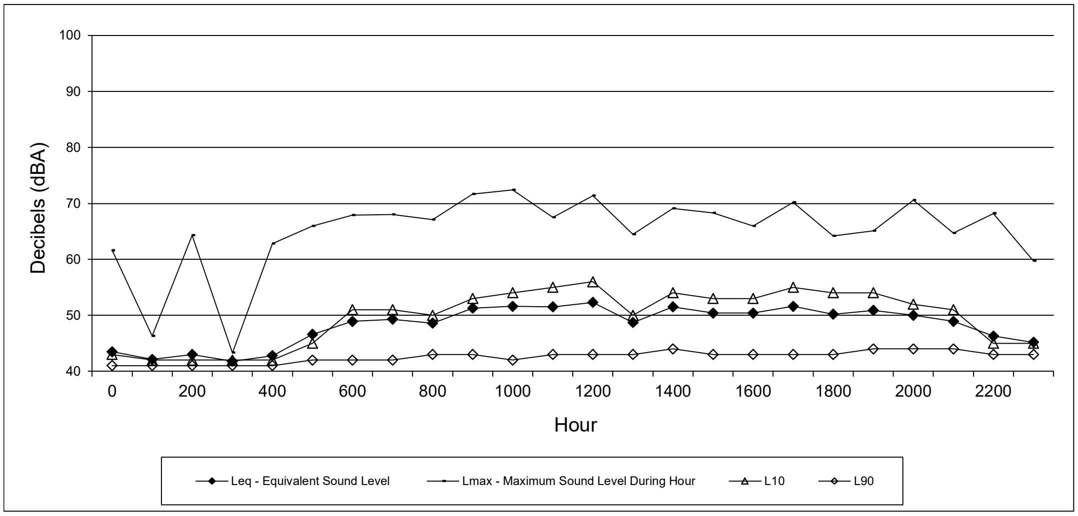
CNEL: 52



Site 4: Nearby intersection of Bay Laurel Ln and Whitman Way, 30 feet north of the centerline of Whitman Way
Tuesday June 27, 2023

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	42	54	42	41
100	43	55	44	42
200	43	50	43	42
300	43	47	43	41
400	43	63	42	41
500	46	67	43	41
600	49	65	52	41
700	48	65	49	42
800	51	72	52	42
900	50	67	52	42
1000	51	71	53	43
1100	52	68	55	43
1200	51	67	54	43
1300	51	72	53	43
1400	52	68	55	44
1500	51	70	53	44
1600	54	78	54	44
1700	50	64	52	44
1800	50	64	52	44
1900	51	68	54	43
2000	49	65	51	43
2100	49	68	51	43
2200	45	64	44	43
2300	46	67	43	42

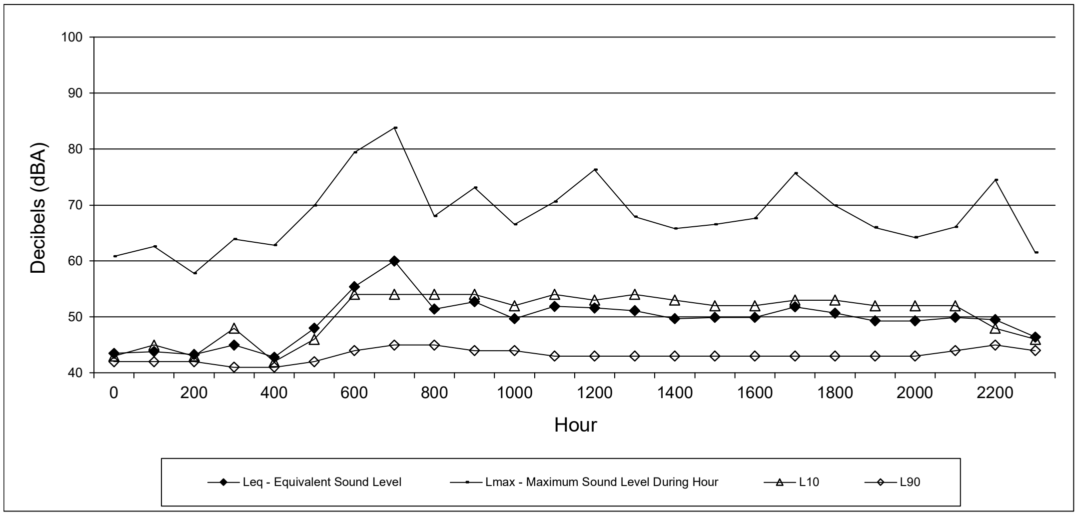
CNEL 53



Site 4: Nearby intersection of Bay Laurel Ln and Whitman Way, 30 feet north of the centerline of Whitman Way
Wednesday June 28, 2023

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	44	62	43	41
100	42	46	42	41
200	43	64	42	41
300	42	43	42	41
400	43	63	42	41
500	47	66	45	42
600	49	68	51	42
700	49	68	51	42
800	49	67	50	43
900	51	72	53	43
1000	52	72	54	42
1100	52	68	55	43
1200	52	71	56	43
1300	49	65	50	43
1400	52	69	54	44
1500	50	68	53	43
1600	50	66	53	43
1700	52	70	55	43
1800	50	64	54	43
1900	51	65	54	44
2000	50	71	52	44
2100	49	65	51	44
2200	46	68	45	43
2300	45	60	45	43

CNEL: 53



Site 4: Nearby intersection of Bay Laurel Ln and Whitman Way, 30 feet north of the centerline of Whitman Way
Thursday June 29, 2023

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	44	61	43	42
100	44	63	45	42
200	43	58	43	42
300	45	64	48	41
400	43	63	42	41
500	48	70	46	42
600	55	79	54	44
700	60	84	54	45
800	51	68	54	45
900	53	73	54	44
1000	50	67	52	44
1100	52	71	54	43
1200	52	76	53	43
1300	51	68	54	43
1400	50	66	53	43
1500	50	67	52	43
1600	50	68	52	43
1700	52	76	53	43
1800	51	70	53	43
1900	49	66	52	43
2000	49	64	52	43
2100	50	66	52	44
2200	50	75	48	45
2300	46	62	46	44

CNEL: 56

```
                        Roadway Construction Noise Model
(RCNM),Version 1.1

Report date:             03/06/2024
Case Description:        Demolition of Sludge Holding Pond (North Side
of Project Site)

                                **** Receptor #1 ****

                                           Baselines (dBA)
Description     Land Use        Daytime    Evening    Night
-----------     --------        -------    -------    -----
Scenario A-1a    Residential        63.0       55.0     52.0

                                     Equipment
                                     ---------
                                       Spec    Actual    Receptor
Estimated
                      Impact  Usage    Lmax    Lmax      Distance
Shielding
Description           Device   (%)     (dBA)   (dBA)      (feet)
(dBA)
-----------           ------  -----    -----   -----     --------
---------
Impact Pile Driver       Yes     20            101.3        370.0
0.0
Excavator                 No     40             80.7        350.0
0.0
Haul Truck                No     40             88.0        350.0
0.0
Haul Truck                No     40             88.0        350.0
0.0
Haul Truck                No     40             88.0        350.0
0.0
Haul Truck                No     40             88.0        350.0
0.0
Compactor (ground)        No     20             83.2        350.0
0.0
Front End Loader          No     40             79.1        350.0
0.0
Dump Truck                No     40             76.5        350.0
0.0
Dump Truck                No     40             76.5        350.0
0.0

                                     Results
                                     -------
                                                            Noise
Limits (dBA)                          Noise Limit Exceedance (dBA)
```

```
----------------------------------------------
----------------------------------------------
                        Calculated (dBA)         Day           Evening
Night              Day           Evening          Night
                        ----------------   --------------
-------------  --------------    --------------  --------------
--------------
Equipment                  Lmax    Leq        Lmax    Leq      Lmax
Leq     Lmax    Leq       Lmax    Leq     Lmax    Leq     Lmax    Leq
----------------------  ------  ------     ------  ------  ------
------  ------  ------    ------  ------  ------  ------  ------
------
Impact Pile Driver        83.9    76.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Excavator                 63.8    59.8        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                71.1    67.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                71.1    67.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                71.1    67.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                71.1    67.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compactor (ground)        66.3    59.3        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Front End Loader          62.2    58.2        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                59.5    55.6        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                59.5    55.6        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
               Total      83.9    78.6        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
```

```
                        Roadway Construction Noise Model
(RCNM),Version 1.1

Report date:             03/08/2024
Case Description:        Demolition of Sludge Holding Pond (North Side
of Project Site)

                                ---- Receptor #1 ----

                                           Baselines (dBA)
Description      Land Use        Daytime    Evening    Night
-----------      --------        -------    -------    -----
Scenario A-1b    Residential        63.0       55.0     52.0

                                     Equipment
                                     ---------
                                       Spec    Actual    Receptor
Estimated
                      Impact  Usage    Lmax    Lmax      Distance
Shielding
Description           Device   (%)     (dBA)   (dBA)      (feet)
(dBA)
-----------           ------  -----    -----   -----     --------
---------
Auger Drill Rig           No     20             84.4        370.0
0.0
Excavator                 No     40             80.7        350.0
0.0
Haul Truck                No     40             88.0        350.0
0.0
Haul Truck                No     40             88.0        350.0
0.0
Haul Truck                No     40             88.0        350.0
0.0
Haul Truck                No     40             88.0        350.0
0.0
Compactor (ground)        No     20             83.2        350.0
0.0
Front End Loader          No     40             79.1        350.0
0.0
Dump Truck                No     40             76.5        350.0
0.0
Dump Truck                No     40             76.5        350.0
0.0

                                     Results
                                     -------
                                                            Noise
Limits (dBA)                          Noise Limit Exceedance (dBA)
```

```
----------------------------------------------
----------------------------------------------
                        Calculated (dBA)         Day           Evening
Night              Day           Evening          Night
                        ----------------   --------------
-------------  --------------    --------------  --------------
--------------
Equipment                  Lmax    Leq        Lmax    Leq     Lmax
Leq     Lmax    Leq       Lmax    Leq     Lmax    Leq     Lmax    Leq
----------------------  ------  ------     ------  ------  ------
------  ------  ------    ------  ------  ------  ------  ------
------
Auger Drill Rig           67.0    60.0        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Excavator                 63.8    59.8        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                71.1    67.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                71.1    67.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                71.1    67.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                71.1    67.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compactor (ground)        66.3    59.3        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Front End Loader          62.2    58.2        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                59.5    55.6        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                59.5    55.6        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
               Total      71.1    73.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
```

```
                        Roadway Construction Noise Model
(RCNM),Version 1.1

Report date:             03/08/2024
Case Description:        Demolition of Sludge Holding Pond (North Side
of Project Site)

                                **** Receptor #1 ****

                                           Baselines (dBA)
Description      Land Use        Daytime    Evening    Night
-----------      --------        -------    -------    -----
Scenario A-1c    Residential        63.0       55.0     52.0

                                     Equipment
                                     ---------
                                           Spec    Actual    Receptor
Estimated
                          Impact  Usage    Lmax    Lmax      Distance
Shielding
Description               Device   (%)     (dBA)   (dBA)      (feet)
(dBA)
-----------               ------  -----    -----   -----     --------
---------
Vibratory Pile Driver*        No     20              95.0       370.0
0.0
Excavator                     No     40              80.7       350.0
0.0
Haul Truck                    No     40              88.0       350.0
0.0
Haul Truck                    No     40              88.0       350.0
0.0
Haul Truck                    No     40              88.0       350.0
0.0
Haul Truck                    No     40              88.0       350.0
0.0
Compactor (ground)            No     20              83.2       350.0
0.0
Front End Loader              No     40              79.1       350.0
0.0
Dump Truck                    No     40              76.5       350.0
0.0
Dump Truck                    No     40              76.5       350.0
0.0

                                     Results
                                     -------
                                                            Noise
Limits (dBA)                          Noise Limit Exceedance (dBA)
```

```
----------------------------------------------
----------------------------------------------
                        Calculated (dBA)         Day           Evening
Night              Day           Evening          Night
                        ----------------   --------------
-------------  --------------    --------------  --------------
--------------
Equipment                  Lmax    Leq        Lmax    Leq     Lmax
Leq     Lmax    Leq       Lmax    Leq     Lmax    Leq     Lmax    Leq
----------------------  ------  ------     ------  ------  ------
------  ------  ------    ------  ------  ------  ------  ------
------
Vibratory Pile Driver*    77.6    70.6        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Excavator                 63.8    59.8        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                71.1    67.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                71.1    67.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                71.1    67.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                71.1    67.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compactor (ground)        66.3    59.3        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Front End Loader          62.2    58.2        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                59.5    55.6        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                59.5    55.6        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
               Total      77.6    75.5        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
```

```
                        Roadway Construction Noise Model
(RCNM),Version 1.1

Report date:             03/06/2024
Case Description:        Demolition of Washwater Recovery Pond - South
Side of Project

                                **** Receptor #1 ****

                                           Baselines (dBA)
Description     Land Use        Daytime    Evening    Night
-----------     --------        -------    -------    -----
Scenario A-2a    Residential        53.0       50.0     43.0

                                     Equipment
                                     ---------
                                       Spec    Actual    Receptor
Estimated
                      Impact  Usage    Lmax    Lmax      Distance
Shielding
Description           Device   (%)     (dBA)   (dBA)      (feet)
(dBA)
-----------           ------  -----    -----   -----     --------
---------
Impact Pile Driver       Yes     20            101.3        100.0
0.0
Excavator                 No     40             80.7         90.0
0.0
Haul Truck                No     40             88.0         90.0
0.0
Haul Truck                No     40             88.0         90.0
0.0
Haul Truck                No     40             88.0         90.0
0.0
Haul Truck                No     40             88.0         90.0
0.0
Compactor (ground)        No     20             83.2         90.0
0.0
Front End Loader          No     40             79.1         90.0
0.0
Dump Truck                No     40             76.5         90.0
0.0
Dump Truck                No     40             76.5         90.0
0.0

                                     Results
                                     -------
                                                            Noise
Limits (dBA)                          Noise Limit Exceedance (dBA)
```

```
----------------------------------------------
----------------------------------------------
                        Calculated (dBA)         Day           Evening
Night              Day           Evening          Night
                        ----------------   --------------
-------------  --------------    --------------  --------------
--------------
Equipment                  Lmax    Leq        Lmax    Leq     Lmax
Leq     Lmax    Leq       Lmax    Leq     Lmax    Leq     Lmax    Leq
----------------------  ------  ------     ------  ------  ------
------  ------  ------    ------  ------  ------  ------  ------
------
Impact Pile Driver        95.2    88.3        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Excavator                 75.6    71.6        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                82.9    78.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                82.9    78.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                82.9    78.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                82.9    78.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compactor (ground)        78.1    71.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Front End Loader          74.0    70.0        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                71.3    67.4        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                71.3    67.4        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
               Total      95.2    90.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
```

```
                        Roadway Construction Noise Model
(RCNM),Version 1.1

Report date:             03/08/2024
Case Description:        Demolition of Washwater Recovery Pond - South
Side of Project

                                **** Receptor #1 ****

                                           Baselines (dBA)
Description     Land Use        Daytime    Evening    Night
-----------     --------        -------    -------    -----
Scenario A-2b    Residential        53.0       50.0     43.0

                                     Equipment
                                     ---------
                                       Spec    Actual    Receptor
Estimated
                      Impact  Usage    Lmax    Lmax      Distance
Shielding
Description           Device   (%)     (dBA)   (dBA)      (feet)
(dBA)
-----------           ------  -----    -----   -----     --------
---------
Auger Drill Rig           No     20             84.4        100.0
0.0
Excavator                 No     40             80.7         90.0
0.0
Haul Truck                No     40             88.0         90.0
0.0
Haul Truck                No     40             88.0         90.0
0.0
Haul Truck                No     40             88.0         90.0
0.0
Haul Truck                No     40             88.0         90.0
0.0
Compactor (ground)        No     20             83.2         90.0
0.0
Front End Loader          No     40             79.1         90.0
0.0
Dump Truck                No     40             76.5         90.0
0.0
Dump Truck                No     40             76.5         90.0
0.0

                                     Results
                                     -------
                                                            Noise
Limits (dBA)                          Noise Limit Exceedance (dBA)
```

```
----------------------------------------------
----------------------------------------------
                        Calculated (dBA)         Day           Evening
Night              Day           Evening          Night
                        ----------------   --------------
-------------  --------------    --------------  --------------
--------------
Equipment                  Lmax    Leq        Lmax    Leq     Lmax
Leq     Lmax    Leq       Lmax    Leq     Lmax    Leq     Lmax    Leq
----------------------  ------  ------     ------  ------  ------
------  ------  ------    ------  ------  ------  ------  ------
------
Auger Drill Rig           78.3    71.3        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Excavator                 75.6    71.6        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                82.9    78.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                82.9    78.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                82.9    78.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                82.9    78.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compactor (ground)        78.1    71.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Front End Loader          74.0    70.0        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                71.3    67.4        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                71.3    67.4        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
               Total      82.9    85.7        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
```

```
                        Roadway Construction Noise Model
(RCNM),Version 1.1

Report date:             03/08/2024
Case Description:        Demolition of Washwater Recovery Pond - South
Side of Project

                                **** Receptor #1 ****

                                           Baselines (dBA)
Description     Land Use        Daytime    Evening    Night
-----------     --------        -------    -------    -----
Scenario A-2c    Residential        53.0       50.0     43.0

                                     Equipment
                                     ---------
                                           Spec    Actual    Receptor
Estimated
                          Impact  Usage    Lmax    Lmax      Distance
Shielding
Description               Device   (%)     (dBA)   (dBA)      (feet)
(dBA)
-----------               ------  -----    -----   -----     --------
---------
Vibratory Pile Driver*        No     20             95.0        100.0
0.0
Excavator                     No     40             80.7         90.0
0.0
Haul Truck                    No     40             88.0         90.0
0.0
Haul Truck                    No     40             88.0         90.0
0.0
Haul Truck                    No     40             88.0         90.0
0.0
Haul Truck                    No     40             88.0         90.0
0.0
Compactor (ground)            No     20             83.2         90.0
0.0
Front End Loader              No     40             79.1         90.0
0.0
Dump Truck                    No     40             76.5         90.0
0.0
Dump Truck                    No     40             76.5         90.0
0.0

                                     Results
                                     -------
                                                            Noise
Limits (dBA)                          Noise Limit Exceedance (dBA)
```

```
----------------------------------------------
----------------------------------------------
                        Calculated (dBA)         Day           Evening
Night              Day           Evening         Night
                        ----------------   --------------
-------------  --------------    --------------  --------------
--------------
Equipment                  Lmax    Leq        Lmax    Leq      Lmax
Leq     Lmax    Leq       Lmax    Leq     Lmax    Leq     Lmax    Leq
----------------------  ------  ------     ------  ------  ------
------  ------  ------    ------  ------  ------  ------  ------
------
Vibratory Pile Driver*    89.0    82.0        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Excavator                 75.6    71.6        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                82.9    78.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                82.9    78.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                82.9    78.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                82.9    78.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compactor (ground)        78.1    71.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Front End Loader          74.0    70.0        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                71.3    67.4        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                71.3    67.4        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
               Total      89.0    87.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
```

```
                        Roadway Construction Noise Model
(RCNM),Version 1.1

Report date:             03/06/2024
Case Description:        Paving of southern area of Project - Directly
south of Washwater Basins

                                **** Receptor #1 ****

                                           Baselines (dBA)
Description     Land Use        Daytime    Evening    Night
-----------     --------        -------    -------    -----
Scenario A-3    Residential        53.0       50.0     43.0

                                     Equipment
                                     ---------
                                         Spec    Actual    Receptor
Estimated
                        Impact  Usage    Lmax    Lmax      Distance
Shielding
Description             Device   (%)     (dBA)   (dBA)      (feet)
(dBA)
-----------             ------  -----    -----   -----     --------
---------
Paver                       No     50             77.2         80.0
0.0
Compactor (ground)          No     20             83.2         80.0
0.0
Roller                      No     20             80.0         80.0
0.0
Haul Truck                  No     40             88.0         80.0
0.0
Haul Truck                  No     40             88.0         80.0
0.0
Haul Truck                  No     40             88.0         80.0
0.0
Concrete Mixer Truck        No     40             78.8         80.0
0.0

                                     Results
                                     -------
                                                            Noise
Limits (dBA)                          Noise Limit Exceedance (dBA)

----------------------------------------------
----------------------------------------------
                        Calculated (dBA)         Day           Evening
Night              Day           Evening          Night
                        ----------------   --------------
-------------  --------------    --------------  --------------
```

```
--------------
Equipment                  Lmax    Leq        Lmax    Leq     Lmax
Leq     Lmax    Leq       Lmax    Leq     Lmax    Leq     Lmax    Leq
----------------------  ------  ------     ------  ------  ------
------  ------  ------    ------  ------  ------  ------  ------
------
Paver                     73.1    70.1        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compactor (ground)        79.1    72.2        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Roller                    75.9    68.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                83.9    79.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                83.9    79.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Haul Truck                83.9    79.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Concrete Mixer Truck      74.7    70.7        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
               Total      83.9    85.3        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
```

```
                        Roadway Construction Noise Model
(RCNM),Version 1.1

Report date:             03/07/2024
Case Description:        Concrete Pours - Southern Washwater Basin

                                **** Receptor #1 ****

                                           Baselines (dBA)
Description     Land Use        Daytime    Evening    Night
-----------     --------        -------    -------    -----
Scenario A-4    Residential        53.0       50.0     43.0

                                     Equipment
                                     ---------
                                         Spec    Actual    Receptor
Estimated
                        Impact  Usage    Lmax    Lmax      Distance
Shielding
Description             Device   (%)     (dBA)   (dBA)      (feet)
(dBA)
-----------             ------  -----    -----   -----     --------
---------
Pickup Truck                No     40             75.0         90.0
0.0
Pickup Truck                No     40             75.0         90.0
0.0
Concrete Mixer Truck        No     40             78.8        100.0
0.0
Concrete Mixer Truck        No     40             78.8        100.0
0.0

                                     Results
                                     -------
                                                            Noise
Limits (dBA)                          Noise Limit Exceedance (dBA)

----------------------------------------------
----------------------------------------------
                        Calculated (dBA)          Day          Evening
Night              Day          Evening          Night
                        ----------------   --------------
-------------  --------------    --------------  --------------
--------------
Equipment                  Lmax     Leq        Lmax     Leq      Lmax
Leq     Lmax     Leq        Lmax     Leq      Lmax     Leq      Lmax     Leq
----------------------  ------  ------     ------  ------  ------
------  ------  ------    ------  ------  ------  ------  ------
------
Pickup Truck              69.9    65.9        N/A     N/A     N/A
```

```
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Pickup Truck              69.9    65.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Concrete Mixer Truck      72.8    68.8        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Concrete Mixer Truck      72.8    68.8        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
               Total      72.8    73.6        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
```

```
                        Roadway Construction Noise Model
(RCNM),Version 1.1

Report date:             03/07/2024
Case Description:        Staging Area Noise

                                **** Receptor #1 ****

                                           Baselines (dBA)
Description     Land Use        Daytime    Evening    Night
-----------     --------        -------    -------    -----
Scenario A-5    Residential        59.0       55.0     48.0

                                     Equipment
                                     ---------
                                 Spec    Actual    Receptor
Estimated
                Impact  Usage    Lmax    Lmax      Distance
Shielding
Description     Device   (%)     (dBA)   (dBA)      (feet)      (dBA)
-----------     ------  -----    -----   -----     --------
---------
Pickup Truck        No     40             75.0         90.0
0.0
Pickup Truck        No     40             75.0         90.0
0.0
Pickup Truck        No     40             75.0         90.0
0.0
Backhoe             No     40             77.6         90.0
0.0
Forklift            No     40             77.0         90.0
0.0

                                     Results
                                     -------
                                                            Noise
Limits (dBA)                          Noise Limit Exceedance (dBA)

----------------------------------------------
----------------------------------------------
                        Calculated (dBA)        Day          Evening
Night              Day           Evening         Night
                        ----------------   --------------
-------------  --------------    --------------  --------------
--------------
Equipment                  Lmax    Leq        Lmax    Leq     Lmax
Leq     Lmax    Leq       Lmax    Leq     Lmax    Leq     Lmax    Leq
----------------------  ------  ------     ------  ------  ------
------  ------  ------    ------  ------  ------  ------  ------
------
```

```
Pickup Truck              69.9    65.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Pickup Truck              69.9    65.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Pickup Truck              69.9    65.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Backhoe                   72.5    68.5        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
Forklift                  71.9    67.9        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
               Total      72.5    74.0        N/A     N/A     N/A
N/A     N/A     N/A       N/A     N/A     N/A     N/A     N/A     N/A
```

APPENDIX G

AB 52 Notification Letters

Valley Water

Clean Water • Healthy Environment • Flood Protection

August 25, 2023

Charlene Nijmeh, Tribal Chair
Muwekma Ohlone Indian Tribe
20885 Redwood Road, Suite 232
Castro Valley, CA 94546
Via E-Mail: cnijmeh@muwekma.org & US Mail

Subject: **Formal Notification Pursuant to Public Resources Code §21080.3.1 (Assembly Bill 52) for the Santa Clara Valley Water District Penitencia Water Treatment Plant Residuals Management Project, San Jose, California**

Dear Ms. Charlene Nijmeh, Tribal Chair:

Pursuant to California Public Resources Code (PRC) §21080.3.1, Santa Clara Valley Water District (Valley Water), as the California Environmental Quality Act (CEQA) Lead Agency, hereby provides formal notification of the decision to undertake the Penitencia Water Treatment Plant (PWTP) Residuals Management Project (project). Valley Water intends to prepare a Mitigated Negative Declaration (MND) for the project to fulfill the requirements of CEQA. This letter is to formally notify you of a consultation opportunity pursuant to PRC §21080.3.1.

The PWTP project is located in the northeastern portion of San Jose, in Santa Clara County (Figure 1). The Project elements include upgrades to the existing washwater handling treatment system, sludge handling, and dewatering system, automation of the sludge withdrawal system in the sedimentation basins, and replacement and improvements to the PWTP perimeter security system, fencing with lighting, and the addition of a security access trail, and landscaping. The Project improvements would be located within the footprint of the existing sedimentation ponds, washwater recovery ponds, and dewatering building as well as along the perimeter fence. The existing PWTP elements are shown in Figure 2.

Pursuant to PRC §21080.3.1 (b), you have 30 days from the receipt of this letter to request consultation, in writing, with Valley Water. Regardless of whether you request consultation pursuant to PRC §21080.3.1 (b), we welcome your participation in the CEQA process.

Should you have any questions, please contact me as Valley Water's point of contact for the proposed project:

Michael F. Coleman

Michael F. Coleman, AICP
Environmental Planner
Mcoleman@valleywater.org
Direct line: 408-630-3096

cc: Susanne Heim, Principal, Panorama Environmental, Inc.
Attachments: Project Location and Project Site Figures

Figure 1 **Project Location**

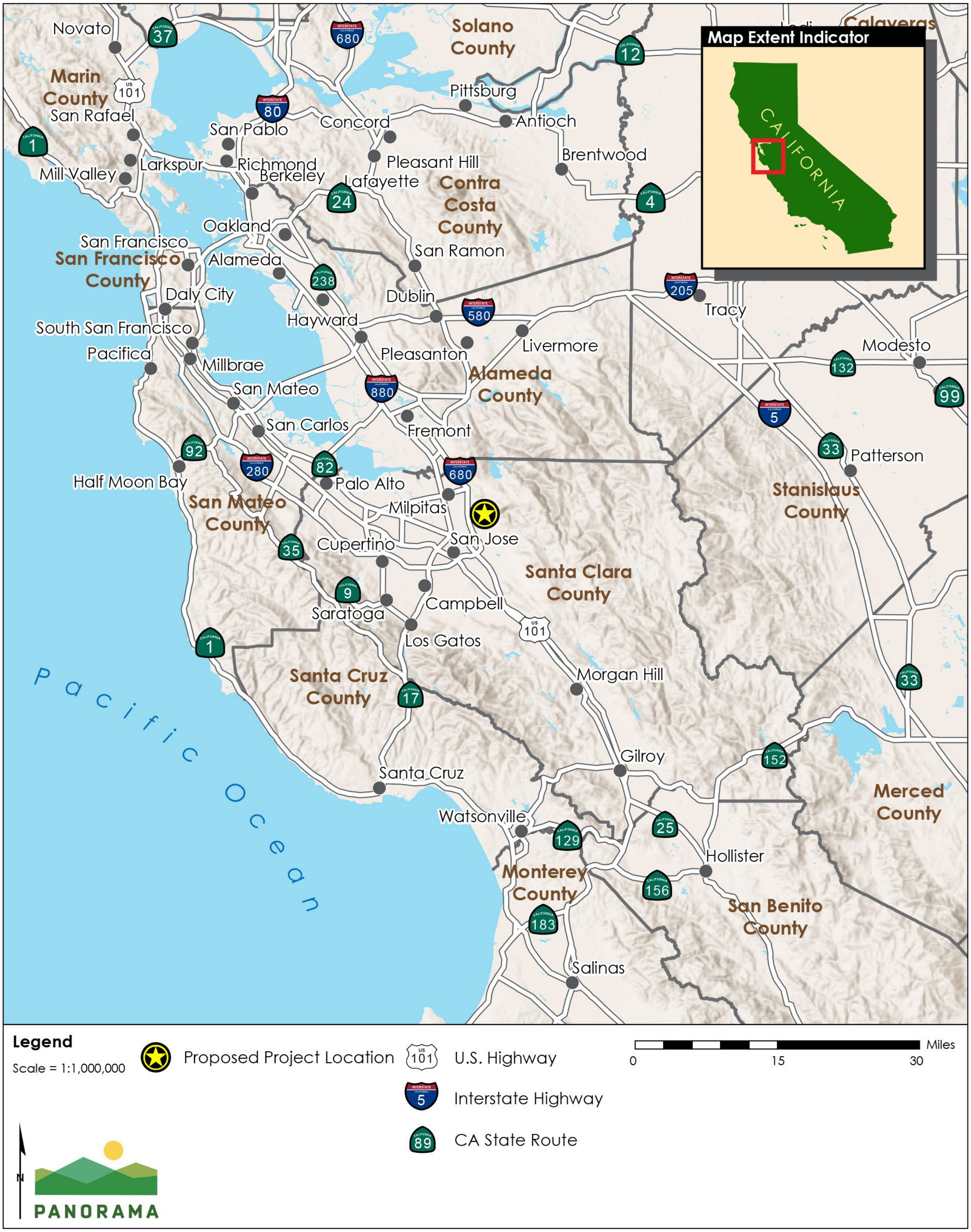


Figure 2 Project Site

Legend

Scale = 1:3,000

N

PANORAMA

Valley Water

Clean Water • Healthy Environment • Flood Protection

August 25, 2023

Johnathan Costillas, Tribal Cultural Resource Officer
Tamien Nation
PO Box 866
Clearlake Oaks, CA 95423
Via E-Mail: thpo@tamien.org & US Mail

Subject: **Formal Notification Pursuant to Public Resources Code §21080.3.1 (Assembly Bill 52) for the Santa Clara Valley Water District Penitencia Water Treatment Plant Residuals Management Project, San Jose, California**

Dear Mr. Johnathan Costillas, Tribal Cultural Resource Officer:

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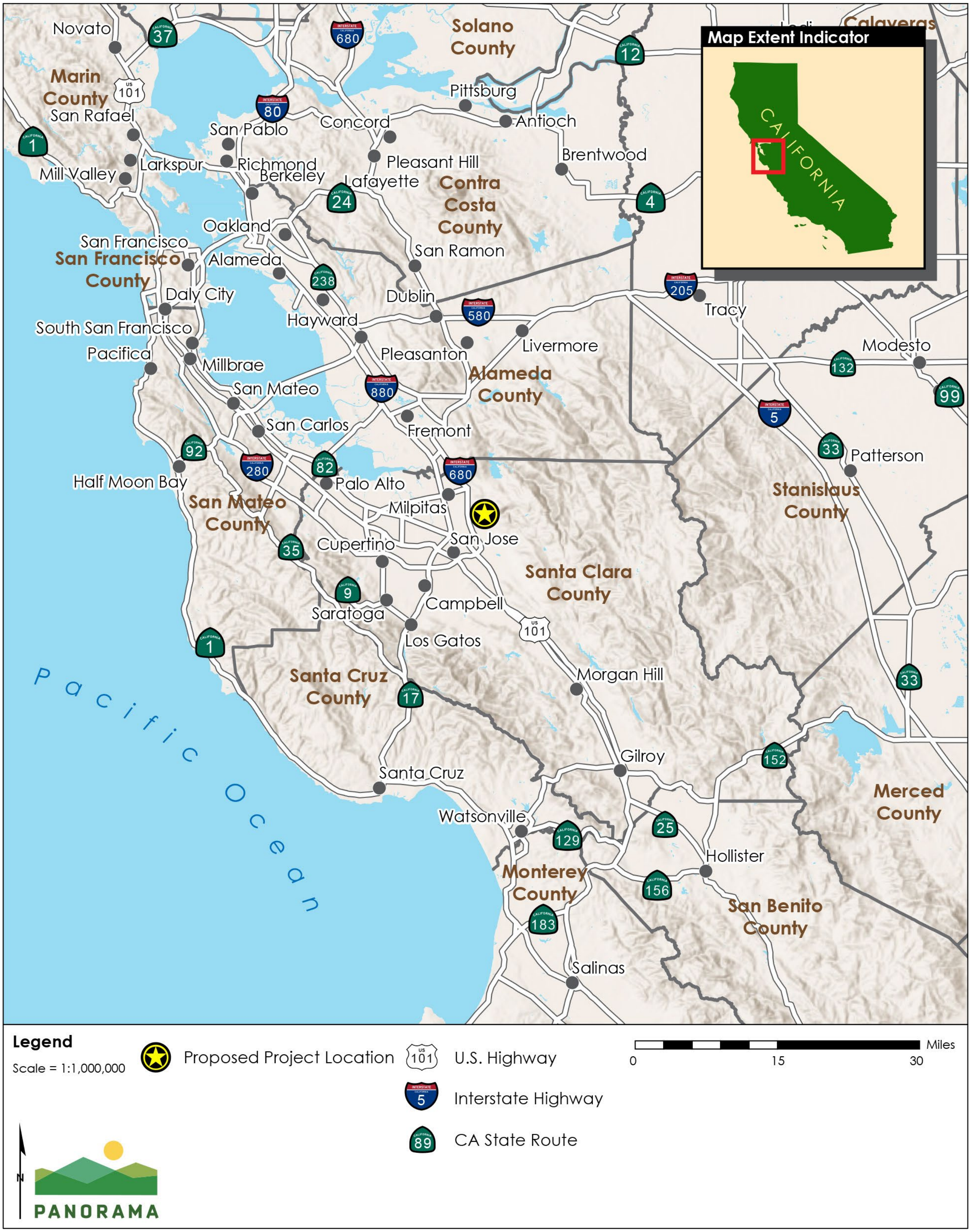
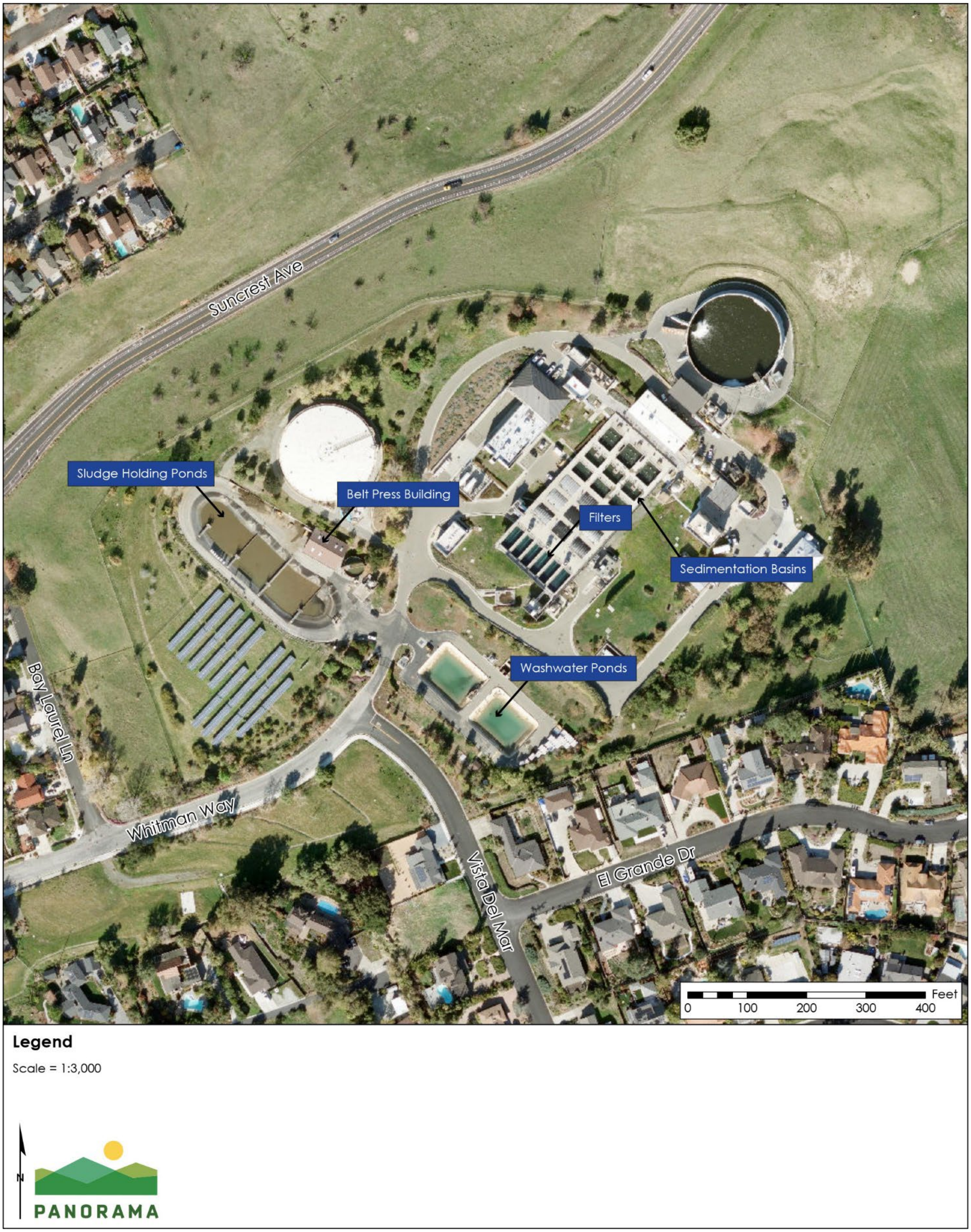


Figure 2 Project Site



Valley Water

Clean Water • Healthy Environment • Flood Protection

August 25, 2023

Quirina Luna Geary, Chairwoman
Tamien Nation
PO Box 8053
San Jose, CA 95155
Via E-Mail: qgeary@tamien.org & US Mail

Subject: Formal Notification Pursuant to Public Resources Code §21080.3.1 (Assembly Bill 52) for the Santa Clara Valley Water District Penitencia Water Treatment Plant Residuals Management Project, San Jose, California

Dear Ms. Quirina Luna Geary, Chairwoman:

Pursuant to California Public Resources Code (PRC) §21080.3.1, Santa Clara Valley Water District (Valley Water), as the California Environmental Quality Act (CEQA) Lead Agency, hereby provides formal notification of the decision to undertake the Penitencia Water Treatment Plant (PWTP) Residuals Management Project (project). Valley Water intends to prepare a Mitigated Negative Declaration (MND) for the project to fulfill the requirements of CEQA. This letter is to formally notify you of a consultation opportunity pursuant to PRC §21080.3.1.

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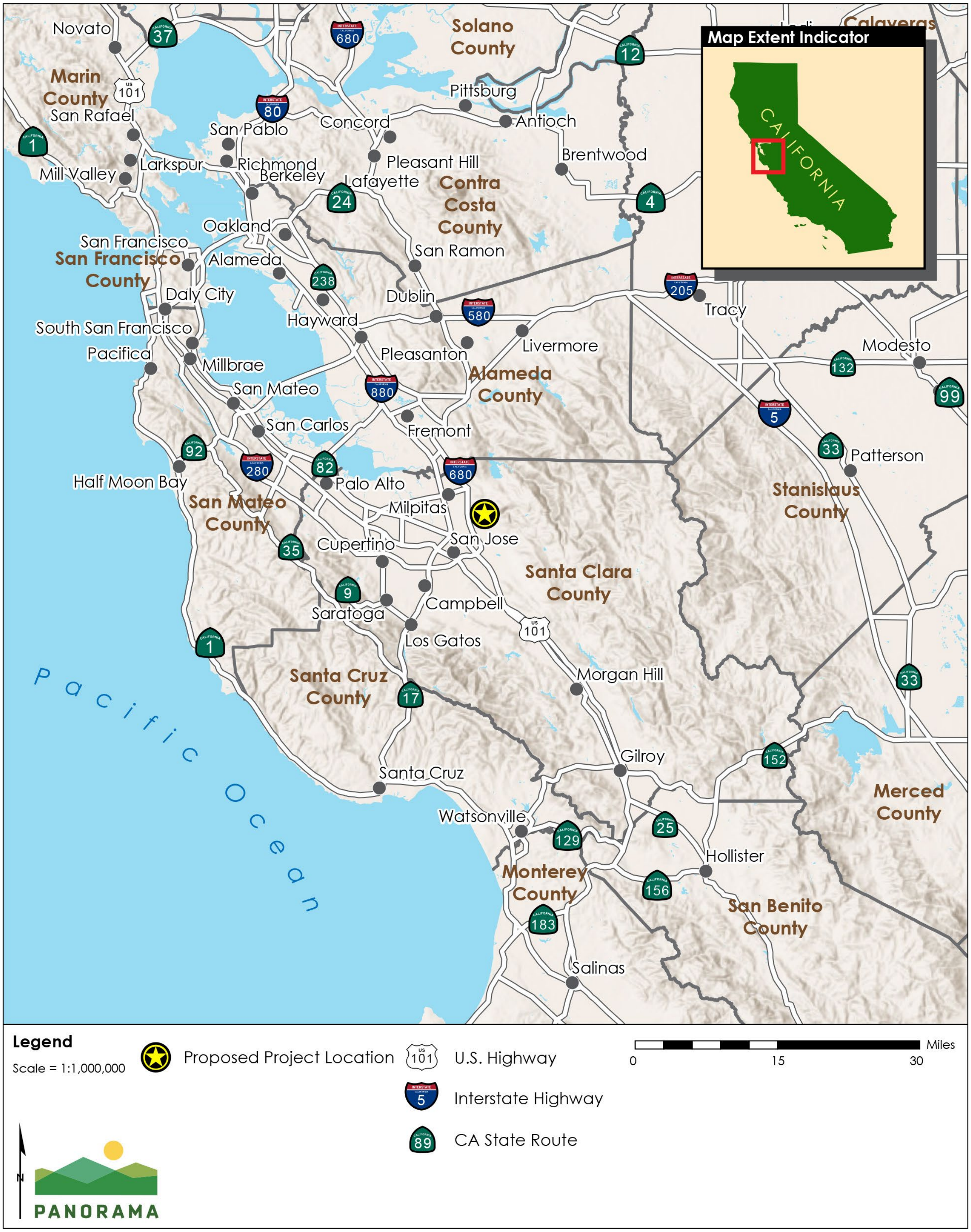

Figure 2 Project Site