3933 Quail Ridge Road Residential Project

Focused Draft Environmental Impact Report

SCH#2019071038

prepared by

City of Lafayette
3675 Mount Diablo Boulevard, #210
Lafayette, California 94549
Contact: Nancy Tran, Senior Planner

prepared with the assistance of

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449 15th Street, Suite 303
Oakland, California 94612

March 2020

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Environmental Scientists | Planners | Engineers
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Acronyms and Abbreviations

BAAQMD	Bay Area Air Quality Management District
BMP	best management practices
CBC	California Building Code
CE&G	Cal Engineering & Geology
CEQA	California Environmental Quality Act
COA	[Standard] Conditions of Approval
EIR	Environmental Impact Report
FEMA	Federal Emergency Management Agency
GHG	greenhouse gas
LMC	Lafayette Municipal Code
NOD	Notice of Determination
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
RWQCB	Regional Water Quality Control Board

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Executive Summary

This document is an Environmental Impact Report (EIR) that analyzes the environmental effects of the proposed 3933 Quail Ridge Road Residential Project (proposed project or project). This section summarizes the characteristics of, alternatives to, and environmental impacts and mitigation measures associated with the proposed project.

Project Synopsis

Project Applicant

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Project Description

This EIR has been prepared to examine the potential environmental effects of the 3933 Quail Ridge Road Residential Project. The following is a summary of the full project description, which can be found in Section 2, *Project Description*.

The project would involve construction of a two-story, single-family residence, including an attached two-car garage and outdoor decks, on a parcel with an active landslide that covers approximately 90 percent of the property. The residence would be approximately 4,000 square feet in size, including the garage, and approximately 35 feet in height. During construction, four protected trees would be removed and replaced with at least three trees south of the proposed residence. Landscaping along the steepest portion of the slide mass near Quail Ridge Road would be installed as part of the project. Development on the project site is constrained by the landslide area and required setbacks from nearby ridgelines and from all property lines. Foundation piles would also be required to anchor the residence to the underlying stable bedrock in the northeast corner of the site. A private driveway on Quail Ridge Road would provide vehicular access to the site.

Project Objectives

- Redevelop the site with a single-family residential structure
- Develop the site in an attractive, well-planned manner

Alternatives

As required by the California Environmental Quality Act (CEQA), this EIR examines alternatives to the proposed project. Studied alternatives include the following two alternatives. Based on the analysis, Alternative 2 was determined to be the environmentally superior alternative.

- Alternative 1: No Project
- Alternative 2: Landslide Stabilization

Alternative 1 (No Project) assumes that no structure would be built on the project site and that the existing landslide would continue to move with natural conditions. Under the No Project Alternative, off-site impacts could occur and therefore this alternative would not be the environmentally superior alternative.

Alternative 2 (Landslide Stabilization) would involve stabilizing the on-site portion of the Quail Ridge Landslide and constructing a single-family residence outside the required setbacks in the central portion of the site. This alternative would comply with City codes and zoning regulations, and would require no variances. The residence could be up to 4,500 square feet, similar in size and character to other residences in the existing neighborhood. Vehicular access would be from Quail Ridge Road at the site's northeast corner. In comparison to the proposed project, this alternative would avoid land use inconsistencies and reduce landslide hazards on and off the site. No mitigation measures would be required under this alternative. Overall, Alternative 2 would be the environmentally superior alternative.

Refer to Section 6, *Alternatives*, for the complete alternatives analysis.

Areas of Known Controversy

The EIR scoping process did not identify areas of known controversy for the proposed project. Section 1, *Introduction,* gives a summary of responses to the Notice of Preparation of a Draft EIR.

Issues to be Resolved

The proposed project would require Phase I Hillside development, grading, and tree removal permits. The proposed project would require Planning Commission approval of an exception for development in a Class II Ridgeline Setback, an exception to Exceed the 15-Degree Declination Requirement, a variance permit, and design review.

Issues Not Studied in Detail in the EIR

Table 5 in Section 1.4 summarizes issues from the environmental checklist addressed in the Initial Study (Appendix A). As indicated in the Initial Study, no substantial evidence indicates that significant impacts would occur to the following issue areas: Aesthetics, Agricultural Resources, Air Quality, Biological Resources, Cultural Resources, Energy, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Hydrology and Water Quality, Land Use and Planning, Mineral Resources, Noise, Population and Housing, Public Services, Recreation, Transportation, Tribal Cultural Resources, Utilities and Service Systems, and Wildfire. Impacts to Geology and Soils were found to be potentially significant; they are further analyzed in this EIR.

Summary of Impacts and Mitigation Measures

Table 1 summarizes the environmental impacts of the proposed project, proposed mitigation measures, and residual impacts (the impact after application of mitigation, if required). Impacts are categorized as follows:

- **Significant and Unavoidable.** An impact that cannot be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires a Statement of Overriding Considerations to be issued if the project is approved per CEQA Guidelines Section 15093.
- **Less than Significant with Mitigation Incorporated.** An impact that can be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires findings under CEQA Guidelines Section 15091.
- **Less than Significant.** An impact that may be adverse, but does not exceed the threshold levels and does not require mitigation measures. However, mitigation measures that could further lessen the environmental effect may be suggested if readily available and easily achievable.
- **No Impact:** The proposed project would have no effect on environmental conditions or would reduce existing environmental problems or hazards.

Table 1 Summary of Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure (s)	Residual Impact
Initial Study Impacts and Mitigation Measures		
Biological Resources		
Impact 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 Wildlife or U.S. Fish and Wildlife Service? (Refer to Appendix A.)	**BIO-1: Pre-construction Special-Status Surveys and Reporting.** No more than one week prior to vegetation clearing and ground disturbance within the project site, a qualified biologist shall conduct pre-construction surveys for special-status wildlife species within the construction footprint and within a 100-foot survey buffer area. If non-listed, special-status species are detected in the construction footprint, the qualified biologist may capture and relocate, as feasible, to adjacent appropriate habitat within the open space on-site or in suitable habitat adjacent to the project area. If individuals are not relocated or leave the site of their own accord, the qualified biologist shall implement an avoidance buffer suitable for protection of the individual(s). If listed special status species are detected within the construction footprint or survey buffer area, the California Department of Fish and Wildlife and/or the United States Fish and Wildlife Service, as appropriate, shall be notified prior to construction activities. The methods and results of the pre-construction survey(s) and any relocation efforts during those surveys shall be documented in a brief letter report (Pre-Construction Survey Report) and submitted to the City no later than three weeks following the completion of the survey(s). **BIO-2: Nesting Bird Pre-construction Surveys and Monitoring.** To avoid disturbance of nesting and special-status birds, including raptorial species protected by the MBTA and California Fish and Game Code, project construction, including but not limited to, vegetation removal, ground disturbance, and construction shall occur outside of the bird breeding season (February 1 through August 30). If construction must begin during the breeding	Less than significant with mitigation

Impact	Mitigation Measure (s)	Residual Impact
	season, then a pre-construction nesting bird survey shall be conducted no more than one week prior to initiation of ground disturbance and vegetation removal activities. The nesting bird pre-construction survey shall be conducted on foot inside the project boundary, including a 300-foot buffer (500-foot for raptors), and in inaccessible areas (e.g., private lands) from afar using binoculars to the extent practical. The survey shall be conducted by a biologist familiar with the identification of avian species known to occur in the project vicinity. If nests are found, an avoidance buffer shall be determined and demarcated by the biologist of a minimum of 50 feet for non-raptor bird species and at least 300 feet for raptor species. Larger buffers may be recommended and/or smaller buffers may be established depending upon the species, status of the nest, and construction activities occurring in the vicinity of the nest. The buffer area(s) should be closed to all construction personnel and equipment until the adults and young are no longer reliant on the nest site. A qualified biologist should confirm that breeding/nesting is completed and young have fledged the nest prior to removal of the buffer. Encroachment into the buffer shall occur only at the discretion of the qualified biologist. If buffer zones are determined to be infeasible, a full-time qualified biological monitor shall be on site to monitor construction within the buffer zones to avoid impacts to active nests and nesting birds.	
Cultural Resources		
Impact b. Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5? (Refer to Appendix A).	**CR-1: Unanticipated Archaeological Resources.** If archaeological resources are encountered during ground-disturbing activities, work within 50 feet of the find shall be halted and an archaeologist meeting the Secretary of the Interior's Professional Qualification Standards for archaeology (National Park Service 1983) shall be contacted immediately to evaluate the find. If necessary, the evaluation may require preparation of a treatment plan and archaeological testing for CRHR eligibility. If the discovery proves to be significant under CEQA and cannot be avoided by the project, additional work, such as data recovery excavation, may be warranted to mitigate any significant impacts to historical resources.	Less than significant with mitigation
Geology and Soils		
Impact f. Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature? (Refer to Appendix A).	**PAL-1: Paleontological Resources Monitoring.**[1] A Qualified Paleontologist shall conduct paleontological monitoring during ground-disturbing activities (including, but not limited to, site preparation, grading, excavation, and trenching). The Qualified Paleontologist shall have at least a Master's Degree or equivalent work experience in paleontology, shall have knowledge of the local paleontology, and shall be familiar with paleontological procedures and techniques. Ground-disturbing activities within areas of the project site underlain by paleontologically sensitive deposits (i.e., Orinda Formation) shall be monitored on a full-time basis. Monitoring shall be supervised by the Qualified Paleontologist and shall be conducted by a qualified paleontological monitor, defined as an individual who meets the minimum qualifications per standards set forth by the Society of Vertebrate Paleontology (2010), which	Less than significant with mitigation

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[1] Please note this measure is listed as "GEO-1" instead of "PAL-1" in the Initial Study (Appendix A).

Impact	Mitigation Measure (s)	Residual Impact
	includes a BS or BA degree in geology or paleontology with one year of monitoring experience and knowledge of collection and salvage of paleontological resources. The duration and timing of the monitoring shall be determined by the Qualified Paleontologist. If the Qualified Paleontologist determines that full-time monitoring is no longer warranted, he or she may recommend reducing monitoring to periodic spot-checking or may recommend that monitoring cease entirely. Monitoring shall be reinstated if any new ground disturbances are required, and reduction or suspension shall be reconsidered by the Qualified Paleontologist at that time. If a paleontological resource is discovered, the monitor shall have the authority to temporarily divert construction equipment around the find until it is assessed for scientific significance and collected. Once salvaged, significant fossils shall be prepared to a curation-ready condition and curated in a scientific institution with a permanent paleontological collection (such as the UCMP). Curation fees are the responsibility of the project owner. A final report shall be prepared describing the results of the paleontological monitoring efforts associated with the project. The report shall include a summary of the field and laboratory methods, an overview of the project geology and paleontology, a list of taxa recovered (if any), an analysis of fossils recovered (if any) and their scientific significance, and recommendations. The report shall be submitted to the lead agency for the project. If the monitoring efforts produce fossils, then a copy of the report shall also be submitted to the designated museum repository.	
Noise		
Impact a. Would the project result in generation of 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? (Refer to Appendix A.)	**NOI-1: Construction Noise Reduction.** As required by the City Municipal Code Section 5-208(d), construction activities shall only take place between the hours of 6:00 a.m. to 8:00 p.m. weekdays and Saturdays, or between 10:00 a.m. and 6:00 p.m. Sundays and federal holidays. In addition, either noise levels produced by individual pieces of equipment shall not exceed 83 dBA at 50 feet, or the noise level at the nearest affected property shall not exceed 80 dBA. Furthermore, the following requirements are provided to reduce construction noise: ▪ Prior to the start of and for the duration of construction, the contractor shall properly maintain and tune all construction equipment in accordance with the manufacturer's recommendations to minimize noise emissions. ▪ During construction, the contractor shall place temporary sound barriers along the northern and eastern boundaries of the construction area on site, to further reduce noise levels from construction equipment. ▪ Prior to use of any construction equipment, the contract shall fit all equipment with properly operating mufflers, air intake silencers, and engine shrouds no less effective than as originally equipped by the manufacturer. ▪ During construction, the construction contractor shall place stationary construction equipment and material delivery (loading/unloading) areas to maintain the greatest distance from the nearest residences.	Less than significant with mitigation

Impact	Mitigation Measure (s)	Residual Impact
	▪ The construction contractor shall post a sign at the work site that is clearly visible to the public, providing a contact name and telephone number for filing a noise complaint. ▪ These measures shall be listed on all grading plans and monitored by the City of Lafayette during construction.	
EIR Impacts and Mitigation Measures		
Geology and Soils		
Impact GEO-1. The proposed project would expose residences to hazards associated with landslides in the event of landslide re-activation resulting from an earthquake. The site is also susceptible to lateral spreading during seismic events. This impact would be less than significant with implementation of standard conditions of approval.	**GEO-1: Final Geotechnical Investigation and Geologic Hazards Setbacks.** A Registered Geotechnical Engineer and Certified Engineering Geologist (CEG) shall complete a design-level geotechnical investigation specific to the proposed project and in accordance with State of California Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California. The design-level geotechnical investigation shall demonstrate at a minimum that: ▪ The building site is protected against regressive landslide failure. ▪ The proposed project does not increase the potential for reactivation of the on-site landslide in any way. ▪ The proposed residence can withstand earthquake-induced landslide deformation without significant damage to the proposed residence or loss of life. The design-level geotechnical investigation shall include but not be limited to the following: ▪ Estimate the level of ground shaking anticipated for the project site in accordance with the California Building Code (CBC). ▪ Estimate both vertical and horizontal anticipated peak ground accelerations. ▪ Evaluate expansive soils within the project site development footprint. ▪ Provide seismic design values based on the site -specific geologic conditions in accordance with the CBC for the structural engineer to utilize in the structural design of the building to ensure the residence is constructed to withstand strong ground shaking from a moderate to large seismic event. ▪ Provide recommendations for geologic hazard such as setbacks, below-grade retaining structures, landslide repairs and/or control of stormwater runoff to ensure the addition of the residence does not contribute to the likelihood of landslide re-activation under both static and coseismic conditions. The design-level geotechnical investigation shall provide grading and foundation recommendations to reduce the adverse effects associated with landslides under static and coseismic conditions at the project site that could impact the proposed residence and/or adjacent properties. The geotechnical report shall be subject to review and approval by the City of Lafayette prior to the approval of building and grading permits. The City shall require as conditions of approval that all recommendations provided in the geotechnical report shall be followed during grading and construction at the site.	Less than significant with mitigation

Impact	Mitigation Measure (s)	Residual Impact
	During the final design review of the project, the City shall require at least one of the following design options: ▪ Require the proposed residence be founded on drilled piers that extend into competent bedrock outside the active landslide limits. This option alone would not be sufficient, and shall be combined with at least one additional option listed below. ▪ Establish appropriate geologic hazard setbacks from the limits of the landslide. Typical landslide setbacks without additional landslide mitigation range from 50 to 200 feet. ▪ Construct a below-ground retaining wall or pier wall between the landslide and house foundation to isolate the building pad from the active landslide and potential landslide regression. ▪ Repair all or a portion of the landslide near the proposed improvements to reduce risks by over-excavating a portion of the landslide down to bedrock and replacing the materials with drained engineered fill to reduce risks to create a slope buttress that would stabilize the building pad, similar to the Quail Ridge Road stabilization. Any of these measures should be expected to mitigate the hazards of earthquake-induced landslide deformation of landslide regression into the building pad by either creating a buffer or separating the building foundation from the active portions of the landslide. However, the drilled pier foundation needs to be performed in addition to the other methods as it is not enough by itself to mitigate the risks.	
Impact GEO-2. The proposed project has the potential to reactivate the on-site landslide from saturation of soils within and adjacent to the active landslide, including from accidental leakages from utilities pipelines, on-site stormwater drainage, and landscape watering. Implementation of mitigation measures would reduce this impact to less than significant.	**GEO-2a: Utilities and Drainage Redundancy.** The proposed utilities connections shall be designed with dual redundancies to prevent leakage into the surrounding soils, specifically the landslide area. This could be accomplished by enclosing pipelines in larger diameter pipes from the proposed residence to the street connection point. A manhole shall be installed within Quail Ridge Road to provide access to the pipelines and identify any leakages as they occur. Design of the system shall be submitted for review and approval by the City, and shall be monitored semi-annually by the landowner. The landowner shall submit monitoring reports to the City, including proof of remediation action, if remediation is required. In the event of leakage from one of the utilities pipelines into the redundancy pipeline, remediation shall be completed within 14 business days. Final project design shall include drainage systems that convey stormwater to Quail Ridge Road for disposal into the City's municipal stormwater system. This on-site drainage system shall be designed to capture all runoff from new impervious surfaces associated with the proposed residence to prevent this runoff from entering into the soils surrounding the building site, specifically the landslide area. Final design of the stormwater system shall be submitted for review and approval by the City. As with the utilities pipeline redundancies described above, the drainage system shall be designed with a similar redundancy to ensure leakages from the on-site stormwater conveyance pipelines do not occur. This system shall be monitored and remediated by the landowner, concurrent with the utilities pipeline monitoring, reporting, and remediation schedule described above.	Less than significant with mitigation

Impact	Mitigation Measure (s)	Residual Impact
	GEO-2b: Landscaping Irrigation. The proposed project shall include only drought-tolerant landscaping that does not require watering. Landscape irrigation shall not be installed on the slope adjacent to the Quail Ridge Landslide. The minimum amount of water required to sustain landscaping on the project site near the residence or driveway shall be determined by a certified arborist or landscape architect. The final landscaping plan, including water requirements, shall be submitted for review and approval by the City. The applicant shall record a deed restriction that requires water application to landscaping be no greater than the arborist- or landscape architect-determined quantity. Water shall not be applied to landscaped areas following rain events. Risks from faulty irrigation systems shall be reduced or mitigated by adding deep sub-drains along the edge of the building pad. **GEO-2c: Undocumented Fill.** The applicant shall be required to remove all areas of undocumented non-engineered fill from the site as part of site development. The engineered fill placed for the Quail Ridge Road repairs is excluded from this mitigation measure.	
Impact GEO-3. The proposed project has the potential to cause landslide risks due to its cantilevered design. Implementation of mitigation measures to require special design considerations to allow for future landslide repairs, as well as standard conditions of approval, would reduce this impact to less than significant.	**GEO-1: Final Geotechnical Investigation and Geologic Hazards Setbacks.** Refer to Impact GEO-1 for the full text of this mitigation measure. **GEO-3: Cantilevered Design Requirements.** During the final design review of the project, the City shall require one of the following design options: ▪ Removal or reduction of the cantilevered project design and implementation of geologic setbacks from the landslide (refer to GEO-1); or ▪ Design of the cantilevered building portions to allow construction equipment full access to all areas of the building foundation in the event that slide repair is required, and ensuring the cantilever is rated for strong seismic events.	Less than significant with mitigation
Impact GEO-4. Implementation of the proposed project would not result in liquefaction, subsidence, or collapse of soils on the project site. This impact would be less than significant.	None required.	Less than significant
Impact GEO-5. Implementation of the proposed project would include ground disturbance such as excavation and grading that would result in loose or exposed soil. This site work-caused erosion could also result in re-activation of the on-site landslide. However, compliance with existing regulations and implementation of standard conditions of approval requiring erosion control	**GEO-2b: Landscaping Irrigation.** Refer to Impact GEO-2 for the full text of this condition of approval. **COA-5: Erosion Control.** A site-specific erosion control plan that incorporates BMPs shall be prepared by the project applicant and approved by the City prior to the granting of any grading permits. All measures identified in the erosion control plans shall be implemented and monitored for continued compliance by the City of Lafayette Public Works Department. Such measures may include slope protection measures, netting and sandbagging, landscaping and possibly hydroseeding, and temporary drainage control facilities such as retention areas. All slopes involved with the project shall be constructed using an erosion control mat and a thorough vegetation and landscape plan. A landscaping plan and a landscape maintenance plan shall be designed by a licensed landscape architect. These plans shall be reviewed and approved	Less than significant with standard condition of approval and mitigation

Impact	Mitigation Measure (s)	Residual Impact
would reduce impacts to less than significant.	by the City of Lafayette Public Works Department prior issuance of grading permits.	
Impact GEO-6. Implementation of the proposed project may result in the construction of structures on expansive soils, which could create a substantial risk to life or property. Compliance with the requirements of the California Building Code, California Residential Code, and COA-1a would reduce this impact to less than significant.	**GEO-1: Final Geotechnical Investigation and Geologic Hazards Setbacks.** Refer to Impact GEO-1 for the full text of this mitigation measure.	Less than significant with mitigation

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1 Introduction

This document is an Environmental Impact Report (EIR) that assesses the environmental effects of developing a single-family residence at 3933 Quail Ridge Road, Lafayette, California. The proposed 3933 Quail Ridge Road Residential Project (hereafter referred to as the “proposed project” or “project”) would be constructed on a site that is currently open space. The project would involve construction of a 4,000-square-foot residential structure on a 1.1-acre site.

This section discusses (1) the project and EIR background; (2) the legal basis for preparing an EIR; (3) the scope and content of the EIR; (4) issue areas found not to be significant by the Initial Study; (5) the lead, responsible, and trustee agencies; and (6) the environmental review process required under the California Environmental Quality Act (CEQA). The proposed project is described in detail in Section 2, *Project Description*.

1.1 Environmental Impact Report Background

The City of Lafayette distributed a Notice of Preparation (NOP) of the EIR for a 30-day agency and public review period starting on July 29, 2019 and ending on August 28, 2019. The City received five letters in response to the NOP during the public review period. The NOP is presented in Appendix A of this EIR, along with the Initial Study prepared for the project and the NOP responses received. Table 2 summarizes the content of the letters and where the EIR addresses the issues raised.

1.2 Purpose and Legal Authority

The proposed project requires the discretionary approval of the City of Lafayette Planning Commission; therefore, the project is subject to the environmental review requirements of CEQA. In accordance with *CEQA Guidelines* Section 15121 (California Code of Regulations, Title 14), the purpose of this EIR is to serve as an informational document that:

> will inform public agency decision makers and the public generally of the significant environmental effects of a project, identify possible ways to minimize the significant effects, and describe reasonable alternatives to the project.

This EIR has been prepared as a project EIR, pursuant to Section 15161 of the *CEQA Guidelines*. A project EIR is appropriate for a specific development project. As stated in the *CEQA Guidelines*:

> This type of EIR should focus primarily on the changes in the environment that would result from the development project. The EIR shall examine all phases of the project, including planning, construction, and operation.

This EIR serves as an informational document for the public and City of Lafayette decision makers. The process includes public hearings before the Planning Commission to consider certification of a Final EIR and approval of the proposed project.

Table 2 NOP Comments and EIR Response

Commenter	Comment/Request	How and Where it was Addressed
Agency Comments		
Native American Heritage Commission	The Lead Agency must determine if there are historical resources within the area of potential effects. AB 52 applies to the project, and requires tribal consultation regarding tribal cultural resources. Native American Heritage Commission recommends consultation with California Native American tribes traditionally and culturally affiliated with the geographic are of the project as early as possible.	Cultural resources, tribal cultural resources, and AB 52 consultation requirements are described in the Initial Study (Appendix A), Sections 5 and 18.
	SB 18 applies to projects that require an amendment of a General Plan or Specific Plan, or the designation of open space.	The project would not require a General Plan or Specific Plan amendment and does not designate open space.
	Recommends contacting the regional California Historical Research Information System Center for an archaeological record search, preparation of a professional report detailing the findings of a field and record survey, and contacting the Native American Heritage Commission for a Sacred Lands File search and Native American Tribal Consultation List.	Potential impacts to cultural resources, as well as methodology and record searches, are described in the Initial Study (Appendix A), Section 5.
	Lack of surface evidence of archaeological resources does not preclude their subsurface existence.	Mitigation Measure CR-1 was included in the Initial Study (Appendix A) regarding unanticipated archeological resources.
Public Comments		
Louise Laemmlen	Quail Ridge Road is privately maintained, and the landslide at 3933 Quail Ridge Road is currently active. The owners at 3933 Quail Ridge Road have not contributed to shared road maintenance in the past.	Comment noted. The history of the site is described in Section 2.4.1, *Site History and Current Conditions*, of this EIR, as well as in Section 8 of the Initial Study (Appendix A). Economic and social issues such as the applicant's contributions to road maintenance are not required to be analyzed under CEQA.
Donald Thielke	Wildfire preparation is a concern.	Wildfire is addressed in the Initial Study (Appendix A) Section 20, *Wildfire.*
	The landslide has slumped over 13 years; construction on the site could reactivate the slide mass, result in roadbed loss, and block fire trail access; past geotechnical studies are valid for three years; seismic enhancement and water supply protection; and improved signage on the Fire Trail.	Geology and soils impacts are addressed in Section 4.1, *Geology and Soils*, of this EIR, as well as in Section 7 of the Initial Study (Appendix A). The project would not affect signage on the fire trail.

Commenter	Comment/Request	How and Where it was Addressed
	Include or attach HDP21-04, June 24, 2008 Seidelman Associates Geotechnical investigation, and July 16, 2012 Lafayette Planning Commission meeting agenda items 05, 05.1, and 05.2.	Geotechnical reports and peer reviews by geotechnical experts regarding the project are included as Appendix B to this EIR. Past public comments were considered during preparation of this EIR.
Mir Ali	Construction traffic should utilize Quail Ridge Road exclusively and not travel on Los Arabis Drive.	Section 2.5, *Project Characteristics*, of this EIR states that construction vehicles would access the site via Quail Ridge Road.
Gregory Millar and Hannah Dunn	Review the full historical file of the property, including prior permit applications, neighbor complaints, and geological reports.	Geotechnical reports and peer reviews by geotechnical experts regarding the project are included as Appendix B to this EIR. Past public comments were considered during preparation of this EIR.
	Soils and gravel were dumped onto the project site and neighboring parcels in 2017. This may be a grading code violation and may have disrupted irrigation lines and a drainage hose.	Geology and soils impacts are addressed in Section 4.1, *Geology and Soils*, of this EIR, and Mitigation Measure GEO-2c reduces impacts from undocumented fill on the project site
	The site owner has not paid their fair share of road maintenance expenses and is in litigation with Yosemite Capital regarding a loan. Describe financial guarantees in place to protect Quail Ridge Road and neighboring properties.	Comment noted. Economic issues, including the financial history of the site, are not required to be analyzed under CEQA.
	Requests Quail Ridge Road be preserved, the site owner cover the costs of triggering a landslide, damage to the road during construction activities is prevented, and mitigation is provided for geological risks.	Comment noted. Geology and soils impacts are addressed in Section 4.1, *Geology and Soils*, of this EIR, as well as in Section 7 of the Initial Study (Appendix A). Mitigation is provided as required.
	Quail Ridge Road is a fire and earthquake evacuation route.	Section 15, *Public Services*, and Section 17, *Transportation*, of the Initial Study (Appendix A) describes potential impacts to fire protection facilities and emergency access routes.
	Privacy to 3927 Quail Ridge Road would be infringed upon by the new residence three feet from the shared property line.	The project would not remove the dense trees and vegetation along the property line and on the western half of the 3927 Quail Ridge Road property. Further, social issues, including privacy, are not required to be analyzed under CEQA.
	Easements for drainage, utility line access, and landslide mitigation should be discussed.	Geology and soils impacts are addressed in Section 4.1, *Geology and Soils*, of this EIR, as well as in Section 7 of the Initial Study (Appendix A).
	The proposed residence is not consistent with neighborhood building standards in terms of sizing and garage requirements.	Consistency with site zoning and land use is described in the Initial Study (Appendix A) Section 11, *Land Use and Planning*.

Commenter	Comment/Request	How and Where it was Addressed
	An alternative of a 4,000-square foot building within existing zoning parameters should be analyzed. Consider alternatives that would provide a long-term solution for the preservation of the project site.	Alternatives are described and analyzed in Section 6, *Alternatives*, of this EIR, including Alternative 2, Landslide Stabilization, which would repair the landslide on-site and construct a residence outside each of the setback areas.
Joseph Garofolo	The NOP does not comply with Section 15082 of CEQA and should provide more information.	Per Section 15082(a)(1) of the CEQA Guidelines, the NOP included a description of the project (NOP, Project Description subheading), location of the project (NOP, Project Location subheading), and probably environmental effects of the project (NOP, Probable Environmental Effects subheading). The Initial Study (Appendix A) provided additional detail.
	The Initial Study does not provide enough analysis of the on-site landslide.	Geology and soils impacts, including potential impacts related to the on-site landslide, are addressed in Section 4.1, *Geology and Soils*, of this EIR.
Scott Ingram	There has been substantial soil movement on the site, recently a tree fell due to said movement. The on-site landslide is actively moving. Construction on the site would cause damage to buildings constructed on site, as well as to adjacent properties.	Geology and soils impacts are addressed in Section 4.1, *Geology and Soils*, of this EIR, as well as in Section 7 of the Initial Study (Appendix A).
	The project will lower property values of the neighborhood and encroach on the privacy of surrounding homes.	Comment noted. Economic issues, including property values, are not required to be analyzed under CEQA. The project would not remove the dense trees and vegetation along the property line and on the western half of the 3927 Quail Ridge Road property.
	The site's owner has not contributed toward maintenance expenses and dumped topsoil on the site.	Comment noted. Economic issues, including the financial history of the site, are not required to be analyzed under CEQA.
Patty and Gene Cronin	The site should be engineered and stabilized prior to building, otherwise the land would not support a house and development would affect neighboring homes.	Alternatives are described and analyzed in Section 6, *Alternatives*, of this EIR, including Alternative 2, Landslide Stabilization, which would fully repair the landslide on-site.
	Dirt has been dumped on the site and on neighboring properties. The slide is actively transporting dirt onto neighboring properties. The lot should not be built on.	Geology and soils impacts are addressed in Section 4.1, *Geology and Soils*, of this EIR, and Mitigation Measure GEO-2c reduces impacts from undocumented fill on the project site.
	Who is responsible for the buttress wall below the roadway? Behind the buttress wall it appears the slide has moved 30 feet. The house at 3881 Los Arabis was removed due to soil moving.	Comment noted. Economic issues, including the financial responsibility of the road repair and buttress wall, are not required to be analyzed under CEQA. Geology and soils impacts are addressed in Section 4.1, *Geology and Soils*, of this EIR, as well as in Section 7 of the Initial Study (Appendix A).

Commenter	Comment/Request	How and Where it was Addressed
	The site owner has never paid their share of road maintenance and appears to not have enough money to pay for construction costs and slide repairs.	Comment noted. Economic issues, including the financial history of the site, are not required to be analyzed under CEQA.
Claudia and Leroy Quan	In 2017, the City did not respond appropriately to complaints of soil dumped soil on the project site.	Geology and soils impacts are addressed in Section 4.1, *Geology and Soils*, of this EIR, and Mitigation Measure GEO-2c reduces impacts from undocumented fill on the project site.
	The on-site landslide is active and has not been stabilized. Construction could destabilize the slide mass and cause movement affected adjacent properties.	Geology and soils impacts are addressed in Section 4.1, *Geology and Soils*, of this EIR, as well as in Section 7 of the Initial Study (Appendix A).
	The slide mass should be stabilized prior to development.	Alternatives are described and analyzed in Section 6, *Alternatives*, of this EIR, including Alternative 2, Landslide Stabilization, which would fully repair the landslide on-site.
Louise Laemmlen	Safety is a major concern; the landslide was devastating for residents. The slide is still active and moves significantly every year. The road is buckling at the west end of the slide and the slide has been pulling away from the retaining wall.	Geology and soils impacts are addressed in Section 4.1, *Geology and Soils*, of this EIR, as well as in Section 7 of the Initial Study (Appendix A).

1.3 Scope and Content

This EIR addresses impacts identified by the Initial Study to be potentially significant. The following issue was found to include potentially significant impacts that have been studied in the EIR:

- Geology and Soils

In preparing the EIR, use was made of pertinent City policies and guidelines, certified EIRs and adopted CEQA documents, and other background documents. A full reference list is contained in Section 7, *References and Preparers*.

The alternatives section of the EIR (Section 6) was prepared in accordance with Section 15126.6 of the *CEQA Guidelines* and focuses on alternatives capable of eliminating or reducing significant adverse effects associated with the project, while feasibly attaining most of the basic project objectives. In addition, the alternatives section identifies the "environmentally superior" alternative among the those assessed. The alternatives evaluated include the CEQA-required "No Project" alternative and one alternative for the project site.

The level of detail contained throughout this EIR is consistent with the requirements of CEQA and applicable court decisions. *CEQA Guidelines* Section 15151 provides the standard of adequacy on which this document is based. The *Guidelines* state:

> An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of the proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR

should summarize the main points of disagreement among the experts. The courts have looked not for perfection, but for adequacy, completeness, and a good faith effort at full disclosure.

1.4 Issues Not Studied in Detail in the EIR

The environmental checklist addressed in the Initial Study (Appendix A) identified issues that will not be addressed in this EIR. As indicated in the Initial Study, there is no substantial evidence that significant impacts would occur in any of the following issue areas:

- Aesthetics
- Agricultural Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Energy
- Greenhouse Gas Emissions
- Hazards and Hazards Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation
- Tribal Cultural Resources
- Utilities and Service Systems
- Wildfire

1.5 Lead, Responsible, and Trustee Agencies

The *CEQA Guidelines* define lead, responsible and trustee agencies. The City of Lafayette is the lead agency for the project because it holds principal responsibility for approving the project. A responsible agency refers to a public agency other than the lead agency that has discretionary approval over the project. There are no responsible agencies for the proposed project. A trustee agency refers to a state agency having jurisdiction by law over natural resources affected by a project. There are no trustee agencies for the proposed project.

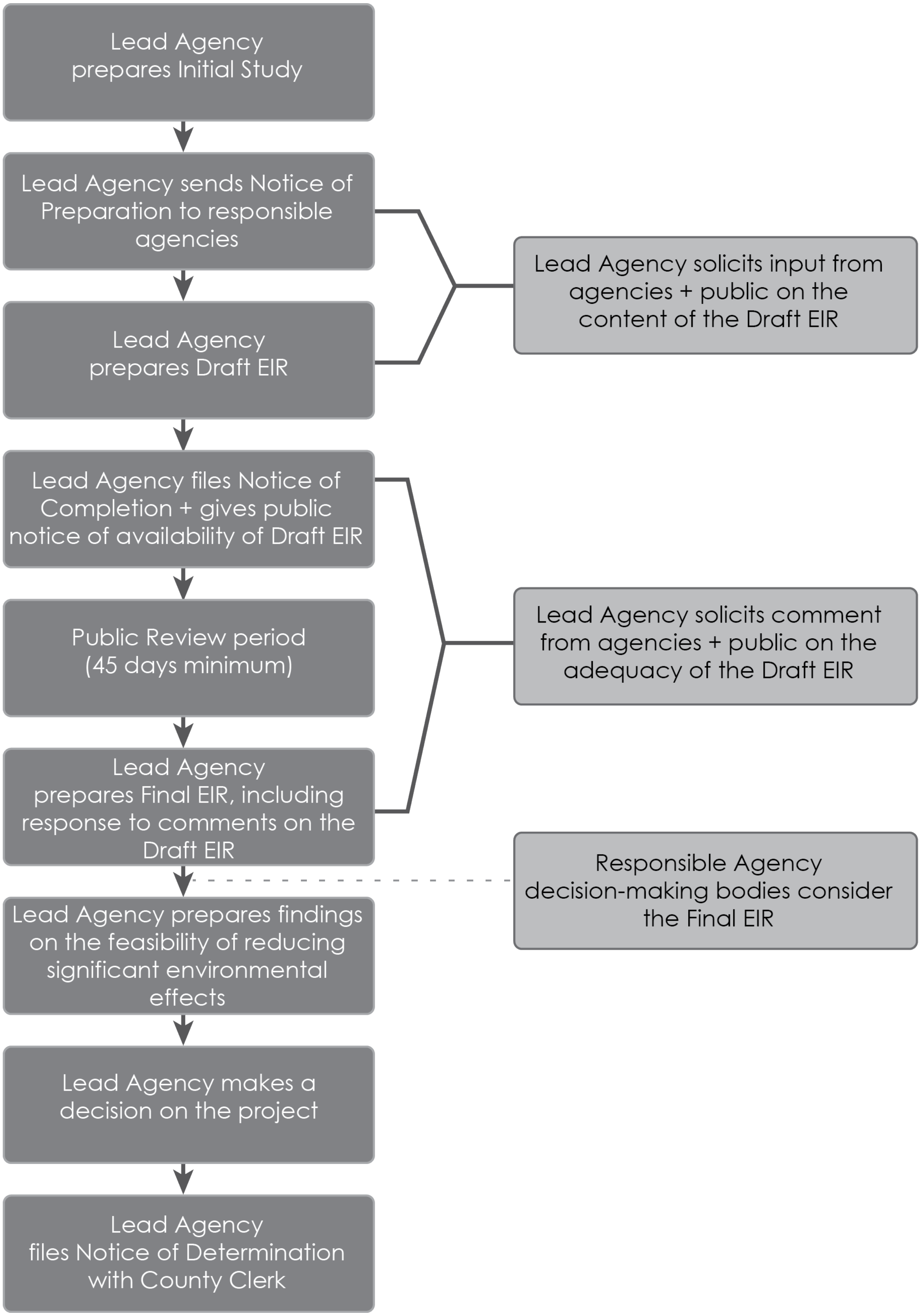
1.6 Environmental Review Process

The environmental impact review process, as required under CEQA, is summarized below and illustrated in Figure 1. The steps are in sequential order as follows.

1. **Notice of Preparation and Initial Study**. After deciding that an EIR is required, the lead agency (City of Lafayette) must file a NOP soliciting input on the EIR scope to the State Clearinghouse, other concerned agencies, and parties previously requesting notice in writing (*CEQA Guidelines* Section 15082; Public Resources Code Section 21092.2). The NOP must be posted in the County Clerk’s office for 30 days. The NOP may be accompanied by an Initial Study that identifies the issue areas for which the project could create significant environmental impacts.
2. **Draft EIR Prepared.** The Draft EIR must contain: a) table of contents or index; b) summary; c) project description; d) environmental setting; e) discussion of significant impacts (direct, indirect, cumulative, growth-inducing and unavoidable impacts); f) a discussion of alternatives; g) mitigation measures; and h) discussion of irreversible changes.

3. **Notice of Completion.** The lead agency must file a notice of completion with the State Clearinghouse when it completes a Draft EIR and prepare a Public Notice of Availability of a Draft EIR. The lead agency must place the notice of completion in the County Clerk's office for 30 days (Public Resources Code Section 21092) and send a copy of the notice of completion to anyone requesting it (*CEQA Guidelines* Section 15087). Additionally, public notice of Draft EIR availability must be given through at least one of the following procedures: a) publication in a newspaper of general circulation; b) posting on and off the project site; and c) direct mailing to owners and occupants of contiguous properties. The lead agency must solicit input from other agencies and the public, and respond in writing to all comments received (Public Resources Code Sections 21104 and 21253). The minimum public review period for a Draft EIR is 30 days. When a Draft EIR is sent to the State Clearinghouse for review, the public review period must be 45 days unless the State Clearinghouse approves a shorter period (Public Resources Code 21091).
4. **Final EIR.** A Final EIR must include: a) the Draft EIR; b) copies of comments received during public review; c) list of persons and entities commenting; and d) responses to comments.
5. **Certification of Final EIR.** Prior to making a decision on a proposed project, the lead agency must certify that a) the Final EIR has been completed in compliance with CEQA; b) the Final EIR was presented to the decision-making body of the lead agency; and c) the decision making body reviewed and considered the information in the Final EIR prior to approving a project (*CEQA Guidelines* Section 15090).
6. **Lead Agency Project Decision.** The lead agency may a) disapprove the project because of its significant environmental effects; b) require changes to the project to reduce or avoid significant environmental effects; or c) approve the project despite its significant environmental effects, if the proper findings and statement of overriding considerations are adopted (*CEQA Guidelines* Sections 15042 and 15043).
7. **Findings/Statement of Overriding Considerations**. For each significant impact of the project identified in the EIR, the lead agency must find, based on substantial evidence, that a) the project has been changed to avoid or substantially reduce the magnitude of the impact; b) changes to the project are within another agency's jurisdiction and such changes have or should be adopted; or c) specific economic, social, or other considerations make the mitigation measures or project alternatives infeasible (*CEQA Guidelines* Section 15091). If an agency approves a project with unavoidable significant environmental effects, it must prepare a written Statement of Overriding Considerations that sets forth the specific social, economic, or other reasons supporting the agency's decision.
8. **Mitigation Monitoring Reporting Program.** When the lead agency makes findings on significant effects identified in the EIR, it must adopt a reporting or monitoring program for mitigation measures adopted or made conditions of project approval to mitigate significant effects.
9. **Notice of Determination (NOD).** The lead agency must file a NOD after deciding to approve a project for which an EIR is prepared (*CEQA Guidelines* Section 15094). A local agency must file the NOD with the county clerk. The NOD must be posted for 30 days and sent to anyone requesting notice previously. Posting of the NOD starts a 30-day statute of limitations on CEQA legal challenges (Public Resources Code Section 21167[c]).

Figure 1 Environmental Review Process



2 Project Description

This section describes the proposed project, including the project applicant, the project site and surrounding land uses, major project characteristics, project objectives, and discretionary actions needed for approval.

2.1 Project Applicant

Ravi and Jessica Reddy
3000 – F Danville Boulevard, #268
Alamo, California 94507

2.2 Lead Agency Contact Person

Nancy Tran, Senior Planner
City of Lafayette
3675 Mount Diablo Boulevard, #210
Lafayette, California 94549
(925) 299-3204

2.3 Project Location

The project site is 1.1 acres (48,750 square feet) in size and is located near the terminus of Quail Ridge Road, west of its intersection with Via Roble, in the central western portion of Lafayette. The Assessor's Parcel Number is 248-130-012 and the site address is 3933 Quail Ridge Road, Lafayette, California 94549. The project site is currently vacant, with an active landslide through most (approximately 90 percent) of the property. Several trees are located along the perimeter of the project site, primarily in the southwest and northeast corners. Figure 2 shows the regional location of the project site and Figure 3 provides an aerial image of the project site in its neighborhood context.

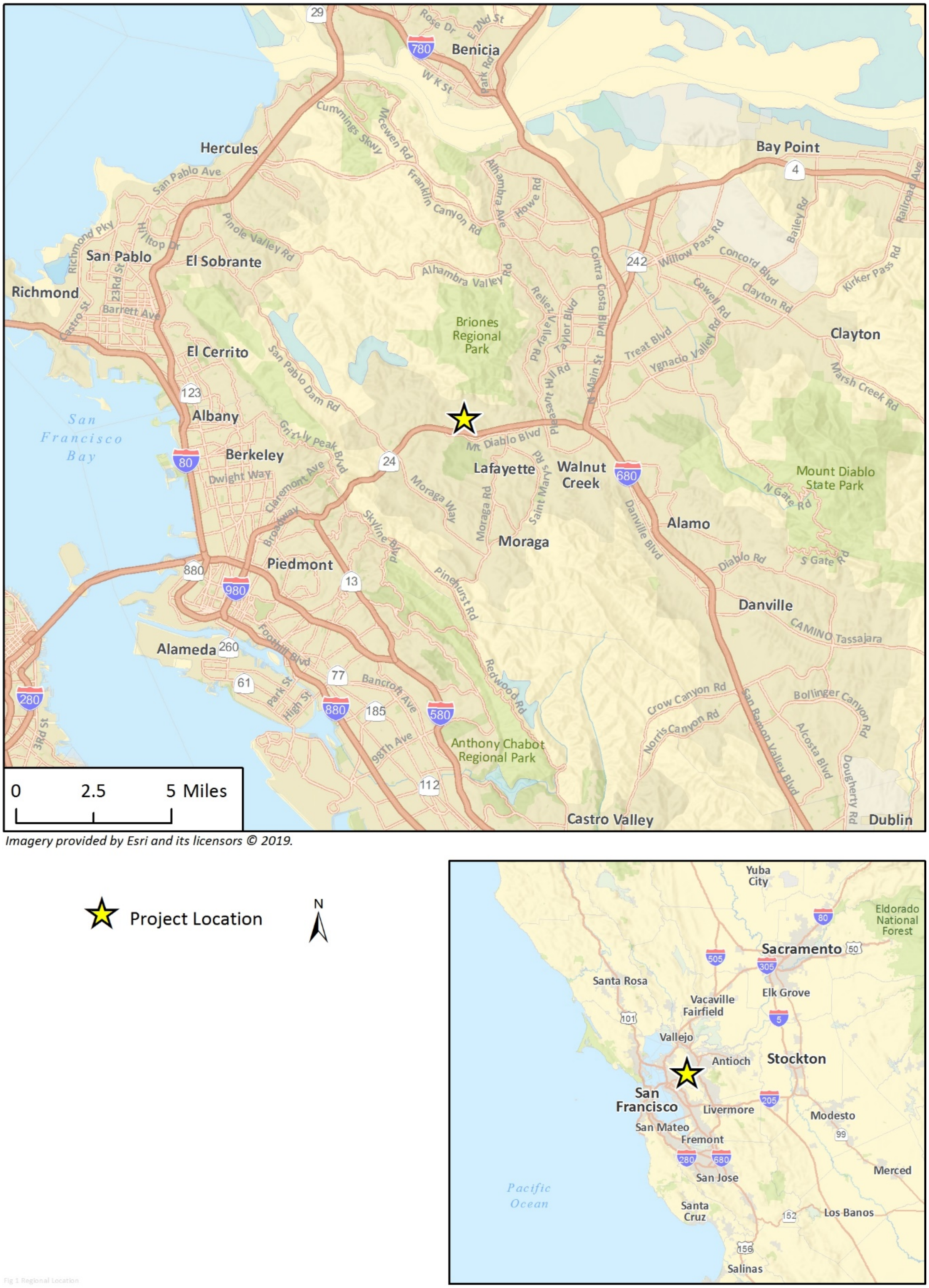
2.4 Existing Site Characteristics

2.4.1 Site History and Current Conditions

In 1997, an approximately 3.7-acre landslide (Quail Ridge Landslide) affected approximately 90 percent of the project site. The residence was destroyed and the debris subsequently removed. The site was partially re-graded, and Quail Ridge Road was repaired and stabilized between 1999 and 2001. The balance of the slide was graded to drain evenly to the south, but the landslide itself was not repaired. Most of the site consists of a steeply sloped landslide area that trends downward, from northwest to southeast. Trees are located on the more stable soil at the landslide's edges.

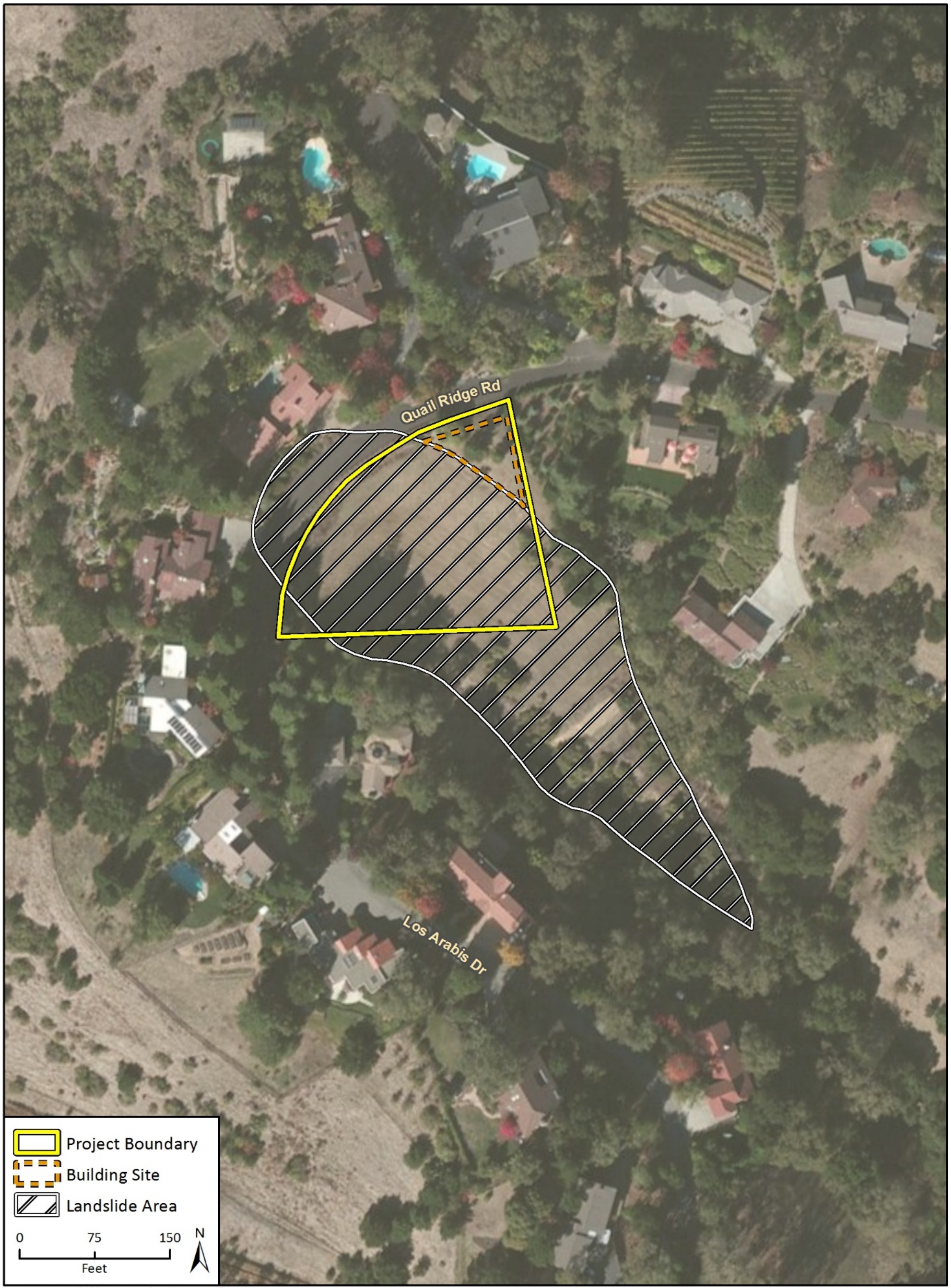
In the winter of 2005/2006, a pumping system installed during the original road repair failed, leading to the re-activation of the landslide area below the road repair. In 2008, the property owner requested to continue the soils review to determine if the portion of the lot not affected by the Quail Ridge Landslide was buildable. The City evaluated a series of soils reports and associated peer

Figure 2 Regional Location



Imagery provided by Esri and its licensors © 2019.

Figure 3 Project Site Location



Imagery provided by Esri and its licensors © 2019.
Additional data provided by Ryan Geological Consulting, INC. 2019.

Fig 2 Project Location

reviews. In December 2008, the City determined it was geotechnically feasible to construct a single-family residence at the northeast corner of the site, outside the limits of the slide. In 2012, the applicant formally submitted an application for a Phase I Hillside Development Permit.

2.4.2 Land Use Designation and Zoning

The site's land use designation is Low Density Single Family Residential up to two dwelling units per acre and the site's zoning is Single Family Residential District (R-20). The site is also located within the Hillside Overlay Area.

2.4.3 Surrounding Land Uses

The project site is in an area of large-lot residential properties on rolling topography with views over wooded hillsides. The site is surrounded by single-family residences with the same zoning and land use designations as the site. In the site vicinity, all parcels are developed, with the exception of those currently inaccessible by paved roadways.

Quail Ridge Road is a private road that provides direct access to the site. Local access is provided by Via Roble and Mount Diablo Boulevard, and regional access is provided by State Route 24 (SR-24) through central Lafayette.

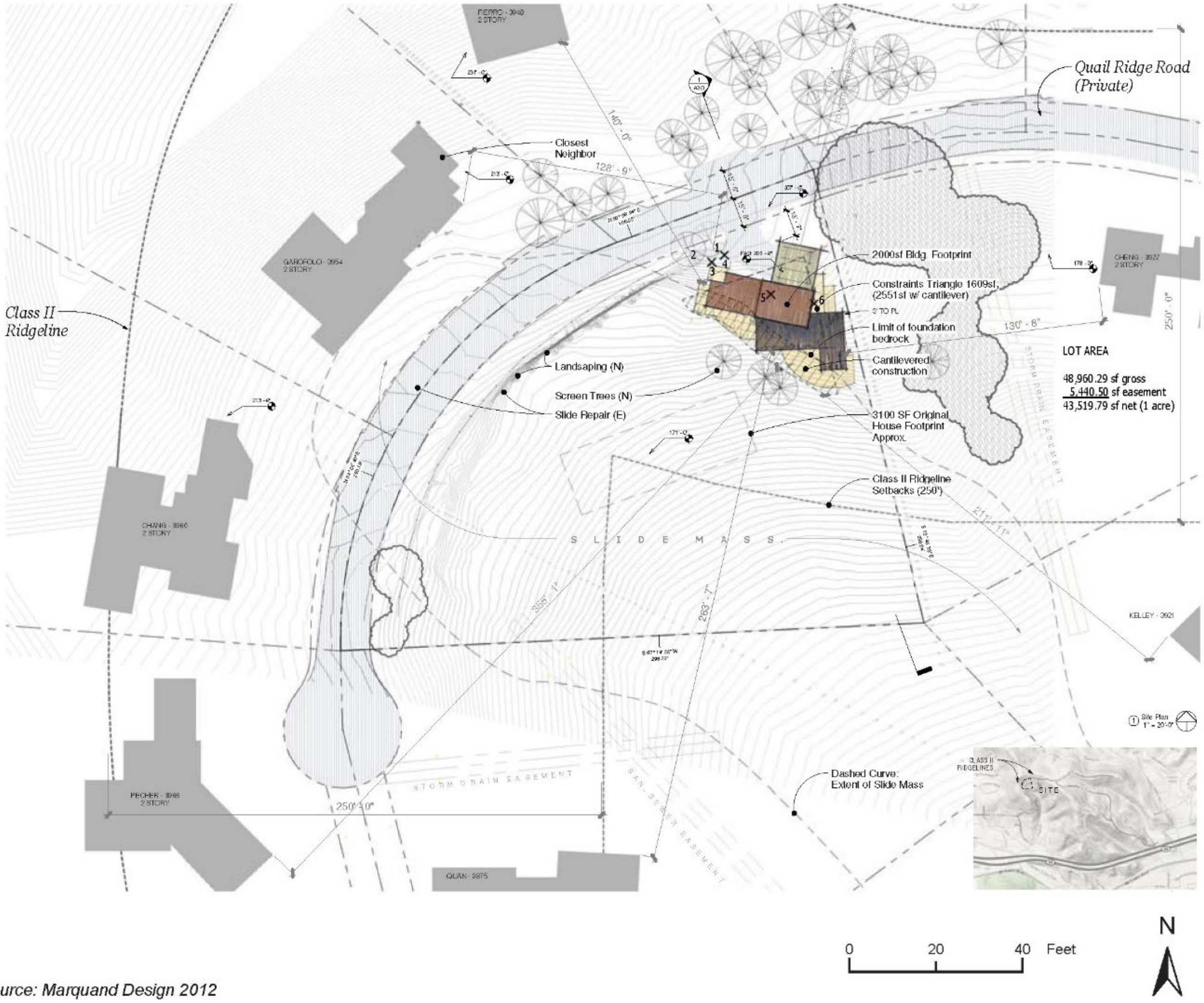
2.5 Project Characteristics

The project would involve construction of a two-story, single-family residence, including an attached two-car garage and outdoor decks. Figure 4 shows the proposed site plan. The residence would be approximately 4,000 square feet in size, including the garage, and approximately 35 feet in height. During construction, four protected trees would be removed and replaced with at least three trees south of the proposed residence. Landscaping along the steepest portion of the slide mass near Quail Ridge Road would be installed as part of the project. Development on the project site is constrained by the landslide area and required setbacks from nearby ridgelines and from all property lines. Foundation piles would be required to anchor the residence to the underlying stable bedrock in the northeast corner of the site. Because the residence would be built on the stable portion of the site, no soils engineering or other major earthwork processes that would require heavy-duty construction equipment are proposed. A private driveway on Quail Ridge Road would provide vehicular access to the site. Construction vehicles would access the site via Quail Ridge Road.

2.6 Project Objectives

- Redevelop the site with a single-family residential structure.
- Achieve some economic benefit from the site.

Figure 4 Proposed Site Plan



Source: Marquand Design 2012

2.7 Required Approvals

The following permits and approvals are required from the City of Lafayette prior to construction of the proposed project:

- Phase I Hillside Development Permit
- Exception for development within a Class II Ridgeline Setback
- Exception to Exceed the 15-Degree Declination Requirement
- Variance Permit
- Design Review
- Grading Permit
- Tree Removal Permit, Category II

3 Environmental Setting

This section provides a general overview of the environmental setting for the proposed project. More detailed description of the environmental setting can be found in Section 4, *Environmental Impact Analysis*.

3.1 Regional Setting

The project site is located in the city of Lafayette in Contra Costa County. Incorporated in 1968, Lafayette encompasses approximately 9,355 acres and is bisected by State Route 24. The city is characterized by medium- and low-density residential neighborhoods and open space areas. Commercial development is concentrated in the downtown area, with some high-density multi-family residential areas south of this commercial district. Much of the city is developed, with a few scattered undeveloped or vacant parcels (City of Lafayette 2002).

The estimated (2018) population of the city is 25,655 persons, and the current housing stock includes an estimated 9,943 units. The average household size is approximately 2.70 persons per unit (California Department of Finance 2018).

The most prevalent mode of travel in the city is driving. The predominant roadway corridor is State Route 24, which bisects the city in an east to west direction. Access to the city from State Route 24 is provided by freeway interchanges at Pleasant Hill Road, First Street/Oak Hill Road/Deer Hill Road, and Acalanes Road/Mt Diablo Boulevard/El Nido Ranch Road. A series of east-west and north-south arterial roadways provide vehicular access within the city. Major east-west thoroughfares include Mt Diablo Boulevard and Deer Hill Road, and major north-south thoroughfares include Pleasant Hill Road and Happy Valley Road.

Lafayette enjoys a classic California Mediterranean climate, with warm to hot, dry summers and mild to cool, wet winters. July and August are usually the warmest months of the year with an average high of 87 degrees Fahrenheit. December and January are usually the coolest months with an average low of 39 degrees Fahrenheit. The average amount of yearly rain is approximately 19.5 inches, with the wettest month being January (Weather Atlas 2019).

3.2 Project Site Setting

As shown in Figure 3*,* the project site is bordered by residential development on all sides, with Quail Ridge Road located immediately north of the site. The project site is currently vacant and has a General Plan land use designation of Low Density Single-family Residential up to two dwelling units per acre, and is in the Hillside Overlay Area. The site is zoned Single-family Residential District (R-20), as defined by the City's Zoning Ordinance and the Land Use Element of the General Plan. Uses permitted in the R-20 designation include single-family dwellings, livestock keeping, home occupations, and supportive care, with additional uses allowed if a use permit is obtained from the City. Most of the site consists of a steeply sloped landslide area that trends downward from northwest to southeast. Trees are located on the more stable soil at the landslide's edges.

3.3 Cumulative Development

In addition to the specific impacts of individual projects, CEQA requires EIRs to consider potential cumulative impacts of the proposed project. CEQA defines “cumulative impacts” as two or more individual impacts that, when considered together, are substantial or will compound other environmental impacts. Cumulative impacts are the combined changes in the environment that result from the incremental impact of development of the proposed project and other nearby projects. For example, traffic impacts of two nearby projects may be less than significant when analyzed separately, but could have a significant impact when analyzed together. Cumulative impact analysis allows the EIR to provide a reasonable forecast of future environmental conditions and can more accurately gauge the effects of a series of projects.

CEQA requires cumulative impact analysis in EIRs to consider either a list of planned and pending projects that may contribute to cumulative effects or a forecast of future development potential. The cumulative scenario considered in the cumulative analysis in Section 4, *Environmental Impact Analysis*, is based on buildout of the City’s General Plan, which projects growth within the City through 2040. There are no individual cumulative development projects currently proposed in the project vicinity. The City’s General Plan anticipates buildout to include an additional 380,000 square feet of commercial development and 1,026 new housing units. The Plan projects a population increase of 16.8 percent from 2010 levels to a population of 27,900; a household increase of 15.4 percent from 2010 levels to a total number of households of 10,640; and a 24.5 percent increase in employment from 2010 levels to a total employment of 13,417 individuals.

4 Environmental Impact Analysis

This section discusses the possible environmental effects of the 3933 Quail Ridge Road Residential Project for the specific issue areas identified through the scoping process as having the potential to experience significant effects. "Significant effect" is defined by the CEQA Guidelines Section 15382 as:

> …a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment, but may be considered in determining whether the physical change is significant.

The assessment of each issue area begins with a discussion of the environmental setting related to the issue, followed by the impact analysis. In the impact analysis, the first subsection identifies the methodologies used and the "significance thresholds," which are those criteria adopted by the City and other agencies, universally recognized, or developed specifically for this analysis to determine whether potential effects are significant. The next subsection describes each impact of the proposed project, mitigation measures for significant impacts, and the level of significance after mitigation. Each effect under consideration for an issue area is listed separately in bold text, with the discussion of the effect and its significance. Each bolded impact statement also contains a statement of the significance determination for the environmental impact as follows:

- **Significant and Unavoidable**. An impact that cannot be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires a Statement of Overriding Considerations to be issued if the project is approved per CEQA Guidelines Section 15093.
- **Less than Significant with Mitigation Incorporated**. An impact that can be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires findings under CEQA Guidelines Section 15091.
- **Less than Significant**. An impact that may be adverse, but does not exceed the threshold levels and does not require mitigation measures. However, mitigation measures that could further lessen the environmental effect may be suggested if readily available and easily achievable.
- **No Impact.** The proposed project would have no effect on environmental conditions or would reduce existing environmental problems or hazards.

Following each environmental impact discussion is a list of mitigation measures (if required) and the residual effects or level of significance remaining after implementation of the measure(s). In cases where the mitigation measure for an impact could have a significant environmental impact in another issue area, this impact is discussed and evaluated as a secondary impact. The impact analysis concludes with a discussion of cumulative effects, which evaluates the impacts associated with the proposed project in conjunction with other planned and pending developments in the area listed in Section 3, *Environmental Setting*. The Executive Summary of this EIR summarizes all impacts and mitigation measures that apply to the proposed project.

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4.1 Geology and Soils

This section discusses potential project impacts related to geology and soils. The analysis is based primarily on geologic and geotechnical investigations prepared for the site and/or project. Appendix B provides geologic documentation of the project site dating from 1997 to 2019. A number of geotechnical investigations and peer reviews were conducted as the City of Lafayette attempted to determine the geologic stability of the site following the 1997 Quail Ridge Landslide. The following reports are included in this appendix in the order shown:

- Boring Logs conducted by William Lettis & Associates, Inc. dated April 1997 (Appendix B-1)
- Geologic Investigation by William Lettis & Associates, Inc. dated November 18, 2003 (Appendix B-2)
- Geotechnical Investigation by Alan Kropp & Associates, Inc. dated November 25, 2003 (Appendix B-3)
- Geotechnical Concerns by GeoForensics, Inc. dated June 13, 2004 (Appendix B-4)
- Geotechnical and Geologic Peer Review by Cal Engineering & Geology (CE&G) dated July 22, 2004 (Appendix B-5)
- Peer review by Seidelman Associates dated June 6, 2005 (Appendix B-6)
- Geotechnical Investigation by Seidelman Associates dated June 24, 2008 (Appendix B-7)
- Letters from Seidelman Associates dated July 2008 (Appendix B-8)
- Second Geotechnical and Geologic Review by CE&G dated November 5, 2008 (Appendix B-9)
- Response to Second CE&G Review by Seidelman Associates dated November 20, 2008 (Appendix B-10)
- Third Geotechnical and Geologic Review by CE&G dated December 17, 2008 (Appendix B-11)
- Geotechnical Commentary by GeoForensics, Inc. dated August 14, 2012 (Appendix B-12)
- Response to Geotechnical Questions by Peters & Ross dated December 8, 2014 (Appendix B-13)
- Engineering Geologic Review by Ryan Geological Consulting, Inc. dated July 30, 2019 (Appendix B-14)
- Geotechnical/Geological Investigation Update by Alan Kropp & Associates, Inc. dated December 20, 2019 (Appendix B-15)

4.1.1 Setting

a. Regulatory Setting

Federal

Clean Water Act

Congress enacted the Clean Water Act (CWA), formerly the Federal Water Pollution Control Act of 1972, with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the United States. The CWA requires states to set standards to protect, maintain, and restore water quality through the regulation of point source and non-point source discharges to surface water. Those discharges are regulated by the National Pollutant Discharge Elimination System (NPDES) permit process (CWA Section 402). NPDES permitting authority is administered by the California State Water Resources Control Board and its nine Regional Water Quality Control Boards (RWQCB). Lafayette is in a watershed administered by the San Francisco RWQCB, Region 2 (San Francisco RWQCB 2017).

Disaster Mitigation Act of 2000

Congress passed the Disaster Mitigation Act of 2000 to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act by invoking new and revitalized approaches to mitigation planning. Section 322 of the Act emphasized the need for state and local government entities to coordinate closely on mitigation planning activities, and makes the development of a hazard mitigation plan a specific eligibility requirement for any local government applying for federal mitigation grant funds. Communities with an adopted and federally-approved hazard mitigation plan thereby become pre-positioned and more apt to receive available mitigation funds before and after the next declared disaster.

To implement the new Stafford Act provisions, the Federal Emergency Management Agency (FEMA) published requirements and procedures for local hazard mitigation plans in the Code of Federal Regulations at Title 44, Chapter 1, Part 201.6. These regulations specify minimum standards for developing, updating, and submitting local hazard mitigation plans for FEMA review and approval at least once every five years.

State

California Building Code

The California Building Code (CBC), Title 24, Part 2 provides building codes and standards for the design and construction of structures in California. The 2016 CBC is based on the 2015 International Building Code, with the addition of more extensive structural seismic provisions. Chapter 16 of the CBC contains definitions of seismic sources and the procedure used to calculate seismic forces on structures. The CBC requires addressing soil-related hazards, such as treating hazardous soil conditions involving removal, proper fill selection, and compaction. In cases where soil remediation is not feasible, the CBC requires structural reinforcement of foundations to resist the forces of expansive soils. The CBC also includes requirements grading, building construction (including materials and design features), and setbacks from slopes. The requirements provide protections against erosion, seismic activity, and water damage.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (A-P Act) of 1972 was passed into law following the destructive February 9, 1971 M6.6 San Fernando earthquake. The A-P Act provides a mechanism for reducing losses from surface fault rupture on a statewide basis. The intent of the A-P Act is to “provide policies and criteria to assist cities, counties, and state agencies in the exercise of their responsibility to prohibit the location of developments and structures for human occupancy across the trace of active faults.” Additionally, the A-P Act is intended to “provide the citizens of the state with increased safety and to minimize the loss of life during and immediately following earthquakes by facilitating seismic retrofitting to strengthen buildings, including historical buildings, against ground shaking.”

The State of California considers a fault active if it has demonstrated movement within the Holocene Epoch of geologic time, within the past roughly 11,700 years. Only Holocene faults that are sufficiently active and well-defined near the ground surface are zoned in accordance with the A-P

Act. Potentially active faults are faults with Quaternary displacement (within the past 1.6 million years) that do not show evidence of Holocene activity are considered Pre-Holocene faults (Special Publication 42, 2018 update) and do not meet the criteria for zoning under the A-P Act. Some faults in this category may be active with a smaller role in the tectonic setting or with a larger recurrence interval than would be detected under the A-P Act, or simply have not been adequately characterized to date.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act (SHMA) of 1990 was passed into law following the destructive October 17, 1989, magnitude 6.9, Loma Prieta earthquake. The SHMA directs the California Geologic Survey (CGS) to delineate areas prone to earthquake hazards and to issue Seismic Hazard Zone Maps that delineate the associated regulatory zones (Zones of Required Investigation). The purpose of the SHMA is to reduce the threat to public health and safety and to minimize the loss of life and property by identifying and mitigating seismic hazards. Cities, counties, and state agencies are directed to use Seismic Hazard Zone Maps developed by the CGS in their land-use planning and permitting processes. The SHMA requires that site-specific geotechnical investigations be performed prior to permitting most urban development projects within seismic hazard zones.

Local

City of Lafayette Municipal Code

The City of Lafayette Building Code (Section 3-304 of the Lafayette Municipal Code [LMC]) incorporates the CBC, described above. The following LMC regulations provide protection against potential hazards due to soil/geologic conditions, and limit the loss of top soil:

- **LMC Section 716-4.804, Reports.** Soil, states that if a soil is critically expansive or has other soils problem, which, if not corrected, would lead to defects in structures or other improvements, recommendations for the correction of those hazardous conditions shall be included in the report.
- **LMC Section 716-6.008.** Supervised development requirements, states that the soil engineer or civil engineer shall inspect the operations and assure compliance with the approved development plans through periodic report submittal.
- **LMC, Section 716-8.422, Fills.** Slope location and setbacks, establishes minimum requirements for excavation and fill slopes near property boundaries, buildings, and structures.
- **LMC Section 5-409.** Best management practices [BMP] and standards, requires all construction projects to incorporate site-specific BMPs for the purpose of erosion control and to reduce the potential for pollutants to exit the site as runoff and enter into stormwater systems.
- **LMC Section 6-2011, Purpose of the Hillside Overlay District.** The Hillside Overlay District is intended to protect the health, safety and welfare of the city by establishing regulations for the development of ridgeline, hillside and other rural residential areas within the city. The district is created and established to implement the goals, policies and programs of the general plan that relate to hillside and ridgeline development, development hazards and protection of open space lands and hillside residential areas.

City of Lafayette General Plan

The following goals, policies, and programs in the City of Lafayette General Plan (2002) are intended to protect soils and address geologic safety concerns in the city.

Goal OS-7 Protect and preserve soil as a natural resource

Policy OS 7.1. Control Soil Erosion. Control soil erosion to prevent flooding and landslides, maintain water quality, and reduce public costs of flood control and watercourse maintenance.

Program OS-7.1.1. Continue to require grading permits for new construction as a part of the development review process. Require soil erosion measures and a revegetation plan.

Policy OS-7.2. Reduce Soil Contamination*.* Reduce soil contamination from chemicals through careful regulation of the storage, transportation and use of chemicals.

Goal S-1 Minimize risks to Lafayette residents and property from landslides and other geologic hazards

Policy S-1.1. Slope and Soil Stability. Consider slope and soil stability when reviewing future projects. Development proposals in areas with landslide hazards shall be reviewed by an engineering geologist to determine whether the proposed development is feasible, and to define the required construction standards and mitigation measures.

Program S-1.1.1: Require submittal and review of a site-specific geotechnical report for proposed development in areas identified on Map VI-1 as "Liquefaction potential possibly present" or on Map VI-2 as "Area of known slides and ground highly susceptible to sliding." Development shall be supervised and certified by a geotechnical engineer, and where necessary, by an engineering geologist.

Program S-1.1.2: Require financial protection for public agencies and individuals as a condition of development approval where geological conditions indicate a potential for ongoing maintenance costs related to the geological conditions.

Program S-1.1.3: Require repair, stabilization, or avoidance of landslides, of areas of soil creep, and of possible debris flow as a condition of project approval.

Program S-1.1.4: Require professional inspection of foundation and excavation, earthwork and other geotechnical aspects of site development during construction on those sites identified as being prone to moderate levels of slope instability.

Policy S-1.2. Density and Location of Buildings: Limit building in areas with significant risk potential. Intensity of development shall be minimal in areas of high risk. Consider potential seismic or geologic hazards when determining building density and in siting dwellings.

Program S-1.2.1: Carefully review applications for development in hilly areas and along creekbanks.

Program S-1.2.2: Seek to identify and map areas, which are deemed unbuildable due to risks of unstable soils.

Goal S-2 Minimize risks to Lafayette residents and property from earthquakes

Policy S-2.1. Seismic Hazards: New development, including subdivisions, new construction, and remodels or expansions of existing structures, shall minimize exposure to seismic hazards through site planning and building design.

Program S-2.1.1: Comply with the provisions of the State Alquist-Priolo Act, as appropriate.

Program S-2.1.4: Require, as conditions of approval, measures to mitigate potential seismic hazards for structures.

Program S-2.1.5: Require geotechnical reports by a state registered geologist for development proposals on sites located in known or suspected seismically or geologically hazardous areas and for all critical structures.

b. Environmental Setting

Site Topography

Elevation on the project site ranges from approximately 143 to 208 feet above mean sea level. The site slopes steeply from north to south, and contains an active landslide, as well as a slide repair area south of the reconstructed roadway. The northeast corner of the site is outside the landslide area and contains the flattest part of the site. In the northeast corner of the project site, a small spur ridge is located outside the active landslide limits. The top of the spur ridge is relatively flat, near the elevation of Quail Ridge Road, while the west side of the spur ridge slopes downward towards the Quail Ridge Landslide at a gradient of approximately 1.5:1 horizontal to vertical.

The site is within the 250-foot Class II ridgeline setbacks associated with an east-west ridge located north of the site, and a north-south ridge located west of the site (City of Lafayette 2002).

Seismicity and Fault Zones

Lafayette is in the tectonically active San Francisco Bay Area which is considered to have a relatively high seismicity due to the proximity of several active faults in the region. The nearest active faults to the project site are the Mount Diablo Thrust, approximately 5.8 miles to the southeast, the northern extent of the Hayward Fault approximately 6.0 miles to the southwest, and the Calaveras fault about 6.5 miles to the southeast. The project site is not located in a State of California designated Earthquake Fault Zone for active faults, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map (California Geological Survey 2019).

Quail Ridge Landslide

The 1997 Quail Ridge Landslide that occurred at the project site included several adjacent parcels is approximately 450 feet wide by 700 feet long, with an estimated depth of up to 65 feet. The Quail Ridge Landslide extended upslope of Quail Ridge Road to the base of the house at 3954 Quail Ridge Road. Between 1999 and 2001, the damaged residence at 3954 Quail Ridge Road was stabilized and the roadway reconstructed. Piers up to 55 feet deep with 45-foot tie-backs (some were 70-feet long) were installed to protect the upslope residences. Plastic sheeting buried at the time of the roadway repair is now exposed along the lower 3 to 6 feet of the vertical face of the repair (Appendix B).

The Quail Ridge Landslide reactivated below the roadway in the winter of 2005/2006 due to a leak in the pump system in the wet pit for the roadway repair. This pump system has since been repaired. To date, the active landslide below the roadway has not been stabilized and poses a significant hazard to development of the project site (Ryan Geological Consulting 2019).

Numerous mapped landslides exist in the city of Lafayette, including on properties surrounding the project site (not including the Quail Ridge Landslide, which affects multiple nearby properties in addition to the project site). Figure 5 through Figure 7 show nearby mapped landslides in the surrounding area, based on figures provided in Appendix B.

Project Site Soils

The Natural Resources Conservation Service Online Web Soil Survey interactive soil mapping tool identifies one soil type at the project site: Los Osos clay loam, 30 to 50 percent slopes. This soil type derives from weathered sandstone and shale residuum. This soil has a low corrosion of concrete, high corrosion of steel, severe erosion hazard (erodibility rating of 0.95 of 1.00), high clay content, high shrink-swell potential (expansiveness of the soil), slow infiltration rate, and high runoff potential. This soil has severe limitations that make it unsuitable for cultivation, with the main hazard of the soil being its high erosion potential (Natural Resources Conservation Service 2019).

4.1.2 Impact Analysis

a. Methodology and Significance Thresholds

Methodology

This section describes the potential environmental impacts of the proposed project relevant to geology and soils. The impact analysis is based on an assessment of baseline conditions for the project site, including topography, geologic and soil conditions, and seismic hazards, as described under the Subsection 4.1.1, *Setting*. This analysis identifies potential impacts based on the predicted interaction between the affected environment and construction, operation, and maintenance activities related to the proposed project. This section describes impacts in terms of location, context, duration, and intensity, and recommends mitigation measures, when necessary, to avoid or minimize impacts.

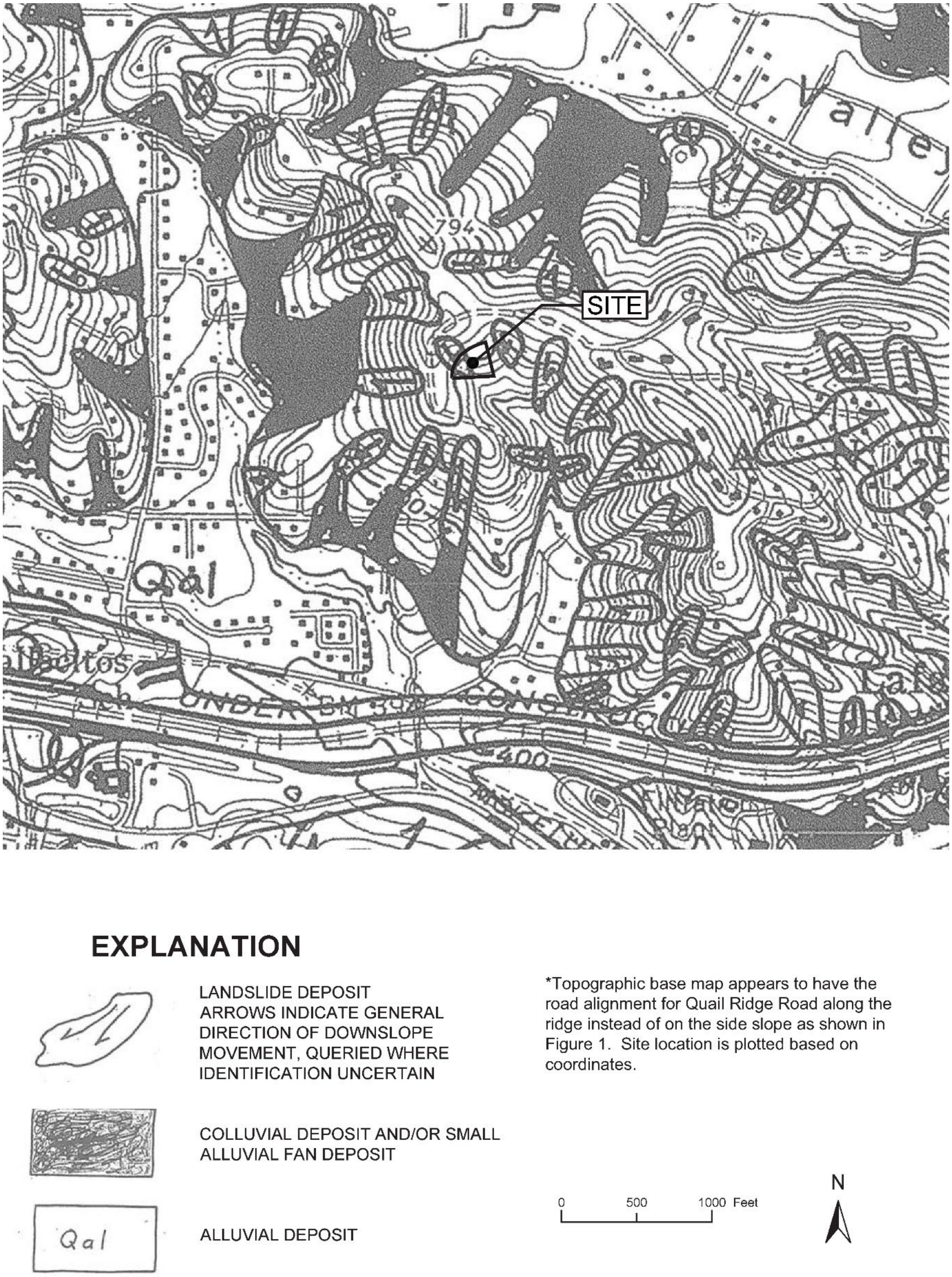
Significance Thresholds

According to Appendix G of the *CEQA Guidelines*, impacts related to geology and soils from the proposed project would be significant if the project would:

a Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
  1 Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault
  2 Strong seismic ground shaking
  3 Seismic-related ground failure, including liquefaction
  4 Landslides

b Result in substantial soil erosion or the loss of topsoil

Figure 5 Photointerpretive Map of Landslides and Other Surficial Features



EXPLANATION

LANDSLIDE DEPOSIT ARROWS INDICATE GENERAL DIRECTION OF DOWNSLOPE MOVEMENT, QUERIED WHERE IDENTIFICATION UNCERTAIN

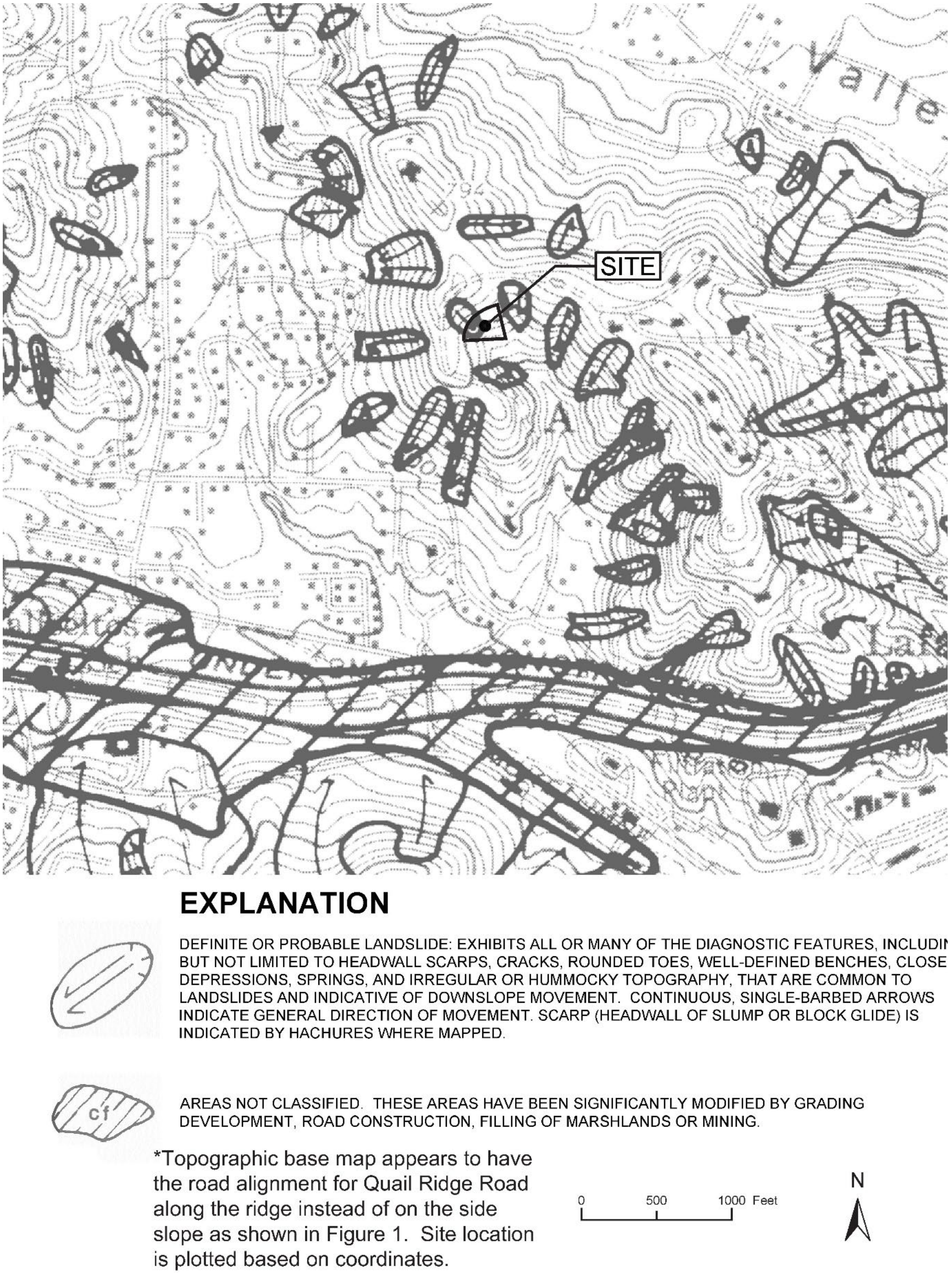
COLLUVIAL DEPOSIT AND/OR SMALL ALLUVIAL FAN DEPOSIT

Qal ALLUVIAL DEPOSIT

*Topographic base map appears to have the road alignment for Quail Ridge Road along the ridge instead of on the side slope as shown in Figure 1. Site location is plotted based on coordinates.

Source: Modified from USGS Open File Report 75-277-8 (Nilsen 1975)

Figure 6 Landslides and Related Features



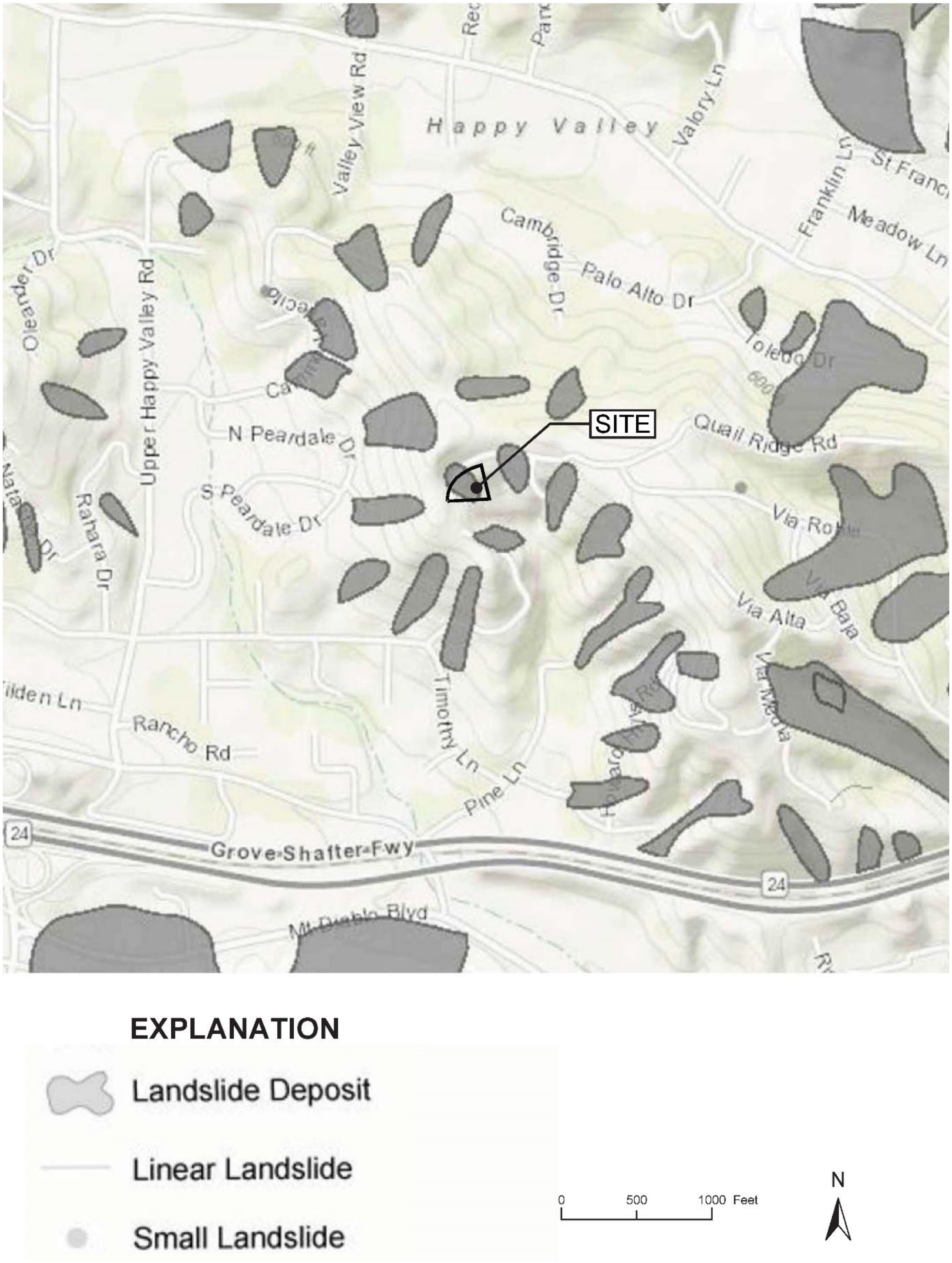
DEFINITE OR PROBABLE LANDSLIDE: EXHIBITS ALL OR MANY OF THE DIAGNOSTIC FEATURES, INCLUDI BUT NOT LIMITED TO HEADWALL SCARPS, CRACKS, ROUNDED TOES, WELL-DEFINED BENCHES, CLOSE DEPRESSIONS, SPRINGS, AND IRREGULAR OR HUMMOCKY TOPOGRAPHY, THAT ARE COMMON TO LANDSLIDES AND INDICATIVE OF DOWNSLOPE MOVEMENT. CONTINUOUS, SINGLE-BARBED ARROWS INDICATE GENERAL DIRECTION OF MOVEMENT. SCARP (HEADWALL OF SLUMP OR BLOCK GLIDE) IS INDICATED BY HACHURES WHERE MAPPED.

AREAS NOT CLASSIFIED. THESE AREAS HAVE BEEN SIGNIFICANTLY MODIFIED BY GRADING DEVELOPMENT, ROAD CONSTRUCTION, FILLING OF MARSHLANDS OR MINING.

*Topographic base map appears to have the road alignment for Quail Ridge Road along the ridge instead of on the side slope as shown in Figure 1. Site location is plotted based on coordinates.

Source: Modified from California Division of Mines and Geology Open File Report 95-12 (Hayden 1995)

Figure 7 California Landslide Inventory



Source: California Geological Survey: California Landslide Inventory Map c Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or off-site landslide, lateral spreading, subsidence, liquefaction or collapse

d Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property

e Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water

f Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature

Impacts related to *thresholds a.4, b, c,* and *d* are analyzed below. Impacts related to *thresholds a.1, a.2, a.3, e,* and *f* were evaluated in the Initial Study, which is provided as Appendix A to this EIR. As described therein, standard construction specifications and engineering practices would ensure the project does not increase ground-shaking hazards on the site; the site is not located in a liquefaction zone; the project does not include installation of a septic tank or alternative wastewater system; and paleontological resources would not likely be encountered on the site, and implementation of mitigation measures outlined in the Initial Study and Table 1 of this EIR would reduce impacts to less than significant levels in the unlikely event that paleontological resources are encountered.

b. Project Impacts and Mitigation Measures

Threshold a.4:	Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?
Threshold c:	Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse?

Impact GEO-1 **THE PROPOSED PROJECT WOULD EXPOSE RESIDENCES TO HAZARDS ASSOCIATED WITH LANDSLIDES FROM POTENTIAL RE-ACTIVATION OF THE QUAIL RIDGE LANDSLIDE. THE SITE IS ALSO SUSCEPTIBLE TO LATERAL SPREADING DURING SEISMIC EVENTS. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT WITH IMPLEMENTATION OF STANDARD CONDITIONS OF APPROVAL.**

The primary geologic hazard at the site is the potential for landslide reactivation under normal conditions and earthquake-induced landslide movement during a major earthquake, although landslide re-activation may also occur due to project design. As shown in Figure 5 through Figure 7, the surrounding area contains a number of landslides due to the topography and soil types.

Slopes underlain by existing landslides are most prone to reactivation and failure in response to earthquake vibrations. The proposed building site is located along the northeastern edge of the Quail Ridge Landslide. The unrepaired landslide below the roadway has been historically active without a significant seismic event. It is anticipated that a moderate earthquake would reactivate landslide creep. A major earthquake would be expected to initiate several feet of sudden mass movement of the landslide similar to the 1997 failure.

The risks of earthquake-induced landslide at the site are extremely high. Under current conditions, earthquake-induced movement would impact the unrepaired landslide below the roadway and the bedrock tension zone identified along the eastern landslide margin. Regressive landslide failure into the spur ridge would also occur. The addition of the proposed residence to the project site is anticipated to affect the landslide area through construction activity on the site (including grading and the movement of heavy equipment on or adjacent to the active landslide), the additional weight from the proposed residence, and runoff from impervious surfaces into the unstable landslide soils. These actions could potentially contribute to re-activation and/or increasing the speed of landslide creep of the unrepaired Quail Ridge Landslide. Significant engineering efforts would be needed to reduce these risks from the proposed development. Updated geotechnical studies and design-level parameters would also be needed to design a structure that could reduce the impacts of earthquake-induced landslides from impacting the site and the proposed structure. This impact would be potentially significant, but implementation of the following mitigation measure would reduce those impacts to less than significant levels.

Mitigation Measures

GEO-1 Final Geotechnical Investigation and Geologic Hazards Setbacks

A Registered Geotechnical Engineer and Certified Engineering Geologist (CEG) shall complete a design-level geotechnical investigation specific to the proposed project and in accordance with State of California Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California. The design-level geotechnical investigation shall demonstrate at a minimum that:

- The building site is protected against regressive landslide failure.
- The proposed project does not increase the potential for reactivation of the on-site landslide in any way.
- The proposed residence can withstand earthquake-induced landslide deformation without significant damage to the proposed residence or loss of life.

The design-level geotechnical investigation shall include but not be limited to the following:

- Estimate the level of ground shaking anticipated for the project site in accordance with the California Building Code (CBC).
- Estimate both vertical and horizontal anticipated peak ground accelerations.
- Evaluate expansive soils within the project site development footprint.
- Provide seismic design values based on the site-specific geologic conditions in accordance with the CBC for the structural engineer to utilize in the structural design of the building to ensure the residence is constructed to withstand strong ground shaking from a moderate to large seismic event.
- Provide recommendations for geologic hazard such as setbacks, below-grade retaining structures, landslide repairs and/or control of stormwater runoff to ensure the addition of the residence does not contribute to the likelihood of landslide re-activation under both static and coseismic conditions.

The design-level geotechnical investigation shall provide grading and foundation recommendations to reduce the adverse effects associated with landslides under static and coseismic conditions at the project site that could impact the proposed residence and/or adjacent properties. The geotechnical report shall be subject to review and approval by the City of Lafayette prior to the approval of building and grading permits. The City shall require as conditions of approval that all recommendations provided in the geotechnical report be followed during grading and construction at the site.

During the final design review of the project, the City shall require at least one of the following design options:

- Require the proposed residence be founded on drilled piers that extend into competent bedrock outside the active landslide limits. This option alone would not be sufficient, and shall be combined with at least one additional option listed below.
- Establish appropriate geologic hazard setbacks from the limits of the landslide. Typical landslide setbacks without additional landslide mitigation range from 50 to 200 feet.
- Construct a below-ground retaining wall or pier wall between the landslide and house foundation to isolate the building pad from the active landslide and potential landslide regression.
- Repair all or a portion of the landslide near the proposed improvements by over-excavating a portion of the landslide down to bedrock and replacing the materials with drained engineered fill to reduce risks to create a slope buttress that would stabilize the building pad. similar to the Quail Ridge Road stabilization.

Any of these measures should be expected to mitigate the hazards of earthquake-induced landslide deformation of landslide regression into the building pad by either creating a buffer or separating the building foundation from the active portions of the landslide. However, the drilled pier foundation needs to be performed in addition to the other methods as it is not enough by itself to mitigate the risks.

Significance After Mitigation

Implementation of Mitigation Measure GEO-1 would reduce impacts from seismic-related landslides to **less than significant**.

This measure has the potential to cause secondary environmental effects from the increased duration of construction (from either installing a retaining wall or pier wall or from repairing a portion of the landslide) and potential increase in vibratory construction techniques (from using drilled piers as part of the foundation work).

This mitigation measure would not substantially alter the aesthetic impacts of the project, even with additional on-site construction of a retaining wall or pier wall. While construction techniques and duration would be modified by this measure, a substantial increase in air quality or greenhouse gas emissions would not occur, as the project would remain below the BAAQMD screening criteria. The noise analysis in Appendix A included a discussion of pile-driving and other vibration-inducing construction equipment; therefore, this measure would not increase the vibration or noise impacts substantially beyond what has already been assumed. Mitigation Measure NOI-1 would continue to reduce construction noise to a less than significant level. Secondary effects of Mitigation Measure GEO-1 would remain **less than significant**.

Impact GEO-2 THE PROPOSED PROJECT HAS THE POTENTIAL TO REACTIVATE THE ON-SITE LANDSLIDE FROM SATURATION OF SOILS IN AND ADJACENT TO THE ACTIVE LANDSLIDE, INCLUDING FROM ACCIDENTAL LEAKS FROM UTILITIES PIPELINES, ON-SITE STORMWATER DRAINAGE, AND LANDSCAPE WATERING. IMPLEMENTATION OF MITIGATION MEASURES WOULD REDUCE THIS IMPACT TO A LESS THAN SIGNIFICANT LEVEL.

Given the presence of an active landslide on most of the project site, potential accidental leakages from the project's proposed utilities connections, on-site stormwater drainage and runoff, and excessive landscape watering could lower the stability of project site soils and result in re-activation of the Quail Ridge Landslide. This is due in part to the Quail Ridge Landslide's sensitivity to the soil moisture content (as stated in Section 4.1.1[b], the landslide was re-activated in 2005/2006 due to a leak in the roadway repair's wet pit pump system) and the steepness of site slopes. As a result, erosion and siltation from the Quail Ridge Landslide onto adjacent properties could occur. Additional impacts that destabilize downslope residences and structures could occur, depending on the severity of the leakage. Undocumented fill is present at the site along the crest of the spur ridge, where the building pad for the residence is proposed. Undocumented fill is prone to erosion that may lead to sedimentation issues on neighboring properties. Impacts would be **potentially significant** and mitigation measures would be required.

Mitigation Measures

GEO-2a Utilities and Drainage Redundancy

The proposed utilities connections shall be designed with dual redundancies to prevent leakage into the surrounding soils, specifically the landslide area. This could be accomplished by enclosing pipelines in larger diameter pipes from the proposed residence to the street connection point. A manhole shall be installed within Quail Ridge Road to provide access to the pipelines and identify any leakages as they occur. Design of the system shall be submitted for review and approval by the City, and shall be monitored semi-annually by the landowner. The landowner shall submit monitoring reports to the City, including proof of remediation action, if remediation is required. In the event of leakage from one of the utilities pipelines into the redundancy pipeline, remediation shall be completed within 14 business days.

Final project design shall include drainage systems that convey stormwater to Quail Ridge Road for disposal into the City's municipal stormwater system. This on-site drainage system shall be designed to capture all runoff from new impervious surfaces associated with the proposed residence to prevent this runoff from entering into the soils surrounding the building site, specifically the landslide area. Final design of the stormwater system shall be submitted for review and approval by the City. As with the utilities pipeline redundancies described above, the drainage system shall be designed with a similar redundancy to ensure leakages from the on-site stormwater conveyance pipelines do not occur. This system shall be monitored and remediated by the landowner, concurrent with the utilities pipeline monitoring, reporting, and remediation schedule described above.

GEO-2b Landscaping Irrigation

The proposed project shall include only drought-tolerant landscaping that does not require watering. Landscape irrigation shall not be installed on the slope adjacent to the Quail Ridge Landslide. The minimum amount of water required to sustain landscaping on the project site near the residence or driveway shall be determined by a certified arborist or landscape architect. The final landscaping plan, including water requirements, shall be submitted for review and approval by the City. The applicant shall record a deed restriction that requires water application to landscaping be no greater than the arborist- or landscape architect-determined quantity. Water shall not be applied to landscaped areas following rain events. Risks from faulty irrigation systems shall be reduced or mitigated by adding deep sub-drains along the edge of the building pad.

GEO-2c Undocumented Fill

The applicant shall be required to remove all areas of undocumented non-engineered fill from the site as part of site development. The engineered fill placed for the Quail Ridge Road repairs is excluded from this mitigation measure.

Significance After Mitigation

Implementation of Mitigation Measures GEO-2a, GEO-2b, and GEO-2c would reduce impacts from erosion and siltation from potential accidental leakage from proposed utilities connections to a **less than significant** level. These measures would result in construction techniques beyond standard construction techniques assumed throughout this Draft EIR. However, the small increase in the total number of haul trips for the removal of undocumented fill under Mitigation Measure GEO-2c, the small increase in vendor trips for the delivery of additional utility pipelines under Mitigation Measure GEO-2a, and the small increase in construction duration to accommodate the additional work required by these measures would not substantially alter the total construction duration or air quality and greenhouse gas emissions beyond those described in the Initial Study (Appendix A). These secondary effects are within the overall project impacts assessed in this EIR.

Impact GEO-3 THE PROPOSED PROJECT HAS THE POTENTIAL TO CAUSE LANDSLIDE RISKS DUE TO ITS CANTILEVERED DESIGN. IMPLEMENTATION OF MITIGATION MEASURES TO REQUIRE SPECIAL DESIGN CONSIDERATIONS TO ALLOW FOR FUTURE LANDSLIDE REPAIRS, AS WELL AS STANDARD CONDITIONS OF APPROVAL, WOULD REDUCE THIS IMPACT TO A LESS THAN SIGNIFICANT LEVEL.

The preliminary project design incorporates cantilevered construction over a portion of the active Quail Ridge Landslide. A cantilever is a rigid structural element anchored at one end to a vertical support element. This design feature maximizes the buildable area of the northeast corner of the site. The cantilevered construction would support portions of the proposed residence over the active landslide, while limiting the ground disturbance footprint to the identified buildable area outside the active landslide boundaries in the northeast corner of the site. This would increase the load requirements of support piles adjacent to the mapped landslide boundary.

Construction of a new building that cantilevers over an active deep landslide is not common practice in the area surrounding the project site, due to the instability of soils and frequency of landslides on nearby steep hillsides. This building design would pose substantial risks to the stability of the structure and the safety of its residents. Because a high likelihood exists that the Quail Ridge Landslide will reactivate in the future, construction of the residence with supports adjacent to the mapped landslide boundary could result in the exposure of the support piles, similar to the impact of the 1997 Quail Ridge Landslide on the 3954 Quail Ridge Road residence. This would require substantial landslide repair actions to ensure the proposed residence remains stable and safe for occupation after an anticipated future landslide event. However, with a cantilevered design over the mapped active landslide area, it may be difficult for construction equipment to access the area below the cantilever and adequately repair the slide area.

Furthermore, as previously discussed, the site is expected to experience a moderate to major earthquake within the lifespan of any project in the area. Shaking under normal conditions is expected to be high, but the cantilevered construction would increase the earthquake shaking intensity on the residence. These risks have a significant potential of reactivating the landslide, which would impact the surrounding areas. This impact would be **potentially significant** and mitigation measures would be required.

Mitigation Measures

GEO-3 Cantilevered Design Requirements

During the final design review of the project, the City shall require one of the following design options:

- Removal or reduction of the cantilevered project design and implementation of geologic setbacks from the landslide (refer to GEO-1); or
- Design of the cantilevered building portions to allow construction equipment full access to all areas of the building foundation in the event that slide repair is required, and ensuring the cantilever is rated for strong seismic events.

Significance After Mitigation

Implementation of Mitigation Measures GEO-1 and GEO-3 would reduce impacts from the proposed cantilevered design to a **less than significant** level.

Impact GEO-4 IMPLEMENTATION OF THE PROPOSED PROJECT WOULD NOT RESULT IN LIQUEFACTION, SUBSIDENCE, OR COLLAPSE OF SOILS ON THE PROJECT SITE. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT.

Liquefaction is the temporary transformation of saturated, cohesionless soils into a viscous liquid during strong ground shaking from a seismic event. Subsidence is the gradual caving in or sinking of land. Collapse is a type of subsidence that affects geologically recent, unconsolidated sediments. The site is underlain by clay-rich cohesive materials overlying bedrock not susceptible to liquefaction, subsidence, or collapse. The potential for liquefaction and associated hazards is very low (Ryan Geological Consulting 2019).

The project would be required to comply with General Plan policies and LMC requirements, as well Mitigation Measure GEO-1 that requires a final geotechnical investigation of the project site. This would ensure a detailed review of design and construction plans and incorporation of additional structural safety features, as necessary, for the proposed residence, which would be located on steep slopes in an area subject to seismic hazards that could result in such as extreme ground shaking, landslides, liquefaction, surficial debris flows, subsidence, and settlement. Impacts would be **less than significant**.

Mitigation Measures

None required.

Significance After Mitigation

Less than significant without mitigation.

Threshold b:	Would the project result in substantial soil erosion or the loss of topsoil?

Impact GEO-5 IMPLEMENTATION OF THE PROPOSED PROJECT WOULD INCLUDE GROUND DISTURBANCE SUCH AS EXCAVATION AND GRADING THAT WOULD RESULT IN LOOSE OR EXPOSED SOIL. THIS SITE WORK-CAUSED EROSION COULD ALSO RESULT IN RE-ACTIVATION OF THE ON-SITE LANDSLIDE. HOWEVER, COMPLIANCE WITH EXISTING REGULATIONS AND IMPLEMENTATION OF STANDARD CONDITIONS OF APPROVAL REQUIRING EROSION CONTROL WOULD REDUCE IMPACTS TO LESS THAN SIGNIFICANT.

Project implementation would involve construction activities such as stockpiling, grading, excavation, paving, and other earth-disturbing activities. Loose and disturbed soils are more prone to erosion and loss of topsoil by wind and water. Erosion occurring on the site has the potential to re-activate the on-site landslide, as these weakened soils are sensitive to changes in pressure and weight.

Construction activities that disturb one or more acres of land surface are subject to the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit). The project would disturb approximately 20 percent of the 1.1-acre project site, less than the 1 acre that triggers the need for coverage under the NPDES Permit. Most of the site would remain undisturbed.

The proposed project would be required to comply with the following policy from the Lafayette General Plan:

General Plan Policy OS 7.1

> Control Soil Erosion: Control soil erosion to prevent flooding and landslides, maintain water quality, and reduce public costs of flood control and watercourse maintenance.
>
> > Program OS-7.1.1. Continue to require grading permits for new construction as a part of the development review process. Require soil erosion measures and a revegetation plan.

The LMC also includes erosion control measures, including requiring planting on cut slopes more than 5 feet in height and fill slopes more than 3 feet in height (Article 716-8.8), implementing temporary erosion control (Section 7.16-8.1012), providing erosion protection during cessation of work (Section 716-6.016), using site-specific BMPs that incorporate erosion control measures (Section 5-409[f]), and reducing short-term and long-term erosion (Section 6-2071[f]). Adherence to the requirements of the LMC would reduce the potential for project construction to cause erosion or the loss of topsoil by ensuring proper management of loose and disturbed soil.

Implementation of these programs and policies, in addition to compliance with applicable laws and regulations, would minimize the potential for erosion and loss of topsoil, which includes the potential for erosion-caused landslide re-activation. The following Standard Condition of Approval (COA) would further ensure that this impact is **less than significant**.

Standard Condition of Approval

COA-5 Erosion Control

A site-specific erosion control plan that incorporates BMPs shall be prepared by the project applicant and approved by the City prior to the granting of any grading permits. All measures identified in the erosion control plans shall be implemented and monitored for continued compliance by the City of Lafayette Public Works Department. Such measures may include slope protection measures, netting and sandbagging, landscaping and possibly hydroseeding, and temporary drainage control facilities such as retention areas. All slopes involved with the project shall be constructed using an erosion control mat and a thorough vegetation and landscape plan. A landscaping plan and a landscape maintenance plan shall be designed by a licensed landscape architect. These plans shall be reviewed and approved by the City of Lafayette Public Works Department prior issuance of grading permits.

Significance After Mitigation and Implementation of COA

Implementation of Mitigation Measure GEO-2b and COA-5 would reduce impacts from the erosion and loss of topsoil to **less than significant**.

Threshold d:	Would the project be located on expansive soil, as defined in Table 1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

Impact GEO-6 **IMPLEMENTATION OF THE PROPOSED PROJECT MAY RESULT IN THE CONSTRUCTION OF STRUCTURES ON EXPANSIVE SOILS, WHICH COULD CREATE A SUBSTANTIAL RISK TO LIFE OR PROPERTY. COMPLIANCE WITH THE REQUIREMENTS OF THE CALIFORNIA BUILDING CODE, CALIFORNIA RESIDENTIAL CODE, AND MITIGATION MEASURE GEO-1 WOULD REDUCE THIS IMPACT TO LESS THAN SIGNIFICANT.**

The project site contains expansive soils with a high shrink-swell potential (Alan Kropp & Associates 2003, Seidelman Associates 2008, Natural Resources Conservation Service 2019). These soils could damage the foundation of the proposed residence, which could result in a direct risk to life or property (Rogers et al. 2015). Damage from expansive soils in conjunction with the site’s steep slopes could also result in a greater potential for indirect damage to downslope properties and people.

The project would be required to comply with CBC Chapter 18, California Residential Code Chapter 4, and LMC, which include various construction and design requirements that would ensure expansive soils are remediated or that foundations and structures are engineered to withstand the forces of expansive soil. In particular, LMC Section 716-8.1014(b) requires “A report by the soil engineer including the recommended soil bearing capacity, a statement as to the expansive qualities of the soil, and summaries of field and laboratory tests.”

In addition to compliance with CBC, California Residential Code, and LMC requirements, implementation of Mitigation Measure GEO-1 would reduce impacts related to expansive soils to **less than significant**.

Mitigation Measures

None required.

Significance After Mitigation

Less than significant without mitigation.

c. Cumulative Impacts

Cumulative development in Lafayette based on the City's General Plan would result in development concentrated in the downtown area with new retail, residential, and commercial developments. Buildout of the General Plan would result in a gradual increase population and, therefore, gradual increase in the number of people exposed to potential geologic hazards, including effects associated with landslides, lateral spreading, soil instability, erosion, and expansive soils. Potential geologic hazards are typically project-level impacts, and are not cumulative in nature. Individual development proposals are reviewed separately by the City and undergo environmental review when it is determined that the potential for significant impacts exist. In the event that future cumulative development would result in impacts related to geologic or seismic impacts, those potential impacts would be addressed on a case-by-case basis in accordance with the requirements of the CEQA. However, compliance with the LMC and General Plan policies and programs, other laws and regulations mentioned above, as well as recommended mitigation measures, would ensure that project-specific impacts associated with geology and soils would be less than significant. Potential impacts associated with geology and soils would not be cumulatively considerable, and cumulative impacts related to geologic hazards would be **less than significant**.

5 Other CEQA Required Discussions

This section discusses growth-inducing impacts and irreversible environmental impacts that would be caused by the proposed project.

5.1 Growth Inducement

Section 15126(d) of the CEQA Guidelines requires a discussion of a proposed project’s potential to foster economic or population growth, including ways in which a project could remove an obstacle to growth. Growth does not necessarily create significant physical changes to the environment. However, depending upon the type, magnitude, and location of growth, it can result in significant adverse environmental effects. The proposed project's growth inducing potential is therefore considered significant if project-induced growth could result in significant physical effects in one or more environmental issue areas.

5.1.1 Economic and Population Growth

The project would increase the available housing in the city by one residence. As described in the Initial Study (Appendix A), this additional residence is anticipated in the City’s General Plan based on the zoning and land use designation of the project site. The City’s General Plan Housing Element estimated that total housing units would increase from 9,223 in 2010 to 10,640 in 2040. This projection represents a growth in housing of 1,417 units or approximately 15 percent. The project would add one housing unit, approximately 0.07 percent of the City’s General Plan Housing Element housing unit growth estimate. Therefore, the project would not induce population growth beyond the City’s growth forecast.

As discussed in the Initial Study (Appendix A), the project involves development on a vacant site in an urbanized area that would not significantly affect scenic resources, air quality and greenhouse gas emissions, native biological habitats, known cultural resource remains, hydrology, or other environmental resources with implementation of mitigation measures discussed in this EIR. Therefore, population growth would not result in significant long-term physical environmental effects.

The project includes residential development rather than commercial development. As such, the project would not directly contribute to economic growth by providing additional space for business. The project would generate short-term employment opportunities during construction activities, which would be expected to draw workers primarily from the existing regional work force. However, because only one residence would be constructed under the project, a substantial indirect contribute to economic growth would not occur. As development occurs under the project, the incremental population increase would likely contribute to the local economy as demand for general goods increases, which in turn could result in incremental economic growth for various sectors. Residents on the project site would be expected to primarily use existing City commercial services, creating only a relatively minor need for expanded services. However, the project would not induce economic expansion to the extent that significant environmental impacts directly associated with the project’s contribution would occur.

5.1.2 Removal of Obstacles to Growth

An extension of municipal services to the project site would not induce population growth on surrounding parcels, as the surrounding area is fully developed and already served by those municipal services. The project would not involve roadway extensions or other changes that would induce growth or remove obstacles to growth. Subsequent projects in the area would also be subject to a separate CEQA review for analysis. Therefore, the proposed project would not have a significant effect from removing obstacles to growth.

5.2 Irreversible Environmental Effects

The CEQA Guidelines Section 15126(c) requires that EIRs contain a discussion of significant irreversible environmental changes. This section addresses non-renewable resources, the commitment of future generations to the proposed uses, and irreversible impacts associated with the proposed project.

The project involves development on a vacant lot in the city of Lafayette. Project construction and operation would involve an irreversible commitment of construction materials and non-renewable energy resources. The project would involve the use of building materials and energy, some of which are non-renewable resources, to construct the proposed residence. Consumption of these resources would occur with any development in the region, and would not be unique to the project.

The project would also irreversibly increase local demand for non-renewable energy resources such as petroleum products and natural gas. However, increasingly efficient building design and automobile engines would offset this demand to some degree. As mentioned in Appendix A, the project would be subject to the energy conservation requirements of the California Green Building Standards Code. The California Green Building Standards Code requires specific requirements related to recycling, construction materials, and energy efficiency standards that apply to construction of residences, as well as water-efficient plumbing fixtures and fittings, recycling services, and other energy-efficient measures in all new single-family dwellings to minimize wasteful, inefficient, and unnecessary energy consumption. Consequently, the project would not use unusual amounts of energy or construction materials and impacts related to consumption of non-renewable and slowly renewable resources would be less than significant. Again, consumption of these resources would occur with any development in the region, and would not be unique to the project.

Additional vehicle trips associated with the project would incrementally increase local traffic and regional air pollutant and greenhouse gas (GHG) emissions. However, as discussed in Appendix A, impacts associated with pollutants and emissions would be less than significant. The project would also require a commitment of law enforcement, fire protection, water supply, wastewater treatment, and solid waste disposal services. However, as discussed in Appendix A, impacts to these service systems would not be significant.

CEQA requires decision makers to balance the benefits of a project against its unavoidable environmental risks in determining whether to approve a project. The analysis contained in this EIR concludes that the project would not result in significant and unavoidable impacts.

6 Alternatives

As required by CEQA Guidelines Section 15126.6, this EIR examines a range of reasonable alternatives to the proposed project that would attain most of the basic project objectives (stated in Section 2 of this EIR) but would avoid or substantially lessen the significant adverse impacts.

As discussed in Section 2, *Project Description*, the project objectives are as follows:

- Redevelop the site with a single-family residential structure
- Develop the site in an attractive, well-planned manner

Included in this analysis are two alternatives, including the CEQA-required "no project" alternative, that involve changes to the project that may reduce the project-related environmental impacts as identified in this EIR. Alternatives have been developed to provide a reasonable range of options to consider that would help decision makers and the public understand the general implications of revising or eliminating certain components of the proposed project.

The following alternatives are evaluated in this EIR:

- Alternative 1: No Project
- Alternative 2: Landslide Stabilization

Detailed descriptions of the alternatives are included in the impact analysis for each alternative. The potential environmental impacts of each alternative are analyzed in Sections 6.1 and 6.2. Please note that findings rejecting proposed alternatives are only required if one or more significant environmental effects would not be avoided or substantially lessened by mitigation measures. Because the proposed mitigation presented in Section 4, *Environmental Impact Analysis*, is adequate to reduce potentially significant impacts to less than significant levels, the lead agency is not required to make findings rejecting the alternatives described in this section.

6.1 Alternative 1: No Project Alternative

6.1.1 Description

The No Project Alternative assumes that no structure would be built on the project site and that the existing Quail Ridge Landslide would continue to move with natural conditions. Under the no project, off-site impacts could occur.

6.1.2 Impact Analysis

The No Project Alternative would involve no changes to the physical environment. As such, this alternative would have generally reduced impacts with respect to aesthetics, air quality, biological resources, GHG emissions, hydrology and water quality, traffic, and noise. Project construction impacts would be avoided because no development would occur on the project site. No mitigation measures would be required for the No Project Alternative. Overall impacts would be lower than those of the project since no change to environmental conditions would occur.

The No Project Alternative would not meet any of the project objectives. This alternative would not redevelop the site to the extent feasible with a single-family residential structure and achieve some economic benefit from the site. Furthermore, this alternative would not preclude future development of the site.

Under the No Project Alternative, the active landslide would continue to move downhill from the project site onto adjacent properties, and no remediation of the landslide area would occur. This may cause effects to downslope properties and could result in property damage or increased safety risks for downslope residents.

6.2 Alternative 2: Landslide Stabilization

6.2.1 Description

Alternative 2 would involve stabilizing the active landslide on the project site and constructing a single-family residence outside the required setbacks. Portions of the Quail Ridge Landslide that are located on adjacent properties would not be stabilized as a result of this alternative. This alternative would comply with City codes and zoning regulations, and would require no variances. The landslide stabilization efforts would require removal and replacement of the existing on-site soils with engineered fill, at a maximum estimated quantity of 82,000 to 97,000 cubic yards. The residence could be up to 4,500 square feet, and would be similar in size and character to the existing neighborhood. Vehicular access would be from Quail Ridge Road from the site’s northeast corner.

6.2.2 Impact Analysis

a. Aesthetics

Similar to the Proposed Project, Alternative 2 would result in less than significant aesthetics impacts. Construction of a single-family residence in the central portion of the site, rather than the northeastern corner of the site, would not affect views of scenic vistas, would not require the removal of on-site trees, would be consistent with the zoning and land use designation of the project site, and would not substantially change the existing lighting environment of the neighborhood or introduce substantial glare. Unlike the proposed project, Alternative 2 would not require permits or approvals for construction in the Class I Ridgeline Setback. Overall, aesthetic impacts under Alternative 2 would be slightly less than under the proposed project and impacts would remain less than significant, similar to the proposed project.

b. Agriculture and Forestry Resources

Similar to the proposed project, Alternative 2 would not construct or convert designated farmland to non-agricultural uses, conflict with agricultural zoning, conflict with a Williamson Act contract, or convert forest land or timberland to non-forest uses. Therefore, impacts would be similar to that of the proposed project, and would be less than significant.

c. Air Quality

Alternative 2 would require extensive construction activities on the site related to the landslide repair. This would include approximately one year of grading activities, approximately 82,000 to 97,000 cubic yards of earthwork, and at least 2,000 to 3,000 truck hauling trips to and from the site. Air quality emissions would be substantially greater than under the proposed project, and does not meet the Bay Area Air Quality Management District (BAAQMD) screening criteria because the substantial increase in grading and earthwork required for Alternative 2 is not consistent with the assumptions of the BAAQMD screening criteria. Alternative 2 construction emissions were modeled using the California Emissions Estimator Model (CalEEMod) Version 2016.3.2, the results of which are provided in Table 3.

Table 3 Alternative 2 Construction Emissions

	Pollutant				
	ROG	NO_x	CO	PM_{10} (exhaust emissions)	$PM_{2.5}$ (exhaust emissions)
Maximum Daily Emissions (Mitigated)[1]	6.6	45.2	13.2	0.9	0.8
Significance Threshold	54	54	N/A[2]	82	54
Significant Impact?	No	No	N/A	No	No

N/A = not applicable

[1] The BAAQMD threshold is expressed in terms of average daily emissions; however, the maximum daily emissions are provided here for a conservative analysis.

[2] BAAQMD does not maintain a threshold for CO, as the SFBAAB is in attainment for this pollutant.

Note: All emissions modelling was completed made using CalEEMod. See Appendix C for modeling results. Emission data is pulled from "mitigated" results, which account for compliance with regulations and project design features. Emissions presented are the highest of the winter and summer modeled emissions.

Source: Appendix C, CalEEMod worksheet Table 2.1 "Overall construction-mitigated" emissions; BAAQMD 2017

As shown in Table 3, Alternative 2 air quality emissions from construction would not exceed BAAQMD thresholds. Therefore, although Alternative 2 would have greater construction emissions that the proposed project, impacts would remain less than significant.

Operational air quality emissions would be similar to the proposed project, with no increases or decreases anticipated in vehicle use. As with the proposed project, no mitigation measures would be required and impacts would be less than significant. However, under Alternative 2, construction air quality emissions would be greater than those of the proposed project.

d. Biological Resources

Alternative 2 would result in greater ground disturbance of the project site than would the proposed project. No native vegetation communities and no individuals or signs of special-status species were observed on the project site. No new or increased impacts to riparian habitat, wetlands, or migratory fish or wildlife would occur. Construction of Alternative 2 could have potential impacts to special-status species or nesting birds. Mitigation Measures BIO-1 and BIO-2 would be required to reduce these potential impacts (see Appendix A and Table 1). No additional mitigation measures would be required to reduce impacts. Impacts under Alternative 2 would be slightly greater than the proposed project, due to the increased area of disturbance.

e. Cultural Resources

Alternative 2 would be developed on the same project site as the proposed project, which was determined to contain no historic resources, no known archaeological resources, and no known human remains. The extend of ground disturbance would be greater under Alternative 2 than under the proposed project, which incrementally increases the likelihood of discovery of unknown archaeological resources and/or human remains on the project site. However, Mitigation Measure CR-1 (see Appendix A and Table 1) and compliance with California Health and Safety Code Section 7050.5 and PRC Section 5097.98 would ensure these impacts remain less than significant. Impacts under Alternative 2 would be slightly greater than the proposed project, due to the increased area of disturbance.

f. Energy

Alternative 2 would require extensive construction activities on the site related to the landslide repair. This would include approximately one year of grading activities, approximately 82,000 to 97,000 cubic yards of earthwork, and at least 2,000 to 3,000 truck hauling trips to and from the site. Construction activities associated with Alternative 2 would require more energy in the form of gasoline and diesel fuel than the proposed project. Alternative 2 would also construct one single-family residence on the project site; operational energy demand would be similar to the proposed project. Overall, energy demand and energy use would be greater than the proposed project. Energy impacts under Alternative 2 would remain less than significant.

g. Geology and Soils

Alternative 2 would involve extensive remediation of the on-site landslide. The result of this remediation would improve the foundational quality of the on-site soils and allow for development of the proposed residence to occur outside the setback areas, including the Class II Ridgeline setback and property line setbacks. This alternative would not require the following approvals from the City of Lafayette, which are required for the proposed project:

- Phase I Hillside Development Permit
- Exception for development within a Class II Ridgeline Setback
- Variance Permit
- Tree Removal Permit, Category II

Development on the project site following repair of the on-site portion of the Quail Ridge Landslide would result in fewer geology and soils impacts, as landslide hazards would no longer be present within or near the proposed development area. Mitigation Measures GEO-2a, GEO-2b, GEO-2c, and GEO-3 would no longer be required. Overall, geology and soils impacts under Alternative 2 would be less than under the proposed project because the existing landslide hazards would be remediated fully. Impacts would be less than significant with implementation of COAs.

h. Greenhouse Gas Emissions

Alternative 2 would require extensive construction activities on the site related to the landslide repair. This would include approximately one year of grading activities, approximately 82,000 to 97,000 cubic yards of earthwork, and at least 2,000 to 3,000 truck hauling trips to and from the site. GHG emissions would be substantially greater than under the proposed project, but are anticipated to be within BAAQMD thresholds, per the BAAQMD's CEQA Air Quality Guidelines. Alternative 2, similar to the proposed project, would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. Operational GHG emissions would be similar to the proposed project, with no increases or decreases anticipated in vehicle use. As with the proposed project, no mitigation measures would be required and impacts would be less than significant. However, Alternative 2 construction GHG emissions would be greater than those of the proposed project.

i. Hazards and Hazardous Materials

Alternative 2 would construct a single-family residence on the project site, similar to the proposed project. Impacts to hazardous materials, including the transport and use of hazardous materials, accidental release of hazardous materials, and interference with an emergency response plan or evacuation plan would be similar to the proposed project, as the type and intensity of development would remain the same. The site is not located within 0.25 mile of a school, listed on a database of known hazardous materials contamination sites, or within 2 miles of an airport. Overall, hazard and hazardous material impacts under Alternative 2 would be similar to the proposed project and impacts would remain less than significant.

j. Hydrology and Water Quality

Alternative 2 would result in greater ground disturbance of the project site than the proposed project. Unlike the proposed project, the disturbance area would likely be greater than one acre, which would require coverage under the NPDES Construction General Permit. This includes preparation of a Stormwater Pollution Prevention Plan describing BMPs specific to the project site and Alternative 2 construction activities. Similar to the proposed project, Alternative 2 would also be required to pay the City drainage impact fee, submit a Drainage Plan, and submit an Erosion and Sediment Control Plan. These requirements would ensure that construction activities do not result in water quality violations, substantial erosion or siltation, or exceedances in stormwater drainage system capacity.

Alternative 2 would introduce a greater amount of impervious surfaces than the proposed project due to the increased driveway length to access the Alternative 2 residence location. Similar to the proposed project, Alternative 2 would be required to pay the City’s drainage impact fee based on the increase in impervious surfaces in accordance with LMC Section 8-1703. Alternative 2 would also require site-specific BMPs to minimize stormwater quality impacts from adding impervious surfaces in the Hillside Overlay District, such as using permeable pavement options and modifying driveway design. This alternative would result in slightly greater although less than significant impacts related to flooding, runoff, and groundwater recharge, as well as similar impacts regarding compliance with water quality control plans and sustainable groundwater management plans. Overall, hydrology and water quality impacts under Alternative 2 would be similar to the proposed project and impacts would remain less than significant, similar to the proposed project.

k. Land Use and Planning

Similar to the proposed project, Alternative 2 would not physically divide an established community or significantly conflict with a land use plan, policy, or regulation. Unlike the proposed project, Alternative 2 would not require permits or approvals for construction within the Class I Ridgeline Setback. Overall, land use and planning impacts under Alternative 2 would be less than under the proposed project and impacts would remain less than significant, similar to the proposed project.

l. Mineral Resources

Similar to the proposed project, Alternative 2 would not require the use of substantial mineral resources during construction or operation and would not involve construction in a mineral resource site. Therefore, impacts would be similar to those of the proposed project, and would be less than significant.

m. Noise

Alternative 2 would involve extensive remediation of the on-site landslide, which would result in extended periods of construction on the site. Alternative 2 would locate the proposed residence on the central portion of the site, which is at a greater distance from adjacent residences. Therefore, construction of the residence would have lesser construction noise impacts than the proposed project, but remediation of the on-site portion of the Quail Ridge Landslide would result in greater noise impacts, due to the proximity to adjacent residences and longer duration of construction. Grading of the site under Alternative 2 would take approximately one year, with at least 2,000 to 3,000 truck hauling trips to and from the site for the required landslide remediation earthwork. The increased length of the grading phase would result in approximately 10 truck hauling trips per day to and from the site, which would not substantially increase traffic noise on local roadways, as this would be approximately 1 to 2 hauling trips per hour. Construction impacts would be temporary, and implementation of Mitigation Measure NOI-1 would continue to reduce construction noise to an acceptable level. Under Alternative 2, operational noise and groundborne vibration would be similar to the proposed project, and impacts would be less than significant.

n. Population and Housing

Similar to the proposed project, Alternative 2 would be consistent with the land use and zoning designations for the site, would result in an incremental increase in population as anticipated by the City's General Plan, and would not result in the demolition or removal of existing housing within the city. Therefore, impacts would be similar to that of the proposed project, and would be less than significant.

o. Public Services

Similar to the proposed project, Alternative 2 would incrementally increase the population of the City, which would not substantially reduce the ability of public service providers (including police, fire protection, schools, parks, and other facilities) to maintain service levels. Additionally, Alternative 2 would be required to pay development fees for school services, similar to the proposed project. Therefore, impacts would be similar to that of the proposed project, and would be less than significant.

p. Recreation

Similar to the proposed project, Alternative 2 would incrementally increase the population of the City, which would result in an incremental increase in demand for recreational facilities. Alternative 2 would be required to pay parkland development fees, similar to the proposed project. Furthermore, the incremental increase in population would not cause substantial physical deterioration of existing facilities or require the expansion of parkland facilities beyond planned future expansions. Therefore, impacts would be similar to that of the proposed project, and would be less than significant.

q. Transportation

Implementation of Alternative 2 would involve the same development of one single-family residence on the project site, which would result in the same level of traffic as the proposed project. Impacts resulting from conflicts with transit, roadway, bicycle, and pedestrian facilities programs, plans, policies, and ordinances; conflicts with CEQA Guidelines Section 15064.3; hazardous design features; or inadequate emergency access would remain less than significant. However, construction worker trips and haul trips would be substantially greater during repair of the on-site portion of the Quail Ridge Landslide. Therefore, Alternative 2 would have greater construction traffic impacts than the proposed project.

r. Tribal Cultural Resources

As stated in the Initial Study (Appendix A), no tribes have requested notification of projects under AB 52. Impacts to tribal cultural resources under Alternative 2 would be similar to the proposed project.

s. Utilities and Service Systems

Alternative 2 would also involve construction of one single-family residence on the project site. Therefore, water demand, wastewater generation, stormwater requirements, solid waste generation, and other utilities impacts would be similar to the proposed project. Overall, utilities and service system impacts remain less than significant.

t. Wildfire

The proposed residence under Alternative 2 would be located more centrally within the project site boundaries, and farther from adjacent residences. This increased distance between structures lessens the likelihood of fires spreading from one structure to another. Alternative 2 would not interfere with emergency response or evacuation plans or exacerbate fire risk in the area. Impacts from wildfires would be slightly lesser than the proposed project, and less than significant.

6.3 Alternatives Considered But Rejected

The parcel is zoned R-20, single-family residential district. The following uses are allowed with a land use permit in the zone:

a) Residential businesses
b) Churches, religious institutions, and parochial and private schools, including nursery schools
c) A second unit which complies with Chapter 6-5, Article 3 of this title
d) [Reserved]
e) Publicly owned buildings and structures, except as provided in Section 6-516
f) Publicly owned parks and playgrounds
g) Community buildings, clubs and activities of a quasi-public, social or fraternal character; and private recreational facilities, such as golf clubs, swimming pools and tennis clubs, whether or not operated for profit
h) Crop and tree farming and horticulture
i) Small farming, including the raising of poultry or rabbits or other grain-fed rodents, exclusively for home consumption
j) Uses which the planning commission has found, after notice and hearing, to be comparable to the uses enumerated in this section
k) Multiple pet activity, but only on parcels of land 20,000 square feet in size or larger

The City considered alternatives that could be allowed with a land use permit that would provide the property owner with some economic benefit. Of these listed uses, none would be approved on the site due to the presence of an active landslide and other constraints.

The City also considered off-site alternatives. There are vacant lots nearby on Los Arabis Drive, Palo Alto Drive, Cambridge Drive, Valory Lane, and Via Alta. However, alternative sites were considered but determined to be infeasible because the project applicant does not own other parcels in the City that could accommodate this project, and CEQA Guidelines Section 15126.6(f)(1) only requires consideration of alternative sites if the project applicant can reasonably acquire or gain access to alternative locations. Furthermore, given the City's current level of urban development, and because similar vacant sites are likely to have similar or other development constraints, an alternative site location would not necessarily avoid or substantially reduce project impacts.

6.4 Environmentally Superior Alternative

Based on the alternatives analysis provided above, Alternative 1 (No Project) would be the environmentally superior alternative. However, per CEQA *Guidelines* Section 15126.6(e)(2), if the No Project alternative is determined to be environmentally superior, the EIR shall also identify an environmentally superior alternative among the other alternatives. Therefore, Alternative 2 would be the environmental superior alternative, as it reduces geology and soils impacts by repairing the on-site portion of the Quail Ridge Landslide, compared to the proposed project.

- **Alternative 1 (*No Project)*** assumes that the proposed single-family residence would not be constructed. The on-site portion of the Quail Ridge Landslide would remain active, and would likely continue movement downslope at its current pace. Under this alternative, project impacts would not occur and potentially significant impacts to geology and soils would be avoided. No construction would occur; therefore, no mitigation measures would be required. However, Alternative 1 would not fulfill the project objectives because no residence would be built on site for future use.
- **Alternative 2 (*Landslide Stabilization)*** would involve repair of the on-site portion of the Quail Ridge Landslide and construction of a single-family residence outside the ridgeline setback area. The on-site landslide would no longer contribute to off-site landslide effects, as a significant mass of the Quail Ridge Landslide would be removed, which would reduce the existing pressure on downslope soils. This alternative would require fewer discretionary approvals than the proposed project, as the residence would be located outside the setback areas. In comparison to the proposed project, this alternative would result in fewer geology and soils impacts, as the landslide would be fully repaired on site. Also, as with the proposed project, the same mitigation measures would be required during construction for biological resources, cultural resources, paleontological resources, and noise; however, mitigation measures for geology and soils impacts would no longer be required. Alternative 2 would fulfill all project objectives; however, the landslide repair would result in significantly higher costs than the proposed project. Overall, Alternative 2 would be considered environmentally superior, as it would eliminate the potentially significant geology and soils impact and would require fewer discretionary and/or legislative approvals.

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7.2 List of Preparers

This EIR was prepared by the City of Lafayette, with the assistance of Rincon Consultants, Inc. Consultant staff involved in the preparation of the EIR are listed below.

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Appendix A

Notice of Preparation and Initial Study

Notice of Preparation

NOTICE OF PREPARATION
For a Focused Draft Environmental Impact Report

Date:	July 23, 2019
To:	State Clearinghouse and Interested Parties and Organizations
Project Title:	3933 Quail Ridge Road Residential Project
Lead Agency:	City of Lafayette Planning & Building Department 3675 Mount Diablo Boulevard, #210 Lafayette, California 94549
Contact:	Ms. Payal Bhagat, Senior Planner, Planning & Building Department
Public Review Period:	July 23 through August 22, 2019 (30 days) in accordance with CEQA Guidelines Section 15082

Purpose of the Notice

The intent of this Notice of Preparation (NOP) is to inform agencies and interested parties that the City of Lafayette is preparing a Draft Environmental Impact Report (EIR) for the proposed 3933 Quail Ridge Road Residential Project in accordance with California Environmental Quality Act (CEQA) Guidelines Section 15082. This NOP provides information about the project and its potential environmental effects and requests that comments be provided on the proposed scope and content of the Draft EIR. An Initial Study has been prepared for the project and is available for review at Planning & Building Department offices during regular business hours or online at https://www.lovelafayette.org/city-hall/city-departments/planning-building/ceqa.

Project Location

The project site is 1.1-acres (48,750 square feet) in size and is located near the terminus of Quail Ridge Road, west of its intersection with Via Roble, in the central western portion of the City of Lafayette. The Assessor's Parcel Number is 248-130-012 and the site address is 3933 Quail Ridge Road, Lafayette, California 94549. The project site is currently vacant, with an active landslide through the majority (approximately 80 percent) of the property. Several trees are located along the perimeter of the project site, primarily in the southwest and northeast corners of the site. Figure 1 shows an aerial image of the project site.

Background

In 1997, an approximately 3.7-acre landslide affected approximately 80 percent of the project site. The residence was destroyed and the debris subsequently removed. The site was partially re-graded, and Quail Ridge Road was repaired and stabilized between 1999 and 2001. The balance of the slide was graded to drain evenly to the south, but the landslide itself was not repaired.

In the winter of 2005/2006, a pumping system installed during the original road repair failed, leading to the re-activation of the landslide area below the hardscape repair. In 2008, the owner requested to continue the soils review to determine if the portion of the lot that was not affected by the landslide is buildable. The City evaluated a series of soils reports and associated peer reviews. In December of 2008, the City determined it was geotechnically feasible to construct a single-family residence at the northeast corner of the site, outside the limits of the slide.

In 2012, the applicant formally submitted an application for a Phase I Hillside Development Permit. The City is currently determining the siting and massing of the proposed development. As part of this process, CEQA environmental analysis is required.

Project Description

The project would involve the construction of a two-story, single-family residence, including an attached two-car garage and outdoor decks. The residence would be approximately 4,000 square feet in size, including the garage, and approximately 35 feet in height. During construction, four protected trees would be removed and replaced by at least three trees south of the proposed residence. Landscaping along the steepest portion of the slide mass near Quail Ridge Road would be installed as part of the project. Figure 2 provides a schematic drawing of the project concept. Development on the project site is constrained by the landslide area and required setbacks from nearby ridgelines and from all property lines. Vehicle access to the site would be provided via a private driveway on Quail Ridge Road. The project would require a Phase I Hillside Development Permit, Exception for development within a Class II Ridgeline Setback, Exception to Exceed the 15-Degree Declination Requirement, Variance Permit, Design Review, Grading Permit, and Tree Permit.

Potential Environmental Effects

An Initial Study was prepared for the project and found that the project would have no impact, a less than significant impact, or a less than significant impact with mitigation incorporated for all environmental issue areas evaluated under CEQA except for Geology and Soils. The Draft EIR will further evaluate the geology and soils constraints of the project site and potential project impacts related to geologic and soil hazards. The Draft EIR will propose mitigation to avoid and/or reduce impacts deemed potentially significant, identify reasonable alternatives, and compare the environmental impacts of the alternatives to the impacts of the proposed project. The Draft EIR will also discuss the cumulative impacts of the proposed project in combination with other closely related past, present, and reasonably foreseeable probable future projects in the area (14 CCR 15130). Comments provided in response to the NOP and during the ensuing analyses may identify additional environmental topics to be evaluated.

Providing Comments

At this time, the City is soliciting your comments on the scope of the Draft EIR, including potential environmental impacts of the project and alternatives to be considered. This information will be considered when preparing the Draft EIR's discussion of environmental impacts, mitigation measures, and alternatives. Because of time limits mandated by State law, comments must be received no later than **5:00 p.m. on August 22, 2019,** which ends the 30-day scoping period.

Comments may be submitted by U.S. mail or by email prior to the close of the scoping period.

Mail comments to:

Ms. Payal Bhagat, Senior Planner
Planning & Building Department
City of Lafayette
3675 Mount Diablo Boulevard, #210
Lafayette, California 94549

Email comments to Payal Bhagat at: pbhagat@ci.lafayette.ca.us

For comments submitted via email, please include "NOP Comments: 3933 Quail Ridge Road Residential Project" in the subject line and the name and physical address of the commenter in the body of the email.

All comments on environmental issues received during the public scoping period will be considered and addressed in the Draft EIR, which is anticipated to be available for public review in the fall of 2019. This NOP, the Initial Study, and other public review documents for this project are available for viewing online at https://www.lovelafayette.org/city-hall/city-departments/planning-building/ceqa. These documents are also available for review at Planning & Building Department offices (3675 Mount Diablo Boulevard, #210) during regular business hours.

If you have any questions about the environmental review process, please contact Payal Bhagat at the contact information provided above.

Ms. Payal Bhagat, Senior Planner
Planning & Building Department
City of Lafayette

Attachments

Figure 1. Project Location

Figure 2. Project Concept Schematic

Figure 1. Project Location

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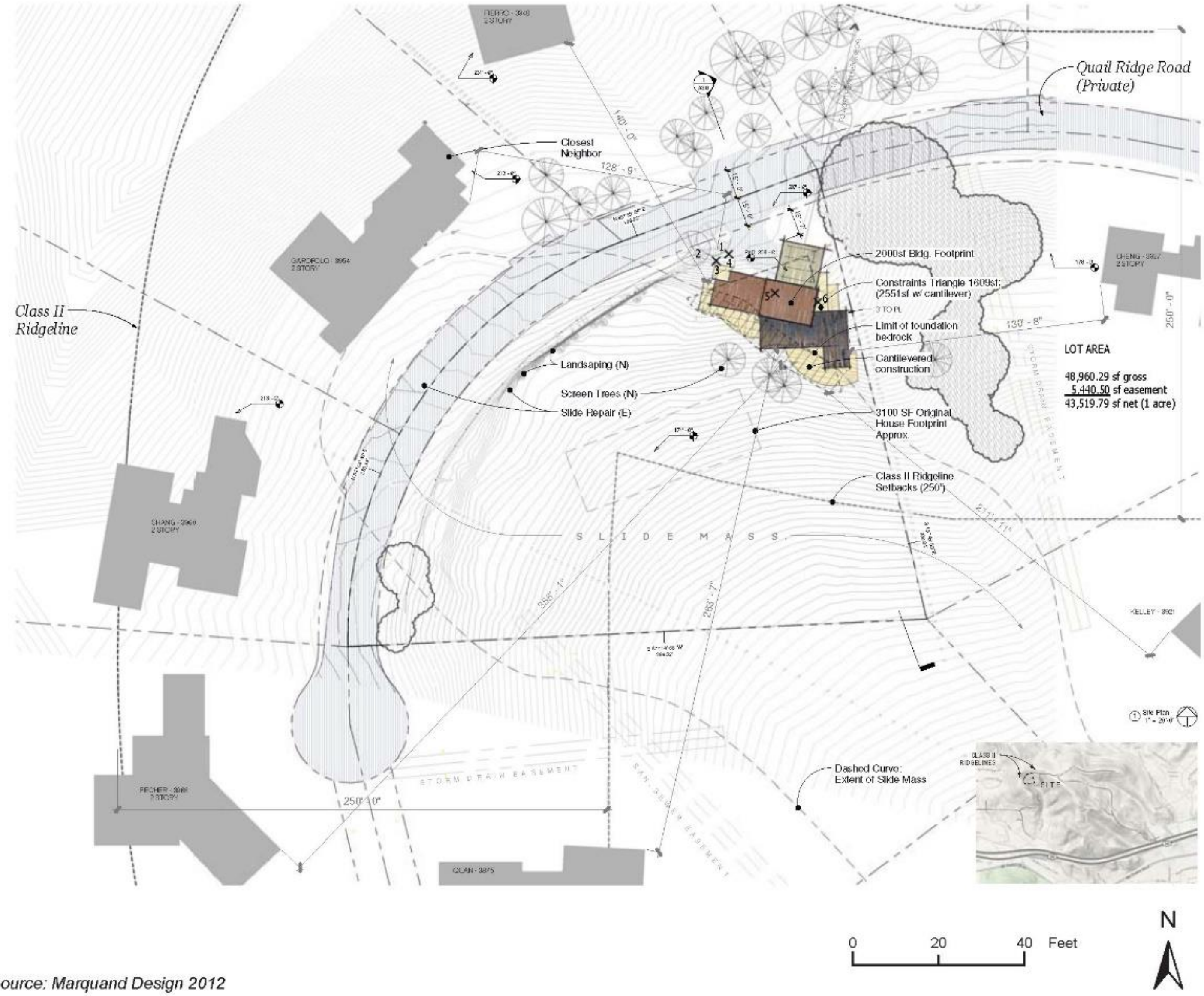
Fig 2 Project Location

Figure 2. Project Concept Schematic



Source: Marquand Design 2012

Initial Study

3933 Quail Ridge Road Residential Project

Initial Study

prepared by

City of Lafayette
Planning & Building Department
3675 Mount Diablo Boulevard, #210
Lafayette, California 94549
Contact: Ms. Payal Bhagat, Senior Planner

prepared with the assistance of

Rincon Consultants, Inc.
449 15th Street, Suite 303
Oakland, California 94612

July 2019

RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
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3933 Quail Ridge Road Residential Project

Initial Study

prepared by

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Tables

Figures

Appendices

Abbreviations and Acronyms

AB	Assembly Bill
ABAG	Association of Bay Area Governments
AQMP	air quality management plan
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
BMP	best management practices
CAL FIRE	California Department of Forestry and Fire Protection
CalEEMod	California Emissions Estimator Model
CARB	California Air Resources Board
CCCFPD	Contra Costa County Fire Protection District
CCCWP	Contra Costa Clean Water Program
CDFW	California Department of Fish and Wildlife
Central San	Central Contra Costa Sanitary District
CEQA	California Environmental Quality Act
CFP	California Fully Protected
CH_4	methane
CHRIS	California Historical Resources Information System
CO	carbon monoxide
CO_2	carbon dioxide
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CRHR	California Register of Historical Resources
CSC	California Species of Special Concern
CWA	Clean Water Act
dB	decibels
dBA	A-weighted sound pressure level
DBH	diameter at breast height
DOF	California Department of Finance

DTSC	Department of Toxic Substances Control
EBMUD	East Bay Municipal Utility District
EIR	Environmental Impact Report
FIRM	(Federal Emergency Management Agency) Flood Insurance Rate Map
FTA	Federal Transit Administration
GHG	greenhouse gases
ITE	Institute of Transportation Engineers
kBtu	thousand British thermal units
kWh	kilowatt-hours
Ldn	Day-Night Average (noise) Level
Leq	single steady A-weighted (noise) level
Lmax	highest root mean squared sound pressure level
Lmin	lowest root mean squared sound pressure level
LMC	Lafayette Municipal Code
LOS	level of service
MBTA	Migratory Bird Treaty Act
mgd	million gallons per day
MMBtu	million British thermal units
MMcf	million cubic feet
MW	megawatts
NAAQS	national ambient air quality standards
N_2O	nitrous oxides
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NWIC	Northwest Information Center
O_3	ozone
Pb	lead
PG&E	Pacific Gas and Electric
$PM_{2.5}$	particulate matter with a diameter of up to 2.5 microns
PM_{10}	particulate matter with a diameter of up to ten microns
ROG	reactive organic gases
RWQCB	Regional Water Quality Control Board
SB	Senate Bill

SFBAAB	San Francisco Bay Area Air Basin
SO_2	sulfur dioxide
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	California State Water Resources Control Board
TMDL	total maximum daily load
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UWMP	Urban Water Management Plan
VMT	vehicle miles traveled
VdB	vibration decibels

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Initial Study

The City of Lafayette, as the Lead Agency, prepared this Initial Study for the 3933 Quail Ridge Road Residential Project in compliance with the California Environmental Quality Act (CEQA), the CEQA guidelines (California Code of Regulations [CCR] Section 15000 et. seq.), and the regulations and policies of the City of Lafayette, California.

1. Project Title

3933 Quail Ridge Road Residential Project

2. Lead Agency Name and Address

City of Lafayette
Planning & Building Department
3675 Mount Diablo Boulevard, #210
Lafayette, California 94549

3. Contact Person and Phone Number

Ms. Payal Bhagat, Senior Planner
(925) 284-1976

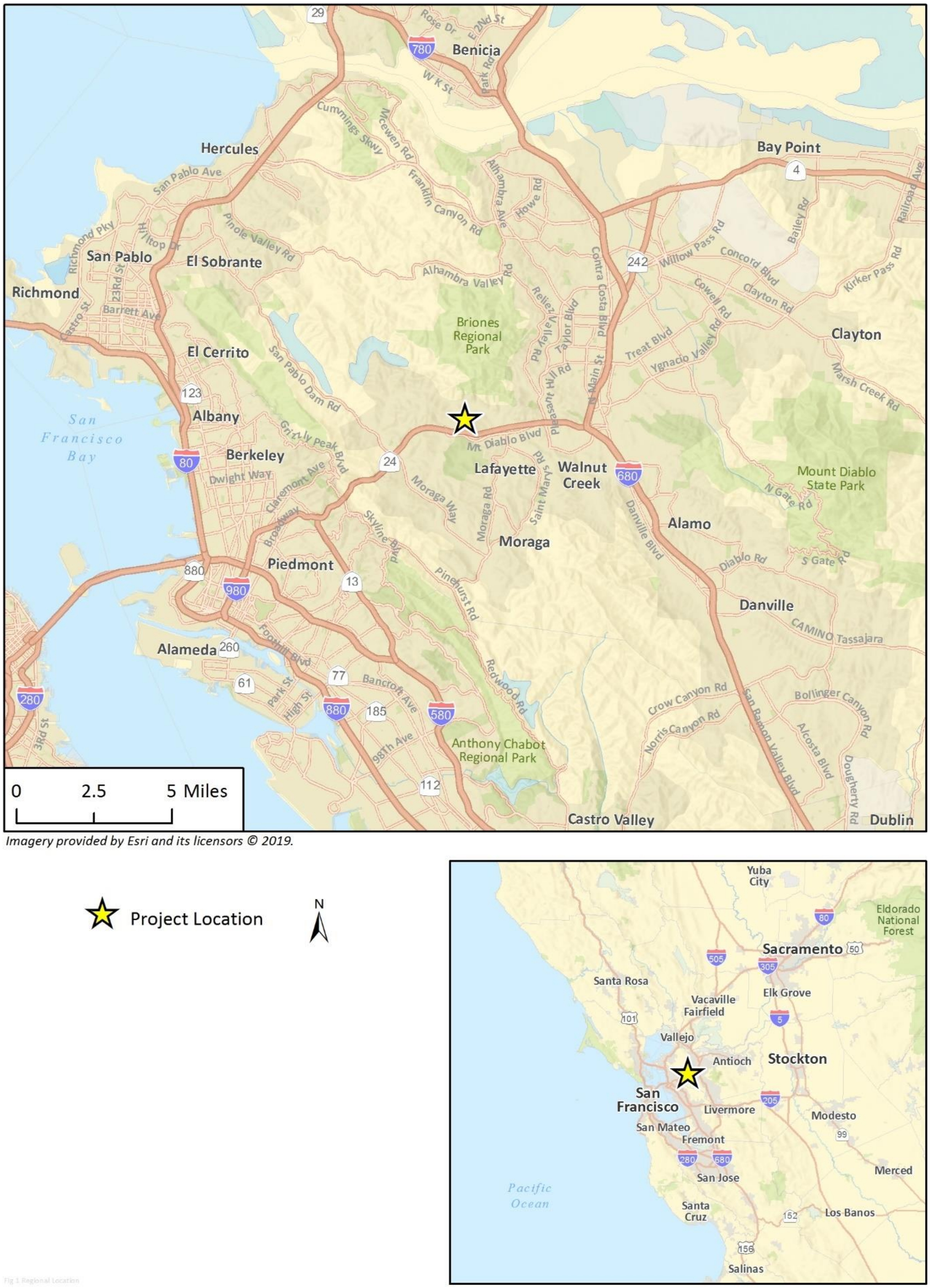
4. Project Location

The project site is 1.1 acres (48,750 square feet) in size and is located near the terminus of Quail Ridge Road, west of its intersection with Via Roble, in the central western portion of Lafayette. The Assessor's Parcel Number is 248-130-012 and the site address is 3933 Quail Ridge Road, Lafayette, California 94549. The project site is currently vacant, with an active landslide through the majority (approximately 90 percent) of the property. Several trees are located along the perimeter of the project site, primarily in the southwest and northeast corners. Figure 1 shows the regional location of the project site and Figure 2 provides an aerial image of the project site in its neighborhood context.

5. Project Sponsor's Name and Address

Ravi and Jessica Reddy
3000 – F Danville Blvd, #268
Alamo, California 94507

Figure 1 Regional Location



Imagery provided by Esri and its licensors © 2019.

Fig 1 Regional Location

Figure 2 Project Location

Imagery provided by Microsoft Bing and its licensors © 2019.

Fig 2 Project Location

6. General Plan Designation

Low Density Single-family Residential up to two dwelling units per acre, Hillside Overlay Area

7. Zoning

Single-family Residential District (R-20)

8. Project Description

Project Background

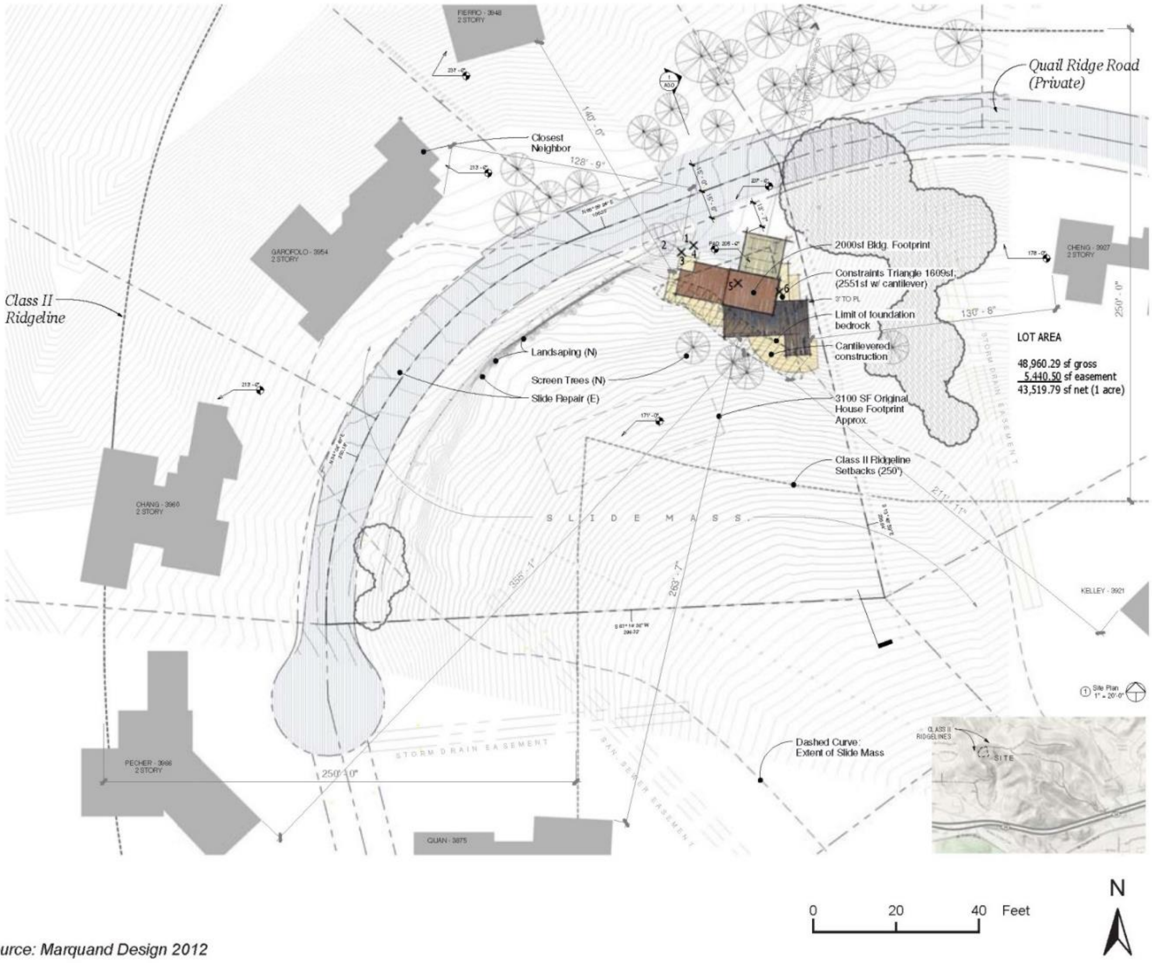
In 1997, an approximately 3.7-acre landslide affected approximately 90 percent of the project site. The residence was destroyed and the debris subsequently removed. The site was partially re-graded, and Quail Ridge Road was repaired and stabilized between 1999 and 2001. The balance of the slide was graded to drain evenly to the south, but the landslide itself was not repaired.

In the winter of 2005/2006, a pumping system installed during the original road repair failed, leading to the re-activation of the landslide area below the road repair. In 2008, the property owner requested to continue the soils review to determine if the portion of the lot not affected by the landslide was buildable. The City evaluated a series of soils reports and associated peer reviews. In December 2008, the City determined it was geotechnically feasible to construct a single-family residence at the northeast corner of the site, outside the limits of the slide. In 2012, the applicant formally submitted an application for a Phase I Hillside Development Permit.

Project Components

The project would involve construction of a two-story, single-family residence, including an attached two-car garage and outdoor decks. Figure 3 shows the proposed site plan. The residence would be approximately 4,000 square feet in size, including the garage, and approximately 35 feet in height. During construction, four protected trees would be removed and replaced with at least three trees south of the proposed residence. Landscaping along the steepest portion of the slide mass near Quail Ridge Road would be installed as part of the project. Development on the project site is constrained by the landslide area and required setbacks from nearby ridgelines and from all property lines. Foundation piles would also be required to anchor the residence to the underlying stable bedrock in the northeast corner of the site. It is assumed that no soils engineering or other major earthwork processes that would require heavy-duty construction equipment would be necessary to prepare the site. A private driveway on Quail Ridge Road would provide vehicular access to the site.

Figure 3 Proposed Site Plan



Source: Marquand Design 2012

City Permits and Approvals Required

The following permits and approvals are required from the City of Lafayette prior to construction of the proposed project:

- Phase I Hillside Development Permit
- Exception for development within a Class II Ridgeline Setback
- Exception to Exceed the 15-Degree Declination Requirement
- Variance Permit
- Design Review
- Grading Permit
- Tree Removal Permit, Category II

9. Surrounding Land Uses and Setting

The project site is in an area of large-lot residential properties on rolling topography with views over wooded hillsides. The site is surrounded by single-family residences with the same zoning and land use designations as the site. In the site vicinity, all parcels are developed, with the exception of those currently inaccessible by paved roadways. Most of the site consists of a steeply sloped landslide area that trends downward, from northwest to southeast. Trees are located on the more stable soil at the landslide's edges.

Quail Ridge Road is a private road that provides direct access to the site. Local access is provided by Via Roble and Mount Diablo Boulevard, and regional access is provided by State Route 24 (SR-24) through central Lafayette.

10. Other Public Agencies Whose Approval is Required

The City of Lafayette is the only public agency with discretionary authority to approve this project.

11. Have California Native American Tribes Traditionally and Culturally Affiliated with the Project Area Requested Consultation Pursuant to Public Resources Code Section 21080.3.1?

The City has not received any requests from California Native American tribes to be notified of proposed projects in the city, pursuant to Public Resources Code (PRC)Section 21080.3.1.

Environmental Factors Potentially Affected

This project would potentially affect the environmental factors checked below, involving at least one impact that is “Potentially Significant” or “Less than Significant with Mitigation Incorporated” as indicated by the checklist on the following pages.

☐ Aesthetics
☐ Agriculture and Forestry Resources
☐ Air Quality
■ Biological Resources
■ Cultural Resources
☐ Energy
■ Geology/Soils
☐ Greenhouse Gas Emissions
☐ Hazards & Hazardous Materials
☐ Hydrology/Water Quality
☐ Land Use/Planning
☐ Mineral Resources
☐ Noise
☐ Population/Housing
☐ Public Services
☐ Recreation
☐ Transportation
☐ Tribal Cultural Resources
☐ Utilities/Service Systems
☐ Wildfire
■ Mandatory Findings of Significance

Determination

Based on this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions to the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

■ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a “potentially significant impact” or “less than significant with mitigation incorporated” impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potential significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature	Date
Printed Name	Title

Environmental Checklist

1 Aesthetics

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Except as provided in Public Resources Code Section 21099, would the project:				
a. Have a substantial adverse effect on a scenic vista?	☐	☐	■	☐
b. Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	■
c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	■	☐
d. Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?	☐	☐	■	☐

The following goals and policies from the City of Lafayette General Plan apply to the project site:

Policy LU-1.1. Scale**:** Development shall be compatible with the scale and pattern of existing neighborhoods.

Goal LU-2. Ensure that development respects the natural environment of Lafayette. Preserve the scenic quality of ridgelines, hills, creek areas, and trees.

Policy LU-2.2. Cluster Development**:** Preserve important visual and functional open space by requiring development to be clustered on the most buildable portions of lots, minimizing grading for building sites and roads.

Policy LU-2.3. Preservation of Views: Structures in the hillside overlay area shall be sited and designed to be substantially concealed when viewed from below from publicly owned property. The hillsides and ridgelines should appear essentially undeveloped, to the maximum extent feasible.

Policy OS-1.1. Protection of Major Ridgelines**:** Preserve Major Ridgelines in their natural state as scenic resources and wildlife corridors.

Policy OS-1.2. Ridgeline Protection: Protect all ridgelines consistent with their function as scenic resources for the community and as wildlife corridors.

Goal OS-3: Maintain the semi-rural character and beauty of the city by preserving its open and uncluttered natural topographic features.

a. Would the project have a substantial adverse effect on a scenic vista?

Ridgelines are located north and west of the project site, and views of ridgelines are available to the south of the project site from Quail Ridge Road. The proposed project would be constructed on a lot zoned for low-density single-family residential uses and would occupy less than 10 percent of the total lot square footage. It would not exceed 35 feet or two stories in height. This is in keeping with the zoning regulations sections 6-781 through 6-793. The house would be built into the slope (Figure 4), minimizing its height as viewed from Quail Ridge Road. The project site is not in an area with prominent visual access to a designated scenic vista as identified in Map I-5 of the City's General Plan. The views from the nearest neighboring lot are directed away from the proposed project, situating it out of the adjacent line-of-sight (Figure 3). Furthermore, the project site is 48,750 square feet in size, while the project footprint would be about 4,000 square feet (less than 10 percent of the total project site), leaving most of the site undeveloped. This design would leave the view to the ridgeline in the far distance (Figure 5) unobscured from Quail Ridge Road and from the properties located directly north of the site. Project implementation would have a less than significant impact on a scenic vista. This impact will not be discussed in the EIR.

Figure 4 Elevation Shows Slope Integration

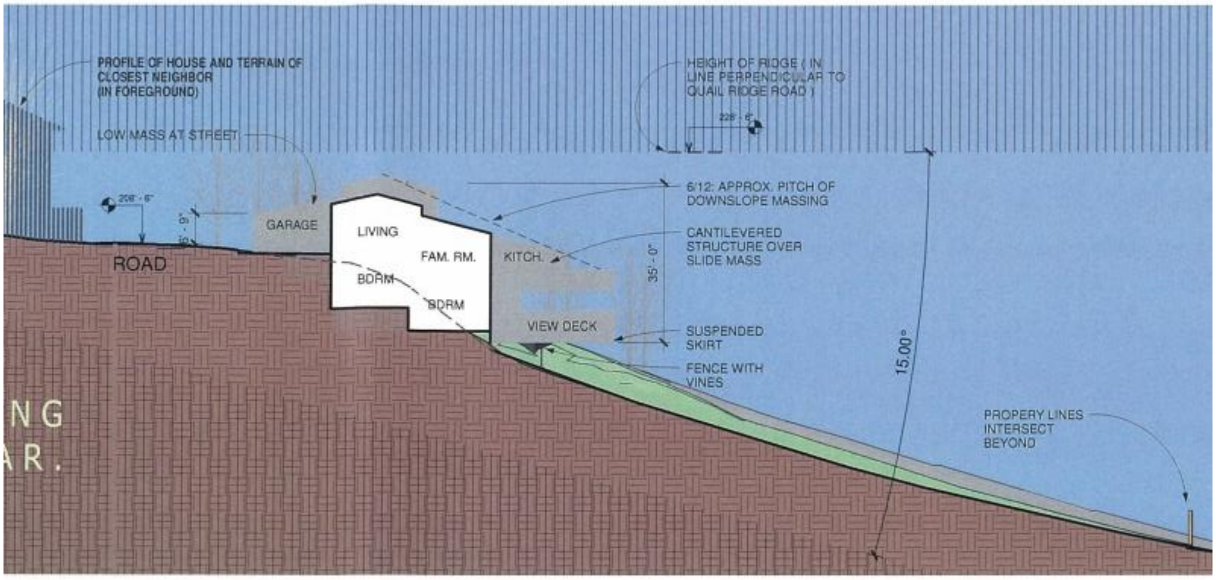


Figure 5 View from Northern Project Site Boundary at Quail Ridge Road toward the Distant Ridge Line in the Southwest

NO IMPACT

b. *Would the project substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?*

The nearest designated state scenic highway is SR-24 (California Department of Transportation 2019), which stretches from the Caldecott Tunnel in Oakland to Interstate 680 in Walnut Creek, passing through Lafayette about 0.5 mile south of the project site. Due to intervening topography and vegetation, the site is not visible from SR-24. The site contains no historic buildings, rock outcroppings, or significant scenic resources. Refer to Section 4, *Biological Resources*, for a discussion of trees on site.

Because the site is not visible from SR-24, the proposed project would not affect views from a state-designated scenic highway, and the project would have no impact under this issue area. This impact will not be discussed in the EIR.

NO IMPACT

c. Would the project, in non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

The project site is in an urbanized (suburban) residential area with large lots, zoned for low-density single-family residential uses. The project site is designated in the City's General Plan as Low Density Single-family Residential (up to two dwelling units per acre) (City of Lafayette 2002). The site is zoned as Single-family Residential District R-20 (City of Lafayette 2013a). Surrounding and adjacent parcels are developed with single-family residences in compliance with the designated land use and zoning district, and the project would result in construction of a single-family residence that would also be in compliance with the designated land use and zoning. As stated in Section 8, *Project Description*, the project would require permits and approvals for construction within the Class II Ridgeline Setback. The surrounding residences are also constructed in the Class II Ridgeline Setback areas; therefore, the project would be consistent with surrounding land uses. With approval of the Exception for Development within a Class II Ridgeline Setback, the project would not be considered to conflict with the zoning of the site. Additionally, project design would be subject to the City's Design Review Commission for final approval to determine its compliance with the Residential Design Review Guidelines (City of Lafayette 1990). As the project is consistent with the land use and zoning designations for the project site, and the design review process would ensure project design follows City design guidelines, impacts would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

d. Would the project create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?

The project site is in a suburban area with low to moderate levels of existing lighting from exterior structure lighting, light visible through windows at adjacent residential uses, and from vehicular traffic on Quail Ridge Road. The proposed project would continue the existing development pattern of single-family dwellings on large lots and thus would not substantially change the existing light environment beyond what is allowed or expected in areas of Lafayette zoned for R-20 development.

The primary sources of glare in the project area are the sun's reflection off light colored and reflective building materials and finishes, and metallic and glass surfaces of parked vehicles. The proposed residence's windows could generate glare from reflected sunlight during certain times of the day. The exterior building colors would be compatible with the surrounding landscape, in adherence with the City's Residential Design Guidelines and thus glare from light-colored surfaces would be minimal. Furthermore, windows would be shielded by landscaping and other design features that break up massing and reduce the possibility of excessive glare from reflected light. Impacts related to light and glare would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

2 Agriculture and Forestry Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	■
b. Conflict with existing zoning for agricultural use or a Williamson Act contract?	☐	☐	☐	■
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)); timberland (as defined by Public Resources Code Section 4526); or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	■
d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	■
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	■

PRC Section 12220(g) defines forest land as:

> land that can support 10-percent native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits.

PRC Section 4526 defines timberland as:

> land, other than land owned by the federal government and land designated by the board as experimental forest land, which is available for, and capable of, growing a crop of trees of a commercial species used to produce lumber and other forest products, including Christmas trees. Commercial species shall be determined by the board on a district basis.

Government Code Section 51104(g) defines a timberland production zone as:

> an area which has been zoned pursuant to Section 51112 or 51113 and is devoted to and used for growing and harvesting timber, or for growing and harvesting timber and compatible uses, as defined in subdivision (h).

a. *Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?*

The project site and surrounding area is located entirely within the Urban and Built-Up Land area (California Department of Conservation [DOC] 2016). The project would only modify the project site; therefore, no Prime Farmland, Unique Farmland, or Farmland of Statewide Importance would be affected by project implementation and no impact would occur. This impact will not be discussed in the Environmental Impact Report (EIR).

NO IMPACT

b. *Would the project conflict with existing zoning for agricultural use or a Williamson Act contract?*

The project site and surrounding areas are not subject to Williamson Act contracts (DOC 2013). The project would only modify the project site; therefore, no Williamson Act contracts would be affected by project implementation and no impact would occur. This impact will not be discussed in the EIR.

NO IMPACT

c. *Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)); timberland (as defined by Public Resources Code Section 4526); or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?*

d. *Result in the loss of forest land or conversion of forest land to non-forest use?*

e. *Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?*

While some vegetation is present on the project site, the site itself is not forest or timberland. The project site is not currently utilized for the provision of forest and timber resources, as it is located in a residential area in Lafayette. As such, the project would not convert forest or timberland uses, and no impact would occur. This impact will not be discussed in the EIR.

NO IMPACT

3 Air Quality

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	■	☐
b. 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?	☐	☐	■	☐
c. Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	■	☐
d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☐	■

Setting

Air Quality Background

The city of Lafayette is within the Diablo Valley-San Ramon Valley subregion of the San Francisco Bay Area Air Basin (SFBAAB), which is under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). Air quality in the SFBAAB is affected by the region's emission sources and by natural factors. Topography, speed, and direction of wind, and air temperature gradient all influence air quality. The SFBAAB is affected by a Mediterranean climate, with warm, dry summers and cool, damp winters.

Air pollutant emissions in the SFBAAB are generated by stationary and mobile sources. Stationary sources can be divided into two major subcategories: point and area sources. Point sources occur at a specific location and are often identified by an exhaust vent or stack. Examples include boilers or combustion equipment that produce electricity or generate heat. Area sources are widely distributed and include sources such as residential and commercial water heaters, painting operations, lawn mowers, agricultural fields, landfills, and some consumer products. Mobile sources refer to emissions from motor vehicles, including tailpipe and evaporative emissions, and are classified as either on-road or off-road. On-road sources may be legally operated on roadways and highways. Off-road sources include aircraft, ships, trains, and self-propelled construction equipment. Air pollutants can also be generated by the natural environment, such as when high winds suspend fine dust particles.

The United States (U.S.) Environmental Protection Agency has set primary national ambient air quality standards (NAAQS) for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter with a diameter of up to ten microns (PM_{10}) and up to 2.5 microns

($PM_{2.5}$), and lead (Pb). Primary standards are those levels of air quality deemed necessary, with an adequate margin of safety, to protect public health. In addition, California has established health-based ambient air quality standards for these and other pollutants, some of which are more stringent than the federal standards.

As the local air quality management agency, the BAAQMD is required to monitor air pollutant levels to ensure that state and federal air quality standards are met and, if they are not met, to develop strategies to meet them. Depending on whether or not standards are met or exceeded, a local air basin is classified as in "attainment" or "non-attainment." The BAAQMD is in non-attainment for the federal standards for O_3 and $PM_{2.5}$ and in non-attainment for the state standard for O_3, $PM_{2.5}$, and PM_{10}.

Regulatory Setting

Air Quality Management

The BAAQMD is primarily responsible for assuring national and state ambient air quality standards are attained and maintained in the Bay Area. The BAAQMD is also responsible for adopting and enforcing rules and regulations concerning air pollutant sources, issuing permits for stationary sources of air pollutants, inspecting stationary sources of air pollutants, responding to citizen complaints, monitoring ambient air quality and meteorological conditions, awarding grants to reduce motor vehicle emissions, conducting public education campaigns, as well as many other activities. The BAAQMD has jurisdiction over much of the nine-county Bay Area, including Contra Costa County.

The BAAQMD adopted the 2017 Clean Air Plan (2017 Plan) as an update to the 2010 Clean Air Plan. The 2017 Plan provides a regional strategy to protect public health and protect the climate. Consistent with the GHG reduction targets adopted by the state, the 2017 Plan lays the groundwork for a long-term effort to reduce Bay Area GHG emissions to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050. To fulfill state ozone planning requirements, the 2017 control strategy includes all feasible measures to reduce emissions of ozone precursors—reactive organic gases (ROG) and nitrogen oxides (NO_X)—and reduce transport of ozone and its precursors to neighboring air basins. In addition, the 2017 Plan builds upon and enhances the BAAQMD's efforts to reduce emissions of fine particulate matter and toxic air contaminants (BAAQMD 2017a).

BAAQMD Screening Criteria

The BAAQMD recommends that lead agencies determine appropriate air quality emissions thresholds of significance based on substantial evidence in the record. The BAAQMD's significance thresholds in the updated May 2017 CEQA Guidelines for project operations within the SFBAAB are the most appropriate thresholds for use in determining air quality impacts of the proposed project. The BAAQMD developed screening criteria to provide lead agencies and project applicants with a conservative indication of whether a project could result in potentially significant air quality impacts. If a project meets all of the screening criteria, then the lead agency or applicant would not need to perform a detailed air quality assessment of their project's air pollutant emissions. These screening levels are generally representative of new development on greenfield sites without any form of mitigation measures taken into consideration (BAAQMD 2017b).

The screening criteria for operational criteria pollutant emissions of single-family residential developments is 325 dwelling units. For construction-related emissions, the screening criteria is 114 dwelling units.

BAAQMD also provides a preliminary screening methodology to conservatively determine whether a proposed project would exceed CO thresholds. If the following criteria are met, a project would result in a less than significant impact related to local CO concentrations:

- Project is consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, regional transportation plan, and local congestion management agency plans.
- The project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour.
- The project traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway).

a. Would the project conflict with or obstruct implementation of the applicable air quality plan?

Vehicle use, energy consumption, and associated air pollutant emissions are related directly to population growth. To be consistent with an air quality management plan (AQMP), a project must conform to the local General Plan and must not result in or contribute to an exceedance of the local jurisdiction's forecasted future population. A project may be inconsistent with the AQMP if it would generate population, housing, or employment growth exceeding the forecasts used in the development of the AQMP. Population growth would lead to increased vehicle use, energy consumption, and associated air pollutant emissions. The most recent and applicable adopted air quality plan is the 2017 Plan. Therefore, the proposed project would result in a significant impact if it would conflict with or obstruct implementation of the 2017 Plan (BAAQMD 2017b).

The proposed project would increase the population in Lafayette by adding one new single-family residence. BAAQMD uses the Association of Bay Area Government's (ABAG) growth forecast. The latest ABAG projections do not include a population forecast but do provide a housing forecast. The ABAG estimates that the number of housing units in Lafayette will be 10,000 in 2040 (ABAG 2017). The California Department of Finance (DOF) estimates the city currently has 9,943 housing units (DOF 2018). Therefore, the addition of the one housing unit associated with the proposed project would bring the city's total housing units to 9,944. The housing growth associated with the project is within ABAG projections and therefore within the 2017 Plan projections. Thus, the project would be consistent with the AQMP. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

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?

Project construction would involve site preparation, grading, excavation, building construction, and architectural coating, which have the potential to generate air pollutant emissions. Long-term emissions associated with project operation would include emissions from vehicle trips (mobile sources), natural gas and electricity use (energy sources), and landscape maintenance equipment, consumer products and architectural coating associated with on-site development (area sources). Per the BAAQMD CEQA Guidelines, the project does not meet the screening criteria (114 dwelling units for construction and 325 dwelling units for operation) for construction- or operation-related emissions. Therefore, air quality emissions related to the project would not exceed the thresholds of significance set by BAAQMD, described in detail in the BAAQMD CEQA Guidelines.

As mentioned in the BAAQMD CEQA Guidelines, the proposed project would result in a less than significant impact related to local CO concentrations if the project is consistent with an applicable congestion management program; would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour; and would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway). There are no applicable congestion management programs or plans with which the project must comply. Mount Diablo Boulevard west of Lafayette Circle, experiences a maximum of approximately 15,000 trips per day through the intersection (TJKM Transportation Consultants 2015). With the increase of an estimated 10 daily trips (per the Institute of Transportation Engineers (ITE) trip generation rate for single-family residences), the project would not result in an increase in traffic volumes at affected intersections to more than 44,000 vehicles per hour. Although the project is located in an area served by a bridge underpass at Via Roble and Dolores Drive, the 24,000 vehicle per hour standard is not met by existing operations of the Dolores Drive and Mount Diablo Boulevard intersection. Thus, the project would not result in individually or cumulatively significant impacts from CO emissions.

A toxic air contaminant (TAC) is defined by California law as an air pollutant that may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health. In the Bay Area, there are a number of urban or industrialized communities where the exposure to TACs is relatively high in comparison to others. However, according to the BAAQMD CEQA Guidelines (Figure 5-1), the project site is not located in an impacted community. Sources of TACs include, but are not limited to, land uses such as freeways and high-volume roadways, truck distribution centers, ports, rail yards, refineries, chrome plating facilities, dry cleaners using perchloroethylene, and gasoline dispensing facilities (BAAQMD 2017b). The proposed project does not involve any of these uses; therefore, it is not considered a source of TACs.

The project would not violate any air quality standards or result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment. Therefore, these impacts would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

c. Would the project expose sensitive receptors to substantial pollutant concentrations?

Certain population groups, such as children, the elderly, and people with health problems, are particularly sensitive to air pollution. Sensitive receptors are defined as population groups that are more susceptible to exposure to pollutants and examples include health care facilities, retirement homes, school and playground facilities, and residential areas. The proposed project would be located close to sensitive receptors, including the surrounding residences. As discussed above in the response to question b, the project would not create emissions that would exceed BAAQMD thresholds and would not generate new sources of TACs. Therefore, it would not expose sensitive receptors to substantial pollutant concentrations. Impacts would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

d. *Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?*

During construction activities temporary odors from vehicle exhaust and construction equipment engines would occur. However, construction-related odors would disperse and dissipate and would not cause substantial odors at the closest sensitive receptors (adjacent residences). In addition, construction-related odors would be temporary and would cease upon completion of construction. The proposed project would involve construction of a single-family residence. This is not considered a source of substantial objectionable odors as listed on Table 3-3 in the BAAQMD *CEQA Air Quality Guidelines* (BAAQMD 2017b). Therefore, the proposed project would have no impact related to other emissions, including odors. This impact will not be discussed in the EIR.

NO IMPACT

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4 Biological Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. 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 Wildlife or U.S. Fish and Wildlife Service?	☐	■	☐	☐
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☐	■
c. 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?	☐	☐	☐	■
d. 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?	☐	☐	■	☐
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	■
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	■

Rincon Senior Biologist Kyle Weichert prepared a memorandum dated May 2019 that summarizes the results of a reconnaissance-level survey conducted on April 19, 2019 (see Appendix A). The survey area included the full extent of the project site as well as an inventory of trees located in the proposed building footprint.

Vegetation and Habitat

Vegetation observed in the study area consists of consists primarily of non-native annual grassland dominated by non-native annual grasses, including rip-gut brome (*Bromus diandrus*), foxtail barley (*Hordeum murinum*), and wild oats (*Avena fatua*), as well as ruderal herbs such as vetch (*Vicia villosa*), annual burclover (*Medicago polymorpha*), and milk thistle (*Silybum marianum*). A large coast live oak (*Quercus agrifolia*) is present in the western corner of the site. The northeast corner of the site and proposed residence location contains a grove of several planted and ornamental trees, including:

- One coast redwood (*Sequoia sempervirens*); diameter at breast height (DBH) 20 inches
- One incense cedar (*Calocedrus decurrens*); DBH 15.5 inches
- One coast live oak (*Quercus agrifolia*); DBH: 7.5 inches
- One toyon (*Heteromeles arbutifolia*); 10+ trunks, DBH range 2-5 inches (calculated total diameter per LMC Section 6-1702[I]: at least 13 inches)
- Two unknown ornamental species; each 8+ trunks, DBH range 1-3 inches (calculated total diameter per LMC Section 6-1702[I]: 6+ inches)

The trees were in fair condition and appear to have been planted ornamentally. Two trees were not in flowering condition during the survey and therefore could not be identified to genus or species. (Appendix A)

No drainages or wetlands potentially under the jurisdiction of the U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), or California Department of Fish and Wildlife (CDFW) were observed on site. No native vegetation communities were observed on the project site.

Regulatory Setting

Regulatory authority over biological resources is shared by federal, state, and local authorities under a variety of statutes and guidelines. Primary authority for general biological resources lies with the land use control and planning authority of local jurisdictions. CDFW is a trustee agency for biological resources throughout the state under CEQA and also has direct jurisdiction under the Fish and Game Code of California. Under the federal and state Endangered Species Acts, the CDFW and the U.S. Fish and Wildlife Service (USFWS) also have direct regulatory authority over species formally listed as Threatened or Endangered. USACE has regulatory authority over specific biological resources, namely wetlands and waters of the U.S., under Section 404 of the Federal Clean Water Act.

Plants or animals may be considered “special-status” due to declining populations, vulnerability to habitat change, or restricted distributions. Special-status species are classified in a variety of ways, both formally (e.g., federal and state Threatened and Endangered Species) and informally (“Special Animals”). Species may be formally listed and protected as Threatened or Endangered by the CDFW or USFWS or as California Fully Protected (CFP). Informal listings by agencies include California Species of Special Concern (CSC) a broad database category applied to species, roost sites, or nests, or as USFWS Candidate taxa. CDFW and local governmental agencies may also recognize special listings developed by focal groups (i.e., Audubon Society Blue List, California Native Plant Society (CNPS) Rare and Endangered Plants, U.S. Forest Service regional lists). Section 3503.5 of the Fish and Game Code of California specifically protects birds of prey, and their nests and eggs, against take, possession, or destruction. Section 3503 of the Fish and Game Code also incorporates restrictions imposed by the federal Migratory Bird Treaty Act (MBTA) with respect to migratory birds.

Chapter 6-17 of the Lafayette Municipal Code (LMC) provides tree protection requirements that would be applicable to the project. This chapter defines a protected tree as "any species with a diameter of six-inches or more and located on an undeveloped property" (LMC Section 6-1702[Q][4]).

LMC Section 6-2072 requires projects in the Hillside Overlay District to implement "site planning techniques to preserve hillsides, ridgelines, knolls and open space, minimize impacts on wildlife habitats to the extent feasible, and provide for the preservation of vegetation, terrain, scenic vistas, trail corridors, streams or water courses, or other areas of ecological significance through dedication, easement, land trust or other suitable regulation." Furthermore, the City's Stormwater Quality Control Guidelines require projects that more than 500 square feet of impervious surfaces in the Hillside Overlay District to implement site-specific best management practices (BMP) to minimize stormwater quality impacts.

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 Wildlife or U.S. Fish and Wildlife Service?

Special-status species are those plants and animals listed, proposed for listing, or candidates for listing as Threatened or Endangered by the USFWS under the Federal Endangered Species Act; those considered "Species of Concern" by the USFWS; those listed or proposed for listing as Rare, Threatened, or Endangered by the CDFW under the California Endangered Species Act; animals designated as "Species of Special Concern" by the CDFW; and CDFW Special Plants, specifically those occurring on lists 1B and 2 of the CNPS Inventory of Rare and Endangered Vascular Plants of California, Sixth Edition.

The CDFW California Natural Diversity Database (CNDDB), USFWS IPaC Resource List, and CNPS Online Inventory of Rare and Endangered Plants were consulted to identify possible special-status species on site. No critical habitat is designated on site, although critical habitat for the Alameda whipsnake (*Masticophis lateralis euryxanthus*) is located north of Lafayette (USFWS 2019a, USFWS 2019b). CNDDB identified 22 threatened, endangered, or species of special concern as potentially occurring within the quadrangle including the project site: foothill yellow-legged frog (*Rana boylii*), California red-legged frog (*Rana draytonii*), northern harrier (*Circus hudsonius*), bald eagle (*Haliaeetus leucocephalus*), tule greater white-fronted goose (*Anser albifrons elgasi*), yellow warbler (*Setophaga petechia*), grasshopper sparrow (*Ammodramus savannarum*), Suisun song sparrow (*Melospiza melodia maxillaris*), Bryant's savannah sparrow (*Passerculus sandwichensis alaudinus*), yellow rail (*Coturnicops noveboracensis*), long-eared owl (*Asio otus*), willow flycatcher (*Empidonax traillii*), Sacramento perch (*Archoplites interruptus*), steelhead (*Oncorhynchus mykiss irideus*), big free-tailed bat (*Nyctinomops macrotis*), San Francisco dusky-footed woodrat (*Neotoma fusipes annectens*), American badger (*Taxidea taxus*), pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), Alameda whipsnake (*Masticophis laterlis euryxanthus*), western pond turtle (*Emys marmorata*), Santa Cruz tarplant (*Holocarpha macradenia*), and pallid manzanita

(*Arctostaphylos pallida*) (CDFW 2019). In addition, the CNPS Rare Plant List identified 67 1- or 2-listed plants in the County (CNPS 2019).

No native vegetation communities were observed on the project site, and no individuals or signs of special-status species were observed on the project site (Appendix A). However, project construction would require removal of four trees that may support nesting birds, including raptors protected under the MBTA and the Fish and Game Code. Removal of these trees could result in the destruction of nests. While the reconnaissance-level survey did not identify any special-status species on site, it was not a protocol-level survey to definitively determine the presence or absence of special-status species. The project could have potential impacts to species; therefore, implementation of Mitigation Measures BIO-1 and BIO-2 would be required. In addition to the mitigation measures described below, permitting would be required if federal and state listed species are present and may be impacted by the proposed project. These mitigation measures will be listed in the EIR's executive summary and included in the project's mitigation monitoring and reporting program.

Mitigation Measures

BIO-1 Pre-construction Special-Status Surveys and Reporting

No more than one week prior to vegetation clearing and ground disturbance within the project site, a qualified biologist shall conduct pre-construction surveys for special-status wildlife species within the construction footprint and within a 100-foot survey buffer area. If non-listed special-status species are detected in the construction footprint, the qualified biologist may capture and relocate, as feasible, to adjacent appropriate habitat within the open space on-site or in suitable habitat adjacent to the project area. If individuals are not relocated or leave the site of their own accord, the qualified biologist shall implement an avoidance buffer suitable for protection of the individual(s). If listed special status species are detected within the construction footprint or survey buffer area, the California Department of Fish and Wildlife and/or the United States Fish and Wildlife Service, as appropriate, shall be notified prior to construction activities. The methods and results of the pre-construction survey(s) and any relocation efforts during those surveys shall be documented in a brief letter report (Pre-Construction Survey Report) and submitted to the City no later than three weeks following the completion of the survey(s).

BIO-2 Nesting Bird Pre-construction Surveys and Monitoring

To avoid disturbance of nesting and special-status birds, including raptorial species protected by the MBTA and California Fish and Game Code, project construction, including, but not limited to, vegetation removal, ground disturbance, and construction shall occur outside of the bird breeding season (February 1 through August 30). If construction must begin during the breeding season, then a pre-construction nesting bird survey shall be conducted no more than one week prior to initiation of ground disturbance and vegetation removal activities. The nesting bird pre-construction survey shall be conducted on foot inside the project boundary, including a 300-foot buffer (500-foot for raptors), and in inaccessible areas (e.g., private lands) from afar using binoculars to the extent practical. The survey shall be conducted by a biologist familiar with the identification of avian species known to occur in the project vicinity. If nests are found, an avoidance buffer shall be determined and demarcated by the biologist of a minimum of 50 feet for non-raptor bird species and at least 300 feet for raptor species. Larger buffers may be recommended and/or smaller buffers may be established depending upon the species, status of the nest, and construction activities occurring in the vicinity of the nest. The buffer area(s) should be closed to all construction personnel and equipment until the adults and young are no longer reliant on the nest site. A qualified biologist should confirm that breeding/nesting is completed and young have fledged the nest prior to removal of the buffer. Encroachment into the buffer shall occur only at the discretion of the qualified biologist. If buffer zones are determined to be infeasible, a full-time qualified biological monitor shall be on site to monitor construction within the buffer zones to avoid impacts to active nests and nesting birds.

Implementation of Mitigation Measures BIO-1 and BIO-2 would reduce impacts to special-status species to a less than significant level.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

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, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

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?

No native vegetation communities were observed on the project site, and no drainages or wetlands potentially under the jurisdiction of the USACE, RWQCB, or CDFW were observed on site. Project construction would not directly impact riparian habitat, sensitive natural communities, or protected wetlands, nor would it indirectly impact such habitat that may occur off site. Thus, the project would not have a substantial adverse effect on any riparian habitat, sensitive natural community, or state or federally protected wetlands. No impact would occur.

NO IMPACT

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?

The project site is surrounded by developed parcels, as shown in Figure 2, and is not located directly adjacent to intact wildlife habitat. Additionally, the residence would be constructed on the northeast corner of the project site, with the remainder of the project site unchanged. While project construction could result in minor alterations of wildlife behavior in the site vicinity, the project would not substantially interfere with movement of resident or migratory fish or wildlife, nor impede the use of wildlife nursery sites, because areas for wildlife movement and nursery sites would remain on and around the project site. Therefore, potential impacts on wildlife movement would be less than significant.

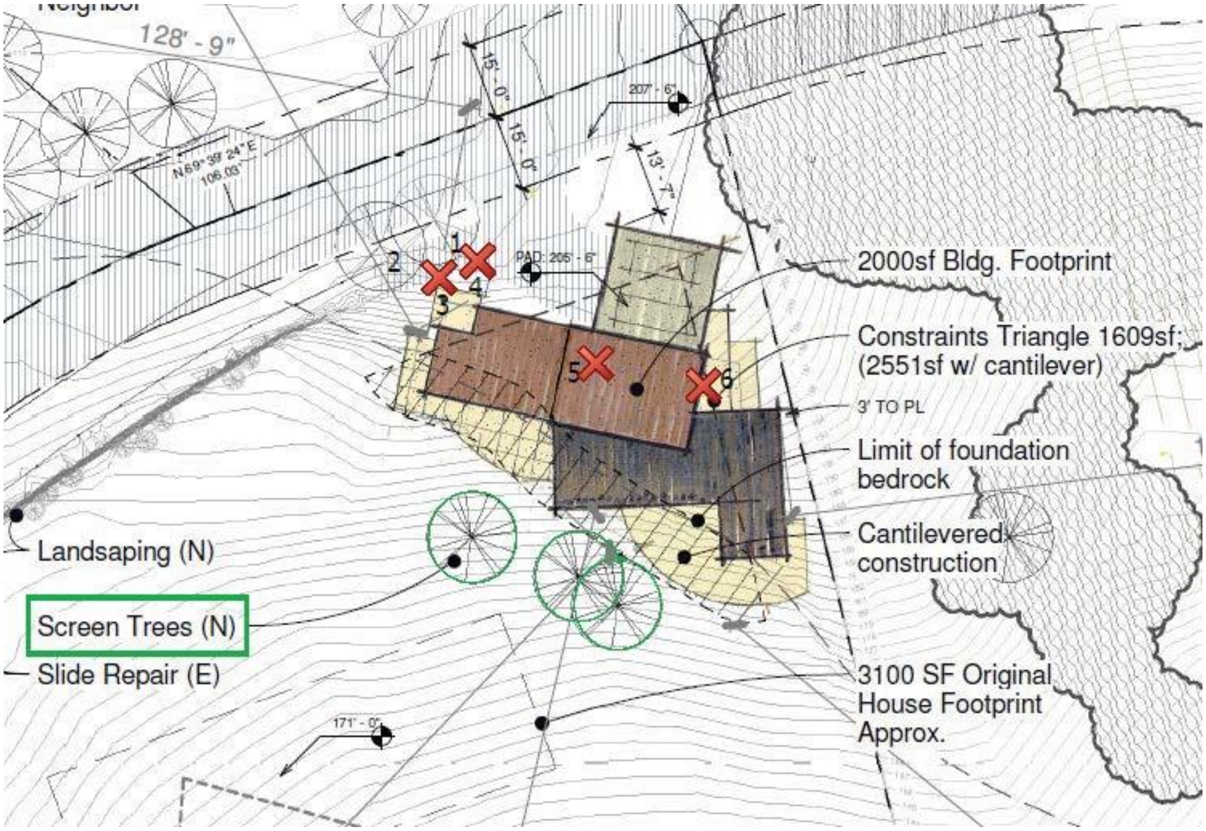
LESS THAN SIGNIFICANT IMPACT

e. Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Removal of protected trees from the project site requires that the applicant obtain a Category II Tree Protection Permit from the City. Four trees would be removed from the project site, all of which meet the definition of a protected tree per LMC Section 6-1702[Q]. The City's Tree Ordinance Sections 6-1704, 6-1707 requires a permit to remove protected trees and indicates that they are to be replaced at a 2:1 ratio, where the tree shall be "the same genus and species [as those] removed or destroyed, or an alternative species approved by the Director [of the Planning and Building

Department].” The project would replace the removed trees at the property boundary with larger specimens downslope from the building footprint to soften views of the proposed residence from below (Figure 6). Therefore, with approval of a Category II Tree Protection Permit, the project would not conflict with local policies and ordinances, and no impact would occur.

Figure 6 Tree Replacement, Plan Detail



NO IMPACT

f. Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

The project site is not under the jurisdiction of any Habitat Conservation Plans, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. Therefore, the proposed project would not conflict with any Habitat Conservation Plan, Natural Community Conservation Plan, or other approved plan, and no impact would occur.

NO IMPACT

5 Cultural Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☐	☐	■
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	■	☐	☐
c. Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	■	☐

In May 2019, Rincon requested a search of the California Historical Resources Information System housed at the Northwest Information Center (NWIC) located at Sonoma State University. The purpose of the records search was to identify all previously recorded cultural resources, as well as previously conducted cultural resources studies on the proposed project site and within a 0.5-mile radius to assess the regional sensitivity for cultural resources. The records search included a review of the National Register of Historic Places, the California Register of Historical Resources (CRHR), the California Points of Historical Interest list, the California Historical Landmarks list, the Archaeological Determinations of Eligibility list, and the California State Historic Resources Inventory list.

The NWIC records search identified 12 previously conducted cultural resources studies within a 0.5-mile radius of the project site; none of which included the project site.

The NWIC records search identified two cultural resources within a 0.5-mile radius surrounding the project site. The resources each were recorded in the early twentieth century and consist of prehistoric habitation sites, one of which included a burial mound. Both are situated on valley floors well away from the project site. No resources have been recorded on the project site.

Rincon also completed a review of the historical aerials available for the project site (NETRonline 2019). Aerial images of the project site are available from 1946, 1958, 1968, 1980, 1987, 1993, 2002, 2005, 2009, 2010, and 2012. The images show that the project site remained vacant from 1946 to at least 1968. Between 1968 and 1980, one structure was constructed on the property. This structure is known to have been destroyed in the 1997 landslide. Historical U.S. Geological Survey (USGS) maps from 1897 through 2015 depict the proposed project site as vacant with nearby housing developments becoming increasingly prevalent by 1960 (NETRonline 2019).

Elevation on the project site ranges from 143 to 208 feet above mean sea level; the project site is steeply sloped and contains an active landslide. Soils mapped at the site consist of Los Osos clay loam with 30 to 50 percent slopes (NRCS 2019). Los Osos clay loam is considered a moderately well to well-developed soil. Soils in the project site overlie the Pliocene-aged Orinda Formation (Dibblee and Minch 2005). The presence of well-developed soils and the age of the geologic formation on which the project site is situated indicate that any archaeological resources in the area should be at or close to the surface and that the project site and vicinity is not sensitive for buried archaeological resources. Additionally, the project site was subject to a landslide in 1997 and soils on the project site suffer high levels of erosion. These factors, coupled with the steep slopes of the project site past development, suggest a low sensitivity for surface archaeological resources as well.

a. Would the project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

No buildings, structures, sites, or objects that may be considered historical resources are present on the project site. The project would not impact historical resources.

NO IMPACT

b. Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

The project is not expected to affect archaeological resources, including those that may be considered historical resources. As discussed above, no archaeological resources have been recorded at the project site. Additionally, given the age of soils on the project site, erosional characteristics of the project site, and the landslide that occurred on the site, the project site is considered to have low sensitivity for archaeological resources. In the unlikely event that resources are encountered during project ground disturbance, the Mitigation Measure CR-1 would be required to address unanticipated discoveries during construction. This mitigation measure will be listed in the EIR’s executive summary and included in the project’s mitigation monitoring and reporting program.

Mitigation Measure

CR-1 Unanticipated Archaeological Resources

If archaeological resources are encountered during ground-disturbing activities, work within 50 feet of the find shall be halted and an archaeologist meeting the Secretary of the Interior’s Professional Qualification Standards for archaeology (National Park Service 1983) shall be contacted immediately to evaluate the find. If necessary, the evaluation may require preparation of a treatment plan and archaeological testing for CRHR eligibility. If the discovery proves to be significant under CEQA and cannot be avoided by the project, additional work, such as data recovery excavation, may be warranted to mitigate any significant impacts to historical resources.

Implementation of Mitigation Measure CR-1 would reduce potential impacts to unanticipated archeological resources to less than significant.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

c. Would the project disturb any human remains, including those interred outside of formal cemeteries?

No human remains are known to exist on the project site, but the discovery of human remains is always a possibility during ground-disturbing activities. If human remains are found, the State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to PRC Section 5097.98. In the event of an unanticipated discovery of human remains, the County Coroner must be notified immediately. If the human remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission, which will determine and notify a most likely descendant. The most likely descendant shall complete the inspection of the site and provide recommendations for treatment to the landowner within 48 hours of being granted access. With adherence to existing regulations, impacts to unanticipated human remains would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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6 Energy

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	■	☐
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	■	☐

Project-related energy consumption would include energy consumed during project construction and operation, such as fuel consumed by vehicles, natural gas consumed for heating and/or power, and electricity consumed for power. The analysis of energy consumption herein involves the quantification of anticipated vehicle and equipment fuel, natural gas, and electricity consumption during construction and operation of the proposed project, to the extent feasible, as well as a qualitative discussion of the efficiency, necessity, and wastefulness of that energy consumption.

a. Would the project result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Construction

Project construction would result in short-term consumption of energy from the use of construction equipment and processes. Energy use would be primarily from fuel consumption to operate heavy-duty equipment, light-duty vehicles, machinery, and generators. Temporary grid power may also be provided to construction trailers or electric construction equipment. Using the California Emission Estimator Model (CalEEMod) default values for equipment usage (type of equipment, hour of use, and length of each phase) based on project site acreage, approximately 668 gallons of gasoline and 23,663 gallons of diesel in total would be used during project construction (California Air Pollution Control Officers Association [CAPCOA] 2013, CAPCOA 2017). Project construction would be required to comply with the LMC, which incorporates the California Green Building Standards Code. The California Green Building Standards Code includes specific requirements related to recycling, construction materials, and energy efficiency standards that apply to construction of residences to minimize wasteful, inefficient, and unnecessary energy consumption. Therefore, project construction would not involve wasteful, inefficient, or unnecessary consumption of energy resources.

Operation

The proposed project would also involve the use of energy during occupancy of the residence. The California Green Building Standards Code includes specific requirements related to energy efficiency standards that apply to new residences and that minimize wasteful, inefficient, and unnecessary energy consumption. The project would be required to comply with the LMC, which incorporates the California Green Building Standards Code (LMC Section 3-304). This code requires water-efficient plumbing fixtures and fittings, recycling services, and other energy-efficient measures in all new single-family dwellings. The proposed residence would require permanent grid connections for electricity and natural gas. Using CalEEMod default values for energy use by climate zone and land use type (T24, NT24, and lighting electricity; and T24 and NT24 natural gas) based on the proposed single-family residence, approximately 7,982 kilowatt-hours (kWh) per year of electricity would be used for lighting and large appliances, and approximately 42,324 thousand British thermal units (kBtu) per year of natural gas would be used primarily for heating (CAPCOA 2017). Estimated project energy would be an incremental increase in energy usage compared to existing conditions. Therefore, the project would not result in wasteful, inefficient, or unnecessary consumption of energy resources during operation.

The proposed project would also involve the use of energy from private vehicle travel to and from the site. According to the California Air Resources Board (CARB), the average miles per gallon for all gasoline vehicles in operational year 2021 is 14.7 miles per gallon (CARB 2019). Assuming a trip length of 10.8 miles (CAPCOA 2017), project operation would require 2,680 gallons of gasoline per year. This estimate conservatively assumes that a variety of vehicle types would travel to and from the project site, whereas for a residential development, most, if not all, vehicle trips would be conducted in passenger vehicles, which generally operate at a higher fuel efficiency than 14.7 miles per gallon. Estimated gasoline consumption from project operation would be an incremental increase in gasoline use compared to existing conditions. Therefore, the project would not result in wasteful, inefficient, or unnecessary consumption of energy resources from travel to and from the site.

Conclusion

Project construction and operation would not result in potentially significant environmental effects due to wasteful, inefficient, or unnecessary consumption of energy. Impacts would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

b. Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

Table 1 provides energy efficiency goals and policies provided in the City of Lafayette General Plan and its Environmental Action Plan; it describes the project’s consistency with these policies (City of Lafayette 2002, 2019).

Table 1 Project Compliance with Energy Efficiency Goals and Policies

Energy Efficiency Goal or Policy	Project Consistency
City General Plan	
Goal C-6: Provide an attractive, well-designed system of walkways for safe and efficient pedestrian movement in Lafayette. The walkway system should connect residential areas with the local and regional trails system, public transportation, schools, parks and other community amenities, and the Downtown Core area.	**Consistent.** The project would not impede implementation of the planned recreational trails, which includes the Walter Costa Trail along Quail Ridge Road in the project vicinity.
Goal OS-11: Reduce the consumption of non-renewable energy resources.	**Consistent.** The project would be required to comply with the LMC, which incorporates the California Green Building Standards Code. The code includes specific requirements related to efficient water usage.
City of Lafayette Environmental Action Plan	
SW—Goal 1: Community Waste Reduction, Recycling, & Composting – Increase community waste reduction, recycling, and composting to 75-percent of yearly solid waste generation by 2025.	**Consistent.** The project would be required to comply with the LMC, which incorporates the California Green Building Standards Code. The code includes specific requirements related to recycling and solid waste generation.
W—Goal 1: Community Water Conservation – Decrease water usage by 30-percent per capita by 2025.	**Consistent.** The project would be required to comply with the LMC, which incorporates the California Green Building Standards Code. The code includes specific requirements related to efficient water usage.
EU—Goal 1: Community Energy Use – Reduce community energy use from 2015 by 5-percent by 2020, 10-percent by 2025, and 15-percent by 2030 and transition to 75% renewable energy by 2025.	**Consistent.** The project would be required to comply with the LMC, which incorporates the California Green Building Standards Code. The code includes specific requirements related to energy efficiency standards that would reduce energy use requirements from the proposed residence. Per Program 1.3 of this goal, the project would adhere to additional energy efficiency performance standards.
GC—Goal 1: Community Green Construction – Increase number of certified green buildings on an ongoing basis.	**Not Applicable.** This goal is intended to be implemented by the municipality, not individual project developers. Nonetheless, the project would by consistent with the California Green Building Standards.

As shown in Table 1, the project would be generally consistent with applicable energy efficiency goals and policies. Therefore, potential impacts associated with renewable energy and energy efficiency would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

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7 Geology and Soils

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
1. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?	☐	☐	■	☐
2. Strong seismic ground shaking?	☐	☐	■	☐
3. Seismic-related ground failure, including liquefaction?	☐	☐	■	☐
4. Landslides?	■	☐	☐	☐
b. Result in substantial soil erosion or the loss of topsoil?	■	☐	☐	☐
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse?	■	☐	☐	☐
d. Be located on expansive soil, as defined in Table 1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	■	☐	☐	☐
e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	■
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	■	☐	☐

a.1. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?

a.2. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?

The nearest mapped active fault, the Hayward Fault, is approximately 5.5 miles west of the project site (DOC 2019a). Additional fault zones are located at farther distances, primarily to the west and east, extending north and south (USGS 2019a). Therefore, the project site is located in an area identified with high regional seismic activity, and it is reasonable to assume that the site will be exposed to strong ground shaking during the life of the project. Additionally, strong ground-shaking events have the potential to reactivate the existing on-site landslide. No active faults are located under the project site; thus, surface rupture on the site itself is not likely to occur, despite the high likelihood of regional earthquakes.

Project construction would be required to comply with the seismic safety requirements in the International Building Code, the California Building Code, and the City of Lafayette Building Code. Compliance with such requirements would reduce seismic ground shaking impacts to the maximum extent practicable with current engineering practices. Furthermore, the project would not increase ground-shaking hazards at adjacent properties. Therefore, impacts related to strong seismic ground shaking would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

a.3. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?

As shown in Figure 7, the project site is not designated as being within a potential liquefaction zone. As liquefaction risk is low, lateral spreading due to liquefaction is not likely to occur on the project site. Therefore, impacts would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

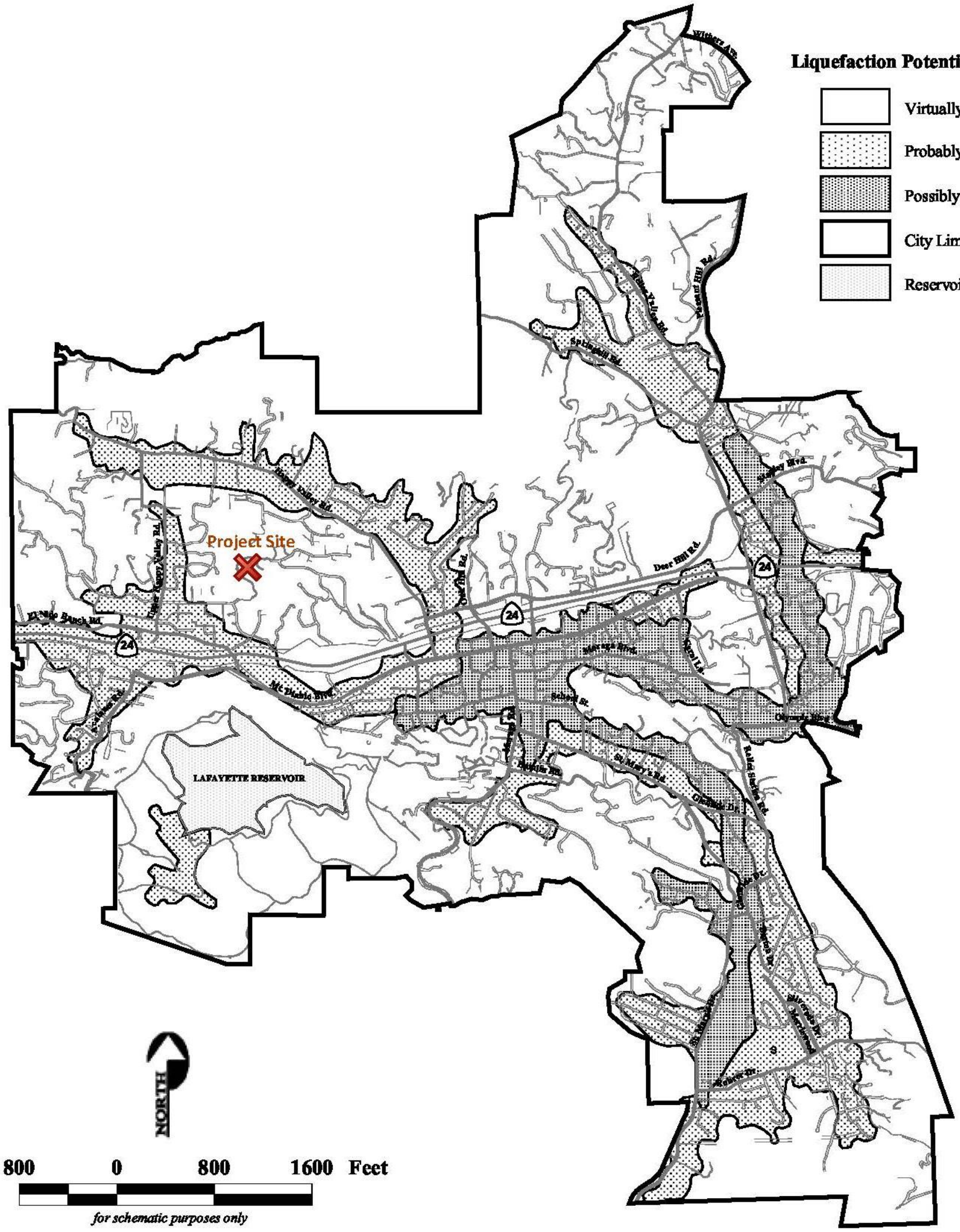
a.4. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?

c. Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse?

The project site contains an active landslide, which limits the developable area of the site. The project could result in accidental leakages from residential plumbing. Substantial leaks from plumbing have the potential to re-activate the landslide, which could cause movement downslope of the project site, and in turn could indirectly cause loss, injury or death involving landslides. This is a potentially significant impact and mitigation measures may not be feasible to reduce impacts to less than significant. Therefore, this impact will be addressed in greater detail in the EIR.

POTENTIALLY SIGNIFICANT IMPACT

Figure 7 City of Lafayette Liquefaction Potential



Source: City of Lafayette 2002

b. Would the project result in substantial soil erosion or the loss of topsoil?

During project construction, soil erosion and loss of topsoil could occur, which could potentially reactivate the on-site landslide. This is a potentially significant impact and mitigation measures may not be feasible to reduce impacts to less than significant. Therefore, this impact will be addressed in greater detail in the EIR.

POTENTIALLY SIGNIFICANT IMPACT

d. Would the project be located on expansive soil, as defined in Table 1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

The project site contains expansive soils with a high shrink-swell potential (Alan Kropp & Associates 2003, Seidelman Associates 2008, NRCS 2019). These soils could damage the foundation of the proposed residence, which could result in a direct risk to life or property (Rogers et al n.d.). Damage from expansive soils in conjunction with the site's steep slopes could also result in a greater potential for indirect damage to downslope properties and people. This is a potentially significant impact and mitigation measures may not be feasible to reduce impacts to less than significant. Therefore, this impact will be addressed in greater detail in the EIR.

POTENTIALLY SIGNIFICANT IMPACT

e. Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

The project site would be served by the municipal sewer system and would not require the installation of an on-site septic tank or alternate wastewater treatment systems. Therefore, no impacts from septic systems or alternative wastewater disposal systems would occur. This impact will not be discussed in the EIR.

NO IMPACT

f. Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

The project site is situated in the Acalanes Ridge of the Coast Ranges Province, which is one of eleven major geomorphic provinces in California (California Geological Survey 2002). According to published geologic mapping by Dibblee and Minch (2005) and site-specific geotechnical studies, the project site is immediately underlain by the Orinda Formation (Tor) and Quaternary landslide rubble (Qls). The Orinda Formation is Pliocene to possibly latest Miocene in age and consists of gray to greenish gray, interbedded, terrestrial sandstone, claystone, and pebble conglomerate derived from Franciscan detritus (Dibblee and Minch 2005). The active landslide deposits derive from a large landslide that occurred in 1997, affecting approximately 90 percent of the project site (Seidelman 2008).

Based on a literature review and in accordance with Society of Vertebrate Paleontology guidelines (2010), the geologic units underlying the project site were determined to have low to high paleontological sensitivity. The Orinda Formation immediately underlies the northeastern portion of the project site and is considered to have a high paleontological sensitivity because numerous localities have been documented in this unit yielding scientifically significant fossil specimens including *Lepisosteus* (gar), *Sorex* (shrew), *Hypolagus* (lagomorph), *Barbourofelis* (large predatory cat), *Gomphotherium* (proboscid), *Hipparion* (horse), *Procamelus* (camel), and *Aphelops* (rhinoceros)

(UCMP 2019). Active landslide deposits consist of an assortment of disturbed sediments and are generally less likely to contain well-preserved fossils and important taphonomic information than intact deposits. As such, landslide deposits have a low paleontological resource potential.

Project ground disturbance would be restricted to the northeastern project site for the proposed single-family residence. Because the northeastern project site is underlain by an intact geologic unit with a high paleontological sensitivity (Orinda Formation), paleontological resources may be encountered during ground-disturbing activities associated with project construction (e.g., grading, excavation, or any other activity that disturbs the surface of the site). Construction activities may result in the destruction, damage, or loss of undiscovered scientifically important paleontological resources. Therefore, impacts to paleontological resources would be potentially significant. Implementation of Mitigation Measure GEO-1 during project construction would reduce potential impacts related to paleontological resources by providing for the recovery, identification, and curation of previously unrecovered fossils. This mitigation measure will be listed in the EIR's executive summary and included in the project's mitigation monitoring and reporting program.

Mitigation Measure

GEO-1 Paleontological Resources Monitoring

A Qualified Paleontologist shall conduct paleontological monitoring during ground-disturbing activities (including, but not limited to, site preparation, grading, excavation, and trenching). The Qualified Paleontologist shall have at least a Master's Degree or equivalent work experience in paleontology, shall have knowledge of the local paleontology, and shall be familiar with paleontological procedures and techniques.

Ground-disturbing activities within areas of the project site underlain by paleontologically sensitive deposits (i.e., Orinda Formation) shall be monitored on a full-time basis. Monitoring shall be supervised by the Qualified Paleontologist and shall be conducted by a qualified paleontological monitor, defined as an individual who meets the minimum qualifications per standards set forth by the Society of Vertebrate Paleontology (2010), which includes a B.S. or B.A. degree in geology or paleontology with one year of monitoring experience and knowledge of collection and salvage of paleontological resources.

The duration and timing of the monitoring shall be determined by the Qualified Paleontologist. If the Qualified Paleontologist determines that full-time monitoring is no longer warranted, he or she may recommend reducing monitoring to periodic spot-checking or may recommend that monitoring cease entirely. Monitoring shall be reinstated if any new ground disturbances are required, and reduction or suspension shall be reconsidered by the Qualified Paleontologist at that time.

If a paleontological resource is discovered, the monitor shall have the authority to temporarily divert construction equipment around the find until it is assessed for scientific significance and collected. Once salvaged, significant fossils shall be prepared to a curation-ready condition and curated in a scientific institution with a permanent paleontological collection (such as the UCMP). Curation fees are the responsibility of the project owner.

A final report shall be prepared describing the results of the paleontological monitoring efforts associated with the project. The report shall include a summary of the field and laboratory methods, an overview of the project geology and paleontology, a list of taxa recovered (if any), an analysis of fossils recovered (if any) and their scientific significance, and recommendations. The report shall be submitted to the lead agency for the project. If the monitoring efforts produced fossils, then a copy of the report shall also be submitted to the designated museum repository.

Implementation of Mitigation Measure GEO-1 would reduce this impact to a less than significant level. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

8 Greenhouse Gas Emissions

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	■	☐
b. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	■	☐

Setting

Climate change is the observed increase in the average temperature of the earth's atmosphere and oceans along with other substantial changes in climate (such as wind patterns, precipitation, and storms) over an extended period of time. Climate change is the result of numerous, cumulative sources of greenhouse gases (GHG), gases that trap heat in the atmosphere, analogous to the way in which a greenhouse retains heat. Common GHGs include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O), fluorinated gases, and O_3. GHGs are emitted by both natural processes and human activities. Of these gases, CO_2 and CH_4 are emitted in the greatest quantities from human activities. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from off-gassing associated with agricultural practices and landfills. Man-made GHGs, many of which have greater heat-absorption potential than CO_2, include fluorinated gases, such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (CARB 2018).

Regulatory Setting

Pursuant to the requirements of Senate Bill (SB) 97, the California Natural Resources Agency adopted amendments to the CEQA Guidelines for the feasible mitigation of GHG emissions and analysis of the effects of GHG emissions. The CEQA Guidelines provide regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents, while giving lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHGs and climate change impacts.

Most individual projects do not generate sufficient GHG emissions to directly influence climate change. However, physical changes caused by a project can contribute incrementally to cumulative effects that are significant, even if individual changes resulting from a project are limited. The issue of climate change typically involves an analysis of whether a project's contribution towards an impact would be cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects (CEQA Guidelines, Section 15064[h][1]).

BAAQMD Screening Criteria

In the 2017 BAAQMD CEQA Air Quality Guidelines, the BAAQMD outlines an approach to determine the significance of projects. The BAAQMD recommends that lead agencies determine appropriate GHG emissions thresholds of significance based on substantial evidence in the record. The BAAQMD's significance thresholds in the updated May 2017 CEQA Guidelines for project operations within the SFBAAB are the most appropriate thresholds for use in determining GHG emission impacts of the proposed project. The BAAQMD developed screening criteria to provide lead agencies and project applicants with a conservative indication of whether a project could result in potentially significant GHG emission impacts. If all of the screening criteria are met by a project, then the lead agency or applicant would not need to perform a detailed assessment of their project's GHG emissions. These screening levels are generally representative of new development on greenfield sites without any form of mitigation measures taken into consideration (BAAQMD 2017b).

The screening criteria for operational GHG emissions of single-family residential developments is 56 dwelling units. For construction-related GHG emissions, the screening criteria is 114 dwelling units. Therefore, for the purpose of this analysis, it was assumed that the project would result in a less than significant impact and would not require additional analysis if it would involve construction of fewer than 114 single-family dwelling units and operation of fewer than 56 single-family dwelling units.

Impact Analysis

a. Would the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

The project's proposed construction activities, energy use, daily operational activities, and mobile sources (traffic) would generate GHG emissions. However, as the project only involves construction of one single-family residence, it is below the BAAQMD screening threshold (114 dwelling units for construction and 56 dwelling units for operation) for a GHG emission analysis and would have a less than significant impact on the environment from construction- and operation-related GHG emissions. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

b. Would the project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

The City of Lafayette does not currently have a qualified GHG reduction plan. However, the City has a General Plan that includes measures to reduce vehicle trips, promote alternative modes of transportation, and reduce solid waste generation. Additionally, the Environmental Action Plan contains measures that intend to reduce waste generation, increase recycling, reduce energy use, encourage green building practices, and reduce mobile GHG emissions. The project would be consistent with these measures because it is located one mile from a high-quality transit corridor (BART), which would encourage residents to utilize public transit, and would be served by recycling and green waste services to divert solid waste from landfills.

Additionally, SB 375, signed in August 2008, requires the inclusion of Sustainable Communities' Strategies in Regional Transportation Plans for the purpose of reducing GHG emissions. The Metropolitan Transportation Commission and ABAG adopted a Sustainable Communities' Strategies that meets GHG reduction targets. Plan Bay Area 2040 is a state-mandated, integrated long-range transportation, land-use, and housing plan that would support a growing economy, provide more housing and transportation choices and reduce transportation-related pollution in the nine-county San Francisco Bay Area (ABAG 2017). The Sustainable Communities' Strategies builds on earlier efforts to develop an efficient transportation network and grow in a financially and environmentally responsible way. Plan Bay Area 2040 would be updated every four years to reflect new priorities. A goal of the Sustainable Communities' Strategies is to reduce vehicle miles traveled (VMT) per capita by 10 percent (ABAG 2017).

The proposed project would be located within one mile of a major public transit system (BART), which would encourage residents to utilize public transit, reducing total vehicle miles travelled by shortening the vehicle portion of a commuter trip. This access to alternative transportation would reduce average VMTs, thereby reducing mobile-related GHG emissions and contributing to achieving GHG-reduction goals.

The project would be infill development that would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions and would be consistent with the objectives of the Regional Transportation Plans/Sustainable Communities' Strategies, General Plan, Environmental Action Plan, and SB 375. Therefore, the proposed project would not conflict with state regulations intended to reduce GHG emissions statewide and would be consistent with applicable GHG reduction plans. Impacts related to GHG emissions would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

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9 Hazards and Hazardous Materials

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	■	☐
b. 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?	☐	☐	■	☐
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?	☐	☐	☐	■
d. Be located on a site that is included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	■
e. For a project located in an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	■
f. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	■
g. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	☐	☐	■	☐

a. *Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?*

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?*

The proposed project would involve the construction of one single-family residence, which typically would not use or store large quantities of hazardous materials. Potentially hazardous materials such as fuels, lubricants, and solvents would be used during project construction. However, the transport, use, and storage of hazardous materials during project construction would be conducted in accordance with all applicable state and federal laws, such as the Hazardous Materials Transportation Act, Resource Conservation and Recovery Act, the California Hazardous Material Management Act, and the CCR, Title 22. Therefore, through the compliance with applicable laws and regulations, the project would have a less than significant impact. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

c. *Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?*

The project site is not located within 0.25 mile of an existing or proposed school. The nearest school is Happy Valley Elementary School, located approximately 0.44 mile north of the project site. Project operation would not involve use or storage of hazardous materials. Though potentially hazardous materials such as fuels, lubricants, solvents, and oils could be used during project construction, the transport, use, and storage of any and all hazardous materials would be conducted in accordance with all applicable State and federal lows, such as the Hazardous Materials Transportation Act, Resource Conservation and Recovery Act, the California Hazardous Material Management Act, and the CCR, Title 22. Regardless, due to the distance to the nearest school, impacts to schools associated with hazardous emissions would not occur. This impact will not be discussed in the EIR.

NO IMPACT

d. *Would the project be located on a site that is included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?*

The following databases were checked, pursuant to Government Code Section 65962.5, on March 27, 2019, for known hazardous materials contamination in the project area.

- **U.S. Environmental Protection Agency**
  - Comprehensive Environmental Response, Compensation, and Liability Information System/ Superfund Enterprise Management System / Envirofacts database search
- **State Water Resources Control Board (SWRCB)**
  - GeoTracker search for leaking underground storage tanks and other cleanup sites
- **California Department of Toxic Substances Control**
  - EnviroStor search for hazardous facilities or known contamination sites
  - Cortese List of Hazardous Waste and Substances Sites

The project site is not included on a list compiled pursuant to Section 65962.5 of the Government Code. The Envirofacts database identified nine sites southeast of the project site and near Highway 24. The GeoTracker database identified one open leaking underground storage tank case almost 1 mile southeast of the project site (SWRCB 2019). The EnviroStor database identified no sites within 1 mile of the project site (DTSC 2019a). The Cortese list identified no sites within the City of Lafayette (DTSC 2019b). While some sites were identified within one mile of the project site, they would not the project site itself due to the topography of the area and the distance between the project site and the listed sites (each site is close to 1 mile from the project site). No impact would occur. This impact will not be discussed in the EIR.

NO IMPACT

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?

The project site is not located within an airport land use plan area, or within 2 miles of a public or private airport. The closest airports are the John Muir Memorial Hospital Heliport, which is approximately 5.5 miles east of the site; the Buchanan Field Airport, which is approximately 7.8 miles northeast of the project site; and the Oakland International Airport, which is approximately 12 miles southwest of the project site. Therefore, there would be no safety hazard impacts related to airports and airstrips. This impact will not be discussed in the EIR.

NO IMPACT

f. Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

The project site is within Zone 2 of the City's Emergency Operations Plan: Wildland Fire Evacuation Plan (City of Lafayette 2016). The project would be required to comply with applicable City codes and regulations (including LMC Chapter 8-3 and Chapter VI: Safety of the City General Plan) pertaining to emergency response and evacuation. Project construction and operation would not restrict implementation of the plan nor would it impede the emergency access route of Zone 2 along Via Roble. No roads would be permanently closed because of the proposed project, and no structures would be developed that could potentially impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. The proposed project would be accessed by a private driveway along Quail Ridge Road. This driveway would provide sufficient ingress/egress for typical passenger vehicles that would access the project site. As such, project implementation would not interfere with existing emergency evacuation plans or emergency response plans. Therefore, no impact would occur. This impact will not be discussed in the EIR.

NO IMPACT

g. Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?

The project site is located in a very high fire hazard severity zone, as is most of northern Lafayette (CAL FIRE 2009). The implementation of the City's Wildfire Evacuation Plan would not be impeded by the proposed project. Compliance with applicable building codes to ensure fire safety measures are included in project design, as well as compliance with the City's Wildfire Evacuation Plan would ensure minimal exposure of people or structures to wildland fires. This impact would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

10 Hydrology and Water Quality

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	■	☐
b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	■	☐
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
(i) Result in substantial erosion or siltation on- or off-site;	☐	☐	■	☐
(ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;	☐	☐	■	☐
(iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	■	☐
(iv) Impede or redirect flood flows?	☐	☐	■	☐
d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	■	☐
e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	■

Setting

The project site is 1.1 acres and steeply sloped with an approximately 100-foot elevation difference between the northern and southeastern site boundaries (USGS 2018). The project site was previously developed with a single-family residence, which was removed following the 1997 landslide. Water drains in sheet flow from the northern boundary to the southeastern corner of the site. The nearest downstream creek is Lafayette Creek at the intersection of Pine Lane and El Nido Ranch Road, approximately 0.5 mile from the project site. Lafayette receives approximately 19.5 inches of rain annually, with rainfall concentrated in the winter months (Weather Atlas 2019).

Regulatory Setting

Clean Water Act

Congress enacted the Clean Water Act (CWA), formerly the Federal Water Pollution Control Act of 1972, with the intent of restoring and maintaining the chemical, physical, and biological integrity of the waters of the U.S. The CWA requires states to set standards to protect, maintain, and restore water quality through the regulation of point source and non-point source discharges to surface water. The NPDES permit process regulates those discharges (CWA Section 402). NPDES permitting authority is administered by the SWRCB and its nine RWQCBs. The project site is in a watershed administered by the San Francisco Bay RWQCB (San Francisco Bay RWQCB 2017).

Individual projects in the City that disturb more than one acre are required to obtain NPDES coverage under the California General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit). The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) describing BMPs the discharger would use to prevent and retain storm water runoff. The SWPPP must contain a visual monitoring program; a chemical monitoring program for “non-visible” pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a waterbody listed on the 303(d) list for sediment.

Section 401 of the CWA requires that any activity that would result in a discharge into waters of the U.S. be certified by the RWQCB. This certification ensures that the proposed activity does not violate State and/or federal water quality standards. Section 404 of the CWA authorizes the U.S. Army Corps of Engineers to regulate the discharge of dredged or fill material to the waters of the U.S. and adjacent wetlands. Discharges to waters of the U.S. must be avoided where possible and minimized and mitigated where avoidance is not possible. Section 303(d) of the CWA requires states to establish total maximum daily load (TMDL) programs for streams, lakes, and coastal waters that do not meet certain water quality standards.

California Porter Cologne Water Quality Control Act

The Porter Cologne Water Quality Control Act of 1967 requires the SWRCB and the nine RWQCBs to adopt water quality criteria to protect State waters. These criteria include the identification of beneficial uses, narrative and numerical water quality standards, and implementation procedures. The criteria for state waters in the region are contained in the *Water Quality Objectives* Chapter of the Basin Plan for the San Francisco Bay RWQCB (San Francisco Bay RWQCB 2017). The Water Quality Control Plan, or Basin Plan, protects designated beneficial uses of State waters through the issuance of Waste Discharge Requirements and through the development of TMDL. Anyone proposing to discharge waste that could affect the quality of the waters of the State must make a report of the waste discharge to the RWQCB or SWRCB as appropriate, in compliance with Porter-Cologne.

Contra Costa Clean Water Program

The City of Lafayette is a contributing city to the Contra Costa Clean Water Program (CCCWP), which was established in 1991 in response to federal stormwater NPDES regulations. Per the CCCWP Stormwater C.3 Guidebook (CCCWP 2017), projects less than 10,000-sf in size are required to prepare and submit a Stormwater Control Plan for a Small Land Development Project. The plan must implement on of the following options: (1) disperse runoff from some amount of roof or paved area to a vegetated area; (2) incorporate some amount of permeable pavement into your project; (3) include a cistern or rain barrel if allowed by your municipality, or (4) incorporate a bioretention facility or planter box.

City of Lafayette General Plan

The Land Use Element and the Safety Element of the General Plan addresses hydrology and water quality issues. The following policies and programs relate to the proposed project:

Goal LU-18: Coordinate with other jurisdictions to protect and restore environmental resources and to provide public services.

Policy LU-18.2 Coordination of Public Services: Coordinate water supply, flood control, wastewater and solid waste disposal, soil conservation, and open space preservation with other jurisdictions to create the greatest public benefit and the least degree of environmental impact.

Program LU-18.2.1: Periodically review level of service standards with the districts providing water supply, flood control, wastewater and solid waste disposal, soil conservation, and open space preservation.

Program LU-18.2.2: Monitor growth and infrastructure capacity through project review under CEQA and through coordination with provider agencies.

Program LU-18.2.3: Consider infrastructure and service capacity when reviewing development proposals.

Policy LU-20.14 Storm Drainage: Require new development to mitigate its impact on the storm drainage system.

Goal S-3: Reduce Flood Hazards.

Policy S-3.1 Reduce Flood Hazards: Reduce flood risk by maintaining effective flood drainage systems and regulating construction.

Program S-3.1.1: Condition new development to maintain post development peak runoff rate and average volume similar to the predevelopment condition, to the maximum extent feasible. Consider use of alternative drainage systems that utilize on-site infiltration or slow runoff during peak periods. Where this is not feasible, the increase must be mitigated. Include clear and comprehensive mitigation measures as part of project approvals with financial and other measures to ensure their implementation.

Program S-3.1.2: Require runoff rate/volume analysis and flow-duration analysis of projects where deemed necessary by City staff and/or required by provisions of the NPDES municipal stormwater permit.

Program S-3.1.3: Require analysis of the cumulative effects of development upon runoff, discharge into natural watercourses, and increased volumes and velocities in watercourses and their impacts on downstream properties. Include clear and comprehensive mitigation measures as part of project approvals with financial and other measures to ensure their implementation.

Policy S-3.2 Flood Protection Standard: In the review of flood control for proposed new development, establish as a standard the flow recurrence intervals used by the Contra costa County Flood Control District (e.g., the 100-year flood event).

Program S-3.2.1: Utilize the Federal Emergency Management Agency's Flood Insurance Rate Map (FIRM) to reduce the risk of flooding, to identify 100 Year Flood Events, to calculate flow rates within identified stream channels, and to review development proposals.

Policy S-3.3 Storm Drainage System: Maintain unobstructed water flow in the storm drainage system.

Program S-3.3.1: Enforce measures to minimize the volume and velocity of surface runoff, soil erosion, and sedimentation both during and after construction through implementation of the Grading Ordinance.

Policy S-3.5 Building Location: Consider potential flood hazards when siting a building. Intensity of development shall be the lowest in areas of high risk.

a. Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

The project site is currently undeveloped and contains a substantial portion of an active landslide that extends onto adjacent properties. The proposed project would involve development of a single-family residence in the northeast corner of the project site, outside the active landslide area. Development would create changes to stormwater flow and introduce additional urban pollutants to the stormwater system through runoff. Furthermore, construction activities could result in temporary impacts to water quality of runoff leaving the site.

Grading activity during construction has the potential to impact water quality through erosion and through debris carried in runoff. Furthermore, the project construction would involve heavy equipment that could result in an increase in fuel, oil, and lubricants in the stormwater runoff due to leaks or accidental releases. To minimize these impacts, the project would be required to pay the City drainage impact fee, submit a Drainage Plan, implement design BMPs in the final design phase of the project, and submit an Erosion and Sediment Control Plan, as described in more detail below (please refer to discussion under questions c.[i], c.[ii], and c.[iii]). In addition, the project would be required to comply with the City's Grading Ordinance, which adopts by reference the Contra Costa County Grading Ordinance. Section 716-4.202 prohibits grading without a permit. To grant a permit, the zoning administrator or Design Review Commission must make a number of findings related to preventing adverse environmental impacts of grading activities. Findings must include a determination that the grading would not endanger the stability of the site or adjacent property, pose a significant ground movement hazard on an adjacent property, significantly increase erosion or flooding of the site, or cause impacts to water quality that cannot be substantially mitigated. These regulations would prevent degradation of water quality from runoff at the project site. Each grading permit requires a final grading plan that is subject to review and approval by the City engineer and the zoning administrator. With compliance with existing regulations, impacts would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

b. *Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?*

The East Bay Municipal Utility District (EBMUD) supplies water to the City of Lafayette and would serve the project site. EBMUD's Urban Water Management Plan ([UWMP] EBMUD 2015) anticipates future growth in the region that includes the proposed project, as allowed under existing land use and zoning designations. EBMUD currently uses surface water primarily from the Mokelumne River, with supplemental water supply from East Bay area watersheds. Therefore, no incremental increase in demand on groundwater supplies would occur, as EBMUD does not use groundwater as a source of water. Groundwater was not observed on site during past site exploration borings (Alan Kropp & Associates, Inc. 2003).

The proposed project would introduce 3,500 square feet of impervious surfaces. This would impede groundwater recharge within the footprint of impervious surfaces. However, a drainage system would be included as part of the final project design that would ensure runoff from new impervious surfaces is allowed to percolate into the groundwater as it does under existing conditions. Because groundwater was not observed in past geological investigations of the project site, the project would not directly interfere with the groundwater table. Impacts related to depletion of groundwater supplies and groundwater recharge would be less than significant.

Because the project would be served by a water utility with sufficient supply that does not extract groundwater, and the project would not interfere with groundwater recharge, this impact would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

c.(i) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation on- or off-site?

c.(ii) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

c.(iii) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

The existing on-site drainage pattern is currently uncontrolled. On-site runoff flows from the northern boundary of the site along Quail Ridge Road, to the south, following the topography of the area which drains toward Pine Lane and Lafayette Creek. The proposed project would be required to pay the City's drainage impact fee based on the increase in impervious surfaces in accordance with the LMC Section 8-1703. The purpose of the required drainage impact fee is to maintain, improve, and expand existing drainage facilities provided by the City. Additionally, the City requires that a Drainage Plan be submitted for review by the City Engineer as part of the design review process for any project adding more than 500 square feet of impervious surfaces.

The project would disturb approximately 10 percent of the 1.1-acre project site, less than the 1 acre that triggers the need for coverage under the NPDES Permit. Most of the site would remain undisturbed. However, the project would be required to implement site-specific BMPs to minimize stormwater quality impacts, as it would create more than 500 square feet of impervious surfaces within the Hillside Overlay District. BMPs identified by the City's Stormwater Quality Control Guidelines include:

- **Design BMPs**
  - Minimize directly connected impervious areas
  - Minimize hardscape areas
  - Use permeable pavement options
  - Modify the driveway design
  - Promote infiltration with landscaping
  - Modify building design and construction
- **Construction BMPs (included in an Erosion and Sediment Control Plan)**
  - Limit access routes and stabilize driveways and access points
  - Phase construction to limit areas and periods susceptible to erosion impacts
  - Stabilize areas denuded by construction activities as soon as possible with seeding, mulching, sod stabilization, vegetative buffer strips, plastic covering, or application of ground base on areas to be paved
  - Protect adjacent properties with vegetative buffer strips, sediment barriers or filters, dikes or mulching
  - Delineate clearing limits, easements, setbacks, sensitive or critical areas and their buffers, and trees and drainage courses by marking them in the field
  - Stabilize and prevent erosion from temporary conveyance channels and outlets
  - Use sediment controls and filtration to remove sediment from water generated by dewatering or collected on-site during construction
  - Install permanent erosion controls (e.g., retaining wall, slope protection, outfall energy dissipater) for slopes greater than 10 percent
  - Use proper construction material and construction waste storage, handling, and disposal practices
  - Use proper vehicle and equipment cleaning, fueling, and maintenance practices
  - Control and prevent the discharge of all potential pollutants, including but not limited to, pesticides, petroleum products, nutrients, solid wastes, and construction chemicals

- Prepare a contingency plan in the event of unexpected rain or BMP failure, including but not limited to, an immediate response plan, storing extra or alternative control materials onsite (stakes, fences, hay bales), notifying the local agency, etc.

Additional BMPs may be required for post-construction and treatment control if design measure and construction BMPs are not implemented to the maximum extent practicable. Per the City’s requirements, payment of the drainage impact fee, submittal of a Drainage Plan, implementation of design BMPs in the final design phase of the project, and submittal of an Erosion and Sediment Control Plan would ensure minimal erosion, siltation, flooding, and polluted runoff occur from development of the site. Impacts would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

c.(iv) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would impede or redirect flood flows?

The proposed project would alter the existing drainage pattern of the project site by increasing the area of on-site impervious roadway surfaces to approximately 3,500 square feet. According to the Federal Emergency Management Agency Flood Insurance Rate Map (FIRM), the project site is located in Zone X, which is characterized as an area of minimal flood hazard and having a less than 0.2 percent annual chance to be inundated by flood waters as a result of a storm event (Map # 06013C0269F, June 16, 2009) (Federal Emergency Management Agency 2009). According to the California Governor’s Office of Emergency Services (Cal OES) MyHazards online database, the project site is not located in a 100-year floodplain (Cal OES 2015).

The project would be required to submit for approval a Stormwater Control Plan for a Small Land Development Project, described above, with provisions for stormwater management. These provisions could include dispersing runoff to a vegetated area, incorporating permeable pavement, or other features to manage stormwater. Therefore, impacts on the redirection of flood flows would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

d. In flood hazard, tsunami, or seiche zones, would the project risk release of pollutants due to project inundation?

The project site is located approximately nine miles east of the San Francisco Bay, and is not located in a tsunami or seiche zone, as shown in the Tsunami Inundation Maps for Contra Costa County (DOC 2019b). The nearest body of water that could experience seiche (water level oscillations in an enclosed or partially enclosed body of water) is the Lafayette Reservoir located approximately 1 mile south and at a lower elevation than the project site. No other large bodies of water with the potential to inundate the project site by a seiche are located near the site. The Briones Reservoir Dam is the nearest dame, approximately 3.7 miles northwest of the site, and Briones Reservoir drains into San Pablo Creek, downstream of the project sit. Based on the distance and the drainage pattern, the project site is not in the inundation area for this dam, or for any other dam or levee. Therefore, the proposed project would not result in the risk of release of pollutants due to inundation by a tsunami, seiche, or flooding. Impacts would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

e. Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

The project would be served by EBMUD, which maintains a UWMP (EBMUD 2015). This plan contains water quality goals more stringent than regulatory standards. EBMUD utilizes water treatment plants to ensure water quality standards and goals are met. Implementation of the project would increase water demand at the project site, but the project would not interfere with the ability of EBMUD to maintain water quality standards, as described in the UWMP.

The project site is within the service area of EBMUD's Groundwater Service Area, although the site itself is not underlain by the adjudicated groundwater basin. A Groundwater Sustainability Plan has not been adopted yet for the Groundwater Service Area. Because no groundwater management plans are currently adopted or approved for groundwater use in the project vicinity, and the project would not introduce more intensive uses or more water-demanding uses than allowed under existing zoning, no impact would occur. This impact will not be discussed in the EIR.

NO IMPACT

11 Land Use and Planning

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Physically divide an established community?	☐	☐	☐	■
b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	■	☐

a. Would the project physically divide an established community?

Project implementation would continue the existing residential development pattern in the neighborhood and would not cut off connected neighborhoods or land uses from each other. No new roads, linear infrastructure or other development features are proposed that would divide an established community or limit movement, travel or social interaction between established land uses. Project construction would not physically divide an established community. This impact will not be discussed in the EIR.

NO IMPACT

b. Would the project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

The project site is designated in the City's General Plan as Low Density Single-family Residential (up to two dwelling units per acre) (City of Lafayette 2002). The site is zoned as Single-family Residential District R-20 (City of Lafayette 2013a). Surrounding and adjacent parcels are developed with single-family residences in compliance with the designated land use and zoning district, and the project would result in construction of a single-family residence that would also be in compliance with the designated land use and zoning. As stated in Section 8, *Project Description*, the project would require permits and approvals for construction within the Class II Ridgeline Setback. However, it should be noted that surrounding residences are also constructed within the Class II Ridgeline Setback areas; therefore, the project would be consistent with surrounding land uses. With approval of the Exception for development within a Class II Ridgeline Setback, and given the project's compliance with the designated land use and zoning of the project site, the project would have a less than significant impact regarding conflicts with existing land use plans. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

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12 Mineral Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	■
b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☐	■

a. *Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?*

b. *Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?*

No mineral resources are located within the City of Lafayette (USGS 2019b), and both the City's General Plan and County General Plan do not identify any significant mineral resources or mining operations within the City (City of Lafayette 2002; Contra Costa County 2004). The project would not require the use of substantial mineral resources during construction or operation and would not involve construction in a mineral resource site. Therefore, no impacts would occur. This impact will not be discussed in the EIR.

NO IMPACT

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13 Noise

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project result in:				
a. Generation of 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?	☐	☐	■	☐
b. Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	■	☐
c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	■

Noise and Vibration Overview

Noise level (or volume) is generally measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels to be consistent with that of human hearing response, which is most sensitive to frequencies around 4,000 Hertz (about the highest note on a piano) and less sensitive to low frequencies (below 100 Hertz).

Sound pressure level is measured on a logarithmic scale with the 0 dBA level based on the lowest detectable sound pressure level that people can perceive (an audible sound that is not zero sound pressure level). Based on the logarithmic scale, a doubling of sound energy is equivalent to an increase of 3 dBA, and a sound that is 10 dBA less than the ambient sound level has no effect on ambient noise. Because of the nature of the human ear, a sound must be about 10 dBA greater than the ambient noise level to be judged as twice as loud. In general, a 3 dBA change in the ambient noise level is noticeable, while 1 to 2 dBA changes generally are not perceived. Quiet suburban areas typically have noise levels in the range of 40 to 50 dBA, while areas adjacent to arterial streets are typically in the 50 to 60+ dBA range. Normal conversational noise levels are usually in the 60 to 65 dBA range, and ambient noise levels greater than 65 dBA can interrupt conversations.

Noise levels from point sources, such as those from individual pieces of machinery, typically attenuate (or drop off) at a rate of 6 dBA per doubling of distance from the noise source. Noise levels from lightly traveled roads typically attenuate at a rate of about 4.5 dBA per doubling of distance. Noise levels from heavily traveled roads typically attenuate at about 3 dBA per doubling of distance. Noise levels may be reduced by intervening structures: generally, a single row of buildings between the receptor and the noise source reduces noise levels by about 5 dBA, and a solid wall or berm reduces noise levels by 5 to 10 dBA. The manner in which residences in California are constructed generally provides a reduction of exterior-to-interior noise levels of approximately 20 to 25 dBA with closed windows.

In addition to the instantaneous measurement of sound levels, the duration of sound is important because sounds that occur over a long period are more likely to be an annoyance or cause direct physical damage or environmental stress. One of the most frequently used noise metrics that considers both duration and sound power level is the equivalent noise level (Leq). The Leq is defined as the single steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual fluctuating levels over a period of time (essentially, the average noise level). Typically, Leq is summed over a one-hour period. Lmax is the highest root mean squared sound pressure level within the measurement period, and Lmin is the lowest root mean squared sound pressure level within the measurement period.

The time at which noise occurs is also important since nighttime noise tends to disturb people more than daytime noise. Community noise is usually measured using Day-Night Average Level (Ldn), which is the 24-hour average noise level with a 10 dBA penalty for noise occurring during nighttime hours (10:00 p.m. to 7:00 a.m.), or Community Noise Equivalent Level (CNEL), which is the 24-hour average noise level with a 5 dBA penalty for noise occurring from 7:00 p.m. to 10:00 p.m. and a 10 dBA penalty for noise occurring from 10:00 p.m. to 7:00 a.m. Noise levels described by Ldn and CNEL typically do not differ by more than 1 dBA. In practice, CNEL and Ldn are often used interchangeably.

The relationship between peak hourly Leq values and associated Ldn/CNEL values depends on the distribution of traffic over the entire day. There is no precise way to convert a peak hour Leq to Ldn or CNEL. However, in urban areas near heavy traffic, the peak hour Leq is typically 2 to 4 dBA lower than the daily Ldn/CNEL. In less heavily developed areas, such as suburban areas, the peak hour Leq is often roughly equal to the daily Ldn/CNEL. For rural areas with little nighttime traffic, the peak hour Leq will often be 3 to 4 dBA greater than the daily Ldn/CNEL value. The project site is located in a suburban area; therefore, the Ldn/CNEL in the area would be roughly equivalent to the measured Leq.

Vibration refers to groundborne noise and perceptible motion. Vibration is a unique form of noise because its energy is carried through buildings, structures, and the ground, whereas noise is simply carried through the air. Thus, vibration is generally felt rather than heard. Some vibration effects can be caused by noise (e.g., the rattling of windows from passing trucks). This phenomenon is caused by the coupling of the acoustic energy at frequencies that are close to the resonant frequency of the material being vibrated. Typically, groundborne vibration generated by manmade activities attenuates rapidly as distance from the source of the vibration increases. The ground motion caused by vibration is measured as particle velocity in inches per second and is referenced as vibration decibels (VdB).

The background vibration velocity level in residential areas is usually around 50 VdB. The vibration velocity level threshold of perception for humans is approximately 65 VdB. A vibration velocity of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people. The range of interest is from approximately 50 VdB, which is the typical background vibration velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Most perceptible indoor vibration is caused by sources in buildings such as operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads.

Regulatory Setting

California Code of Regulations

The CCR, Title 24, Section 1207.4 requires interior noise levels attributable to exterior sources to be at or below 45 dBA in any habitable room of a development based on the noise metric used in the noise element of the local general plan. All residential windows, exterior doors, and exterior wall assemblies would be required to have sound transmission class ratings that would ensure adequate attenuation of noise at a range of frequencies. The Noise Element of the Lafayette General Plan uses a noise metric of Ldn. Therefore, interior noise levels of the project would need to be at or below 45 dBA Ldn to be compliant with CCR requirements.

Lafayette General Plan

The City's General Plan Noise Element identifies noise sources and areas of noise impact to achieve and maintain noise control and land use compatibility in the City. Noise sources in the City are primarily from vehicular traffic, including automobiles, trucks, buses, and motorcycles. The BART is also a source of noise; however, traffic along SR-24 generally obscures noise from BART trains. High altitude aircraft are also a source of noise within the city, which produce an Ldn of less than 50 dBA (City of Lafayette 2002). The following goal and policies from the Noise Element apply to the proposed project:

Goal N-1. Ensure that all new development is consistent with the standards for noise.

> **Policy N-1.2.** *Reduce Noise Impacts:* Avoid or reduce noise impacts first through site planning and project design. Barriers and structural changes may be used as mitigation techniques only when planning and design prove insufficient.
>
> **Policy N-1.3.** *Noise and Land Use Compatibility Standards:* Ensure that all new noise sensitive development proposals be reviewed with respect to Figure 1: Noise and Land Use Compatibility Standards. Noise exposure shall be determined through actual on-site noise measurements.
>
> **Policy N-1.4.** *Residential and Noise Sensitive Land Use Standards:* Require a standard of 40 - 45 Ldn (depending on location) for indoor noise level for all new residential development including hotels and motels, and a standard of 55 Ldn for outdoor noise, except near the freeway. These limits shall be reduced by 5 dB for senior housing and residential care facilities.

Lafayette Municipal Code

Chapter 5 of the City of Lafayette Municipal Code sets forth the City's noise standards, guidelines, and procedures concerning noise regulation. The LMC Section 5-205 restricts exterior noise levels at single-family residences to 50 dBA between 7:00 a.m. and 10:00 p.m. and 45 dBA between 10:00 p.m. and 7:00 a.m. For areas where the measured ambient noise level exceeds these thresholds, the threshold is raised in 5-dBA increments until it encompasses or reflects the ambient noise level (Section 5-205[c]).

The LMC also includes a restriction for construction activities. According to LMC Section 5-207(e), construction activities, including the use of mechanical equipment, are restricted to the hours of 7:00 a.m. through 10:00 p.m. on Monday through Friday, with no construction allowed on Sundays or holidays, such that the noise from construction equipment creates a disturbance across a residential or commercial property line or at any time violates the City's noise standards. Section 5-208(d) includes special provisions for construction noise. This section permits construction between the hours of 8:00 a.m. and 8:00 p.m. on weekdays, and between 10:00 a.m. and 6:00 p.m. on Sundays and holidays with authorization of a valid city permit. With a valid city permit construction noise is allowed during these hours if it meets at least one of the following noise limitations:

- No individual piece of equipment may produce a noise level exceeding 83 dBA at a distance of 50 feet. If the device is housed within a structure on the property, the measurement must be made outside the structure at a distance as close to 25 feet from the equipment as possible.
- The noise level at the nearest affected property may not exceed 80 dBA.

Ambient Noise Levels

The project setting consists of private residential roadways that do not experience substantial traffic volumes. The primary off-site noise sources in the vicinity are occasional vehicle traffic on Quail Ridge Road, overhead flights from passing aircraft, and birds. The City's General Plan estimates ambient noise levels in Lafayette neighborhoods to be 55 dBA (City of Lafayette 2002).

Sensitive Receptors

Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with those uses. The nearest noise-sensitive receptors to the project site are existing single-family residences that surround the project site, with the closest single-family residences located to the north across Quail Ridge Road and on the parcel adjacent to the eastern project boundary are approximately 100 feet from the boundary of proposed construction areas within the project site. The nearest adjacent residential property boundary is within 25 feet of the proposed construction area on site. In addition, the proposed project would involve construction of one single-family residence, which would also be considered a new noise-sensitive receptor in the existing residential community surrounding the project site.

a. Would the project result in generation of 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?

Exterior and Interior Noise

Because CEQA does not require analysis of potential impacts of the environment on proposed projects, the following impact analysis of the ambient environment on the project is provided for informational purposes only to disclose existing noise conditions in the project vicinity. The existing ambient sound level at the project site is estimated to be 55 dBA.

According to the City's General Plan Noise Element, the project site is within the 60 dBA Ldn noise contour, which is the City's standard for maximum outdoor noise levels in residential areas. Based on the expected ambient noise level of approximately 55 dBA Ldn, the proposed project would not be exposed to an incompatible noise environment. In addition, the General Plan requires interior noise levels attributable to exterior sources to no greater than 45 dBA Ldn. Based on an exterior noise exposure level up to 55 dBA Ldn, interior noise levels at the proposed residence would be approximately 30 to 35 dBA Ldn, which would be below the State's 45 dBA interior noise standard. Impacts would be less than significant.

Construction Noise

Temporary noise levels would be a function of the noise generated by construction equipment, the location and sensitivity of nearby land uses, and the timing and duration of noise-generating activities. To determine impacts, noise is estimated at the nearest sensitive receptor, consisting of a single-family residence within 100 feet of the project site. Table 2 demonstrates the typical noise levels associated with heavy construction equipment during phases of construction at distances of 25, 50, and 100 feet from the noise source. While the nearest residential structure is approximately 100 feet from the construction boundary, the nearest adjacent residential property boundary is within 25 feet of the proposed construction area on site. Noise levels at a distance of 50 feet are provided by the Federal Transit Administration (FTA), while the other distances under evaluation are calculated at an attenuation rate of 6 dBA per doubling of distance, based on the distances of the project site to the nearest sensitive receptors. Pile-driving equipment would be required for the project because the building foundation would need to be supported by the underlying bedrock, located approximately 18 feet below ground surface.

Table 2 Construction Noise Levels

Equipment	Approximate Noise Level at 25 feet (dBA, Leq)	Approximate Noise Level at 50 Feet (dBA, Leq)	Approximate Noise Level at 100 feet (dBA, Leq)
Air Compressor	86	80	74
Backhoe	86	80	74
Compactor	88	82	76
Concrete Mixer	91	85	79
Crane	94	88	82
Dozer	91	85	79
Generator	88	82	86
Grader	91	85	79
Loader	86	80	74
Paver	91	85	79
Pile-driver (impact)	107	101	95
Roller	91	85	79
Scraper	91	85	79
Truck	90	84	78

An attenuation rate of 6 dBA per doubling of distance was used to calculate noise levels at 25 feet and 100 feet.

Source: FTA 2018

The City of Lafayette establishes allowable hours of operation and noise limits for construction activities to minimize disturbance associated with such activities. According to the City of Lafayette Municipal Code Section 5-207(e), noise sources associated with construction are exempt from Municipal Code requirements, provided the activities do not take place before 8:00 a.m. or after

8:00 p.m. on weekdays (Monday through Saturday) or before 10:00 a.m. or after 6:00 p.m. on Sundays and federal holidays. In addition, either noise levels produced by individual pieces of equipment shall not exceed 83 dBA at 50 feet, or the noise level at the nearest affected property shall not exceed 80 dBA. As shown in Table 2, noise from construction equipment has the potential to exceed the City's standard 80 dBA at the residences 100 feet away from the site. These impacts would be temporary and would only last during the construction period. Nonetheless, due to the exceedance of construction noise standards in the City of Lafayette Municipal Code, impacts are potentially significant and mitigation is required. Mitigation Measure NOI-1 would be required to achieve this reduction. This mitigation measure will be listed in the EIR's executive summary and included in the project's mitigation monitoring and reporting program.

Operational Noise

Occupancy at the project site may generate noise from private vehicles (doors opening/closing, brakes, etc.), decks, patios, circulation walkways, and/or heating, ventilation, and air conditioning equipment. However, these noise-generating sources would be typical of the existing residential community and would not result in a substantial increase in ambient noise levels.

Other sources of noise from the proposed residence include traffic noise from vehicles that would use area roadways. According to the ITE Trip Generation Manual 9th Edition (ITE 2012), the trip generation rate for a single-family residence is 9.52 average daily trips (ADT) per dwelling unit. Therefore, the proposed residence would generate approximately 10 ADT on area roadways.

Because existing roadway noise is approximately 55 dBA at 3933 Quail Ridge Road, the noise exposure increase that would constitute a significant impact is 3 dBA Ldn. Modeling of traffic noise indicates that, in general, a 10 percent increase in traffic volume would raise traffic noise by approximately 0.4 dBA. The project would add approximately 10 daily trips to local roadways, which is less than 10 percent of the existing traffic on local roadways. Fourteen single-family residences are located between the terminus of Quail Ridge Road and Via Roble. Using the ITE trip generation rate for these residences, existing traffic is approximately 140 daily trips along this section of Quail Ridge Road. The addition of 10 daily trips from the project site represents an approximately 7.1 percent increase in trips. Therefore, the project would increase roadway noise by less than 0.4 dBA compared to existing conditions due to the minimal increase in roadway traffic. Therefore, the increase in roadway noise would be imperceptible to the human ear and would not exceed the threshold of 3 dBA. Impacts related to roadway noise would be less than significant.

Mitigation Measure

NOI-1 Construction Noise Reduction

As required by the City Municipal Code Section 5-208(d), construction activities shall only take place between the hours of 6:00 a.m. to 8:00 p.m. weekdays and Saturdays, or between 10:00 a.m. and 6:00 p.m. Sundays and federal holidays. In addition, either noise levels produced by individual pieces of equipment shall not exceed 83 dBA at 50 feet, or the noise level at the nearest affected property shall not exceed 80 dBA. Furthermore, the following requirements are provided to reduce construction noise:

- Prior to the start of and for the duration of construction, the contractor shall properly maintain and tune all construction equipment in accordance with the manufacturer's recommendations to minimize noise emissions.

- During construction, the contractor shall place temporary sound barriers along the northern and eastern boundaries of the construction area on site, to further reduce noise levels from construction equipment.
- Prior to use of any construction equipment, the contract shall fit all equipment with properly operating mufflers, air intake silencers, and engine shrouds no less effective than as originally equipped by the manufacturer.
- During construction, the construction contractor shall place stationary construction equipment and material delivery (loading/unloading) areas to maintain the greatest distance from the nearest residences.
- The construction contractor shall post a sign at the work site that is clearly visible to the public, providing a contact name and telephone number for filing a noise complaint.
- These measures shall be listed on all grading plans and monitored by the City of Lafayette during construction.

Implementation of Mitigation Measure NOI-1 would reduce construction noise levels. As a result, mitigated construction activities would increase ambient noise levels up to 83 dBA at 50 feet during construction. These noise levels would be typical of normal construction activities, would occur only during daytime hours as required by the LMC, and would be temporary. Therefore, implementation of Mitigation Measure NOI-1 would reduce construction noise impacts to a less than significant level. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

b. Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

Project construction would create groundborne vibration from the use of heavy construction machinery such as rollers, dozers, and loaded trucks; however, project operation would not generate significant ground-borne vibration because single-family residences do not require the use of heavy industrial machinery. Therefore, this analysis considers vibration impacts only from project construction. To determine groundborne vibration impacts, vibration was modeled at the nearest sensitive receptors, approximately 100 feet from the project site.

To determine vibration impacts during project construction, vibration levels were calculated at these sensitive receptors using the vibration velocity in decibels (i.e., VdB) of the highest impact pieces of equipment that would be used during project construction: rollers, dozers, and loaded trucks (see Table 3). Table 3 lists groundborne vibration levels from a roller, dozer, and loading truck at 25 feet and 100 feet from the source.

Table 3 Estimated Groundborne Vibration during Construction

Equipment	Approximate Vibration Levels at 25 Feet (VdB)	Approximate Vibration Levels at 100 Feet (VdB)[1]
Pile Driver (impact)	104	86
Vibratory Roller	94	76
Large Bulldozer	87	69
Loaded Truck	86	68

[1] Values calculated using the equation: VdB (100 feet) = VdB (25 feet) - 30 * log (100 ft / 25 ft).

Source: FTA 2018

As shown in Table 3, construction equipment would generate peak vibration levels ranging from 68 VdB to 86 VdB at the nearest sensitive receptors. Although vibration would exceed 75 VdB (the approximate dividing line between barely perceptible and distinctly perceptible), such events would be intermittent and relatively short in duration. Construction activity would be limited to daytime hours as required by LMC Section 5-207(e), and would not disrupt residences during recognized hours of sleep. Groundborne vibration would not reach levels that could cause building damage to fragile buildings (100 VdB; FTA 2018) in the project vicinity. Therefore, vibration caused by project construction would result in a less than significant impact. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

c. *For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?*

The project site is not located within an airport land use plan area, or within 2 miles of a public or private airport. The closest airports are the John Muir Memorial Hospital Heliport, which is approximately 5.5 miles east of the site; the Buchanan Field Airport, which is approximately 7.8 miles northeast of the project site; and the Oakland International Airport, which is approximately 12 miles southwest of the project site. The project site is not in an airport noise contour area. There are no private airstrips in the project vicinity. Therefore, the proposed project would not expose people residing or working in the project area to excessive noise levels associated with airports or a private airstrip. No impact would occur. This impact will not be discussed in the EIR.

NO IMPACT

14 Population and Housing

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Induce substantial unplanned population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?	☐	☐	■	☐
b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	■

a. *Would the project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?*

The project would be consistent with the land use and zoning designations for the site and would result in an incremental increase in population in the City. The increase was anticipated in the City's General Plan and would not be unplanned growth. This impact would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

b. *Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?*

The project site does not currently contain housing, and the project would not result in the removal of housing from the City. Therefore, the project would not displace existing people or housing and there would be no impact. This impact will not be discussed in the EIR.

NO IMPACT

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15 Public Services

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
1 Fire protection?	☐	☐	■	☐
2 Police protection?	☐	☐	■	☐
3 Schools?	☐	☐	■	☐
4 Parks?	☐	☐	■	☐
5 Other public facilities?	☐	☐	■	☐

a. *Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:*

1 *Fire protection?*

2 *Police Protection?*

3 *Schools?*

4 *Parks?*

5 *Other public facilities?*

The Lafayette Police Department is located approximately 1.6 miles southeast of the project site. The Moraga-Orinda Fire District is located approximately 1.5 miles west of the project site and Contra Costa Fire Station 15 is located approximately 2.1 miles east of the site. Happy Valley Elementary School is located approximately 0.4 mile north of the project site and Bentley Upper School is located approximately 0.5 mile south of the project site. The Lafayette Reservoir is located 0.6 mile south of the project site.

The proposed project would result in an incremental increase in population of approximately 3 new residents (DOF 2018) and a related incremental increase in demand for public services. The City requires the payment of development fees, including fees for the provision of parkland, park facilities, walkways, and public art. Additionally, as part of the Building Permit process, the Contra Costa County Fire Protection District (CCCFPD) reviews project plans to ensure that the CCCFPD's fire safety standards are met.

The CCCFPD has an average response time of 6.5 minutes to incidents in western Contra Costa County (CCCFPD 2019). The addition of one residence would not substantially decrease this average response time and would not reduce response times below the CCCFPD's goal of 10:00 to 11:45 average response time. The Lafayette Police Department had a ratio of 1.93 officers per 1,000 residents in 2016 (Lafayette Police Department 2016). This ratio would not substantially change with project implementation and no new or altered facilities would be required to provide police protection services to the site.

The Lafayette School District requires the payment of developer fees (Lafayette School District 2018). Pursuant to Section 65995 (3)(h) of the California Government Code (SB 50, chaptered August 27, 1998), the payment of statutory fees "is deemed to be full and complete mitigation of the impacts of any legislative or adjudicative act, or both, involving, but not limited to, the planning, use, or development of real property, or any change in governmental organization or reorganization." Thus, payment of the development fees is considered full mitigation for the proposed project's impacts under CEQA. Impacts to parks and recreational facilities are described in more detail in Section 16, *Recreation*.

The project would maintain service ratios, would pay applicable development impact fees, and would not substantially reduce the provision of public services within the City. Therefore, the project would not require the provision of new or altered governmental facilities, and this impact would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

16 Recreation

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	■	☐
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	■	☐

a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

The city has three regional recreational facilities, contains an extensive system of trails, and has several community and neighborhood parks. However, the City aims to maintain a ratio of five acres of parkland for every 1,000 residents and is approximately 44 acres short of this goal based on a projected population of 27,000 (City of Lafayette 2009).

The proposed project would incrementally increase the demand for park and recreational facilities. The project site has direct access to the existing Walter Costa Trail extends north to south, including the portion of Quail Ridge Road adjacent to the project site (City of Lafayette 2013b). This trail provides access from the project site to the Briones Regional Park located north of the city. While the City falls short of its park-to-population goals, Lafayette's proximity to adjacent regional parks and open space areas provides sufficient park facilities for use by new residents.

The project would be within the growth assumptions for the City; therefore, the demand for parks would not exceed the demand anticipated in local planning documents, including the City General Plan (City of Lafayette 2002) and the Parks and Recreation Facilities Master Plan (City of Lafayette 2009).

As stated in Section 15, *Public Services*, the project would be required to pay development fees, including for the provision parkland, park facilities, and walkways. The payment of these fees will aid the City in developing the required parkland facilities within the City, as identified above.

The project would increase the population of the City by approximately three residents; this incremental increase in demand for park and recreation facilities would not cause substantial physical deterioration of existing facilities or require the expansion of parkland facilities beyond previously planned future expansions as described above. Therefore, impacts would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

17 Transportation

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	■	☐
b. Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☐	■	☐
c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?	☐	☐	■	☐
d. Result in inadequate emergency access?	☐	☐	■	☐

a. Would the project conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

The City of Lafayette strives to maintain a level of service (LOS) D for intersections in the downtown corridor, which includes Mount Diablo Boulevard and Dolores Drive, which would be utilized by project residents for local access to the site. The project is anticipated to result in an estimated 10 daily trips per the ITE trip generation rate for single-family residences, with one trip each during the a.m. and p.m. peak hours. The addition of 10 daily trips to project area roadways would not cause local intersections to exceed the LOS standard set by the City. As discussed in the City's General Plan, the intersection of Dolores Drive and Mount Diablo Boulevard operates no worse than LOS C during peak hours. As only one trip would be added during each peak hour by the project, this incremental increase would not substantially impact the existing LOS of the intersection.

Development of the site would not impair roadways or conflict with planned pedestrian, bicycle, and transit facilities in the vicinity. Therefore, this impact would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

b. Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

CEQA Guidelines Section 15064.3(b) describes criteria for analyzing transportation impacts. Depending on the type of project, different thresholds of significance are applicable. Section 15064.3(b)(1) applies to land use projects, including the proposed project:

> Vehicle miles traveled exceeding an applicable threshold of significance may indicate a significant impact. Generally, projects within one-half mile of either an existing major transit stop or a stop along an existing high-quality transit corridor should be presumed to cause a less than significant transportation impact. Projects that decrease vehicle miles traveled in the project area compared to existing conditions should be presumed to have a less than significant transportation impact.

BART is considered to be a high-quality transit corridor, but it is located approximately one mile from the project site. The Lafayette BART station provides parking for residents to use for commuting to other cities in the Bay Area, which would reduce VMT generated by the project.

The project would generate an estimated 10 daily trips, below the screening threshold for a VMT analysis as described in the Governor’s Office of Planning and Research (OPR) Technical Advisory on Evaluating Transportation Impacts in CEQA (OPR 2018). Therefore, this impact would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

c. Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?

d. Would the project result in inadequate emergency access?

The project would not include hazardous design features such as sharp curves or dangerous intersections. Project operation would not involve the use of oversized or otherwise non-standard vehicles. The addition of one new single-family residence and associated new residents would not substantially increase traffic on local roadways serving the project site and surrounding area; therefore, emergency access to the project site and surrounding residences would not be impeded by the addition of the proposed project. Impacts would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

18 Tribal Cultural Resources

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in a Public Resources Code Section 21074 as either a site, feature, place, or cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or	☐	☐	☐	■
b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☐	■

California Assembly Bill (AB) 52 was enacted in 2015 and expands CEQA by defining a new resource category, "tribal cultural resources." AB 52 states, "A project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment" (PRC Section 21084.2). It further states the lead agency shall establish measures to avoid impacts altering the significant characteristics of a tribal cultural resource, when feasible (PRC Section 21084.3).

PRC Section 21074 (a)(1)(A) and (B) defines tribal cultural resources as "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe" and is:

1. Listed or eligible for listing in the CRHR or in a local register of historical resources as defined in PRC section 5020.1(k), or
2. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1. In applying these criteria, the lead agency shall consider the significance of the resource to a California Native American tribe.

AB 52 also establishes a formal consultation process for California tribes regarding those resources. The consultation process must be completed before a CEQA document can be certified or adopted. Under AB 52, lead agencies are required to "begin consultation with a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project." Native American tribes to be included in the process are those having requested notice of projects proposed in the jurisdiction of the lead agency.

No California tribes have requested notification of projects under AB 52 from the City of Lafayette, thus the City of Lafayette did not distribute AB 52 notification letters for the project.

a., b. Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in a Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is (a) listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or (b) a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?

No tribes have requested notification of projects under AB 52, thus the City of Lafayette assumes that no tribal cultural resources are on the project site.

Additionally, no cultural resources of Native American origin were identified that would be impacted by the project and the site is considered to have low archaeological sensitivity (see Section 5, *Cultural Resources*). Based on the above, it is assumed no tribal cultural resources are present on the project site. Therefore, no impacts would occur to tribal cultural resources. See Section 5, *Cultural Resources*, for mitigation measures related to the unanticipated discovery of archaeological resources. This impact will not be discussed in the EIR.

NO IMPACT

19 Utilities and Service Systems

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project:				
a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	■	☐
b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	■	☐
c. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	■	☐
d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	■	☐
e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	■	☐

a. *Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?*

b. *Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?*

c. *Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?*

Water

EBMUD supplies water to the city of Lafayette via either the Walnut Creek Water Treatment Plant, which has a capacity of 115 million gallons per day (mgd), or the Lafayette Water Treatment Plan (as needed), which has a capacity of 35 mgd (EBMUD 2015). EBMUD has an average district-wide water consumption is 192 mgd and has a total water treatment capacity of 375 mgd, with a total surplus of 183 mgd (EBMUD 2012, EBMUD 2019). The project's estimated water demand of approximately 106,000 gallons per year (CAPCOA 2017) would constitute less than 0.1 percent of the available water treatment capacity as well as less than 0.1 percent of the capacity of the Lafayette Water Treatment Plant. Therefore, water supply impacts of the proposed project would be less than significant. This impact will not be discussed in the EIR.

Wastewater

The project's estimated wastewater generation would be approximately 88,000 gallons per year (CAPCOA 2017), or approximately 241 gallons per day (this estimate assumes that water use is 120 percent of wastewater generation). The proposed project would be served by connection to the municipal sewer system. Wastewater would be treated by the Central Contra Costa Sanitary District (Central San) Treatment Plan located approximately 10 miles northeast of the project site in Martinez. The Central San Treatment Plant has a total treatment capacity of approximately 54 mgd and currently treats an average of 35 mgd with a remaining capacity of 19 mgd (Central San 2019). The project's anticipated wastewater generation would be less than 0.1 percent of the Central San Treatment Plant's remaining capacity. Therefore, the proposed project would not require the construction of new municipal wastewater treatment facilities or impact the treatment capacity of existing municipal wastewater treatment providers. Impacts to wastewater treatment facilities would be less than significant. This impact will not be discussed in the EIR.

Stormwater

The project would be designed and engineered with drainage features appropriate to accommodate the needs of the proposed project. As discussed in Section 10, *Hydrology and Water Quality*, the project would be required to comply with City requirements, including paying the drainage impact fee, submitting a Drainage Plan during design review, implementing design BMPs, and submitting an Erosion and Sediment Control Plan to ensure minimal erosion, siltation, flooding, and polluted runoff occur from development of the site. The proposed project would not require the construction of new stormwater drainage facilities or expansion of existing facilities. Impacts would be less than significant. This impact will not be discussed in the EIR.

Electricity, Natural Gas, and Telecommunications

A significant impact to electricity, natural gas, and telecommunications facilities may occur if a project's demand for these services exceeds the capacity of local providers. Electricity would be provided to the project site by Pacific Gas and Electric (PG&E) or Marin Clean Energy at the discretion of the project residents, and natural gas would be provided by PG&E. Telecommunications services would be provided by AT&T or Comcast at the discretion of the project residents. Telecommunications are generally available in the project area, and facility upgrades would not likely be necessary.

As described in Section 6, *Energy*, the project would require approximately 7,982 kWh per year of electricity and approximately 42.3 million British thermal units (MMBtu) per year of natural gas.

PG&E maintains power lines along Quail Ridge Road that serve adjacent properties and would serve the project site. The power line has a capacity of 11.3 megawatts (MW) and a peak load of 8.6 MW, with a remaining capacity of 2.7 MW. The substation that powers this line has a capacity of 29.7 MW and a peak load of 22.8 MW, with a remaining capacity of 6.9 MW (PG&E 2019). The project would require approximately 0.001 MW, less than 0.1 percent of the remaining capacity of the PG&E power lines and substation that would serve the project site. For 2017, the total system of natural gas that PG&E provided was 2,517 million cubic feet (MMcf) per day, or 2,610,000 MMBtu per year (California Gas and Electric Utilities 2018). Therefore, natural gas demand generated by the project would represent less than 0.1 percent of PG&E's natural gas demand. Accordingly, the project would be accommodated adequately by existing electricity, natural gas, and telecommunication facilities and would not require improvements to existing facilities, or the provision of new facilities, that would cause significant environmental effects. This impact would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

d. *Would the project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?*

e. *Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?*

Republic Services provides solid waste service including public trash, recyclables, and green waste collection in the City. The proposed project would generate solid waste during construction and operation. Handling of debris and waste generated during construction would be subject to LMC Section 5-602, which requires that projects divert at least 60 percent of construction or demolition waste (with an increase to 75 percent diversion effective January 1, 2020). The project would not involve demolition activities; therefore, construction activities would not generate substantial solid waste.

Solid waste generated by project operation would be collected by Republic Services and transferred to the Keller Canyon Landfill serving Contra Costa County. The permitted daily throughput of this landfill is 3,500 tons per day, the estimated average waste quantities disposed is 3,000 tons per day, the remaining capacity is 25.4 million tons, and the anticipated closure date is 2030 (California Department of Resources Recycling and Recovery [CalRecycle] 2019a, 2019b; Republic Services 2019). The Keller Canyon Landfill has an estimated average remaining capacity of 500 tons per day. According to CalEEMod default values, the project would generate approximately 0.42 tons of waste per year, or approximately 0.001 ton per day (CAPCOA 2017). This estimate is conservative as it does not factor in any recycling or waste diversion programs. The 0.001 ton of solid waste generated daily by the project would represent substantially less than one percent of the available surplus capacity of the Keller Canyon Landfill. The City is required to meet the statewide waste diversion goal of 50 percent set by AB 939. Project residents would be provided recycling and green waste collection services, which would reduce the amount of solid waste sent to landfills. The proposed project would comply with federal, state, and local statutes and regulations related to solid waste, such as AB 939, the LMC, and the City's recycling program. Impacts related to solid waste and waste facilities would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

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20 Wildfire

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a. Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	■
b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	■	☐
c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	■	☐
d. Expose people or structures to significant risks, including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	■	☐

a. If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project substantially impair an adopted emergency response plan or emergency evacuation plan?

The project site is located in a very high fire hazard severity zone, as is most of northern Lafayette (California Department of Forestry and Fire Protection [CAL FIRE] 2009). The project site is within Zone 2 of the City's Emergency Operations Plan: Wildland Fire Evacuation Plan (2016). As described in Section 9, *Hazards and Hazardous Materials*, project construction and operation would not restrict implementation of the plan nor would it impede the emergency access route of Zone 2 along Via Roble. No roads would be permanently closed because of the proposed project, and no structures would be developed that could potentially impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. The proposed project would be accessed by a private driveway along Quail Ridge Road. This driveway would provide sufficient ingress/egress for typical passenger vehicles that would access the project site. As such, project implementation would not interfere with existing emergency evacuation plans or emergency response plans in the area. Therefore, no impact would occur. This impact will not be discussed in the EIR.

NO IMPACT

b. *If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project due to slope, prevailing winds, and other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?*

The project site is steeply sloped from 143 feet above mean sea level in the southeastern corner of the site to 208 feet above mean sea level in the northeastern corner of the site. Surrounding areas are hilly, with a ridgeline located north of Quail Ridge Road near the project site. In the project vicinity, prevailing wind blows to the southeast (National Oceanic and Atmospheric Administration 2019). Due to the presence of nearby slopes and wind direction, which could carry fires down slopes toward the site, the project would expose project occupants to wildfire impacts. However, building code fire safety requirements, project design review by the CCCFPD, and General Plan policies would require the provision of fire suppression and alarm systems, use of fire-resistant roofing and building materials, development and implementation of a Vegetation Management Plan, and payment of fire protection development fees, which would aid in preventing the spread of wildfires. Required compliance with these policies would reduce this impact to a less than significant level. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

c. *If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?*

The project would not involve the construction of new roads or the extension of utilities that could exacerbate wildfire risk or result in temporary or ongoing impacts to the environment. The project would be required to comply with building code and fire safety requirements, as well as General Plan policies. Construction BMPs, such as ensuring equipment has spark arresters installed, would ensure temporary construction does not exacerbate fire risks in the area. This impact would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

d. *If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project expose people or structures to significant risks, including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?*

The project would introduce people to the project site, which is within a very high fire hazard severity zone and contains an active landslide. As discussed in Section 10, *Hydrology and Water Quality*, the proposed project would introduce impervious surfaces to the site, which would increase the volume of stormwater runoff from the site. This increase in runoff volume could also increase the rate of surface runoff and flooding on or off site. Per the City’s requirements, payment of the drainage impact fee, submittal of a Drainage Plan, implementation of design BMPs in the final design phase of the project, and submittal of an Erosion and Sediment Control Plan would ensure minimal erosion, siltation, flooding, and polluted runoff occur from development of the site. The project site is located within 250 feet of a ridgeline and is not directly downstream of an established waterway that could result in substantial post-fire flooding and instability. Therefore, this impact would be less than significant. This impact will not be discussed in the EIR.

LESS THAN SIGNIFICANT IMPACT

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21 Mandatory Findings of Significance

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
Does the project:				
a. Have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	■	☐	☐
b. Have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	■	☐
c. Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	■	☐	☐	☐

a. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

As described in Section 4, *Biological Resources,* implementation of Mitigation Measures BIO-1 and BIO-2 would address potential impacts to special status species and migratory birds. Therefore, the project would not substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or substantially reduce the number or restrict the range of a rare or endangered plant or animal, and impacts would be less than significant with mitigation incorporated.

As noted under Section 5, *Cultural Resources*, and Section 7, *Geology and Soils*, no historical, archeological, or paleontological resources were identified on site. Nevertheless, the potential for the recovery of buried cultural materials during development activities remains. Implementation of Mitigation Measures CR-1 and GEO-1 would reduce impacts to previously undiscovered cultural resources to a less than significant level by providing a process for evaluating and, as necessary, avoiding impacts to any resources found during construction. Therefore, impacts to important examples of California history or prehistory would be less than significant with mitigation incorporated.

As noted throughout the Initial Study, most other potential environmental impacts related to the quality of environment would be less than significant or less than significant with implementation of mitigation measures. Further analysis in an EIR is required for impacts to geology and soils.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

b. *Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?*

Cumulative development in the City is anticipated to consist primarily of additional residences or modifications to existing residences because the over 75 percent City is designated for single-family residential land use (City of Lafayette 2002). Cumulative impacts associated with some of the resource areas have been addressed in the individual resource sections above: Air Quality, Greenhouse Gases, Water Supply, and Solid Waste (CEQA Guidelines Section 15064[h][3]) and would be less than significant. Some of the other resource areas were determined to have no impact in comparison to existing conditions and therefore would not contribute to cumulative impacts, such as Mineral Resources and Agriculture and Forestry Resources. As such, cumulative impacts in these issue areas would also be less than significant (not cumulatively considerable). Other issues (e.g., aesthetics, hazards and hazardous materials) are site-specific by nature, and impacts at one location do not add to impacts at other locations or create additive impacts. The project would be incrementally increase traffic compared to existing conditions. However, the project would be consistent with the type and density of development anticipated by the City's General Plan and cumulative impacts would be less than significant. Therefore, the project's impacts would not be cumulatively considerable with implementation of the required mitigation measures. This impact would not require further analysis in an EIR.

LESS THAN SIGNIFICANT IMPACT

c. *Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?*

In general, impacts to human beings are associated with air quality, hazards and hazardous materials, and noise impacts. As detailed in analyses for air quality, hazards and hazardous materials, and noise, the proposed project would not result, either directly or indirectly, in substantial adverse hazards related to air quality, hazardous materials, or noise. Compliance with applicable rules and regulations would reduce potential impacts on human beings to a less than significant level. However, potential impacts to humans from landslides require further analysis. Those impacts will be addressed in the EIR.

POTENTIALLY SIGNIFICANT IMPACT

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List of Preparers

Rincon Consultants, Inc. prepared this Initial Study under contract to the City of Lafayette. Persons involved in data gathering analysis, project management, and quality control are listed below.

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Appendix A

Biological Resources Reconnaissance Survey Results

Rincon Consultants, Inc.

Environmental Scientists *Planners* *Engineers*

M E M O R A N D U M

■ **San Luis Obispo**
1530 Monterey Street
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Riverside:	(951) 782-0061		

Date: May 10, 2019

To: Payal Bhagat (City of Lafayette)

Project: 3933 Quail Ridge Road Project (19-07358)

From: K. Weichert, D. Kremin (Rincon)

E-mail:

cc:

Re: Biological Resources Reconnaissance Survey Results

Dear Ms. Bhagat:

This memo presents the results of a reconnaissance-level survey to document existing conditions and observed biological resources for the 3933 Quail Ridge Road project. Rincon Senior Biologist and International Society for Arboriculture (ISA) Certified Arborist Kyle Weichert conducted the survey on April 19, 2019. Mr. Weichert surveyed the entire parcel on foot and documented existing conditions, described and characterized vegetation types, as well as conducted a general inventory of the trees within the building footprint. Information collected regarding trees within the building footprint was limited to species identification and measurement of each tree’s diameter at breast height (DBH).

The site consists of a somewhat steep, southeast-facing slope in a rural-residential setting. Vegetation on site consists primarily of non-native annual grassland dominated by non- native annual grasses such as rip-gut brome (*Bromus diandrus*), foxtail barley (*Hordeum murinum*), and wild oats (*Avena fatua*), as well as ruderal herbs such as vetch (*Vicia villosa*), annual burclover (*Medicago polymorpha*), and milk thistle (*Silybum marianum*). A large coast live oak (*Quercus agrifolia*) is also present in the western corner of the parcel. The northeast corner of the parcel and proposed building site contains a grove of several planted and ornamental trees, including:

- One coast redwood (*Sequoia sempervirens*); DBH 20 inches
- One incense cedar (*Calocedrus decurrens*); DBH 15.5 inches
- One coast live oak (*Quercus agrifolia*); DBH: 7.5 inches
- One toyon (*Heteromeles arbutifolia*); 10+ trunks, DBH range 2-5 inches
- Two unknown ornamental species; each 8+ trunks, DBH range 1-3 inches

The trees were each in fair condition and appear planted ornamentally. Two trees were not in flowering condition during the survey and therefore could not be identified to genus or species.

No drainages or wetlands potentially under the jurisdiction of the United States Army Corps of Engineers, Regional Water Quality Control Board, or California Department of Fish and Wildlife were observed on site.

Special status species or their sign were not observed during the reconnaissance survey; however, it should be noted that a reconnaissance survey does not constitute a protocol survey to definitively determine the presence or absence of special status species. The potential for special status species would need to be assessed based on a habitat suitability analysis or protocol surveys conducted to determine the presence or absence of special status species where such protocols approved by the resource agencies exist.

Thank you for the opportunity to support this project. Please contact Kyle Weichert if you have any questions concerning the contents of this report. He may be reached by telephone at (805) 547-0900, or by email at kweichert@rinconconsultants.com.

Sincerely,

Rincon Consultants, Inc.

Kyle Weichert, MS
Senior Biologist/ISA Certified Arborist (WE-12113A)

Attachment: Photographs

Photo 1: View west of the subject parcel.

Photo 2: View east of the proposed building footprint.

Comment Letters

STATE OF CALIFORNIA Gavin Newsom, Governor

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691 Phone (916) 373-3710
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RECEIVED
AUG 15 2019
CITY OF LAFAYETTE
PLANNING DEPT.

August 13, 2019

Payal Bhagat
City of Lafayette
3675 Mount Diablo Boulevard, #210
Lafayette, CA 94549

RE: SCH# 2019071038 3933 Quail Ridge Road Residential Project, Contra Costa County

Dear Mr. Bhagat:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements**. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:
   - **a.** A brief description of the project.
   - **b.** The lead agency contact information.
   - **c.** Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
   - **d.** A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).
   - **a.** For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:
   - **a.** Alternatives to the project.
   - **b.** Recommended mitigation measures.
   - **c.** Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:
   - **a.** Type of environmental review necessary.
   - **b.** Significance of the tribal cultural resources.
   - **c.** Significance of the project's impacts on tribal cultural resources.
   - **d.** If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:
   - **a.** Whether the proposed project has a significant impact on an identified tribal cultural resource.
   - **b.** Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:
    - **a.** The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or
    - **b.** A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:
    - **a.** Avoidance and preservation of the resources in place, including, but not limited to:
        - **i.** Planning and construction to avoid the resources and protect the cultural and natural context.
        - **ii.** Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
    - **b.** Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
        - **i.** Protecting the cultural character and integrity of the resource.
        - **ii.** Protecting the traditional use of the resource.
        - **iii.** Protecting the confidentiality of the resource.
    - **c.** Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
    - **d.** Protecting the resource. (Pub. Resource Code §21084.3 (b)).
    - **e.** Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).
    - **f.** Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:
    - **a.** The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.
    - **b.** The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.
    - **c.** The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code §65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
    a. If part or all of the APE has been previously surveyed for cultural resources.
    b. If any known cultural resources have already been recorded on or adjacent to the APE.
    c. If the probability is low, moderate, or high that cultural resources are located in the APE.
    d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
    b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:
    a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
    b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
    a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
    b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
    c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Nancy.Gonzalez-Lopez@nahc.ca.gov.

Nancy Gonzalez

Nancy Gonzalez-Lopez
Staff Services Analyst

cc: State Clearinghouse

Louise Laemmlen
3966 Quail Ridge Road
Lafayette, CA 94549

RECEIVED
AUG 13 2019
CITY OF LAFAYETTE
PLANNING DEPT.

August 11, 2019

Dear Ms. Bhagat,

I have been overseeing the management of the Quail Ridge Road Maintenance Group since roughly 2007 when my husband and I purchased our home at 3966 Quail Ridge Road. As you are probably aware, Quail Ridge is a privately maintained road in Lafayette with a history of a significant landslide that occurred in 1997.

My purpose here is to show the severity of the landslide and make you aware of the history of the current owner of the lot at 3933 Quail Ridge with regard to his responsibilities to our Road Maintenance Group. Each parcel owner has historically and currently shares equally in the maintenance of Quail Ridge Road. Because of the sensitive history of the landslide, the group makes every effort to maintain the safe passage of our road for utilities, fire, postal service, and residents.

Since the current owner who wishes to undertake the construction project at 3933 purchased the lot in about 2008, he has not paid his share of road maintenance expenses. At one point, we had to take him to small claims court to get partial payment for his share of road maintenance. Listed below is a sampling of projects completed for which the owner still owes.

Examples include, but are not limited to:

4/10/2009: East Bay Pump & Equipment Co., for maintenance and repair of pump system	$1,468.33
5/01/2010: Engineered Soil Repairs, Inc., for pipe repair	$4,299.70
11/16/2015: American Asphalt, for asphalt repair and slurry seal	$14,708.00
6/30/2016: American Asphalt, for slurry seal and crackfill	$12,200.00

Thank you for taking this information into consideration regarding the proposed project.

Sincerely,

Louise Laemmlen

Louise Laemmlen

Attachments: 5

← Mound adjacent to landslide. Area of proposed project.

The 1997 Quail Ridge Landslide

Work begins to prepare new road. Location of proposed project.

←

Home destroyed in 1997 landslide, on lot of proposed project.

Location of prosed project ↓

←

Location of proposed project.

←

Extensive work was undertaken to stabilize the road and existing homes. The landslide was never stabilized and is still active.

The condition of the landslide and proposed building site today, August 11, 2019.

Photo 1: The road buckling at the West end of the slide.
Photo 2: The proposed building site looking East and detail of ESR's planned pull away of the active landslide (from the metal baskets which support the earth under the road).

Photo 3:

Photo 1:

Photo 3: Detail of the landslide as it abuts the wedge of land of the proposed building site.
Photo 4: The proposed building site from downslope.

Photo 4

Photo 2

AMERICAN ASPHALT R&R Co., Inc.
PO BOX 3367
HAYWARD, CA 94540-3367
(510) 723-0280 Fax (510) 723-0288

CUSTOMER #: 6926
INVOICE #: 7392
INVOICE DATE: 11/16/15
DUE DATE: 11/16/15

BILL TO:
Quail Ridge Road Association
3966 Quail Ridge Road
Lafayette, CA 94549

JOB: 393350
Quail Ridge Road AC CF
Quail Ridge Road
Lafayette, CA

CODE	DESCRIPTION	CURRENT CONTRACT	PREVIOUS BILLED	PREV %	% COMPL	CURRENT BILLING
01	ASPHALT	14,708.00			100.0	14,708.00
03	SEALCOAT	2,400.00				
	TOTALS:	17,108.00			86.0	14,708.00

NET DUE: 14,708.00

Thank you for your business!

PAID
✓ Koelmel
✓ Chang H&R
✓ Wu
✓ Smith
✓ Benner
✓ Garofolo
✓ Pecher
✓ Cambra
✓ Hiran
✓ Kelly
✓ Cheng - paid 2X → Reddy's DID NOT PAY
✓ Cronin

Paid
ck# 127
12/20/15

Happy Valley Highlands Improvement Association

Ms.Payal Bhagat, Senior Planner, Planning & Building Department **August 15, 2019**
City of Lafayette, 3675 Mt. Diablo Blvd. #210
Lafayette, California 94549

RECEIVED
AUG 20 2019
CITY OF LAFAYETTE
PLANNING DEPT.

Subject: Draft Environmental Report (DEIR) Notice of Preparation (NOP)
3933 Quail Ridge Rd. Residential Project, CEQA, Section 15082 **HDP07-19**

The scope of this project, although relatively small in size, has a much larger impact upon its surroundings, neighbors, access roadbed and adjacent neighbors than one might expect. Once a part of 49.6 Acres of zoned Open Space, the area was envisioned as a 60 unit sub-division, followed by 39 unit plan in 1963. (Prior to Lafayette Incorporation in 1968) Both plans were not pursued, **But....**In 1972-73, a new application evolved with requested Zoning change from R-20 to P-1 status to accommodate 60 units. (ESA-EIR 7321, August 6, 1973 Summary Report **Exhibit "A"** Excerpted pages

Shortly thereafter, in October 1975, a new Environmental Impact Report for the City of Lafayette was produced for twenty-two (**22**) lot sub-division known as Tiffany Hills. **Exhibit "B"** Excerpted pages
Exhibit "B-1" Hydrology comments

Subdivision 4770 (Tiffany Hills) Final Map was recorded August 12, 1977. Fifty-Four (**54**) Conditions of Approval were applicable to this Subdivision. **Exhibit "C-1"** Conditions of Approval, 1-54, six pages.
Declaration of Restrictions, Subdivision 4770 **Exhibit "C-2"Articles I-IV,** Three pages

1985-86...A Slide destroyed established residence on Lot 22, 3881 Los Arabis Drive. **Exhibit "D"**
The Lot remains empty, owned by Central Sanitary District.

In January 1997, a massive slide destroyed the existing residence at 3933 (Lot 18) Quail Ridge Road and concurrently contributed to the complete collapse of Quail Ridge Rd. roadbed and surface paving. (See Engineering Reports for description of Road Repairs). The Slide **was not repaired.**

STAFF PLEASE NOTE: All documents/references are the product of HVHIA Archives. It is our request that recorded full scale/view material be researched for accuracy of content of INITIAL STUDY.

Although Tiffany Hills is not included in the Association (Happy Valley Highlands Improvement Association), HVHIA consisting of 150 Residences, accessed by Via Robles has a vested interest in the preservation of Quail Ridge Rd. **AND** the Westerly Cul-de-sac Emergency Fire Trail to Los Arabis Dr. The recent emphasis on WILDFIRE preparation adds to our concern(s):

1) The Scarpface South of the Quail Ridge Rd. repair has slumped approximately 34-36 feet over thirteen (13) years adjacent to the Grid Buttress supporting the roadbed. **Exhibit "E"** January 14, 2019
2) The proposed construction/drilling for building site and retaining wall(s) *could* reactivate slide mass.
3) The *possible* repetition of roadbed loss, due to a partial and/or larger slide blocking Fire Trail access.
4) Both Kropp and Seidelman Geo-Technical data studies sunset after three years.
5) Seismic enhancement and protection of water supply of 13 lots along Quail Ridge Rd.
6) Improved signage on Fire Trail precluding parking and blockage.

Continued on page two.........

The Association (HVHIA) suggests the inclusion/attachment of the complete file(s) on **HDP21-04** plus the complete file of **Seidelman Associates** June 24, 2008 Geotechnical Investigation of portion of Lot 3933, Quail Ridge Rd. for Mr. Robbi Reddy to the References/Bibliography listing prepared by RINCON CONSULTANTS,INC. Pages 89-93 Initial...In addition, The Lafayette Planning Commission Public meeting of July 16, 2012 Agenda items **05. Item 8A, HDP08-12, 1 of 3** 65 page/s
05.1 item 8A HDP08-12, 2 of 3 174 pages
05.2 item 8A HDP08-12 3 of 3 56 pages
Should also be included.

The Public Comment, **HDP08-12, Exhibit "F"** is reiterated for your convenience. **Exhibits A-F are Attached for your review and use. Items of particular interest are** tagged **for ease of location.**

Respectfully submitted
Donald F. Thielke
Donald F. Thielke, President
Happy Valley Highlands Improvement Association (HVHIA)

1973

RECEIVED
AUG 20 2019
CITY OF LAFAYETTE
PLANNING DEPT.

LAFAYETTE

RZ-14-72

CITY COUNCIL
Walter H. Costa, Mayor
James C. Davy [illegible]
Donn L. Black
Robert M. Fisher
[illegible]

July 3, 1973

Mr. Robert L. Goetz
Pier 33 North
San Francisco, Ca. 94111

Dear Mr. Goetz:

On Tuesday, July 17, 1973, at 7:30 p.m., a meeting will be held at the Veteran's Memorial Building, First Street and Mt. Diablo Boulevard, Lafayette, between representatives of Environmental Science Associates and Happy Valley homeowners associations and citizens.

Environmental Science Associates is preparing the Environmental Impact Report on application RZ-14-72, Robert Goetz (applicant), Woolridge Homes (owner); a request for rezoning of 50 acres from R-20 to P-1 for the construction of 60 single family, detached dwelling units, with garages, located between the west end of Quail Ridge Road and the east end of Los Arabis Drive, Assessor's Parcel No. 248-110-22.

The purpose of the meeting is to allow communication between citizens and the EIR consultant. The latter will explain the report development process, and citizens will be able to supply him with ideas and facts.

Very truly yours,

Steven D. Billington

STEVEN D. BILLINGTON,
Planning Assistant

SDB:sl

CC: Mr. Paul E. Zigman
Mr. & Mrs. John L. White (owners)
Mr. Robert E. Woolridge (optionee
Happy Valley Association
Bob Wood
Al Ruddarow
Happy Valley Highlands Improve. Assn.
Valley View Estates Assn.
Pine Lane Assn.

EXHIBIT "A"

ESA-EIR-7321
August 6, 1973

ENVIRONMENTAL IMPACT REPORT
FOR
QUAIL RIDGE DEVELOPMENT
LAFAYETTE

SUMMARY

Prepared for
City of Lafayette

Environmental
Science
Associates

ESA-EIR-7321
August 6, 1973

SUMMARY OF
DRAFT
ENVIRONMENTAL IMPACT REPORT
ON AN APPLICATION FROM
ROBERT L. GOETZ,
LAND DEVELOPMENT PLANNING
ON BEHALF OF
ROBERT E. WOOLDRIDGE
FOR
CHANGE OF ZONE FROM R-20 TO P-1
FOR
60 SINGLE-FAMILY HOUSES
ON
QUAIL RIDGE, LAFAYETTE
CONTRA COSTA COUNTY

ASSESSOR'S PARCEL NO.
248-110-022

Prepared for
CITY OF LAFAYETTE
Mr. Clark Smithson, Assistant City Manager
and Director of Planning

ENVIRONMENTAL SCIENCE ASSOCIATES

770 Airport Boulevard
Burlingame, California 94010
(415) 342-9407

8725 Venice Boulevard
Los Angeles, California 90034
(213) 838-2221

II. PROJECT SETTING

A. Biophysical

Geology and Soils

The bedrock on the site is composed of red, loosely consolidated, pebble conglomerates; light grey, moderately hard sandstones; claystones; and siltstones. The soils are light brown, highly expansive but moderately permeable, silty clays and clay loams. They are extremely hard when dry, but moderately to highly plastic when wet. Sliding has affected large areas on the west side of the property (see Figure 8), but does not appear active at the present time. Soil creep occurs over the whole project area to some extent. The nearby Las Trampas Fault may extend into the project area. No mineral or aggregate deposits are found in the project area.

Ecology

The upland portions of the site are largely composed of grassland, with a scattering of Coast Ceanothus shrubs. The dominant grass is California Oat Grass. There are four species of thistles. The lower slopes and draws of the site contain an oak-woodland community of Coast Live Oak and Valley Oak, with an understory of California Buckeye, Box Elder, Squaw Bush, Poison Oak, and Honeysuckle. The animal community is varied and the species observed include numerous insects, Sparrows, Scrub Jay, Mourning Dove, Red-tailed Hawk, Sagebrush Lizard, Western Fence Lizard, and Mule Deer. From tracks, the presence of Valley Quail, raccoon, domestic dog, cat, and horse was inferred. No rare or endangered species was observed, nor is there any reason to expect that any might be associated with the site.

Hydrology and Water Quality

The project site receives about 27 inches of rainfall annually. There are numerous seeps of groundwater on the site, but no creeks or ponds.

III. ENVIRONMENTAL IMPACT OF THE PROPOSED PROJECT

A. Biophysical

Geology and Soils

During the construction of this project, reactivation of old slides and initiation of new slides is considered quite likely. An area of particular concern is on the west edge of the property, where old, inactive slides which lie above developed areas could be subject to possible reactivation.

Slides and debris flowage may be induced by a change in the surface and groundwater regime through landscape irrigation and the leaking of water mains and the proposed swimming pool. There is also a chance of "cut failure" occurring after weathering. The soil expansivity may cause problems ranging from annoying cracking of plaster and brickwork and sticking of doors and windows, to complete structural disruption, although much of this could be prevented by proper foundation design. There could be other problems such as the cracking of sidewalks, roadways, garage slabs, and the community swimming pool, and possible disruption of water mains and underground utility lines after a number of years. In addition, there would be a need for periodic trimming of the base of cut slopes which may be mandated by the tendency of such soils to creep downslope. New seeps induced by landscape irrigation may induce some foundation problems. In the event of an earthquake, ground rupture and/or deformation within the project area seems slightly more likely than in most other parts of the surrounding region due to the site's location just off the mapped end of the Las Trampas Fault.

Ecology

The grading associated with site development would destroy a considerable portion of the grassland plant community along the crest of the ridge. This would destroy or displace the few animals vailing zoning regulations.

B. Socioeconomic

Land Use

WHICH RIDGE

In 1963 a plan for single-family use of the site was prepared with 60 lots averaging 3000 square feet in size accommodating town houses on the ridge. The remainder of the site was left open. An alternate typical subdivision plan was also prepared for comparison which accommodated 39 lots. Neither of these plans was successfully pursued. The intent of the present plan is to comply with the fundamental purpose of the P-1 District to provide diversification in the relationship of various uses, buildings, lot sizes and open spaces. Thus, approximately 50 percent of the site is left in a natural state.

The project is in conflict with the adopted Open Space element of the General Plan which shows the entire site in open space use, and with the adopted Trails Plan which indicates a riding and hiking trail across the property. Although the project plan indicates an internal system of trails, none of them would serve the purpose of the city-wide Trails Plan. The project site plan lowers the north and west ridgelines by an average of ten feet. It may be presumed that the project is being proposed in this manner in order to create some level areas on the ridgetop to facilitate building design and construction on the basis of multiple lots with uniform characteristics rather than designing on an individual, one-of-a-kind, lot-by-lot basis that would be required if extensive grading and reshaping of the land were not utilized. The intent of the Hillside and Ridgeline Regulations, however, is to retain a ridgetop skyline of natural rounded contours and naturally irregular trees rather than the more regular and even silhouettes of residential buildings. However, if the site is to projected response time is four minutes from Station 15, located to the east on Mount Diablo Boulevard. Station 16 is located physically closer to the site, to the west, at 4007 Los Arabis Drive. There is no permanent public access from that side of the project, a situation which lengthens estimated response time to five minutes. As the large amount of summertime dry grass on the ridge is a severe fire hazard, it would be desirable to maintain the currently existing fire road which enters the property from the adjacent parcel on the south, and connects with the ridge road. As the area is served by standard 6-inch and 8-inch water mains, and 72 pounds of hydraulic pressure are available in the hydrant nearest the site, there should be adequate water for firefighting. Five fire hydrants would be required within the proposed development.

Police. Lafayette police service is provided by the Contra Costa County Sheriff's Department. The project would not require additional personnel or equipment.

Water and Sewerage. Water for the project area would be provided by the East Bay Municipal Utilities District. The water main serving the site is beneath Quail Ridge Road, and is eight inches in diameter. The District anticipates no adverse impact from the project, and has adequate capacity to serve it. The sewerage needs of the site would be served by the Central Contra Costa County Sanitary District which has adequate capacity at its sewage treatment plant to process the 18,000 gallons of sewage per day which would be generated by the project.

WHERE?

Economic Impact

104 M

The total assessed valuation of the project site is $26,000. The estimated assessed value after development is $1,500,000. On the basis of the 1972-73 tax rate, the project would generate

Such an opening would provide a public view down the wooded canyon and over to the undisturbed west slope of the southern part of the main Happy Valley Ridge, and would also constitute an effective firebreak. If kept unfenced it would also facilitate the movements of deer, raccoons, and similar wildlife across the site.

A modification to the project that would alleviate the dust, noise, removal, and visual problems associated with excessive cutting and grading would be the development of the site with buildings on pier foundations which would require minimal grading of the site. Such a pattern would require individual lot by lot design of foundation piers, increasing the cost to the builder, but it could result in a more attractive environment for which the high-income market for which the project is proposed should be willing to pay.

In conjunction with this form of redesign, street widths could be reduced to 18 feet, provided off-street parking provisions were supplemented on each building site and in parking compounds. This might lessen the extent of grading required for road improvements, it would be in harmony with the rural character of many roads in Happy Valley, but it would be less acceptable to the Fire District than the 32-foot standard width proposed.

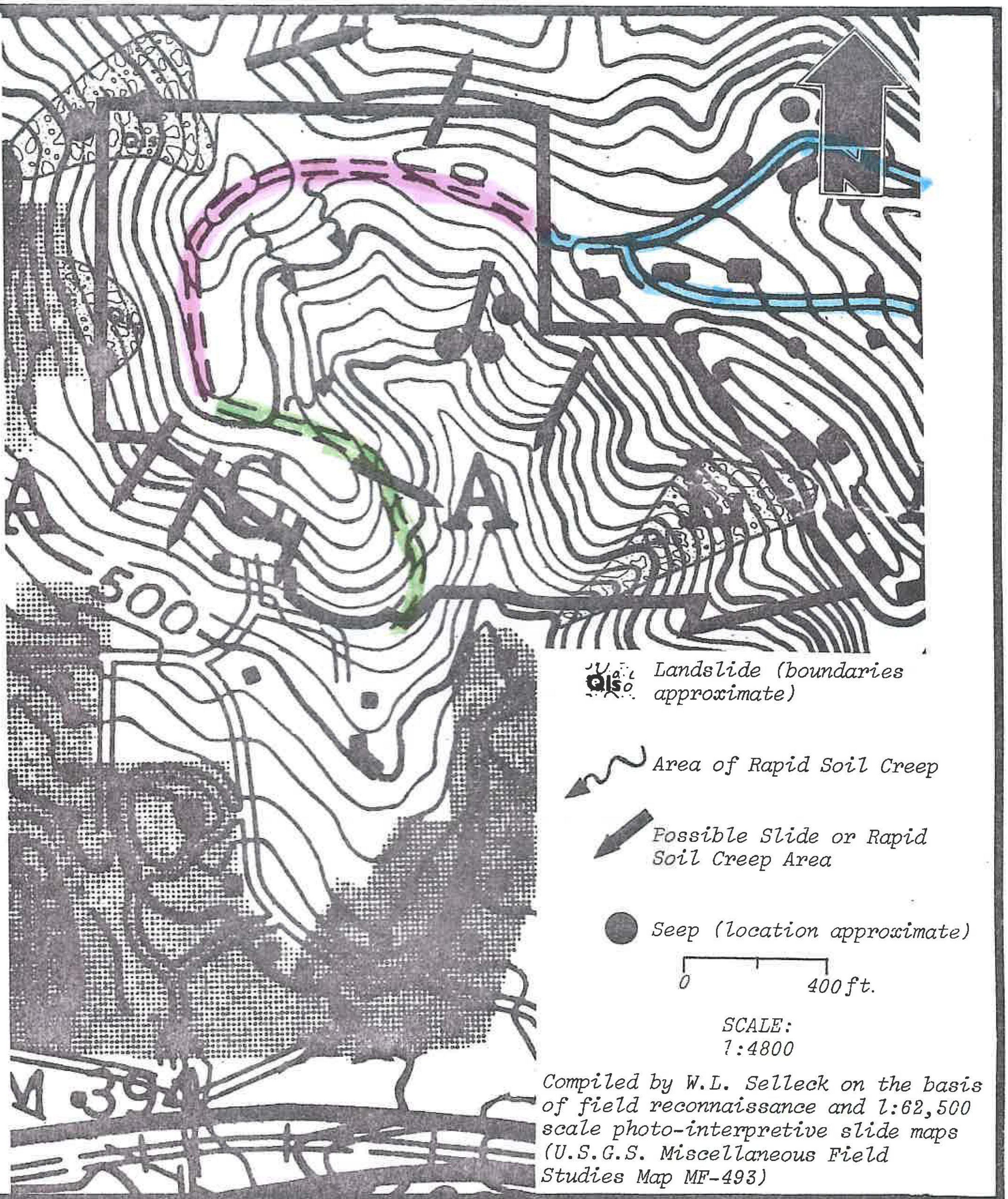
A measure that would assure a visually acceptable hillside pattern below the proposed dwellings would be the prohibition of rear yard fences which, if built on the projected lot lines, would create a strident geometric pattern foreign to the natural terrain.

Removal of trails from individual lots by the provision of easements similar to the one provided near the community swimming pool would eliminate the dependence of the system on private easement rights, and would prevent potential conflicts between trail use and individual parcel use.

The third indicated alternative is development of a regular R-20 development with no communal open space. Under the formulas of the Hillside and Ridgeline Regulations, each lot would require 43,000 square feet of land area per dwelling unit. The woodland canyon and the steep slope on the main ridge above the canyon would be used. Although each lot would be at least 43,000 square feet in area, the usable portion at and around each homesite would be considerably less. A maximum net of 40 to 45 lots could be obtained, allowing for roads and a possible community swimming pool. The impact of such a development would be visually different from the proposed Planned Unit Development project. The spacing of free-standing detached houses on one-acre lots would be in conformity with the pattern generally prevailing in Happy Valley and Lafayette, but more than 25 acres of canyon woodland and open hillside grassland left undisturbed by the P-1 project plan would be committed to private ownership and use forever, and be disrupted visually by twenty to twenty-five houses.

VII. RELATION BETWEEN SHORT-TERM AND LONG-TERM BENEFITS AND DETRIMENTS

Short-term benefits of the proposed project include the provision of housing for up to sixty families in the attractive and desirable environment that typifies Lafayette; and the increase in tax revenue, the stimulation of the construction industry economy and of employment in the building trades during construction



Compiled by W.L. Selleck on the basis of field reconnaissance and 1:62,500 scale photo-interpretive slide maps (U.S.G.S. Miscellaneous Field Studies Map MF-493)

SURFICIAL GEOLOGY

🟦 VIA ROBLE
QUAIL RIDGE RD.
🟪 TIFFANY HILLS
🟩 LOS ARABIS

FIGURE 8

1975

RECEIVED
AUG 20 2019
CITY OF LAFAYETTE
PLANNING DEPT.

ENVIRONMENTAL IMPACT REPORT

FOR

TIFFANY HILLS, TWENTY-TWO LOT SUBDIVISION

GROUPDESIGNERS

LAFAYETTE, CALIFORNIA

OCTOBER, 1975

PREPARED BY:

P. E. R. L. & Associates
1609 Oak Park Blvd.
Pleasant Hill, CA. 94523
(415) 935-8018

B

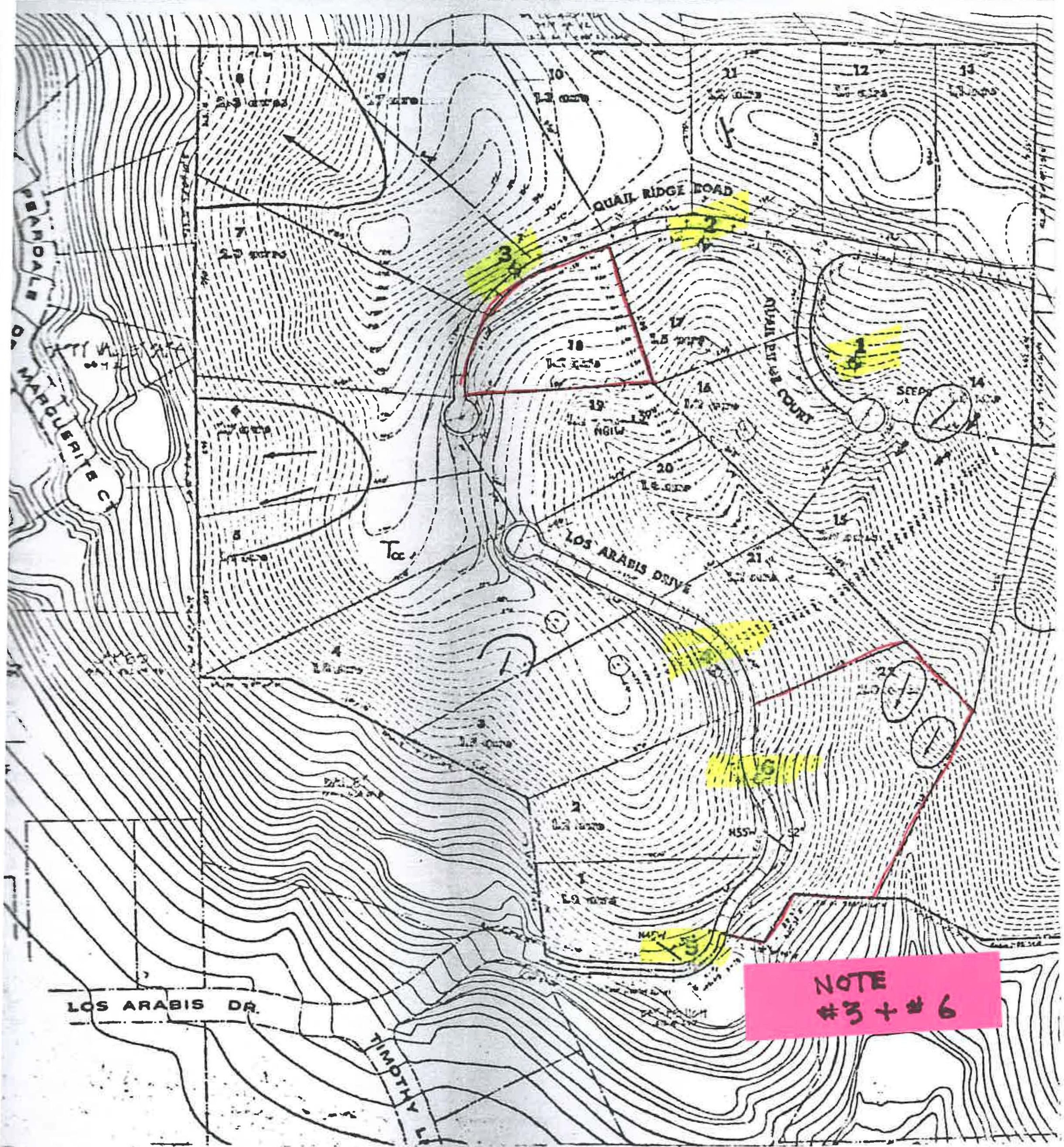
FOR:

City of Lafayette
Lafayette, CA.

EXHIBIT "B"

TABLE OF CONTENTS

E.I.R.

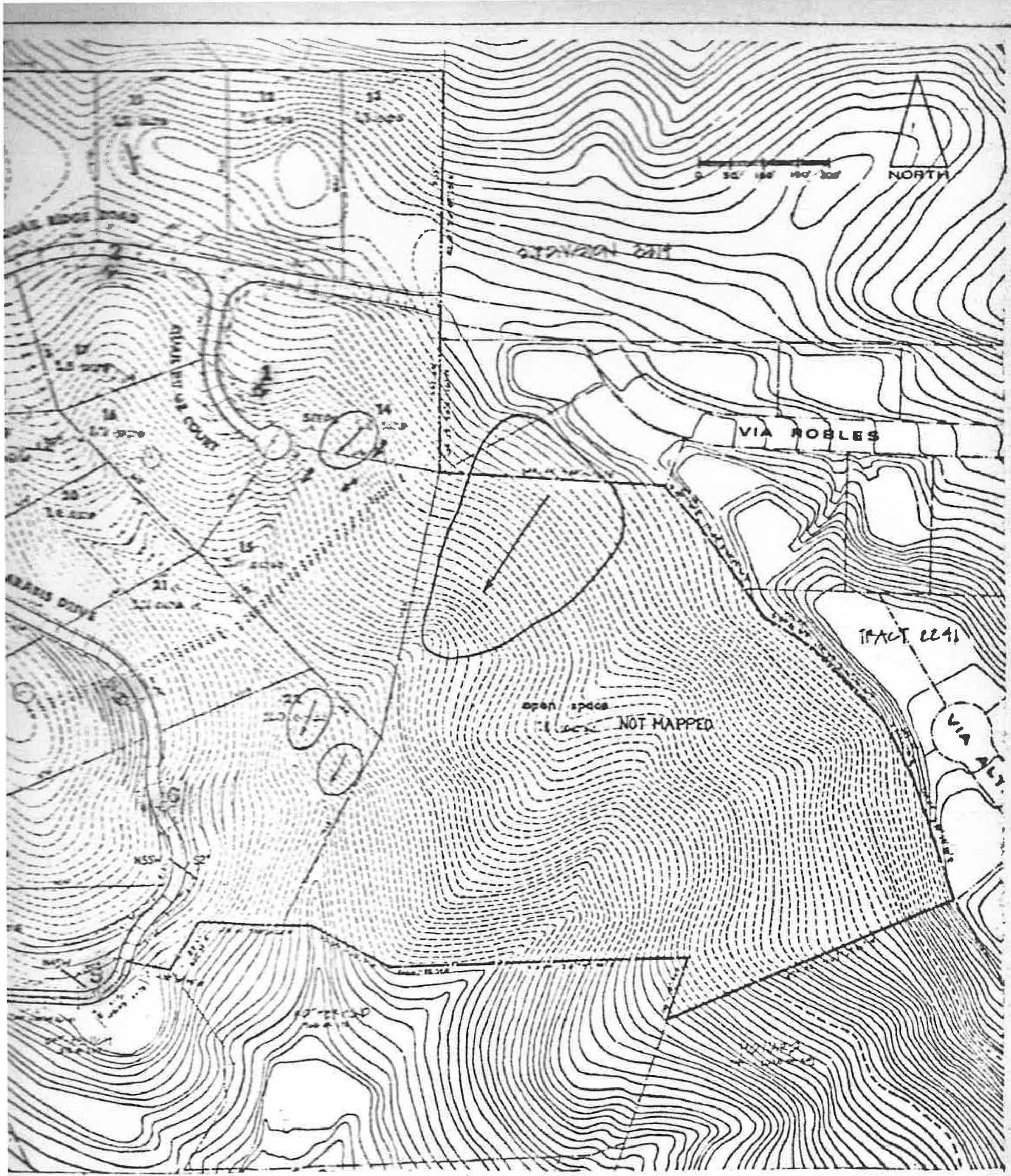


NOTE
#3 + #6

TEST BORINGS
1-6.

ENGEO
INCORPORATED
ENGINEERS AND GEOLOGISTS
CONSULTANTS IN THE APPLIED
EARTH SCIENCES
2150 SHATTUCK AVENUE, SUITE 600,

SCAL
DATE



ENGEO INCORPORATED
ENGINEERS AND GEOLOGISTS
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EARTH SCIENCES

Tiffany Hills
Lafayette, California

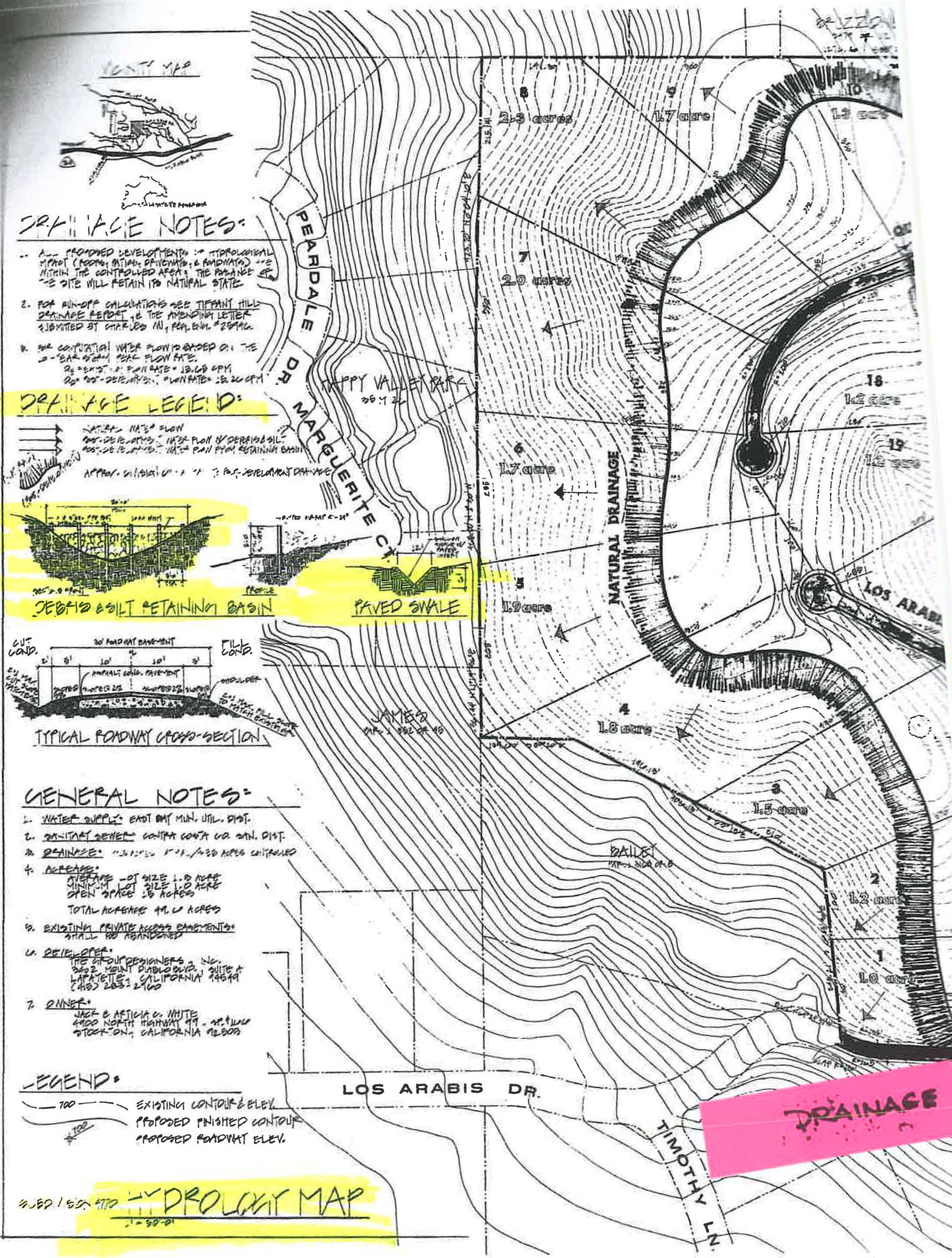
GEOLOGIC MAP

FIGURE NO. 4

SCALE 1" = 200'
DATE Oct 1975

JOB NO. N5-0638-B1

2150 SHATTUCK AVENUE, SUITE 600, BERKELEY, CALIFORNIA 94704 · PHONE (415) 548-8800



DRAINAGE NOTES:

1. ALL PROPOSED DEVELOPMENTS OF HYDROLOGICAL IMPACT (ROOFS, PATIOS, DRIVEWAYS, & ROADWAYS) ARE WITHIN THE CONTROLLED AREA; THE BALANCE OF THE SITE WILL RETAIN ITS NATURAL STATE.
2. FOR RUN-OFF CALCULATIONS SEE TIFFANY HILL DRAINAGE REPORT, & THE AMENDING LETTER SUBMITTED BY CHARLES MI, REG. ENG. #25946.
3. THE COMPUTATION WATER FLOW IS BASED ON THE 10-YEAR STORM PEAK FLOW RATE.
   Q_e = EXISTING FLOW RATE = 13.68 CFM
   Q_p = POST-DEVELOPMENT FLOW RATE = 15.20 CFM

DRAINAGE LEGEND:

NATURAL WATER FLOW
POST-DEVELOPMENT WATER FLOW W/ DEBRIS & SILT.
POST-DEVELOPMENT WATER FLOW FROM RETAINING BASIN
APPROX. DIVISION OF PRE- & POST-DEVELOPMENT DRAINAGE

DEBRIS & SILT RETAINING BASIN

PAVED SWALE

TYPICAL ROADWAY CROSS-SECTION

GENERAL NOTES:

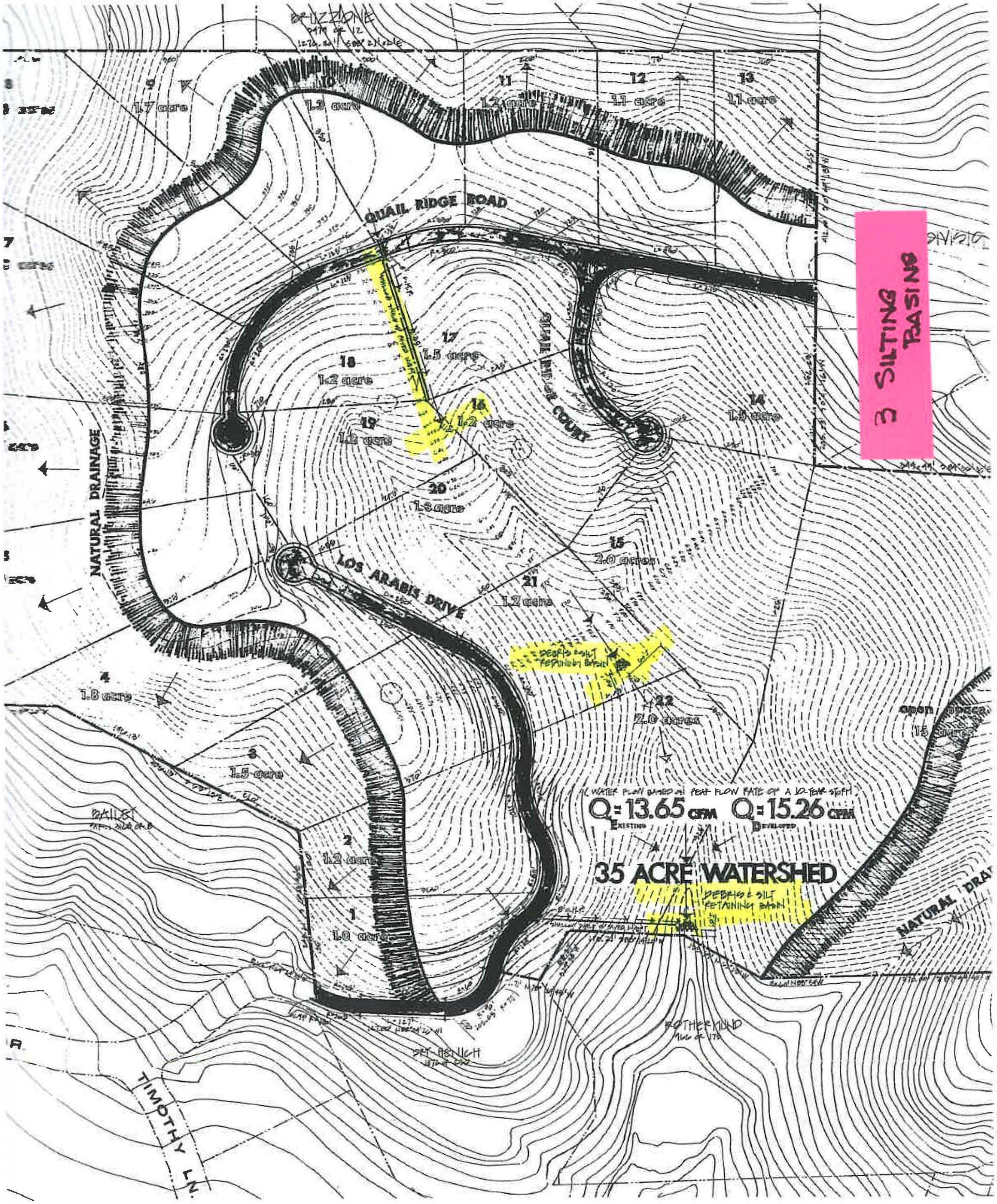
1. WATER SUPPLY: EAST BAY MUN. UTIL. DIST.
2. SANITARY SEWER: CONTRA COSTA CO. SAN. DIST.
3. DRAINAGE: [illegible] ACRES CONTROLLED
4. ACREAGE:
   AVERAGE LOT SIZE 1.5 ACRE
   MINIMUM LOT SIZE 1.0 ACRE
   OPEN SPACE 15 ACRES
   TOTAL ACREAGE 41.6 ACRES
5. EXISTING PRIVATE ACCESS EASEMENTS: SHALL BE ABANDONED
6. DEVELOPER:
   THE GROUP DESIGNERS, INC.
   3402 MOUNT DIABLO BLVD., SUITE A
   LAFAYETTE, CALIFORNIA 94549
   (415) 283-2100
7. OWNER:
   JACK & PATRICIA C. WHITE
   4900 NORTH HIGHWAY 99 - SP. [illegible]
   STOCKTON, CALIFORNIA 92505

LEGEND:

— 700 — EXISTING CONTOUR & ELEV.
PROPOSED FINISHED CONTOUR
700 PROPOSED ROADWAY ELEV.

SUBD / SD 4770 HYDROLOGY MAP
1" = 50'-0"

DRAINAGE


BRUZZONE
9
1.7 acre
10
1.3 acre
11
1.2 acre
12
1.1 acre
13
1.1 acre
QUAIL RIDGE ROAD
QUAIL RIDGE COURT
3 SILTING BASINS
17
1.5 acre
18
1.2 acre
16
1.2 acre
19
1.2 acre
14
1.5 acre
20
1.3 acre
NATURAL DRAINAGE
15
2.0 acres
LOS ARABIS DRIVE
21
1.2 acre
DEBRIS & SILT RETAINING BASIN
4
1.8 acre
22
2.0 acres
open space
15 acres
3
1.5 acre
BALLEST
WATER FLOW BASED ON PEAK FLOW RATE OF A 10-YEAR STORM
Q EXISTING = 13.65 CFM
Q DEVELOPED = 15.26 CFM
2
1.2 acre
35 ACRE WATERSHED
DEBRIS & SILT RETAINING BASIN
1
1.0 acre
NATURAL DRAINAGE
ROTHERMUND
DEHEUGH
TIMOTHY LN.

3

D. Avoid creating steep slopes so that plants may be easily established and maintained.

E. Stock pile topsoil to apply on sites that are otherwise unsuited for establishing vegetation.

F. Don't bury construction debris in fills.

G. Apply needed ground cover on exposed areas before fall rains start, and immediately on areas subject to wind erosion.

✓ H. Select species that are adapted to the site and purpose of planting (in this case, native species).

I. Begin and finish all earth movement before fall rains.

2. Keying and subsurface drainage may be required to mitigate landslide potential in areas of cut and fills.

3. Minimum grading of hillside lots to mitigate potential of land movement.

✓ 4. Houses must be specially designed to withstand potential shallow landslides.

5. Provide heavy retaining walls on driveways to reduce slope instability.

✓ 6. Individual, detailed soil investigations of each lot be done by a Soil Engineer when house details and locations are known.

7. Proper pavement and foundation design will mitigate the possibility of damage caused by expansive soils.

8. Properly designed structures can withstand anticipated ground shaking due to fault movement.

9. No structures should be located on suspected landslides unless slides are stabilized.

10. Subdrains will be required in seep areas to prevent blocking of subsurface water and future earth movement.

11. Construct a retaining and silting basin on-site at the base of the swale to mitigate increased run-off and flooding problems on Pine Lane.

12. During grading operations watering to control dust should be done; watering should be controlled so that erosion does not occur.

✓ 13. During construction, vibration and unacceptable noise levels can be mitigated by using quieter than normal or "new technology" equipment, operating fewer pieces of equipment at a time; scheduling noisy operations for the day-time hours and by arranging equipment operations within the site to reduce sound transmission to the boundary or noise sensitive locations.

✓ 14. Protect roots of oak trees, well beyond the drip line of the branches from grade changes, impervious paving, soil compaction and irrigation.
Any necessary soil grade lowering or root cutting should be compensated by appropriate overhead trimming. All trees should be protected from mechanical damage, injury from dumped chemicals, fill or debris during construction. Discourage use of introduced or foreign plant materials to prevent excessive irrigation.

✓ 15. Retain as much of the oak-woodland as possible, especially large old valley oaks and locations where brush species appear as an understory. Preserve dead snag used by acorn woodpeckers and as much as the natural grassland.

the groupdesigners inc.

architecture — engineering — construction — land planning

state contractor's license #[illegible]
registered civil engineer #[illegible]

Oct. 1, 1975

Mr.T.E.Burlingame
Assistant Public Work Director
Flood Control Planning
255 Glacier Drive
Martinez, Calif. 94553

Subject : Tiffany Hill Drainage Report (Lafayette, California)

Dear Mr. Burlingame:

On September 24, a meeting was held with Mr. Dennis Desmond, associate engineer of Contra Costa County Flood Control & Water Conservation District, Public Works Department. Conclusions are summarized as follows:

1. Since most proposed houses are located within one water shed area, I propose that the balance of the site will retain in its natural state. The hydrology computation is for this water shed area. Attached is a hydrology map (per your request) showing the water shed area, run-off direction and drainage details.

2. The proposed development will strive to maintain the site its rural quality and natural grade. The streets and driveways are confined to a paved width of 20 ft. with 5 ft. shoulder on each side, no gutters will be provided. Surface run-off will be overland flow type, follow natural grade and drain into an existing swale.

the groupdesigners inc.
architecture — engineering — construction — land planning
state contractor's license #292336
registered civil engineer #25946

3. Grading within this development will be kept at a minimum, most proposed houses are designed as split levels. The roof area per building site is assumed 3,000 sq ft. of which 1,000 sq. ft. allowrance for patio and driveway area.

4. The latest revision of design criteria are per the following:

Contra Costa County Flood Control and Water Conservation District Dwg. No. A-85. Date: 8/75. Entitled: Runoff Coefficients For Rational Method, and

Dwg. No. A-86. Date: 1/75. Entitled: Precipitation Duration-Frequency Intensity Curves.

Unimproved area:	C=0.3
Roofs, Driveways, asphalt paved streets:	C=0.85
Precipitation intensity:	I=1.3 In./Hr.

Revision for Tiffany Hill drainage report on pages 4 and 5 :

Revised Qe = 0.3 x 1.3 x 35
=13.65 C. F. S. ------------Existing condition
Qd = (0.85 x 2.27) + (0.3 x 32.73) x 1.3
=15.26 C. F. S. ------------After development
Total increase Runoff on a Percentage
Basis $\frac{15.26-13.65}{13.65}$ = 11 %

5. Locations and details of proposed silty and debris retaining basins are shown on hydrology map. Please review and comment.

REGISTERED PROFESSIONAL ENGINEER
CHARLES J. H. WU
No. 25946
CIVIL
STATE OF CALIFORNIA

Very truly yours,

Charles J. H. Wu

C. C. Mr. Dennis Desmond, Flood Control Planning, Public Works Dept.
Mr. Steve Billington, Planning Dept., City of Lafayette.
Ms. Jan Wilson, Perl & Associates.
Mr. Arnie Beyer, Pine Lane Home Owner Association.

figure 1 of this study

NGEO
NCORPORATED
ENGINEERS AND GEOLOGISTS • CONSULTANTS IN THE APPLIED EARTH SCIENCES

In Reply
Please Refer To:
N5-0638-B1

October 10, 1975

The Group Designers, Inc.
3402 Mt. Diablo Boulevard, Suite A
Lafayette, California 94549

Attention: Mr. Charles J. R. Wu

Subject: Tiffany Hills Development
Lafayette, California
SOIL AND GEOLOGIC STUDY

Gentlemen:

As requested, ENGEO has conducted a soil and geologic study for the site of the proposed Tiffany Hills Development. This data is to provide the necessary soil and geologic input for the Environmental Impact Report prepared by P.E.R.L.

Site Location and Description

The site is located on Quail Ridge, between Happy Valley Road and Upper Happy Valley Road in Lafayette, California. Access to the site is by way of Via Robles, which terminates at the northeast corner of the property and Los Arabis Drive which ends at the southwest corner of the property as shown on the site plan, Figure 1.

The site is irregular in shape and encompasses some 50 acres of undeveloped mostly grass-covered hillside. Scattered trees are found on the hillsides and clumps of trees are concentrated in the bottom of the ravine areas.

Elevations on the development area of the site range from approximately 780 feet on the ridge axis to 500 feet in the bottom of the swales. The hillside natural slopes vary from approximately 2:1 to 3:1, horizontal to vertical.

Scope

The scope of our study was to determine the effects of the soil and geologic conditions on the proposed development including the potential seismic hazard for the site.

Investigative procedures consisted of research and review of relevant geologic reports and maps (see bibliography), geologic field mapping and reconnaissance of the site, interpretation of an aerial photograph of the site and its vicinity, subsurface boring exploration and soil laboratory testing.

2150 SHATTUCK AVENUE, SUITE 400, BERKELEY, CALIFORNIA 94704 • PHONE (415) 548-8800

Subsurface Exploration

A field exploration program was conducted. A total of 6 borings, 15 to 20 feet deep, were drilled at the locations shown on Figure 1. Essentially, the boring coverage was along the proposed roadway alignments.

Initial grading proposed is to extend the existing bordering roadways and provide access to some 22 lots of 1 acre plus in size for later development for single-family lots. Borings were so located to investigate the feasibility of the proposed grading for the roads in the areas of major cuts and fills.

Soil Conditions

The upper layer of on-site soils consists mostly of residual plastic silty clays derived from the underlying bedrock, These soils can exhibit a high expansion potential. Below the upper clays, a weathered zone of generally silty sands with varying amounts of pebbles was encountered overlying sandstones and conglomerates.

On the ridges and on the steep hillside slopes, the soil mantle is thin, probably varying from 1 to 3 feet in thickness, whereas in the swale areas and on the flatter hillside slopes, the decomposed layer can be expected to be thicker and could be in excess of 20 feet. In boring 5, a layer of existing fill, approximately 7 feet thick, was encountered which was on the outside edge of an existing trail.

The soils of the area have been mapped as Diablo-Altamount association which is formed on moderately steep uplands. The soils are well drained and slowly permeable with a moderate erosion hazard. The Altamount soils are characterized by greyish brown subsoils with soft shales and fine-grained sandstone as the parent material. Because of steepness, the prime agricultural usage would be for pasture range.

Because of shrinkage crack development and the steepness of the terrain, some slow downhill soil creep under the effect of gravity can be expected in the upper soils. Some areas of suspected earth movement, which would include the parent material and weathered bedrock in most cases, are shown on the enclosed site plan. This does not include mapping of all slides in the proposed open space area which is beyond effecting the proposed improvements.

Geologic Setting

The bedrock at the site is composed of sedimentary loosely consolidated pebble conglomerates, grey to tan moderately hard sandstone, siltstone and claystones, belonging to the Tertiary Contra Costa Group (undifferentiated). The orientation of the bedrock at the site is northwest - southwest as shown by the symbols on Figure 1. The dip angle is 35° to 55° to the northeast. This bedding may be overturned based on evidence of graded bedding.

Seismicity

Available geologic map studies do not show any faults passing through the project area.

According to the geologic map by R. B. Saul, *Geology and Slope Stability of the S.W. ¼ Walnut Creek Quadrangle, Contra Costa County, California*, the Las Trampas Fault is approximately 1.8 miles to the east of the site. A secondary splinter of this fault lies approximately 1.1 miles east of the site. Another splinter fault, splaying from the Las Trampas Fault, extends south of the site and may pass in the vicinity of Lafayette Dam.

The Las Trampas Fault can be viewed as a portion of the Calaveras Fault System which is considered potentially active. No record of ground displacement has been recorded on the Calaveras Fault more than 5 miles north of Dublin.

The active Hayward Fault is situated approximately 6 miles southwest of the site and the active San Andreas Fault lies almost 25 miles from the site.

Seismic Hazards

The San Francisco Bay Area is seismically active, that is, subject to earthquakes. The site could be affected by earthquakes with epicenters on any of the active faults in the Bay Area. At present, it is not possible to predict when or where movement will occur on these faults. However, it must be assumed that one or more the these faults will move during the life expectancy of any construction on the site.

In the event of an earthquake, seismic risk to a structure depends on the distance of the structure from the epicenter and source fault, the character of the earthquake, the geologic, groundwater and soil conditions underlying the structure and its immediate vicinity and the nature of the construction.

The damaging effects of earthquakes are classified as primary and secondary. The primary effect is ground rupture, also called surface faulting. The common secondary effects are: ground failure caused by soil liquefaction, lurch cracking or lateral spreading, landslides, regional subsidence or uplift and structural damage due to ground shaking.

Ground rupture tends to occur along lines of previous faulting. Since no active faults were found on the site, the potential for ground rupture can be considered minimal.

The secondary seismic effects of liquefaction, lurch cracking and lateral spreading are related to soil and groundwater conditions. These conditions are considered to be favorable at the site and the potential for these seismic effects is rated low.

suggested that limited grading be done on the hillside lots to mitigate the potential of land movement. These houses must be specially designed to withstand potential shallow landslides. The uphill lots must be provided with steep driveways. These driveways may induce instability of the slopes unless provided with heavy retaining walls. We recommend that a detailed soil investigation of each lot be done by a Soil Engineer when house details and locations are known.

Expansive Soils

The on-site soils are expansive and this may cause certain problems with the proposed dwellings such as cracking of the plaster and the concrete floors and possibly structural damages. Most of the damage caused by the expansive soils can be prevented by proper foundation design. Roadway pavement may also crack because of expansive soil. With proper pavement design, this also can be prevented.

Earthquake hazards at this site are a possibility. Since no fault crosses the site, ground rupture is unlikely. Damage to the proposed dwellings caused by earth shaking is possible, however, properly designed structures can withstand anticipated ground shaking.

The existing landslides outlined in Figure 1 may be reactivated during an earthquake. We recommend that no structures be located on the suspected landslides unless they are stabilized.

Ground Water

There is existing intermittent spring activity on the site in the form of seeps, see Figure 1. The minor cul-de-sac Quail Ridge Court is anticipated to have a terminal high fill slope in a seep area. Initial preparation for filling will require an adequate subdrain system. Caution will need to be taken in the other ravine fills to prevent the blocking of subsurface groundwater. The adverse effects of seeps can be minimized by the prudent use of subdrains.

Sincerely,

ENGEO, Inc.

William B. Wigginton

William B. Wigginton
Certified Engineering Geologist #855

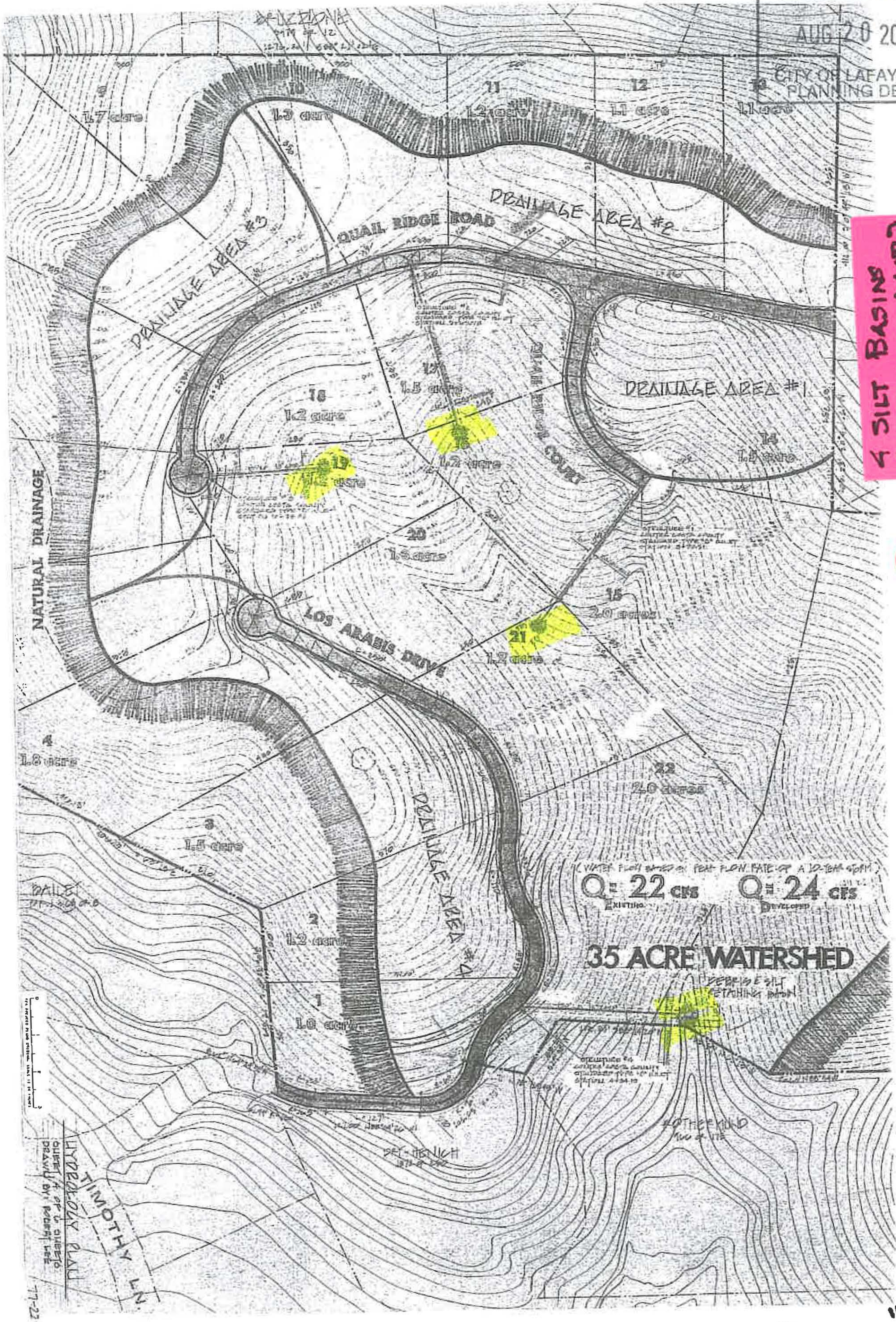
Copies: 4 to Client

Depth in Feet	Sample No.	Log & Location of Sample	DESCRIPTION	N Standard Pen Blows/Ft.	q_u U.C.S. T.S.F. *	IN-PLACE	
						Dry Density P.C.F.	Moisture Content % Dry Wt.
		▨	light brown to grey silty CLAY, very stiff				
		▨	light tan sandy CLAY with fragments of sandstone and claystone, damp				
5							
10			more sand				
			moist				
15							

ENGEO INCORPORATED	Tiffany Hills	FIGURE No. 4 JOB No. N5-0638-B1 DATE Oct 1975	BORING No. 3

Depth in Feet	Sample No.	Log & Location of Sample	DESCRIPTION	N Standard Pen Blows/Ft.	q_u U.C.S. T.S.F. *	IN-PLACE Dry Density P.C.F.	IN-PLACE Moisture Content % Dry Wt.
5			dark brown silty CLAY FILL				
10			brown silty CLAY with trace of sand, very stiff				
15 20			tan silty CLAY with fragments of claystone and sandstone hard drilling				

ENGEO INCORPORATED	Tiffany Hills	FIGURE No. 7 JOB No. N5-0638-B1 DATE Oct 1975	BORING No. 6?



4 SILT BASINS
Q. ON FINAL MAP?

④ FOUR

EXHIBIT "B-1"

Contra Costa County
FLOOD CONTROL
& Water Conservation District

VICTOR W. SAUER
ex officio Chief Engineer

J. E. TAYLOR, Deputy Chief Engineer
255 Glacier Drive, Martinez, Calif. 94553
Telephone (415) 372-4470

November 28, 1975

Planning Department
City of Lafayette
975 Oakland Street
Lafayette, CA 94549

Our File: 1002-4770

Attention: Steven D. Billington,
Assistant City Manager/Planning Director

Gentlemen:

The technical staff has reviewed the Environmental Impact Report submitted for Subdivision 4770 and has the following comments:

1. Summary Table, first page, under Geophysical; Hydrology - the statement that there are no permanent water courses on the site is erroneous.

2. Page 5, Item B-1 Topography - the reference to "secondary" drainage channels in the second to last sentence should be changed to "minor" drainage channels.

3. Page 6, Item B-2 Impact on Geology --- etc. - the first paragraph does not include anything about erosion that may occur as a result of discharge of storm water flows from the roadside ditches nor does it mention any method of prevention.

4. Page 7, Item B-3 Hydrology - the first paragraph states that there are no permanent water courses on the site. This statement is erroneous.

In the second paragraph, the swale referred to would be more accurately defined as a draw or ravine. Also, the last two sentences are vague and do not seem to agree with the preceeding sentences.

5. Page 7 Item B-3 Impact on Hydrology - the second paragraph refers to silting and debris retaining basins which are shown in a detail on the Hydrology map following Page 7. These basins are unacceptable. We do not believe they will function as intended and will be a potential hazard to downstream properties.

Very truly yours,

Victor W. Sauer
ex officio Chief Engineer

RECEIVED
DEC 1 - 1975
CITY OF LAFAYETTE

By B. O. Fawcett for TEB
T. E. Burlingame
Assistant Public Works Director
Flood Control Planning

DJD:bb

Malcolm K. Nielsen
1050 Pine Lane
Lafayette, California 94549

December 10, 1975

RECEIVED
DEC 17 1975
CITY OF LAFAYETTE

Steve Billington, City Planner
City of Lafayette
Lafayette, California 94549

Dear Mr. Billington:

I had the opportunity to examine the Environmental Impact Report that was prepared on the Tiffany Hills Sub-Division. Not being an engineer I cannot comment on the technical aspects of this report. I am concerned, however, about two sections of the report: (1) the proposal that a silting-debris retaining basin be constructed at the bottom of the existing swale (page 7). This seems to be quite vague. I cannot find in any other part of the report a description of what a silting and debris basin is, or any specifications for such an installation. As I examine the map it appears that this basin would be constructed very close to the back property line of our property and I am concerned as to the characteristics of this construction. In addition, this basin is proposed to be built on the 15 acres of open space that is dedicated to the City. Will the City assume responsibility for the maintenance, and I assume maintenance is required, of such an installation? I would hope that before the Environmental Impact Report is accepted and before the sub-division is approved, we would be given much greater detail as to the nature of this basin and responsibility for maintenance.

(2) It is proposed that 15 acres is to be retained in a natural state and dedicated to the City "as part of the parks, recreation, and open space element for use by the surrounding neighborhood". I would suggest that the Planning Commissioner and the Planning Commission examine the proposed 15 acres very carefully. It is my opinion that the sub-divider basically is trying to unload land that is not only worthless, but actually may be a liability to the City. A large portion of it is a practically impossible ravine that starts at our back property line and goes on over the hills. The growth of poison oak is luxuriant in this area. Fire abatement procedures in the area would be expensive and it would require constant petroling to keep the dirt bike riders from creating a nuisance and possible ~~and~~ slight problems. It may even be better for the City if the sub-divider distributed the 15 acres of land between the various lots that abut the property so that there is someone responsible for the land, and not just thrown in to that open space basket that seems such a popular proposal these days.

Malcolm K. Nielsen
1050 Pine Lane
Lafayette, California 94549

I look forward to receiving any additional information from the Planning Commission or the people that prepared the environmental impact study on the two above subjects.

Cordially,

Malcolm Nielsen

Malcolm K. Nielsen

4770

10E

RECEIVED
AUG 20 2019
CITY OF LAFAYETTE
PLANNING DEPT.

DEC. 12, 1988

TO: Lafayette City Council

FROM: Betsy Van Popering, Associate Planner

RE: Tiffany Hills Subcommittee

As you may recall, the Tiffany Hills subdivision recorded in 1978 with 22 lots has been a source of close scrutiny and review for the last ten years. The lots off of Quail Ridge Road and Los Arabis Drive have had Planning Commission, Design Review Committee and Council Subcommittee reviews and releases for issuance of building permits.

The last lot (located off Quail Ridge Road) has construction on it now. One lot remains vacant off of Los Arabis because of a slide that destroyed a residence. This lot is currently owned by Central Sanitary District and is not expected to have another residence on it.

Because the Council at one time required requests for all building permits to be reviewed by the Subcommittee of the Council prior to issuance, the review period is automatically extended. Now that all residences have been built or are currently under construction within the Subdivision, it is recommended that future applications for accessory structures or additions be processed through the Planning Commission and Design Review Committee per the requirements of the Hillside and Ridgeline Ordinance.

RECOMMENDATION

Disband the Council Subcommittee on Tiffany Hills.

bvp

APPROVED
LAFAYETTE CITY COUNCIL

CITY CLERK 12/12/88
DATE

4770

4770

EXHIBIT A

CONDITIONS OF APPROVAL FOR SUBDIVISION 4770

GENERAL

1. Approval is based on the tentative map dated "1 July 75", on file in the City Office, with the exception of changes resulting from the conditions listed herein.

2. The maximum number of approved residential lots is 22.

3. Before building permits are issued, elevations and site plans for houses and accessory structures proposed for each parcel shall be approved by the Environmental Review Commission. No fee shall be charged for processing these plans through said Commission. In reviewing these plans, the Commission shall consider height, finish materials and colors, siting of structures, grading, tree removal, and other aspects of proposed environmental change to assure that improvements blend with the natural environment.

4. House numbers and names for private roads must be approved by the Planning Director before building permits are issued.

5. There shall be no further subdivision of the property. In order to implement this condition the owner(s) shall, before a building permit is issued, grant to the City a scenic easement, acceptable in form to the City Attorney, precluding further subdivision.

6. Before a building permit is issued, the owner(s) shall request that the City Council provide that the State Vehicle Code apply to the private roads in the subdivision.

UTILITIES:

7. Sewage disposal facilities serving this subdivision shall be installed by the developer as required by the Central Contra Costa Sanitary District. Each individual living unit shall be served by a separate sewer connection. The sewers located within the boundaries of this subdivision shall become an integral part of the Central Contra Costa Sanitary District's sewerage collection system. Any offsite improvement of existing sewer lines necessary to provide service to this subdivision shall be made at the expense of the developer.

8. Water supply facilities acceptable to the East Bay Municipal Utility District shall be installed at the expense of the developer. Each individual living unit shall be served by a separate water connection. Such water distribution system located within the boundaries of this subdivision shall become an integral part of the East Bay Municipal Utility District's water distribution system.

9. Public utility easements will be required for the electric distribution, telephone communications and cable television systems. The exact locations of the easements shall be determined by Pacific Gas and Electric Company, Pacific Telephone Company, and Televents. All necessary public utility easements shall be shown on, and shall be conveyed to the utilities by appropriate language on, the Final Map.

EXHIBIT "C-1" 4770

10. Any changes in existing utility poles or other utility facilities desired by the developer or required by the City in the development of this subdivision shall be made only at the expense of the developer.

11. All utility distribution facilities shall be installed underground. Facilities shall include conduit for cable television to be installed by the cable company, at the expense of the developer.

FIRE SAFETY:

12. The Final Map shall show, and language thereon shall convey to the City, an easement for pedestrian, utilities, and fire fighting access between the termini of the Los Arabis and Quail Ridge Road cul-de-sacs, the width, alighnment and required nature of improvement of which shall be approved by the Contra Costa County Consolidated Fire District. The subject easement shall be kept clear of trees and shrubs.

13. Fire hydrants in the number and locations required by the Fire District shall be installed at the expense of the developer. Required fire flow shall be as specified by the Fire District.

14. All roofs in the subdivision shall either be constructed of roofing material which bears an Underwriter's Laboratories Class C or higher rating, or be provided with a fire protective sprinkler system considered by the Fire District to provide fire protection equivalent to that provided by Class C roofing materials.

15. House numbers shall be conspicuously posted at the intersections of the private driveways and the private subdivision road.

16. In connection with the construction of buildings on each residential lot, the builder shall comply with these requirements:

    a. All combustible grass, weeds and native brush shall be removed for a distance of not less than thirty feet (30') from around all buildings and structures. Such fire breaks shall be made permanent by the planting and maintenance of non-resinous, fire resistive plants or ground covers.

    b. A cleared space of at least ten feet, measured from the drip line, shall be maintained between any chimney and the nearest tree, shrub, or other vegetation.

17. The Fire District shall approve fire hydrant turn-out areas near each hydrant, as shown on the Improvement Plans, before the Final Map is presented to the City Council for approval.

18. Signs prohibiting on street parking, except in approved parking bays, shall be installed at the expense of the developer along both the Los Arabis and Quail Ridge Road cul-de-sacs.

GRADING:

19. A grading permit shall be required for all earthwork necessary to develop the subdivision.

20. Before the issuance of a building or grading permit for any lot, a soil investigation report prepared by a licensed soil engineer shall be required. It shall report on the ability of the site to support the improvements anticipated and shall include recommended foundation designs, driveway grading, and surface and subsurface drainage to achieve maximum stability of soils.

21. The plans accompanying each application for a building permit for a residence shall show the existing contours and the extent of the proposed grading and drainage improvements, and shall be approved by the Grading Section of the County Building Inspection Department (hereinafter called "Grading Section") and by the Land Development Division of the County Public Works Department (hereinafter called Land Development) before said permit is issued.

222 An encroachment permit shall be obtained for construction within any public street right-of-way.

23. All grading shall be kept to a minimum and no level lot pads shall be created.

24. For construction of homes on individual lots, no exposed cut shall exceed five vertical feet and no cut or filled slope shall exceed 2 to 1, horizontal to vertical. Subject to approval of the Grading Section and the Environmental Review Commission, cuts may exceed five vertical feet on lots 2 to 13 inclusive to assist in preventing visual encroachment of walls of proposed structures into the skyline of the ridge on the subdivision property.

25. The Grading Section shall be assured, during the development process, that all earthwork is being performed in substantial conformance with the recommendations contained in the submitted geotechnical investigation report by ENGEO, Inc., Job # NS-0638-B1. Any deviations from those recommendations must be approved by the Grading Section, and deviations which, in the opinion of the Grading Section, are substantial shall be approved by the City Council.

26. Detailed plans and specifications of the private roads of the subdivision (including parking bays and fire hydrant bays) shall be submitted to the Grading Section for approval. The road improvements shall be bonded in an amount equal to 100% of the estimated construction cost before the Final Map is submitted to the City Council for approval.

27. No work shall be started in the subdivision until the Improvement Plans have been approved by the City Council.

28. A timetable for private road construction shall be approved by the Grading Section before a grading permit is issued.

29. All exposed cuts and fills necessary for subdivision development shall be hydroseeded with a plant material with low fuel-loading characteristics, approved by the Fire District.

30. To the maximum extent reasonably possible, cuts and fills shall be balanced so that no earth needs to be imported onto, nor exported from, the subdivision.

31. During any grading/filling operations on site, watering to control dust shall be done by the applicant to the satisfaction of the Planning Director, with proper control to prevent erosion.

32. During major on site road grading and improvement work, the developer, at the discretion of the Planning Director, may be required to provide one or more flagmen on Los Arabis Drive and one or more flagmen on Via Roble for the safe movement of large construction vehicles in those areas with poor or unsafe vehicular sight distance.

33. All swimming pools proposed in the subdivision shall be engineered, and shall be approved by the Grading Section prior to issuance of building permits.

DRAINAGE:

34. All Storm drainage improvements shall be provided and installed by the developer, subject to the approval of both Land Development and the Grading Section. Such improvements shall include, but shall not be limited to, curbs, dikes, inlets, debris catching devices, siltation ponds, pipes, and such other downstream improvements as may be required.

35. Before the Final Map is approved, the developer shall submit, for approval by the Grading Section and by the Planning Director, a time-table for construction of required drainage facilities, indicating that all required improvements will be completed on or before October 1 of the calendar year in which development begins.

36. Natural channels and gullies within the subdivision which are to remain in their natural state shall be stabilized and shall comply with requirements of Land Development.

37. Drainage easements for watercourses and storm drainage facilities within the subdivision shall be shown on the Final Map and shall be offered for dedication to the City.

38. After installation of required of required on-site improvements and prior to issuance of any building permits for permanent structures, the main drainage swale on site, and off site as recommended by Land Development, shall be cleaned of all debris for maximum unobstructed flow of storm waters.

PARKING:

39. Paved on-street parking bays shall be provided to accommodate parking for at least 5 vehicles on the Los Arabis cul-de-sac, and for at least 6 vehicles on the Quail Ridge cul-de-sac. Each parking space shall have minimum dimensions of 8' x 22' and their locations shall be approved by the Grading Section.

40. Fire hydrant turnouts shall be provided in the locations and numbers required by the Fire District.

41. Each approved lot shall provide a minimum of 4 off-street parking spaces with the dimensions of 10' x 20' behind the required front setback.

CIRCULATION:

42. The Improvement Plans shall show a road pavement width of 20' for both the Los Arabis Drive and Quail Ridge Road extensions with minimum 25' radius cul-de-sac pavement, or such greater radii as may be required by the Fire District.

43. Access to lots 15 and 16 shall be over a minimum 16' wide paved drive.

44. Prior to commencement of any on site work, the developer shall perform selected brush and tree branch removal, as required by the Planning Director, at the intersection of Los Arabis Drive

and Upper Happy Valley Road for safer sight distance for westbound vehicles.

45. Prior to the start of construction in the subdivision, or prior to recordation of the Final Map, whichever occurs first, the applicant shall provide to the Planning Director a set of photographs which shall clearly indicate the state of repair of Los Arabis Drive east of Upper Happy Valley Road. Said photographs shall be used for comparison of the condition of that portion of Los Arabis Drive after final inspection and approval of required on site improvements, including but not limited to roads, curbs, gutters, drainage facilities and utilities, or after a period of two years from the date of approval of the Final Map by the City Council, whichever is later. The developer shall, prior to recordation of the Final Map, enter into a recordable agreement to insure that the subject portion of Los Arabis Drive shall be repaired by him at the time specified in this condition to at least the level of repair which existed prior to commencement of construction. Inspection of the road with use of the photographs prior to commencement of construction and after completion of the required on site improvements or two years after approval of the Final Map, whichever is later, shall be by the Planning Director or his designee.

46. The applicant shall install at his expense bollards or some other device, to be approved by the Consolidated Fire District, to prevent through vehicular traffic of passenger vehicles between the termini of the Los Arabis Drive and Quail Ridge Road cul-de-sacs.

47. The applicant shall at his expense relocate the guard rail currently located at the western terminus of pavement on Quail Ridge to the north side of the intersection of Via Roble and Quail Ridge Road.

48. The following easements shall be shown on the final map and shall be offered for dedication to the City:

a. A 10' wide pedestrian/equestrian easement along the west property line of lot 11.

b. A 10' wide pedestrian/equestrian easement running south from Quail Ridge Road along the westerly and southerly property lines of Lot 14 to the northwest corner of the area indicated as open space on the tentative map.

c. A 10' wide non-exclusive pedestrian/equestrian, and utiltity easement between the termini of the Los Arabis Drive and Quail Ridge Road cul-de-sacs. Prior to issuance of any building permits for structures in the subdivision, the develope at his expense shall install a 4" think, 6' wide paved pedestrian path within said easement between the subject cul-de-sacs.

SITING OF STRUCTURES:

49. All structures shall be sited on the interior (southerly and westerly) of the ridgeline as shown on the submitted hydrology map on file with the City. Unless otherwise approved by the Environmental Review Commission, no structures shall be so designed or sited on Lots 2 to 13 inclusive, so as to protrude into the skyline above the ridge as viewed from the northwesterly terminus of Knox Drive.

* All requests for building/grading permits shall be reviewed + approved by Subcommittee of City Council prior to issuance.

50. Major landscaping treatment (trees and shrubs) of the more visible ridgeline lots (lots 2 to 13 inclusive) shall be with native California plant materials suitable to the local climate and the particular terrain of individual lots and shall be approved by the Environmental Review Commission.

MISCELLANEOUS:

51. The developer shall be responsible for the prompt removal of all construction materials, debris, mud and other foreign matter which is placed or is spilled off-site on any city streets, resulting either from the development of the subdivision or from the construction of houses therein. A $500 bond or other financial guarantee shall be deposited with the City prior to commendement of any construction on site to insure compliance with this condition. The bond shall be held by the City until all lots are developed with dwelling units.

52. Before the Final Map is recorded, a copy of the conditions, covenants, and restrictions of the subdivision shall be approved by the City Council. The document shall include provisions for continuing architectural control of development on all lots after initial City architectural control by the Environmental Reive Commission has been exercised.

53. Before the Final Map is recorded, an assessment district shall be formed for the purpose of providing revenue for continuous maintenance of the on-site drainage system, on-site roads, the impr proved pedestrian trail between cul-de-sacs, and the 15 acres common open space. The assessment district shall include all the subject property. The revenue derived from the assessment district shall be used by the City only for said maintenance. The City will be responsible for maintenance of the drainage system. Maintenance shall include regular periodic removal of silt from any siltation pond(s) constructed within the subdivision.

54. No additional overhead transformers, cables, wires, or any increase in existing wire diameters shall be installed on Via Roble in order to accommodate this Subdivision.

DECLARATION OF RESTRICTIONS
SUBDIVISION 4770
TIFFANY HILL. LAFAYETTE

WHEREAS, the undersigned are the owners of that certain real property situated in the County of Contra Costa, State of California, described as follows:

Lots 1 through 22 inclusive. Map of Subdivision 4770, filed August 12, 1977, Map Book 200, page 43, Contra Costa County records.

WHEREAS, it is the desire of said undersigned owners to impose upon said real property and the present and future owners thereof, the restrictions and covenants hereinafter set forth.

NOW THEREFORE, said undersigned owners do hereby declare that each lot designated on said map of Subdivision 4770 shall be held and conveyed subject to the conditions, restrictions and covenants hereinafter contained as follows:

ARTICLE I
USE RESTRICTIONS

Section I. The properties and all lots or plots located therein, are hereby declared to be residential in character, and shall not be used for any purpose or purposes other than residential purposes.

Section 2. Ho building, other than a detached single family dwelling house and appurtenant outbuildings, including garages for private use, shall be erected, constructed or maintained on the properties to be used for any purpose other than a private dwelling house or appurtenant outbuilding, including garage for private use.

Section 3. For the purpose of this Declaration, a private garage for the use of the owners or occupants of the lot upon which said garage is erected shall be deemed an outbuilding, and may be erected and constructed on such lot. A private garage may be incorporated in and made a part of any private dwelling house erected on the lot in the manner prescribed in this Declaration, but may not be used or occupied for dwelling purposes.

Section 4. When the construction of any building on any lot is once begun, work thereon must be prosecuted diligently and it must be completed within a reasonable time. No building shall be occupied during construction, or until a final inspection is made by the governmental agency involved.

Section 5. No outbuildinq, garage, shed, shack, tent, trailer or temporary building of any kind shall be erected, constructed, permitted or maintained on any lot prior to commencement of the erection of a dwelling house, and no outbuilding. garage, shack, shed, tent, trailer, basement, or temporary building shall be used for permanent or temporary residence purposes.

Section 6. No dwelling shall be permitted on any lot at a cost of less than S150,000.00, including cost of lot and dwelling house, based upon cost levels prevailing on the date these covenants are recorded, it being the intention and purpose of the covenant to assure that all dwellings shall be of a quality of workmanship and materials substantially the same or better than that which can be produced on the date these covenants are recorded at the minimum cost stated herein for the minimum permitted dwelling size. The floor area of the main structure, exclusive of one-story open porches and garages, shall be not less than 2,000 square feet.

Section 7. No sign of any kind shall be displayed to the public view on any lot or plot except one sign of not more than five square feet in size advertising the property for sale or rent, or signs used by Declarant or any other builder to advertise the property during the original construction and sales period.

Section 8. No animals, livestock, or poultry of any kind shall be raised, bred or kept on any of the properties except that dogs, cats, or other household pets may be kept, provided that they are not kept, bred, or maintained for any commercial purpose.

Section 9. The area of any lot lying between the principal building thereon and the public front or side Street bordering such lot shall at all times be kept free of rubbish, litter and weeds. No building materials or other substances shall be piled, placed or otherwise stored on such portion of any lot or plot alter the completion of the residence thereon.

Section 10. No lot or plot shall be used or maintained as a dumping ground for rubbish. Trash. garbage or other waste shall be kept thereon except in sanitary containers All equipment for the storage or disposal of such materials shall be kept in a clean and sanitary condition.

Section 11. No provision on herein shall be interpreted to forbid the use of any lot or plot within said property for public park or public playground and recreational purposes.

Section 12. Sewage disposal shall be by means of public sewer and no Cesspools or outside toilets shall be permitted.

Section 13. No noxious or offensive activity shall be carried on on any lot, nor shall anything be done thereon which may be or become a nuisance or annoyance to the neighborhood.

Section 14. No individual water-supply system shall be permitted on any lot unless such system is located, constructed and equipped in accordance with the requirements, standards and recommendations of the appropriate public health authority. Approval of such system as installed shall be obtained from such authority.

Section 15. No owner of a lot within said property shall permit anything to be done or kept on said lot which will result in the cancellation of or increase in the premium on insurance on any portion of said property, except the owner's lot, or which would be in violation of any law.

Section 16. No mast, tower, antenna, or similar structure shall be erected or maintained on the exterior of any lot or any portion of any improvement thereon.

EXHIBIT "C-2"

Section 17. No owner of a lot within said property shall park, store, or keep, or permit the parking, storage or keeping of any commercial vehicle,
truck camper or any boat trailer or aircraft, in or upon the public street or private streets within said property except for occasional temporary periods of time of not more than eight hours, nor shall any owner of a lot within said property repair or restore any motor vehicle boat trailer or aircraft in or upon the public streets or private streets within said property except for emergency repairs to motor vehicles or trailers, and then only to the extent necessary to enable movement of the vehicle or trailer.

Section 18. Every owner of a lot within said property excepting declarant and its initial corporate transferees shall have the obligation to maintain in sound and attractive condition the landscaping and fencing on his lot which are visible from the street on which the lot fronts.

Section 19. No oil drilling, oil development operations, oil refining, quarrying or mining operations of any kind shall be permitted upon or in any lot, nor shall oil wells, tanks, tunnels, mineral excavations or shafts be permitted upon or in any lot. No derrick or other structure aligned for use in boring for oil or natural gas shall be erected, maintained or permitted upon any lot.

ARTICLE II
ARCHITECTURAL CONTROL

Section 1. No building, fence, wall or other structure shall be commenced, erected or maintained upon the Properties, nor shall any exterior addition to or change or alteration therein be made until the plans and specifications showing the nature, kind, shape, height materials and location of the same shall have been submitted to and approved in writing as to harmony of external design and location in relation to surrounding structures and topography by the Environmental Review Committee, of tire City of Lafayette and by the Architectural Control Committee.

Section 2. The Architectural Control Committee is composed of:

Name	Address
Charles Wu	3135 Mt. Diablo Blvd., Lafayette, CA
Richard Bulger	3135 Mt. Diablo Blvd.' Lafayette, CA
Robert Lee	3135 Mt. Diablo Blvd., Lafayette, CA

A majority of the committee may designate a representative to act for it. In the event of death, adjudicated incompetency or resignation of any members of the committee, the remaining members or member shall have full authority to designate a successor or successors. Neither the members of the committee nor its designated representative shall be entitled to any compensation for services performed, pursuant to this covenant. At any time, the then record owners of a majority of the lots shall have the power through a duly recorded written instrument to change the membership of the committee or to withdraw from the committee or restore to it any of its powers and duties.

Section 3. The Committees approval or disapproval as required by Section 1 hereof shall be in writing Such approval will be deemed given and the related covenants will be deemed to have been fully complied with it either (a) the committee or its designated representative fails to approve or disapprove plans and specifications within 30 days after the same have been submitted to the committee or (b) no suit to enjoin the work or erection, alteration or placement has been commenced prior to completion of such work provided that the plans and specifications shall have been previously submitted to the Committee.

ARTICLE III

EASEMENTS

Section 1. Easements for installation and maintenance of utilities and drainage facilities are shown on the recorded map. Within these easements, no structure, planting, or other material shall be placed or permitted to remain which may damage or interfere with the installation and maintenance of utilities, or which may change the direction of flow or drainage channels in the easements, or which may obstruct or retard the flow of water through drainage channels in the easements or drainage ditches. The easement area of each lot and all improvements in it shall be maintained continuously by the owner of the lot, except for those improvements for which a public authority or utility company is responsible.

Section 2. Easements, reservations and rights of way as shown on map shall be and are, reserved on and across said property for the erection construction and maintenance of:

(a) Poles, wires and conduits for the transmission of electricity, power, lighting telephone and other purposes, pipes and mails for water gas and heating and for necessary attachments in connection therewithin.

(b) Public and private sewers storm drains and land drains.

(c) Any other method of conducting or performing any public or guasi-public utility, function, or use beneath the surface of the ground.

Section 3. Such easement, reservations and rights of way are designated on said map, and additional easements, reservations and rights of way may he reserved, created or conveyed by Declarant, its successors and assigns, in any conveyance it or they may make of said property, or any portion thereof.

Section 4. No dwelling house and or other structure of any kind shall be built erected maintained upon any such easement, reservation, or right of way, and said easements, reservations and rights of way shall, at all times be open and accessible to public and quasi-public utility corporations, and other persons erecting, constructing or servicing such utilities and quasi-utilities, and to Declarant, its successors and assigns, all of whom shall have the right to ingress and egress thereto and therefrom, and the right and privilege of doing whatever may be necessary in, under and upon said locations for the carrying out of any of the purposes for which said easements, reservations, and rights of way are hereby reserved, and may hereafter be reserved. In addition, the emergency vehicle easement between the termini of the cul-de-sacs of Los Arabis Road and Quail Ridge Road shall be kept clear of trees and shrubs.

ARTICLE IV

GENERAL PROVISIONS

Section 1. Enforcement. Any Owner shall have the right to enforce by any proceeding at law or in equity, all restrictions, conditions, covenants, reservations, liens and charges now or hereafter imposed by the provisions of this Declaration. Failure by any Owner to enforce any covenant or restriction herein contained shall in no event be deemed a waver of the right to do so thereafter.

Section 2. Severability. Invalidation or any one of these covenants or restrictions by judgment or court order shall in no way effect any other provision which shall remain in full force and effect.

Section 3. Amendment. The covenants and restrictions of this Declaration shall run with and bind the land and shall inure to the benefit of and be enforceable by the legal owner or the Owner of any Lot subject to this Declaration their respective legal representatives, heirs, successors, and assigns, for a term of twenty years front the date this Declaration is recorded, after which time said covenants shall be automatically call y extended or successive periods of ten yeas. The covenants and restrictions of this Declaration may be amended during the first twenty year period by an instrument signed by not less than ninety percent of the lot Owners, and thereafter by an instrument signed by not less than seventy-five percent of the Lot Owners. Any amendment must be properly recorded.

Section 4. Declarant's transferees will undertake the work of developing all of the lots included within said property. The completion of that work and sale rental and other disposal of residential units in essential to the establishment and welfare of said property as a residential community In order that said work may be completed and said property be established as a fully occupied residential community as rapidly as possible. nothing in this Declaration shall be understood or construed to,

(a) Prevent Declarant, its transferees, or its or their contractors, or subcontractors. from doing on said property or any part thereof whatever they determine to be reasonably necessary or advisable in connection with the completion of said work; or

(b) Prevent Declarant, its transferees or its or their representatives from erection, constructing and maintaining on any part or parts of said property owned or controlled by Declarant, or its transferees such structures as may be reasonably necessary for the conduct of its business of completing said work and establishing said property as a residential community and disposing of the same in parcels by sale, lease or otherwise; or

(c) Prevent Declarant, or its transferees from conducting or any part or parts of said property owned or Controlled by Declarant, or its transferees, its or their business of completing said workand of establishing said property as a residential community and of disposing of said property in parcels by sale, lease or otherwise; or

(d) Prevent Declarant or its transferees maintaining such sign or signs on any of said lots owned or controlled led by Declarant as nay be necessary for the purpose of establishing a developed and occupied residential tract. As used in this section and its subparagraphs, the words "its transferees" specifically do not include purchasers of individual lots improved with completed residences.

IN WITNESS WHEREOF, the undersigned being the Declarant herein, has hereunto set its hand and seal this ninth day of June 1977.

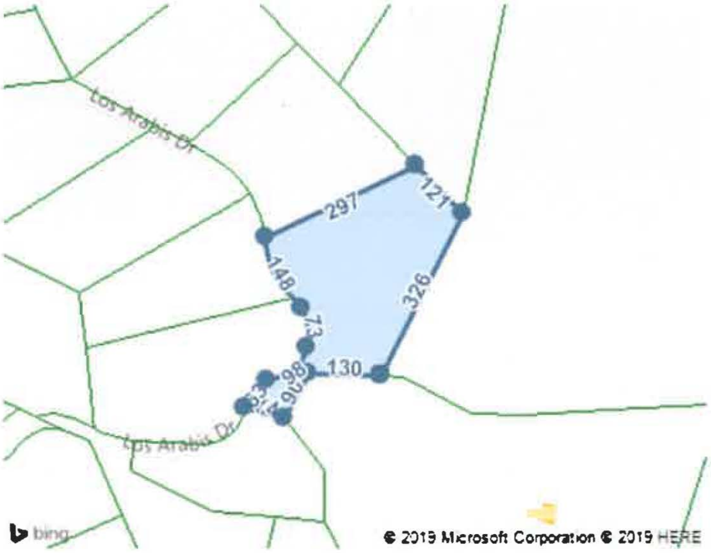
'EN DEV'R, INC.
SIGNED Charles Wu, President

SIGNED Richard Bulger

CRS Data

Monday, August 12, 2019

No Images Available



LOCATION

Property Address	3881 Los Arabis Dr Lafayette, CA 94549
Subdivision	
Carrier Route	C038
County	Contra Costa County, CA

GENERAL PARCEL INFORMATION

APN/Tax ID	248-140-009-7
Alt. APN	
Account Number	
Tax Area	14-002
2010 Census Trct/Blk	3480/2
Assessor Roll Year	2018

PROPERTY SUMMARY

Property Type	Exempt
Land Use	Governmental/Public Use General
Improvement Type	
Square Feet	
# of Buildings	0

CURRENT OWNER

Name	Central Cc Sanitary District
Mailing Address	5019 Imhoff Pl Martinez, CA 94553-4316
Owner Occupied	No

SALES HISTORY THROUGH 08/02/2019

Date	Date Recorded	Amount	Buyer/Owners	Seller	Instrument	No. Parcels	Book/Page Or Document#
1/14/1986	1/14/1986	**$117,000**	Central Cc Sanitary District				12705856

TAX ASSESSMENT

Tax Assessment	**2018**	**Change (%)**	**2017**	**Change (%)**	**2016**
Assessed Land	$204,760.00	$4,014.00 (2.0%)	$200,746.00	$3,936.00 (2.0%)	$196,810.00
Assessed Improvements					
Total Assessment	$204,760.00	$4,014.00 (2.0%)	$200,746.00	$3,936.00 (2.0%)	$196,810.00
Exempt Reason					
% Improved	0%				

TAXES

EXHIBIT "D"

Tax Year	City Taxes	County Taxes	Total Taxes

No tax records were found for this parcel.

MORTGAGE HISTORY

No mortgages were found for this parcel.

FORECLOSURE HISTORY

No foreclosures were found for this parcel.

PROPERTY CHARACTERISTICS: BUILDING

No Buildings were found for this parcel.

PROPERTY CHARACTERISTICS: EXTRA FEATURES

No extra features were found for this parcel.

PROPERTY CHARACTERISTICS: LOT

Land Use	Governmental/Public Use General	**Lot Dimensions**	
Block/Lot		**Lot Square Feet**	84,500
Latitude/Longitude	37.896233°/-122.141955°	**Acreage**	1.94

PROPERTY CHARACTERISTICS: UTILITIES/AREA

Gas Source		**Road Type**	
Electric Source		**Topography**	
Water Source		**District Trend**	
Sewer Source		**Special School District 1**	1
Zoning Code		**Special School District 2**	8
Owner Type			

LEGAL DESCRIPTION

Subdivision		**Plat Book/Page**	
Block/Lot		**Tax Area**	14-002
Description	T04770 L0022 B		

FEMA FLOOD ZONES

Zone Code	Flood Risk	BFE	Description	FIRM Panel ID	FIRM Panel Eff. Date
X	Minimal		Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level.	065037-06013C0269F	06/16/2009

EXHIBIT "E" 1/14/19

RECEIVED
AUG 20 2019
CITY OF LAFAYETTE
PLANNING DEPT.

JULY 16, 2012
3 OF 3

HDP08-12
Public Comment

EXHIBIT "F"

Happy Valley Highlands Improvement Association

RECEIVED
JUL 09 2012
CITY OF LAFAYETTE
PLANNING DEPT.

Planning Commission
City of Lafayette, California 94549

July 8, 2012

SUBJECT: Lot 18,(3933) Subdivision 4770, a.k.a. Tiffany Hill, Lafayette, California **HDP08-12**

Commissioners:

Bay area residents in general face two potential hazards, namely Earthquake and Wildfire due to geographic and weather patterns. Those choosing a suburban residence here in the East Bay Communities are made aware that their choice of location is also mitigated by a secondary factor of Landslide, Slump, Subsidence and "Contra Costa Creep". Homeowners in the "Spanish Hill" area and adjacent Western portion of Quail Ridge Road (A Private Road) have experienced **ALL** of the above over a period of thirty years. In addition, recent communications from the Contra Costa Fire Protection District advises the closing of 8-10 fire stations if reserve funding is not restored and additional monies are not generated. A revenue measure is proposed for the November ballot, but judging by past history of Lafayette residents non-support of parcel taxes for road repair, we fear for positive passage of same.

In 1977, with the development of Tiffany Hill, the usual covenants and restrictions were formulated to apply to all property owners of record within the subdivision, e.g;
Art I sect6...Main structure floor area, minimum 2000 square feet.
Art I sect 15...No owner of a lot shall permit anything to be done which could result in increase or cancellation of insurance premium.
Art II sect 1 ...Approval of Architectural Control Committee.
Art III sect 1-4...Easements and Emergency vehicle access between Quail Ridge Road and Los Arabis.
(paraphrased excerpts, see complete text of CCand R's for exact wording)

Twenty years later, after all 22 lots were developed, in January 1997, the Quail Ridge roadbed and pavement began to sink and slide southward. The anguish, litigation/cross complaints, financial stress and commitment visited upon the then owners during(Five Years) the lengthy excavation, construction and repair of the PRIVATE ROAD are well documented. The Slide was not repaired. During the five year period, the fire trail between Quail Ridge and Los Arabis was inaccessible to all residents and the only means of vehicular egress was Via Robles. In case of emergency, individuals could WALK out of the area from the Eastern cul-de-sac of Quail Ridge Road to Crestmont Drive or the trail path to Palo Alto Drive.

In 2003-2004, a second owner submitted a proposal to build a home in the Northeast corner of Lot 18 and submitted plans and geotechnical data...(Kropp&associates) A pier wall was proposed along the slide margin with two rows of additional drilled, cast-in-place friction piers tied together with grade beams not connected to the pier wall. These findings were based on one(1) test boring to 45 feet and one(1) test trench 45 feet in length and subject to several peer reviews. HDP21-04 was withdrawn April 17, 2007. (See John Sakamoto Memorandum, June 15,2004)

In April 2008 Seidelman Associates completed and logged a large diameter (30") test boring to a depth of 70 feet and is using that data as verification of bedrock underlying the Northeastern corner triangular shaped building site which comprises 6% of the lot 18 land mass. (94% unbuildable).

Continued......................

In March through May of 2012, the new owners of lot 18 (Robbi and Leela Reddy) submitted multiple requests for permits, exceptions, variance and Design Review to allow construction of a new 4000 sq. ft. single family residence.The Reddy's are reported to have considerable structural engineering expertise and purchased the lot with full knowledge of the property geotechnical reports. We believe it is extremely important to establish the motivation for this home, i.e., is it to be a personal residence, speculative in nature, or engineering challenge? Past experience with other builder/developer projects within the area mandates a personal commitment to the completion of the task. Our concern is simple, do not fixate on one solitary aspect of this application to the detriment of adjacent property owners and the neighborhood. The preservation of Quail Ridge Rd. AND the emergency access/egress passage is of the highest priority to the residents of Happy Valley Highlands Improvement Association.

The project Principle Engineer (Seidelman) has affixed his seal and signature to a geotechnical investigation report (June 24, 2008) affirming, along with four other firms, that the Northeast corner triangle is a suitable building site. Being lay people and not experts, the Association understands the reasoning in determination of the site, but we must express our deep concern for the integrity and stability of the reported "bedrock" underlying the home foundation structure and adjacent existing roadbed. The 115' long drilled pier retaining wall capped by a 5' grade beam is adjacent to the existing scarp face of the slide mass. Will this pier wall in any way conflict and/or compromise the existing pin-pile vertical pile tie-backs at 40' depth? The second row of piers easterly will also penetrate to 40' depth, the verbiage in the report alludes to a permissive rather than imperitive third row of piers to a 20' depth. Is one test boring satisfactory to accommodate the multiple penetrations envisioned?

Seismicity effect and drainage cannot be minimized and the durability and placement of water collection and conveyance off-site is as important as the foundation grid that supports the structure.

These observations are offered to the Commission to provoke probing questions during the review of the available data. We are sure the surviving incumbent residents of Tiffany Hill will provide much more insight of their personal experience during a very trying and disruptive period in their lives. Their concern and apprehension of any induced or associated geologic disturbance is completely understandable. You had to witness the process from beginning to conclusion to truly appreciate the enormity of the impact upon the residents and surrounding neighborhood.

Respectfully submitted,

Donald F. Thielke

Donald F. Thielke, President
Happy Valley Highlands Improvement Association(HVHIA)

Attachment:
John Sakamoto, letter to Planning Commission, June 15, 2004
(with his permission)
CCC Fire Protection District,Battalion Chief Bill Hess July 23,1997 from files

MEMORANDUM

June 15, 2004

Planning Services Division
City of Lafayette
3675 Mt. Diablo Boulevard
Suite 210
Lafayette, CA 94549-1968

Attention: Members of the Lafayette Planning Commission

Lindy Colburn
Lafayette Assistant Planner

Subject: Hillside Permit Application and Variance Requests
HDP 21-04 Matt & Maria Click

Draft

Dear Members of the Lafayette Planning Commission:

The City of Lafayette is currently considering an application to develop a new single-story single family residence in the Hillside Overlay District, located at 3933 Quail Ridge Rd. (APN 248-130-012). This property had a 1997 landslide resulting in massive property and infrastructure damage.

I have reviewed the geotechnical report prepared by Alan Kropp & Associates, Inc. dated, November 25, 2003. It is apparent that they are employing sound engineering techniques to develop geotechnical recommendations to structurally support the proposed residence accounting for lateral soil pressures induced by soil creep. However, there are no recommendations offered to mitigate the basic landslide issues of the site. The report instead proposes isolating the residence outside of the presumed landslide boundaries.

Noted in its findings are disclaimers and reservations about the efficacy of building a new residence that is fully mitigated from a landslide hazard. The report states:

> "Based on the subsurface data collected from our field investigation program, it appears to us the extreme northeast corner of the lot is outside the limits of the previous landslide. Since the previous landslide has not been removed or repaired and only remedial work has been performed to restore Quail Ridge Road, the project owners need to understand and accept the risk that a future landslide may still occur within the lot and may impact the stability of the extreme northeast corner of the lot even though it is situated outside the landslide mass."

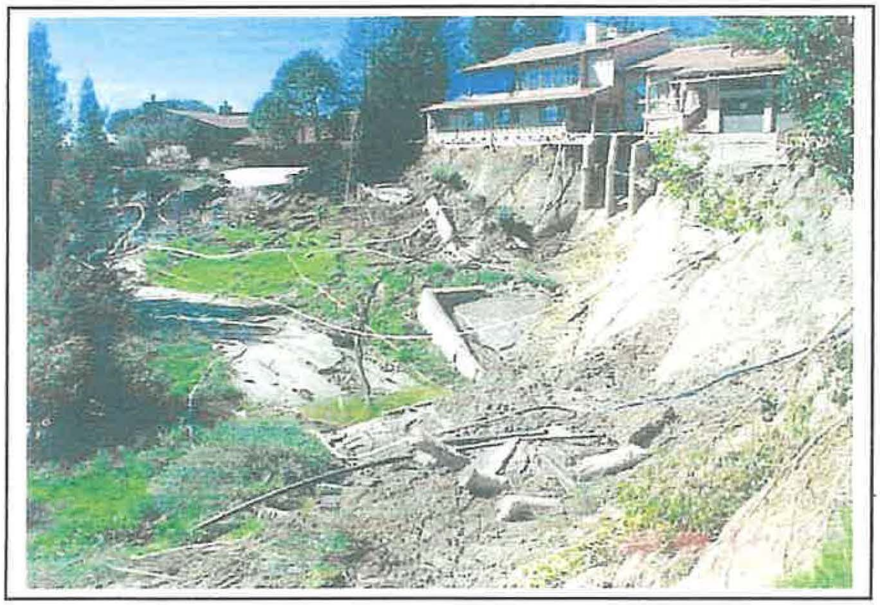
Geotechnically, a new slide may occur from general site instability, phreatic (water head) buildup, or instability resulting from seismic activity. Numerous studies, including the Kropp report, have cited that the base slide area has yet to be removed or mitigated. The apparent margin of the landslide area is based on only a single boring and test trench.

In addition, the footprint of the proposed structure can pose water flow, erosion and geotechnical instability from the drainage flowing downhill. The downstream areas include Los Arabis Drive, Pine Lane and Howard Hills Road. The report states:

> "Although there are other methods to discharge water within your property, the water eventually drains onto the downslope property and can cause future problems . . .. If a drainage easement cannot be granted, the collected surface water may be discharged onto the slope downhill of the residence with the understanding that there may be a higher risk of future problems resulting from the discharged water."

The west end of Quail Ridge Road is considered an alternative escape route for its residents. The 1997 event completely destroyed the roadside as shown in the Figure 1. Should this occur following an earthquake and a resulting hillside fire, this escape path would be unavailable to the residents of Quail Ridge Road.

Figure 1
1997 Quail Ridge Road Landslide[1]



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This property is infamous with a history of property damage, multiple party litigation, huge reconstruction costs, neighbor strife, and personal sorrow. We support the City in its efforts to perform a detailed site, geology and geotechnical peer review and to remove disclaimers and asterisks which affect our community. I appreciate your careful consideration to this proposed project and the resultant consequences of a future landslide to the neighbors of Quail Ridge Road.

Respectfully Submitted,

John Sakamoto
3882 Quail Ridge Road
Lafayette, CA 94549

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[1] Alan Kropp and Associates Website, 2004

Contra Costa County *Fire Protection District*

Fire Chief
ALLEN LITTLE

July 23, 1997

Mr. Richard Kostyrka
Happy Valley Highlands Home Improvement Assoc.
3797 Quail Ridge Road
Lafayette, CA 94549

Dear Mr. Kostyrka:

As we discussed in our telephone conversation, this fire department is very concerned about safety issues and access problems in all our response areas. I did some research into the slide problem on Quail Ridge Road and found that the street reverts to a private roadway at 3930 Quail Ridge - the affected slide properties are in this private roadway - this limits the City of Lafayette response and control of any repairs, although they are monitoring the situation. I encourage you and your homeowner's association to actively monitor progress on mitigating this problem and to keep the Fire District informed as to the repair timetable.

I have met with our Communications Manager and revised the response of our units to ensure as efficient a response as possible to an emergency in your area. I have also reviewed any alternative evacuation routes from the effected area. There are no viable alternative exits other than those existing (Via Roble to Dolores). In light of this, I will make myself available to your homeowner's association to present evacuation methods, safety precautions, fire department operational needs in an emergency, etc. If you feel that will be valuable please contact me at 930-2109.

Sincerely,

Bill Hess
Battalion Chief

C: Fire Chief Little
Assistant Chief Miraglia
Assistant Chief Argo
Stations 15 and 16

U:\BCs\Hess\Kostyrka.707\cj

☑ 2010 Geary Road · Pleasant Hill, California 94523-4694 · Telephone (510) 930-5500 · Fax 930-5592
☐ 4527 Deerfield Drive · Antioch, California 94509 · Telephone (510) 757-1303 · Fax 754-8852

RECEIVED
JUL 11 2012
CITY OF LAFAYETTE
PLANNING DEPT.

Ms Lindy Chan

City of Lafayette Planning Services Division

3675 Mount Diablo Blvd Suite 210

Lafayette, CA 94549

RE: HDP08-12 Leela Reddy

July 10, 2012

Dear Members of the Planning Commission:

1. We are opposed to the granting of the house site in its current location. Mr. Henry Chang, a trained and licensed geotechnical engineer has carefully studied the boring data from the most recent study by Seidelman and has discovered two slide planes existing in the proposed build site. He further postulated that the slide planes represent ancient slides that extend to several adjacent properties. By placing the house on this site, it will create a Health and Safety Hazard for the entire neighborhood. (Attachment 1)

In a Geotechnical letter by GeoForensics dated June 13, 2004. Dan Dychman states

> "All portion of the Korpell preoperty (currently Reddy) were to be remained unrepaired and to be considered Active Landslide material. This would mean that at some point in the future, there is a high probability that the landslide will again mobilize. Movement to the depth of more than 50 feet will occur adjacent to the proposed new residence.... In short, it cannot be concluded that this small area of ground will remain undamaged by future movement of the adjacent 50 plus foot deep active landslide" (Attachment 2)

He went on to conclude that

> "It is undoubted that reactivation of the slide would instigate new damages on this and adjacent lots, the result of which would be again be a massive lawsuit engaging all adjacent property owners" (Attachment 3)

In a letter to the planning committee dated June 15, 2004 Mr. Sakamoto states

> "Geotechnically, a new slide may occur from general site instability, water head buildup...Numerous studies have cited that the base slide area has yet to be removed or mitigated. The apparent margin of the landslide area is only based on only a single boring and test trench. In addition, the footprint of the proposed structure can pose water flow, erosion and geotechnical instability from the drainage flowing downhill. The downstream areas include Los Arabis Drive, Pine Land and Howard Hills Road" (Attachment 4)

2. We oppose the variance from the side yard of 15 to 3 feet. And the variance from the road from 25 to 13 feet

A 4000 sq ft house on a small building pad is inappropriately large; by building within variance they can still achieve a 2500 sq ft house. The Reddys simply did not demonstrate why the variances should be granted.

I would also point out a deceptive drawing purposely trying to downplay the size of the structure. The garage was conveniently darken to make it appear nonexistent, yet it sits 13 feet from the street (Attachment 5)

3. We oppose the exemption to the building within the class II ridgeline setback and increase of the building height .

   The Reddys second floor looks directly into my bedroom window and would be merely 30 feet from our future swimming pool site. I would ask them to shift the second story away from our property and lower the entire structure to one story. (Attachment 6)

If the Reddys are allowed to build in the current site after they satisfy all requirements, the neighbors would ask for a bond to insure the road and that they carry an insurance policy to protect against future slide occurrence for 10 years.

We have misgivings about the Reddy's ultimate intent due to their past behaviors. They have not acted in a good neighborly fashion. They refused to pay for their share of the road repair until we took them to small claims court (Attachment 7). They have neglected their duty in mitigating the slide mass, and the continued earth movements have caused damages to the Quan and Ingram properties. The land mass has also shifted the water drainage to converge onto the Kelly's property, endangering the foundation of his house.

I am asking the planning commission to carefully listen to our concerns.

Sincerely,

Joseph Cheng

Sara Reinganum

3927 Quail Ridge Road

Lafayette

1

July 11, 2012

Planning Commission
City of Lafayette
3675 Mt. Diablo Blvd, Suite 210
Lafayette, California 94549

Attention: Members of the Lafayette Planning Commission
Lindy Chan, Associate Planner

Subject: HP08-12 LEELA REDDY (OWNER), R-20 ZONING

Dear Members of the Lafayette Planning Commission:

My name is C.-Y. Chang, registered Civil Engineer and Geotechnical Engineer. I am one of the neighbors that are impacted by the proposed development at 3933 Quail Ridge Road. I recently had an opportunity to review the following geotechnical reports:

1. Geotechnical Investigation of Portion of Lot at 3933 Quail Ridge Road, Lafayette, California, dated June 24, 2008 prepared by Seidelman Associates
2. Geotechnical Investigation, Quail Ridge Residence, Northeast Corner of Lot, 3933 Quail Ridge Road, Lafayette, California dated November 25, 2003 by Alan Kropp & Associates, Inc.
3. Geologic Investigation of Proposed Home Site on Click Property, 3933 Quail Ridge Rd., Lafayette, California dated November 18, 2003 by William Lettis & Associates, Inc.
4. Response to Geotechnical Peer Review, Quail Ridge Slide, Quail Ridge Road, Lafayette, California dated August 15, 1999, prepared by GeoForensics, Inc.
5. Geotechnical and Geologic Peer Review, Proposed Development at 3933 Quail Ridge Road, Lafayette, California dated July 22, 2004 by CAL ENGINEERING & GEOLOGY (CE&G)
6. Second Geotechnical and Geologic Review, Proposed Development at 3933 Quail Ridge Road, Lafayette, California, dated November 5, 2008 by CAL ENGINEERING & GEOLOGY (CE&G)
7. Third Geotechnical and Geologic Review, Proposed Development at 3933 Quail Ridge Road, Lafayette, California, dated December 17,, 2008 by CAL ENGINEERING & GEOLOGY (CE&G)

Based on the review of above documents, it is concluded that one of the very important issues regarding the possibility of a larger ancient landslide originally postulated by GeoForensics (GFI) in 1999 (ref. 4) has not been evaluated by Seidelman Associates in their report of June 24, 2008. The postulated larger ancient landslide encompassed the proposed building site to the eastern drainage ravine is shown in Figure 2 (attached) of CE&G's letter report (Ref. 5) dated July 22, 2004 prepared for the City of Lafayette, Engineering Division. The CE&G's letter states that "*we feel that before the proposed site development can be considered to be*

1

geotechnically feasible it must be demonstrated that the larger slide either a) does not exist beneath the proposed building site, or b) is stable in its current and future configurations." In addition, the CE&G's letter also states that "*To demonstrate the viability of the proposed building site, it will be necessary to better define the geologic conditions of the site. This will require that additional subsurface exploration be completed. Consideration should be given to drilling and downhole logging large diameter boring(s) to determine if there is a landslide below the building site.*"

In response to the comments raised by CE&G's review comments, in 2008, Seidelman Associates performed a 30-inch diameter downhole logging at the proposed building site to a depth of 70 ft (the deepest boring compared to the previous borings performed in the existing slide mass). A copy of the boring location and the boring log are shown in Attachment A. The boring log shows that there are two shear zones (clay seam) located at a depth of about 53 ft and 67 ft, respectively. The shear zones dip towards the eastern drainage ravine. Presence of shear zones is generally indicative of a landslide occurred previously in a geologic time (i.e., ancient landslide). The ancient landslide which is not active presently may be re-activated under some combinations of conditions in the future (change in loading and hydrogeological conditions). The existing landslide reactivated in 1997 is an example.

In Section D - Landsliding Analysis and Discussion of the 2008 report prepared by Seidelman Associates, no analyses were performed to incorporate the presence of the shear zones depicted in the log of boring to demonstrate that no future landslide will occur beneath the building site and adjacent areas impacting the roadway above the building site and adjacent properties.

Because of potential impact on the public health and safety, the issue of a potential landslide towards the eastern drainage ravine should be further evaluated in light of the presence of the shear zones in rock.

Respectfully Submitted,

C.-Y. Chang, C21708, GE202
3960 Quail Ridge Road,
Lafayette, CA 94549

Current Development Proposal

We understand that there is currently a proposal to construct a new residence on the tiny (5,000 square foot), triangularly-shaped, sliver of the Korpell property located just off the northeastern side of the landslide (see Figure 4). Construction details of the residence and any associated mitigative measures to protect the residence are currently unknown to our office.

Geotechnical Concerns

As discussed above, our mitigation plan which was completed in 2001 was only intended to provide stability to the affected portion of Quail Ridge Road above the old Korpell house within the slide area. All portions of the active landslide downslope of the roadway, including nearly the entire Korpell property were to remain unrepaired and to be considered Active Landslide materials. This would mean that at some point in the future, there is a high probability that the landslide will again mobilize. During that mobilization, movements in the ground to a depth of more than 50 feet will occur directly adjacent to the location of the proposed new residence. Such movements will at least remove the lateral support for the remaining wedge of land on the Korpell lot, which could well induce sympathetic lateral movements of this small knoll by the side scarp of the slide. ***In short, it cannot be concluded that this small area of ground will remain undamaged by future movements of the adjacent 50+ foot deep active landslide.***

In addition to the potential for damage/destruction to the proposed new residence, we are gravely concerned about the increased potential for landslide reactivation posed by the new residence. With the removal of the old Korpell residence, several water sources have been eliminated from the area, including: irrigation; downspout waters; water supply lines; irrigation lines; and sewer lines. To permit the reconstruction of a residence on the Korpell lot would permit these sources of water to again be introduced onto the slope immediately above an active landslide. Even if no irrigation was permitted (and that could be enforced), and all surface runoff was piped to the eastern drainage swale, underground pipelines do unexpectedly rupture. ***Such a water leak would certainly introduce water into the landslide, with the net affect of reactivating the landslide.*** If the slide were to remobilize, it is our opinion that the movements would again affect your property and those of your neighbors.

Summary

There is a tiny 5,000 square foot sector of land between an active landslide, street, and eastern property line on the old Korpell property in which a residence is proposed to be constructed. The landslide adjacent to this area extends over 50 feet below the ground surface. We do not believe that this small area of ground can be adequately stabilized without substantially reworking the entire adjacent slide area as part of a repair similar to that completed in 2001. To our knowledge, no such repair plan is contemplated as part of the residential construction (as its cost would certainly exceed the 1.5 million dollar repair previously incurred for simply stabilizing the roadway).

While it is unlikely that adequate mitigation measures will be proposed to provide long term stability to the proposed development site, our greatest concern is for the increased potential for reactivation of the large landslide due to the introduction of new water sources directly above the landslide mass. It is undoubted that reactivation of the slide would instigate new damages on this and adjacent lots, the result of which would again be a massive lawsuit engaging all adjacent property owners.

In simple terms, we strongly recommend that no new residence (or other improvements) be constructed above this massive, active, deep landslide mass.

Should you have any questions please contact the undersigned.

Respectfully Submitted;
GeoForensics, Inc.

Daniel F. Dyckman, PE, GE
Senior Geotechnical Engineer, GE 2145

cc: 5 to addressee

m

JOHN KING

Slide Scene Mired in Legalese

Private road in Lafayette — 7-figure damage costs

Visit Quail Ridge Road in Lafayette, and your jaw will drop. A mock-Mediterranean mansion sits precariously on a hillside — its concrete support piles exposed — because the front yard and 20 yards of roadway have crept downhill like a muddy iceberg.

The really creepy thing? It's been this way for a year. And the sound you hear is the rustle of lawyers filing lawsuits.

"It could be a tourist attraction," says Timothy Schmal, one of many attorneys wrestling over how to divvy up a repair bill expected to top seven figures. "When a landslide literally starts at someone's front porch, that's dramatic. And these are very expensive pieces of real estate."

Next to earthquakes, there's no natural disaster like a landslide to bring out the voyeur in Bay Area residents. In the past week on newscasts we've seen two homes crumple in Oakland; another storm and it could be Orinda or Inverness, San Mateo or San Francisco.

What Quail Ridge Road shows is this: When television crews leave a landslide behind, the mess just stays there getting worse. And the only group sure to benefit is — you guessed it — attorneys.

But I'm ahead of the story.

Until last January, the 3900 block of Quail Ridge Road was your basic street of dreams, a private road built in the late '70s framed by 14 houses. Most sit on an acre of land. Some have sold for more than $1 million.

Then it rained — a lot. The road started cracking. A gap appeared between the road and the driveway to Tahsin Bakr's house. Bakr's front yard began to sink, ripping the veranda off the house.

The road collapsed. The house across from Bakr vanished from sight; it now rests 10 feet below where it started, intact but uninhabitable. The Bakr home remains upright on concrete legs, but the family moved out last fall.

"Bing, bing, bing — all this happened in stages," recalls Lois Hagen, who lives with her husband next door to the Bakr house.

So far, the Hagens have only had to patch cracks on the driveway leading up to their spacious hillside home. But this kind of drama isn't what they were looking for back when they moved from Walnut Creek in 1981.

"We've always loved it up here," Hagen sighs before showing a flair for understatement: "The last year has not been pleasant."

A severed road, two empty houses, a wet El Niño winter; gee, you think you'd see some repair crews. There's one problem, though — nobody wants to take responsibility for whatever huge bill finally emerges.

The city of Lafayette points out it's a private road. The East Bay Municipal Utility District scoffs at the idea of broken water pipes causing a slide with an estimated depth of 60 feet below the surface. Insurance policies don't cover movement of the earth.

As neighbors searched for a solution, what emerged was the American answer to everything:

KING: *Page A22 Col. 1*

KING

From Page A15

Go to court.

"People kept telling us 'you won't get anything until somebody sues,' " Hagen says. "What I've learned about the legal system in all this . . ." — she shakes her head.

Tahsin Bakr started things rolling with a lawsuit against the city, the county, EBMUD and everyone involved in building the road and homes. Plus all neighbors "and DOES 1 through 100 inclusive," in case testimony uncovers a driver who emptied coffee by the road.

"Nobody's pointing fingers right now," Bakr attorney Nick Shamiyeh insists. "We just want to find out what happened."

Now a set of neighbors, including the Hagens, have filed a cross-complaint against the city and EBMUD and a batch of neighbors including the Bakrs. Other neighbors have attorneys staking out individual positions.

Despite this lawyers' full employment act, Hagen describes the block as allies working together. "We've maintained a good relationship," she says. "This has brought us closer, it really has."

The hole that was once a road continues to deepen. Two houses at the end of Quail Ridge Road can only be reached by a fire lane. If there's a bright spot, it's that the Contra Costa Superior Court has a mediator working on a cost-sharing formula to start shoring things

Residents of Quail Ridg
a January 1997 landsl
up.

"The cost is so huge i
into the millions," says R
Brummitt, one attorney
"It has to be a cooperativ

Brummitt's legal nich
estate cases involving da
homes.

MEMORANDUM

4

RECEIVED
JUN 16 2004
CITY OF LAFAYETTE
PLANNING DEPT.

June 15, 2004

Planning Services Division
City of Lafayette
3675 Mt. Diablo Boulevard
Suite 210
Lafayette, CA 94549-1968

Attention: Members of the Lafayette Planning Commission

Lindy Colburn
Lafayette Assistant Planner

Subject: Hillside Permit Application and Variance Requests
HDP 21-04 Matt & Maria Click

Dear Members of the Lafayette Planning Commission:

The City of Lafayette is currently considering an application to develop a new single-story single family residence in the Hillside Overlay District, located at 3933 Quail Ridge Rd. (APN 248-130-012). This property had a 1997 landslide resulting in massive property and infrastructure damage.

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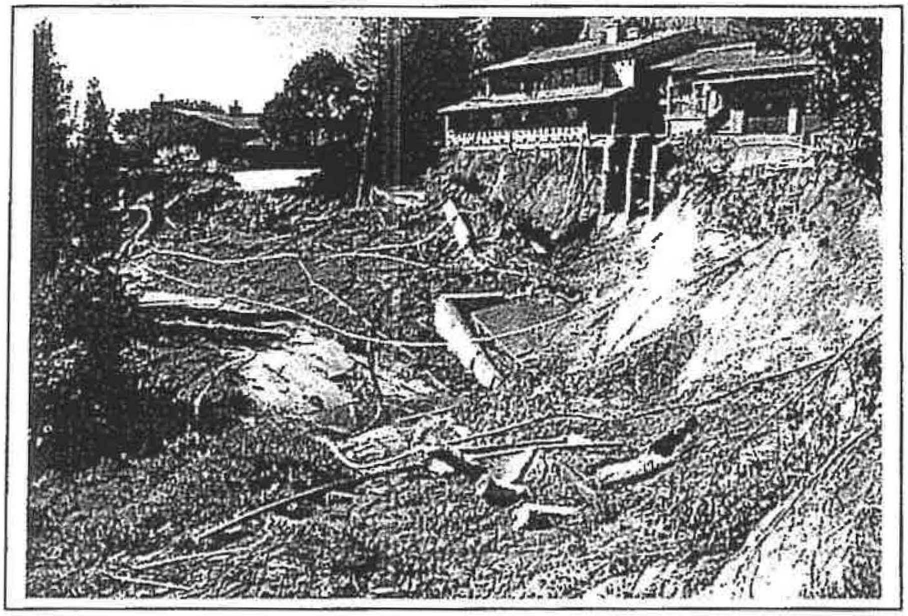
In addition, the footprint of the proposed structure can pose water flow, erosion and geotechnical instability from the drainage flowing downhill. The downstream areas include Los Arabis Drive, Pine Lane and Howard Hills Road. The report states:

> "Although there are other methods to discharge water within your property, the water eventually drains onto the downslope property and can cause future problems . . .. If a drainage easement cannot be granted, the collected surface water may be discharged onto the slope downhill of the residence with the understanding that there may be a higher risk of future problems resulting from the discharged water."

4

The west end of Quail Ridge Road is considered an alternative escape route for its residents. The 1997 event completely destroyed the roadside as shown in the Figure 1. Should this occur following an earthquake and a resulting hillside fire, this escape path would be unavailable to the residents of Quail Ridge Road.

Figure 1
1997 Quail Ridge Road Landslide[1]



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Respectfully Submitted,

John Sakamoto
3882 Quail Ridge Road
Lafayette, CA 94549

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[1] Alan Kropp and Associates Website, 2004

From: Mir Ali [mailto:mireali.md@gmail.com]
Sent: Tuesday, August 20, 2019 8:08 AM
To: Bhagat, Payal; Bhagat, Payal
Subject: NOP Comments: 3933 Quail Ridge Road Residential Project

Hello Ms. Bhagat,

I received the notice re: the construction of the planned home at 3933 Quail Ridge. As a concerned homeowner in the area I would like to clarify something.

Where will the construction traffic be going through for this project? It should travel through Quail Ridge Road only. The neighborhood at Los Arabis Drive is a private road with a lot of need for repair already. It cannot handle all the construction traffic and the resulting wear and tear which would fall on private residents to repair. Furthermore Los Arabis is 1 lane in some areas with sharp turns and steep drop offs - and thus cannot accommodate large construction vehicles. Los Arabis drive is thus not meant for heavy traffic but only resident traffic.

Please enter this communication into the formal comments for this project. I appreciate your response.

Mir Ali
3882 Los Arabis Drive

RECEIVED
AUG 27 2019
CITY OF LAFAYETTE
PLANNING DEPT.

August 26, 2019

Ms. Payal Bhagat, Senior Planner
and
Planning Commission and Design Review Commission
Lafayette Planning and Building Department
3675 Mount Diablo Boulevard, #210
Lafayette, California 94549

Re: 3933 Quail Ridge Road (the "Subject Property")

Dear Ms. Bhagat and Commissioners:

Reference is made to the pending application for a Hillside Development Permit (the "Permit Application") and Notice of Preparation (the "NOP") of Environmental Impact Analysis (the "EIA") for the Subject Property. Our family bought the property adjacent to the Subject Property, at 3927 Quail Ridge Road, in April 2017. We have significant concerns about the Permit Application, and we would like to request that the EIA analyze certain pertinent factors and issues.

A. Background

We understand the Subject Property is the site of a landslide that was re-activated in 1997, at which time Quail Ridge Road, which is private yet functions as a public fire and earthquake evacuation route (the "Shared Road"), was destroyed and impassable. Since then, there have been attempts to seek city approval to develop the Subject Property. Neighbors have raised concerns as to certain geological and infrastructure risks, and numerous geotechnical investigations and reports have evidently been conducted; they are not referenced in the NOP. We respectfully ask you to review the full historical file of prior permit applications and analyses on the Subject Property in the EIA.

In addition, we would like to notify you that there has been substantial dumping of soils and gravel on the Subject Property, and ask that this be analyzed in the EIA.

To our knowledge, the owner or developer of the Subject Property may be known as one or more of the following, known variously through a number of representations and deed transfers: Ravi Reddy, Jessica Reddy, Salla Reddy, SAI Family Trust, Purushotham Reddy, Pradeepkumar Gandhi, Kaplana Gandhi, and/or Leela Reddy (collectively, and with their agents and affiliates, "Reddy").

B. Reddy's Dumping of Substantial Soils and Gravel in 2017 (the "Dumping"), Lack of Mitigation

In June of 2017, we believe Reddy dumped a substantial amount of soils and gravel on (i) our property, (ii) the Quan property which is located on the other side of the Subject Property and (iii) the Subject Property, in a possible grading code violation. Surrounding neighbors observed Dumping by multiple trucks, and we made a report to Lafayette Code Officer Tom Gill regarding the soils and gravel that were deposited on our property at that time.

The soils and gravel have been an ongoing trespass on our property, and have impacted our irrigation lines. We have seen no effort by Reddy to remedy the situation. Moreover, we are concerned that the boundary line between our properties may now be in question due to the shifting of land caused by the significant quantity of soils and gravel that Reddy dumped at or near the original property line, as well as subsequent rainfall.

During the Dumping, we understand that Reddy may have also disrupted the drainage hose that had been installed for drainage to maintain the Shared Road above the site of the pre-existing landslide at the Subject Property.

We respectfully ask the City of Lafayette to (i) analyze in the EIA the volume and nature of soils and gravel that were deposited on the Subject Property, our property and the Quan property in 2017 to determine whether a grading code violation occurred, (ii) analyze the potential and actual environmental impact of such Dumping, (iii) analyze whether the Dumping has impacted load bearing and drainage at and around the landslide site and (iv) evaluate in the EIA whether the Dumping, or clean-up or excavation of the Dumping, may pose geologic risk and, if so, how that may be mitigated.

C. Financial Obligations and Litigation as to the Subject Property

After the Dumping, we understand that Reddy defaulted on a loan from Yosemite Capital that was secured by the Subject Property, and became involved in litigation with Yosemite Capital with respect to the Subject Property.[1]

According to neighbor Louise Laemmlen, Reddy has not met his obligations with respect to his share of annual and recurring maintenance expenses of the Shared Road.[2]

We refer to financial obligations and legal issues related to the Subject Property[3] to highlight our concern as to a proposed developer's willingness to (i) maintain completion guarantee, bonding, insurance or other financial responsibility requirements to ensure the Shared Road is preserved and cover the costs of triggering any landslide, (ii) ensure that the Shared Road will not be damaged during any construction or excavation project on the Subject Property, (iii) financially guarantee the expenses of Shared Road maintenance or repair expenses arising from any construction project on the Subject Property, (iv) fulfill the Subject Property's financial obligations for the maintenance and repair obligations of the Shared Road on an ongoing basis and (v) sufficiently mitigate potentially sizable environmental and geological risk to the Subject Property.

We respectfully request that the EIA consider the importance of the Shared Road as a fire and earthquake evacuation route, as well as its importance for fire-fighting efforts in the area, and analyze the potential geological and economic impact of the Shared Road being damaged or destroyed as a part of the implementation of, or result of, activities contemplated in the Permit Application. We also request that the EIA analyze what financial guarantees should be in place to protect the Shared Road and neighboring properties.

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[1] Per statements of Tom Malgesini, principal of Yosemite Capital.

[2] See Laemmlen/Pescher email communications to Ms. Payal in August 2019.

[3] E.g., the Contra County Tax Assessor's records indicate that there may have been no tax payments made for the Subject Property between 2015 and 2018. See https://taxcolp.cccounty.us/taxpaymentrev3/lookup/?searchparcel=248130012.

D. Our Right to Privacy and Enforcement of Existing Setback Restrictions and Easements; Community Standards and Zoning Rules

The drawings in the NOP indicate that Reddy has requested to build a very large building within approximately three feet of our property line. As neighbors adjacent to the Subject Property, we have a right to the privacy of our family; therefore, we oppose any variance or exemption from Lafayette's restrictions as to property line, road, ridgeline or other setbacks or similar restrictions with respect to the Subject Property. Moreover, any easements on the Subject Property for drainage, utility line access, landslide mitigation or similar purposes should be carefully analyzed in the EIA, given the geological sensitivity of the Subject Property. We believe existing zoning rules should be followed and that additional mitigation measures may be warranted.

There remain standard community concerns as to enforcement of the building standards of the Quail Ridge neighborhood. We understand that houses in our neighborhood are required to maintain certain sizing and garage requirements. The rest of the property owners on Quail Ridge Road (and others in similar neighborhoods in Lafayette) must maintain homes of a certain profile and meet applicable zoning obligations; we see no compelling reason why a developer should be exempt from these rules. Granting an exception may diminish the character and value of the neighborhood.

We respectfully request that the EIA analyze the environmental impact of a 4,000 square foot building on the Subject Property situated within the existing zoning parameters (i.e., with no setback variances or other variances).

E. Environmental Impact Analysis under CEQA and Further Evaluation

The California Environmental Quality Act ("CEQA")[4] requires state and local public agencies to identify the environmental impacts of proposed projects, determine if the impacts will be significant and identify alternatives and mitigation measures that will substantially reduce or eliminate significant impacts to the environment.

We respectfully request that the Planning Department conduct thorough environmental impact investigation by conducting further evaluation of the proposed project through careful due diligence and analysis, including consideration of the historical record and research, observation and conclusions of geotechnical engineers that are not compensated by the developer. Moreover, we believe CEQA requires a thorough evaluation of the geological and environmental impact of the Dumping in the EIA. We would like to understand better what diligence and review the City has conducted to date and what further study is planned in connection with the EIA.

We believe it is in the City of Lafayette's interest to meet the CEQA and responsible planning obligations and ensure that its environmental impact and other review processes protect the environment and the property rights of the neighbors that call Lafayette their home and community. We respectfully request that the City carefully consider alternatives to development that may present a long-term solution for the preservation of the Subject Property and effectively mitigate its environmental risks.

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[4] 14 CA ADC § 15000 et seq.

We thank you for your consideration, and are available to answer any questions you may have in connection with the EIA or Permit Application or otherwise.

Sincerely,

Gregory Millar and Hannah Dunn, Esq.
3927 Quail Ridge Road
Lafayette, California 94549

CC: Jonathan Fox

From: Joseph Garofolo <jgarofolo@garofololaw.com>
Sent: Tuesday, August 27, 2019 12:20 PM
To: Bhagat, Payal
Cc: Planner
Subject: NOP Comments: 3933 Quail Ridge Road Residential Project
Attachments: 8-27-19_Garofolo_NOP_Response.pdf

Dear Ms. Bhagat:

The attached letter is submitted on behalf of Joseph Garofolo and Sylvia Pastor Garofolo, the owners of 3954 Quail Ridge Road, Lafayette, California 94549.

If there is anything that you would like to discuss, please respond to this e-mail or call me at (415) 981-9775. Thank you.

Sincerely,

Joseph A. Garofolo

August 27, 2019

Ms. Payal Bhagat, Senior Planner
Planning & Building Department
City of Lafayette
3675 Mount Diablo Boulevard, #210
Lafayette, California 94549

Re: NOP Comments Relating to 3933 Quail Ridge Road Residential Project

Dear Ms. Bhagat:

I write on behalf of myself and Sylvia Pastor Garofolo, the owners of 3954 Quail Ridge Road, Lafayette, California 94549. This letter responds to the Notice of Preparation for a Focused Draft Environmental Impact Report ("NOP") dated July 25, 2019.

We join the response to the NOP set forth in the letter dated August 26, 2019 from Mr. Millar and Mrs. Dunn, the owners of 3927 Quail Ridge Road.

Moreover, we object to the NOP because it does not comply with the requirements of Section 15082 of the California Environmental Quality Act Guidelines (the "CEQA Guidelines"), California Code of Regulations, Title 14, Section 1500 et seq. Section 15082(a)(1)(C) of the CEQA Guidelines provides that the NOP is required to contain information sufficient to allow a "meaningful response" including, "[a]t a minimum, . . . probable environmental effects of the project." The NOP references an "Initial Study" that is available on the website for the City of Lafayette. The Initial Study includes an Environmental Checklist for Geology and Soils that indicates "potentially significant impact" for all of the following: i) "landslides;" ii) "substantial soil erosion or the loss of topsoil," iii) "[project] located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse," and iv) "[project] located on expansive soil, as defined in Table 1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property" (collectively, "Significant Impact Issues"). Initial Study at 35.

The Initial Study, however, fails to provide sufficient information that would allow us to meaningfully respond to the NOP with regard to any of the Significant Impact Issues. *See id.* at 36-38.[1] For example, in its analysis of landslides, the Initial Study provides only the following: "The project site contains an active landslide, which limits the developable area of the site. This is a potentially significant impact and will be addressed in greater detail in the EIR." *Id.* at 36.

---

[1] On page 2, the NOP appears to acknowledge its deficiency with the following statement: "Comments provided in response to the NOP *and during the ensuing analyses* may identify additional environmental topics to be evaluated." (Emphasis added).

Accordingly, we object to the NOP and should be provided with additional information before being required to submit comments in response to the NOP on the proposed scope and content of the Draft Environmental Impact Report. *See* CEQA Guidelines § 15082(a)(1)(C).

We reserve all of our rights and remedies.

If you would like to contact us, please e-mail jgarofolo@garofololaw.com or call me at (415) 981-9775. Thank you.

Sincerely,

Joseph A. Garofolo

From: Scottingram1 <scottingram1@comcast.net>
Sent: Sunday, August 25, 2019 5:03 PM
To: Planner
Subject: Fwd: NOP comments: 3933 Quail Ridge Road residential project

Scott Ingram
(925) 570-3446

Begin forwarded message:

> **From:** "Scott Ingram" <scottingram1@comcast.net>
> **Date:** August 25, 2019 at 12:57:46 PM PDT
> **To:** <Pbhagat@ci.lafayette.ca.us>
> **Cc:** "'Kristin Ingram'" <kbdi@icloud.com>, "David Given" <dmg@phillaw.com>
> **Subject: NOP comments: 3933 Quail Ridge Road residential project**
>
> Dear Ms. Bhagat,
>
> Below is a picture that was taken 2 days ago from my living room of the proposed building site at 3933 Quail Ridge Road. As you can see, it shows substantial earth movement and erosion, including a fallen tree that fell within the last week also due to earth movement.
>
> One of my neighbors, Henry Chang, a retired soils engineer, pointed out in the last public forum on this property, that there are several deep slide planes through this proposed site and this project should not be allowed to move forward. These slide fissures are clearly shown in the core samples provided my Mr. Reddy.
>
> Attached is another photo that shows my fence line across the slide and how the whole hillside moved at least 4 feet(!!) in the winter before last. I have lived in my house since 1994 and I can tell you that this is an active slide that cannot be stopped because it is deep and constant. Not only will a house foundation fail on that small mound that has multiple fissures, but any building on the site, including attempts to landscape, will only exacerbate the slide and further damage my property. Furthermore, the proposed 4,000 sq. foot structure will not fit on this small mound without encroaching on the property next door and will most likely lower the property values of the neighborhood. It has hillside development issues and invades the privacy that I have come to enjoy as the house will completely overlook my house.
>
> Also, records show and it is my belief that Mr. Reddy is a shady business man who has not paid his bills for maintenance, sold the property to entities within his family to increase the value, sold it and bought it back a couple of times and only wants to build a “spec” house to make money with no real intention to live in the house. He illegally dumped topsoil on the site and had to be sued to provide weed abatement. Not a good neighbor.
>
> For the good of the neighborhood and Lafayette as a whole, please heed the comments of my neighbors and myself and block this project once and for all.

Thank you,

Scott Ingram
Owner, 3877 Los Arabis Dr.
Cell: (925) 570-3446

C.c. David Given, ESQ, Attorney at Law.

HDP 07-19

RECEIVED

AUG 23 2019

CITY OF LAFAYETTE
PLANNING DEPT.

August 21, 2019

RE: 3933 Quail Ridge Road, Lafayette residential project

Dear Ms Payal Bhagat,

I understand a letter has been sent out to neighbors with regards to the vacant lot at 3933 Quail Ridge Road. We have lived on the street since 1989 and witnessed the movement of the road, the removal of the house and the repairs made to stabilize the road approximately 20 years ago. The property at 3933 has sold, gone through foreclosure and the individual who let the property go to foreclosure has now purchased it again for considerably less than the loan he took out on the property. He was denied a variance by the owners of 3927 Quail Ridge at a prior time and yet has returned to try again.

Unless the lot is engineered and stabilized prior to building; and it can be demonstrated that the land would support a house, not effect neighboring homes during construction, this lot should not be built upon. There is very little land available to build, without stabilization, and it is our understanding that a variance would be needed to build without going through the expense that is needed per the engineering reports. The foundation and lot stabilizing would probably cost more than the house and then the house has a terrible stigma attached to it because of the slide.

Based on the owners financial background it does not appear he has the funds to do it correctly. This will be an expensive undertaking according to ESR (Engineered Soil Repair) who did the buttress wall stabilization when the slide occurred.

We also understanding that on more than one occasion dirt has been dumped on the site and on neighbor's property at odd hours. Neighbors have witnessed this and taken photos. More dirt is now moving down the hill and now moving on to neighbor's property.

It is our opinion the lot should not be built on as it is evident the land is still moving and may have compromised the work that was done (the buttress wall) after the initial slide. The owners have not attempted to do anything to relieve pressure of the dirt moving. They knew when they purchased the lot it had inherit problems that would be extremely expensive to repair. Probably not worth the cost on this site. I believe most of the engineering reports will support this opinion.

Who is responsible for the buttress wall and its performance? If all the owners on the street then they have a say in building. If the wall is the responsibility of the owner of 3933 to maintain his property then the answer is clear, he is not doing anything to prevent the soil from moving.

Just from observation of where the dirt was, right behind the buttress wall and where the dirt is today it looks like the elevation has continued to slide up to and maybe more than 30 feet. The engineering reports show the toe of the slide several hundred feet dropping down close to the lot at 3881 Los Arabis. In addition, the side areas are still moving which is evident from the soil movement along the eastern side. It should also be noted that the house located at 3881 Los Arabis also had to be removed due to the soil moving.

The west end of Quail Ridge, Tiffany Hills, is a private road and the owner of 3933 Quail Ridge, to my knowledge, never paid his share of the road maintenance. It seems the owners who live on the private road should be able to regulate the use of the road since they maintain it at their cost. Even if the owner could do the engineering of the hill and the foundation to bedrock the road would be destroyed. He apparently does not have the financial ability to pay for all of the construction costs since it was in foreclosure when he purchased it a 2nd time. It is just too much of a problem which is evident because there were no other parties interested in purchasing the lot and building on this site. Prior owners of the lot also walked away because of the cost and the issues.

Sincerely,

Patty L. Cronin

Patty and Gene Cronin

3915 Quail Ridge Road

HDP07-19
RECEIVED
AUG 23 2019
CITY OF LAFAYETTE
PLANNING DEPT.

August 11, 2019

Ms. Payal Bhagat, Senior Planner
Planning nd Building Department
City of Lafayette
3675 Mount Diablo Boulevard, #210
Lafayette, California 94549

Re: 3933 Quail Ridge Road, Lafayette, California

Dear Ms. Bhagat,

This letter is in response to the proposed developing of Assessor's Parcel Number 248-130-012 and the ensuing Environmental Impact Report being drafted. I am a homeowner in the development and precisely at 3875 Los Arabis Dr., Parcel Number 248-130-013, adjacent to the subject property.

I would begin my comments with how disappointed I am with the city's response to my complaint made in 2017 concerning the dumping of "unknown, unauthorized and unwelcomed" materials onto my property. The culprit for this illegal act is believed to be the same person filing to develop at 3933 Quail Ridge Rd. It is amazing how this violation goes unenforced.

As for this current request, it is clear and well known that said property is located on an active slide, one with a disastrous history that impacted the entire neighborhood by the collapse of the entire roadway. However, through much litigation, a fix was constructed that allowed a reconstruction of the road, but nothing to stabilize the slide itself.

My concern is whether any construction onto the property will destabilize the entire slide mass causing movement that will undermine my property. I will send a photo showing the narrow margin of earth that separates the slide mass from the pier to our foundation. Please see the attached photo and appreciate the reason for my concern. Knowing we have an active slide that continues to move naturally is one thing we accept in the neighborhood. However to intentionally disturb the mass, adding to the load (weight), and to conclude no threat to my property is unimaginable.

In addition to the above, the initial project description indicates no attempt to stabilize the slide mass prior to development. I sincerely find this incredibly irresponsible either showing little understanding for the dangers and potential devastation to the neighborhood, and specifically to my property, or little concern for the consequences of what possibly could happen if history repeats itself.

Lastly, the history of Mr. Reddy's dealing with this property should cause all concern about the sincerity for the welfare of the neighborhood. Is his intent to build as his residence, or his intention to build out the plans himself? Or is his intent to gain permit to build and then sell permit and plans to other leaving an unsuspecting buyer holding the bag of problems building out this site brings? I suspect it's the latter as Mr. Reddy's history of business dealings indicates more interest in playing the influence and political game for his personal gains.

In conclusion, I am filing a request that the city of Lafayette and Contra Costa County should oppose development on this property. Approval exposes the entire city to unnecessary scrutiny about the integrity of such an approval. The history of this lot is well known throughout the county so approval will for sure raise "eye brows". Please allow caution to govern.

Sincerely,

Claudia and Leroy Quan
3875 Los Arabis Drive
Lafayette, Califor

Attached: Photo

From: Louise Laemmlen
To: Bhagat, Payal
Subject: Re: current condition of lot at 3933 Quail Ridge Road
Date: Wednesday, August 14, 2019 2:24:41 PM

Thank you. We appreciate that. Safety is a major concern. As you realize, the landslide was catastrophic and devastating for the residents.

Louise

> On Aug 14, 2019, at 11:19 AM, Bhagat, Payal <Pbhagat@ci.lafayette.ca.us> wrote:
>
> Yes, I know the history of the slide. We have that information in the file. I understand your position very clearly, but because this is really a private matter between the residents, I am not sure how much the City can really dictate. However, the project will have environmental review, so, hopefully there will be mitigation measures that will come out of the document that would help stabilize the on-going concerns you have outlined below.
>
> Thanks,
> Ms. Payal Bhagat
> Senior Planner
> City of Lafayette
> Direct: (925) 299-3219 | Main: (925) 284-1976
> www.lovelafayette.org
>
> *How are we doing? Please take a moment to fill-out our customer satisfaction form here!*
>
> ***PS: My last day at the City of Lafayette is on August 23, 2019***
>
> Please consider the environment before printing this e-mail
>
> ---
>
> **From:** Louise Laemmlen [mailto:lou.laemmlen@gmail.com]
> **Sent:** Wednesday, August 14, 2019 11:03 AM
> **To:** Bhagat, Payal
> **Cc:** Fox, Jonathan
> **Subject:** Re: current condition of lot at 3933 Quail Ridge Road
>
> Dear Ms. Bhagat,
>
> Please do not think of this as the “history” of the slide. You know that history. The whole point of the communication is to show that the slide is still active; it

moves significantly every year, and the current owner seems uninterested in due diligence to maintain the road or stabilize the slide.

Thank you,
Louise Laemmlen

Sent from my iPhone

On Aug 14, 2019, at 9:31 AM, Bhagat, Payal <Pbhagat@ci.lafayette.ca.us> wrote:

> Hi Louise,
> I have received your letter (it came in yesterday). Thank you for sending me the digital pictures, and the explanation of the history of the site. I will save all of this in the project folder.
>
> Thanks,
> Ms. Payal Bhagat
> Senior Planner
> City of Lafayette
> Direct: (925) 299-3219 | Main: (925) 284-1976
> www.lovelafayette.org
>
> *How are we doing? Please take a moment to fill-out our customer satisfaction form here!*
>
> ***PS: My last day at the City of Lafayette is on August 23, 2019***
>
> Please consider the environment before printing this e-mail
>
> ---
>
> **From:** Louise Laemmlen [mailto:lou.laemmlen@gmail.com]
> **Sent:** Tuesday, August 13, 2019 6:37 PM
> **To:** Bhagat, Payal
> **Subject:** Fwd: current condition of lot at 3933 Quail Ridge Road
>
> Dear Ms. Bhagat,
>
> This week I sent you a hard copy of a letter and some photos pertaining to the proposed Quail Ridge project, however, on paper, this set of photos printed out of order and may be confusing on the photocopied submission. This set is clearer and follows in order, photo 1, 2, 3, 4.
>
> Please include these in the file regarding the proposed project.

Thank you,
Louise Laemmlen

Begin forwarded message:

From: Louise Laemmlen <lou.laemmlen@gmail.com>
Subject: current condition of lot at 3933 Quail Ridge Road
Date: August 11, 2019 at 11:36:16 AM PDT
To: "jfox@lovelafayette.org" <jfox@lovelafayette.org>
Cc: Hannah Dunn <dunn.hannah.e@gmail.com>, Henry Chang <chinychang@yahoo.com>

The condition of the landslide and proposed building site today, August 11, 2019.

Photo 1: The road buckling at the West end of the slide.
Photo 2: The proposed building site looking East and detail of ESR's planned pull away of the active landslide (from the metal baskets which support the earth under the road).
Photo 3: Detail of the landslide as it abuts the wedge of land of the proposed building site.
Photo 4: The proposed building site from downslope.

Date: August 11, 2019 at 10:56:53 AM PDT

<image001.jpg>

<image002.jpg>

<image003.jpg>

<image004.jpg>

Sent from my iPhone

From:	Louise Laemmlen
To:	Fox, Jonathan
Cc:	Hannah Dunn; Henry Chang
Subject:	current condition of lot at 3933 Quail Ridge Road
Date:	Sunday, August 11, 2019 11:36:40 AM

The condition of the landslide and proposed building site today, August 11, 2019.

Photo 1: The road buckling at the West end of the slide.
Photo 2: The proposed building site looking East and detail of ESR's planned pull away of the active landslide (from the metal baskets which support the earth under the road).
Photo 3: Detail of the landslide as it abuts the wedge of land of the proposed building site.
Photo 4: The proposed building site from downslope.

Date: August 11, 2019 at 10:56:53 AM PDT

Sent from my iPhone

Appendix B

Geotechnical Documentation

Appendix B-1

1997 WLA Boring Logs

WLA

BORING LOG

Page 1 of 4

Project: Quail Ridge (AKA # 1729-1A)
Job No.: 1179
Boring No.: ~~B1~~ (AK1)
Type & Diameter of Boring: CME 750 8 in Hollow stem auger
Boring Location: center of Quail Ridge Lane, Lafayette Head scarp area of slide; 80 ft W of right marg
Total Depth: 56 ft
Sampling Method: 2½ in split-spoon sampler. w/ brass liners.
Sample Driving Hammer and Drop: 140 lb. 30 in., hydraulic
Elevation @ Top of Hole: ≈ 732 ft. per map (5A I)
Drilling Contractor and Rig: CME 750 Layne Exploration; Fontana CA
Date Started: 4/15/97
Date Completed: 4/15/97
Logged By: KIKelson

Inclinometer installed 4.15.97 see p 4.

Uncorrected Blows per 6-inch drive	SPT $N_1(60)$ 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
		0						Asphalt 8 in Road base - gravel - 3 in	Start @ 1140 am no observers described cuttings:
		1	CL					SILTY CLAY (CL) (2.5Y 3/2 (m)) very dark grayish brown; trace fine to med sand, trace gravel; medium stiff, moist, massive (in cuttings), (FILL?)	
		2							easy drilling.
		3							
		4							
4 6 10		5		☒	0 in				sample @ 1150 sample left in hole; installed catcher in sampler for next time
		6							
		7							
		8							slightly softer drill @ 8½ ft.
		9							
6 8 9		10	CL	☒	12 in			SANDY CLAY (CL) 2.5Y 4/2 m dark grayish brown, sand fine to med, trace gravel; moist; massive; trace carbonate nodules up to 3mm. (COLLUVIUM)	sample @ 1200 from 10.0 to 10.5 sample kept
		11							
		12							
		13							
		14							
		15							

▨ 3.0-inch Pitcher tube sampler

☒ 2.5-inch I.D. split spoon sampler

▮ Standard Penetration Test (SPT) sampler

WLA

BORING LOG

Page 2 of 4

Project	Job No.	Boring No.
Quail Ridge	1179	AK1

Uncorrected Blows per 6-inch drive	SPT N1(60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
7 11 16		15	CL	☒	15			SANDY CLAY (CL), as above 2.5Y 4/2 m; v stiff except few small gravel up to 5 mm, no $CaCO_3$ (COLLUVIUM) seems greener, but same Munsell	1210
		16							
		17							
		18							
		19							easy drilling
7 12 14		20	CL	☒	18			SANDY CLAY (CL) olive (5YR 4/3m); moist fine to coarse sand; few gravel up to 10mm few vertical $CaCO_3$ Stringers, v. stiff (COLLUVIUM)	1220
		21							
		22							
		23							
		24							
12 16 17		25	SP	☒	16			SAND (SP) 5Y 5/4 m olive, moist, hard fine to med sand; dense; blocky fracture in 1/4 in; semiconsolidated, (SANDSTONE - weathered bedrock)	1230
		26							
		27							harder drilling
		28							easy from 27.5 to 28.5
		29							then hard again
9 10 20		30	SM	☒	14			SILTY SAND (SM), olive 5Y 5/4(M); moist, hard - fine sand, 15-20% silt, trace pebble to 15 mm; subrounded to rounded (BEDROCK - SILTY SANDSTONE)	1240
		31							
		32							

▨ 3.0-inch Pitcher tube sampler

☒ 2.5-inch I.D. split spoon sampler

▯ Standard Penetration Test (SPT) sampler

WLA

BORING LOG

Page 3 of 4

Project	Job No.	Boring No.
3933 Quail Ridge	1179	AK1

Uncorrected Blows per 6-inch drive	SPT N1(60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
		33							
		34						SAND – as above (SANDSTONE)	
18		35		☒				abrupt, no clay; depos.	sampled @ 1250 photo of contact (pencil points up)
23 37		36	SW	☒	15			SAND (SW) Gray N5/0 dry, DRY; hard fine to med sand; 5% silt. distinct bluish gray; no fractures, no CaCO3 (SANDSTONE BEDROCK)	
		37							stiff drilling
		38							
		39							
29 55		40	SW	☒	12			SANDSTONE – as above gray, dry, hard; no fractures prominent	sampled @ 1305 disturbed sample – only one liner put in sampler, – sample was slid into liner, to keep.
50	(4 inches)	41							
		42							
		43							stiff drilling
		44							harder drilling 41.2 to 44.7 ft
37 60	for 5 in.	45	SW	☒				SANDSTONE – as above gray, dry, hard, planar fracture – but prob. from sampler. gravels up to 15mm (rare), subrounded	sampled @ 1320
		46							
		47							
		48							
		49							
		50							

▨ 3.0-inch Pitcher tube sampler

☒ 2.5-inch I.D. split spoon sampler

▮ Standard Penetration Test (SPT) sampler

WLA

BORING LOG

Page 4 of 4

Project	Job No.	Boring No.
Quail Ridge	1179	AK1

Uncorrected Blows per 6-inch drive	SPT N_1(60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
38		50	SP	☒	12			SANDSTONE (SP); ~~50~~% dry, hard (as above) fine to med silt	sampled @ 1340
75									
		51							
		52							Stiff drilling all this run.
		53							
		54							
70		55	SP	☒	8			SANDSTONE, ~5% dry, hard (as above).	sampled @ 1405.
100	2								
		56						TD = 56 ft	stopped @ 1415.
		57							
		58						Inclinometer installed to depth of 53.5 ft, with 2.5 ft long grout valve to bottom of hole. Annular space filled with grout/bentonite mix. 2.75 in O.D. inclinometer casing used	
		59							
		60							
		61							
		62							
		63							
		64							
		65							
		66							
		67							

▨ 3.0-inch Pitcher tube sampler

☒ 2.5-inch I.D. split spoon sampler

▮ Standard Penetration Test (SPT) sampler

BORING LOG

Page 1 of 4

Project: Quail Ridge Landslide	Job No.: 1176	Boring No.: AK-2
Type & Diameter of Boring: 8"Ø OD Hollow Stem Flight Augers	Boring Location: Driveway, mid/top of Qls	Total Depth: 55'8"
Sampling Method: 2.5"Ø ID splitspoon w/acrylic liners	Sample Driving Hammer and Drop: Automatic trip 140lb 30" drop	Elevation @ Top of Hole:
Drilling Contractor and Rig: Layne Drilling - CME 750	Date Started: 4/16/97	Date Completed: 4/16/97
		Logged By: P. Drouin

Inclinometer Installed - details on P.4.

Uncorrected Blows per 6-inch drive	SPT $N_1(60)$ 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
		0–1						AC + Baserock	Easy, smooth augering
3 6 7 5		1–3	CL	☒	16"			CLAY, sandy, silty; gray (Gley 5/N) with orange mottling; moist; soft to firm; (Fill)	
3 6 9 14		3–5	CL	☒	20"	2.5		CLAY, sandy with gravel; black (5YR 2.5/1); moist; firm; small, subrounded clasts; (Qc/Qls)	
4 7 10 13		5–7		☒	24"			Same as above	
5 7 10 14		7–9	CL-ML	☒	22"			CLAY, silty; light yellowish brown; moist; firm; carbonate nodules (Qls)	2.5Y6/3
7 9 14 19		9–11		☒	13"				
11 12 20 21		11–13	ML	☒	16"	>4.5		SILT, sandy; light brownish gray (2.5Y6/2); moist; stiff; (Bedrock/Qls)	
9 21 33 41		13–15		☒	19"	>4.5		Same as above - mod. stiff to v. stiff; vertical, oxidized joints - tight (⅛-1"); planar	Fall runs - poor recovery reflects compressed sample

▨ 3.0-inch Pitcher tube sampler

☒ 2.5-inch I.D. split spoon sampler w/acrylic liners

▮ Standard Penetration Test (SPT) sampler

WLA

BORING LOG

Page 3 of 4

Project	Job No.	Boring No.
Quail Ridge Landslide	1176	AK-2

Uncorrected Blows per 6-inch drive	SPT N1(60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
10 20		15	ML-SM	☒				SILT, sandy to SAND, silty; light brownish gray; hard; Tightly jointed (½-1"), joints planar & oxidized, (Bedrock/Qls)	-Acrylic liner bent
28 35		16			17"				-Smooth augering; light brown [illegible]
16 24		17		☒				Same as above	-No liner used to better see entire core
36 37		18			24"			-Large (2") clast (limestone)	-Horizontal frac. breaks
15 23		19		☒				Grading coarser ↓	-9:15 am -liner
35 40		20	SP		13"			(SAND; med. grained)	
26 41		21		☒				-SaSAND -, med. to coarse grained as above, poorly graded.	-Slight chatter
52 90		22	[illegible]		22"				-9:40 am
26 33		23		☒				-Same as above	
44 47		24	SP		16"				
23 32		25		☒				-Same as above SAND, gravelly-coarse with larger (2") clasts; gray to dark reddish brown (oxidized zone); dense; moist; subrounded grains; fractured	
40 47		26	SP.		18"				
17 22		27		☒				SILT, sandy; light yellowish brown (2.5Y 6/4); dry; soft to firm.	-@ ~27.5'- ¼" Thick colluvial unit
24 25		28			24"			CLAY, silty; dark brown; moist; firm; (Qls slideplane?)	
14 24		29	GW	☒				GRAVEL; sandy; brown (10YR 4/3); moist; loose; subround to subangular clasts & grains (clast [illegible]); pods of greenish gray clay;	
25 27		30			23"				-Grading greener
17 17		31		☒				GRAVEL, sandy with sand & silty sand interbeds; orangish brown; moist to wet in coarse interbeds; loose to dense;	-mod. dipping clay seam at contact
21		32	GW		24"				

▨ 3.0-inch Pitcher tube sampler

☒ 2.5-inch I.D. split spoon sampler
Dashed where no liner was used

◧ Standard Penetration Test (SPT) sampler

WLA

BORING LOG

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Project	Job No.	Boring No.
Quail Ridge Q15	1176	AK-2

Uncorrected Blows per 6-inch drive	SPT N1(60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
21 28		32						GRAVEL, sandy - same as above; subrounded to subangular clasts;	
10 18		33		☒				SILT, clayey with gravel; pale olive (5Y 6/3); moist; Firm to stiff, slightly plastic, small subrounded clasts	
24 30		34	ML	☒	13"			(weathered Bedrock)	
8 10		35							
12 15		36	SM		24"			SAND, silty with gravel (15%); brown; moist; dense; subrounded to subangular clasts up to 3/4"; oxidized zones. (weathered Bedrock)	11:20am
11 16		37		☒					
27 38		38		☒	20"				
11 21		39	ML					SILT, sandy; greenish gray (Gley 6/1); moist; v. stiff; rock texture; [illegible] oxidized [illegible]	
33 37		40			24"			CLAY, with some sand + gravel; brownish gray; moist; stiff; plastic; oxidized. (slough?)	- maybe slough in auger
8 37		41	SM	☒	14"			SAND with some silt; grey (Gley 5/N); moist; very stiff to hard; oxidized Fractures;	- upper 4" sandy, silty clayey mottling looks like slough
60		42		☒				- same as above (weathered Siltstone)	
70 100 50/4		43			18"			- same as above; hard with steeply dipping joints.	12:15pm
49 99		44		☒				same as above	
		45						-	- Augered to 50'
		46							
		47	SM						
		48							
		49							

▨ 3.0-inch Pitcher tube sampler

☒ 2.5-inch I.D. split spoon sampler

▮ Standard Penetration Test (SPT) sampler

WLA

BORING LOG

Page 4 of 4

Project	Job No.	Boring No.
Quail Ridge O/S	1176	AK-2

Uncorrected Blows per 6-inch drive	SPT N1(60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
		49							
22 44		50	SM	⊠	24"			SAND as above; hard (weathered Sandstone)	-low blowcount at top may be slump in hole
125		51							
		52							
		53							
		54	SM						
94 100/5"		55		⊠	16"				1:20pm
		56						BOH@ 55'8" 4/16/97 Inclinometer installed to a depth of 52' (inside casing) (54' total) 1:1 Grout to Bentonite mix backfilled around casing. 2 3/4" ØOD casing with grout valve at the end.	no groundwater encountered

▨ 3.0-inch Pitcher tube sampler ⊠ 2.5-inch I.D. split spoon sampler ▮ Standard Penetration Test (SPT) sampler

BORING LOG

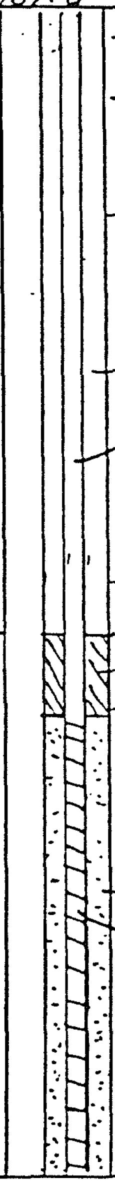
Page 1 of 3

Project: Quail Ridge Landslide	Job No.: 1176	Boring No.: AK-3
Type & Diameter of Boring: 8"ØOD Hollow Stem Augers	Boring Location: Adjacent to AK2	Total Depth: 50 Ft
Sampling Method: 2.5"Ø ID Split spoon w/acrylic liners	Sample Driving Hammer and Drop: 140lb automatic trip 30"drop	Elevation @ Top of Hole:

Drilling Contractor and Rig: Layne Drilling, CME 750	Date Started: 4/16/97	Date Completed: 4/16/97	Logged By: P. Drouin

Piezometer installation
No groundwater encountered while drilling
No groundwater - 4/17/97

ers



Uncorrected Blows per 6-inch drive	SPT $N_1(60)$ 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description - log of cuttings except where noted	Remarks
		0						CLAY, dark brown; moist	Started 5:50pm
		1							- smooth augering
		2	CL-CH						
		3							Dark brown cuttings
		4							
		5		☒ bag					Grout
		6							solid casing
		7							smooth, easy augering
		8						CLAY, silty sandy; light brown; moist	Bentonite
		9							lighter brown cuttings,
		10	CL-CH	☒ bag					
		11							sand
		12							slotted casing
		13							
		14							
		15		☒ bag				- CLAY as above w/carbonate nodules	

▨ 3.0-inch Pitcher tube sampler ☒ 2.5-inch I.D. split spoon sampler ▮ Standard Penetration Test (SPT) sampler

BORING LOG

Page 3 of 3

Project	Job No.	Boring No.
Quail Ridge Landslide	1176	AK-3

Uncorrected Blows per 6-inch drive	SPT N1 (60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Piezometer As built	Remarks
		15						CLAY, silty, sandy; light brown		
		16								
		17								-slightly harder augerings, smooth
		18								
		19								slotted casing.
		20	CL-	X				CLAY, sandy with gravel; brown; moist		Sand
		21	CH					Gravel content increasing up to 1" subrounded clasts		
		22								-6:00pm
		23								
		24								-2.5" sampler
		25		X				CLAY, gravely, sandy; brown; moist		-6:10pm
13 18		26		X						-Acrylic liner used; not logged. unable to see in liner.
22 24		27		X	19"					
12 15		28	ML	X				SILT, sandy with clay; yellow brown; moist; stiff		-In shoe.
26 43		29		X	18"			SILT, clayey; olive brown; moist; stiff		
		30		X	bag					-6:30pm -In shoe
		31								-Slow augering
		32								

▩ 3.0-inch Pitcher tube sampler

☒ 2.5-inch I.D. split spoon sampler w/Acrylic liners

▮ Standard Penetration Test (SPT) sampler

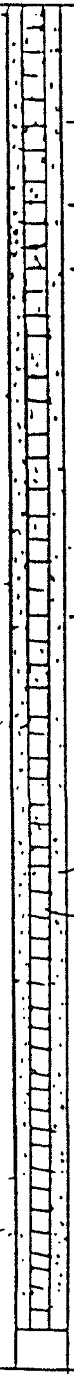
BORING LOG

Page 3 of 3

Project	Job No.	Boring No.
Quail Ridge Landslide	1176	AK-3

Depth (feet)	Uncorrected Blows per 6-inch drive	SPT $N_1(60)$ 0 10 20 30 40 50 60	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
32									
33									[illegible]
34									
35								Dark gray	Dark gray cuttings Slow augering
36			?						
37			CL						
38								CLAY, silty; light brown; moist stiff to v. stiff;	
39	26 40 89			☒	24	>4.5		SILT, sandy to SAND, silty; blue gray; moist; very stiff to hard Steeply dipping joints	6:50 pm
40			ML SM						
41									
42									
43									Sand slotted casing
44									
45				☒ bag					
46								Piezometer installed: 10' not screened	
47								8' Grout 1' Bentonite 40' screened, #2/12 Montrey sand 40' sand + screen	
48									
49									No groundwater encountered
50								BOH @ 50' 4/16/97	7:20 pm

Piezometer As-built



3.0-inch Pitcher tube sampler

☒ 2.5-inch I.D. split spoon sampler

▮ Standard Penetration Test (SPT) sampler

BORING LOG

Page 1 of 4

Project: Quail Ridge Landslide	Job No.: 1176
	Boring No.: AK-4
Type & Diameter of Boring: 8"φ Hollow Flight Augers	Boring Location: Below House [illegible]
	Total Depth: 65 ft
Sampling Method: 2.5"φ Split Spoon w/Acrylic 3"φ ID (5' long) Split Spoon Continuous	Sample Driving Hammer and Drop: 140 lb automatic trip 30" drop
	Elevation @ Top of Hole:
Drilling Contractor and Rig: Layne Drillers; CME 750	Date Started: 4/17/97
Date Completed: 4/17/97	Logged By: P. Drouin

Groundwater encountered ~ 41'

Inclinometer installed to 65.2'

Uncorrected Blows per 6-inch drive	SPT $N_1(60)$ 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
		0	CL-CH					CLAY, dark brown to black, moist, firm; roots throughout; (Fill/Soil)	Smooth, easy augering
7 10 12 13		3		☒	16"	×45			
		4.5	SM	▨				SAND (fine), silty with some clay; light yellowish brown (2.5Y6/3); stiff (maybe compacted due to sampling); carbonate nodules; slight oxidation; roots in upper 2-3 ft. (Qc/Qls)	- 5' runs - 9:20 am - Smooth, easy augering; yellowish brown cuttings
		7		▨	49"				
		9	SM	▨				- same as above	
		10		▨		2.5-3.5	0.6		- Finished 9:27 am Started 9:40 am
		11.5		▨					- Brown cuttings
		12	ML-CL	▨	41"			SILT, clayey, olive brown, moist, firm to stiff; blocky; roots (Qc/Qls)	
		15		▨					@15' - 2.5' runs 9:45

▨ 3.0-inch ~~Pitcher~~ Acrylic tube sampler Continuous (2.5' long - 5 foot runs)

☒ 2.5-inch I.D. split spoon sampler w/Acrylic liner

▯ Standard Penetration Test (SPT) sampler

WLA

BORING LOG

Page 2 of 4

Project	Job No.	Boring No.
Quail Ridge Landslide	1176	AK-4

Uncorrected Blows per 6-inch drive	SPT N_1(60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
		15	CL-ML					CLAY, silty to SILT, clayey; olive brown; moist, stiff; roots (Bedrock!/Qls?)	10:07am
		16			30"				
		17							10 11am start 10:17am
		18	?					— ? — — ? — — ? — — ? —	
		19	SM		30"			SAND (fine to medium; with fines; pale olive (5Y 6/3); v. dense to hard; dry to moist, almost consolidated rock, some oxidizing;	
		20							10:21am 10:27am
		21	ML		30"			(Bedrock/Qls?)	
		22						SILT, with clay and fine sand; olive gray (5Y 5/2); moist; firm to stiff; oxidized, steeply dipping wavy joints (2" spacing) carbonate nodules (Siltstone/Qls?)	10 30am 10:35
		23							
		24	ML		28"			-Same as above, very fractured w/ oxidized staining (spaced 1/8"-1/4"); angular blocky	
		25							10:40
		26	ML		28"				
		27						-Same as above, slightly moister	
			GC					— ? — — ? — — ? —	10:45 10:52
		28						GRAVEL, clayey, silty; brown; wet; soft; subangular to subrounded clasts (1/4-1/2"); oxidized; carbonate nodules	-maybe slump in auger string
		29	ML		28"			SILT, with clay and fine sand; olive gray (5Y 5/2) with orange mottling ([illegible]); moist to wet along gravel layers, stiff; highly fractured (1/8-1/2"); carbonate stringers + nodules (cubic); intermittent lenses of GRAVEL; clay films on fractures	
		30							1057 11:00
		31			[illegible]				
		32						(Siltstone/Qls)	11:05

▨ 3.0-inch ~~Plexiglas~~ Acrylic tube sampler ☒ 2.5-inch I.D. split spoon sampler ▮ Standard Penetration Test (SPT) sampler

WLA

BORING LOG

Page 3 of 4

Project	Job No.	Boring No.
Quail Ridge Landslide	1176	Ak-4

Uncorrected Blows per 6-inch drive	SPT N1(60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
		32						SILT as above	11:10
		33	ML-bk					SILT (as above) with clay and fine sand; olive gray with orange mottling (~20%), moist; hard (Siltstone/ols?)	
		34			30"				
		35							11:13 11:18
		36			30"				
		37						SILT (as above) with vertical joints, oxidized with black staining (1½" spacing)	
		38						SILT to SILTSTONE, olive gray; moist; hard soil (soft rock), jointed & fractured, joints steeply dipping to vertical - oxidized & black staining, wavy, tight (1-1½")	11:22 11:25
		39	ML-bk		30"				
		40						same as above, wet sample	11:32 11:37
		41			30"				wet sampler
		42							11:43 11:50
		43						same as [illegible] samples, slightly sandier	
		44	ML-bk		30"				
		45							11:55 12:00
		46			30"				
		47							12:05 12:14
		48			25"			? - - - ? - - ? - - ? - - ? - - ? - -	
		49						SILT, sandy, description next page	

▯ 3.0-inch Pitcher tube sampler

☒ 2.5-inch I.D. split spoon sampler

◧ Standard Penetration Test (SPT) sampler

WLA

BORING LOG

Page 4 of 4

Project: Quail Ridge Landslide
Job No.: 1176
Boring No.: AK-4

Uncorrected Blows per 6-inch drive	SPT N1(60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
		49						SILT, sandy; bluish gray (Gley 5/5B); wet; st.-v.st. to hard; v. fractured with clay in some fracture surfaces; angular blocky;	
		50	ML-bk						12:16pm 12:25pm
		51			30"			(Siltstone) Grading sample	
		52	-?- SP					—?— —?— —?— —?— SAND (fine to medium), bluish gray (Gley 5/5B); wet; very dense to hard (rock like - soft to fissile); uniform consistency; not fractured;	12:29pm 12:35pm
		53			30"				
		54	SP-bk					(Sandstone)	12:40pm 12:55pm
		55						Same as above	
		56			30"				
		57							12:57pm 1:05pm -harder augering
		58						Same as above	
		59			30"				
		60	SP-bk						1:13pm
		61			23"			Same as above	
		62			Sample				-Bottom of sample slumped out -1:58pm
		63							-Sample 10" over run, extra from previous run saved & labelled 62-62.5'
		64			40"				
		65						BOH @ 65' 4/17/97 Inclinometer installed	2:02pm
		66							

▯ 3.0-inch Pitcher tube sampler

☒ 2.5-inch I.D. split spoon sampler

▮ Standard Penetration Test (SPT) sampler

39-41'

BORING LOG

Page 1 of 4

Project: Quail Ridge Landslide

Job No.: 1176

Boring No.: AK-5

Type & Diameter of Boring: 8"⌀ Hollow Flight Auger

Boring Location: Adjacent to AK-4

Total Depth: 60'

Sampling Method: 3"⌀ Acrylic sampler in Auger String

Sample Driving Hammer and Drop: Automatic trip

Elevation @ Top of Hole:

Drilling Contractor and Rig: Layne Drilling/CME 750

Date Started: 4/17/97

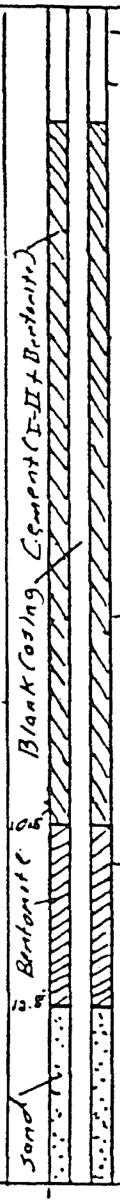
Date Completed: 4/17/97 drilling 4/18/97 Piezo.

Logged By: P. Drouin

Piezometer Installed.

Uncorrected Blows per 6-inch drive	SPT N_1(60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Cuttings Description	Remarks
		0							Smooth, easy augering
		1						CLAY, dark brown; moist;	S:10
		2							
		3							
		4							
		5		X					
		6						?— — —?— — —?—	
		7						SILT, sandy, clayey; light olive brown; moist	
		8							Light brown cuttings
		9							
		10		X				SILT as above	
		11							S:15
		12							
		13							
		14							
		15		X				SILT as above	

As Built Piezometer



▨ 3.0-inch Pitcher tube sampler ☒ 2.5-inch I.D. split spoon sampler ▮ Standard Penetration Test (SPT) sampler

WLA

BORING LOG

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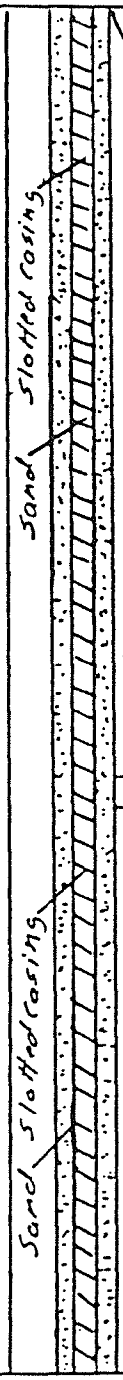
Project	Job No.	Boring No.
Quail Ridge Landslide	1176	AK-5

Uncorrected Blows per 6-inch drive	SPT N1(60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
		15							Blank casing above 15 feet
		16							
		17							
		18							
		19							
		20		☒				SILT, clayey, sandy; olive brown, moist	
		21							
		22							
		23							
		24							
		25		☒				SILT, clayey, sandy; olive brown; moist	5:40 ▽ GW @ 25 ft on 4/18/97
		26							
		27							
		28							
		29							
		30							
		31		☒				SILT as above	
		32							



▨ 3.0-inch Pitcher tube sampler

☒ 2.5-inch I.D. split spoon sampler

▮ Standard Penetration Test (SPT) sampler

WLA

BORING LOG

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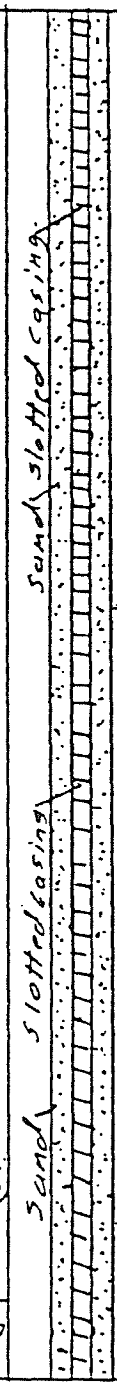
Project	Job No.	Boring No.
Quail Ridge Landslides	1176	AK-5

Uncorrected Blows per 6-inch drive	SPT N_1(60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
		32							Smooth, easy augering
		33							
		34							
		35		☒				SILT, clayey; olive brown; moist;	
		36							
		37							
		38							
		39							6:00
		40		☒					
		41							
		42							
		43							
		44							
		45		☒				SILT, clayey; dark olive brown; moist	2½" Ø sampler sent down hole to clean auger string before continuous sampling
		46							
		47						SILT to SILTSTONE; olive gray; wet; hard (soft to fissile rock); steeply dipping to vertical, oxidized joints; v. fractured.	6:15
		48		▨				?—?— —?— —?	Sampler wet
		49		▨				SILT; bluish gray; description next page	



▨ 3.0-inch Pitcher tube sampler ☒ 2.5-inch I.D. split spoon sampler ▮ Standard Penetration Test (SPT) sampler

BORING LOG

Page 1 of 4

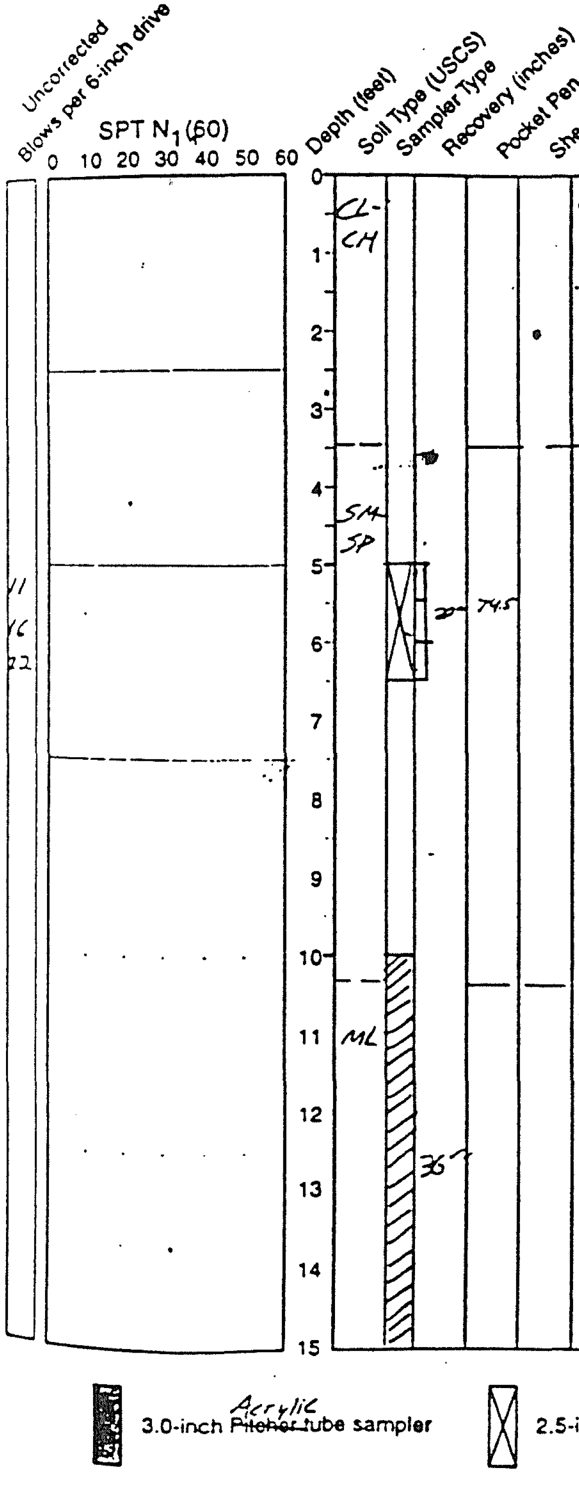
Project	Job No.	Boring No.
Quail Ridge Landslide	1179	AK-6

Type & Diameter of Boring	Boring Location	Total Depth
8"⌀ Hollow Flight Augers	Toward slide margin	60 Ft

Sampling Method	Sample Driving Hammer and Drop	Elevation @ Top of Hole:
2.5"⌀ ID splitspoon with brass & acrylic liners 3"⌀ Continuous Split-spoon in Auger	140 lbs Automatic Trip 30" drop	

Drilling Contractor and Rig	Date Started	Date Completed	Logged By
Layne Drilling / CME750	4/18/97	4/18/97	P. Drouin

Inclinometer installed 4/18/97



Description	Remarks
CLAY, Silty; dark brown; moist; firm to stiff; (Soil)	10:26 Smooth, easy augering; light brown, clayey cuttings
SAND (Fine to medium) with trace silt (<5%); light olive brown (2.5Y 5/4); moist; dense to v. dense; oxidized joints - planar to wavy; few roots in upper ~4" (Sandstone/Qls?)	light brown, sandy, silty cuttings 10:40; brass liners
? ? ?	10:59
SILT, clayey; light yellowish brown (2.5Y 6/3); moist; stiff to v. stiff; fractured - closely spaced; oxidized orange mottling (~10-20%); clay film on fracture surfaces; angular blocky, (Siltstone/Qls)	11:02

▨ 3.0-inch Acrylic ~~Pitcher~~ tube sampler

☒ 2.5-inch I.D. split spoon sampler

▮ Standard Penetration Test (SPT) sampler

BORING LOG

Page 2 of 4

Project	Job No.	Boring No.
Quail Ridge Landslide	1176	AK-6

Uncorrected Blows per 6-inch drive	SPT N1 (60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
		15	ML	▨				-@~15'-45° joint, downdip: slickensides, with clay & oxidation on surface (Sampled)	11:12
		16		▨	30				
		17		▨				-SILT, clayey; slight yellowish brown; moist; stiff to very stiff; Fractured; angular blocky; (Siltstone/QIS)	11:14 11:20
		18	ML	▨	30				
		19		▨				Same as above	
		20		▨					11:24 12:15
		21	ML	▨	30			Same as above with fine sand & charcoal/manganese?; and platy weathered claystone (brown clayey inclusions?)	
		22		▨					12:17 12:27
		23	ML	▨	28			-Same as above; highly fractured	
		24		▨					
10		25		☒					12:30
16				☒	15			Same as above	
24		26		☒				More abundant, closer spaced fractures with clay films on fracture surfaces. clay content increasin	@26.5'-roots along vertical fractures
		27							
		28	ML-CL	▨				Same as above; clay film on fracture surfaces abundant SILT, clayey to CLAY, silty (Siltstone/QIS)	
		29		▨	20				
		30		▨				-Trace gravels.	
		31		▨	30				
		32		▨					

▨ 3.0-inch Pitcher tube sampler

☒ 2.5-inch I.D. split spoon sampler

▮ Standard Penetration Test (SPT) sampler

WLA

BORING LOG

Page 3 of 4

Project	Job No.	Boring No.
Quail Ridge Landslide	1176	AK-6

Uncorrected Blows per 6-inch drive	SPT N1 (60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
		32	CL					SILT, clayey to CLAY, silty; olive brown; moist; stiff to v. stiff; highly fractured with clay films on fracture surfaces (Siltstone/Qls)	
		33	ML						
		34			28"				
		35							
		36			26"				- v. easy drilling - wet sampler
								— ? — — ? — — ? —	
		37	SP-SM					SAND (course with medium) w/silt + gravel; olive brown (2.5Y4/3); wet; loose to dense; subrounded to subangular grains + clasts up to 3/4" - chert + qtz grains; (Coarse Sandstone/Qls)	- 1:25
		38							- loss sample, driller's report v. easy augering
		39			0				- measured down hole - 3" in auger
		40							- 5' run attempted to catch bottom of gravel to retain sample
		41							- @41' driller reports harder drilling
		42			38"				
		43	SP-SM						- @44' - driller - "very hard, sampler may be full"
		44	? CL					— ? — — ? — — ? — — ? —	
								CLAY?, dark brown mottled white (CaCO3?); mod. dipping	- In sample liner
								— ? — — ? — — ? —	
		45	SP-SM					SAND (medium to fine); olive gray (5Y4/2) mottled dark yellowish brown (10YR4/4) around 20%; wet; dense; subangular grains of chert and quartz; fractured? (Sandstone)	
		46							
		47							
		48						same as above	
		49							

▨ 3.0-inch Pitcher tube sampler ☒ 2.5-inch I.D. split spoon sampler ▮ Standard Penetration Test (SPT) sampler

WLA

BORING LOG

Page 4 of 4

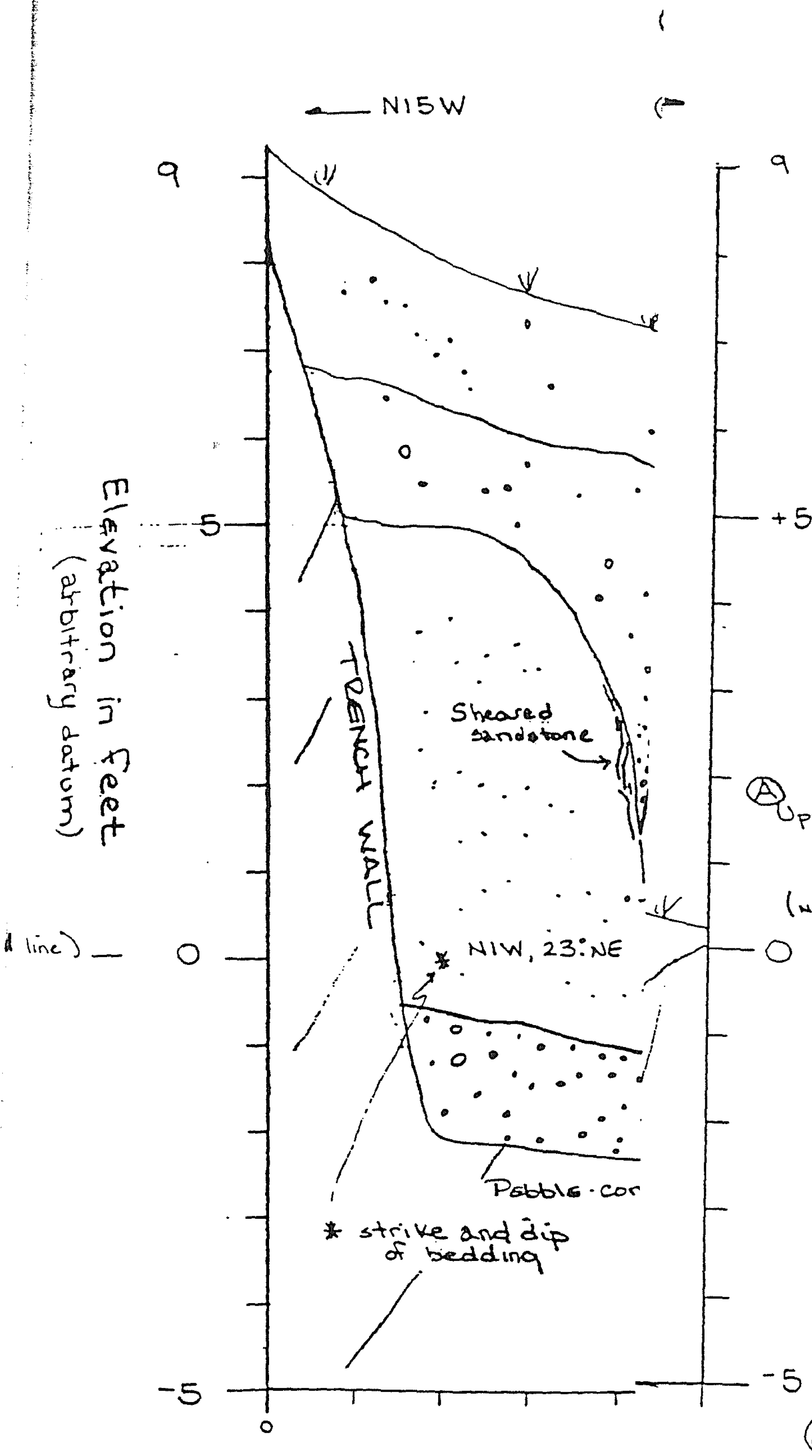
Project	Job No.	Boring No.
Quail Ridge Landslide	1179	AK-6

Uncorrected Blows per 6-inch drive	SPT N_1(60) 0 10 20 30 40 50 60	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Vane (TSF)	Description	Remarks
		49	SW SM	▨				SAND (medium to fine) with trace silt (<5%); olive gray mottled dark yellow brown, dry; dense; Subangular qtz & chert grains; fractured? (Sandstone)	
		50		▨					2:14
		51		▨					
		52	ML- SM	▨	40			SILT, sandy to SAND (fine), silty; bluish gray (5B5/1); moist to wet; v. stiff (v. dense) to hard; uniform consistency; (Siltstone/Sandstone)	
		53		▨					
		54		▨					
		55		▨					2:20
		56	ML- SM	▨				same as above	
		57		▨	60				
		58		▨					
		59		▨					245
		60						BOH @ 60'	
		61							
		62							
		63							
		64							
		65							
		66							

■ 3.0-inch Pitcher tube sampler

☒ 2.5-inch I.D. split spoon sampler

▯ Standard Penetration Test (SPT) sampler



Ⓐ Upper colluvium: dark brown (10YR 3/3m) gravelly clay (CL); clasts and gravel from Orinda Formation at 10-15%.
(note difference in effect of upper colluvium A and G, and top of bedrock)

Ⓑ Lower colluvium: dark yellowish brown (10YR 4/4m), gravelly clay (CL); gravel content at 15-25%.

Ⓒ Fissure fill: Firm, moist. pre-1997; gravelly sand clasts up to 1/4"; grades to colluvium up section

Ⓓ Mottled bedrock, silty clay (CL); semi-consolidated. (orinda Fm)

Ⓔ Bedrock: semi-consolidated sandstone (Orinda Fm)

Logged by KIK @ WLA
April 30, 1997.

Appendix B-2

2003 William Lettis & Associates, Inc. Geologic Investigation

WLA
WILLIAM LETTIS & ASSOCIATES, INC.
1777 Botelho Drive, Suite 262, Walnut Creek, California 94596
tel (925) 256-6070 fax (925) 256-6076

Messrs. Alan Kropp & Philip Tse
Alan Kropp & Associates, Inc.
2140 Shattuck Avenue
Berkeley, CA 94704

November 18, 2003

RE: Geologic investigation of Proposed Homesite on Click property, 3933 Quail Ridge Rd., Lafayette, California

Dear Alan and Philip:

Introduction

This letter report presents the results from the William Lettis & Associates, Inc. (WLA) geologic investigation of the proposed residential homesite on the Click property located at 3933 Quail Ridge Road in Lafayette, California (Figure 1). The WLA study was performed under subcontract to Alan Kropp & Associates, Inc. (AKA), as part of the AKA geotechnical investigation for the proposed residential structure. Jeff Bachhuber, C.E.G. (Principal Engineering Geologist) and Sean Sundermann (Staff Geologist) from WLA performed the geologic investigation.

The property owner, Mr. Matt Click, is proposing to construct a single-level, single family residence on the extreme northeast corner of the property. We understand that the house will have a raised structural steel platform supported on a pier and grade beam foundation. The proposed house location is above and east of the lateral margin of an active (unstabilized) landslide that occurred on the property in 1997. The 1997 slide damaged a former house on the landslide-affected part of the lot, and extended under a portion of Quail Ridge Road. The damaged structure was removed, the site was partially regraded, and Quail Ridge Road was rebuilt on a tieback wall and geogrid-reinforced fill buttress by Engineered Soil Repairs (ESR) in 1999. Our investigation focused on evaluation of the stability of the proposed homesite, and determination of the location and characteristics of the eastern lateral margin of the landslide that bounds the west and south margins of the proposed Click homesite.

The WLA investigation included subsurface exploration of the site with a boring and test pit, and characterization of the geologic conditions and properties to be used for input in the AKA geotechnical investigation. The AKA investigation will evaluate the suitability of the site foundation conditions, evaluate possible stabilization or defense measures to counter future sliding, and develop grading and foundation recommendations. We note that the 1997 landslide on the Click property was not stabilized, and is subject to future movements that could significantly damage any structures constructed on, or across the margin of, the landslide. It is therefore necessary to locate the proposed house a sufficient distance away from the landslide margin to prevent future damages to the structure. A recommended "Special Design Zone" is established adjacent to the slide margin as discussed in a later section of this report. No structure should be constructed within this special design zone unless specific engineering stabilization measures, such as pier walls or regrading, are used to stabilize the slide margin and allow safe construction within the special design zone. These stabilization measures shall be designed by a qualified licensed geotechnical engineer. Optional stabilization measures are discussed in the AKA geotechnical report.

Numerous studies by various geologic/geotechnical consultants (including WLA and AKA) were performed after the 1997 landslide to determine the cause and characteristics of the slide, and exploratory borings, test pits, and monitoring systems were made in the slide mass to identify and measure slide movement locations and magnitudes. Some of this information is available in the WLA and AKA office files, and was reviewed for this current study. In addition to the past landslide studies, Mr. Click provided a copy of the 1999 design plans for the Quail Ridge Road repair that was performed by ESR, and extended partly onto the Click property. The property owner, and any future homeowners that purchase the property, should review these past studies to be fully aware of the landslide conditions, past movements and damage, and potential future risks associated with the proposed new house.

Scope of Work and Limitations

The scope of the WLA investigation included the following:

1. Review of published and unpublished information in the WLA project file and office;
    - pre and post-landslide aerial photographs
    - detailed landslide map (1997)
    - WLA exploratory borings and test pits in the slide mass (1997)
2. site visual inspection and mapping;
3. excavation and logging of an exploratory boring within the proposed house site area;
4. excavation and logging of an exploratory test pit adjacent to the south margin of the proposed house site and across the active landslide margin;
5. geologic analysis and preparation of a site map and cross section; and,
6. preparation of this letter report.

The proposed house site location was defined in the field by the property owner, and is within the extreme northeast corner of the property east of the landslide and adjacent to Quail Ridge Road. The exact location of a house structure has not yet been determined, and is partly dependent on the results of this study. A site survey and topographic map were performed by DeBolt Civil Engineering, and formed the basis for our selection of the exploration locations. The locations of the WLA site explorations and active landslide margin are shown on a copy of a portion of the DeBolt topographic map in Figure 2.

The WLA investigation was scoped to fit within the approved project budget developed between AKA and Mr. Click, and is suitable for the conceptual siting of the house and preliminary geotechnical engineering. An additional exploratory test pit should be excavated and logged by a qualified engineering geologist across the landslide lateral scarp, and extending through the central part of the final building footprint area, to provide an additional data point regarding the location and geometry of the slide lateral margin in the exact location of the house. We do not anticipate that the exposures from the future test pit would significantly modify the location of the slide margin shown on Figure 2, but will provide additional data to verify the margin location for final house or stabilization design.

This report has been prepared for the exclusive use of Mr. Click and his consultants for the specific application to the proposed residential development in accordance with generally accepted geologic and geotechnical engineering practices. No other warranty, expressed or implied, is made. In the event that the nature, design, or location of the home differs from what has been noted above, or if any additional facilities are proposed, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and the conclusions of the report modified or verified in writing.

The findings of this report are valid as of the present date. However, the passing of time will likely change the conditions of the existing property due to natural processes or the works of man. In addition, due to legislation or the broadening of knowledge, changes in the applicable or appropriate standards may occur. Accordingly, the findings of this report may be invalidated, wholly or partly, by changes beyond our control. Therefore, this report should not be relied upon after three years without being reviewed by our office. This report should be provided to any future purchasers or owners of the property.

Background

The property is located on the south-facing slope of a small ridge between Happy Valley and Highway 24, and south of Quail Ridge Road (Figure 1). The site is on the south limb of the Happy Valley Syncline, and underlain by Tertiary Orinda Formation (Contra Costa Group) non-marine sedimentary bedrock that strikes to the northwest and dips north into the axis of the syncline at inclinations between 35 and 40 degrees (Crane, 1988, Haydon, 1995). Interbedded sandstone, conglomerate, siltstone, and claystone was encountered underlying the proposed house site at depths of between about 2 and 5 feet (Figure 3).

Published landslide maps (e.g., Nilsen, 1975; Haydon, 1995) show previously-existing landslides (prior to the 1997 slide) in the swales to the west and east of the site, but do not show the 1997 landslide. This landslide also was not described in the pre-development subdivision and lot geotechnical and foundation reports by ENGEO (1975) and Hallenbeck-McKay & Associates, Inc. (1978). The results from exploratory test pits and borings made in the central part of the landslide mass during the previous WLA/AKA landslide investigations (1997) showed that the 1997 slide occurred along 6- to 24-inch thick brown clay zones in bedrock at depths of about 30 to 40 feet, and possibly with minor displacements along similar clay zones at 60 foot-depth. The previous WLA exploratory test pits provided evidence for past ancient landsliding in the bedrock along the approximate boundaries of the 1997 landslide. This suggests that the 1997 slide occurred along pre-existing planes of weakness in the bedrock. Pre-slide aerial photographs show the site to be located within a broad swale area that possibly defined the extent of an ancient landslide. The proposed Click homesite area is primarily located on an apparently in-place bedrock spur ridge that bounds the swale area, and did not show evidence of past landslide activity on the aerial photographs.

Some grading, primarily cutting, was performed on the site during demolition of the previous landslide-damaged house, and stabilization and reconstruction of Quail Ridge Road. This grading extends partly into the house site area of the planned Click residence, and backfilled a depression and 4- to 6-foot high scarp that formed along the 1997 slide margin below the homesite area. The original ground surface above the landslide lateral margin was excavated and lowered several feet in some areas, and slightly filled in others, obscuring the location of the lateral slide margin that formerly was well-expressed as a steep scarp and disrupted ground area. Because of this post-landslide grading, the location of the lateral slide margin is difficult to determine, and requires the use of exploratory test pits.

A detailed landslide map showing the slide lateral margins was prepared by WLA in 1997. Additionally, post-landslide aerial phographs flown in December, 1997, clearly show the outlines of the landslide. Our interpreted location of the slide margin is shown on Figure 2, and was compiled by superpositioning of the 1997 landslide map with the DeBolt topographic map, examination of the post-slide aerial photographs, and extrapolation of the slide margin location and geometry from our new WLA Trench T-1 that is described below. We believe that the margin location shown on Figure 2 has a locational margin-of-error of about 5 feet to either side of the map line.

The proposed house site location is bounded by the lateral landslide margin, and has an area of approximately 2,000 to 3,000 square feet. The size of the house footprint will be significantly constrained by required setbacks from the property lines, and the landslide lateral margin.

WLA Site Exploration

The WLA site exploration program consisted of one exploratory boring (WLA T-1), and one exploratory test pit (WLA B-1). The locations of the explorations are shown on Figure 2.

Exploratory Test Pit WLA T-1

Exploratory test pit WLA T-1 was excavated on August 18, 2003 across the slide margin and adjacent to the southern margin of the proposed house site location. The test pit was 45 feet long, 5 to 6 feet deep, and 3 feet wide. The test pit was oriented perpendicular to the slide margin at an azimuth of N24E. WLA geologists cleaned and examined the pit walls to identify soil and bedrock units and structures, and to locate and measure the landslide lateral margin. A detailed log was prepared of the south wall of the test pit, and is included in Attachment A. A well-defined slide margin that juxtaposed slide debris against in-place bedrock and colluvium was observed in the lower part of the trench. Uphill (east) of the landslide margin, consistently north-dipping sandstone and conglomerate bedrock was encountered underlying a 1- to 3-foot thick mantle of stiff, sandy and silty clay fill and colluvium. The base of the colluvium (colluvium-bedrock contact) was irregular and marked by deep soil tongues. Bedrock was interbedded, moderately weathered, weakly cemented (friable) sandstone and conglomerate that exhibited a relatively consistent strike of between 305 to 330 degrees, and northward dip (into the slope) of between 35 and 40 degrees. The slide contact was sharp, and had a strike of 324 degrees, and southwest dip of 54 degrees.

A secondary slide margin, defined by a bedrock fracture with 6- to 8-inch vertical offsets of bedding, was located in dilated bedrock immediately behind the main slide margin. A 5- to 10-foot wide, near-vertical, dilated bedrock zone with numerous closely-spaced tensional fractures was observed behind the secondary and main lateral margins. Rock bedding was not displaced by the tensional fractures, and no indications of significant lateral movements were observed in this zone. The colluvial soil overlying the bedrock tension zone was not deformed, suggesting that the tension zone may have formed by ancient landsliding and slope relaxation prior to deposition of the colluvium (perhaps many hundreds of years ago). Bedrock bedding contacts and structure appeared to be stable and in-place above the tensional zone. The landslide debris south and west of the lateral margin consisted of intermixed, translated, clay, rock blocks, and fill that is in a stiff condition. A layer of drainrock was encountered in the extreme downhill end of the trench, about 5 feet west of the slide margin. This drain rock was presumably placed as part of a subsurface drain during reconstruction of Quail Ridge Road by ESR in 1999.

Bedrock observed in the trench is weakly cemented, but exhibits good foundation strength properties. Pocket penetrometer soundings both in the bedrock, and overlying stiff clayey colluvium, exceeded 4.5 tons per square foot. The trench remained dry during excavation and logging, and no seeps or wet zones were encountered.

Exploratory Boring WLA B-1

Exploratory boring WLA B-1 was drilled on September 29, 2003 along the west-central boundary of the proposed house site location (Figure 2) where the fill and overburden soils are believed to be thickest. This location also is along the downhill margin of the proposed house site location nearest the slide margin, and represents the likely worst-case condition for house foundations and possible slide stabilization structures. The boring was drilled with a truck-mounted rig using 6-inch diameter hollow stem augers. The boring was drilled dry, and extended to a depth of 45 feet. The boring was logged by a WLA geologist, and boring logs are included in Attachment A. Samples were collected in the boring using an automatically-tripped, 140 pound hammer with a 30-inch drop. The following sampling tubes were used to collect samples: 3-inch outside diameter Shelby tubes; 3-inch outside diameter driven split spoon ("Modified California") sampler with 2.5-inch diameter brass liner tubes; and, Standard Penetration Test (SPT) drive sampler. Sampling was near continuous for the upper 12 feet of the boring, and thereafter spaced between 2.5 and 3 feet to the bottom of the boring. Samples were retrieved and examined by the WLA geologist, and sealed in labeled plastic bags or capped sample tubes for transport to the WLA office. The samples were described on the boring logs, and delivered to AKA for laboratory testing.

Subsurface stratigraphy encountered in the boring consisted of a 7-foot thick upper layer of stiff (SPT "N" blow counts of 12), silty SAND-CLAY (SC-CL) colluvium overlying sedimentary bedrock that extended to the bottom of the hole. The bedrock was similar to that observed in WLA T-1, and included: (1) an upper layer of moderately weathered, dense (SPT N count of 18 to 33) silty SANDSTONE between 7 and 18.5 foot depth; (2) slightly to moderately weathered, dense to very dense (SPT N count 55 to 76) SILTY SANDSTONE-SILTSTONE between 18.5 feet and 37 feet; and, (3) slightly to moderately weathered, very dense (SPT N count 50 to 60) CLAYSTONE from 37 feet to the bottom of the hole at 45 feet. No landslide failure planes or clay seams, similar to those encountered at the base of the 1997 slide, were encountered in the boring, and the bedrock at the boring location appears to be in-place and stable. No free groundwater was encountered in the boring. The boring was backfilled with cement grout upon completion.

Geologic Cross Section

Figure 3 is an interpreted geologic cross section that was developed by WLA geologists using a hand level and tape, and information from the exploratory boring and test pit. The location and geometry of the slide margin were extrapolated from the WLA T-1 test pit and previous mapping, and bedrock bedding was extrapolated from the WLA T-1 test pit. Evaluation of the cross section suggests that the buried bedrock surface is relatively flat under the proposed house site location, and steepens southward below boring WLA B-1 into the axis of the 1997 slide mass. A bedrock tension zone, similar to that observed behind the slide lateral margin in WLA T-1, is shown on the cross section between the boring the extrapolated slide margin.

Based on examination of the cross section, it appears that future movements of the 1997 landslide will be constrained to the area of the existing landslide lateral margin and the bedrock tension zone extending for about 10 feet uphill from the lateral margin. Possible future slide movements are not believed likely to extend significantly eastward beyond the tension zone, and into the proposed house site location. The cross section suggests that large-scale eastward slide enlargement would be partly constrained by the rising bedrock surface behind the lateral margin, and failure planes would need to be substantially flatter than the current lateral margins that are inclined between 54 and 85 degrees. The weathered bedrock behind the tension zone did not exhibit low-strength planes of structural weakness, and likely possesses sufficient strength to resist low-angled slide planes. Additionally, the bedrock bedding is favorably inclined into the slope, and movements in the bedrock tension zone likely would be topple or raveling-type movements into the slide lateral margin zone. The old colluvium above the bedrock tension zone in WLA T-1 did not appear to have experienced significant slide-induced movements, and the bedrock tension cracks appear to have formed prior to deposition of the colluvium. This suggests a substantial antiquity for the bedrock tension cracks. Based on this information, large-scale enlargement of the slide margin into the in-place, stable bedrock uphill from the bedrock tension zone is not believed to be likely.

Recommendations

Based on the past history of sliding and observed conditions, it is likely that the unstabilized landslide mass located west of the lateral slide margin will be subject to future creeping-type movements, and possible large-scale movements. Any structures that cross, or encroach against, the slide margin are subject to large-scale deformations (vertical and lateral movements on the order of several feet or more) that could cause substantial damage or structural collapse and a life-safety hazard to inhabitants. The dilated tension zone in bedrock immediately behind (east of) the slide lateral margin is potentially subject to future small- to moderate-magnitude (inches to a couple of feet) of lateral and vertical movements in response to future displacement of the main slide. Such displacements in the tension zone could cause damage to any structures sited over this zone.

We define a 20-foot wide "Special Design Zone" adjacent to (east of) the slide margin as shown on Figure 2. The 20-foot wide special design zone includes the bedrock tension zone, and an additional buffer zone of 10 feet behind the tension zone. No structures should be sited within the special design zone without specific engineering stabilization and foundation design measures to allow safe construction within the zone. This special design zone is believed to provide a relatively high level of safety against future slide movements that are similar to those that occurred in 1997, and ancient past slides in the bedrock. The recommended special design zone was made as narrow as possible, balanced by the need to include the rock tension zone and uncertainty in the location and behavior of the slide margin. It may be feasible to stabilize the margin of the slide adjacent to the proposed house site location using a drilled pier wall or other method to stabilize the slope and allow safe encroachment of the structure within the recommended 20 foot special design zone. Such a design should be developed by a qualified geotechnical engineer, and factor future large-scale movements of the unstabilized part of the slide.

Future slide movements should not significantly encroach past the special design zone during a single catastrophic event. However, it is possible that the slide could progressively enlarge eastward in a series of separate slide events. The recommended special design zone should allow sufficient warning to permit safe evacuation of residents, and provide time to respond to the slide with possible emergency stabilization measures. The house structure should be supported on engineered deep pier and grade beam foundations that extend into the sound and stable bedrock. This will provide an extra level of safety for the house. Drainage should be well-controlled on the site, and prevented from flowing into, and saturating, the slide area.

As discussed previously, we recommend that an additional exploratory test pit be sited across the slide margin, and extending onto the central portion of the final house site location to verify the location of the slide margin for final house layout and design.

Closure

Please call us at 925-256-6070 if you have any questions regarding this report.

Sincerely,
WILLIAM LETTIS & ASSOCIATES, INC.

Jeffrey L. Bachhuber, C.E.G.	Sean Sundermann
Principal Engineering Geologist	Staff Geologist

References:

Crane, R.C., 1988, Geologic 7.5 Minute quadrangle map of the Briones Valley Quadrangle: in, Northern California Geological Society, Field Trip Guide to the Geology of the San Ramon Valley and Environs, April 30, 1988, map scale 1:24,000.

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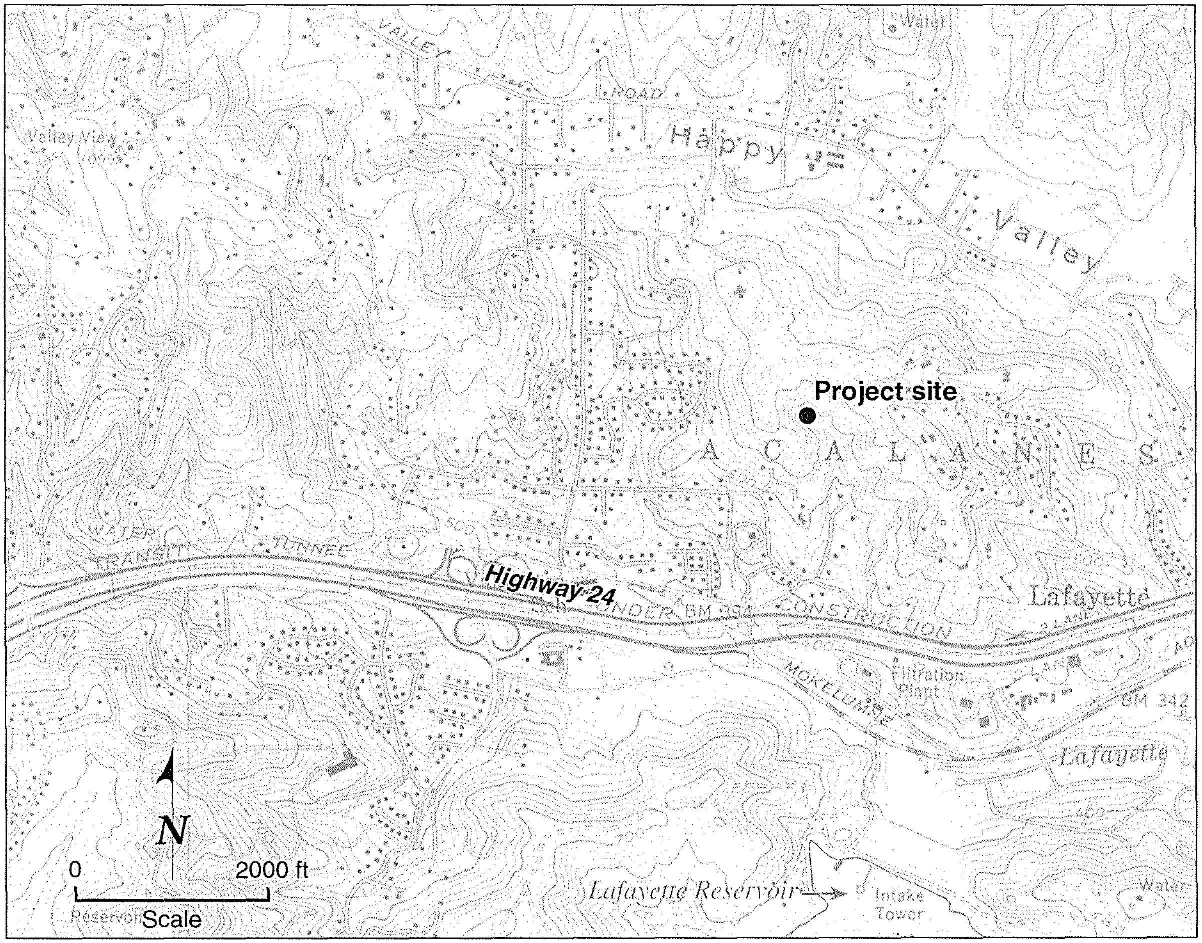


Modified from USGS Briones Valley 7.5 minute quadrangle

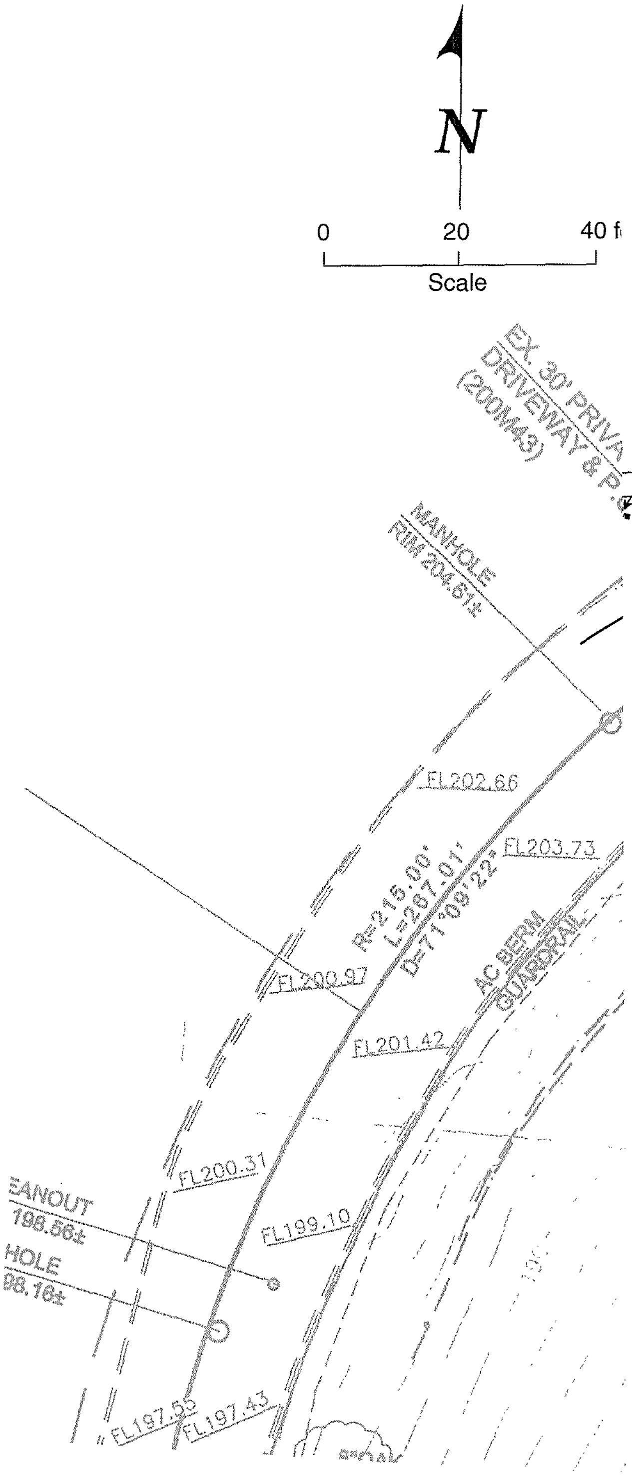
QUAIL RIDGE RD.-CLICK

Site Location Map

WLA William Lettis & Associates, Inc.

Figure 1

1630 Quail Ridge Rd.



Modified from topographic map and survey by DeBolt (6/20/0

Explanation

WLA B-1 ⌖	Location of exploratory boring by WLA
WLA T-1 ▬	Location of exploratory test pit by WLA
Landslide margin 20-foot special design zone Rock tension zone	No structure should be constructed within the special design zone unless specific engineering stablization measures, such as pier walls or regrading, are used to stabilize the slide margin. These stabilization measures shall be designed by a qualified, licensed geotechnical engineer
Qls	Active landslide mass (unsuitability) and movement direction subject to future large-scale movements
Tb	Tertiary Contra Costa Group bedrock; interbedded sandstone, siltstone, and claystone, forms a resistant ridge east of slide margin; overlain by 1 to 5 feet of soil
37 ⟍	Bedrock bedding strike and dip
A ⎣___⎦ A'	Cross section location (Figure 3)

Note: Refer to extensive studies performed by Alan Kropp & Associates, Inc., William Lettis& Associates (1997-1998) for additional information on the active landslide on the subject property.

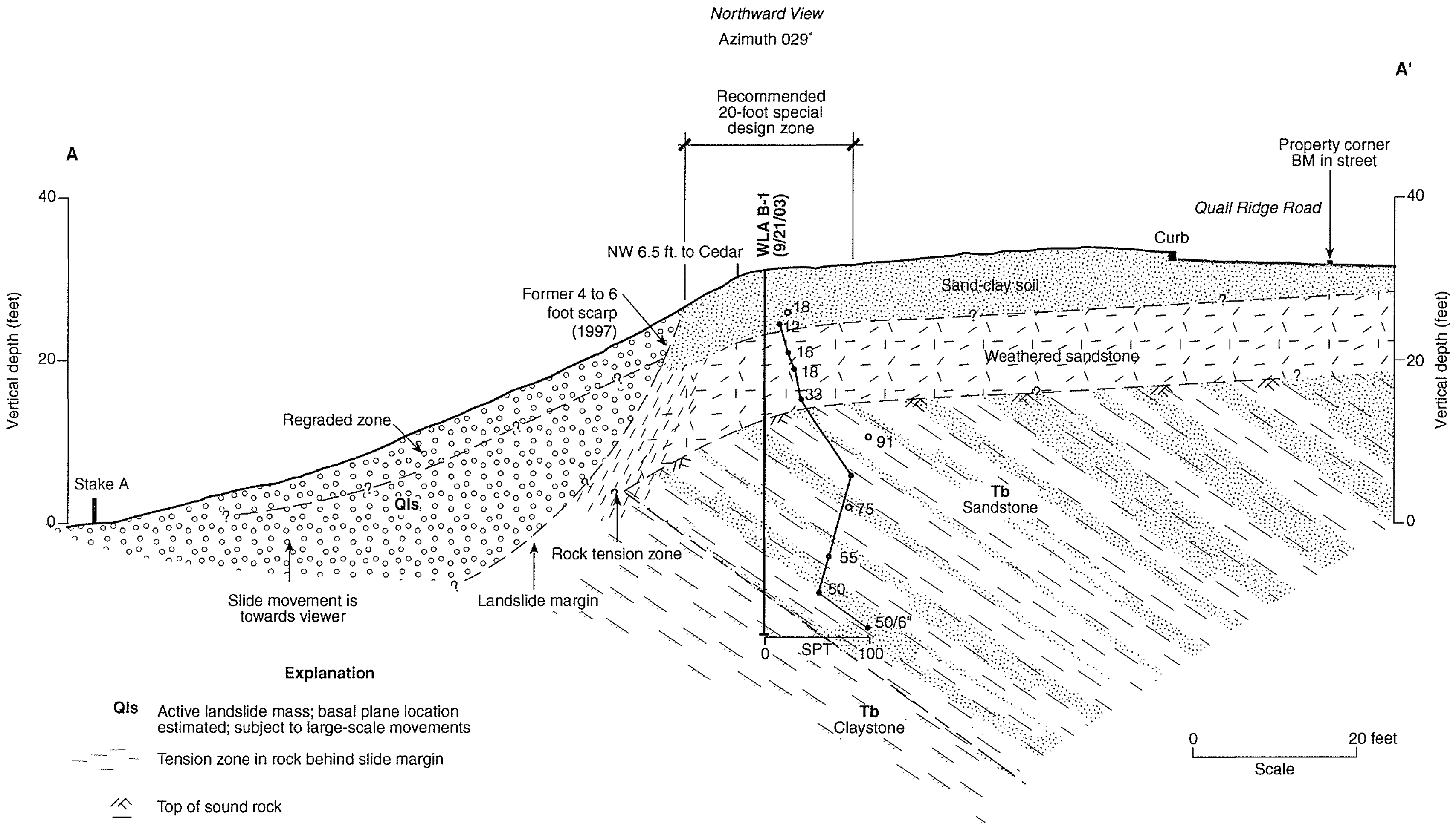
QUAIL RIDGE RD.-CLICK

Site Geologic Map and Exploration Locations

WLA William Lettis & Associates, Inc.

Figure 2

1623 Quail Ridge Road



Explanation

Qls Active landslide mass; basal plane location estimated; subject to large-scale movements

Tension zone in rock behind slide margin

Top of sound rock

35 55 50 Standard penetration test blow counts (uncorrected)

○ Modified California sampler blow counts

Bedrock bedding apparent dip, extrapolated from WLA T-1

Note: Topography based on a hand level and tape survey by Jeff Bachhuber and Sean Sundermann on 9/29/03.

QUAIL RIDGE RD.-CLICK

Geologic Cross Section A-A'

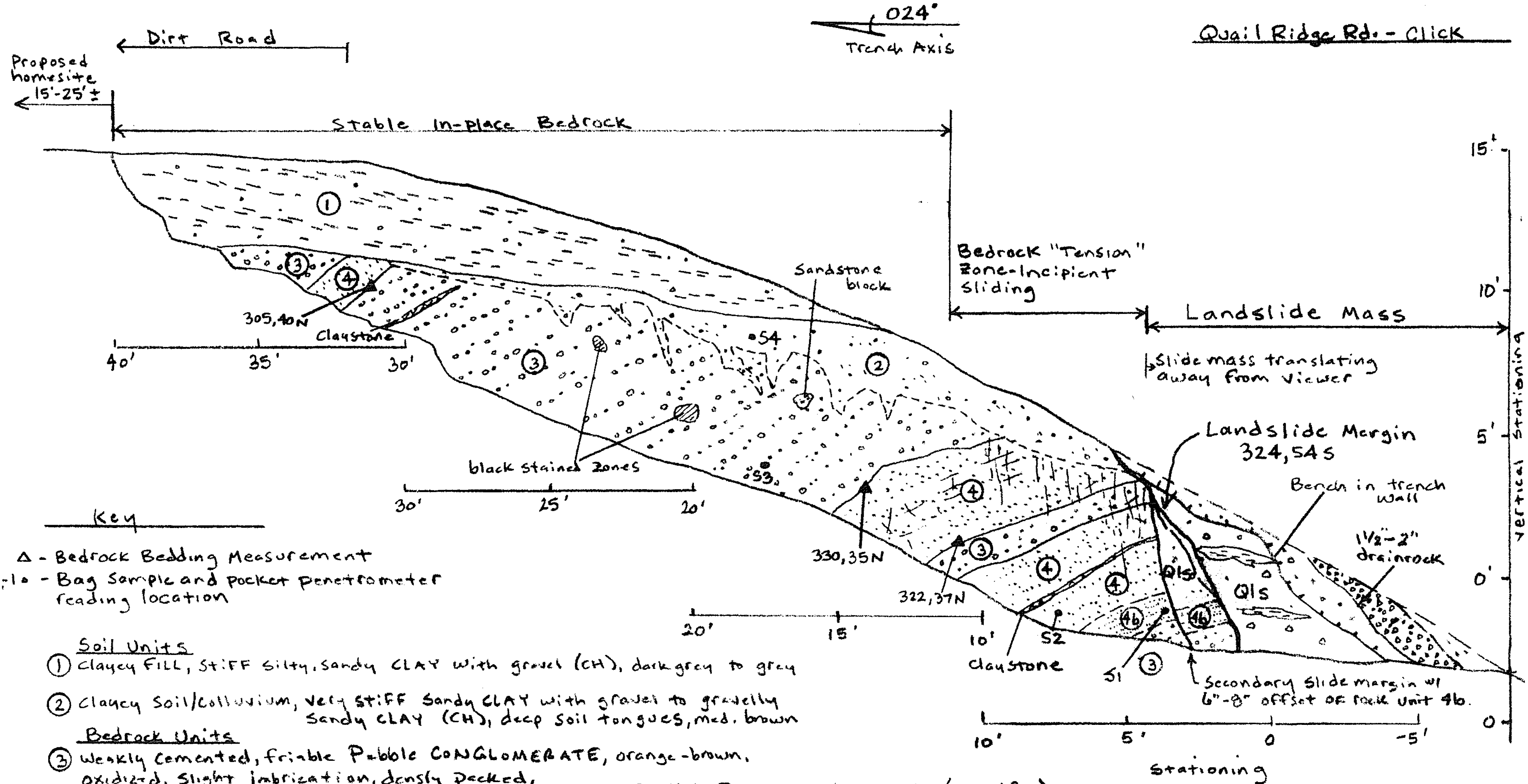
WLA William Lettis & Associates, Inc. | Figure 3

1623 Quail Ridge Road

ATTACHMENTS – TEST PIT AND BORING LOGS

William Lettis Assoc., Inc. (WLA) for
Alan Kropp Associates, Inc (AKA)
Logged by: Jeff Bachhuber, C.E.G.
Sean Sandelmann

August 18, 2003
Trench 3' wide



Key

Δ - Bedrock Bedding Measurement
S-1• - Bag Sample and pocket penetrometer reading location

Soil Units
① Clayey FILL, Stiff silty, sandy CLAY with gravel (CH), dark grey to grey

② Clayey Soil/Colluvium, very stiff Sandy CLAY with gravel to gravelly Sandy CLAY (CH), deep soil tongues, med. brown

Bedrock Units
③ Weakly cemented, friable Pebble CONGLOMERATE, orange-brown, oxidized, slight imbrication, densly packed, contains black-stained zones, clasts 1/4-2", subrounded

④ Medium to coarse weakly cemented, friable SANDSTONE, tan, clayey zones and fine-grained zones (4b), locally jointed

Landslide Mass
Mixed clayey fill (post-landslide grading) and clayey, rocky debris, medium stiff

Pocket Penetrometer Tests (tons/ft²)

S-1	4-4.5+
S-2	4.5+
S-3	4.5+
S-4	4.5+

B-1

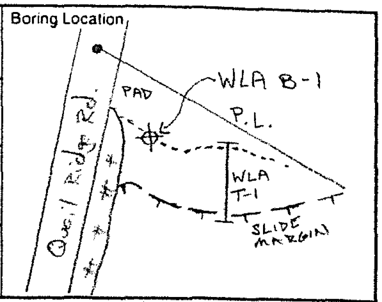
WLA

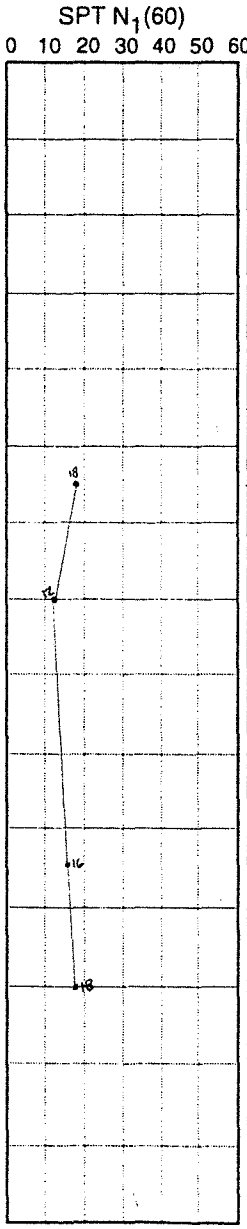
BORING LOG

Page 1 of 3

Project: Quail Ridge - Click
Job No.: 1623
Boring No.: WLA B-1
Type & Diameter of Boring: Hollow Stem Auger
Elevation @ Top of Hole / Total Depth: ±196 el
Sampling Method: 3"ϕ Shelby; 3" O.D. ModCal; 1.4" SPT
Sample Driving Hammer and Drop: 140 lb. auto-trip 30" drop
Drilling Contractor and Rig: V&W CME 850
Date Started: 9/29/03
Date Completed: 9/29/03
Depth to groundwater: Not Encountered
Logged By: S. Sundermann / J. Bachhuber
Notes:

Boring Location





Depth (feet)	Uncorrected Blows per 6-inch drive	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Torvane (TSF)	Description	Remarks
0								
2			☒ 1-1	24			SAND-CLAY, silty; mottled tan to red-brown; angular sandstone rock fragments up to 1" diameter; medium dense; poorly sorted; well graded (Colluvium)	250 psi
4	1 A 6 B 12 C	SC-CL	1-2	8	>4.5		↓	
5.5	6 6 6		▯ 1-3	12	4.5		Grades coarser and darker color (brown-gray) TOP OF BEDROCK	
7			☒ 1-4	24			SANDSTONE with silt; light tan to brown-yellow; fine grained; weakly cemented; slight to moderate weathering; sub-horizontal laminations and oxidation streaks	200-500 psi
9	1 A 4 B 12 C	SP-SW	1-5	4	>4.5			
10.5	7 8 10		▯ 1-6	16				
13		SANDSTONE					SANDSTONE, silty, with clay; light gray to tan; very fine to fine grained; soft; weakly cemented; slight to moderate weathering; discontinuous joints	
14			☒ 1-7 R	8	>4.5			500 psi
15								

▨ 3.0-inch O.D. split spoon sampler

☒ 3.0 ~~2.5~~-inch O.D. Shelby ~~split spoon~~ sampler

▯ Standard Penetration Test (SPT) sampler

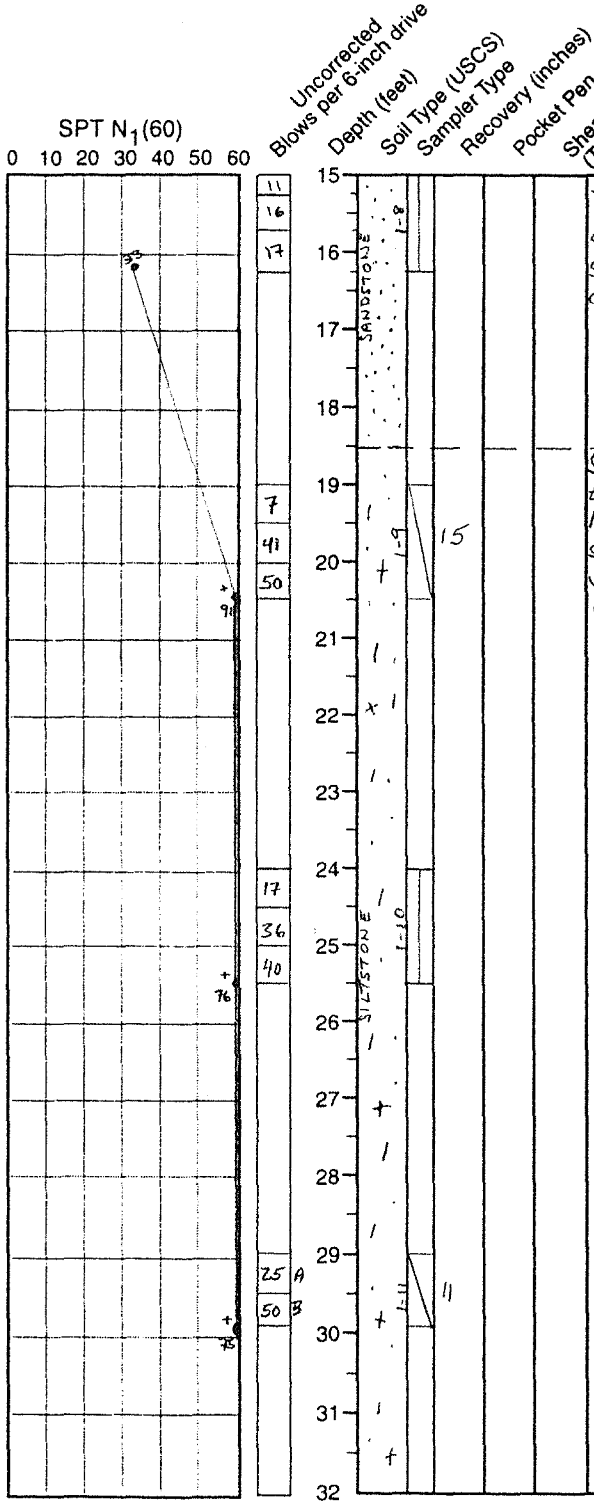
B-1

WLA

BORING LOG

Page 2 of 3

Project	Job No.	Boring No.
Quail Ridge - Click	1623	WLA B-1



Description

SANDSTONE, silty, with clay; light gray to tan; very fine to fine grained; soft; weakly cemented; Slight to moderate weathering; discontinuous joints

Silty SANDSTONE to Sandy SILTSTONE; tan to light orange-brown; sub-horizontal laminations and oxidation streaks; slightly weathered; weak to moderate weakly cemented; fine-grained; stained and oxidized discontinuous joints

↓

Coarsens Downward

Remarks

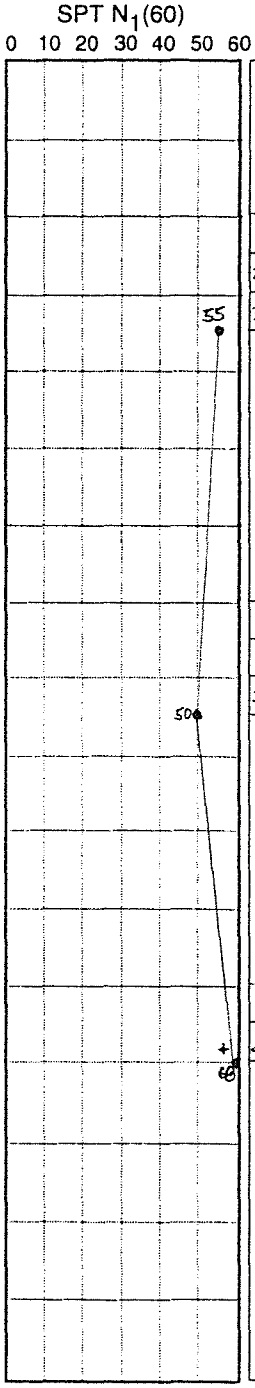
▨ 3.0-inch O.D. split spoon sampler ☒ 2.5-inch I.D. split spoon sampler ▮ Standard Penetration Test (SPT) sampler

WLA

BORING LOG

Page 3 of 3

Project	Job No.	Boring No.
Quail Ridge - Click	1623	WLA B-1



Uncorrected Blows per 6-inch drive	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Torvane (TSF)	Description	Remarks
14 25 30	32 33 34 35 36 37		1-12	18			Silty SANDSTONE to Sandy SILTSTONE; tan to light orange-brown; sub-horizontal laminations and oxidation streaks; slightly weathered; weak to moderately cemented; medium-grained; stained and oxidized discontinuous joints.	
9 16 34 18 50	38 39 40 41 42 43 44 45	CLAYSTONE	1-13 1-14	17 11 R			CLAYSTONE; micaceous with calcium carbonate blebs; light gray to gray; low plasticity; weakly to moderately cemented; soft; discontinuous joints.	
	46 47 48 49						Bottom of Hole @ 44.9' No Free groundwater encountered Backfilled with neat cement by tremmie method 9/29/03	

▨ 3.0-inch O.D. split spoon sampler ☒ 2.5-inch I.D. split spoon sampler ■ Standard Penetration Test (SPT) sampler

Appendix B-3

2003 Alan Kropp & Associates, Inc. Geotechnical Investigation

ALAN KROPP
& ASSOCIATES, INC.

GEOTECHNICAL
CONSULTANTS

ALAN KROPP, CE, GE
JAMES R. LOTT, CE, GE
MARLENE K. JACKSON, CE, GE
PHILIP C. TSE, CE, GE
JANETTE PROSSER, CE
DONALD L. IRBY, CE

November 25, 2003
1729-1B, L-25867

Mr. and Mrs. Matt Click
2364-A Westcliffe Lane
Walnut Creek, CA 94597

RE: Geotechnical Investigation
Quail Ridge Road Residence
Northeast Corner of Lot
3933 Quail Ridge Road
Lafayette, California

Dear Mr. and Mrs. Click:

At your request, we have performed a geotechnical investigation for the proposed home to be constructed on the extreme northeast corner of the site located at 3933 Quail Ridge Road in Lafayette, California. It should be noted that a large landslide occurred in 1997 which severely damaged a previous home on this property. The damaged home was demolished and removed from the site. The upper portion of the landslide was repaired and rebuilt to support the portion of Quail Ridge Road above the site. The repair was designed and performed by Engineered Soil Repairs (ESR) in 1999. The repair included the installation of a tieback wall to depths on the order of 45 to 50 feet deep, excavation for a buttress keyway, and construction of a geo-grid reinforced fill buttress. Based on the repair plan prepared by ESR, William Lettis & Associates (WLA) have sketched the site plan with the approximate location of the tieback wall and the approximate location of the fill daylight line near the northeast corner of the site. In summary, major remedial work has been performed to restore Quail Ridge Road, which was also badly damaged during the landslide. However, the landslide within the site was not removed or repaired.

1.00 PROPOSED CONSTRUCTION

A copy of the topographic survey plan dated June 20, 2003 and prepared by DeBolt Civil Engineering was provided to us on July 15, 2003 for our use during subsurface investigation and report preparation. Based on our discussions with you, we understand a conceptual development plan is available at this time; however, you agree to amend the plan as needed in accordance with our findings. For the purpose of our investigation, we assume the new residence will be one story, with a raised structural steel platform, and supported by a pier-and-grade beam foundation. Building loads are anticipated to be typical for this type of construction.

2.00 PURPOSE

The purpose of our investigation was to evaluate the general geotechnical suitability of the extreme northeast corner of the lot for a possible new house and to provide geotechnical engineering design and construction criteria for the following aspects of the work:

2140 SHATTUCK AVENUE BERKELEY, CA 94704 TEL 510.841.5095 FAX 510.841.8357 WWW.AKROPP.COM

- Site preparation and earthwork,
- Surface drainage,
- Pier wall construction at the margin of the mapped landslide,
- House foundations,
- Building code seismic design parameters,
- Retaining walls, and
- Upslope subdrain.

3.00 SCOPE

As outlined in our proposal dated July 25, 2003, the scope of our work to accomplish the stated purpose included:

- Reconnaissance of the entire site and portions of the immediate surrounding properties to evaluate current geotechnical and site conditions;
- A review of published geotechnical materials with data relevant to the site;
- A review of geotechnical consultants' materials from our files and other firms which have been supplied to us;
- An examination of aerial photographs of the area;
- A subsurface exploration program consisting of drilling exploratory test borings and excavation of test pits in the area to evaluate the subsurface materials for this phase of work;
- Laboratory index, classification and strength tests on surface and subsurface samples from the site, as required, to evaluate the properties of the materials recovered;
- Geotechnical engineering analyses of the collected data; and
- Preparation of a geotechnical investigation report for the site which would present the results of our studies and provide geotechnical design and construction criteria for the geotechnical aspects of the proposed home.

During the course of this project, we completed the field exploration program by drilling one test boring to about 45 feet deep and excavating one test trench of about 45 feet long in the area to evaluate the subsurface materials.

The scope of our services did not include an environmental assessment or investigation for the presence of hazardous or toxic materials in the soil, groundwater, or air on, below, or around this site.

This report has been prepared for the exclusive use of you and your consultants for specific application to the proposed residence in accordance with generally accepted geotechnical engineering practices. No

other warranty, expressed or implied, is made. In the event that the nature, design, or location of the home differs significantly from what has been noted above, or if any additions are proposed, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and the conclusions of this report modified or verified in writing.

The findings of this report are valid as of the present date. However, the passing of time will likely change the conditions of the existing property due to natural processes or the works of man. In addition, due to legislation or the broadening of knowledge, changes in applicable or appropriate standards may occur. Accordingly, the findings of this report may be invalidated, wholly or partly, by changes beyond our control. Therefore, this report should not be relied upon after three years without being reviewed by this office.

We have performed this geotechnical investigation with WLA. WLA performed the geological subsurface investigation, including the excavating and logging of the test trench and drilling and logging of the test boring, at the site. WLA has performed aerial photograph examination, has reviewed reports and files from other consultants during the landslide studies for this site, and has prepared a geologic report (dated November 18, 2003). WLA's report is included as Appendix A of this report.

Since the descriptions and discussions of site condition and history, geotechnical setting, and subsurface information have been reported under WLA's geologic report, we will not duplicate these items in this report.

4.00 EVALUATIONS AND CONCLUSIONS

4.01 General Site Suitability

WLA has mapped the margin of the landslide based on the test trench data and the previous subsurface data from other consultants' reports for the landslide studies on this lot. Based on the subsurface data collected from our field investigation program, it appears to us the extreme northeast corner of the lot is outside the limits of the previous landslide. Since the previous landslide has not been removed or repaired and only remedial work has been performed to restore Quail Ridge Road, the project owners need to understand and accept the risk that a future landslide may still occur within the lot and may impact the stability of the extreme northeast corner of the lot even though it is situated outside of the mapped landslide margin. If the project owners elect to construct a new home at the extreme northeast corner of the lot, a drilled pier wall should be installed at the margin of the landslide in order to separate the northeast corner of the lot from the landslide mass.

As such, it is our opinion the extreme northeast corner of the lot is suitable for the construction of a new home from a geotechnical standpoint. However, all of the conclusions and recommendations presented in this report should be incorporated in the design and construction of the project to minimize possible soil and foundation problems.

We understand from you that the proposed house footprint will be planned for the extreme northeast corner of the site in order to be further away from the landslide margin; however, this planning concept may situate the proposed footprint over the sideyard setback zone. It is our opinion from a geotechnical standpoint that it is preferable to situate the house farther away from the landslide margin and to possibly encroach on the sideyard setback zone. However, this concept should be submitted to the County for approval.

The primary considerations for foundation design at the site are:

- Surface soils and bedrock tension zone due to previous landslide,
- Strong ground shaking, and
- Site drainage.

Each of these conditions is discussed individually below.

4.02 Surface Soil and Bedrock Tension Zone

Based on the test boring and test trench data, we have encountered up to about 7 feet of sandy clay soil near the surface. The surface soil was underlain by highly weathered bedrock material to about 18 feet deep. In addition, a portion of the highly weathered bedrock has experienced bedrock tension due to previous landsliding within a zone of about 7 feet horizontally directly behind the landslide mass. In other words, the surface soil (up to about 7 feet) and highly weathered bedrock (up to about 11 feet), (i.e., a total thickness of 18 feet within a 7-foot zone behind the landslide mass), may be identified as surface soils and bedrock tension zone. This tension zone of 18 feet in thickness may be susceptible to lateral movement especially if the landslide becomes active again in the future. Since the proposed home will be constructed on sloping terrain and since the previous landslide on the lower portion of the subject lot has not been removed or repaired, WLA has recommended in their report that a special design zone of 20 feet wide should be established in the planning, design and construction for the proposed house in the northeast corner of this site. Thus, we recommend the following:

- A line of drilled pier wall should be constructed along the margin of the previously mapped landslide. All the piers should extend through the upper 18 feet of tension zone, and at least 15 feet into underlying firm and less weathered bedrock. In addition, due to the potential instability of the tension zone, the pier wall should be designed to resist a substantial creep load.

- Within the 20-foot special design zone, the portion of the proposed residence should be supported on drilled, cast-in-place friction piers. The piers should extend through the upper 18 feet of potential unstable soils, and at least 10 feet into the underlying firm bedrock materials. In addition, due to the potential for downward creep of the overlying soil and tension materials, the piers should be designed to resist creep load.

- Beyond the 20-foot special design zone, the portion of the proposed residence should be supported on drilled, cast-in-place friction piers. The piers should extend through the upper 8 feet of soils, and at least 10 feet into the underlying firm bedrock material. In addition, due to the potential for downward creep of the overlying soil, the piers should be designed to resist creep load.

- We also recommend a subdrain, which penetrates through the fill into the underlying native soils, be constructed upslope of the home and surface drainage be carefully controlled at the site because an increase in the soil moisture content tends to promote slope creep.

4.03 Earthquake Hazards

As noted earlier, the subject site is located in the highly seismic San Francisco Bay Area, and there is a strong probability that a moderate to severe earthquake will occur during the life of the structure. The site

is not mapped in the immediate proximity of any active or inactive faults; therefore, the likelihood of fault rupture directly below the proposed home is low.

During strong earthquakes, various forms of ground failure can occur, such as liquefaction, lateral spreading, and lurch cracking. The existing upper 18 feet of tension zone can also undergo renewed movements as the result of the earthquake shaking. However, our evaluation of the ground conditions at the subject site indicate it is very unlikely the site is susceptible to ground failure during an earthquake.

The proposed home will almost certainly experience strong ground shaking during a major earthquake in the life of the building. Recently, the Uniform Building Code has adopted provisions for incorporation of strong ground shaking into the design of all structures. Our recommendations for geotechnical parameters to be used in the structural seismic design of the home are presented in Section 5.05, "Building Code Seismic Design Parameters."

4.04 Site Drainage

To minimize infiltration of surface runoff and subsequent weakening and swelling of the soils underlying the house, drainage should be carefully controlled at the site. Surface and subsurface drainage improvements should be designed to collect and channel water to appropriate outlets. These improvements should include positive surface gradients along with systems utilizing drainrock, perforated pipe, solid pipe, and gutters.

5.00 RECOMMENDATIONS

This report is issued with the understanding that it is the responsibility of the owner or the owner's representative to ensure that the information and recommendations contained in this report are called to the attention of all concerned parties. In addition, it is the responsibility of the owner or owners representative to ensure these recommendations are incorporated into the plans and that the necessary steps are taken to see that the contractors or subcontractors carry out such recommendations in the field.

5.01 Site Preparation and Earthwork

The site of the proposed residence should initially be cleared of selected trees and bushes and then stripped to sufficient depth to remove surface vegetation and weeds; these materials should be removed from the site. If foundation elements are exposed during the site clearing or foundation construction, then the exposed elements, slabs, or retaining walls should be removed from the site.

It is our understanding that there will not be a substantial amount of grading for this portion of the lot in order to construct the proposed home. We were told that the proposed grading will likely be less than two to three feet of cut and fill. The previously mapped landslide margin should be staked and clearly marked onsite by the surveyor in order to avoid grading or construction into the landslide area. After the site is cleared and stripped, the pier wall should be constructed along the margin of the previously mapped landslide prior to performing any grading or construction at the northeast corner of this lot.

After the site for the residence is cleared and stripped and the pier wall is constructed, any excavation and/or filling operations required for this area can be made. Any filling operations on slopes steeper than 6:1 (horizontal to vertical) should be keyed and benched into competent soils and/or the weathered

bedrock materials. We should note that loose soils resulting from excavations or pier drilling should either be removed from the site or placed and compacted as engineered fill.

All on-site soils below the stripped layer having an organic content of less than 3 percent by volume are suitable for use as fill. However, we should note that clayey soils are very difficult to moisture condition and compact when there is excessive moisture from winter rains. In addition, due to the expansive nature of the clayey surface soils, minor cracking of asphalt pavements (requiring periodic maintenance) should be anticipated.

Any fill placed at the site should not contain rocks or lumps greater than 6 inches in greatest dimension with not more than 15 percent larger than 2.5 inches. In addition, imported fill material used at the site should be a non-expansive material with a plasticity index of 12 or less. The fill should be compacted to at least 90 percent relative compaction by mechanical means only as determined by ASTM Test Designation D1557-91 for fills less than 5 feet in height. Fill should be compacted to at least 95 percent relative compaction for fills greater than 5 feet in height. Fill should be placed on a firm, unyielding base surface in lifts not exceeding 8 inches in uncompacted thickness.

We recommend that all new cut or fill slopes at the site have a maximum inclination of 2:1. At this inclination, the cut and fill slopes will probably be subjected to some minor erosion and/or sloughing, thus requiring periodic maintenance of the slopes. We recommend the existing fill slopes and any new cut or fill slopes be planted with erosion-resistant vegetation and an erosion control netting system be installed. A landscape architect experienced in erosion control planting should be consulted prior to selection of the type of vegetation to be used.

5.02 Surface Drainage

Positive surface drainage should be provided adjacent to the residence so as to direct surface water away from the foundations of the building into closed pipes that discharge downslope of the proposed residence. Flexible drain pipe (flexline), 2000-pound crush pipe, leachfield, and ASTM F810 pipe are not recommended for use in the surface water drainage system because of the likelihood of damage to the pipe during installation due to the weak strength of these pipes. In addition, these drainpipes are sometimes difficult to clean with mechanical equipment without damaging the pipe. We recommend the use of Schedule 40 PVC, SDR 35 PVC or ABS, Contech A-2000 PVC drainpipe, or equivalent for the drain system. Ponding of surface water should not be allowed in any areas adjacent to the structure. Concentrated flows of water should not be allowed across any slopes as erosion or weakening of surface soils could occur. In particular, berms or drainage ditches should be installed behind the road cut slope to divert surface water flow away from the top of the slope.

We also recommend that rainwater collected on the roof of the building be transported through gutters, downspouts, and closed pipes that lead to suitable discharge facilities downslope of the residence. The most desirable location to discharge the water is onto the downslope street, or into an existing storm drain system under the downslope street (subject to City and/or County regulations).

Although there are other methods to discharge the water within your property, the water eventually drains onto the downslope property and can cause future problems. Therefore, we would strongly encourage you to negotiate with a downslope neighbor to obtain a drainage easement so the water collected from your property can be placed into a pipe which crosses your downslope neighbor's property and discharges to an appropriate drainage discharge facility.

If this easement is granted, you will have maintenance responsibilities for this drainpipe. If a drainage easement cannot be granted, the collected surface water may be discharged onto the slope downhill of the residence with the understanding that there may be a higher risk of future problems resulting from the discharged water. In order to minimize, but not eliminate, this risk, we recommend the collected water discharge into an energy dissipator. We should note that suitable discharge facilities do not include so called "dry wells" and these should be avoided.

Some nominal maintenance of the drainage facilities should be expected after the initial construction has been completed. To assist in maintaining proper drainage and erosion control measures for the site, we have included a "Guide to the Maintenance of Hillside Home Sites" in Appendix B.

Should ownership of this property change hands, the new owner should be informed of the existence of this report, not adversely change the grading or drainage facilities, and understand the importance of maintaining proper surface drainage.

5.03 Pier Wall

A pier wall should be constructed along the margin of the landslide, as shown on the site plan (Appendix A). The pier wall should consist of a row of large-diameter reinforced concrete piers that are founded in the underlying bedrock and spaced no further apart than 8 feet, center to center. Based on our subsurface investigation, the depth to firm rock and below the tension zone in this portion of the site is believed to be on the order of 18 feet below existing ground surface. With piers spaced no further than 8 feet on center, it can be assumed that the soil and rock will effectively arch between adjacent piers and therefore lagging will not be necessary.

The wall should be designed to withstand a uniform horizontal earth pressure of 1000 pounds per square foot (psf) over the upper 18 feet of the wall (i.e., 18 kips per running foot of wall). This active pressure value has not included hydrostatic pressure due to groundwater.

The lateral active load can be assumed to be resisted by passive pressure. The passive pressure can be assumed to start at a depth of 18 feet with an initial value of 400 psf and increase at a rate of 400 psf per foot of depth below 18 feet up to a maximum value of 10,000 psf. This value can be assumed to be acting over 1.5 times the diameter of the individual pier shafts. It is noted that wall pressures could be resisted with drilled tiebacks. However, the tiebacks would need to extend a significant distance into the upslope property or the existing road and could interfere with future pier installation for the house at the northeast corner of this lot. Furthermore, permission would have to be obtained from the County and/or the homeowner association within which the tiebacks extend. Since the concept of the proposed wall has not been determined at this time, we have not presented tieback criteria. With the relatively large loads as given above, it may be necessary to construct multiple rows of staggered piers interconnected with grade beams in order to spread out the loads. It is anticipated the wall as proposed above will undergo some amount of deflection in the event that the full loads as specified are developed. The underground pier retaining wall should therefore not be connected to the house foundation and/or other site improvements.

Since surface sandy clay material and bedrock tension were encountered in the WLA boring, it is susceptible to “cave-in” during pier wall drilling, especially at depths below groundwater level. As a result, it is our opinion that casing of the drilled pier holes is required for the pier construction. Even though groundwater was not encountered in the WLA boring, groundwater may fluctuate with weather and time of year. The bottom of pier excavations should be reasonably free of loose cuttings and soil

fall-in prior to installing reinforcing steel and placing concrete. It is our recommendation the contractor be made aware of the subsurface conditions outlined in this report and he obtain construction equipment appropriately sized to perform the recommended work. In particular, the piers must extend a minimum of 18 feet below the ground surface, which is likely about 10 feet into bedrock. Equipment capable of performing this recommendation should be employed. Any accumulated water in pier excavations should be removed prior to placing reinforcing steel and concrete, or the concrete should be tremied from the bottom of the hole. Care should be taken during concrete placement to avoid "mushrooming" at the top of the pier because distress in the building may result from expansive soil uplift forces on the "mushroom caps." Each pier should be drilled and poured on the same day.

The proper handling of spoils excavated during the pier drilling is very important. If these materials are left in a loose condition on a slope, they will have a tendency to creep down hill and/or erode during periods of heavy rainfall. Therefore, we recommend these materials be removed from the site, placed and compacted as engineered fill.

Observations during pier drilling operations should be performed by a representative of our firm to confirm that anticipated conditions are being encountered. If drilling refusal is encountered, we can coordinate a review of the conditions and drilling equipment adequacy, as well as conduct discussions with the project structural engineer.

5.04 House Foundation

It is our understanding that the house will be constructed at the extreme northeast corner of the lot. WLA have mapped the margin of the landslide which is shown on the site plan (Appendix A). The proposed house footprint should be cited outside of the landslide margin. In addition, we have recommended above that a pier wall be installed along the landslide margin. Thus, the house foundations and structure should not be connected to the pier wall.

As such, we recommend the proposed residence be supported on drilled, cast-in-place, straight-shaft piers, which are designed to develop their load carrying capacity through friction between the sides of the piers and the surrounding subsurface materials. The house piers should not be connected to the pier wall at the margin of the landslide, and should be setback at least 5 feet from the pier wall. Friction piers should have a minimum diameter of 16 inches, and there should be a minimum center-to-center spacing of at least three pier diameters between adjacent piers.

Beyond the 20-foot special design zone, the piers should generally extend to a depth adequate to provide at least 10 feet of embedment into competent underlying bedrock, which is at least 18 feet below the ground surface.

Within the 20-foot special design zone, the piers should extend to a depth at least 10 feet into competent bedrock underlying the tension zone, which is at least 28 feet below the ground surface.

To determine whether these depths are adequate to carry the structural loads of the residence, the following allowable (factored) skin friction values should be used:

- 500 pounds per square foot for dead plus live loads (factor of safety ≈ 2)
- 650 pounds per square foot for all loads, including wind or seismic (factor of safety ≈ 1.5).

These values can be used starting at a depth of 8 feet for the piers situated beyond the special design zone and at a depth of 18 feet for the piers situated within the special design zone.

All house piers should be designed for a pressure of 65 pounds per square foot. These loads should be considered to act as uniform loads spread over a depth of 8 feet for the piers beyond the special design zone and over a depth of 18 feet for the piers within the special design zone, and across the width of the foundation area.

Lateral loads on the piers may be resisted by passive pressures acting against the sides of the piers. We recommend an allowable passive pressure equal to an equivalent fluid weighing 400 pounds per square foot per foot of depth to a maximum value of 4000 pounds per square foot (factor of safety ≈ 2). This value can be assumed to be acting against 1.5 times the diameter of the individual pier shafts starting at a depth of 12 feet. Passive resistance should be disregarded for the uppermost 8 feet of the pier embedment beyond the special design zone and for the uppermost 18 feet of pier embedment within the special design zone.

The surficial soils may have a tendency to creep downhill, creating a void along the downslope sides of the piers and leaving them unsupported. Therefore, we recommend the piers be designed as free-standing columns, in accordance with the requirements of the 1997 Uniform Building Code, Section 1910, for the upper 8 feet beyond the special design zone and for the upper 18 feet within the special design zone.

The bottom of pier excavations should be reasonably free of loose cuttings and soil fall-in prior to installing reinforcing steel and placing concrete. It is our recommendation the contractor be made aware of the subsurface conditions outlined in this report and he obtain construction equipment appropriately sized to perform the recommended work. In particular, the piers must extend a minimum of 18 feet below ground surface beyond the special design zone and a minimum of 28 feet below the ground surface within the special design zone. Equipment capable of performing this recommendation should be employed. Any accumulated water in pier excavations should be removed prior to placing reinforcing steel and concrete, or the concrete should be tremied from the bottom of the hole. Care should be taken during concrete placement to avoid "mushrooming" at the top of the pier because distress in the building may result from expansive soil uplift forces on the "mushroom caps".

Due to the high groundwater at the site and the significant potential for caving of the pier walls, special construction techniques are strongly recommended for pier installation. One common technique for pier drilling in caving soil consists of casing the hole as drilling proceeds, installing the reinforcing steel, and then pulling the casing out as the concrete is tremied from the bottom of the hole. Other techniques involve the use of drilling "mud" to hold the borehole open during drilling, and then tremying the concrete from the bottom of the hole. The procedures involved for pier installation under these conditions are not trivial. We strongly recommend a contractor experienced in pier installation procedures for caving soils below the groundwater table be retained to perform this work.

The piers should be tied together in at least one direction with grade beams and tie beams that extend up and down the slope between the piers, as well as across the slope between the piers. The maximum horizontal distance between the grade beams and tie beams should be approximately 20 feet. The grade beams and tie beams should be designed to span between the piers in accordance with structural requirements. In order to minimize the possible detrimental effects of the expansive soils, we recommend either a 4-inch void be created at the bottom of all grade beams and tie beams, or the grade beams be designed to resist an ultimate (non-factored) uplift pressure of 2000 pounds per square foot. If a void is

used, our firm should review and approve the method of forming the void prior to construction of the grade beams and tie beams. We should note that if styrofoam is used to form the void beneath the grade beams or tie beams, it must be removed upon completion of the concrete placement. If the grade beams or tie beams are to retain soil, they should be designed to resist the appropriate lateral earth pressures provided in Section 5.07, "Retaining Walls."

The proper handling of spoils excavated during the pier drilling is very important. If these materials are left in a loose condition on a slope, they will have a tendency to creep downhill and/or erode during periods of heavy rainfall. Therefore, we recommend these materials be removed from the site, placed and compacted as engineered fill, or placed as wall backfill where settlement would not cause a problem.

The floor system should be structurally supported and derive all of its support from the pier-and-grade beam foundations.

5.05 Building Code Seismic Design Parameters

Based on our review of the site geology and the 1997 Uniform Building Code (UBC), we recommend an S_D soil profile for the seismic design of the structures. The nearest active fault is the Hayward fault, located approximately 10 km (approximately 6.2 miles) to the southwest. It is a Type A fault as identified in Table 16-U of the 1997 UBC. The site is located within Seismic Zone 4 as determined from Figure 16-2 of the 1997 UBC. We recommend near-source factors of $N_a = 1.0$ and $N_v = 1.2$.

5.06 Slabs-on-Grade

5.06.1 Living Area Slabs

Interior slabs-on-grade are not recommended for this project, due to unstable near-surface soils.

5.06.2 Garage and Exterior Slabs

We recommend that any exterior slabs-on-grade (including the garage slabs) be supported on a minimum of 12 inches of imported, compacted, non-expansive fill. In areas of existing fill, we recommend all of the old, existing fill underlying any proposed slabs be removed and recompacted to the requirements of structural fill. If all of the old fill under proposed slabs cannot be removed, then some settlement, tilting, and cracking of the slab should be expected.

In order to minimize volume change of the subgrade soils, these materials should be scarified to a depth of 6 inches, moisture conditioned to slightly above optimum water content, and compacted to the requirements for structural fill. Prior to the construction of the slabs, the subgrade surface should be proof-rolled to provide a smooth, firm surface for slab support.

The slabs should be structurally independent from the perimeter grade beams and be free floating. Score joints should be provided at a maximum spacing of 10 feet in both directions. The slabs should be appropriately reinforced according to structural requirements; concentrated loads may require additional reinforcing. Minor movement of the concrete slab with resulting cracking should be expected. Therefore, partition walls or doorway trim boards should not be supported directly on the concrete slab and steps to the house from the slab area should be created with a void between the steps and the house foundations. The recommendations presented above, if properly implemented, should help minimize the magnitude of this cracking. It has been our experience the installation of wire mesh for slab reinforcement is often not

performed properly during construction of the slab. As a result, we recommend steel bar reinforcement be used to reinforce any proposed slabs.

5.07 Retaining Walls

Retaining walls should be supported on pier foundations designed in accordance with Section 5.04, "House Foundation." Retaining walls must be designed to resist both ultimate (non-factored) lateral earth pressures and any additional lateral loads caused by surcharge loads on the adjoining ground surface. We recommend walls be designed to resist the equivalent fluid pressures indicated in the table below. The appropriate design values should be chosen based on the condition of the wall (restrained or unrestrained) and the angle of the slope behind the wall. Unrestrained wall pressures should only be considered applicable where it would be structurally and architecturally acceptable for the wall to laterally deflect 2 percent of the wall height.

Condition	**Cut Slopes**		**Fill Slopes**	
	4:1[1] or flatter	2:1	4:1 or flatter	2:1
Unrestrained	50 pcf[2]	70 pcf	55 pcf	75 pcf
Restrained	65 pcf	85 pcf	75 pcf	95 pcf

1 Inclination behind wall, horizontal to vertical.
2 "pcf" signifies "pounds per cubic foot" equivalent fluid pressure.

- A linear interpolation should be used to determine design values for retaining walls where the slope behind the wall is between 4:1 and 2:1. Slopes steeper than 2:1 are not anticipated at the site.

- For surcharge loads, increase the ultimate (non-factored) design pressures behind the wall by an additional uniform pressure equivalent to one-half (for restrained condition) or one-third (for unrestrained condition) of the maximum anticipated surcharge load applied to the surface behind the wall.

The above pressures assume sufficient drainage will be provided behind the walls to prevent the build-up of hydrostatic pressures from surface and subsurface water infiltration. Adequate drainage may be provided by a subdrain system consisting of a 4-inch, rigid, perforated pipe, bedded in ¾-inch, clean, open-graded rock. As shown on Figure 2, the recommended location of the subdrain pipe is behind the heel of the footing. Although we have observed that the subdrain pipe is often placed on top of the heel of the footing, it has been our experience this may lead to moisture seeping through the wall resulting in dampness and staining on the opposite wall face despite the application of waterproofing. However, if such seepage or dampness is acceptable (in front of landscape walls, for example), then the subdrain pipe may be placed on top of the heel of the footing. To prevent ponding of water on top of the heel of the footing, we recommend that the top of the heel be sloped to drain away from the wall with a minimum positive gradient of 5 percent. The perforated drainpipe should sloped to drain with a minimum positive gradient of 2 percent. The entire rock/pipe unit should be wrapped in an approved, non-woven, polyester geotextile such as Mirafi 140N or 140NL, or a 4-ounce equivalent. The rock and fabric placed behind the wall should be at least one foot in width and should extend to within one foot of finished grade. The upper one foot of backfill (6 inches for walls less than 5 feet in height) should consist of on-site, compacted, relatively impervious soils (an impermeable plug). We should note that flexible, perforated pipe

(flexline), 2000-Pound Crush, Leachfield, and ASTM F810 pipe are not acceptable for use in the subdrain because of the likelihood of damage to the pipe during installation and the difficulty of future cleaning with mechanical equipment without damaging the pipe. We recommend the use of Schedule 40 PVC, SDR 35 PVC or ABS, Contech A-2000 PVC drainpipe, or equivalent for the drain system. The subdrain pipe should be connected to a system of closed pipes (non-perforated) that lead to suitable discharge facilities. At the location where the perforated subdrain pipe connects with the solid discharge drainpipe, drainrock backfill should be discontinued. A "clay plug" should be constructed out of relatively impervious soils to direct collected water into the perforated pipe and minimize the potential for water collecting around the solid drainpipe and saturating the adjacent soils. We recommend waterproofing be applied to any proposed retaining walls where applicable. The specification of the type of waterproofing and the observation of its installation should be performed by the architect and/or structural engineer.

In addition, the "high" end and all 90-degree bends of the subdrain pipe should be connected to a riser which extends to the surface and acts as a cleanout. The number of cleanouts can be reduced by installing "sweep" 90-degree bends or pairs of 45-degree bends in succession instead of using "tight" 90-degree bends. "Sweep" 90-degree bends are similar to those used in sanitary sewer pipe connections.

Lined surface ditches with a minimum width of 18 inches should be provided behind any walls that will have an exposed sloping surface steeper than 4:1 behind them. These ditches, which will collect runoff water from the slopes, should be sloped to drain (minimum 2 percent positive gradient) to suitable discharge facilities. If the lined surface ditches consist of reinforced concrete, expansion joints should be provided every 10 feet. The top of the walls should extend at least one foot above the ditch (6 inches for walls less than 5 feet in height). All structural backfill placed behind retaining walls should be compacted in accordance with the requirements provided in Section 5.01, "Site Preparation and Earthwork."

5.08 Plan Review

We recommend our firm be provided the opportunity for a general review of the geotechnical aspects of the final plans and specifications for this project in order that the geotechnical recommendations may be properly interpreted and implemented in the design and specifications. Specific items which we recommend our firm review and which the plans should contain include, but are not limited to, the following:

- General: a citation of this geotechnical investigation report (in the general notes);
- Pier wall and house foundations: pier dimensions and depth of embedment, void below grade beams, as applicable;
- Slabs: import fill depth, recompaction of subgrade, as required;
- Retaining walls: foundation requirements (as noted in Item 2 above), wall drain system, impermeable plug above drain, surface ditch and freeboard, as needed; and
- Drainage: gradient away from structure, downspout collector pipes, surface or subdrain collector system, crawlspace drainage, and discharge location.

If our firm is not accorded the privilege of making the recommended review, we can assume no responsibility for misinterpretation of our recommendations.

5.09 Construction Observation

The analysis and recommendations submitted in this report are based in part upon the data obtained from the WLA test trench and soil boring. The nature and extent of variations across the site may not become evident until construction. If variations then become apparent, it will be necessary to re-evaluate the recommendations of this report.

We recommend our firm be retained to provide geotechnical engineering services during the earthwork, foundation construction, and drainage phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction. Specifically, we recommend a representative of our firm observe the following aspects of the construction:

1. Earthwork: site clearing and debris removal, excavations, subgrade preparation for slabs or filling, compaction operations including retaining wall or trench backfill, as applicable;

2. Foundations: pier drilling, void below grade beams, footing trench excavations; and

3. Drainage: retaining wall subdrains, downspouts, area drains, surface ditches, positive surface gradients adjacent to the home, crawlspace drainage, discharge location.

In order to effectively accomplish these observations, we recommend a pre-construction meeting be held to develop a mechanism for proper communications throughout the project. We also request the client or the client's representative (the contractor) contact our firm at least two working days prior to the commencement of any of the items listed above. If our representative makes a site visit in response to a request from the client or the client's representative and it turns out that the visit was not necessary, our charges for the visit will still be forwarded to the client.

5.10 Wet Weather Construction

Although it is possible that construction can proceed during or immediately following the wet winter months, a number of geotechnical problems may occur which may increase costs and cause project delays. The water content of on-site soils may increase during the winter and rise significantly above optimum moisture content for compaction of subgrade or backfill materials. If this occurs, the contractor may be unable to achieve the recommended levels of compaction without using special measures and would likely have to:

1. Wait until the materials are dry enough to become workable;

2. Dispose of the wet soils and import dry soils; and

3. Use lime or cement on the native materials to absorb water and achieve workability.

If utility trenches, pier holes, or footing excavations are open during winter rains, then caving of the trenches, pier walls, or footing excavations may occur. Also, if the pier holes or footing trenches fill with water during construction, or if saturated materials are encountered at the anticipated bottom of the excavations, the piers or footings may need to be extended to greater depths to reach adequate support capacity than would be necessary if dry weather construction took place.

We should also note it has been our experience increased clean-up costs will occur, and greater safety hazards will exist, if the work proceeds during the wet winter months. Furthermore, engineering costs to observe construction are increased because of project delays, modifications, and rework.

5.11 Future Performance

All people who own or occupy homes on hillsides should realize landslide movements are always a possibility, although generally the likelihood is very low that such an event will actually occur. The probability that landsliding will occur is substantially reduced by the proper maintenance of drainage measures at the site (see detailed discussion in Appendix B). Therefore, the homeowner should recognize their responsibility for performing such maintenance. Consequently, we recommend a copy of our report be provided to any future homeowners of the property if the home is sold, so they will also be aware of their maintenance responsibilities.

If you have any questions concerning this letter, please call us.

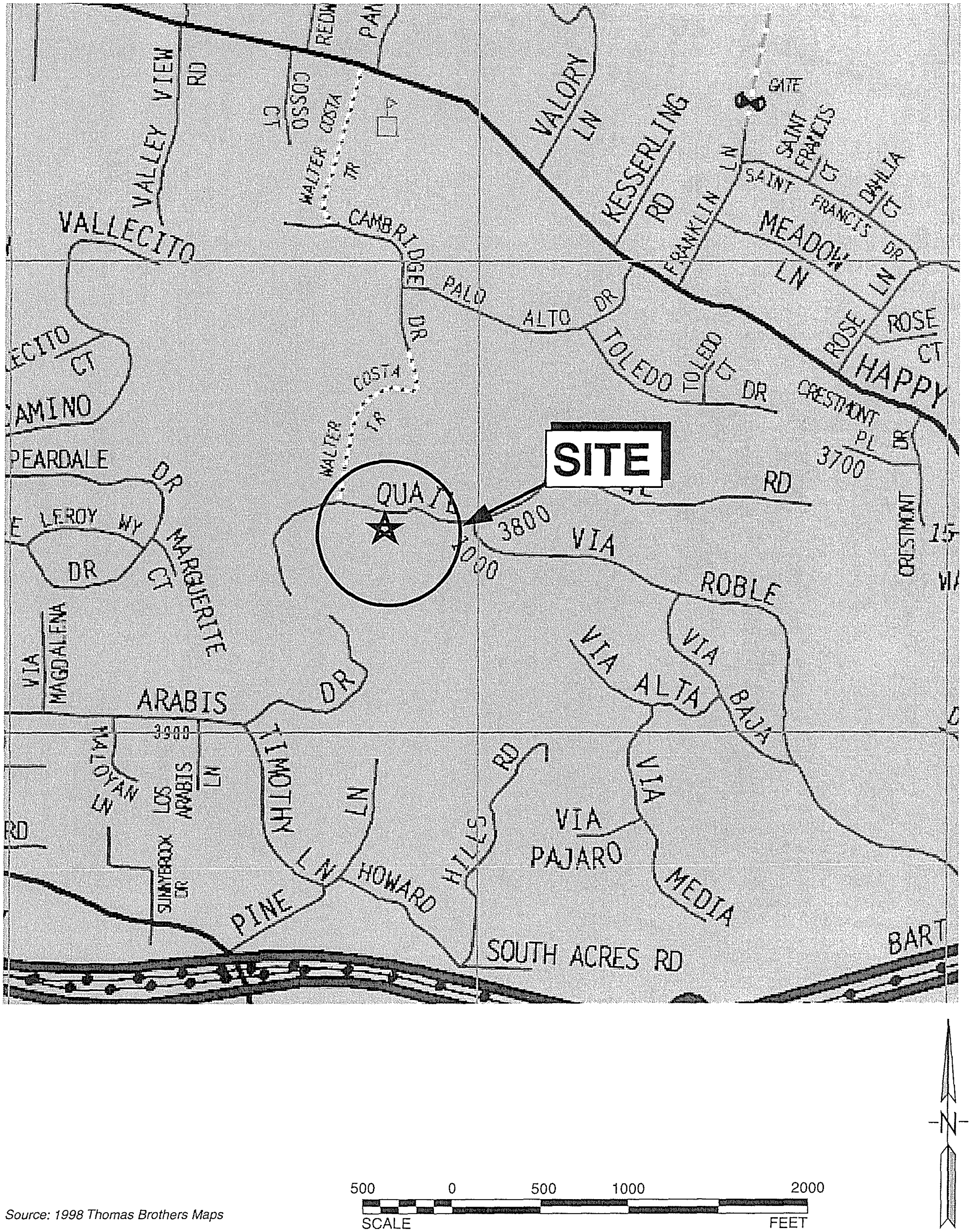
Very truly yours,

Philip Tse, G.E.
Associate Engineer

REGISTERED PROFESSIONAL ENGINEER
PHILIP C. TSE
No. 2236
Exp. 06/30/05
GEOTECHNICAL
STATE OF CALIFORNIA

PT/sn

Copies: Addressee (2)



Source: 1998 Thomas Brothers Maps

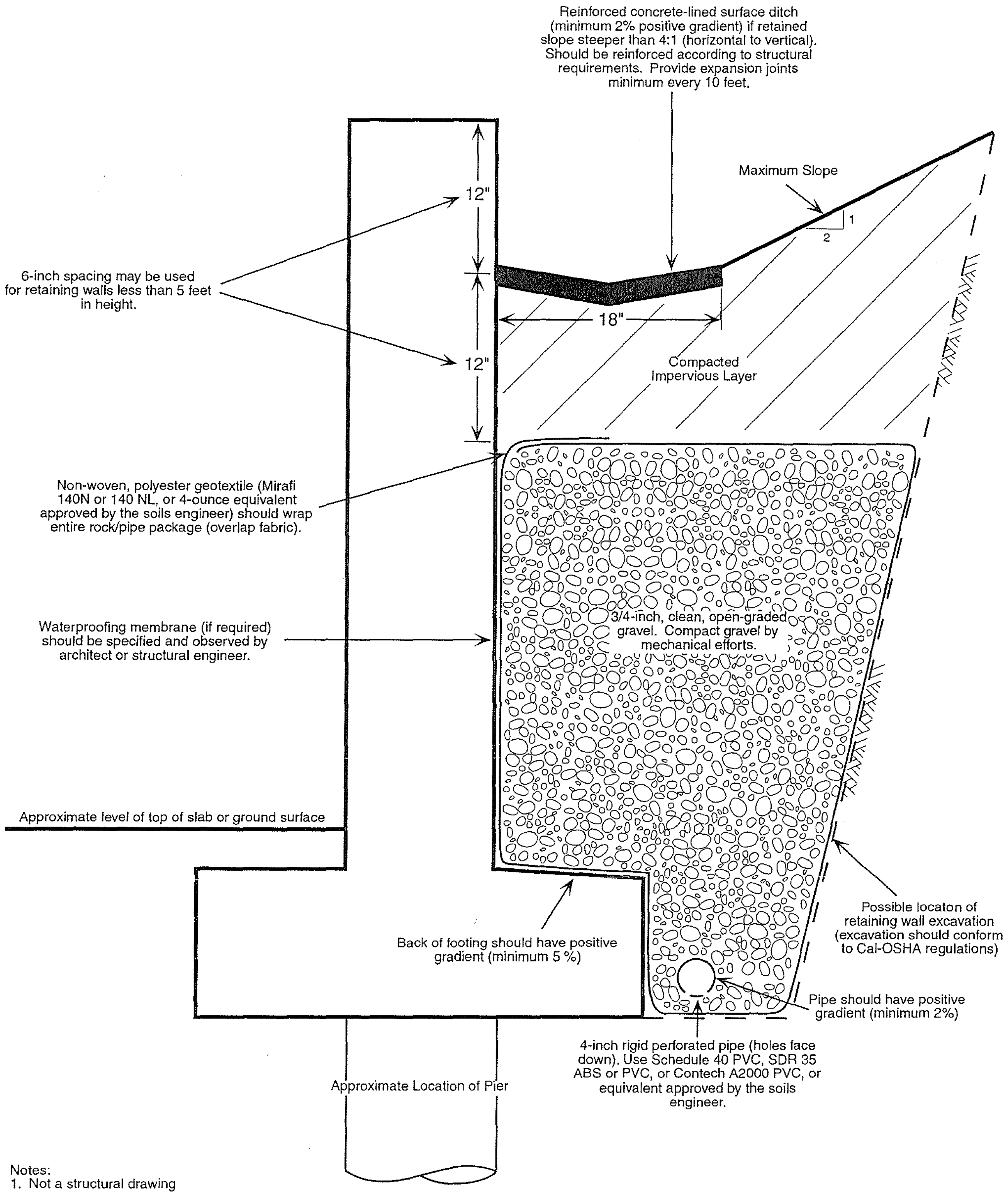
ALAN KROPP & ASSOCIATES

Geotechnical Consultants

VICINITY MAP

QUAIL RIDGE ROAD RESIDENCE
Lafayette, California

PROJECT NO.	DATE	FIGURE 1
1729-1B	November 2003	



Notes:
1. Not a structural drawing
2. All dimensions should be considered minimums
3. See text for further discussion of detail

NOT TO SCALE

ALAN KROPP
& ASSOCIATES

Geotechnical Consultants

TYPICAL RETAINING WALL SUBDRAIN DETAIL

QUAIL RIDGE ROAD RESIDENCE
Lafayette, California

PROJECT NO.	DATE	FIGURE 2
1729-1B	**November 2003**	

APPENDIX A

William Lettis & Associates
Geologic Investigation of 3933 Quail Ridge Road
Lafayette, California

APPENDIX A TO 2003 ALAN KROPP & ASSOCIATES, INC. GEOTECHNICAL INVESTIGATION
INCLUDED AS **APPENDIX B-3** OF THIS DOCUMENT

APPENDIX B

GUIDE TO THE MAINTENANCE OF HILLSIDE HOME SITES

During the wet winter season, homeowners, particularly those living in houses placed on fill (man-placed earth) or in the vicinity of excavated (cut) slopes, become concerned about the condition of their building site. In general, modern design and construction practice minimizes the probability of serious landsliding (slope failure). The grading codes of the local jurisdictions (cities and counties) in California concerning filled land, excavation, terracing, and slope construction are among the most stringent in the country and, if followed, are adequate to meet almost any natural occurrence. Therefore, the concern of the homeowner should be directed toward maintaining slopes, drainage provisions, and facilities so that they will perform as designed.

The following discussion, general recommendations, and simple precautions are presented to help the homeowner maintain their hillside building site.

The general public often regards the natural terrain as stable — "terra firma." This is, of course, an erroneous concept. Nature is always at work altering the landscape. Hills and mountains are worn down by mass wasting (erosion, sliding, creeping, etc.) and the valleys and lowlands collect these products. Thus the natural process is toward leveling the terrain. Periodically (over tens of millions of years), major land movements rebuild mountains and hills, and these processes begin again. In some areas these processes are very slow, and in others they are more rapid.

Development of hillsides for residential use is carried out, as far as possible, to enhance the natural stability of the site and to minimize the potential for instability resulting from the grading necessary to provide home sites, streets, yards, and other improvements. This has been done by the developer and designers on the basis of geologic and soil mechanics investigations. In order to be successful, the slope, drainage provisions, and facilities must be maintained by the homeowner.

Homeowners are accustomed to maintaining their homes. They expect to paint their houses periodically, replace wiring, clean out clogged plumbing, and repair roofs. Maintenance of the home site, particularly on hillsides, should be considered on the same basis, or even on a more serious basis because neglect can result in serious consequences. In most cases, lot and site maintenance can be taken care of along with landscaping, and can be carried out more economically than repair after neglect.

Most slope and hillside lot problems are associated with water. Uncontrolled water from a broken pipe, cesspool, or wet weather causes most damage. Wet weather is the largest cause of slope problems, particularly in California where rain is intermittent, but may be torrential. Therefore, drainage and erosion control are the most important aspects of home site stability; these provisions must not be altered without competent professional advice. Further, maintenance must be carried out to assure their continued operation.

As geotechnical engineers concerned with the problems of building sites in hillside developments, we offer the following list of recommended "Do's and Don'ts" as a guide to homeowners.

----- ----- -----

1. DO check roof drains, gutters and down spouts to be sure they are clear. Depending on your location, if you do not have roof gutters and down spouts, you may wish to install them because roofs, with their wide, flat area can shed tremendous quantities of water. Without gutters or other adequate drainage, water falling from the eaves collects against foundation and basement walls, which can be undesirable.

2. DO clear surface and terrace drainage ditches, and check them frequently during the rainy season. Use a shovel, if necessary. Ask your neighbors to do likewise.

3. DO be sure that all drainage ditches have outlet drains that are open. This should be tested during dry weather and can usually be done with a hose. If blockage is evident, you may have to clear the drain mechanically.

4. DO check all drains at top of slopes to be sure they are clear and that water will not overflow the slope itself, causing erosion.

5. DO keep subsurface drain openings (weep-holes) clear of debris and other material which could block them in a storm.

6. DO check for loose fill above and below your property if you live on a slope or terrace.

7. DO monitor hoses and sprinklers. During the rainy season, little, if any, irrigation is required. Over-saturation of the ground is unnecessary, increases watering costs, and can cause subsurface drainage.

8. DO watch for water backup of drains inside the house and toilets during the rainy season, as this may indicate drain or sewer blockage.

9. DO exercise ordinary precaution. Your house and building site were constructed to meet certain standards which should protect against any natural occurrence if you do your part in maintaining them.

----- ----- -----

1. DON'T block terrace drains and brow ditches on slopes or at the tops of cut or fill slopes. These are designed to carry away runoff to a place where it can be safely distributed. Generally, a little shovel work will remove any accumulation of dirt and other debris which may clog the drain. If several homes are located on the same terrace, it is a good idea to check with your neighbors. Water backed up on their property may eventually reach you. Water backed up in surface drains will tend to overflow and seep into the terraces, creating less stable slopes. Maintain the ground surface upslope of lined ditches to ensure that surface water is collected in the ditch and is not permitted to be trapped behind or under the lining.

2. DON'T permit water to collect or pond on your home site. Water gathering here will tend to either seep into the ground (loosening fill or natural ground), or will overflow into the slope and begin erosion. Once erosion is started, it is difficult to control and severe damage may result rather quickly.

3. DON'T connect roof drains, gutters, or down spouts to subsurface drains. Rather, arrange them so that water either flows off your property in a specially designed pipe or flows out into a paved driveway or street. The water then may be dissipated over a wide surface or, preferably, may be carried away in a paved gutter or storm drain. Subdrains are constructed to take care of ordinary subsurface water and cannot handle the overload from roofs during a heavy rain.

4. DON'T permit water to spill over slopes, even where this may seem to be a good way to prevent ponding. This tends to cause erosion and, in the case of fill slopes, can eat away carefully designed and constructed sites.

5. DON'T drop loose soil or debris over slopes. Loose soil soaks up water more readily than compacted fill. It is not compacted to the same strength as the slope itself and will tend to slide when laden with water; this may even affect the soil beneath the loose soil. The sliding may clog terrace drains below or may cause additional damage in weakening the slope. If you live below a slope, try to be sure that loose fill is not dumped above your property.

6. DON'T discharge water into subsurface blanket drains close to slopes. Trench drains are sometimes used to get rid of excess water when other means of disposing of water are not readily available. Overloading these drains saturates the ground and, if located close to slopes, may cause slope failure in their vicinity.

7. DON'T discharge surface water into septic tanks or leaching fields. Not only are septic tanks constructed for a different purpose, but they will tend, because of their construction, to naturally accumulate additional water from the ground during a heavy rain. Overloading them artificially during the rainy season is bad for the same reason as subsurface subdrains, and is doubly dangerous since their overflow can pose a serious health hazard. In many areas, the use of septic tanks should be discontinued as soon as sewers are made available.

8. DON'T over-irrigate slopes. Naturally, ground cover of ice plant and other vegetation will require some moisture during the hot summer months, but during the wet season, irrigation can cause ice plant and other heavy ground cover to pull loose. This not only destroys the cover, but also starts serious erosion. In some areas, ice plant and other heavy cover can cause surface sloughing when saturated due to the increase in weight and weakening of the near-surface soil. Planted slopes should be planned where possible to acquire sufficient moisture when it rains.

9. DON'T let water gather against foundations, retaining walls, and basement walls. These walls are built to withstand the ordinary moisture in the ground and are, where necessary, accompanied by subdrains to carry off the excess. If water is permitted to pond against them, it may seep through the wall, causing dampness and leakage inside the basement. Further, it may cause the foundation to swell up, or the water pressure could cause structural damage to walls.

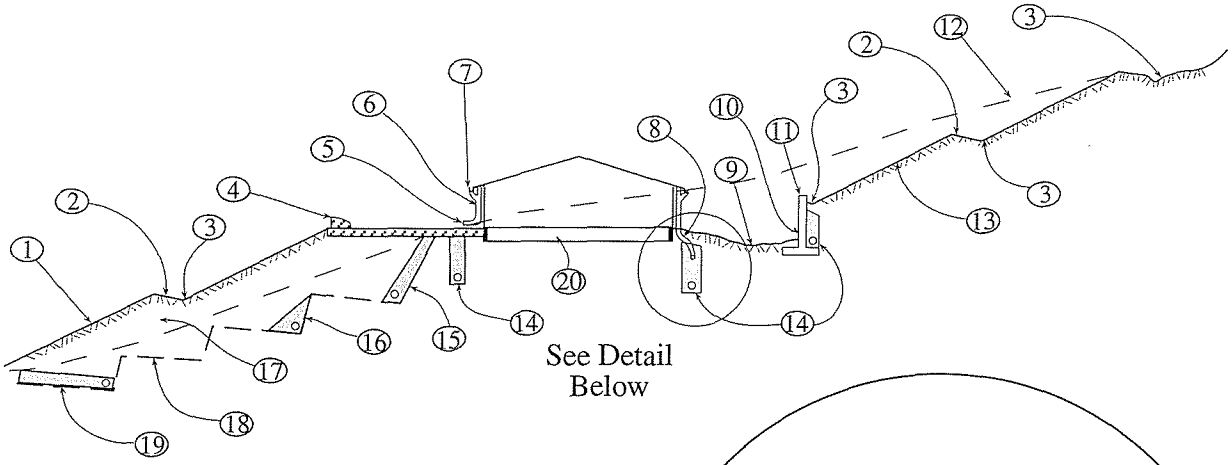
10. DON'T try to compact soil behind walls or in trenches by flooding with water. Not only is flooding the least efficient way of compacting fine-grained soil, but it could damage the wall foundation or saturate the subsoil.

11. DON'T leave a hose and sprinkler running on or near a slope, particularly during the rainy season. This will enhance ground saturation which may cause damage.

12. DON'T block ditches which have been graded around your house or the lot pad. These shallow ditches have been put there for the purpose of quickly removing water toward the driveway, street or other positive outlet. By all means, do not let water become ponded above slopes by blocked ditches.

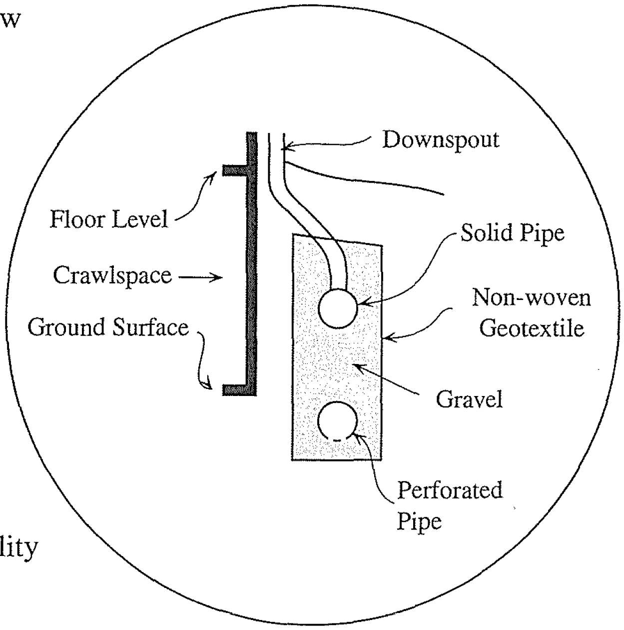
A typical slope section showing various grading and drainage requirements, as well as terms used for hillside developments, is attached.

TYPICAL SLOPE SECTION
(Not to Scale)



CONDITIONS:

① Fill Slope
② Drainage Terrace
③ Lined Ditch
④ Curb to Prevent Slope Erosion
⑤ Drain Pipe Provided with Positive Outlet on Paved Surface
⑥ Downspout
⑦ Roof Gutter
⑧ Drain Pipe Connected to Solid Pipe and Discharged to an Approved Drainage Facility
⑨ Drainage Swale
⑩ Weep Holes Through Retaining Wall
⑪ Retaining Wall
⑫ Original Ground Surface
⑬ Cut Slope
⑭ Subdrain
⑮ Curtain Drain
⑯ Wedge Drain
⑰ Fill Compacted to Engineering Specifications and Benched into Competent Material
⑱ Bench
⑲ Blanket Drain
⑳ Crawlspace



DETAIL
(Not to Scale)

Note: Acknowledgment is hereby made to the San Diego Chapter of the California Council of Civil Engineers and Land Surveyors

ALAN KROPP
& ASSOCIATES
Geotechnical Consultants

TYPICAL SLOPE DETAIL

FIGURE B-1

Appendix B-4

2004 GeoForensics Inc. Geotechnical Concerns Letter

GEOFORENSICS INC.
Consulting Soil Engineering
561 Pilgrim Dr., Suite D, Foster City, California 94404
Phone: (650) 349-3369 Fax: (650) 571-1878

File: 97057
June 13, 2004

HDP21-04
RECEIVED
JUL 01 2004
CITY OF LAFAYETTE
PLANNING DEPT.

Mr. Joe Chang
3927 Quail Ridge Road
Lafayette, CA 94549

Subject:

Proposed New Residence
Lot 18 Quail Ridge Road
Lafayette, California
GEOTECHNICAL CONCERNS

Dear Mr. Chang:

This letter has been prepared to document our concerns regarding the current proposal to construct a residence on a portion of the lot adjacent to your property on Quail Ridge Road.

Previous Work

In 1997, our office became the geotechnical engineers-of-record for the design and construction of a partial slide mitigation project to address a large landslide which encompassed the vast majority of the old Korpell property (Lot 18). The slide was mapped by our Alan Kropp and William Lettis as shown on Figure 2. Borings drilled on the Korpell property disclosed that the landslide mass was at least 40 feet deep, with possible slide planes extending to at least depths of 52 feet below grade.

Based upon the subsurface information collected by Kropp and Lettis, our office proposed, then designed, a mitigation plan to provide stability for the Quail Ridge Road pavement area. Several repair options were evaluated, but the only economically feasible option was to provide a partial repair of the slide where-in a stable platform would be created for the roadway and residences above the slide, but the slide mass below the roadway would not be repaired ***and would remain in an unstable state, capable of renewed movements at any time.*** Even with the limited area of repair, the cost of mitigation exceeded 1.5 million dollars.

In 2000 and 2001, our office was engaged by the Homeowners group to observe, document, and consult upon the construction of our recommended mitigation plan. During the construction work completed by Engineered Soil Repairs (ESR), excavations up to about 65 feet deep along the roadway alignment were excavated to remove the slide materials. The excavations were deeper towards the northeastern side of the slide than the southwestern side. Although we had postulated that there may be an old landslide plane which passed northeastward beyond the mapped active slide limits to the adjacent drainage swale on your property, during the deep excavation work, no such slide plane was observed. Therefore, we concluded that the probability of an existing slide extension to the east was unlikely.

Current Development Proposal

We understand that there is currently a proposal to construct a new residence on the tiny (5,000 square foot), triangularly-shaped, sliver of the Korpell property located just off the northeastern side of the landslide (see Figure 4). Construction details of the residence and any associated mitigative measures to protect the residence are currently unknown to our office.

Geotechnical Concerns

As discussed above, our mitigation plan which was completed in 2001 was only intended to provide stability to the affected portion of Quail Ridge Road above the old Korpell house within the slide area. All portions of the active landslide downslope of the roadway, including nearly the entire Korpell property were to remain unrepaired and to be considered Active Landslide materials. This would mean that at some point in the future, there is a high probability that the landslide will again mobilize. During that mobilization, movements in the ground to a depth of more than 50 feet will occur directly adjacent to the location of the proposed new residence. Such movements will at least remove the lateral support for the remaining wedge of land on the Korpell lot, which could well induce sympathetic lateral movements of this small knoll by the side scarp of the slide. ***In short, it cannot be concluded that this small area of ground will remain undamaged by future movements of the adjacent 50+ foot deep active landslide.***

In addition to the potential for damage/destruction to the proposed new residence, we are gravely concerned about the increased potential for landslide reactivation posed by the new residence. With the removal of the old Korpell residence, several water sources have been eliminated from the area, including: irrigation; downspout waters; water supply lines; irrigation lines; and sewer lines. To permit the reconstruction of a residence on the Korpell lot would permit these sources of water to again be introduced onto the slope immediately above an active landslide. Even if no irrigation was permitted (and that could be enforced), and all surface runoff was piped to the eastern drainage swale, underground pipelines do unexpectedly rupture. ***Such a water leak would certainly introduce water into the landslide, with the net affect of reactivating the landslide.*** If the slide were to remobilize, it is our opinion that the movements would again affect your property and those of your neighbors.

Summary

There is a tiny 5,000 square foot sector of land between an active landslide, street, and eastern property line on the old Korpell property in which a residence is proposed to be constructed. The landslide adjacent to this area extends over 50 feet below the ground surface. We do not believe that this small area of ground can be adequately stabilized without substantially reworking the entire adjacent slide area as part of a repair similar to that completed in 2001. To our knowledge, no such repair plan is contemplated as part of the residential construction (as its cost would certainly exceed the 1.5 million dollar repair previously incurred for simply stabilizing the roadway).

While it is unlikely that adequate mitigation measures will be proposed to provide long term stability to the proposed development site, our greatest concern is for the increased potential for reactivation of the large landslide due to the introduction of new water sources directly above the landslide mass. It is undoubted that reactivation of the slide would instigate new damages on this and adjacent lots, the result of which would again be a massive lawsuit engaging all adjacent property owners.

In simple terms, we strongly recommend that no new residence (or other improvements) be constructed above this massive, active, deep landslide mass.

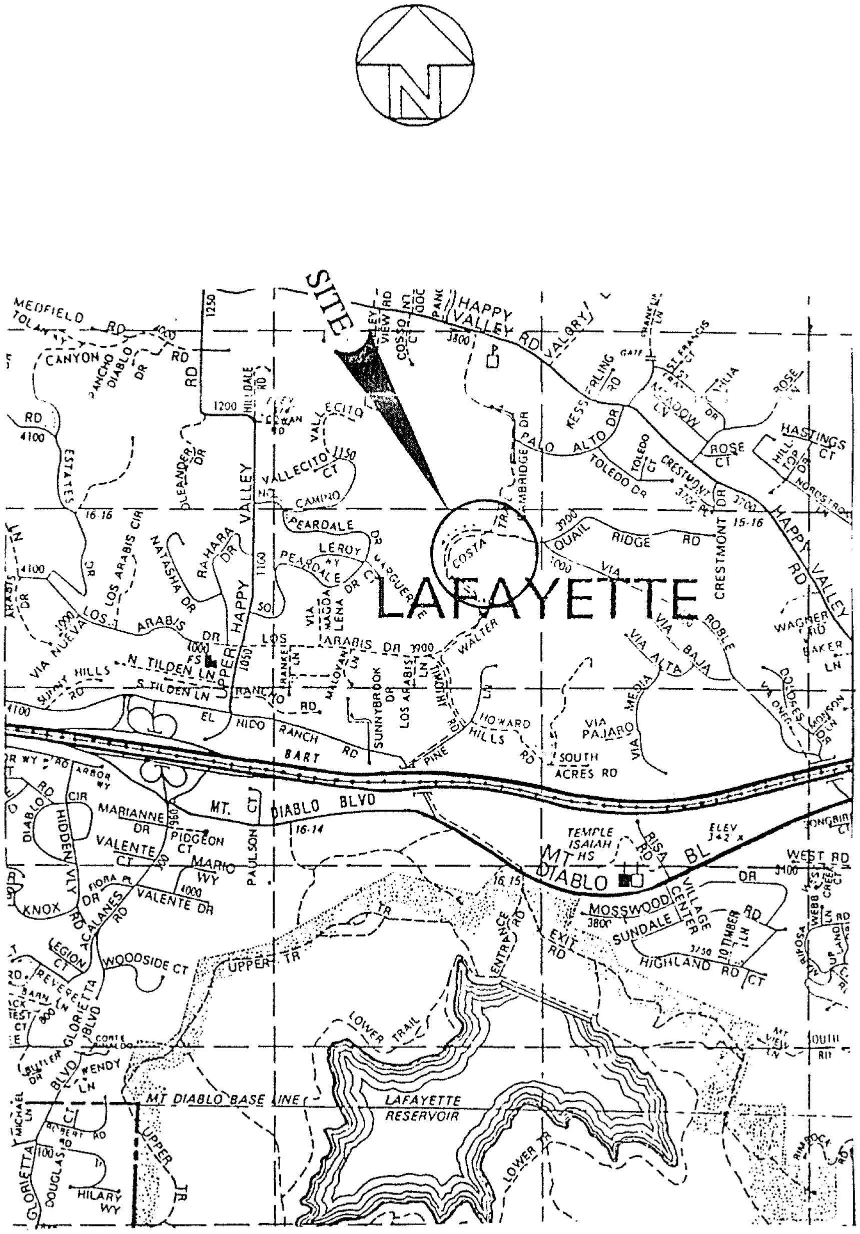
Should you have any questions please contact the undersigned.

Respectfully Submitted;
GeoForensics, Inc.

Daniel F. Dyckman, PE, GE
Senior Geotechnical Engineer, GE 2145

REGISTERED PROFESSIONAL ENGINEER
Daniel F. Dyckman
No. 002145
Geotechnical
STATE OF CALIFORNIA

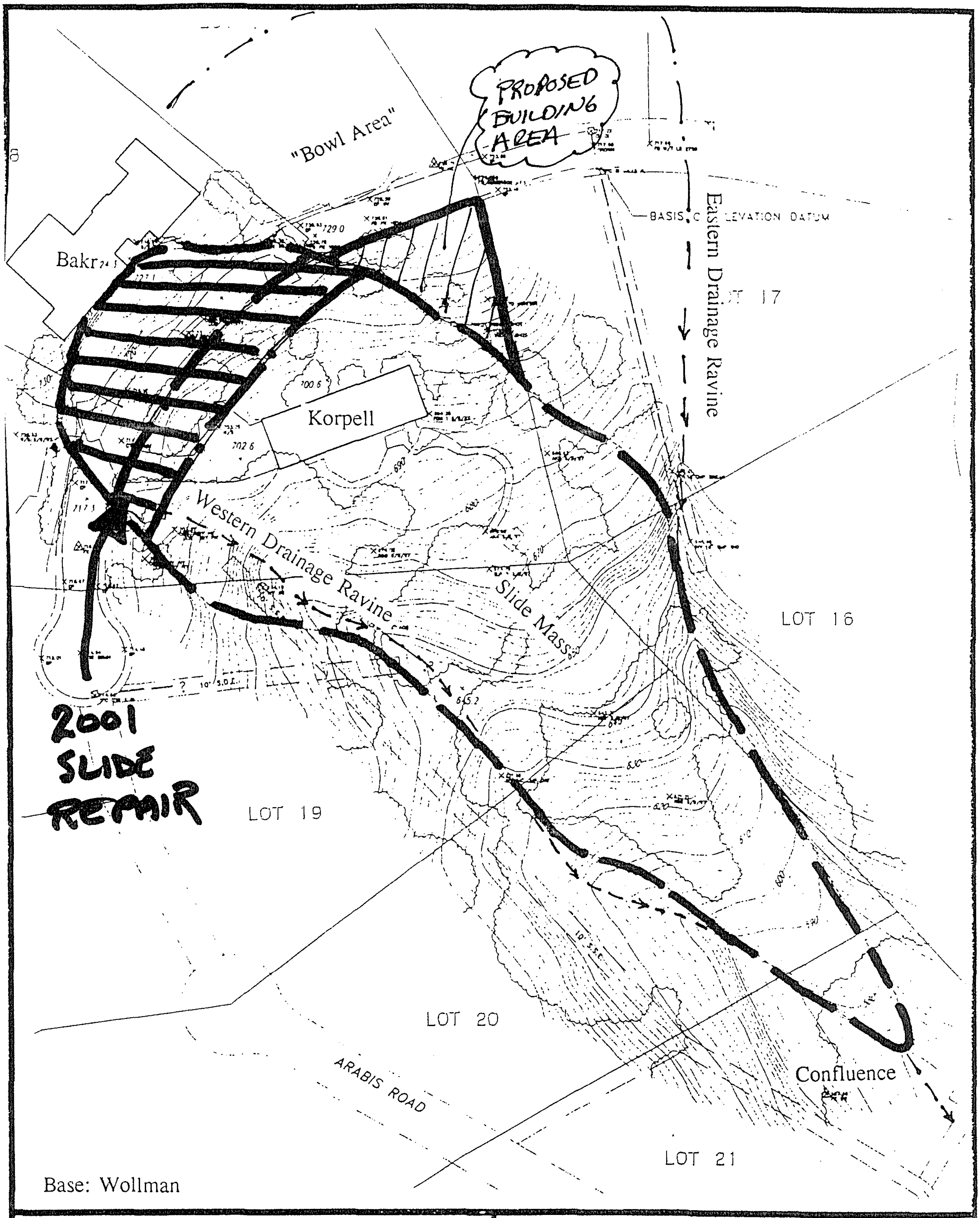
cc: 5 to addressee



Source: Thomas Bros. Guide

GeoForensics Inc.
555-A Pilgrim Drive Foster City, CA 94404
Tel: (650) 349-3369 Fax: (650) 571-1878

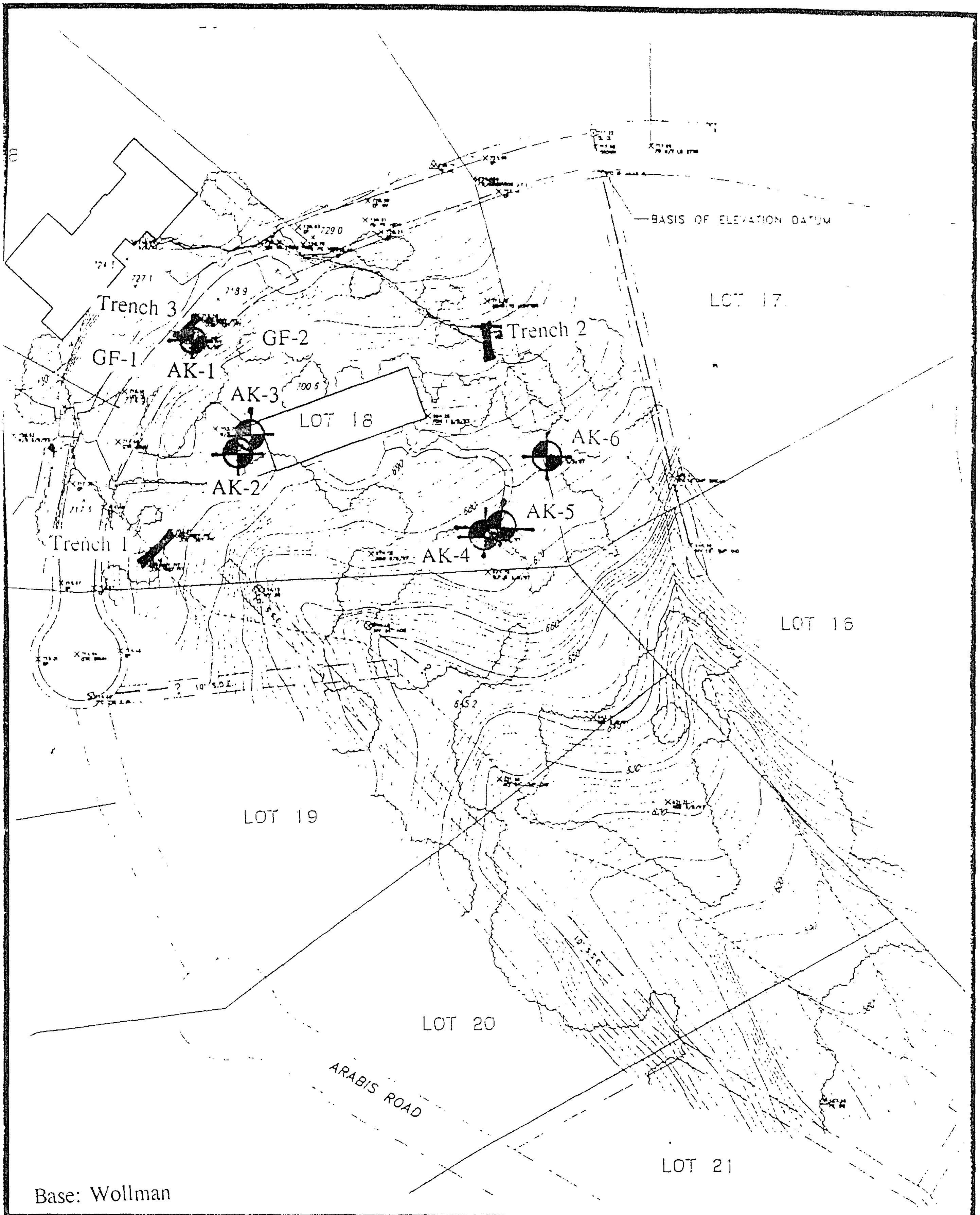
Figure 1 - Site Location



Base: Wollman

GeoForensics Inc.
555 Pilgrim Dr., Suite A, Foster City, CA 94404
Tel: (650) 349-3369 Fax: (650) 571-1878

Figure 2 - Site Topographic Map
(Scale: 1" = 80')

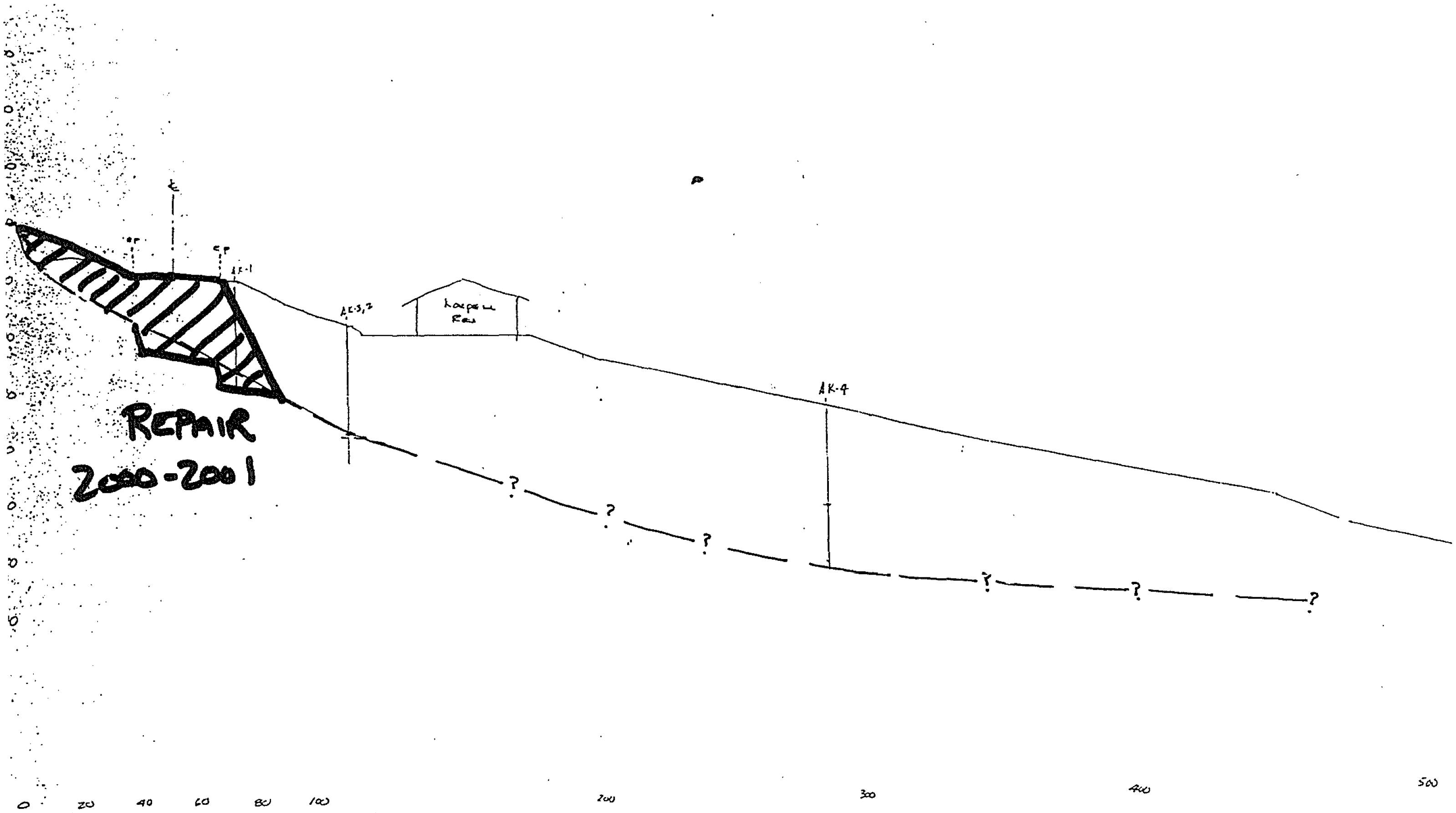


Base: Wollman

GeoForensics Inc.
555 Pilgrim Dr., Suite A, Foster City, CA 94404
Tel: (650) 349-3369 Fax: (650) 571-1878

Figure 3 - Subsurface Exploration

(Scale: 1" = 80')



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GeoForensics Inc.
555 Pilgrim Dr., Suite A, Foster City, CA 94404
Tel: (415) 349-3369 Fax: (415) 571-1878

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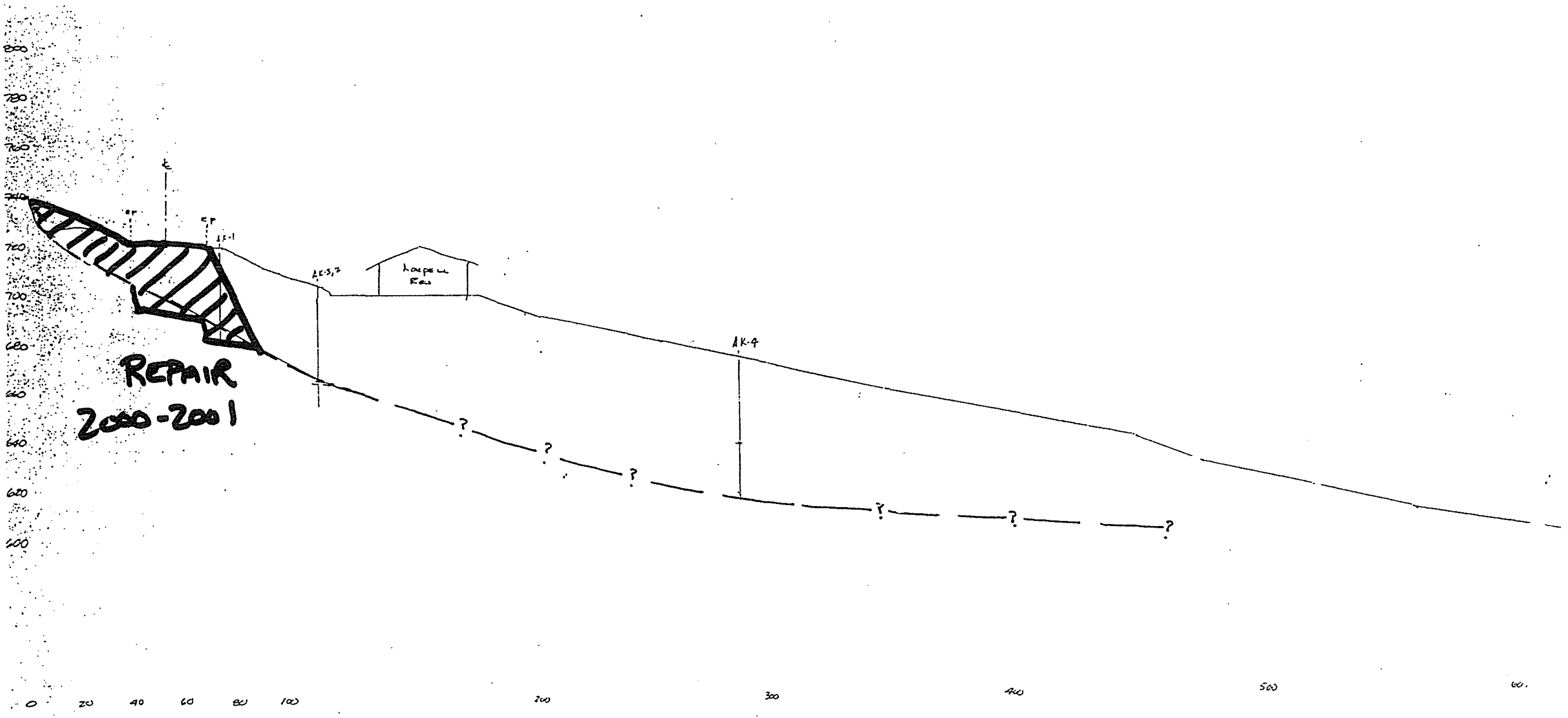


(Scale: 1"=40') (Scale: 1"=80') AK-1 AK-4

GeoForensics Inc.
555 Pilgrim Dr., Suite A, Foster City, CA 94404
Tel: (415) 349-3369 Fax: (415) 571-1878

Figure 4 - Full Slide Cross Section

Appendix B-5

2004 Cal Engineering & Geology Geotechnical and Geologic Peer Review

CE&G
CAL ENGINEERING & GEOLOGY

1870 Olympic Blvd.
Suite 100
Walnut Creek
California 94596

Tel: (925) 935-9771
Fax: (925) 935-9773
www.caleng.com

22 July 2004

RECEIVED
JUL 26 2004
CITY OF LAFAYETTE
ENGINEERING DEPT.

Tony Coe, P.E.
City of Lafayette
Engineering Division
3675 Mt. Diablo Boulevard Suite 210
Lafayette, California 94549-1968

RE: Geotechnical and Geologic Peer Review
Proposed Development at 3933 Quail Ridge Road
Lafayette, California

Dear Mr. Coe:

At your request, we have completed our geologic and geotechnical peer review of the geotechnical report, geologic report, and the site development plans for the proposed new residence to be located at 3933 Quail Ridge Road in Lafayette, California. This letter contains our review comments pertaining to the geotechnical and geologic aspects of the proposed project.

The following documents were reviewed during the course of this project:

A. a geotechnical report prepared by Alan Kropp & Associates, Inc. (AKA) dated November 25, 2003 titled *Geotechnical Investigation Quail Ridge Road Residence Northeastern Corner of Lot 3933 Quail Ridge Road Lafayette, California;*

B. a geologic report prepared by William Lettis & Associates, Inc. (WLA) dated November 18, 2003 titled *Geologic Investigation of Proposed Homesite on Click Property, 3933 Quail Ridge Rd., Lafayette, California;* and

C. site development plans including untitled and anonymously prepared architectural plans for the Click residence dated March 17, 2004 and civil engineering plans prepared by DeBolt Civil Engineering dated April 20, 2004 *Preliminary Grading and Drainage Plan Click Residence 3933 Quail Ridge Road.*

We have also reviewed numerous documents provided to us by the City relating to the landslide on the property and adjacent property which reactivated in 1997 and was partially stabilized between 1998-2001. Among the documents reviewed were the following geotechnical reports and letters:

D. a preliminary geotechnical design report prepared by GeoForensics, Inc. (GFI) dated June 24, 2004 titled *Quail Ridge Slide Quail Ridge Road Lafayette, California PRELIMINARY DESIGN CONCEPTS;*

E. a geotechnical design report prepared by GFI dated September 17, 1998 titled *Quail Ridge Slide Quail Ridge Road Lafayette, California GEOTECHNICAL RECOMMENDATIONS FOR PROPOSED HEADSCARP STABILIZATION*;

F. an interim geotechnical construction letter report prepared by GFI dated May 13, 1999 titled *Quail Ridge Slide Quail Ridge Road Lafayette, California CONSTRUCTION OBSERVATIONS OF WINTERIZATION WORK*;

G. a series of geotechnical peer review letters prepared by Sanders Associates GeoStrutural Engineers, Inc. (SAGE) on behalf of the City of Lafayette regarding technical review of the proposed landslide headscarp stabilization project;

H. a series of response letters and calculations and plans prepared by GFI and Engineered Soil Repairs, Inc. (ESR) that provide responses to issues raised by SAGE in their letters; and

I. a geotechnical construction observations and testing report prepared by GFI dated January 7, 2002 titled *Quail Ridge Landslide Mitigation Lafayette, California GEOTECHNICAL OBSERVATIONS AND TESTING OF CONSTRUCTION.*

Our review included the examination of the above referenced materials for pertinent information regarding the technical feasibility of the project. We also made reconnaissance level observations of the project site, reviewed several published geologic maps of the area, and reviewed aerial photographs of the site which were in our office files.

SITE HISTORY

It is proposed to construct a new home in the northeast corner of the lot at 3933 Quail Ridge Road. This lot and the private street and portions of the adjoining properties are the site of a large landslide which occurred in 1997. The landslide was approximately 240 feet wide by 680 feet long and had an estimated maximum depth of more than 60 feet. The landslide closed the road, created a 20 foot high headscarp directly below the property at 3954 Quail Ridge Road, and severely damaged the home at the 3933 Quail Ridge property. The damaged home was eventually demolished and removed from the site. A repair of the headscarp and road was completed between 1998 and 2001. The repair system was designed and constructed by ESR. Geotechnical recommendations and geotechnical observations and testing during construction were provided by GFI. The repair system included the installation of a tieback retaining wall up to 50 feet high, excavation for a buttress keyway, and construction of a geosynthetic reinforced earth retaining structure. The majority of the landslide mass was left in place below the road and no stabilization measures were implemented for these displaced materials.

PROPOSED PROJECT

The landslide debris which became active in 1997 encompassed approximately 80 percent of the lot at 3933 Quail Ridge Road. A triangular portion of the lot in the extreme northeast corner of the property was not involved in the active landsliding in 1997. It is proposed to develop this portion of the lot with a new 2200 square foot single family residence. The proposed building area is shaped like a right triangle with an 80 foot base along the Quail Ridge Road frontage and a 110 foot height down the slope. The reports prepared by AKA and WLA were intended to evaluate the geotechnical and geologic feasibility of constructing a new home in the northeast corner of the property and to provide design and construction recommendations, as appropriate.

REVIEW OF AKA AND WLA REPORTS

Our review of the reports prepared by AKA and WLA revealed that development of the proposed residence may be possible from a geotechnical and geologic perspective. However, it is our opinion that the geotechnical feasibility of the project has not been adequately demonstrated at this time. Several issues remain regarding the long-term stability of the in-place earth materials underlying the proposed building site. We offer the following comments with respect to the AKA and WLA reports:

Geologic Characterization

1. In their reports AKA and WLA both refer to subsurface exploration, instrumentation, and geologic work completed by AKA and WLA during the 1997-1999 time period. None of this information is presented in the report. This information and additional data which are included in the design and construction reports for the headscarp repair should also be incorporated into the geotechnical report for the proposed development.

2. Comparison of the data included in the GFI and ESR documents for the headscarp repair with the data included in the AKA and WLA reports revealed apparent inconsistencies in the interpretation of the data. The GFI design report (Document E) indicates that the depth of the landslide increases from west to east and that the portion of the lot proposed for development is within a portion of a larger landslide which did not become active in 1997. GFI concludes on page 10 that...

> *"Based upon our review of the WLA and AKA data, and upon our own field work, it is our opinion that the existing slide mass is part of a larger slide which occupies the majority of the bowl-shaped area (see Figure 2) at the head of the main drainage ravine. That larger slide mass is believed to be defined by the eastern and western drainage swales as they diverge from the confluence, and extending up to near the crest of the ridge. The headscarp area to the east of the subject slide mass has been too disturbed by grading to accurately determine its location.*
>
> *"This geometry is of importance as it suggests that the active slide probably deepens to the east of the current axis of the mapped slide (closer to the real main slide axis) and is shallower to the west. It is also suggests that it will be very important to provide some support for the materials in the active headscarp area to the east of the residence so as to minimize the potential for lateral enlargement of the slide into that area during construction."*

GFI's interpretation of the above described larger landslide is depicted on Figure 2 of their report (see the attached figure modified by us to show the proposed building area relative to the landslide features).

In 2004 AKA and WLA evaluated the localized conditions along the eastern lateral scarp of the 1997 landslide by excavating a test trench perpendicular to the scarp and by drilling an additional boring. A geologic cross-section through the building area was developed based on the data.

With regard to the larger landslide postulated by GFI, on page 3 of their report WLA writes that "*Pre-slide aerial photographs show the site to be located within a broad swale area that possibly defined the extent of an ancient landslide. The proposed Click residence is primarily located on an* ***apparently*** (emphasis added) *in-place bedrock spur ridge that bounds the swale area, and did not show evidence of past landslide activity on the aerial photographs.*" It is not clear how WLA has determined that the bedrock spur is in-place and will not be subject to future instability.

WLA further indicates (p. 3) that *"The weathered bedrock zone did not exhibit low-strength structural weakness, and likely exhibits sufficient strength to resist low-angled slide planes."* However, the report also provides a qualification that *"...it is possible that the slide could progressively enlarge eastward in a series of separate slide events."* It is our opinion that the work completed thus far does not definitively demonstrate the long-term stability of the bedrock spur ridge / proposed building site.

It is our opinion that the postulated "larger landslide" described by GFI represents a credible explanation of the site geomorphology. Because of the conflict between the GFI and WLA/AKA interpretation of the site conditions we feel that before the proposed site development can be considered to be geotechnically feasible it must be demonstrated that the larger slide either a) does not exist beneath the proposed building site, or b) is stable in its current and future configurations.

To demonstrate the viability of the proposed building site, it will be necessary to better define the geologic conditions of the site. This will require that additional subsurface exploration be completed. Consideration should be given to drilling and downhole logging large diameter boring(s) to determine if there is a landslide below the building site. Exploratory trenches along the active landslide margin and at the location of the postulated margin of the larger landslide scarp along the eastern drainage ravine may also be necessary. Additional deep borings downslope of WLA B-1 combined with data developed by GFI and ESR could be used to define the geometry of the descending slope of the west side of the spur ridge and allow revision of Geologic Cross-Section A-A'.

This additional data will allow for more accurate characterization of the spur ridge and can then be used to complete a slope stability analysis of the building site and the western slope of the spur ridge which is currently covered by active landslide debris. The analyses should reflect both existing conditions (ie. the downslope landslide debris remains in place) and future conditions which will exist when the unrepaired landslide debris moves further downslope and the buttressing affect which currently exists is lost.

Remedial Measures

4. Both AKA and WLA recognize that the development of the site will require that special design elements be incorporated into the project. Based on their geologic characterization, WLA presented recommendations for a 20 foot "Special Design Zone" setback from the mapped location of the lateral scarp of the active landslide. The design zone is indicated to account for the bedrock tension zone identified in their test trench plus 10 feet. The lateral scarp location is indicated to be within 5± feet.

   The recommendation of a "Special Design Zone" suggests that the area beyond the scarp is entirely unstable and that the bedrock tension zone is marginally stable. It is our opinion that the long-term stability of the bedrock tension zone is questionable, particularly after additional movement of the abutting landslide has occurred. Unless additional exploration described above demonstrates the stability of the bedrock tension zone, we believe that no habitable structures should be constructed in this area. We suggest that a no-build setback of at least 10 feet be required. Consideration should be given to using this area to construct a stabilization structure (ie, a buried tieback pier wall).

5. AKA has recommended that a pier wall be constructed along the landslide margin and that the house foundation and pier wall should not be connected. Design parameters are provided for both the pier wall and the house foundation.

   The lateral pressure recommendations for the pier wall appear reasonable. However, the values given for passive resistance may need to be re-evaulated based on the results of additional subsurface exploration. The value of 400 psf for lateral below 18 feet appears to be based on the assumption of full passive being developed in the bedrock below that elevation. Because the bedrock surface likely drops steeply to the west toward the axis of the active landslide, we believe that it is unlikely that full passive can be developed (see WLA Geologic Cross-Section A-A'). We recommend that the passive pressure value be re-evaluated based on the development of an accurate cross-section for the slope below the west side of the pier wall.

   The design recommendations for the house foundation appear reasonable except for the passive recommendation for piers within the 20 foot Special Design Zone. These values should be re-evaluated as described above.

Site Grading

6. On page 5 AKA indicates that *"The previously mapped landslide margin should be staked and clearly marked by the surveyor in order to avoid grading or construction into the landslide area."* In our opinion, this recommendation is paramount to making this a site potentially feasible from a geotechnical perspective. We recommend that AKA be requested to provide a plan showing all areas where any grading or development or any sort should be

prohibited. This map should be based on current information plus that developed from additional subsurface exploration. The map should also be reviewed and signed by the responsible engineering geologist from WLA. We strongly recommend that if the project is determined to be geologically feasible, that a no-build easement be required as part of the conditions of approval for the project.

REVIEW OF DEVELOPMENT PLANS AND DRAINAGE AND GRADING PLANS

7. Review of the development and grading and drainage plans revealed that many of the recommendations of the geotechnical and geologic reports were not followed. The designers should show the mapped lateral scarp and the Special Design Zone clearly on all sheets of the plans, particularly sheets A-2.0 and A-6.0.

   The plans (DeBolt Preliminary Grading and Drainage Plan) appear to show the corners of the house located <u>on</u> the lateral margin of the landslide. This would require that the house foundation and lateral scarp pier wall be built at the same location. This is contrary to the recommendations provided by AKA (see Comment 5). This apparent conflict between the AKA recommendations and the DeBolt plans should be corrected. The final location of the house should be determined only after the additional subsurface work recommended above has been completed.

   The grading and improvement plans also show substantial grading and construction on the active landslide area. Over 1400 cubic yards of material are depicted as fill placed in the upper half of the active landslide. Placement of 1400 cy of fill at this location should not be allowed unless it can be demonstrated that the fill will not adversely impact the stability of the slide area.

   The plans also indicate extensive landscaping on the landslide. It is assumed that this will require irrigation. We also recommend that landscaping which requires <u>any</u> irrigation not be allowed in the landslide area. Hardscape areas such as drainage ditches, walkways, and patios are shown on the landslide. We concur with AKA that such improvements should not be allowed in this area.

8. It appears likely that the geotechnical consultant and geologic consultant have not reviewed the project improvement plans. We recommend that the geotechnical and geologic consultants review the current plans and meet with the design team to discuss their review and the comments provided herein.

SUMMARY

Based on the data and analyses provided, it is our opinion that the proposed project has not been demonstrated to be geotechnically feasible at this time. Additional mapping and subsurface exploration will be necessary in order to fully characterize the geologic conditions and to develop effective geotechnical design recommendations which will result in the construction of a project which is stable over the long-term.

The recommendations provided by the geotechnical and geologic consultant thus far have not been adhered to in the preparation of the current development plans. If this project is eventually determined to be geotechnically feasible and gets constructed, adherence to the geotechnical and geologic recommendations will be critical.

CLOSURE

This review has been performed by request of the City of Lafayette. Our role has been to provide technical advice to assist the City in its discretionary permit decisions, and we are afforded the same protection under state law. Our services have been limited to the review of the documents listed above and a visual review of the property. We have no control over the future construction on this property and make no representations regarding its future conditions.

We trust this provides you with the information you require. We appreciate the opportunity to be of service to you. If you have any questions, please feel free to give us a call. We have employed accepted geotechnical engineering procedures, and our professional opinions and conclusions are made in accordance with generally accepted geotechnical engineering principles and practices. This standard is in lieu of all warranties, either expressed or implied.

Yours truly,

CAL ENGINEERING & GEOLOGY, INC.

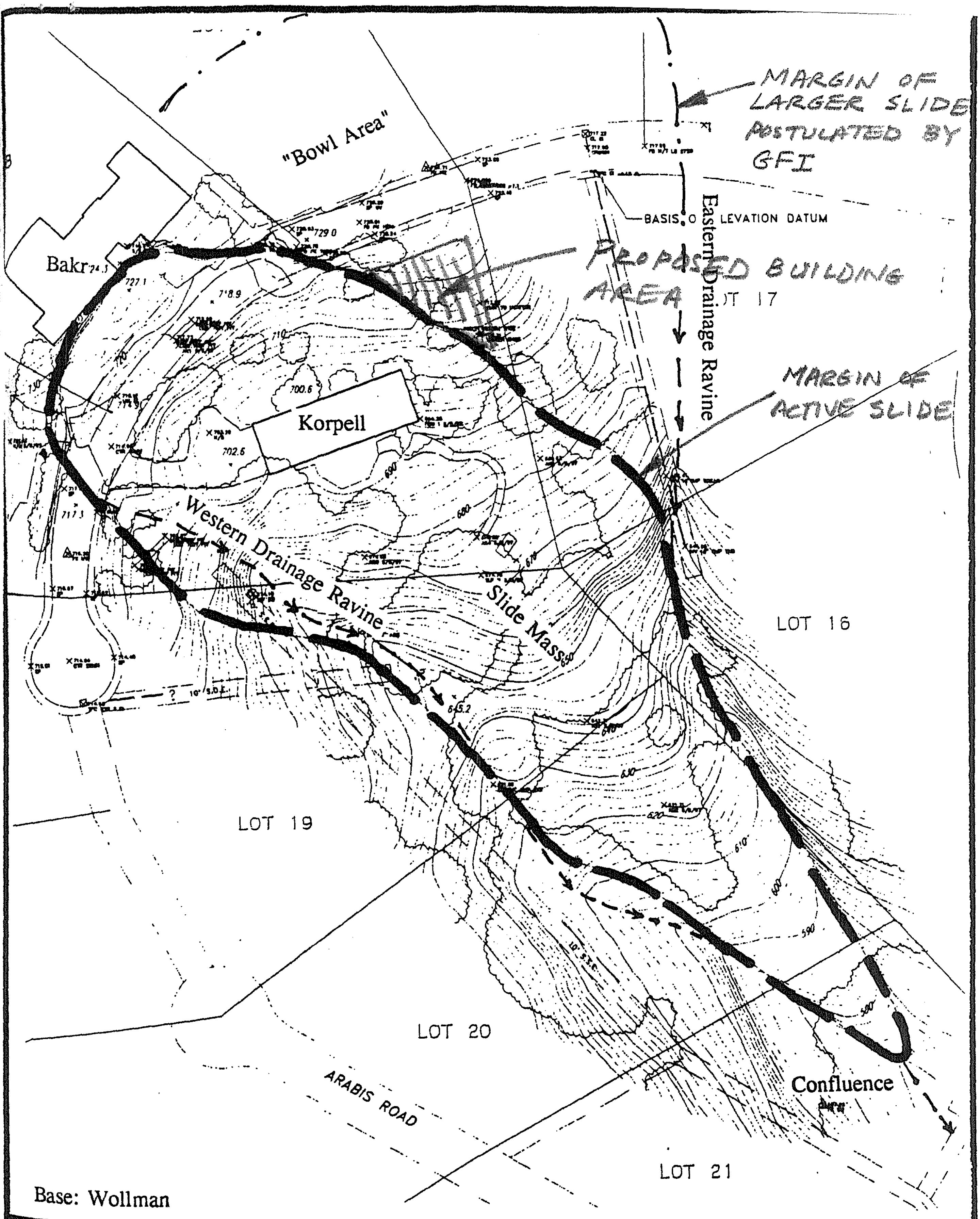
Phillip Gregory, P.E., G.E.
Principal Engineer

PHILLIP O GREGORY
No. Geo GE 2193
No Civil C 40728
Exp 3/31/07

Mitchell D. Wolfe, R.G., C.E.G.
Principal Geologist

MITCHELL WOLFE
EG 1487

attachment: figure as noted



Base: Wollman

GeoForensics Inc.
555 Pilgrim Dr., Suite A, Foster City, CA 94404
Tel: (650) 349-3369 Fax: (650) 571-1878

Figure 2 - Site Topographic Map
(Scale: 1" = 80')

Appendix B-6

2005 Seidelman Associates Peer Review Letter

SEIDELMAN ASSOCIATES
2427 CHERRY HILLS DRIVE
LAFAYETTE, CALIFORNIA 94549
(925) 930-0646
(925) 930-0828 (FAX)

RECEIVED
SEP 15 2005
CITY OF LAFAYETTE
PLANNING DEPT.

June 6, 2005

Mr. & Mrs. Matt Click
824 Golfclub Circle
Pleasant Hill, CA 94523

RE: Discussion of Peer Review and the Results of Trenching at 3933 Quail Ridge Road in Lafayette, California

Dear Mr. & Mrs. Click:

At your request we have reviewed the letter prepared by Cal Engineering and Geology and dated 22 July, 2004. Our work also consisted of reviewing the following documents:

1. Alan Kropp & Associates, Inc. Geotechnical Investigation: Quail Ridge Road Residence, 3933 Quail Ridge Road, dated November 25, 2003
2. William Lettis & Associates, Inc: Geologic Investigation of the proposed home site on the Click Property, 3933 Quail Ridge Road, Lafayette, California
3. GeoForensics, Inc: Proposed new residence, Lot 18 Quail Ridge Road, June 13, 2004.

Additionally, we should point out that we were the first responders to the landslide that occurred on Quail Ridge. We installed inclinometers adjacent to the right-of-way on the weekend that the slide initiated, and located the failure surface at the outer edge of the private road 50' below the road surface, where our inclinometer sheared off less than 24 hours after placement. This work was completed at the request of the homeowner, Mr. Bakar, whose home is situated immediately adjacent to and above the crown scarp of the large landslide failure. The Bakar residence had a zero setback from the crown of the slide, and was supported by piers that extended to bedrock. The house remained intact, with little or no cracking associated with the landslide, despite it's front foundation being undermined by the slide, the piers penetrated deep enough to maintain support of the residence.

We understand that some of the early workers on this landslide have postulated a larger, deep-seated slide whose central access is situated east of what is now the eastern boundary of the slide that has been recently active. However, during the actual earthwork, the postulated failure surface was found not to extend eastward of the existing lateral scarp. In fact, all of the geotechnical evidence that is objective and not interpretive supports the conclusion that the limit of the landslide activity is presented by the boundary clearly demonstrated in the recent, large-scale activation of the slide.

In order to add to the body of information concerning the quality of the materials along the eastern flank of the landslide, we trenched perpendicular to the lateral margin, and located bedrock exactly where anticipated at a depth of about 13' below the ground surface. A second trench was excavated in the flat area centrally located on the proposed building pad. That excavation also encountered sandstone bedrock at a depth of 12', and was supportive of the exploratory work completed by WLA.

Based on the observations made during construction, the investigations by WLA & AKA, and our own trenches, we conclude that the activation of the landslide fully mobilized the slide mass, and that the adjoining bedrock areas to the north and east remain intact and stable.

As a part of the reconstruction of the roadway, a fully-drained substantial buttress fill was put in place. This creates a situation quite different than the physical conditions present prior to the landslide activation. Two factors are permanently altered. The watertable is dramatically limited by the drainage system associated with the buttress. A second major change is that a substantial reduction in driving forces has been achieved by the buttressing of the crown area at the head of the slide.

During the active period of sliding, it was apparent that a very high watertable existed in the slide mass, and that the safety factor of the slide was only marginally reduced below unity. This was apparent from the amount of movement that occurred, and the rate at which the movement occurred. The force in balance could not have amounted to more than a few percent.

It is our opinion that the recommendations of the Alan Kropp and William Lettis reports are appropriate, and present a safe way to construct a residence on the limited remaining bedrock-supported site. We further believe that it is quite unlikely that the unrepaired portion of this slide will become active again in the future, unless its activation is accompanied by an earthquake during a wet winter. Static reactivation, given the reduced soil loading and poor water pressures, is highly unlikely.

The present proposed building site can be structurally secured against anything short of a massive migration of the slide into the bedrock adjacent to it. There is no evidence that this has occurred in the geologic past, and the possibility of this occurring in the geologic future has been substantially abated by the repairs completed after the recent activation.

We do recommend installing very substantial concrete caissons into bedrock. These excavations can be inspected by geologic personnel to ensure that their depth is sufficient to resist any reasonable soil pressures or bedrock pressures that might be postulated based on geologic structure. We anticipate pier depths of around 40', with pier diameters of 30", but the possibility exists that they may have to extend even deeper to provide the maximum possible protection. The finalization of the caisson depths should be determined individually, as they are drilled, by using downhole inspection.

In conclusion, we are of the opinion that the site will be more stable than any of the adjacent sites that are developed if the site is designed as proposed by Alan Kropp & Associates, Inc. and William Lettis & Assocaites, Inc. We have indicated to you that we can provide the engineering designs and inspection services required to implement the recommended foundation installation.

We hope this has provided you with the information you need to proceed in this matter. Should you have any further questions, please don't hesitate to give us a call.

Sincerely,

SEIDELMAN ASSOCIATES

Paul Seidelman
Owner
RCE 29683

Appendix B-7

2008 Seidelman Associates Geotechnical Investigation

SEIDELMAN ASSOCIATES
2427 CHERRY HILLS DRIVE
LAFAYETTE, CALIFORNIA 94549
(925) 930-0646
(925) 930-0828 (FAX)

June 24, 2008

Mr. Robi Reddy
3000F Danville Blvd., #268
Alamo, CA 94507

Re: Geotechnical Investigation of Portion of Lot at 3933 Quail Ridge Road, Lafayette, California

Dear Mr. Reddy:

At your request, we have completed our geotechnical investigation of a portion of your property at 3933 Quail Ridge Road in Lafayette, California.

The subject lot has a history of extreme landslide activity over most of the parcel's land area. This study was undertaken for the purpose of evaluating the stability of the extreme north corner of the subject parcel. The area, in question, is situated adjacent to the landslide scarp that developed in January, 1997. During the extensive period of landslide activity, there was no apparent involvement of the area presently under study.

The scope of our investigation included a review of the numerous reports and studies prepared for the original development and subsequent repair of the subdivision. Based on these studies, we undertook to install a large diameter boring in order to conduct "down hole logging" of the boring throughout its 70' depth. The *hole was logged by representatives from Cal Engineering and Geology, Seidelman Associates* and *Joyce Associates* on April 17, 2008.

Based on these data, we have developed recommendations for the construction of foundations for a single family residence and garage over a portion of the parcel that is not affected by landslide activity.

We hope this has provided you with the information necessary to proceed in this matter. Should further questions arise, please don't hesitate to give us a call.

Sincerely,

SEIDELMAN ASSOCIATES

Paul Seidelman
Principal Engineer
GE 761
RCE 29683 CEG 1086

PAUL J. SEIDELMAN
No. GE 000751
Exp. 3-31-09

INTRODUCTION

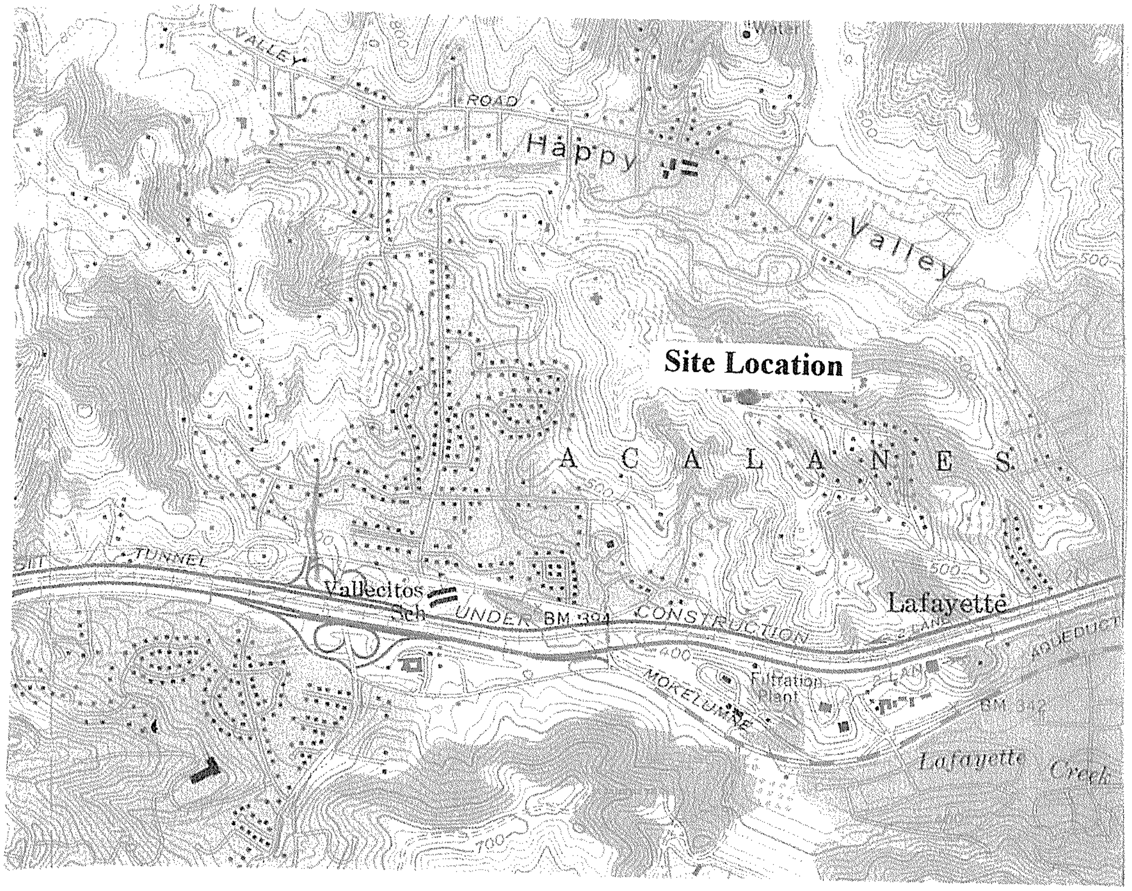
The site for the following study is located at 3933 Quail Ridge Road, Lafayette, CA. **See Site Location Map**. The purpose of the study is to evaluate land stability over a portion of Lot 18 of Subdivision 4770. The Parcel was created in April 1977, and employed a geotechnical investigation provided by *Hallenbeck, McKay and Associates* (1973), and *ENGEO, Inc.* (1975). The Parcel was developed with a residential structure in the late 1970s. In January 1997, a large, deep-seated, translational landslide became active over much of the subject parcel and several of the adjacent parcels. The landslide had a maximum width of just over 200 feet, and had a length of nearly 1,000 feet. The landslide activity resulted in the complete loss of the residential structure at the subject site.

Subsequent to investigations by *GeoForensics, Inc.*, a repair was undertaken by *Engineered Soil Repairs* of Walnut Creek, California. The repair consisted of three main elements:

- Stabilization of the property adjacent to the crown scarp of the landslide. This was accomplished by installing a pin-pile wall consisting of 28 vertical piles with 27 tie-backs into bedrock. The wall would allow excavation of the slide mass adjacent to the crown scarp by retaining the home sites and improvements adjacent to the 50 feet plus excavation.

- With the stabilizing wall in place, a large massive material was excavated in front of the wall to the depth of the landslide failure plane and for a width of approximately 80 feet. The geo-grid reinforcement zone underlies Quail Ridge Road and extends below the road approximately 10-15 feet. Thus, a buttress nearly 200 feet in width by 70 feet in length, by nearly 60 feet in depth, was constructed in front of the tied back, pin-pile wall. A drainage system was installed beneath the geo-grid reinforced buttress to complete the stabilizing buttress. The drain is accessed through a manhole on Quail Ridge Road, where a pump removes and

SITE LOCATION MAP



discharges the collected sub-surface water. A back up generator and pump are available at the site.

- The balance of the landslide, nearly 850 feet below the buttress, was graded to drain smoothly to the south. This work was completed in November 2001.

During the winter of 2005-2006, there was a pump failure in the wet pit on Quail Ridge Road. This resulted in complete saturation of the landslide mass and a reactivation of the slide mass below the reinforced earth buttress, and entirely within the lateral confines of the earlier landslide. The pump situation was repaired and there have been no further events since that time.

During 2003, *Alan Kropp & Associates, Inc.* and *William Lettis and Associates, Inc.* prepared reports for redevelopment of 3933 Quail Ridge Road. Those reports contained the results of a sub-surface trench and one small diameter boring. The reports also reviewed the history and literature associated with the property. Those reports may be found in **Appendix B** to this report.

In August 2004, *Seidelman Associates* made two trench excavations confirming the location of the lateral scarp in the same area where *William Lettis and Associates* had trenched. These new trenches were excavated in order to confirm the location of the lateral margin of the slide (not visible at that time). Since that time, the minor activation, due to a pump failure, has manifested the slide margins quite clearly.

In April 2008, *Seidelman Associates* conducted down hole logging operations on the proposed building site. The excavation consisted of a 30 inch diameter bucket-auger hole, excavated to a depth of 70 feet. The bore hole was formally logged by *Joyce Associates* as a sub-contractor to *Seidelman Associates*. Mr.

Seidelman also examined the boring, as did representatives from *Cal Engineering and Geology*. **Appendix A**

SCOPE OF WORK

The scope of work performed in this investigation included a review of available soil and geologic data for the area, the excavation of one, large diameter, down hole exploratory boring, a site reconnaissance, engineering analyses of the field and laboratory data and the preparation of this report. The data obtained and the analyses performed were for the purpose of providing design and construction criteria for site earthwork, structural foundations, retaining walls and pavements. Seismic considerations are also provided.

This report has been prepared for your use and the use of your consultants for specific application to the subject property in accordance with generally accepted geologic, soil and foundation practices. The recommendations contained herein are based on our analysis of the soil and rock conditions, based on the data provided in this study, as well as the *Alan Kropp, William Letttis,* and *GeoForensics* reports for the same area.

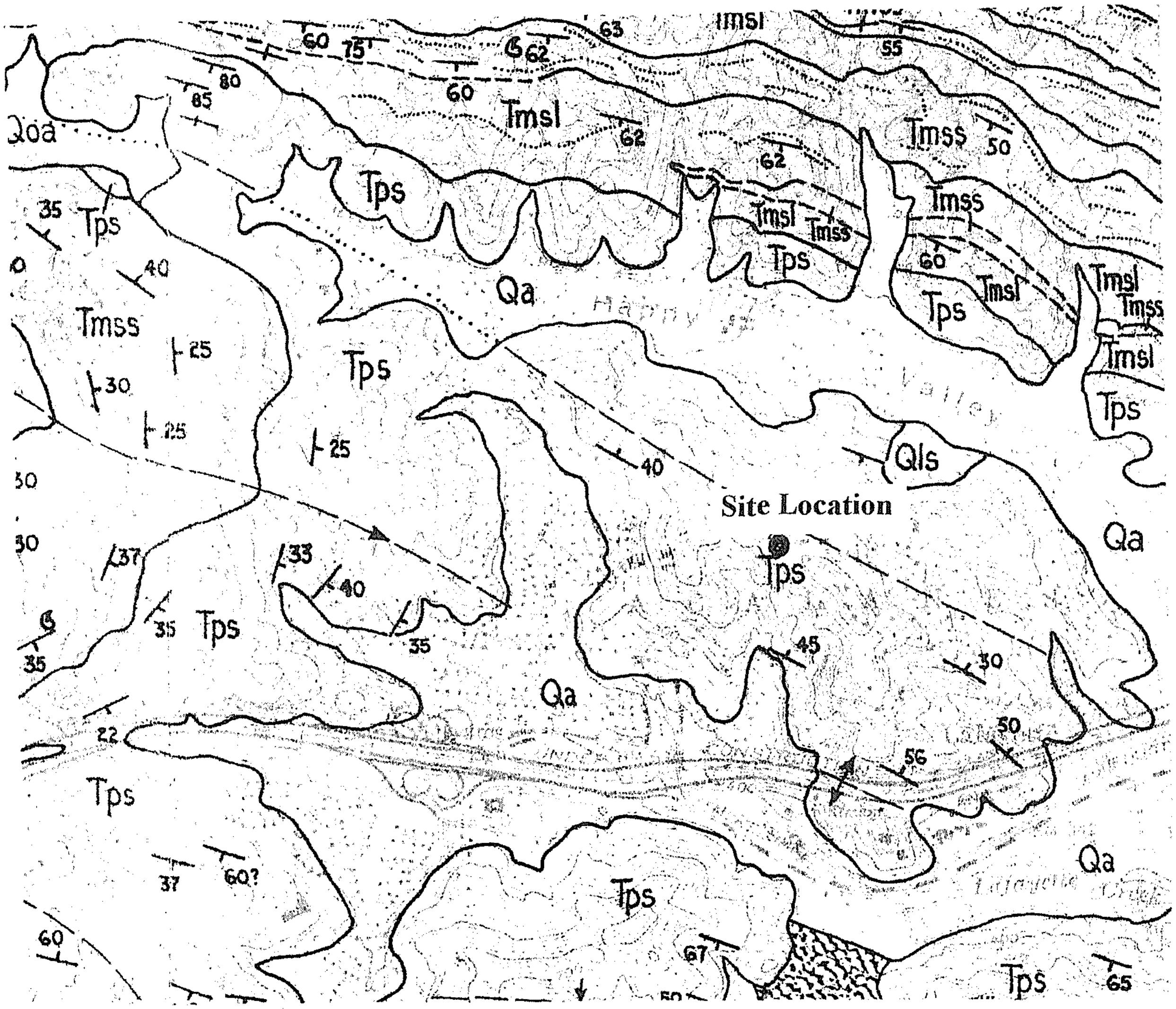
A. Geology

The site is underlain by marine deposits of siltstone, sandstone and conglomerate belonging to the Orinda Formation. The geologic units are steeply dipping to the northeast at 30 to 60 degrees. The subject site is bounded to the south and southwest by landslide deposits that have been historically active. Structurally, the site is located on the southwest limb of a northwest trending syncline. **See Geologic Map, *Dibblee, 1977*.**

B. Subsurface

The proposed building site, is underlain by three feet of artificial fill. Beneath the surficial soil, there are sandstones and pebble conglomerates to a depth of 18 feet. These units are, in turn, underlain by sandstones that extend to a depth of 37

GEOLOGIC MAP



feet, with the balance of the bedrock geology consisting of siltstones and sandstones inter-bedded to a depth of 70 feet.

The surface soils at the site are clay-rich and appear to extend to a depth of two to four feet.

The bedrock units tend to weather into soils that are clay rich and contain smetitic clays. The surface soils at the site classify as CH clays. These clays tend to be expansive and have a high plasticity index. The soils also tend to creep on slopes at least to a depth of six to eight feet. **See Appendix A.**

C. Seismicity

Geologists recognize the San Francisco Bay Area as one of the most active seismic regions in the United States. The region lies within the zone of influence by the San Andreas Fault, the Hayward Fault, the Calaveras Fault and the Concord Fault. The closest known active fault in the vicinity is the Hayward Fault, located approximately seven kilometers to the west of the site. The Concord Fault is located approximately fourteen kilometers east of the subject site. No field conditions were identified that might indicate the presence of an active fault at the subject site. This conclusion is supported by our review of the literature and previous mapping for the area. Based on this information, it is unlikely that surface rupture due to faulting will occur at the site.

Intense ground shaking is likely during a major earthquake on any one of the active fault systems. Seismologists have not yet reached the point where they can accurately predict the location and magnitude of an earthquake, though research in this field has greatly increased. Nevertheless, based on current technology as well as historical evidence, it is reasonable to assume that at least one moderate to severe earthquake will impact the area during the design life of the proposed structure.

As with all hillside projects in the area, the project owners will have to accept the highly unlikely possibility of ground rupture due to faulting or seismically induced landsliding. There is also a high probability of intense ground shaking and/or lateral and vertical soil movement that occurs in seismically active areas. These hazards are not elevated when compared to other hillslope sites in the general area.

D. Landsliding Analysis and Discussion

As we discussed earlier, much of the parcel under study is underlain by a deep-seated bedrock landslide that was quite active 10 years ago. Additionally, there are at least two other bedrock landslides in the general vicinity; thus, care must be taken to thoroughly evaluate landslide potentials. These conditions provided the motivation for the large diameter, deep boring that was constructed at the site. The results of that investigation reached the conclusion that the bedrock slide that failed in 1997 was fully expressed by the boundary surface rupture that appeared during that active period of sliding. No bedrock rupture failure surface extends beneath the ridge divide that is the subject of this investigation.

This conclusion is also supported by the bedrock observations made during the stabilization of the head scarp for the slide. In a letter report to Mr. Joe Chang, 3927 Quail Ridge Road, issued by *GeoForensics, Inc.* in June 14, 2004, **"In 2000 and 2001 our office was engaged by the Homeowner's group to observe, document, and consult upon the construction of our recommended mitigation plan. During the construction work completed by Engineered Soil Repairs (ESR), excavations up to 65 feet deep along the roadway alignment were made to remove slide materials. The excavations were deeper towards the northeastern side of the slide than the southwestern side. Although we had postulated that there may be an old landslide plane which passed northeastward beyond the mapped active slide limits to the adjacent drainage swale on your property, during the deep excavation work, no such slide plane was observed. Therefore, we concluded that the probability of an existing slide extension to the east was unlikely."**

On November 25, 2003 *Alan Kropp and Associates* issued a report prepared for Mr. and Mrs. Matt Click. The report addressed the same house building site being evaluated in this report. The Alan Kropp report concludes on Page 3, "it is our opinion the extreme northeast corner of the lot is suitable for construction of a new home from a geotechnical standpoint". The report presents extensive subsurface studies completed at that time by *William Lettis and Associates,* as well as Alan Kropp. **See Appendix .**

Thus, all of the investigators, *Seidelman Associates, Joyce Associates, GeoForensic, Inc., Alan Kropp Associates* and *William Lettis and Associates, Inc.* are in agreement that the subject building site at the northeast corner of the large parcel, that failed in 1997, is suitable for construction of a new residence, provided that stringent adherence to foundation recommendations be incorporated into the plans and specifications for the development of foundation systems for the new structure.

E. Foundation Design Requirements

The detailed trench logs, prepared by *William Lettis and Associates, Inc.*, found tension failures in the bedrock up to eight feet above the ground rupture associated with the landslide movements of 1997. Thus, we recommend construction of drilled pier supports for the house structure be located no closer to the landslide scarp than eight feet.

The first row of piers, adjacent to the landslide scarp, should be spaced at no greater than eight foot centers. Each pier should have a diameter of not less than 24 inches, and should extend to a depth of not less than 40 feet. A second row of piers, approximately 20 feet easterly of the primary row of piers should extend to similar depths at similar diameters. Bond beams, at least 24 inches in width and height, should extend from the lower line of piers to the upper line of piers. This will create a restrained condition of loading for the lower piers, but will also lessen the bending moments in each pier by restraining rotation of the pier top. We concur with Alan Kropp's recommendation for the lower row of piers to be supportive of an 18 foot depth. However, we see no reason to apply significantly elevated lateral loading to these piers, and concur with the pressure chart prepared by William Lettis and Associates indicating a restrained at rest pressure of 85 lbs pcf for cutslopes and 95 pcf for fill slopes. A third row of piers may be placed eastward of the middle row and constructed to a depth of 20 feet. The bond beams should connect through to this final row of piering. The bond beams may be designed as grade beams and used for support of the house. Connections between the bond beams and the piers should be designed as moment carrying and restraining to the top of each pier. The row of piers, constructed eight feet from the active scarp, should be capped with a sub-surface grade beam that extends to a depth of five feet. Each pier shall be designed as a column capable of supporting 25,000 lbs. vertical load, with horizontal loads determined by wind, seismic and lateral ground pressures. Tiebacks may be employed within the geometric confines of the parcel.

Based on our large diameter boring, none of the piers for the house will encounter the water table, and all of the holes will penetrate firm, competent bedrock materials. However, it is advisable to set reinforcement cages immediately after drilling and to place concrete soon thereafter. This will ensure hole cleanliness and minimize dryout or shrinkage of the excavated hole.

Slab-on-Grade

Unsupported slab-on-grade construction is only recommended for garages and patios. All concrete-on-grade should be designed as a pier-supported, structural mat. The minimum required mat slab thickness shall be 6 inches. Garage mat slabs should be constructed on a vapor barrier consisting of 10 mil visqueen or PVC overlain by two inches of sand. It is advisable to install a capillary break of pea gravel, four inches in thickness beneath the PVC liner .

F. Drainage

Drainage on the subject building site, will include the collection and removal of all roof and landscape watering areas. Additionally, the five foot retaining wall paralleling the landslide scarp, should be fitted with a back wall drain. These waters, in their entirety, should be conveyed to the base of the landslide at the downhill edge of the property.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

A. General Specifications

The following general specifications are intended to be used as guidelines for the planning, design, and construction phases of the project. We strongly recommend that all final foundation, grading, and drainage plans for the proposed project be reviewed by SEIDELMAN ASSOCIATES prior to their implementation in order to ensure that they fulfill the intent and requirement of this report. Additionally, we recommend that the pier drilling preparation, foundation steel reinforcement, engineered fills, and drainage systems be inspected by a representative of SEIDELMAN ASSOCIATES. In order to ensure proper scheduling, **ALL REQUIRED INSPECTIONS SHOULD BE SCHEDULED AT LEAST 48 HOURS IN ADVANCE.** It is requested that at least 7 days notice be given prior to commencement of the project.

B. Earthwork

1. Clearing and Site Preparation

Prior to the placement of any fill, the site should be cleared of all obstruction including any buried utility or irrigation lines, fences, trees, including tree roots greater that ½ inch in diameter. These should be stripped from any areas receiving fill, a foundation, a pavement structure, base rock, slabs-on-grade, patios, or any other improvement. Holes resulting from the removal of underground obstruction that extend below the proposed finish grade should be cleared and backfilled with suitable material compacted to the requirement given under Item B.5, "Compaction." Organically contaminated soil or other deleterious material that is generated from stripping operations shall not be used as fill, but may be used in landscaped areas as approved by the soils engineer. All clearing, grubbing, stripping, and site preparation for the project shall be accomplished by the contractor to the satisfaction of the soils engineer.

2. Excavations

Based on our experience with the soil and bedrock units in the project area, normal excavating equipment will be suitable for all general excavations.

3. Sub grade Preparation

After the site has been properly cleared and stripped and any necessary excavations made, the exposed soils in those areas scheduled to receive structural fill, slabs-on-grade or pavements, should be scarified to a depth of six inches, moisture conditioned to at least 4% above optimum water content and compacted to the appropriate requirements for structural fill.

4. Materials for Fill

All on-site soils below the stripped layer and having an organic content of less than three percent by volume can be used as fill except where base rock material is required beneath the roadways, walkways, or slabs. However, all fill placed at the site, including on-site soils, should not contain rocks or lumps larger than six inches in greatest dimension with not more than 15% larger than 2 ½ inches. In addition, any required import fill should be predominantly granular with a plasticity index of 15 or less. Representative samples of on-site materials to be used for fill shall be tested in the laboratory by the soils engineer in order to determine the physical characteristics of the soil materials. In areas to receive fill, moisture condition and compact all soils within two feet of the existing grade. All wet areas shall be thoroughly drained.

5. Compaction

All structural fill less than five feet thick should be compacted to at least 90% relative density as determined by ASTM Test Designation D1557-78. Moisture content should be maintained at not less than 4% above optimum. Fill thickness beneath building sites should be as uniform as possible. Structural fill or wall backfill, greater than five feet deep, should be entirely compacted to at least 90% relative compaction.

Inspection of the fill placement shall be provided by the soils engineer. Moisture/density testing and determination during construction shall be made by the soils engineer. When moisture/density test results on the newly constructed fill fall below the specification required by the soils engineer, the particular layer or portion shall be reworked until the required density and/or moisture content has been attained. No additional fill shall be placed over an area until the previous lift has been tested and found to meet the specified density and moisture requirements and is approved by the soils engineer.

6. Trench Backfill

Pipeline trenches should be backfilled with fill placed in lifts of approximately eight inches in uncompacted thickness. However, thicker lifts may be used provided the method of compaction is approved by the soils engineer and the required minimum degree of compaction is achieved. If on-site soil is used, the material should be compacted to at least 85 percent relative compaction by mechanical means only. Imported sand can also be used for back-filling trenches, provided it is compacted to at least 90 percent relative compaction. If imported sand is used, sufficient water should be added during the trench back-filling operations to prevent the soil from bridging during compaction. Trenches should be carefully evaluated for their potential to carry unexpected water. Outlet subdrains may be needed.

In slab and pavement areas, the upper three feet of trench backfill should be compacted to at least 90 % relative compaction for on-site soils, and 95% where imported sand backfill is used. In addition, the upper six inches of all trench backfill in pavement areas should be compacted to at least 95 % relative compaction.

Where sand backfill utility trenches enter the building pad, we recommend that they be backfilled by an impermeable soil plug or mastic sealant to minimize moisture change in the highly to critically expansive clays beneath the slab. In addition, where sand backfilled utility trenches cross planter areas and pass below pavements or concrete sidewalks, they should be sealed to minimize soil volume change below asphalt and concrete areas.

7. Slopes

Cutslopes should be no steeper than 2:1 and should be inspected for adverse structural or soil characteristics. Mitigation of these adverse features may require reduction in cutslope steepness or retention by retaining structures.

8. Construction During Wet Weather Conditions

If construction is interrupted by weather or some other adverse condition, fill operations will not be resumed until field conditions, as determined by the soils engineer, are within the specified acceptable limits.

FINAL REVIEW AND INSPECTION PROCEDURES

We recommend that all final plans for the repairs be reviewed by SEIDELMAN ASSOCIATES prior to their implementation in order to ensure that they fulfill the recommendations of this report. Also, during the construction phase of the project, we recommend that inspections be made during any foundation construction, drainage construction, or any structures or measures that are constructed as a result of the recommendations contained in this report.
TO ENSURE PROPER SCHEDULING, THESE INSPECTIONS MUST BE SCHEDULED AT LEAST 48 HOURS PRIOR TO THE PLACEMENT OF ANY CONCRETE OR OTHER PERMANENT IMPROVEMENT.

LIMITATIONS OF THE INVESTIGATION

The recommendations contained within this report are based upon the assumption that the soil and geologic conditions at the project site do not deviate from those presented in this report. If any unusual soil or geologic conditions are encountered during construction, or if proposed repair plans change, SEIDELMAN ASSOCIATES should be notified so that we may provide supplemental recommendations.

Construction outside of the currently designated proposed building site is not covered by this report. Additional soil and geologic studies should precede any development of these areas. Some statements in this report are true of the entire area. However, specific statements, conclusions, and recommendations apply only to those areas within the proposed building site. As with all hillside developments there is always the possibility that unforeseen adverse geologic conditions may be encountered that may result in substantial design changes and cost increases. You should be prepared for such contingencies.

THIS REPORT IS ISSUED WITH THE UNDERSTANDING THAT IT IS THE RESPONSIBILITY OF THE OWNER OR THEIR REPRESENTATIVE TO ENSURE THAT THE CONTENTS OF THIS REPORT ARE CALLED TO THE ATTENTION OF THE ENGINEERS FOR THE PROJECT AND INCORPORATED INTO PROJECT PLANS, SPECIFICATIONS, AND ACTUAL CONSTRUCTION. MOREOVER, IT IS THE OWNER'S RESPONSIBILITY TO SEE THAT THE CONTRACTORS CARRY OUT THE RECOMMENDATIONS IN THE FIELD.

The findings in this report are valid as of the present time. However, the passing of time may change the conditions of the property due to natural processes or the works of humans. in addition, legislation or the broadening or knowledge may require additional recommendations. Accordingly, the findings of this report may be invalidated, entirely or in part, by changes beyond our control. Therefore, this report should not be relied upon after a period of 3 years, or if additional damage occurs in or around the building envelope without a review by an engineering geologist and a soils engineer.

The conclusions and recommendations presented in this report are the result of geologic and engineering analyses based on our interpretations of the surface and subsurface conditions. This report has been prepared according to generally accepted geologic and soils engineering practices. No other warranty is given. Should the final development plans vary from those described in this report we should be notified so that we can evaluate the need to revise our recommendations.

APPENDIX A

BORE HOLE LOGS

Log of Boring LD-1

Project Name Quail Ridge Road

Job Number

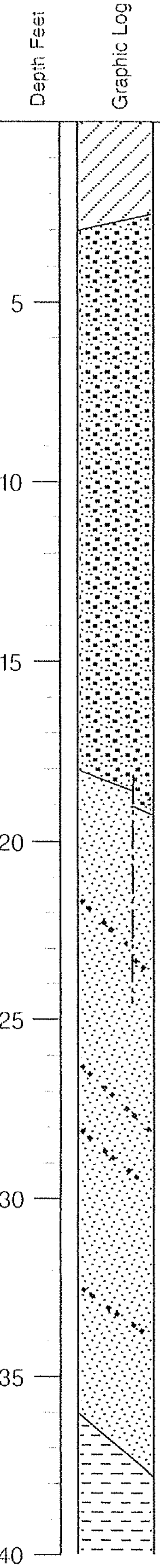
Drilling Method 30 inch Bucket Auger

Location Lafayette, CA

Date Completed 04/17/08

Depth 70 ft.

Elevation:



BROWN SILTY CLAY (CL) hard, dry with gravel (Fill)

Set casing to 4.5 feet

YELLOWISH BROWN GRAVELLY SANDSTONE AND PEBBLE CONGLOMERATE, friable, deeply weathered, tight, moist, no visible stratification

Locally black with manganese coatings. Bedding @N15W35NE

Becomes moderately weathered, lightly cemented

With intermixed zones of light brown silty sandstone, friable, moderately weathered, tight, moist

Occasional small roots along verticle shears

Bedding @ N15W24E at contact between gravelly sandstone above and sandstone below. Contact offset several inches by vertical fracture @N89E90, with roots along fracture

YELLOWISH BROWN SANDSTONE, thick bedded, friable, lightly cemented, moderately weathered, coarse grained, tight

Bedding on gravel lense @ N38E41SE, contact offset by vertical shear @N85E90, offset approximately 12" vertical, with roots along shear

with occasional lenses of gravelly sandstone

Becomes medium to coarse grained, with lenses of gravelly sandstone

Bedding on base of gravelly sandstone lense @N30W38NE

with inclusions of gray siltstone within sandstone (rip-up clasts)

with vertical shear @N35E90

Bedding on base of conglomerate lense @ N10W31E

Contact between sandstone above siltstone below @N10W42NE

BROWNISH GRAY SILTSTONE WITH SAND, friable, little weathered, very tight, moist, locally grades more sandy

Becomes medium gray, wet

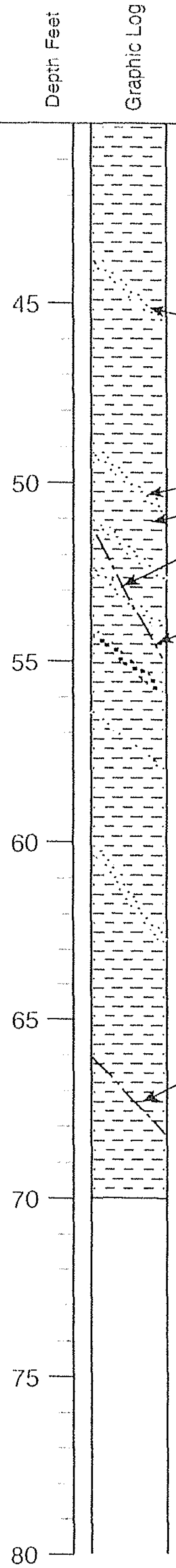
SEIDELMAN ASSOCIATES

Log of Boring LD-1, 0 to 40 Feet
Quail Ridge Road
Lafayette, California

Log of Boring LD-1

Project Name Quail Ridge Road
Job Number
Drilling Method 30 inch Bucket Auger

Location Lafayette, CA
Date Completed 04/17/08
Depth 70 ft.
Elevation:



MEDIUM GRAY SILTSTONE WITH SAND, friable, little weathered, very tight, wet, locally grades more sandy, with some interbedded sandstone and gravelly sandstone

Yellowish Brown Sandstone, medium grained, laminated, friable, little weathered, moist
Top contact @N20W42NE, bottom contact @N14W52NE

Brown Sandstone bed, 5" thick, friable, bedding @ N18W60NE
Tuffaceous siltstone bed, sandy, moderately plastic, wet, no visible shearing
Seepage at 51 feet (uppermost seepage zone)
Shear zone: Light gray clay seam 1/8" thick @ N75W65NE
Seepage at sandstone bed
Bedding in sandstone @ N13W40NE
shear zone @ N73W54NE

6" gravel lense, bedding @N45W40NE

Seepage increasing
1" thick gravelly sandstone, bedding @ N26W37NE
Siltstone becomes dark gray, clayey to sandy with some intermixed silty sandstone, friable, tight, little weathered, with occasional gravels and localized seepage

Bedding in sandstone @ N32W60NE

Shear zone consisting of 1.5" thick stiff gray clay seam @N20W47NE
additional seepage.

Boring drilled to 70 feet, visually logged to 67 feet

Boring drilled on 4/16/08; logged on 4/17/08
water level at 8:00 am on 4/17/08 (prior to cleaning or logging) was 69 feet

APPENDIX B

GEOTECHNICAL REPORTS

- Alan Kropp & Associates, Inc.
- William Lettis & Associates, Inc.

APPENDIX B TO 2003 2008 SEIDELMAN ASSOCIATES GEOTECHNICAL INVESTIGATION
INCLUDED AS **APPENDICES B-4** AND **B-3** OF THIS DOCUMENT

Appendix B-8

2008 Seidelman Associates Letters

SEIDELMAN ASSOCIATES
2427 CHERRY HILLS DRIVE
LAFAYETTE, CALIFORNIA 94549
(925) 930-0646
(925) 930-0828 (FAX)

July 17, 2008

Mr. William Marquand, AIA
3498 Monroe Avenue
Lafayette, CA 94549

RE: Foundation Location Limits – 3933 Quail Ridge, Lafayette

Dear Mr. Marquand:

As we discussed on the phone, it would be helpful for all, in planning the residential development of the subject property, to indicate on a map the location of the slide margin as discussed in our report dated, June 24, 2008. We have attached a portion of a topographic map developed for the site. On that map, we have indicated the location of the pin-pile wall on which the house foundation margin may be placed. The line shown on the map was developed by reviewing the trench location from the William Lettis study, and our field review of the slide margin as it became visible during the recent reactivation of the lower slide body. The surveyor also indicated both the bottom and the top of the newly revealed slide scarp. For the most part, we have located the foundation margin above the lower scarp, and along the alignment of the upper scarp as revealed by the recent movement. We also left two stakes in the field located by our trenching some three years ago.

In response to your question regarding the relationship between the landslide and the new house, the proposed structure will not add any loads to the existing landslide, and if the recommendations in our report are followed in regards to drainage, the redeveloped lot will in no way influence the old landslide.

We hope this has provided you with the information you need to proceed in this matter. Should you have any further questions, please don't hesitate to give us a call.

Sincerely,

SEIDELMAN ASSOCIATES

Paul Seidelman
Principal Engineer
RCE 29683
GE 761

SEIDELMAN ASSOCIATES
2427 CHERRY HILLS DRIVE
LAFAYETTE, CALIFORNIA 94549
(925) 930-0646
(925) 930-0828 (FAX)

July 24, 2008

Mr. Bill Marquand
3498 Monroe Avenue
Lafayette, CA 94549

RE: Alternative Development Feasibility – 3933 Quail Ridge, Lafayette

Dear Mr. Marquand:

Based on your recent email, your discussions with the City of Lafayette indicated their question regarding what, if any, alternative development plans are feasible for the subject lot. As you know, this was the subject of extensive legal negotiations at the time of the landslide failure. Numerous experts and insurance companies, and interested parties, discussed alternative ways of handling the very large landslide that had occurred.

The landslide is nearly 1,300 feet in total length, and extends well offsite onto the parcel of land below (see attached map). Alteration of the active landslide mass is highly dangerous, as it will remove lateral confining pressures on the left and right flank of the slide mass. The repair of five years ago addressed this problem in the crown area only by installing deep (70 foot) wide flange beams with tiebacks to stabilize the crown area during excavation for the buttress fill necessary to support the crown area. The conclusion at the time of repair was that it would cost many millions of dollars to install this support feature to the flanks of the landslide, and that it was therefore not economically feasible, as the repair exceeded the value of the parcel and house by over 100% at that time.

Since that time, the cost of grading has greatly accelerated due to the cost of fuel and heavy equipment. We would broadly estimate that application of the repair procedures necessary to make the lot buildable in the area of the slide would require 2.5 to 4 million dollars in grading and structural expense. Furthermore, there would be an elevated risk of landslide renewal during the repair process. Such a renewal could adversely affect the existing repair which moved two years ago, placing the reinforced earth buttress in an altered condition. Thus, the alternative to the present proposal has extreme costs and increased risk to existing parcels associated with it. The present proposal in no way adds to the loading on the existing repair and slide mass, an in no way reduces the support for the adjoining properties. In fact, it represents an extension of the crown support wall to the north and east of the existing wall terminus. Thus, it adds onto the existing systems that are supporting the crown area.

We have employed accepted engineering procedures and our professional opinions and conclusions are made in accordance with generally accepted soil and foundation engineering principles and practices for reconnaissance level investigations. However, we do not undertake the guarantee of land or site improvements. This warranty is in lieu of all other warranties either expressed or implied.

We hope this has provided you with the information you need to proceed in this matter. Should you have any further questions, please don't hesitate to give us a call.

Sincerely,

SEIDELMAN ASSOCIATES

Paul Seidelman
Principal Engineer
RCE 29683
GE 761
CEG 1086

Appendix B-9

2008 Cal Engineering & Geology Second Geotechnical and Geologic Review

CE&G
CAL ENGINEERING & GEOLOGY

1870 Olympic Blvd.
Suite 100
Walnut Creek
California 94596

Tel:925.935.9771
Fax:925.935.9773
www.caleng.com

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NOV 18 2008
CITY OF LAFAYETTE
ENGINEERING DEPT.

5 November 2008

Tony Coe, P.E.
City of Lafayette
Engineering Division
3675 Mt. Diablo Boulevard Suite 210
Lafayette, California 94549-1968

RE: Second Geotechnical and Geologic Review
Proposed Development at 3933 Quail Ridge Road
Lafayette, California

Dear Mr. Coe:

At your request, we have completed our second geologic and geotechnical review of the recent geotechnical report and addendum letters prepared by Seidelman Associates (SA) for the proposed development of 3933 Quail Ridge Road in Lafayette, California. This letter contains our review comments pertaining to the Seidelman report and letters. This letter also contains our comments from our 2004 review of the geotechnical and geologic reports prepared Alan Kropp & Associates (AKA) and William Lettis Associates (WLA) for a previously proposed project on the property.

The following documents were recently reviewed during the course of this second peer review:

1. A geotechnical report prepared by Seidelman Associates dated June 24, 2008 titled *Geotechnical Investigation of Portion of Lot at 3933 Quail Ridge Road, Lafayette, California.*

2. An addendum letter prepared by Seidelman Associates dated July 17, 2008 regarding *Foundation Location Limits - 3933 Quail Ridge, Lafayette.*

3. An addendum letter prepared by Seidelman Associates dated July 24, 2008 regarding *Alternative Development Feasibility - 3933 Quail Ridge, Lafayette.*

4. A letter prepared by Seidelman Associates dated November 1, 2005 addressed to Mr. & Mrs. Matt Click regarding *Your Parcel on Quail Ridge.*

5. A letter prepared by Seidelman Associates dated June 6, 2005 to Mr. & Mrs. Matt Click regarding *Discussion of Peer Review and the results of Trenching at 3933 Quail Ridge Road in Lafayette, California.*

6. Plan sheet C1.3 titled *Site Geology* prepared by Seidelman Associates for the Reddy Residence 3933 Quail Ridge Road, Lafayette, California, dated October 2008.

We previously reviewed the following documents as part of our initial review of a previously proposed project for the property in 2004:

A. A geotechnical report prepared by Alan Kropp & Associates, Inc. (AKA) dated November 25, 2003 titled *Geotechnical Investigation Quail Ridge Road Residence Northeastern Corner of Lot 3933 Quail Ridge Road Lafayette, California;*

B. A geologic report prepared by William Lettis & Associates, Inc. (WLA) dated November 18, 2003 titled *Geologic Investigation of Proposed Homesite on Click Property, 3933 Quail Ridge Rd., Lafayette, California;* and

C. Site development plans including untitled and anonymously prepared architectural plans for the Click residence dated March 17, 2004 and civil engineering plans prepared by DeBolt Civil Engineering dated April 20, 2004 *Preliminary Grading and Drainage Plan Click Residence 3933 Quail Ridge Road.*

We have also reviewed numerous documents provided to us by the City pertaining to the landslide on the property and adjacent properties which reactivated in 1997 and was partially stabilized between 1998-2001. Among the documents reviewed were the following geotechnical reports and letters:

D. A preliminary geotechnical design report prepared by GeoForensics, Inc. (GFI) dated June 24, 2004 titled *Quail Ridge Slide Quail Ridge Road Lafayette, California PRELIMINARY DESIGN CONCEPTS;*

E. A geotechnical design report prepared by GFI dated September 17, 1998 titled *Quail Ridge Slide Quail Ridge Road Lafayette, California GEOTECHNICAL RECOMMENDATIONS FOR PROPOSED HEADSCARP STABILIZATION*;

F. An interim geotechnical construction letter report prepared by GFI dated May 13, 1999 titled *Quail Ridge Slide Quail Ridge Road Lafayette, California CONSTRUCTION OBSERVATIONS OF WINTERIZATION WORK*;

G. A series of geotechnical peer review letters prepared by Sanders Associates GeoStrutural Engineers, Inc. (SAGE) on behalf of the City of Lafayette regarding technical review of the proposed landslide headscarp stabilization project;

H. A series of response letters and calculations and plans prepared by GFI and Engineered Soil Repairs, Inc. (ESR) that provide responses to issues raised by SAGE in their letters; and

I. A geotechnical construction observations and testing report prepared by GFI dated January 7, 2002 titled *Quail Ridge Landslide Mitigation Lafayette, California GEOTECHNICAL OBSERVATIONS AND TESTING OF CONSTRUCTION.*

This review has included the examination of the above referenced materials for pertinent information regarding the technical feasibility of the currently proposed project. We also made reconnaissance level observations of the project site, observed and logged a large diameter boring excavated as part of the recent Seidelman Associates exploratory work, reviewed several published geologic maps of the area, and reviewed aerial photographs of the site which were in our office files.

SITE HISTORY

It is proposed to construct a new home in the northeast corner of the lot at 3933 Quail Ridge Road. This lot and the private street and portions of the adjoining properties are the site of a large landslide which occurred in 1997. The landslide was approximately 240 feet wide by 680 feet long and had an estimated maximum depth of more than 60 feet. The landslide closed the road, created a 20 foot high headscarp directly below the property at 3954 Quail Ridge Road, and severely damaged the home at the 3933 Quail Ridge property. The damaged home was eventually demolished and removed from the site. A repair of the headscarp and road was completed between 1998 and 2001. The repair system was designed and constructed by ESR. Geotechnical recommendations and geotechnical observations and testing during construction were provided by GFI. The repair system included the installation of a tieback retaining wall up to 50 feet high, excavation for a buttress keyway, and construction of a geosynthetic reinforced earth retaining structure. The majority of the landslide mass was left in place below the road and no stabilization measures were implemented for these displaced materials.

In 2004 a proposed project to develop the northeast corner of the property was presented to the City of Lafayette. We reviewed the geologic and geotechnical aspects of the proposed project and prepared a review letter dated 22 July 2004. The July 2004 peer review letter identified several items which warranted additional investigation and consideration on the part of the geotechnical consultant and the design team at that time. In response to the July 2004 review letter, Seidelman Associates prepared their letter dated June 2005. Seidelman then completed additional trenching of the landslide headscarp along the edge of the proposed building pad and presented the trenching results in their November 2005 letter.

During the winter of 2005-2006, a failure of a pumping system installed during ESR's 1998-2001 work on the landslide led to re-activation of the landslide mass left below the headscarp repair. The movement associated with the reactivated landslide more caused the headscarp below the edge of the proposed building pad to be more clearly identifiable.

In April 2008 Seidelman conducted downhole logging of a large diameter boring excavated from within the proposed building pad. Representatives of our firm were also present during the drilling and logging of the large diameter boring. Based on the results of the downhole logging and other prior investigative work, Seidelman prepared their June 2008 report and the two addendum letters which together provide their findings and recommendations regarding the geologic and geotechnical aspects of the currently proposed project.

PROPOSED PROJECT

The landslide deposit which became active in 1997 encompassed approximately 80 percent of the lot at 3933 Quail Ridge Road. A triangular portion of the lot in the extreme northeast corner of the property was not involved in the active landsliding of 1997. In 2004 it was proposed to develop this portion of the lot with a new 2200 square foot single family residence. The proposed building area is shaped like a right triangle with an 80 foot base along the Quail Ridge Road frontage and a 110 foot height down the slope. The reports prepared by AKA and WLA were intended to evaluate the geotechnical and geologic feasibility of constructing a new home at this location and to provide design and construction recommendations, as appropriate. Our July 2004 peer review addressed this previously proposed project.

For this second review we have been provided with only the geotechnical report, letters, and single plan sheet prepared by Seidelman since 2005. We have not been provided with any additional or revised site improvement or development plans other than those submitted by the Clicks in 2004.

SUMMARY OF FIRST GEOLOGIC AND GEOTECHNICAL REVIEW

Our 2004 review revealed that development of the proposed residence may be possible from a geotechnical and geologic perspective. However, based on the data and analyses that were provided and reviewed, it was our opinion that the proposed project had not been demonstrated to be geotechnically feasible. Additional mapping and subsurface exploration was deemed necessary in order to fully characterize the geologic conditions and to develop effective geotechnical design recommendations which would result in the construction of a project which is stable over the long-term. In our 2004 review letter we requested the following information:

a) all available subsurface information developed by AKA, WLA, and GFI be incorporated into the geotechnical report for the proposed development

b) it be demonstrated that the larger slide either 1) does not exist beneath the proposed building site, or 2) is stable in its current and future configurations

c) additional subsurface exploration consisting of drilling and downhole logging large diameter boring(s) to determine if there is a landslide below the building site

d) exploratory trenches be excavated as warranted along the active landslide margin and at the location of the postulated margin of the larger landslide scarp along the eastern drainage ravine may also be necessary

e) unless additional exploration described above demonstrates the stability of the bedrock tension zone, a no-build setback of at least 10 feet should be considered/required

f) the passive pressure value be re-evaluated based on the development of an accurate cross-section for the slope below the west side of then-proposed pier wall and for the house foundation piers within the 20 foot Special Design Zone defined by AKA

g) a plan should be prepared showing all areas where any grading or development of any sort should be prohibited and a resulting no-build easement be required as part of the conditions of approval for the project

h) the mapped lateral scarp and the Special Design Zone identified by AKA should be shown clearly on all plan sheets

i) the final location of the house should be determined only after the additional subsurface work recommended above has been completed

j) placement of any fill should not be allowed unless it can be demonstrated that the fill will not adversely impact the stability of the slide area.

k) landscaping which requires <u>any</u> irrigation and hardscape areas such as drainage ditches, walkways, and patios not be allowed in the landslide area

l) the geotechnical consultant and geologic consultant should review the plans and meet with the design team to discuss their review

REVIEW OF RECENTLY SUBMITTED DOCUMENTS

Based on our review of the documents provided to us since our initial review in 2004, it is our opinion that many of the critical issues and comments from our original review letter have been addressed. Specifically, in our opinion the additional exploration work completed by Seidelman in 2004 and 2008 demonstrates that the proposed triangular building area is not underlain by a landslide deposit (see items a, b, c, d, and h, above). The findings presented within the June 24, 2008 Seidelman report together with the November 1, 2005 Seidelman letter prepared for the previous property owners present clear findings regarding the geologic conditions at the site and the relative stability of northeast corner of the parcel.

Some of our original comments summarized above have not been addressed and a few of the recommendations provided in the Seidelman report and letters are not entirely clear to us. We recommend that additional clarification be requested regarding the following items:

1. The June 24, 2008 report references exploratory trenches excavated and logged by Seidelman in August 2004, but does not mention or reference the November 1, 2005 letter regarding the trenching. Consideration should be given to appending that letter and its attachments to the June 24, 2008 report.

2. On page 7 of the June 24, 2008, report it is recommended that "..construction of drilled pier supports for the house be located no closer than eight feet" to the edge of the landside scarp. However, on the site geology figure attached to the July 17, 2008 Seidelman letter (C1.2), there is a row of piers identified by a callout as "(N) CONC. PIERS TO BEDROCK, RET. WALL ON TOP" located right on the headscarp without any setback. It is not clear if the piers identified in the callout on C1.2 are house foundation piers or are for a separate stabilization structure as was recommended in the AKA report. As shown, the pier locations conflict with the recommendations on page 7 of the June 24, 2008 report. This conflict should be corrected.

3. The recommendations for the foundation piers provide lateral loading design criteria which differs from that previously recommended by AKA. In our opinion the criteria provided by Seidelman is reasonable even though it differs from AKA's. However, the June 24, 2008 report by Seidelman does not provide design criteria for passive pressures or design criteria for tiebacks. This information will be required for the structural design of the house foundation system.

4. Figure C1.2 which was transmitted with the July 17, 2008 Seidelman letter does not show the locations of the test trenches which were excavated and logged by Seidelman in 2004. These should be added to the figure for completeness.

5. The drainage recommendations included in the June 24, 2008 report indicate that the collected drainage should be "...conveyed to the base of the landslide at the downhill edge of the property." Since base of the landslide is not located on the 3393 Quail Ridge Road property does this mean the water will be conveyed down the entire length of the landslide and discharge on the adjacent property? This should be clarified and appropriate drainage and maintenance easements should be obtained as needed.

6. No specific recommendations regarding "no-grading" or "no-improvements" zones are provided in the June 24, 2008 Seidelman report. In our opinion, in order to develop the property, these types of restrictions are warranted and recommendations should be provided in a manner similar to those presented in the AKA report.

7. It is not clear from the June 24, 2008 report if a different site development plan has been prepared since our first review in 2004. If, or when, a plan is developed, items g through l summarized above should be addressed.

CLOSURE

This review has been performed by request of the City of Lafayette. Our role has been to provide technical advice to assist the City in its discretionary permit decisions, and we are afforded the same protection under state law. Our services have been limited to the review of the documents listed above and a visual review of the property. We have no control over the future construction on this property and make no representations regarding its future conditions.

We trust this provides you with the information you require. We appreciate the opportunity to be of service to you. If you have any questions, please feel free to give us a call. We have employed accepted geotechnical engineering procedures, and our professional opinions and conclusions are made in accordance with generally accepted geotechnical engineering principles and practices. This standard is in lieu of all warranties, either expressed or implied.

Yours truly,

CAL ENGINEERING & GEOLOGY, INC.

Phillip Gregory, P.E., G.E.
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
PHILLIP O. GREGORY
No. Geo GE 2193
No Civil C 40728
Exp. 3/31/09
CIVIL-GEOTECHNICAL
STATE OF CALIFORNIA

Mitchell D. Wolfe, R.G., C.E.G.
Principal Geologist

PROFESSIONAL GEOLOGIST
MITCHELL WOLFE
G 1487
p. 7/31/09
CERTIFIED
ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

Appendix B-10

2008 Seidelman Associates Response to Second CE&G Review

RECEIVED

NOV 2 5 2008

CITY OF LAFAYETTE
PLANNING DEPT.

SEIDELMAN ASSOCIATES
2427 CHERRY HILLS DRIVE
LAFAYETTE, CALIFORNIA 94549
(925) 930-0646
(925) 930-0828 (FAX)

November 20, 2008

Mr. Tony Coe
City of Lafayette
Engineering Division
3675 Mt. Diablo Boulevard, Suite 210
Lafayette, California 94549

RE: Response to CE&G Peer Review - 3933 Quail Ridge Road

Dear Mr. Coe:

The following are responses to the review provided by Phil Gregory of **Cal Engineering and Geology**. We have numbered our responses in accordance with Mr. Gregory's items 1-7, as shown on page 5 and 6 of his letter.

1. The information developed subsequent to our report of November, 2005, supercedes the information presented in the earlier report, as both of our trenches constructed at that time present information that is significantly improved upon by subsequent exploration. The trench on top of the side ridge intersects the location of our large diameter, down hole log, bore hole. The down hole, bore log hole discloses much more information than the earlier trench. The side hill trench, constructed in 2005, has the purpose of identifying the old scarp line. This was necessary because the William Lettis trench provided only one point along the old scarp line. As you know, the landslide became slightly activated two years ago and the entire lateral scarp became obviously visible. Subsequent to that landslide movement, a new topographic map was prepared and presented with this scarp information clearly shown. Thus, the older trench becomes superfluous.

2. The recommendations of Alan Kropp are no longer pertinent, as he is no longer the engineer of record for this project and his recommendations are no longer being presented by the applicant. The recommendations under review are those of Seidelman Associates and none others.

3. The present report discusses the stability of the site and its appropriateness for development with a residential structure. A design level report will be presented with the application for building permit. This report will contain the necessary wall design criteria. Our present thinking is that the wall alignment will follow the scarp line and consist of 40 foot deep piers, 24 inches in diameter. The design criteria for the piers will discount the upper 15 feet as non-supportive, and will commence with a passive resistance of 250 pcf, commencing 15 feet below the ground surface. The wall will be

designed to retain an active pressure of 65 pcf and an at rest pressure of 95 pcf. Tie-backs will have a minimum unsupported length of 15 feet, followed by frictional contact with bedrock materials amounting to 1,000 lbs psf of tie-back surface area contact.

4. Same answer as given in item 1.

5. We recognize that two alternatives exist to drain the project. The first is to obtain the necessary easements to convey the water into the creek below the dormant landslide area. The second alternative envisions a cistern with pump and backup power to convey collected drainage waters to the street above.

6. Upon completion of the project, those areas outside of the designated development area should remain in their present category of no grading and no improvements.

7. A different site development plan and geotechnical engineer and architect have been employed by the present owner. The previous data, developed by William Lettis and Alan Kropp, have been employed in our evaluations and recommendations. However, the project is somewhat different than the earlier project.

We hope this has provided you with the information you need to proceed in this matter. Should you have any further questions, please don't hesitate to give us a call.

Sincerely,

SEIDELMAN ASSOCIATES

Paul Seidelman
Principal Engineer
GE 761
RCE 29683

REGISTERED PROFESSIONAL ENGINEER
PAUL J. SEIDELMAN
No. GE 000761
Exp. 3-31-09
GEOTECHNICAL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
PAUL J. SEIDELMAN
No. C 029683
Exp. 3-31-09
CIVIL
STATE OF CALIFORNIA

Appendix B-11

2008 Cal Engineering & Geology Third Geotechnical and Geologic Review

CE&G
CAL ENGINEERING & GEOLOGY

1870 Olympic Blvd.
Suite 100
Walnut Creek
California 94596

Tel:925.935.9771
Fax:925.935.9773
www.caleng.com

RECEIVED
DEC 22 2008
CITY OF LAFAYETTE
ENGINEERING DEPT.

17 December 2008

Tony Coe, P.E.
City of Lafayette
Engineering Division
3675 Mt. Diablo Boulevard Suite 210
Lafayette, California 94549-1968

RE: Third Geotechnical and Geologic Review
Proposed Development at 3933 Quail Ridge Road
Lafayette, California

Dear Mr. Coe:

At your request, we have completed our third geologic and geotechnical review of the proposed development of 3933 Quail Ridge Road in Lafayette, California. We initially prepared a review letter dated 2004 that included comments relating to the project originally proposed in 2004. Our second review letter dated 5 November 2008 included comments regarding the currently proposed project and additional subsurface exploration data developed by Seidelman Associates (SA) after our initial review letter. Detailed information regarding the history of the project and our previous review comments are included in the 5 November 2008 letter. This third review has focused on a November 20, 2008 letter prepared by Seidelman Associates (SA) regarding "Response to CE&G Peer Review - 3933 Quail Ridge Road."

November 20, 2008 Letter from Seidelman Associates

The Seidelman Associates response letter addresses each of the seven comments included in our November 5, 2008 review letter. Our review of the letter revealed that all of the comments have been reasonably addressed and/or will be more completely addressed when a design level geotechnical report and site development plans are prepared, as indicated in several of the responses. At this point, it is our opinion that the geologic and geotechnical work completed for the site has demonstrated that the site is it geotechnically feasible to construct a single family residence at the site. After the design level geotechnical report and site development plan have been completed, we recommend that they be provided for our review and comment.

Limitations

This review has been performed by request of the City of Lafayette. Our role has been to provide technical advice to assist the City in its discretionary permit decisions, and we are afforded the same protection under state law. Our services have been limited to the review of the documents listed above and a visual review of the property. We have no control over the future construction on this property and make no representations regarding its future conditions.

Closing

We trust this provides you with the information you require. We appreciate the opportunity to be of service to you. If you have any questions, please feel free to give us a call. We have employed accepted geotechnical engineering procedures, and our professional opinions and conclusions are made in accordance with generally accepted geotechnical engineering principles and practices. This standard is in lieu of all warranties, either expressed or implied.

Yours truly,

CAL ENGINEERING & GEOLOGY, INC.

Phillip Gregory, P.E., G.E.
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
PHILLIP O. GREGORY
No. Geo GE 2193
No Civil C 40728
Exp. 3/31/09
CIVIL-GEOTECHNICAL
STATE OF CALIFORNIA

Matt Wolf

Mitchell D. Wolfe, R.G., C.E.G.
Principal Geologist

PROFESSIONAL GEOLOGIST
MITCHELL WOLFE
EG 1487
Exp. 7/31/09
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Appendix B-12

2012 GeoForensics Inc. Geotechnical Commentary

GEOFORENSICS INC. **Consulting Soil Engineering**

561-D Pilgrim Drive, Foster City, CA 94404 Phone: (650) 349-3369 Fax: (650) 571-1878

File: 212107
August 14, 2012

Mr. Cheng
15035 E. 14th Street
San Leandro, CA 94578

Subject: **Quail Ridge Property**
3933 Quail Ridge Road
Lafayette, California
GEOTECHNICAL COMMENTARY

Dear Mr. Cheng:

This letter has been prepared to document our thoughts on the potential building site at the subject property identified above. It is our understanding that a small piece of this property is being considered for development with a new single family residence.

Previous Work

As you are aware, our office was intimately involved in analysis and partial stabilization of the previous landslide which affected the vast majority of the subject lot and upslope street. During our work with the slide stabilization work, we were able to observe conditions of that landslide at depths up to 70 feet below original grades. It is our opinion that this has provided us with a rather unique understanding of the conditions present in the area of the original slide, and how those conditions may impact the proposed development of the remaining small portion of the subject lot.

Current Soils Report

You have provided our office with a copy of a soils report prepared by Seidelman Associates dated June 24, 2008. That report updated information contained in a previous soils repot by Alan Kropp & Associates (11/25/03). It had been determined by the City's geotechnical/geologic review consultant that supplemental information was required to evaluate the potential for an old slide plane to pass under this remaining unfailed section of the property. In order to answer issues posed by the Town's review consultant, Seidleman had a large diameter boring drilled into the property to a depth of 70 feet (logged to 67 feet). The boring was logged downhole by geologist James Joyce, and was also observed by the Town's geologic consultant.

We understand that it was the conclusion of both Joyce and the Town's consultant that discontinuities observed in the boring were "tectonic shears" created by old movements of the earth's crust, not old landslide planes.

COMMENTS

In our opinion, the geotechnical report leaves several unanswered/unresolved issues, including:

Mischaracterization - In our original report on the slide, we had postulated that there may be a deep slide plane which continued easterly under the unfailed portion of the remainder of the lot, possibly emerging in the adjacent creek channel. After the slide stabilization work had been completed, we stated in a letter to you (6/14/04) that we had concluded that "the probability of an existing slide extension to the east was unlikely". However, we did not conclude that the remaining portion of that lot was "suitable for construction of a new residence", as stated by Seidleman. While we cannot state that the lot is "unbuildable", it is our opinion that the safe development of the lot will require substantial measures to ensure long term stability.

Identified Discontinuities - The log of the boring is attached to the end of the Seidleman report. However, in the text of his report Seidleman provides absolutely no information about the discontinuities observed, including:

- Vertical offset and fracture observed at a depth of 18 to 25 feet below grade
- Steeply dipping shear at depth of 51 to 55 feet
- Steeply dipping shear at depth of 66 to 68 feet

The vertical offset and fracture is suggestive of movements which may be related to the previous slide (and/or its partial stabilization work from 2000). Although Seidleman has indicated that the Lettis report found cracks to a depth of 8 feet which were believed to be associated with the old slide movements, Seidleman has not addressed this much deeper fracture in the ground.

The shears identified above have not been addressed by Seidleman in his report. We have discussed the conditions with the logging geologist and with the Town's review consultant and understand that these discontinuities are believed to be due to tectonic movements of the earth's crust many thousands of years ago, and find no reason to doubt the conclusions of these geologists. However, their potential impact on the future stability of the site has not been addressed. It is possible/likely that the previous landslide that encompasses the subject lot was able to develop as deeply as it did by taking advantage of similar existing tectonic shears. We note that at least one of the shears is oriented in a downslope direction which will significantly increase the potential for it to also become involved in sliding. That potential slide would encompass the proposed building site.

In summary, we are very concerned that future slide movements may similarly take advantage of these weak clay seams, allowing a deep landslide to develop on those planes. Seidleman has proposed piers which are a maximum of 40 feet deep, which is well above the elevation of those potential future slide surfaces. As a minimum, deeper piers should be considered.

Continued Slide Movements – the stabilization of the landslide we designed was intended to support the street and upslope lots. The materials which exist downslope of the slide were always considered to be unstable slide debris capable of movement at any time in the future. Continued movements of the slide have occurred over the past decade, exposing portions of the stabilization work completed under our observations. Those movements continue to expose the lateral margins of the old landslide scarp as well. As these movements continue in the future, the scarp between the slide and proposed building area will continue to grow larger. In this area, the slide was approximately 70 feet deep. There is no discussion in the Seidleman report about potential loss of deep lateral support, or how to address such deep movements. Certainly the 40 foot deep piers would be incapable of resisting such movements.

Tie-Back Wall – The Seidleman report alludes to the deep temporary "pin-pile" wall used to support the headscarp of the slide as the upper portion of the slide was reconstructed as an engineered fill/wall. The suggestion in the report is that these improvements will provide some measure of support to the proposed building site. We note that the "pin-pile" wall was a temporary installation (tie-backs were not double corrosion protected as is required for permanent structures) and hence cannot be relied upon for long term support. Further, both the "pin-pile" wall and the stabilization fill/wall were constructed lateral to the proposed building pad, not downslope of the pad where these walls could be relied upon for any support of the proposed building pad. This again suggests that the issue of deep loss of lateral support must be better addressed by the design consultant.

Development Impact On Slide – You have asked us whether the development of the lot could cause instability of the remaining portions of the landslide. While the weight of the new house would be insignificant in its potential to cause movements of this massive landslide, we are concerned about water. Specifically, water used for irrigation will soak into the ground and penetrate into the slide mass. Similarly any leakage of a water supply (or return system such as sewer ejection system) could provide water to the remaining slide mass. As it only takes 1 inch of water to raise the ground water table 7 inches, the potential for destabilization of the landslide mass could be very high if there were to be leaks of any water supply or return system, or if irrigation is not stringently controlled.

Stabilization Options – You have also inquired as to whether the proposed building site can be safely developed. It is our opinion that ***if properly analyzed and designed***, this portion of the lot can be safely developed. We would suggest that as a minimum, piers having a minimum depth on the order of those used for the temporary stabilization of the headscarp could be used (would need proper corrosion protection), along with tie-backs to support the enormous loads on these piers. Alternatively, repairs similar to the one we used to support the upper portions of the slope could be incorporated into remaining portions of the slide to stabilize the slope above that repair. We would expect either of these options would provide a buildable site on the subject property. However, the current design recommendations contained in the Seidleman report are insufficient to provide a safe building site on this property, in our opinion.

Limitations

The findings and conclusions expressed in this letter have been prepared based upon our previous involvement with the large landslide and its partial stabilization in the late 1990's to early 2000's, and our review of the report issued by Seidleman Associates on June 24, 2008. We have performed our limited scope of current work in conformance with the standard of care for geotechnical projects within the greater San Francisco Bay Area. We make no other warranty either express or implied.

Should you have any questions regarding the information and opinions expressed in this letter, please contact the undersigned.

Respectfully Submitted;
GeoForensics, Inc.

Daniel F. Dyckman, PE, GE,
Senior Geotechnical Engineer, GE 2145

REGISTERED PROFESSIONAL ENGINEER
Daniel F. Dyckman
No. 002145
Geotechnical
STATE OF CALIFORNIA

Cc: 1 to addressee via email

Appendix B-13

2014 Peters & Ross Response to Geotechnical Questions

Peters & Ross

Geotechnical & Geoenvironmental

Consultants

December 8, 2014
Project No. 14200.001

Mr. Ravi Reddy
RSR Development Co.
3000F Danville Blvd., #268
Alamo, CA 94507

RE: 3933 Quail Ridge Road – Response to Geotechnical Questions Regarding Hillside Development Permit No. HDP08-12 Reddy

Dear Mr. Reddy:

At your request the undersigned reviewed the geotechnical questions developed by the City of Lafayette Planning Commission and a letter dated August 14, 2012, by GeoForensics, Inc. In addition we reviewed the following documents:

1. *Potential For Slide Stabilization and House Siting*, dated April 28, 2004, by Seidelman Associates, Inc.
2. *Geotechnical Investigation of Portion of Lot at 3933 Quail Ridge Road, Lafayette, California*, dated June 24, 2008, by Seidelman Associates, Inc.
3. *Foundation Location Limits – 3933 Quail Ridge, Lafayette*, dated July 17, 2008, by Seidelman Associates, Inc.
4. *Alternative Development Feasibility – 3933 Quail Ridge, Lafayette*, dated July 24, 2008, by Seidelman Associates, Inc.
5. *Second Geotechnical and Geologic Review, Proposed Development at 3933 Quail Ridge Road, Lafayette, California*, dated November 5, 2008, by Cal Engineering & Geology
6. *Response to CE&G Peer Review – 3933 Quail Ridge Road*, dated November 20, 2008, by Seidelman Associates
7. *Third Geotechnical and Geologic Review, Proposed Development at 3933 Quail Ridge Road, Lafayette, California*, dated December 17, 2008, by Cal Engineering & Geology

SUMMARY

The following are Peters & Ross responses to the questions posed by the Planing Commision. We have numbered our responses in accordance with the attached six bullet items.

1. The unrepaired portions of the 1997 landslide are still moving. Based on the response that Seidelman Associates provided in their letter dated November 20, 2008, it is Peters & Ross understanding that a soldier pile and tie back wall will be constructed along the top scarp, separating the triangular portion of the lot (proposed for development) and the active slide zone. Peters & Ross will prepare a detailed design report that will contain the design criteria for the soldier pile and tie back wall so that the house foundation can be located immediately behind the wall.
2. Seidelman addressed the question of repairing the portion of the slide located on the Reddy property in his letter dated July 24, 2008. He said that to repair the Reddy property would be on the order of 2.5 to 4.0 million 2008 dollars. These costs have increased making the repair economically unfeasible.
3. Mr. Seidelman passed away and Mr. Reddy has hired Peters & Ross to address these comments. GeoForensics in their August 14, 2012, letter states that both Joyce Associates and the Cal Engineering & Geology (the Town's consultant) concluded that the discontinuities observed in the large diameter boring, logged by Joyce Associates and included in the June 24, 2008, Seidelman report, were "tectonic shears" and not old (ancient) landslide planes. William Lettis & Associates in their report dated February 18, 2004, which is included in Appendix B of Seidelman's June 24, 2008 report, states that the proposed building envelope is located on an apparently in-place bedrock spur ridge that did not show evidence of past (ancient) landslide activity on the historic aerial photographs.
4. The short term risk of development were addressed in Seidelman's July 17, 2008, letter in which he states that the proposed structure will not add any loads to the landslide. For this project the soldier piles and tie backs will be installed with drilling equipment. It has been our experience with large landslide mitigation efforts that drilling equipment imparts low level vibrations into the landslide mass; thus the risk of impacting the slide mass is low. Details of how the soldier piles and tiebacks will be installed and how materials will be staged at the site so as to not load the landslide mass will be addressed in the design report. William Lettis & Associates in their February 18, 2004, report states that large-scale enlargement of the slide margin into the in-place, stable bedrock uphill from the bedrock tension zone is not believed to be likely. It is Peters & Ross opinion that the long term risk of slide enlargement will be higher without the implementation of the soldier pile and tieback wall.
5. Appropriate screening can be accommodated on the triangle as well as within the landslide mass. A landscape architect that is versed in biotechnical and soil bioengineering should be consulted as to what type of woody vegetation should be used.
6. Figure 2 of William Lettis & Associates report shows that the proposed soldier pile and tie back wall would be an extension of work done by Engineered Soils Repair in 1999. The proposed soldier pile and tieback wall poses no risk to previous repairs.

Rather the proposed wall will provide further stability to Quail Ridge Road and the surrounding homes.

Limitations

Peters & Ross services consist of professional opinions that are made in accordance with generally accepted geotechnical engineering principles and practices. The opinions presented in this report are based on a site reconnaissance and review of published and unpublished literature. This warranty is in lieu of all other warranties either expressed or implied.

If you have any questions concerning the results of our observations, please call us.

Very truly yours,

Peter K. Mundy, P.E., G.E.
Geotechnical Engineer 2217

REGISTERED PROFESSIONAL ENGINEER
PETER K. MUNDY
No. 2217
Expires 3/15
GEOTECHNICAL
STATE OF CALIFORNIA

- City Engineer / Geotechnical Engineers
  - Is the *1997 landslide* still moving? Neighbors who were impacted by the slide indicate that there continues to be movement which has affected their fencing, pavement, foundation, etc. If the slide is still moving, how does that impact the Planning Commission's determination on siting?
  - Is it possible to repair the *1997 slide* on the Reddy property in order to build a house outside of the triangle? If technically feasible, what would be involved, what would the process be, and what would the estimated cost be?

This was answered by Seidelman in 2004
let me know if you don't have the memo

  - Seidelman has indicated that the *ancient slide* affecting the triangular building site is not a problem; however for other projects in Lafayette, he has argued that ancient slides are ominous. Clarify the analysis of the ancient slide, what information is he is relying on and how he is interpreting it, and why it is not a problem.
  - What is the short term and long term risk associated with developing the triangle in terms of reactivating the slide, exacerbating downslope creep, vibration and other potential impacts from
  - Can the site support new trees that could screen development on the triangle or in the vicinity of the prior residence?
  - What is the relationship between the prior repairs and the proposed development? Would construction on the triangle pose a risk to the partial slide repair? (e.g. drilling piers for the new house, which could damage the tie-backs from the slide repair)

Appendix B-14

2019 Ryan Geological Consulting, Inc. Engineering Geologic Review

RYAN GEO*LOGICAL* CONSULTING, INC.
PROVIDING LOGICAL GEOLOGICAL SOLUTIONS
16 Southwood Drive
Orinda, CA 94563
510-520-5592

ENGINEERING GEOLOGIC REVIEW
PROPOSED RESIDENTIAL CONSTRUCTION
3933 QUAIL RIDGE ROAD
APN 248-130-012
LAFAYETTE, CALIFORNIA

JULY 30, 2019
JOB NO. 1436.100

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RYAN GEO*LOGICAL* CONSULTING, INC.
PROVIDING LOGICAL GEOLOGICAL SOLUTIONS
16 Southwood Drive
Orinda, CA 94563
510-520-5592

July 30, 2019
Job No. 1436.100

Rincon Consultants, Inc.
449 15th Street, #303
Oakland, California 94612

Attn: Mrs. Darcy Kremin

Subject: Engineering geologic review
Proposed residential development
3933 Quail Ridge Road
APN 248-130-012
Lafayette, CA

Dear Mrs. Kremin:

1.0 INTRODUCTION

This report presents the results of our engineering geologic review of the existing conditions that impact the proposed residential development of the northeast corner of the property located at 3933 Quail Ridge Road in Lafayette, California. The site is located on the southeast side of the road about 500 feet from the cul-de-sac at the end of Quail Ridge Road. The approximate site location is shown on the attached Vicinity Map, Figure 1.

The site is the location of a massive neighborhood-scale[1] landslide that occurred across portions of 8 residential properties in 1997. The landslide is locally referred to as the Quail Ridge Landslide; its approximate limits are shown on the Site Plan, Figure 2. The Quail Ridge Landslide measured about 450 feet wide by about 700 feet long with an estimated depth of up to 65 feet. The landslide scarp extended upslope of the roadway to the base of the house at 3954 Quail Ridge Road. At the 3954 location, the scarp was about 20 feet high and increased in height to the east. The landslide caused a large section of Quail Ridge Road to fail. The home at the 3933 Quail Ridge Road was severely damaged and had to be demolished and removed from the site.

The damaged home at 3954 Quail Ridge Road was stabilized and the roadway reconstructed by Engineered Soil Repairs (ESR) in between 1999 and 2001. The repair included installing piers up to 55-feet-deep with 45- to 70-foot-long tie backs along the scarp to protect the upslope homes, excavating the landslide debris under the road, and reconstructing the roadway with geogrid-reinforced engineered fill. Based on discussions with the design engineers for the road stabilization, we understand that the keyway

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[1] A neighborhood-scale landslide is a massive landslide that covers several residential properties and cannot be stabilized from within any one property by alone.

excavations on the order of roughly 55 to 60 feet below the original road elevation were needed to remove the landslide debris from the keyway. Additionally, we understand that the landslide was found to be up to about 65 feet deep in the northeast corner of the keyway.

The landslide reactivated below the roadway in the winter of 2005/2006, largely due to a leak in the pump system in the wet pit for the Quail Ridge Road repair. We understand that the pump system was repaired. To date, the active landslide below Quail Ridge Road has not been stabilized and poses a significant hazard to site development.

This project is intended to summarize the existing subsurface conditions and geologic hazards and their impact on site development as a supplement to your preparation of the project Environmental Impact Report (EIR). This report is not intended to provide analysis to be used for the design and construction of any site improvements.

2.0 PURPOSE AND SCOPE OF SERVICES

The purpose of this project was to review the existing geologic/geotechnical information with respect to the proposed improvements and to summarize the geologic hazards and geotechnical constraints that impact safe development of the lot. We provided the following scope of services for the project:

1. Reviewed regional maps of geologic and landslide conditions in the site vicinity.
2. Review stereo-paired aerial photographs of the site vicinity.
3. Reviewed geotechnical reports regarding the landslide conditions, plans for Quail Ridge Road and geotechnical reports for the proposed construction.
4. Conducted a geologic reconnaissance of the site and vicinity
5. Consulted on our findings.
6. Prepared this report.

3.0 PROPOSED RESIDENTIAL CONSTRUCTION

We received a 13-sheet plan set titled "*Reddy Residence, 3933 Quail Ridge Road, Lafayette, California*" that was prepared by Marquand Design dated May 2012. These plans are stamped received by the City of Lafayette on May 14, 2012 are the basis for this evaluation. The plans show an approximately 2000 sq. ft. building envelope in the extreme northeast corner of the property as shown on Figure 2. Three building concepts are provided, each of which shows two-story residential construction with building elements cantilevered over the limits of the active landslide. The uphill portions of the building would be cut into the hill with one story below-grade and a second story approximately at road grade.

There are no geologic, geotechnical or landslide setbacks depicted on the plans. The plans depict the conceptual construction of a below-grade pier wall along the eastern margin of the landslide to isolate the building site from the active landslide mass. The proposed construction is within the 250-foot Class II ridge setback as shown on the Lafayette Area Ridge Map (LARM) and Hillside Overlay District Map (HODM).

4.0 FINDINGS

4.1 SITE DESCRIPTION

The approximately 1-acre site is located at 3933 Quail Ridge Road in Lafayette, California at the approximate location shown on Figure 1. Roughly 90% of the site is underlain by the active Quail Ridge Landslide. The site is currently vacant as the former residence has been demolished and removed due to the severe landslide damage in 1997.

The portion of the site proposed for development includes a small roughly 2,000 sq. ft. triangular-shaped piece of land on a small spur ridge in the extreme northeast corner of the lot. The spur ridge is reportedly outside the active landslide limits. The top of the spur ridge is relatively flat near the elevation of Quail Ridge Road. The west side of the spur ridge slopes down towards the Quail Ridge Landslide at a gradient of about a 1½ horizontal to 1 vertical (1½H:1V).

Below Quail Ridge Road, the front of the buttress fill constructed by ESR is exposed. We observed plastic sheeting along the lower 3 to 6 feet of a vertical face of the buttress fill. The plastic sheeting was buried at the time of construction.

4.2 REGIONAL GEOLOGIC CONDITIONS

4.2.1 Geologic Conditions

The site is located in the Coast Ranges Geomorphic Province[2] of California. The Coast Ranges are characterized by a series of northwest-trending, folded and faulted mountain chains and intervening valleys that generally subparallel the San Andreas fault. Folding and faulting has deformed the area over the past few million years due to right-lateral strike-slip relative motions between the Pacific and North American tectonic plates. The majority of active deformation in the San Francisco Bay Area is believed to have occurred over the past few million years. As a result, the area is highly folded into anticlines and synclines, “A-shaped” and “U-shaped” folds, respectively.

Regional geologic maps (listed in the references) show the site to be situated on a folded block of Orinda formation bedrock, positioned between the Happy Valley Syncline to the northeast and the Miner Ranch Anticline to the southwest. The Orinda formation is a series of seafloor sedimentary rocks that were deposited during the Pliocene Epoch of geologic time, roughly 2.5 to 5.3 million years before present. The Orinda formation consists of interbedded layers of claystone, siltstone, and fine-grained sandstone with occasional lenses of pebble conglomerate. Even the coarse-grained portion of the Orinda formation has a clay-matrix and the majority of these rocks are bound by clay cement that weathers rapidly near the ground surface.

The bedrock structures shown on the regional geologic maps indicates the site is on the northeast dipping limb of the folds, near the axis of the Happy Valley Syncline. Bedrock structure on this fold limb is shown

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[2] California is divided into 11 geomorphic provinces that are naturally defined geologic regions that display a distinct landscape or landform. Each province displays unique, defining features based on geology, faults, topographic relief and climate.

dipping northeast at gradients ranging from about 30 to 56 degrees. A portion of the Dibblee and Minch (2006) geologic map is provided on Figure 4 for reference.

4.2.2 Earthquake Faults and Seismicity

The site is located in the tectonically active San Francisco Bay Area which is considered to have a relatively high seismicity due to the proximity of several active faults. The site is not located within a State of California designated Earthquake Zones of Required Investigation for active faults. The State of California considers a fault active if it has demonstrated movement within the Holocene Epoch of geologic time, within the past roughly 11,700 years. Only Holocene-active faults that are sufficiently active and well-defined near the ground surface are zoned in accordance with the A-P Act.

Table 1 below lists known active faults that are believed to present the highest potential levels of ground shaking at the site, their distances from the site, estimated slip rate, and potential maximum moment-magnitude event. Faults listed below are those shown in the 2008 Fault Source Map contained in the 2014 Fault Parameters by the U.S. Geological Survey's Earthquake Hazards Program and are arranged in order of their increasing distance from the site.

TABLE 1. Potential Active Earthquake Fault Sources

FAULT SOURCE[3]	APPROXIMATE DISTANCE TO FAULT TRACE (Miles)[4]	COMPASS DIRECTION TO FAULT	SLIP RATE (Millimeters per year)[5]	MAXIMUM E.Q. MAG. (Mm)[6]
Mt. Diablo Thrust[7]	5¾	SE	2 ± 1	6.6
Hayward fault - Northern	6	SW	9 ± 2	7.1
Calaveras fault - Northern	6½	SE	6 ± 2	6.8
Concord fault – Ygnacio Valley Section	7½	NE	4 ± 2	6.2
Greenville fault – Clayton Section	11½	NE	2 ± 1	6.5
Green Valley fault	12½	NNE	5 ± 3	6.2
West Napa fault - Napa Airport	18	N	1 ± 1	6.5
Greenville fault – Marsh Creek-Greenville Section	19	SE	2 ± 1	6.5
Rodgers Creek fault	23	NW	9 ± 2	7.0
San Andreas fault – 1906 Rupture	24½	SW	24 ± 3	7.9
San Gregorio	26	SW	7 ± 3	7.2
Monte Vista Shannon fault	35	SW	0.4 ± 0.3	6.7

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[3] Fault sources included in the 2014 Fault Parameters provided by the U.S. Geological Survey's Uniform Earthquake Rupture forecast version 3.0.

[4] Fault locations and distances to the site were determined from the KML files provided from the Quaternary Fault and fold Database and were measure from the center of the proposed development site.

[5] Slip rates obtained from Cao *et a*l. (2003).

[6] Maximum Earthquake Magnitude (Mm) Cao *et al*. (2003).

[7] The Mount Diablo Thrust fault is a blind fault that is not zoned in accordance with the A-P Act due to insufficient evidence of activity and surface expression. While it is mapped a Quaternary fault, it is considered a potential seismic source and is therefore also included in Table 1 above.

Potentially active faults are faults with Quaternary displacement (within the past 1.6 million years) but do not show evidence for Holocene activity; these faults are considered Pre-Holocene faults (Special Publication 42, 2018 update) and do not meet the criteria for zoning under the A-P Act. Some faults in this category may be active with a smaller role in the tectonic setting or with a larger recurrence interval than would be detected under the A-P Act or simply have not been adequately characterized to date.

Quaternary faults near the site include the two splays of the South Hampton fault located ½ and 2¼ miles to the east (the eastern splay is also known as the Lafayette fault), the Franklin fault located about 4 miles to the east, the Moraga fault located about 2¾ miles to the west and the Pinole fault is located about 7¾ miles to the northwest. Only Holocene-active faults that are sufficiently well defined or sufficiently active near the ground surface are zoned in accordance with the A-P Act.

4.2.3 Published Landslide Maps

The site is in an area of known landslides and relatively high landslide hazards. Regional photo-interpretive landslide maps prepared by the U.S. Geological Survey (Nilsen, 1975) show several landslide features on slopes and swales in the site vicinity. While the U.S. Geological Survey mapping is broad due to scale, Nilsen shows a landslide feature that appears to correlate with the upper portion of the 1997 Quail Ridge Landslide. While the landslide patterns are different, the map shows a landslide in the same topographic swale as the 1997 Quail Ridge Landslide. Nilsen shows another landslide feature in the swale on the northeast side of the spur ridge proposed for development. A portion of the Nilsen (1975) landslide map is provided on Figure 4 for reference.

Similar landslide mapping was performed by the California Division of Mines and Geology[8] (Hayden, 1995). The Hayden map show similar landslide conditions as Nilsen, including the landslide feature at the site and second on the opposite side of the spur ridge. A portion of the Hayden (1995) landslide map is provided on Figure 5 for reference.

The California Geological Survey (CGS) manages a database named the California Landslide Inventory. The California landslide Inventory includes mapped landslides identified through their landslide hazards identification and mapping programs. The project site is located just west of the map coverage by Hayden (1995) and reflects the same mapping as shown on Figure 6.

The Hayden (1995) study included maps of geology, landslides and relative landslide susceptibility. The relative landslide susceptibility map shows the site to be in SUBAREA 4.2, the most susceptible areas. A portion of Hayden's (1995) Relative Landslide Susceptibility Map is provided on Figure 7 for reference.

It should be noted that the Nilsen and Hayden landslide maps used a topographic base that has a dirt road plotted along the ridge crest which is not Quail Ridge road. Quail Ridge Road is correctly plotted on the topographic base map on Figure 1 and on Figure 6. The site location is plotted based on GPS coordinates

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[8] The California Division of Mines and Geology (CDMG) renamed in 2006 to the California Geological Survey (CGS).

on those Figures. Refer to the California Landslide Inventory Map on Figure 6 for correct registration of Quail Ridge Road, the mapped landslides and the project site.

4.3 AERIAL PHOTOGRAPH INTERPRETATION

We reviewed 8 sets of stereo-paired aerial photographs covering the site vicinity that were taken between the years 1954 and 2000. Aerial photographs were obtained from the archive library at Pacific Aerial Surveys in Novato, California. Additional imagery was viewed on line at the Historic Aerials website[9] and the UC Santa Barbara on-line aerial photograph library[10]. An engineering geologist viewed the aerial photographs with an Old Delft ODSII scanning stereoscope. Emphasis was placed on evaluating the geomorphology and landslide conditions at the site.

The oldest available photographs from 1954 show the site in the natural undeveloped conditions. The site is located on the side of a bowl-shaped hillside below a sharp crested ridgeline. A faint line that appears to be a dirt road is present below the ridge. Within the larger bowl-shaped topography, there are 3 smaller convergent swales. The site is located in the central swale. The central swale and western swale are separated by a subtle rounded spur ridge. The central and eastern swales are separated by a sharp narrow spur. Slight changes in vegetation colors in the axis of the swales are suggesting of the landslides mapped by Nilsen and Hayden as discussed above. The swales are separated by small spur ridges. Below the 3933 Quail Ridge Road property, there are light colored tones along the axis of the western swale that suggest a thin mudflow deposit.

By 1969, a new road is present along the crest of the main ridgeline. The central swale appears to be disturbed. A thin apparent landslide deposit extends from the ridgeline down to the bottom of the swale. The apparent landslide deposit is in a similar location as the Quail Ridge Landslide but appears to be a smaller narrower deposit.

By 1986 the neighborhood was developed and homes were present at the lots along this portion of Quail Ridge Road. The alignment of Quail Ridge Road is below the ridge near the dirt road noted in 1954. Homes upslope of Quail Ridge Road have the rear yards at the ridgeline and the dirt road noted in 1976 is gone. The project site at 3933 Quail Ridge Road was constructed in the central swale against the narrow spur ridge on the east side. The house footprint is within the alignment of the suspected landslide noted in the 1969 photographs.

There were no changes in site conditions noted on the photographs until after the Quail Ridge Landslide failed. In the 2000 photographs the landslide is obvious. A tall scarp is visible up to the base of the home at 3954 Quail Ridge Road (upslope of the roadway). The scarp arcs across Quail Ridge Road and along the west side of the spur ridge that separates the central and western swales. The home at 3933 Quail Ridge Road is gone. There appears to be some erosion control on the upper portion of the slope near the Quail Ridge Road failure.

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[9] Historic Aerials obtained via the web at www.historicaerials.com
[10] The UC Santa Barbara library via the web at https://www.library.ucsb.edu/src/airphotos

4.4 PREVIOUS SITE INVESTIGATIONS

4.4.1 Quail Ridge Landslide Investigation

We were not able to locate original geotechnical reports or plans for the development. The first investigation of the Quail Ridge Landslide was performed by Alan Kropp & Associates (AKA) and William Lettis Associates (WLA) in 1997 which we found located within the GeoForensics Inc (GF) 1998 Report. AKA was the lead consultant responsible for geotechnical engineering and they retained WLA to characterize the landslide and subsurface geology. The AKA/WLA study included the drilling and logging of 6 exploratory borings ranging from about 50 and 65 feet and the excavation and logging of 2 exploratory test pits around the scarp area. Slope inclinometers were installed in 4 of the borings and piezometers in 2 of the borings. The investigation revealed an active landslide that ranged from 32 to 65 feet deep, interpreting the inclinometer for AKA-4 is moving at the bottom of the casing installation as suggested by the plot and discussed in the GF report. The approximate location of the AKA/WLA investigation borings are shown on Figure 2.

In 1998 GF prepared a geotechnical report for the purpose of stabilizing the head scarp and roadway. The report utilized the subsurface data obtained in the AKA/WLA study and provided stability analysis and laboratory data to support the recommended repair. The proposed repair was focused on the top of the landslide to protect the upslope lots and restore Quail Ridge Road. To qualify the results of the repair, GF was clear that the landslide is active and repairing the road will not stop the active landslide movement below the road. The report states:

> *…the upslope repair is not intended to be a stabilizing force on the downslope sections of the unrepaired slide. THE DOWNSLOPE SECTIONS OF REMAINING SLIDE DEBRIS SHOULD NOT BE CONSIDERED STABLE."*[11]
>
> *"THIS REPAIR IS NOT INTENDED TO STABILIZE THE SLIDE MASS DOWNSLOPE OF THE GRID-REINFORCED BUTRESS."*[12]

The repair area was designed to stabilize the roadway only and did not have any significant stabilizing effect on the downslope portions of the landslide. The repair was not designed to comply with FHWA standards, which was disclosed and agreed to between the design engineers, Quail Ridge homeowners and City of Lafayette's Engineering Division. Based on the information obtained during the scarp and roadway repairs, we understand that the east side of the keyway[13] excavations, the portion adjacent to the proposed development discussed herein, was the deepest portion of the landslide and extended roughly 65 to 70 feet deep. The approximate limits of the repaired portion of the landslide are shown on Figure 2.

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[11] GeoForensics, Inc, September 7, 1998. Page 2.

[12] GeoForensics, Inc, September 7, 1998. Page 11.

[13] A "keyway" is an excavation intended to penetrate into competent materials, typically bedrock, beneath any zone of unstable earth to support the engendered fill placed in the excavation.

4.4.2 Geotechnical Investigations for Proposed Development Site

Geotechnical investigations for the proposed development of the extreme northeast corner of the lot were performed by the team of AKA and WLA as summarized in their 2003 and 2004 reports. The investigation was focused on identifying the edge of the landslide so that a single-story residential building could be constructed outside of the landslide limits.

The geologic investigation by WLA included a single boring to a depth of about 45 feet and an exploratory trench across the eastern lateral margin of the landslide. The approximate locations of these investigation points are shown on Figure 2. WLA defined the edge of the landslide and recommended a 20-foot setback from a zone of bedrock tension that was interpreted to be under incipient landside conditions. The edge of the landslide was encountered in the trench dipping to the west (into the landslide mass) between 54 and 70 degrees. The risks of landslide movement were geologic report by WLA was clear that:

> *"Any structures that cross, or encroach against, the slide margin are subject to large scale deformations (vertical and lateral) movements on the order of several feet or more."*[14]

The 2003/2004 AKA reports recommended construction of a below-grade pier wall to mitigate regressive landslide failure to the east and that the house foundation piers are at least 5 feet away from and not connected to the pier wall. These recommendations were also designed to accommodate the bedrock tension zone defined by the WLA study. However, the report stated that:

> *"Since the previous landslide has not been removed or repaired and only remedial work has been performed to restore Quail Ridge Road, the project owners need to understand and accept the risk that a future landslide may still occur within the lot and may impact the stability of the extreme northeast corner of the lot even though it is situated outside of the mapped landslide margin."*[15]

There was debate if the small triangular-shaped piece of ground in the extreme northeast corner of the site was underlain by a potentially unstable older landslide. It was theorized that the spur ridge along the east side of the Quail Ridge Landslide was part of an ancient landslide that encompassed the larger bowl-shaped geomorphic feature at the top of the drainage ravine (GF, 2004; CEG, 2004). Property ownership changed and in 2008, Seidelman Associates became the geotechnical engineer for the new residence. Seidelman retained Joyce Associates to provide geologic characterization to further investigate the potential for instability under the proposed building site and if the subject spur ridge was part of an older ancient landslide. The investigation included a large diameter boring that was logged down-hole to a depth of about 70 feet. The interpretations made inside the large diameter boring indicated that geologic structures dipped to the northeast (into the hill) and therefore the spur ridge was not part of an older ancient landslide feature. The report further concluded that the edge of the Quail Ridge Landslide is as previously mapped. The approximate location of the down-hole boring is shown on Figure 2.

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[14] William Lettis Associates, February 14, 2004; Page 6.
[15] Alan Kropp & Associates February 25, 2004; Page 3.

4.5 GEOLOGIC HAZARD CONSIDERATIONS

4.5.1 Earthquake-Induced Landslide Potential

The primary geologic hazard at the site is the potential for earthquake-induced landslide movement. The site is not within a State of California designated Earthquake Zones of Required Investigation for earthquake-induced landslide potential, largely because the State has not allocated budget to map this part of mapped Contra Costa County to date. However, all studies in the hillsides within the SF Bay Area should be performed similar to the guidelines set forth in CGS Special Publication 117A, Guidelines for evaluating and mitigating seismic hazards in California.

The stability of all slopes is lower during a seismic event than at any other time. Slopes underlain by existing landslides are most prone to reactivation and failure in response to earthquake vibrations. The building site is along the eastern edge of the neighborhood-scale Quail Ridge Landslide. The unrepaired landslide below the road has been historically active without a significant seismic event. It should be expected that a moderate earthquake should be expected to reactivate landslide creep. A major earthquake should be expected to initiate several feet of sudden mass movement of the landslide similar to the 1997 failure.

The risks of earthquake-induced landslide potential at the site are extremely high. In the current conditions, earthquake-induced landslide movement should be expected to impact the unrepaired landslide below the road and the bedrock tension zone identified along the eastern landslide margin. Regressive landslide failure into the spur ridge should also be expected. Significant engineering efforts will be needed to reduce these risks from the proposed development site. Updated geotechnical studies and design-level parameters are needed to design a structure that could reduce the impacts of earthquake-induced from impacting the site.

4.5.2 Strong Ground Shaking

Given the relatively high seismicity in the region, the site is expected to experience at least one moderate to large magnitude earthquake in the future. The 2013 Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3) estimates there is 100% likelihood that the San Francisco Bay Area will experience a moderate to large earthquake in the next 30 years as summarized in Table 2 below.

TABLE 2. Likelihood and Recurrence of Selected Earthquakes in the San Francisco Bay Region

Richter Magnitude (greater than or equal to)	Average recurrence interval (years)	30-year likelihood of one or more events (%)
5	1.3	100
6	8.9	98
6.7	29	72
7	48	51
7.5	124	20
8	824	4

Given the high likelihood of a moderate to strong earthquake occurring in the vicinity, ground shaking can vary depending on the site geology, proximity to the earthquake epicenter, and quality of construction. Table 3 below presents the Modified Mercalli Intensity Scale that measures earthquakes based on their effects at any given location correlated to the Righter Magnitude which measures earthquake energy.

TABLE 3. Modified Mercalli Intensity Scale

Intensity Value	Intensity Description	Richter Magnitude
I	Not felt except by a very few persons under especially favorable circumstances.	2
II	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	2
III	Felt noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly, vibration similar to a passing truck. Duration estimated.	3
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	4
V	Felt by nearly everyone, many awakened. Some dishes and windows broken; a few instances of cracked plaster; unstable object overturned. Disturbances of trees, poles may be noticed. Pendulum clocks may stop.	4
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; and fallen plaster or damaged chimneys. Damage slight.	5
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.	5 to 6
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly build structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.	6
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.	7
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.	7
XI	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	8+
XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown in to the air.	8+

Strong ground shaking from a major earthquake is a hazard that cannot be eliminated, but the effects can be reduced through sound construction practices and observance of current seismic design codes.

4.5.3 Surface Fault Rupture

The site is not located within a State of California designated Earthquake Fault Zone for active faults. The State considers a fault active if it has demonstrated activity within Holocene time, roughly the past 11,700 years. The closest State of California designated Earthquake Fault Zone is for the Hayward fault about 6 miles to the southwest. We did not encounter evidence of an active or potentially active fault crossing or trending towards the site. The risk of surface fault rupture at the site is considered low.

4.5.4 Lurching and Lateral Spreading

Lurching is a phenomenon in which loose to poorly consolidated deposits move laterally as a response to strong ground shaking during an earthquake. Lurching is typically associated with soil deposits on or adjacent to steep slopes. The site is underlain by a bedrock tension zone along the edge of the Quail Ridge Landslide. The bedrock tension zone is an area of expected lurching and potential lateral spreading during a major earthquake.

4.5.5 Liquefaction Potential

Liquefaction is the temporary transformation of saturated cohesionless soils into a viscous liquid during strong ground shaking from a seismic event. The site is underlain by clay-rich cohesive materials overlying bedrock that are not susceptible to liquefaction. The potential for liquefaction and associated hazards is very low.

5.0 DISCUSSION

The proposed development in the extreme northeast corner of the property at 3933 Quail Ridge Road is along the edge of the active neighborhood-scale Quail Ridge Landslide. The landslide is active and creeping at very slow rates. Given the likelihood of major earthquakes and uncertainty with respect to weather patterns, sudden movement on the order of several feet should be expected. Regressive landslide failure into the spur ridge is expected to impact the proposed building site. Therefore we conclude that site is not suitable for development in the current conditions. Significant engineering efforts will be needed to safely construct a residence at the site. Additionally, significant engineering efforts will be needed to ensure the proposed development does not trigger landslide movement that will impact adjacent lots.

It should be noted that construction of a new residence cantilevering over an active deep landslide is not common practice in the area and this may be the riskiest method of developing the lot. In our opinion, these risks also have a significant potential for adverse impacts of reactivating the landslide which would impact the surrounding areas.

Our main concerns regarding the geologic hazards and the impacts of the current development to the site and adjacent properties are summarized below:

- The proposed development is adjacent to the eastern edge of an active neighborhood-scale landslide, the Quail Ridge Landslide. Development standards typically include setbacks or landslide mitigation to protect the residence from additional landslide movement and/or regressive landslide failure. There are no setbacks and mechanical stabilization (a buried pier wall) is proposed right at the edge of the landslide.

- While geologic and geotechnical data does define the edge of the landslide near the ground surface, the steepness of the slide plane and depth to the base of the landslide in front of the buried pier wall are unknown at depth. The nearest boring within the landslide is B-4 where inclinometer data suggests possible movement at or just below 65 feet. The next closest boring is in the center of the landslide mass. There are no data along the eastern edge to define the base of the landslide in front of the proposed buried pier wall.
- The landslide stability is not being improved by the project and improper drainage, leaks or other malfunctioning water bearing systems could potentially leak into the base of the landslide could lower stability.
- The proposed construction includes deep excavations into the hill that will be supported with retaining walls. Drainage from behind the retaining walls would be at too low an elevation to gravity drain to the street and has a potential to locally saturate the landslide. Pumps and redundancy may be needed.
- As previously discussed, the site is expected to experience a moderate to major earthquake within the lifespan of any project in the area. Shaking under normal conditions is expected to be high. The cantilevered construction is expected to increase the earthquake shaking intensity on the building.
- The cantilevered construction is expected to limit landslide repairs if/when mass movement occurs and stabilization or erosion control efforts are needed.

7.0 LIMITATIONS

The results of this project are based upon the information provided to us regarding site improvements, the findings of our field and laboratory programs, and professional judgment. This project has been conducted in accordance with currently accepted engineering geologic and geotechnical engineering standards only; no other warranty is expressed or implied. This study was a review of existing information only and was not aided with the benefit of subsurface investigation.

Respectfully submitted,
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REFERENCES AND REVIEWED DOCUMENTS

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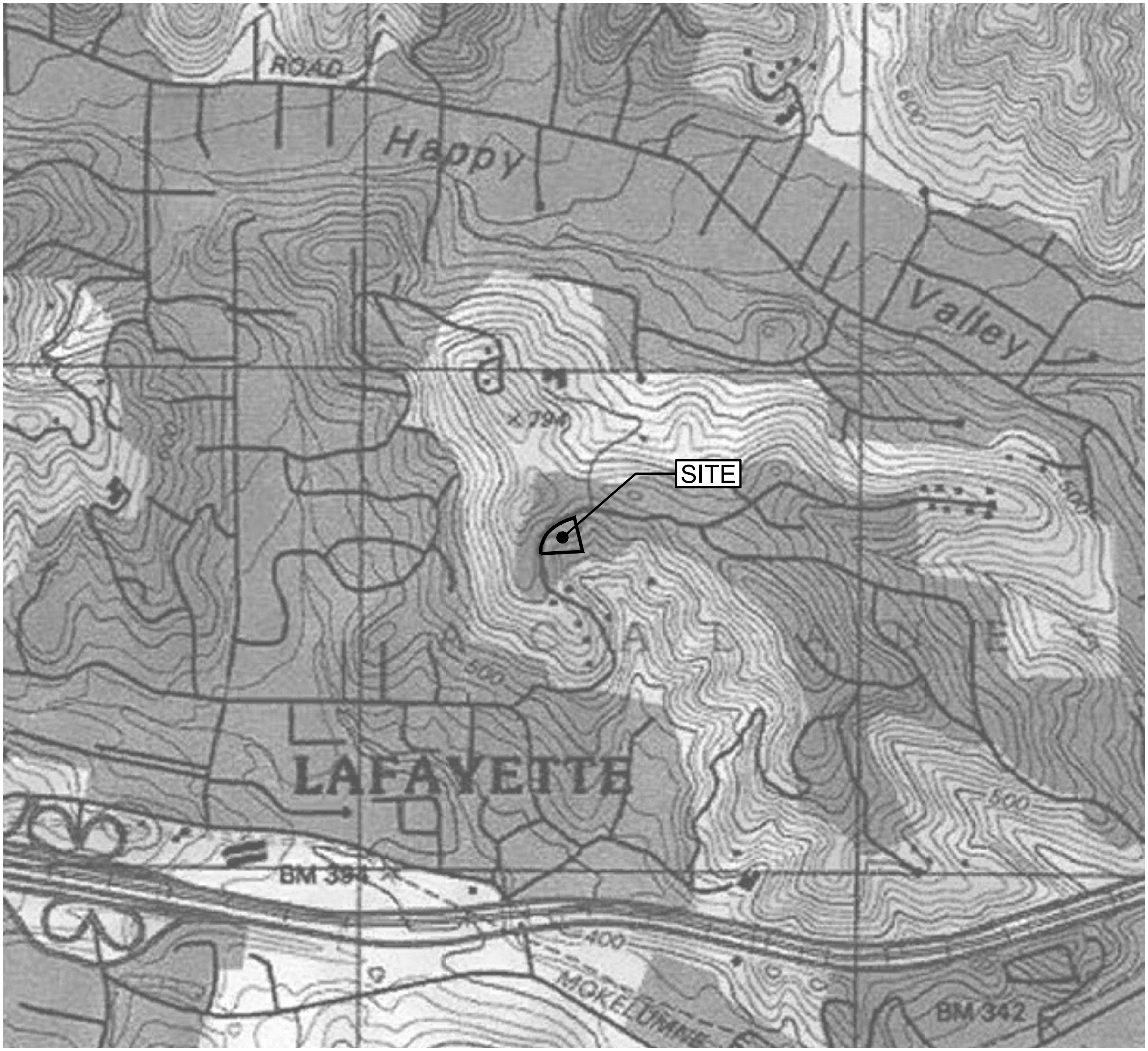
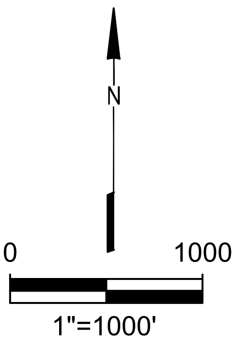
Date Flown	Flight #	Line	Frames
5-19-2000	6597	13	2,3
10-08-1996	5200	115	14,15
11-30-1994	4625	115	14,15,16
6-12-1990	3845	13	16,17
4-20-1986	2861	10	16,17
5-27-1976	1251	10	15,16
5-28-1969	905	12	14,15,16
2-23-1954	127	02	2,3





BASE: PORTIONS OF U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLE, BRIONES VALLEY, CALIFORNIA AT A SCALE OF 1:24,000.

VICINITY MAP

Engineering Geologic Review
3933 Quail Ridge Road
Lafayette, CA

Date: 7-30-19	Project No. 1436.000	Figure 1

RYAN GEO*LOGICAL* CONSULTING, INC.
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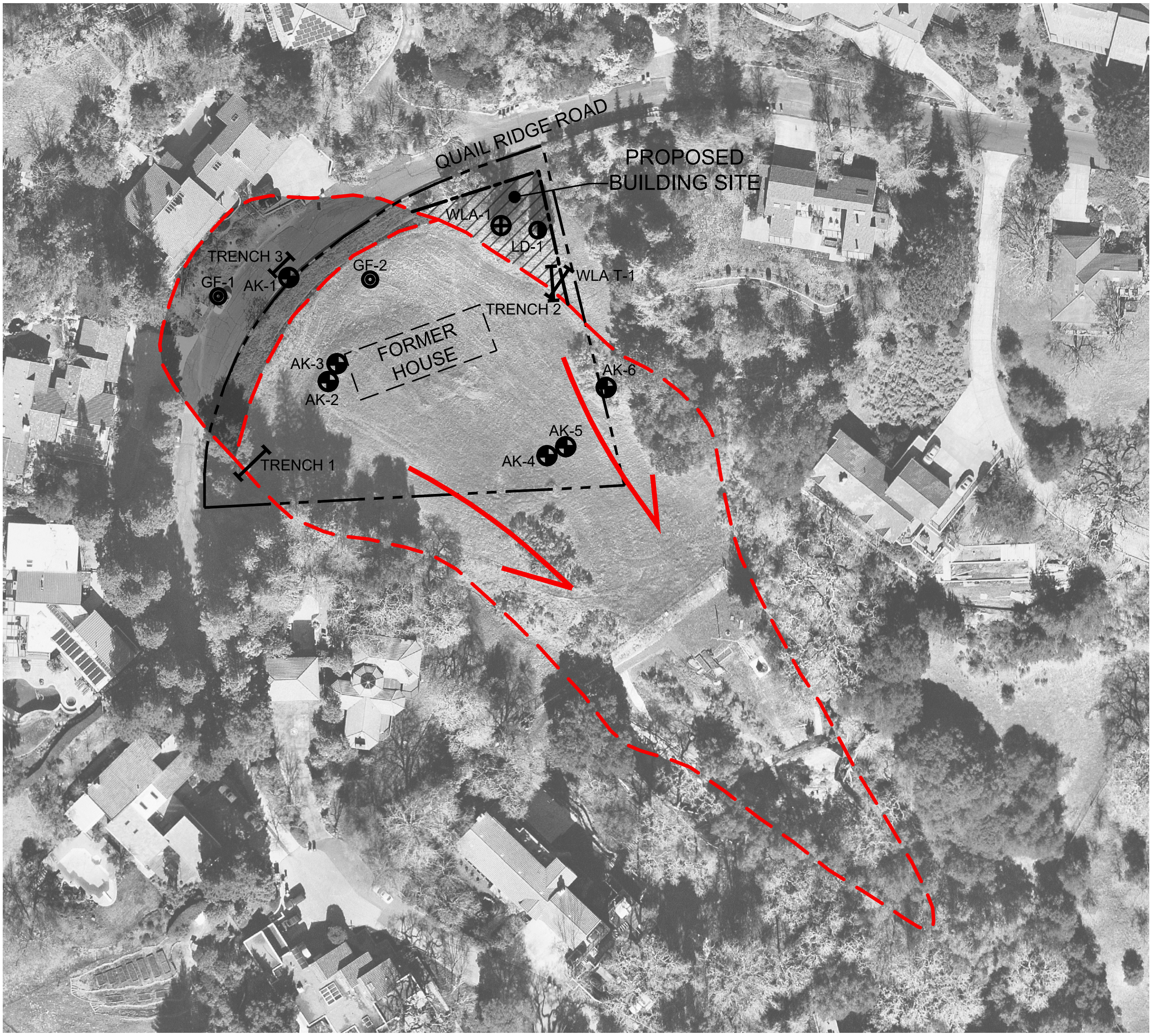
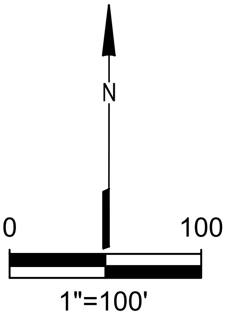


EXPLANATION

— - - —	PROPERTY BOUNDARY
	APPROXIMATE LIMITS OF QUAIL RIDGE LANDSLIDE ARROWS SHOW RELATIVE DIRECTION OF MOVEMENT
▨	2001 SLIDE REPAIR
AK-6 ●	BORING LOCATIONS AK
GF-2 ◎	BORING LOCATIONS (GEOFORENSICS INC.)
LD-1 ◐	BORING LOCATIONS (SEIDELMAN ASSOCIATES 2008)
WLA-1 ⊕	BORING LOCATIONS (WLA, 2003)
TRENCH 3 ⊢⊣	TRENCH LOCATION
WLA T-1 ⊢⊣	TRENCH LOCATIONS (WLA, 2003)



BASE: AERIAL IMAGE DATED: 2-1-16

SITE PLAN

Engineering Geologic Review
3933 Quail Ridge Road
Lafayette, CA

Date: 7-30-19 | Project No. 1436.000 | Figure 2

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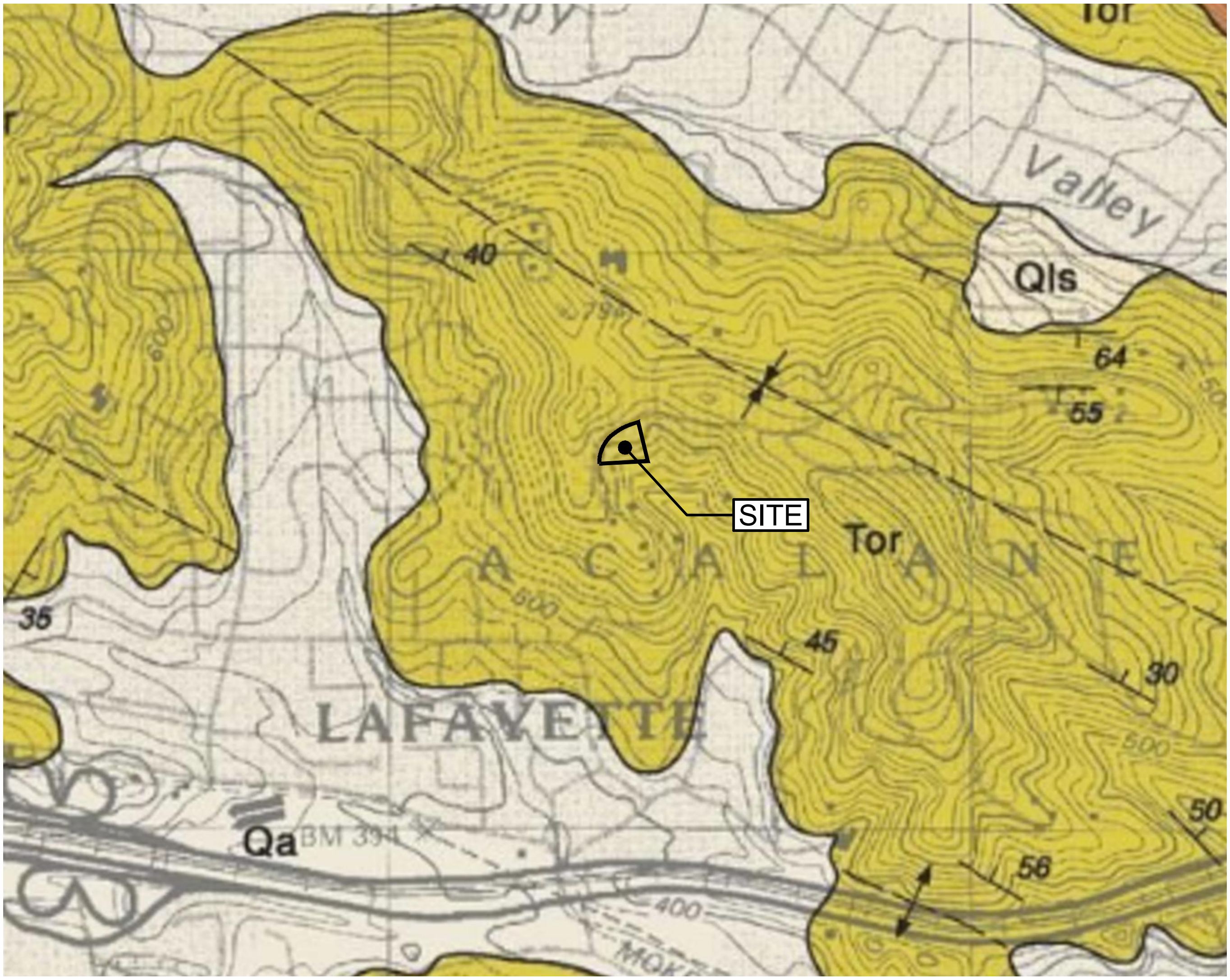
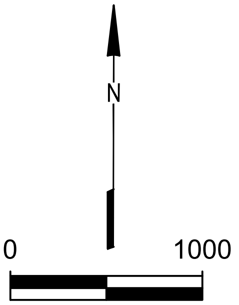


EXPLANATION

———	CONTACT - DEPOSITIONAL OR INTRUSIVE CONTACT, DASHED WHERE APPROXIMATELY LOCATED, DOTTED WHERE CONCEALED
- - - - - -	FAULT - DASHED WHERE APPROXIMATELY LOCATED, DOTTED WHERE CONCEALED SAWTEETH ARE ON UPPER PLATE OF LOW ANGLE THRUST FAULT
⊤	STRIKE AND DIP OF BEDDING
⊤	STRIKE AND DIP OF OVERTURNED BEDDING

Qa	ALLUVIAL GRAVEL, SAND AND CLAY OF VALLEY AREAS
Qls	LANDSLIDE RUBBLE
Tor	TERRESTRIAL PEBBLE CONGLOMERATE OF FRANCISCAN DETRITUS, SANDSTONE AND CLAYSTONE, INTERBEDDED, GRAY TO GREENISH GRAY



1"=1000'

BASE: PORTIONS OF GEOLOGIC MAPS OF THE BRIONES VALLEY QUADRANGLE, CONTRA COSTA AND ALAMEDA COUNTIES, CALIFORNIA BY: DIBBLEE AND MINCH, 2005 #DF-148

REGIONAL GEOLOGIC MAP

Engineering Geologic Review
3933 Quail Ridge Road
Lafayette, CA

Date: 7-30-19 | Project No. 1436.000 | Figure 3

RYAN GEO*LOGICAL* CONSULTING, INC.
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EXPLANATION

⬯	LANDSLIDE DEPOSIT ARROWS INDICATE GENERAL DIRECTION OF DOWNSLOPE MOVEMENT, QUERIED WHERE IDENTIFICATION UNCERTAIN
▨	COLLUVIAL DEPOSIT AND/OR SMALL ALLUVIAL FAN DEPOSIT
Qal	ALLUVIAL DEPOSIT

*Topographic base map appears to have the road alignment for Quail Ridge Road along the ridge instead of on the side slope as shown in Figure 1. Site location is plotted based on coordinates.

N

0 1000

1"=1000'

BASE: PORTION OF NILSEN, T.H. 1975 PRELIMINARY PHOTOINTERPRETATION MAP OF LANDSLIDE AND OTHER SURFICIAL DEPOSITS OF THE BRIONES VALLEY 7-1/2 QUADRANGLE CONTRA COSTA AND ALAMEDA COUNTIES, CALIFORNIA, BY TOR H. NILSEN US GEOLOGICAL SURVEY OPEN-FILE REPORT 75-277-8

PHOTOINTERPRETIVE MAP OF LANDSLIDES AND OTHER FEATURES

Engineering Geologic Review
3933 Quail Ridge Road
Lafayette, CA

Date: 7-30-19	Project No. 1436.000	Figure 4

RYAN GEO*LOGICAL* CONSULTING, INC.
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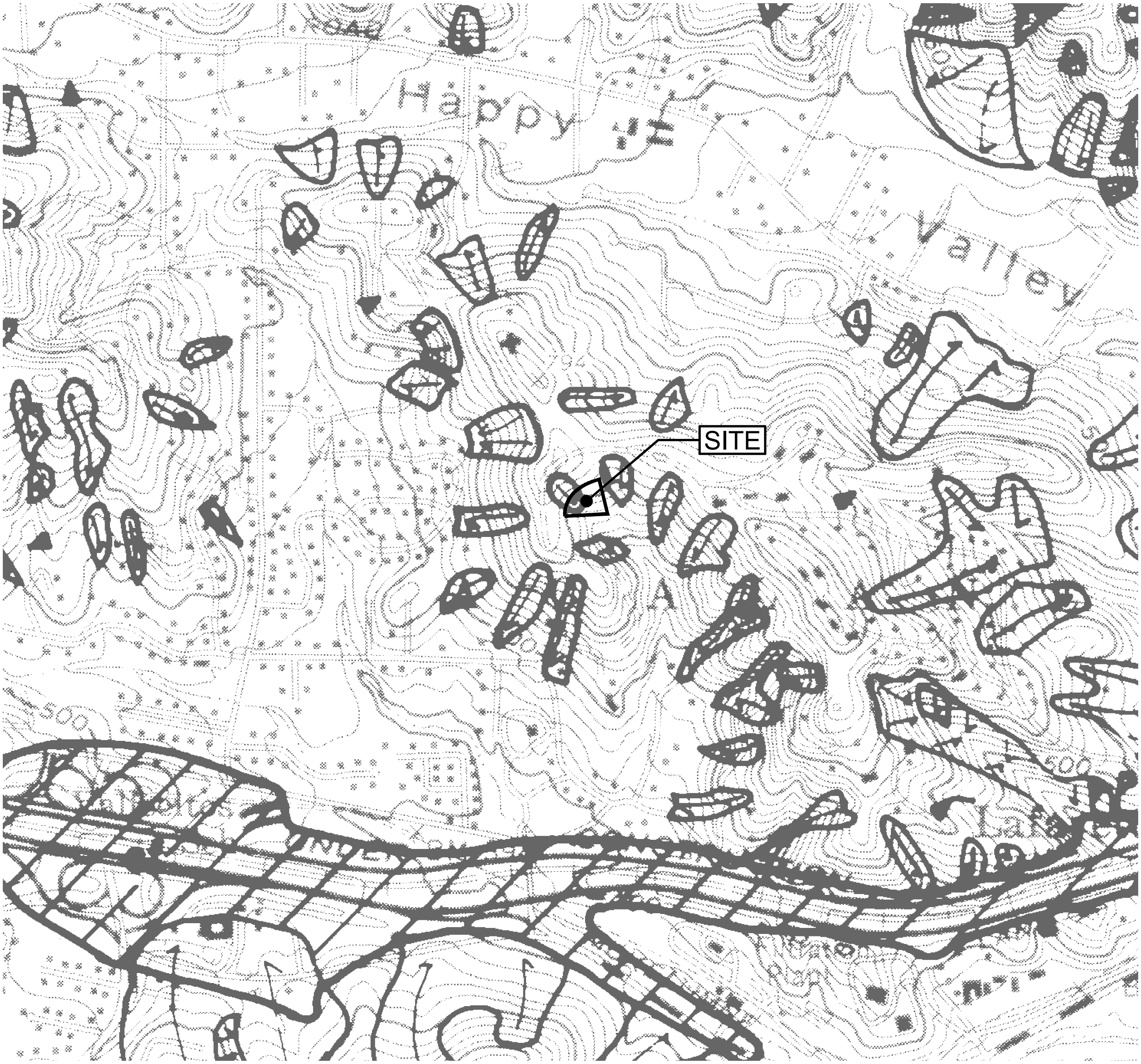
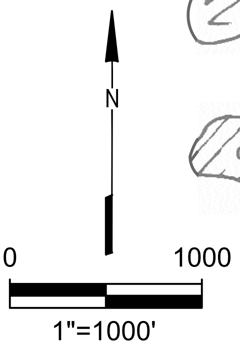


EXPLANATION

DEFINITE OR PROBABLE LANDSLIDE: EXHIBITS ALL OR MANY OF THE DIAGNOSTIC FEATURES, INCLUDING BUT NOT LIMITED TO HEADWALL SCARPS, CRACKS, ROUNDED TOES, WELL-DEFINED BENCHES, CLOSED DEPRESSIONS, SPRINGS, AND IRREGULAR OR HUMMOCKY TOPOGRAPHY, THAT ARE COMMON TO LANDSLIDES AND INDICATIVE OF DOWNSLOPE MOVEMENT. CONTINUOUS, SINGLE-BARBED ARROWS INDICATE GENERAL DIRECTION OF MOVEMENT. SCARP (HEADWALL OF SLUMP OR BLOCK GLIDE) IS INDICATED BY HACHURES WHERE MAPPED.

AREAS NOT CLASSIFIED. THESE AREAS HAVE BEEN SIGNIFICANTLY MODIFIED BY GRADING DEVELOPMENT, ROAD CONSTRUCTION, FILLING OF MARSHLANDS OR MINING.



*Topographic base map appears to have the road alignment for Quail Ridge Road along the ridge instead of on the side slope as shown in Figure 1. Site location is plotted based on coordinates.

BASE: PORTION OF HAYDEN, W.D., 1995, LANDSLIDE HAZARDS IN THE MARTINEZ-ORINDA-WALNUT CREEK AREA, CONTRA COSTA COUNTY, CALIFORNIA: CALIFORNIA DIVISION OF MINES AND GEOLOGY OPEN-FILE REPORT 95-12, LANDSLIDE HAZARD IDENTIFICATION MAP NO. 32

LANDSLIDES AND RELATED FEATURES MAP

Engineering Geologic Review
3933 Quail Ridge Road
Lafayette, CA

Date: 7-30-19	Project No. 1436.000	Figure 5

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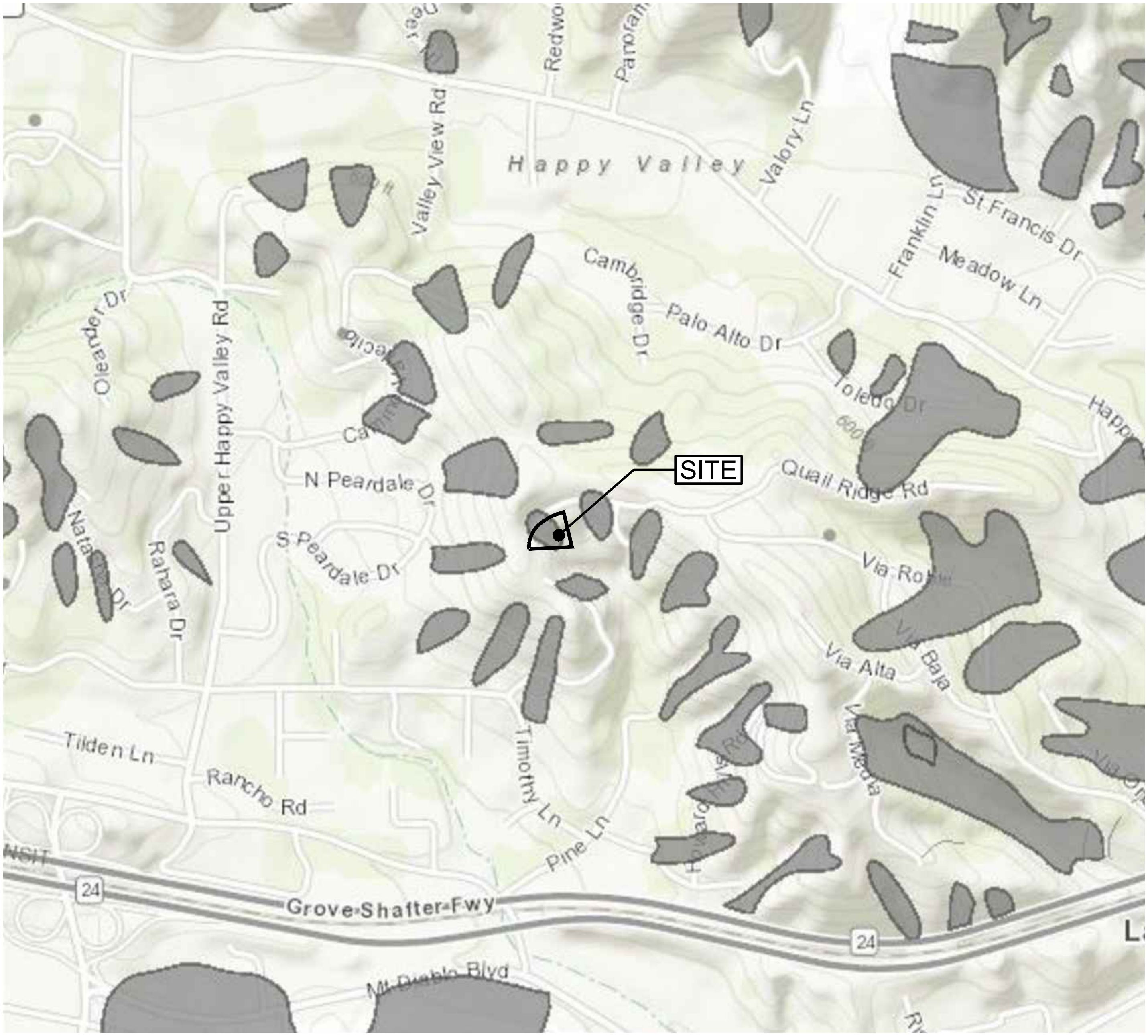

EXPLANATION

▨ Landslide Deposit

— Linear Landslide

● Small Landslide

N

0 1000

1"=1000'

BASE: CGS.GOV LANDSLIDE INVENTORY MAP
https://maps.conservation.ca.gov/cgs/lsi/app/

CALIFORNIA LANDSLIDE INVENTORY

Engineering Geologic Review
3933 Quail Ridge Road
Lafayette, CA

Date: 7-30-19	Project No. 1436.000	Figure 6

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EXPLANATION

cf	AREAS NOT CLASSIFIED THESE AREAS HAVE BEEN SIGNIFICANTLY MODIFIED BY GRADING FOR DEVELOPMENT, ROAD CONSTRUCTION FILLING OF MARSHLANDS OR MINING PROGRAM
2.1	**MARGINALLY SUSCEPTIBLE AREA.** SUBAREA 2.1: THE LAND UNDERLAIN BY THE BAY MUD AND FILLED MARSHLANDS CONSTITUTES SUBAREA 2 1 THESE MATERIALS ARE SUSCEPTIBLE TO FLOWAGE AND LATERAL MOVEMENT ON NEARLY FLAT LYING SLOPES (LESS THEN 2 PERCENT OR 1 DEGREE) AND LIQUEFACTION DURING EARTHQUAKES THE WEAK MATERIALS IN SUBAREA 2 1 ARE VULNERABLE TO SLOPE FAILURE WHEN UNDERCUT, EXCAVATED OR SUBJECTED TO DIFFERENTIAL LOADING, ESPECIALLY ALONG MARGINS OF TIDAL CHANNELS
4.2	**MOST SUSCEPTIBLE AREA. THIS AREA IS CHARACTERIZED BY RUGGED, VERY STEEP TERRAIN, WITH SLOPES THAT ARE GENERALLY GREATER THAN 50 PERCENT (26 DEGREES) AND LOCALLY 75 PERCENT (37 DEGREES) OR STEEPER MOST 01 THE IDENTIFIED LANDSLIDES ARE WITHIN AREA 4 THIS CATEGORY CONTAINS TWO SUBAREAS** SUBAREA 4.2. THIS SUBAREA CONSISTS PRIMARILY OF THE GENTLER AND LOWER RELIEF TERRAIN WITHIN AREA 4, IN CONTRAST TO THE STEEP TERRAIN WITHIN SUBAREA 4 1 THIS SUBAREA ALSO INCLUDES PLACES SURROUNDED BY SUBAREA 4 1, WHERE THE PRESENCE OF FAULTS APPEARS TO HAVE ADVERSELY AFFECTED THE SLOPE STABILITY LANDSLIDE DENSITY IS GREATER THAN ELSEWHERE IN THE STUDY AREA WITH LANDSLIDES BEING COMMON TO VERY COMMON, AS WELL AS BEING CLOSELY SPACED LANDSLIDES IN SUBAREA 4.2, RANGE FROM SMALL AND SHALLOW (LESS THAN 5 ACRE) TO VERY LARGE (30 TO 40 ACRES), DEEP BEDROCK TRANSNATIONAL SLIDES THE LARGER, DEEPER LANDSLIDES ARE WIDESPREAD AND, LOCALLY VERY ABUNDANT THE COMBINATION OF PREDOMINANTLY GENTLER AND LOWER RELIEF TERRAIN. ABUNDANCE OF LANDSLIDES, LARGE LANDSLIDE SIZE, AND THE PERFORMANCE OF THE GEOLOGIC FORMATIONS EXPOSED IN SUBAREA 4 2 INDICATE THAT THESE ROCK UNITS ARE GENERALLY SOFTER, WEAKER LESS RESISTANT AND LESS STABLE THAN THE ROCKS EXPOSED IN SUBAREA 4 1 AND ARE INVARIABLY LESS STABLE THAN THOSE IN THE BALANCE OF THE STUDY AREA SLOPES IN SUBAREA 4 2 ARE CONSIDERED TO BE NATURALLY UNSTABLE AND SUBJECT TO FAILURE EVEN IN THE ABSENCE OF THE ACTIVITIES OF MAN SLOPE INSTABILITY RESULTS PRIMARILY FROM THE WEAKNESS OF THE ROCKS IN WHAT IS ONLY MODERATELY STEEP TERRAIN

*Topographic base map appears to have the road alignment for Quail Ridge Road along the ridge instead of on the side slope as shown in Figure 1. Site location is plotted based on coordinates.

BASE: PORTION OF RELATIVE LANDSLIDE SUSCEPTIBILITY MAP LANDSLIDE HAZARDS IN THE MARTNIEZ-ORINDA-WALNUT CREEK AREA, CONTRA COSTA COUNTY, CALIFORNIA, LANDSLIDE HAZARD IDENTIFICATION MAP NO. 32, BY: WAYNE D. HAYDON, 1995

REGIONAL LANDSLIDE SUSCEPTIBILITY MAP

Engineering Geologic Review
3933 Quail Ridge Road
Lafayette, CA

Date: 7-30-19	Project No. 1436.000	Figure 7

RYAN GEO*LOGICAL* CONSULTING, INC.
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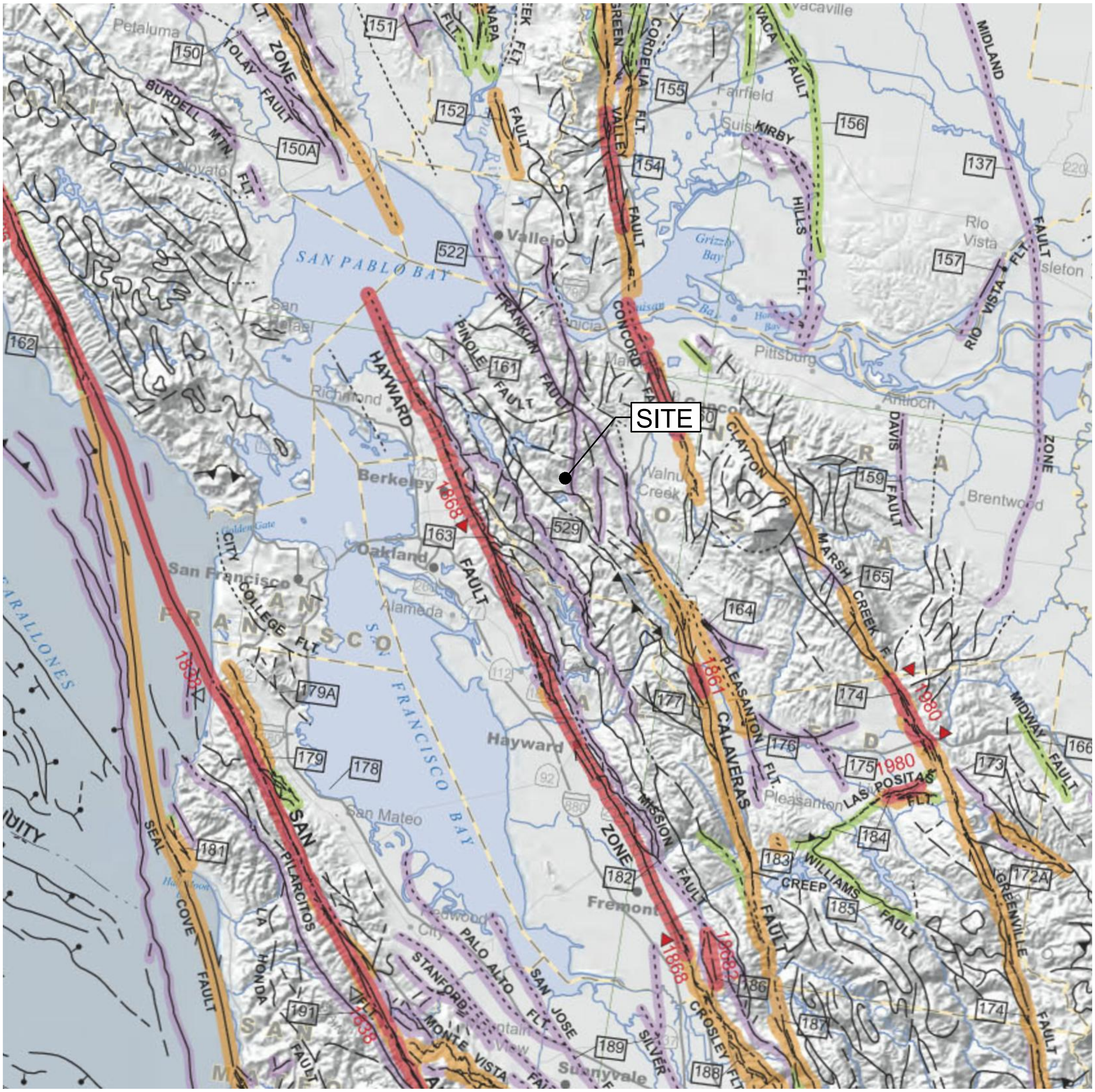

EXPLANATION

🟥	FAULT ALONG WHICH HISTORIC (LAST 200 YEARS) WITH HISTORIC RECORD DISPLACEMENT HAS OCCURRED
🟧	HOLOCENE FAULT DISPLACEMENT (WITHIN PAST 11,700 YEARS) WITHOUT HISTORIC RECORD
🟩	LATE QUATERNARY FAULT DISPLACEMENT (WITHIN PAST 700,000 YEARS)
🟪	QUATERNARY FAULT (AGE UNDIFFERENTIATED)
———	PRE-QUATERNARY FAULT

N

0 50,000

1"=50,000'

BASE: JENNINGS, J.W. AND BRYANT, W.A., 2010 FAULT ACTIVITY MAP OF CALIFORNIA: CALIFORNIA GEOLOGICAL SURVEY, GEOLOGIC DATA MAP NO. 6.

BAY AREA FAULT MAP

Engineering Geologic Review
3933 Quail Ridge Road
Lafayette, CA

Date: 7-30-19 | Project No. 1436.000 | Figure 8

RYAN GEO*LOGICAL* CONSULTING, INC.
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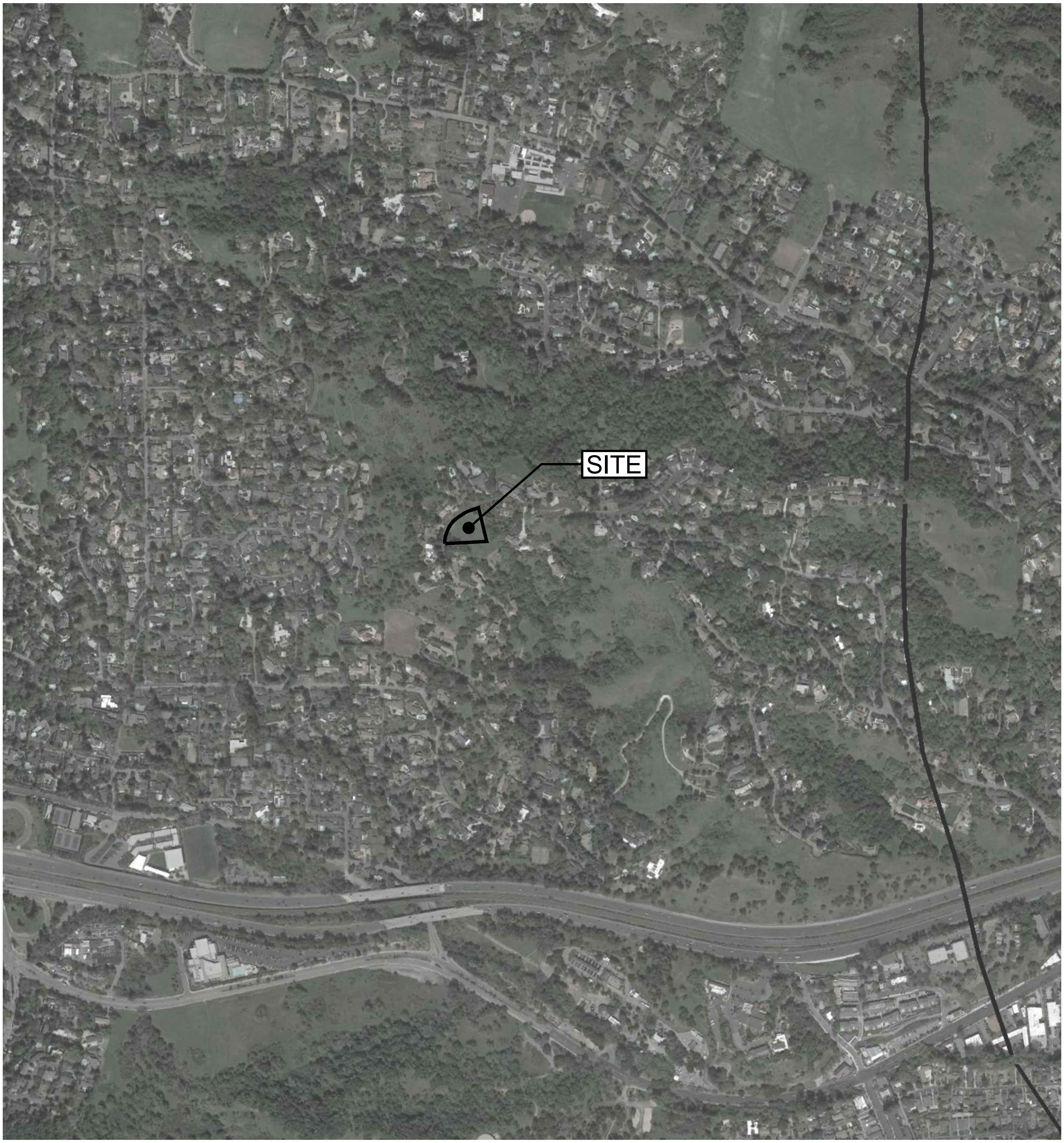

EXPLANATION

— SOUTHAMPTON FAULT
UNDIFFERENTIATED QUATERNARY
(<1.6 MILLION YEARS)

N

0 1000

1"=1000'

BASE: GOOGLE EARTH AERIAL AND USGS QUATERNARY FAULT AND FOLD DATABASE KMZ FILE

QUATERNARY FAULT AND FOLD DATATBASE MAP

Engineering Geologic Review
3933 Quail Ridge Road
Lafayette, CA

Date: 7-30-19	Project No. 1436.000	Figure 9

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Appendix B-15

2019 Alan Kropp & Associates, Inc. Geotechnical/Geological Investigation Update

GEOTECHNICAL/GEOLOGICAL INVESTIGATION UPDATE
3933 QUAIL RIDGE ROAD RESIDENCE
LAFAYETTE, CALIFORNIA

ALAN KROPP
& ASSOCIATES, INC.
GEOTECHNICAL
CONSULTANTS

ALAN KROPP, CE, GE
JAMES R. LOTT, CE, GE
JEROEN VAN DEN BERG, CE
THOMAS M. BRENCIC, CE

December 20, 2019
1729-1C, L-31864R

Mr. Ravi Reddy
PB Commercial Investments
pbcommercial@gmail.com

RE: Geotechnical/Geological Investigation Update
3933 Quail Ridge Road Residence
Lafayette, California

Dear Mr. Reddy:

At your request, we are providing an update to our geotechnical investigation for a new house to be built at 3933 Quail Ridge Road in Lafayette, California. The site location can be seen on the Vicinity Map, Figure 1. Our firm previously completed a geotechnical investigation of the site and summarized our findings in a report dated November 25, 2003. This project is extremely complex because it is located immediately adjacent to a landslide that seriously damaged a house in the middle of the lot in 1997, and led to the demolition of the home. Following our 2003 investigation, we understand other consultants have provided geotechnical/geological services for various possible homes on the site, and tentative project approval was granted by the City about 10-15 years ago for one design. However, the project has been generally dormant since that time and now the design needs to be updated. Therefore, the purpose of our investigation update has been to evaluate the current condition of the site for a residence and to provide updated and/or supplemental geotechnical design criteria as may be appropriate for the project.

RECENT SITE HISTORY

The 1997 landslide seriously damaged Quail Ridge Road as well as having a major impact on the house that formerly existed on the subject lot. In addition, many other houses were threatened on the opposite side of, and at the end of, Quail Ridge Road. It should be noted the lot containing 3933 Quail Ridge Road is quite large (1.1 acres), and the active landslide, which occurred in 1997, occupied about 80% of the property. After the landslide-damaged home was demolished and removed from the site, the upper portion of the landslide was repaired and rebuilt to support the portion of Quail Ridge Road repaired uphill of the site. The repair was designed and performed by Engineered Soil Repairs (ESR) in 1999. The repair included the installation of a tieback wall to depths on the order of 45 to 50 feet deep, excavation for a buttress keyway, and construction of a geo-grid reinforced fill buttress. Based on the repair plan prepared by ESR, William Lettis & Associates (WLA), who was our geological consultant for our 2003 study, sketched on their site plan the approximate location of the tieback wall and the approximate location of the fill daylight line near the northeast corner of the site. Although major remedial work was performed to restore Quail Ridge Road, the landslide within the site was not removed or repaired.

During the winter of 2005-2006, a pump failed that was pumping water out of the slide mass, and hillside movement was reactivated. The limits of this new movement were apparently confined to the area of past landsliding, and the extent of the landslide was not increased. The pump was subsequently repaired and we have been informed no further large-scale slide movements have occurred.

PROJECT DESIGN

Since most of the lot is underlain by landslide deposits that were not repaired, and these landslide materials may reactivate again in the future, only a small portion of the lot is being considered for development. This section of the property is the extreme northeast corner of the lot, and is generally just beyond the landslide. The area is roughly triangular in shape, with approximate dimensions of 70 feet along Quail Ridge Road, and 120 feet along the eastern property line of the lot. The third leg of the triangle is formed by the lateral boundary of the unrepaired landslide materials from the 1997 landslide. For simplicity, the small triangular area being considered for development will be referred to as the Triangle for the remainder of this report. The proposed development scheme includes about 3,950 square feet of living space plus a detached two car garage. A key layout issue is the relationship of the proposed home to the landslide boundary, particularly how close any foundations can be to the boundary and whether portions of the house can cantilever out over the boundary. The location of the development scheme is presented on Figure 3, House Location.

SCOPE OF SERVICES

Our proposal dated June 7, 2019, indicated our update would include:

1. Review our previous study and other materials you transmit to us;
2. Perform a visual reconnaissance of the site in order to evaluate current conditions;
3. Examine historical aerial photographs of the area;
4. Consult with the City planner and CEQA firm representative you have engaged;
5. Excavate supplemental test pits in the general building area;
6. Perform geotechnical/geological engineering analyses of the collected data; and
7. Prepare an updated geotechnical investigation report for the site.

Our scope of services has not included an environmental assessment or investigation of the site for the presence of hazardous or toxic materials in the soil, groundwater, or air.

PREVIOUS STUDIES

Our 2003 investigation included both our geotechnical work and the geological studies of our consultant, William Lettis & Associates (WLA). The field work by WLA included the logging of a trench across the landslide boundary by the Triangle, and logging a boring drilled to a depth of 45 feet. Based on our work, and that of WLA, we concluded the Triangle could be developed, but only if the owner was willing to accept a higher than normal risk, and restrictive geotechnical/geological recommendations were followed. The entirety of our November 25, 2003 report, including the attached WLA report with their trench and boring logs, is contained in Appendix B.

Following the submittal of our investigation report, supplemental studies of the Triangle were performed by Seidelman Associates (SA). This work included an investigation report dated June 24, 2008, which presented their design recommendations based on their review of my firm's work and additional subsurface exploration. The key element of their additional fieldwork was the drilling and logging of a large diameter hole on the Triangle which was extended to 70 feet; a log of this boring was contained within their report. Various written peer reviews of the SA work were prepared by Cal Engineering & Geology (CEG), with responses to requests for information then provided by SA. In their third peer review letter, dated December 17, 2008, CEG stated "At this point, it is our opinion that the geologic and geotechnical work completed for the site has demonstrated that the site is geotechnically feasible to construct a single family residence at the site. After the design level geotechnical report and site development plan have been completed, we recommend that they be provided for our review and comment." The package of SA and CEG letters and reports you transmitted to me are presented in Appendix C.

After 2008, there was a lull in activity regarding the site, in part due to the passing of Paul Seidelman. Peters & Ross (PR) were later engaged to follow up by responding to six specific questions raised by the Planning Commission when the project was submitted to the City of Lafayette. The responses to the questions were contained in the PR letter dated December 8, 2014. The PR letter is presented in Appendix D.

In May 2019, an Initial Study of the project was performed by the City of Lafayette with the assistance of Rincon Consultants (RC). We have not included that document in our report because it is readily available on the City website.

DISCUSSIONS WITH CITY PLANNER AND CEQA CONSULTANT

On September 13, 2019, we contacted Lafayette Planning Director Greg Wolff. He indicated he was willing to receive any additional information we have prepared, but did not have much input into our study.

On September 13, 2019, we also contacted Darcy Kremin of RC. She indicated we should transmit our report to her as input into their Focused EIR, so it could be included as community input.

SITE RECONNAISANCE

We visited the site on July 10, 2019, to observe the current surficial conditions. Prior to our visit, some brush clearing took place to facilitate our equipment access for digging test pits. We did not note any obvious changes in site conditions from our past work, although the surrounding trees were larger. No large ground cracks were seen in the Triangle that would indicate the initiation of new landslide movements.

AIR PHOTO STUDY

To supplement the air photo evaluation work performed by WLA as part of our 2003 study, we conducted a historic search of images on Google Earth. It appeared some movement of the main landslide mass took place in the winter of 2006, and new ground separations could be seen at the head of the slide adjacent to the wall system that was part of the repair along the downhill side of Quail Ridge Road. Periodic brush clearing took place over the time period from 2003 to present, but no obvious ground movements within the Triangle were seen.

TEST PIT EXCAVATION

On July 10, 2019, we excavated two test pits along the landslide boundary area of the Triangle with a track-mounted backhoe. The pits were generally 15 to 18 feet long and 7 to 9 feet deep. They were loosely compacted upon completion and the backfill is likely to settle in the future. The locations of the test pits, along with the previous locations of site exploration, are presented on the Site Plan, Figure 2.

In both pits, the surficial materials at the uphill limit of the pits appeared to be a thin layer of clayey fill. This material dramatically thickened as the trench extended down the slope, and appeared to transition to landslide debris part way down each trench (which was apparently covered by fill). Therefore, we have depicted a "Limit of Slide" line on our Site Plan that in our judgment designates the beginning of the landslide materials. The fill and landslide debris were underlain by closely fractured siltstone bedrock, which extended to the bottom of each test pit. The upper three to four feet of the bedrock in the pits was dilated, while the bedrock below was tight.

Detailed descriptions of the materials encountered in the test pits are found in the pit logs presented in the attached Appendix A. A Physical Properties Criteria for Rock Descriptions, Figure A-1, is also included. The attached logs and related information depict subsurface conditions only at the specific locations shown on the Site Plan and on July 10, 2019. The passage of time may result in changes in the subsurface conditions due to environmental changes. The locations of the test pits were approximately determined by hand tape measurement from existing field landmarks. The locations should be considered accurate only to the degree implied by the method used.

No groundwater was encountered in either test pit. The pits were backfilled immediately after the completion of the logging. It should be noted that groundwater measurements in the test pits may have been made prior to allowing a sufficient period of time for the equilibrium groundwater conditions to become established. In addition, fluctuations in the groundwater level may occur due to variations in rainfall, temperature, and other factors not evident at the time the measurements were made.

EVALUATION AND CONCLUSIONS

1. General Site Suitability

All of the subsurface exploration at the Triangle has indicated the edge of the massive 1997 landslide forms the southwestern boundary of this portion of the overall site, and it appears the Triangle is outside the limits of the previous landslide. Since the previous landslide has not been removed or repaired and only remedial work has been performed to restore Quail Ridge Road, you and all future owners of the property must understand and accept the risk that a future landslide may still occur within the overall lot, and such landslide activity may impact the stability of the Triangle even though it is situated outside of the mapped landslide margin.

If you elect to construct a new home on the Triangle after accepting the risk noted above, two major structural elements must be included in the project design. The first is the construction of a drilled pier wall at the margin of the landslide in order to separate the Triangle from the landslide mass. Secondly, a very deep and robust foundation system, entirely separate and set back from the drilled pier wall, must be used to support the house. If these systems are constructed, it is our opinion the Triangle is suitable for the construction of a new home from a geotechnical standpoint. However, all of the conclusions and recommendations presented in this report should be incorporated in the design and construction of the project to minimize possible soil and foundation problems. We should note that portions of the proposed structure may cantilever out beyond the drilled pier wall provided such areas do not have contact with the ground surface. Detailed recommendations for the general design of the structure are presented in the following section of our report, although the recommendations are incomplete because the design layout of the house has not yet been established. Supplemental recommendations will be necessary when the house layout design is finalized.

We understand from you that the proposed house footprint will be planned to be as far away from landslide margin as possible; however, this planning concept may situate the proposed footprint over the sideyard setback zone. It is our opinion that, from a geotechnical standpoint, it is preferable to situate the house farther away from the landslide margin and to possibly encroach on the sideyard setback zone. However, this concept should be submitted to the City for approval.

2. Design Framework

We are re-assuming the role of geotechnical engineer of record for the development of your house on the Triangle. Therefore, we will utilize the design framework presented in our 2003 report as the primary basis of our design recommendations. However, the subsurface studies performed since 2003 (including the 2008 SA large diameter boring and our recent test pits), along with peer review comments by CEG, have provided a basis for some modifications. We have copied our entire 2003 report in Appendix B for ready access; all of the recommendations presented in that report will remain our recommendations for your proposed home, with the exception of the modifications noted in the **RECOMMENDTIONS** section of this current update report. We should note that some of these adjustments in the recommendations have been made because they have already been accepted during the peer review process by CEG.

3. Deep Slide Plane

At the time of our 2003 report, there was still some concern a deeper, old slide plane might be present within the bedrock and extend below the Triangle. Due to concerns about lateral movement along such a plane, high, lateral creep loads were recommended for the design of the drilled pier wall and the house foundations in our 2003 recommendations. However, in the large diameter boring logged by SA, it was concluded the shear surfaces encountered were tectonic in origin and not indicative of an old slide plane. Therefore, it is our judgment the design creep loads can be reduced from the values we provided in our previous study.

4. Dilated Bedrock Zone

In the WLA (2003) trench, their logging indicated that tension cracking in the bedrock extended about 7 feet beyond the limits of the landslide. Our recent test pits indicated a dilated zone within the bedrock about 3-4 feet back from the landslide or fill materials. Both of these descriptions relate to the same phenomena, which is openings in the bedrock as a result of loss of lateral support from older or more recent landslide movements causing the ground to drop immediately adjacent to the bedrock. This width of this zone may vary along the border of the Triangle, but we will continue to use the conservative value of 7 feet in our design recommendations.

5. Edge of Landslide Deposits

The recent test pits have further refined the location of the limits of the landslide area along the southwestern side of the Triangle. It appears some fill materials have been placed along the boundary area since our work was performed in 2003, perhaps as a result of confirming trenches excavated by SA or from grading related to work generated by the large diameter boring. Therefore, the boundary between the recent filling and the landslide margin was not distinct, but our geologist has denoted an "Edge of Fill" location on the Site Plan. It is our judgment this is currently the best estimate for the limits of the landslide, although the southern end of the area may move to the west in the area of the WLA trench.

RECOMMENDATIONS

1. General

All of the recommendations contained in our 2003 report are still applicable, unless the recommendations are modified below.

2. Drilled Pier Wall

The drilled pier wall along the landslide should include piers drilled to a depth of 40 feet. The active pressure acting against the piers should be equal to an equivalent fluid pressure of 65 pounds per cubic foot for active loading or 95 pounds per cubic foot for at-rest loading; this load should be applied to a depth of 18 feet. The passive pressure resisting lateral movements should be equal to an equivalent fluid pressure of 250 pounds per cubic foot, starting at a depth of 18 feet and acting against two pier diameters. If tie-backs are used, an allowable bond strength of 1,000 pounds per square foot can be used in competent bedrock.

3. House Foundation Piers

All house foundation piers should be located at least 8 feet from the drilled pier wall. If tie-backs are used for the drilled pier wall, all house foundation piers should be carefully located to avoid conflict with the tie-backs.

4. House Cantilever

Portions of the proposed house or decks may cantilever westerly beyond the house piers (and even beyond the drilled pier wall), provided all house and deck elements are suspended at least 3 feet above the ground surface. No stairs, utilities, or other improvements should extend from the ground to the house or deck in any cantilever areas.

5. Drainage Discharge

It does not appear that water collected from the house roof and other impervious surfaces within the Triangle can be discharged to the street without a sump and pump system. This is the preferred solution, although the project civil engineer may need to incorporate C3 provisions into the design. The subdrain around the uphill side of the house can also drain into this sump. Appropriate back-up power supply, alarm systems, and other emergency provisions will likely be needed in the event of a power outage. We do not encourage the discharge of any water into the landslide deposits.

FUTURE STUDIES

The recommendations are intentionally incomplete because the house layout scheme has not yet been finalized. This includes various seismic provisions because building codes are evolving and may be different than the current codes when the final house plans are being prepared. We will need to supply supplemental recommendations at that time.

LIMITATIONS

This firm's services have been performed in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied.

If you have any questions, please call us.

Very truly yours,

Alan Kropp

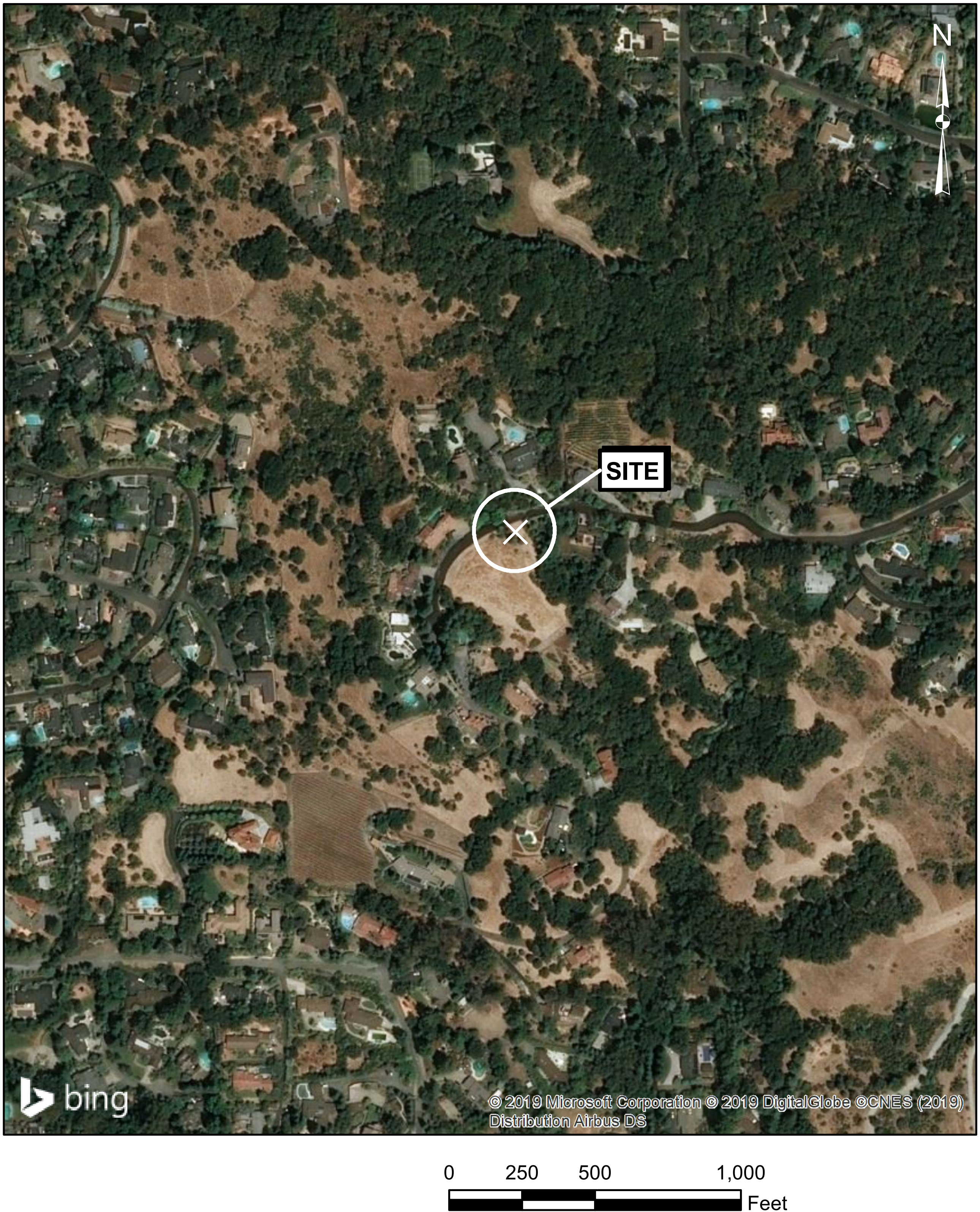
Alan Kropp, G.E.
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
ALAN LEE KROPP
GE 487
EXP. 12/31/19
GEOTECHNICAL
STATE OF CALIFORNIA

AK/jc

Copies: Addressee (PDF)

1729-1C Quail Ridge Road GI Update R



Original figure produced in color.

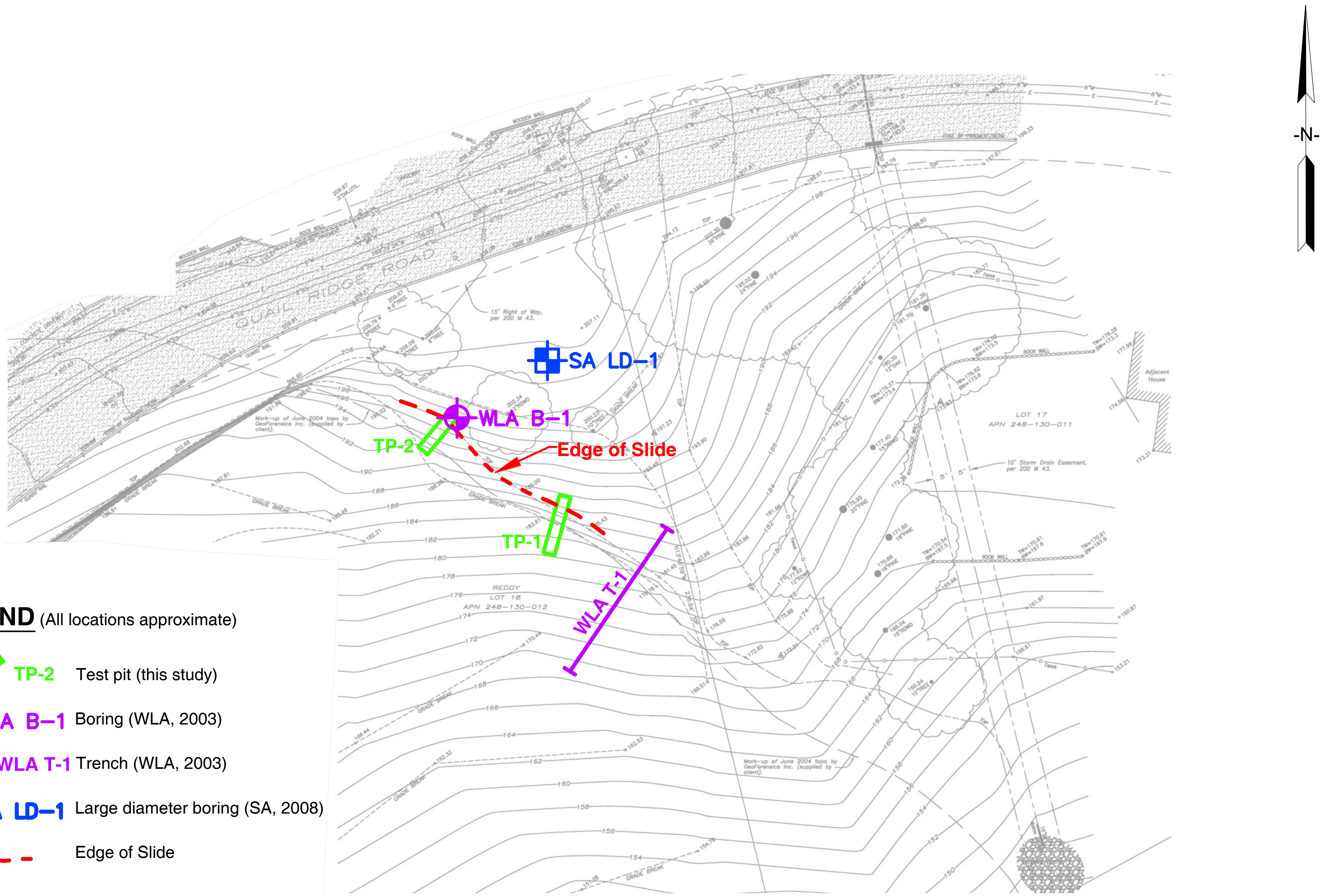
ALAN KROPP
& ASSOCIATES

Geotechnical Consultants

VICINITY MAP

QUAIL RIDGE ROAD RESIDENCE
Lafayette, California

PROJECT NO.	DATE	FIGURE **1**
1729-1C	**December 2019**	



LEGEND (All locations approximate)

🟩	TP-2	Test pit (this study)
⊕	WLA B-1	Boring (WLA, 2003)
⊢⊣	WLA T-1	Trench (WLA, 2003)
⊞	SA LD-1	Large diameter boring (SA, 2008)
- - -		Edge of Slide

20 0 40 80
APPROXIMATE SCALE FEET

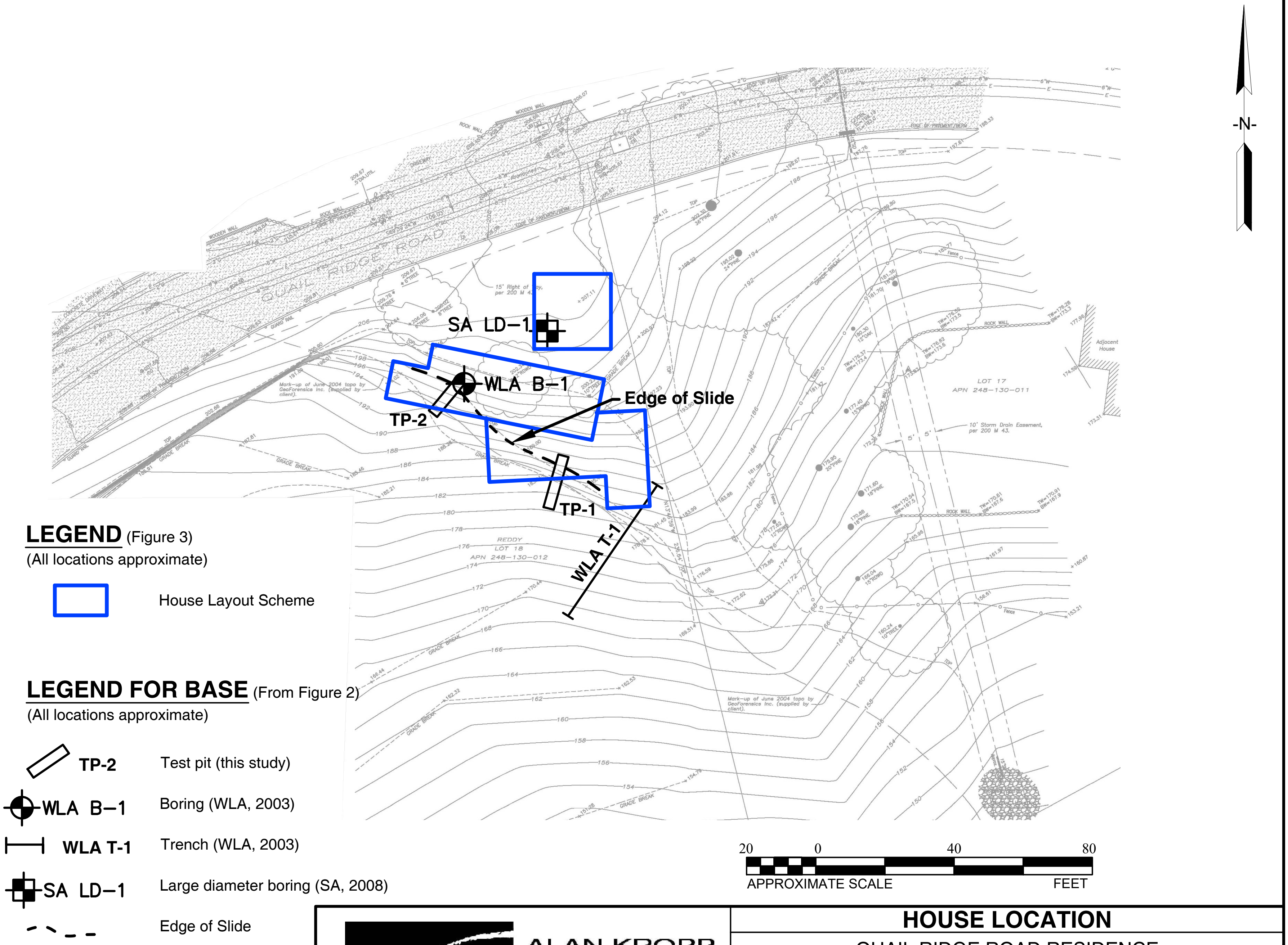
Original figure produced in color.

ALAN KROPP
& ASSOCIATES
Geotechnical Consultants

SITE PLAN

QUAIL RIDGE ROAD RESIDENCE
Lafayette, California

PROJECT NO.	DATE	FIGURE 2
1729-1C	**December 2019**	



ALAN KROPP
& ASSOCIATES

Geotechnical Consultants

HOUSE LOCATION

QUAIL RIDGE ROAD RESIDENCE
Lafayette, California

PROJECT NO.	DATE	FIGURE 3
1729-1C	**December 2019**	

Original figure produced in color.

APPENDIX A

CONSOLIDATION OF SEDIMENTARY ROCKS; usually determined from unweathered samples. Largely dependent on cementation.

U = unconsolidated
P = poorly consolidated
M = moderately consolidated
W = well consolidated

BEDDING OF SEDIMENTARY ROCK

Splitting Property	Thickness	Stratification
Massive	Greater than 4.0 feet	Very thick-bedded
Blocky	2.0 to 4.0 feet	Thick-bedded
Slabby	0.2 to 2.0 feet	Thin-bedded
Flaggy	0.05 to 0.2 feet	Very thin-bedded
Shaly or platy	0.01 to 0.05 feet	Laminated
Papery	Less than 0.01 feet	Thinly laminated

FRACTURING

Intensity	Size of Pieces in Feet
Very little fractured	Greater than 4.0 feet
Occasionally fractured	1.0 to 4.0 feet
Moderately fractured	0.5 to 1.0 feet
Closely fractured	0.1 to 0.5 feet
Intensely fractured	0.05 to 0.1 feet
Crushed	Less than 0.05 feet

HARDNESS

1. **Soft** - Reserved for plastic material alone.
2. **Low Hardness** - Can be gouged deeply or carved easily by a knife blade.
3. **Moderately Hard** - Can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and is readily visible after the powder has been blown away.
4. **Hard** - Can be scratched by a knife blade with difficulty; scratch produces little powder and is often faintly visible.
5. **Very Hard** - Cannot be scratched by a knife blade; leaves a metallic streak

STRENGTH

1. **Plastic** - Very low strength.
2. **Friable** - Crumbles easily by rubbing with fingers.
3. **Weak** - An unfractured specimen of such material will crumble under light hammer blows.
4. **Moderately Strong** - Specimen will withstand a few heavy hammer blows before breaking.
5. **Strong** -Specimen will withstand a few heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments.
6. **Very Strong** -Specimen will resist heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments.

WEATHERING - the physical and chemical disintegration and decomposition of rocks and minerals by natural processes such as oxidation, reduction, hydration, solution, carbonation, and freezing and thawing.

D. **Deep** - Moderate to complete mineral decomposition; extensive disintegration; deep and thorough discoloration; many fractures, all extensively coated or filled with oxides, carbonates and/or clay or silt.

M. **Moderate** - Slight change or partial decomposition of minerals; little disintegration; cementation little to unaffected. Moderate to occasionally intense discoloration. Moderately coated fractures.

L. **Little** - No megascopic decomposition of minerals; little or no effect on normal cementation. Slight and intermittent, or localized discoloration. Few stains on fracture surfaces.

F. **Fresh** - Unaffected by weathering agents. No disintegration or discoloration. Fractures usually less numerous than joints.

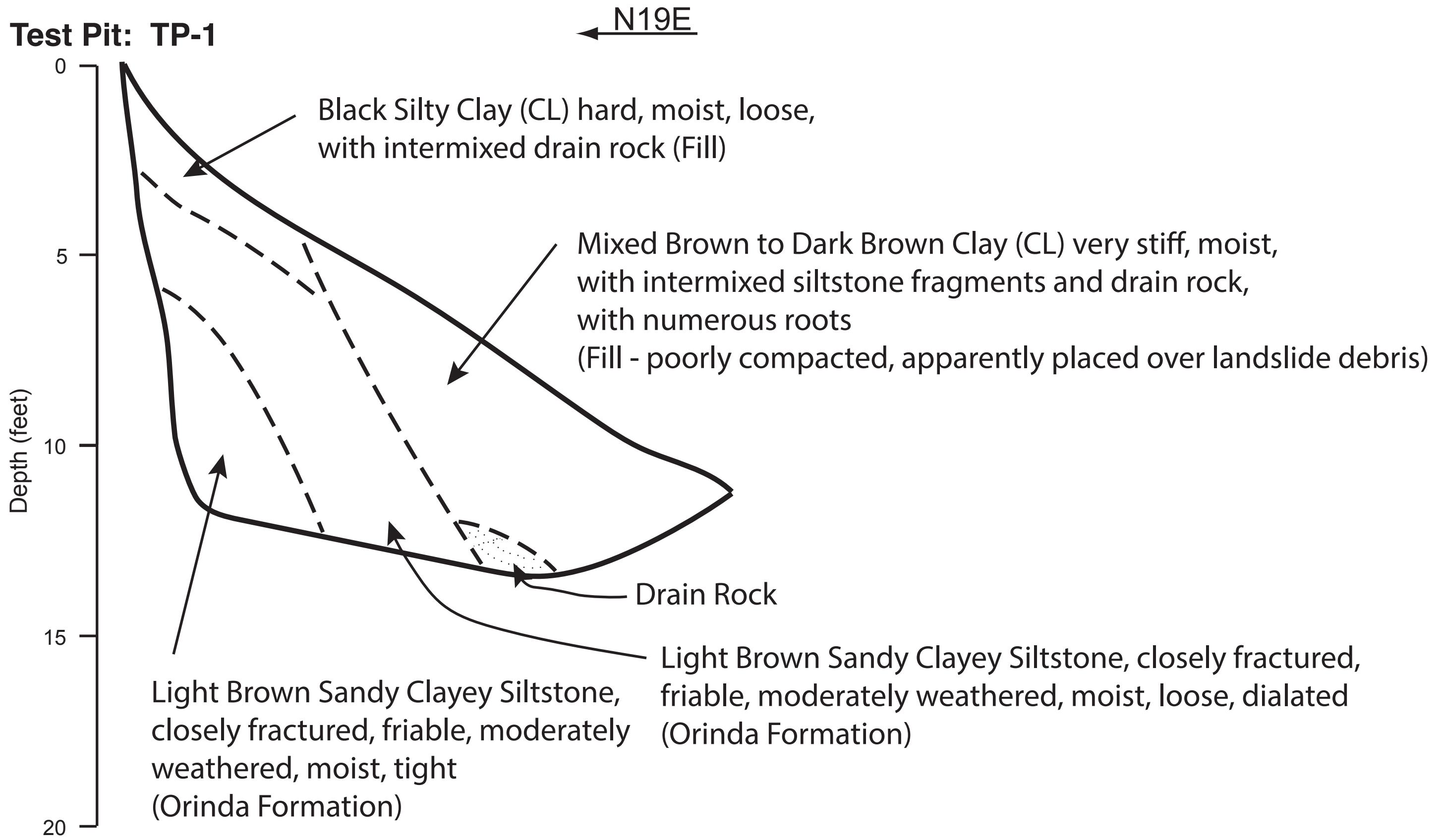
ALAN KROPP
& ASSOCIATES
Geotechnical Consultants

PHYSICAL PROPERTIES CRITERIA FOR ROCK DESCRIPTIONS

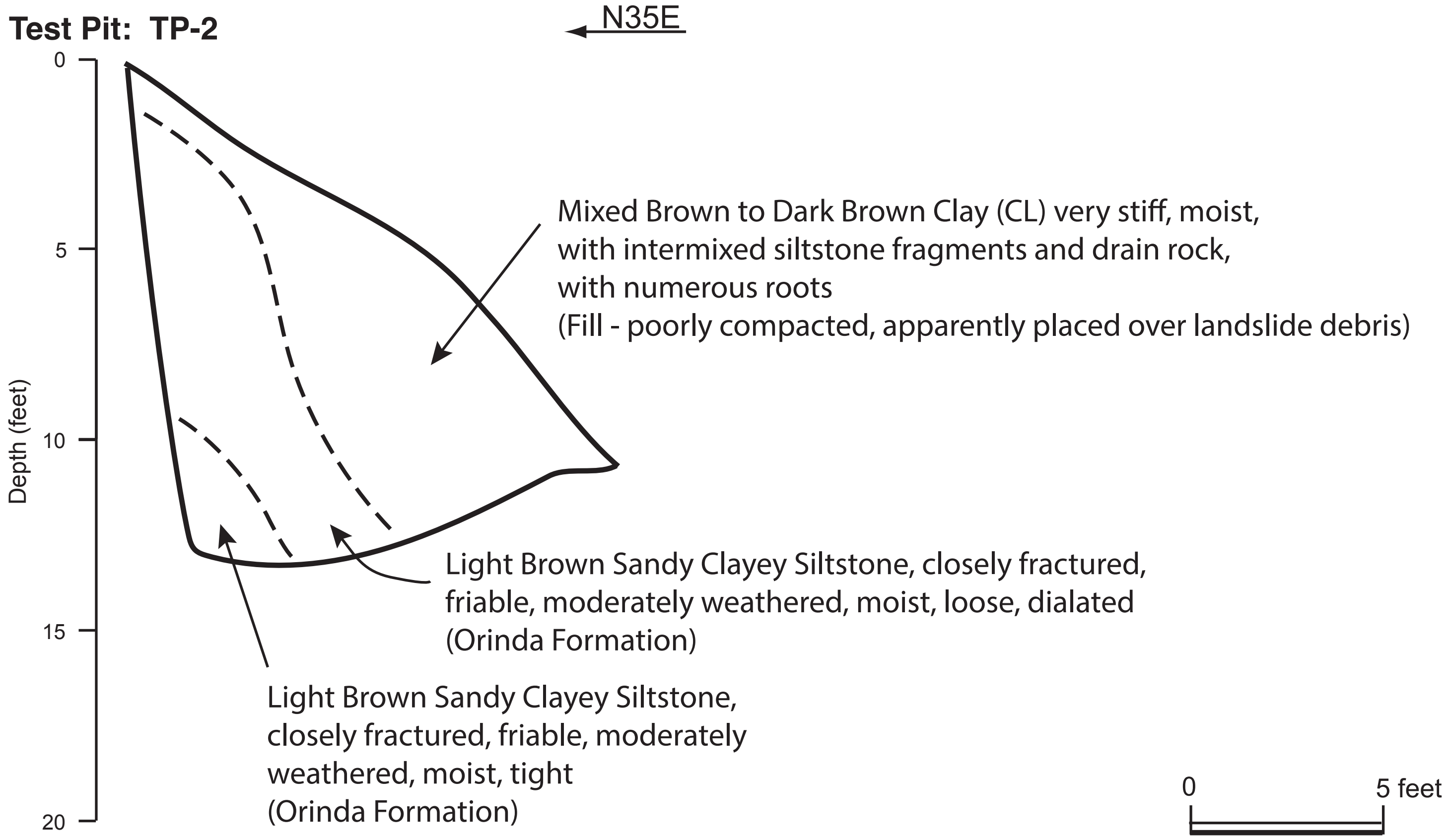
QUAIL RIDGE ROAD RESIDENCE
Lafayette, California

PROJECT NO.	DATE	FIGURE **A-1**
1729-1C	**December 2019**	

Test Pit: TP-1



Test Pit: TP-2



ALAN KROPP & ASSOCIATES

Logs of Test Pits TP-1 and TP-2

3933 Quail Ridge Road
Lafayette, California

PROJECT NO. 1729-1C

DATE: December 2019

APPENDIX B

GEOTECHNICAL INVESTIGATION
QUAIL RIDGE ROAD RESIDENCE
NORTHEAST CORNER OF LOT
3933 QUAIL RIDGE ROAD
LAFAYETTE, CALIFORNIA

ALAN KROPP
& ASSOCIATES, INC.

GEOTECHNICAL
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DONALD L. IRBY, CE

February 25, 2004
1729-1B, L-25867

Mr. and Mrs. Matt Click
2364-A Westcliffe Lane
Walnut Creek, CA 94597

RE: Geotechnical Investigation
Quail Ridge Road Residence
Northeast Corner of Lot
3933 Quail Ridge Road
Lafayette, California

Dear Mr. and Mrs. Click:

At your request, we have performed a geotechnical investigation for the proposed home to be constructed on the extreme northeast corner of the site located at 3933 Quail Ridge Road in Lafayette, California. It should be noted that a large landslide occurred in 1997 which severely damaged a previous home on this property. The damaged home was demolished and removed from the site. The upper portion of the landslide was repaired and rebuilt to support the portion of Quail Ridge Road above the site. The repair was designed and performed by Engineered Soil Repairs (ESR) in 1999. The repair included the installation of a tieback wall to depths on the order of 45 to 50 feet deep, excavation for a buttress keyway, and construction of a geo-grid reinforced fill buttress. Based on the repair plan prepared by ESR, William Lettis & Associates (WLA) have sketched the site plan with the approximate location of the tieback wall and the approximate location of the fill daylight line near the northeast corner of the site. In summary, major remedial work has been performed to restore Quail Ridge Road, which was also badly damaged during the landslide. However, the landslide within the site was not removed or repaired.

1.00 PROPOSED CONSTRUCTION

A copy of the topographic survey plan dated June 20, 2003 and prepared by DeBolt Civil Engineering was provided to us on July 15, 2003 for our use during subsurface investigation and report preparation. Based on our discussions with you, we understand a conceptual development plan is available at this time; however, you agree to amend the plan as needed in accordance with our findings. For the purpose of our investigation, we assume the new residence will be one story, with a raised structural steel platform, and supported by a pier-and-grade beam foundation. Building loads are anticipated to be typical for this type of construction.

2.00 PURPOSE

The purpose of our investigation was to evaluate the general geotechnical suitability of the extreme northeast corner of the lot for a possible new house and to provide geotechnical engineering design and construction criteria for the following aspects of the work:

- Site preparation and earthwork,
- Surface drainage,
- Pier wall construction at the margin of the mapped landslide,
- House foundations,
- Building code seismic design parameters,
- Retaining walls, and
- Upslope subdrain.

3.00 SCOPE

As outlined in our proposal dated July 25, 2003, the scope of our work to accomplish the stated purpose included:

- Reconnaissance of the entire site and portions of the immediate surrounding properties to evaluate current geotechnical and site conditions;
- A review of published geotechnical materials with data relevant to the site;
- A review of geotechnical consultants' materials from our files and other firms which have been supplied to us;
- An examination of aerial photographs of the area;
- A subsurface exploration program consisting of drilling one exploratory test boring and excavation of one test trench in the area to evaluate the subsurface materials for this phase of work;
- Laboratory index, classification and strength tests on surface and subsurface samples from the site, as required, to evaluate the properties of the materials recovered;
- Geotechnical engineering analyses of the collected data; and
- Preparation of a geotechnical investigation report for the site which would present the results of our studies and provide geotechnical design and construction criteria for the geotechnical aspects of the proposed home.

The scope of our services did not include an environmental assessment or investigation for the presence of hazardous or toxic materials in the soil, groundwater, or air on, below, or around this site.

This report has been prepared for the exclusive use of you and your consultants for specific application to the proposed residence in accordance with generally accepted geotechnical engineering practices. No

other warranty, expressed or implied, is made. In the event that the nature, design, or location of the home differs significantly from what has been noted above, or if any additions are proposed, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and the conclusions of this report modified or verified in writing.

The findings of this report are valid as of the present date. However, the passing of time will likely change the conditions of the existing property due to natural processes or the works of man. In addition, due to legislation or the broadening of knowledge, changes in applicable or appropriate standards may occur. Accordingly, the findings of this report may be invalidated, wholly or partly, by changes beyond our control. Therefore, this report should not be relied upon after three years without being reviewed by this office.

We have performed this geotechnical investigation with WLA. WLA performed the geological subsurface investigation, including the excavating and logging of the test trench and drilling and logging of the test boring, at the site. WLA has performed aerial photograph examination, has reviewed reports and files from other consultants during the landslide studies for this site, and has prepared a geologic report (dated February 18, 2004). WLA's report is included as Appendix A of this report.

Since the descriptions and discussions of site condition and history, geotechnical setting, and subsurface information have been reported under WLA's geologic report, we will not duplicate these items in this report.

4.00 EVALUATIONS AND CONCLUSIONS

4.01 General Site Suitability

WLA has mapped the margin of the landslide based on the test trench data and the previous subsurface data from other consultants' reports for the landslide studies on this lot. Based on the subsurface data collected from our field investigation program, it appears to us the extreme northeast corner of the lot is outside the limits of the previous landslide. Since the previous landslide has not been removed or repaired and only remedial work has been performed to restore Quail Ridge Road, the project owners need to understand and accept the risk that a future landslide may still occur within the lot and may impact the stability of the extreme northeast corner of the lot even though it is situated outside of the mapped landslide margin. If the project owners elect to construct a new home at the extreme northeast corner of the lot, a drilled pier wall should be installed at the margin of the landslide in order to separate the northeast corner of the lot from the landslide mass.

As such, it is our opinion the extreme northeast corner of the lot is suitable for the construction of a new home from a geotechnical standpoint. However, all of the conclusions and recommendations presented in this report should be incorporated in the design and construction of the project to minimize possible soil and foundation problems.

We understand from you that the proposed house footprint will be planned for the extreme northeast corner of the site in order to be further away from the landslide margin; however, this planning concept may situate the proposed footprint over the sideyard setback zone. It is our opinion from a geotechnical standpoint that it is preferable to situate the house farther away from the landslide margin and to possibly encroach on the sideyard setback zone. However, this concept should be submitted to the County for approval.

The primary considerations for foundation design at the site are:

- Surface soils and bedrock tension zone due to previous landslide,
- Strong ground shaking, and
- Site drainage.

Each of these conditions is discussed individually below.

4.02 Surface Soil and Bedrock Tension Zone

Based on the test boring and test trench data, we have encountered up to about 7 feet of sandy clay soil near the surface. The surface soil was underlain by highly weathered bedrock material to about 18 feet deep. In addition, a portion of the highly weathered bedrock has experienced bedrock tension due to previous landsliding within a zone of about 7 feet horizontally directly behind the landslide mass. In other words, the surface soil (up to about 7 feet) and highly weathered bedrock (up to about 11 feet), (i.e., a total thickness of 18 feet within a 7-foot zone behind the landslide mass), may be identified as surface soils and bedrock tension zone. This tension zone of 18 feet in thickness may be susceptible to lateral movement especially if the landslide becomes active again in the future. Since the proposed home will be constructed on sloping terrain and since the previous landslide on the lower portion of the subject lot has not been removed or repaired, WLA has recommended in their report that a special design zone of 20 feet wide should be established in the planning, design and construction for the proposed house in the northeast corner of this site. Thus, we recommend the following:

- A line of drilled pier wall should be constructed along the margin of the previously mapped landslide. All the piers should extend through the upper 18 feet of tension zone, and at least 15 feet into underlying firm and less weathered bedrock. In addition, due to the potential instability of the tension zone, the pier wall should be designed to resist a substantial creep load.

- Within the 20-foot special design zone, the portion of the proposed residence should be supported on drilled, cast-in-place friction piers. The piers should extend through the upper 18 feet of potential unstable soils, and at least 10 feet into the underlying firm bedrock materials. In addition, due to the potential for downward creep of the overlying soil and tension materials, the piers should be designed to resist creep load.

- Beyond the 20-foot special design zone, the portion of the proposed residence should be supported on drilled, cast-in-place friction piers. The piers should extend through the upper 8 feet of soils, and at least 10 feet into the underlying firm bedrock material. In addition, due to the potential for downward creep of the overlying soil, the piers should be designed to resist creep load.

- We also recommend a subdrain, which penetrates through the fill into the underlying native soils, be constructed upslope of the home and surface drainage be carefully controlled at the site because an increase in the soil moisture content tends to promote slope creep.

4.03 Earthquake Hazards

As noted earlier, the subject site is located in the highly seismic San Francisco Bay Area, and there is a strong probability that a moderate to severe earthquake will occur during the life of the structure. The site

is not mapped in the immediate proximity of any active or inactive faults; therefore, the likelihood of fault rupture directly below the proposed home is low.

During strong earthquakes, various forms of ground failure can occur, such as liquefaction, lateral spreading, and lurch cracking. The existing upper 18 feet of tension zone can also undergo renewed movements as the result of the earthquake shaking. However, our evaluation of the ground conditions at the subject site indicate it is very unlikely the site is susceptible to ground failure during an earthquake.

The proposed home will almost certainly experience strong ground shaking during a major earthquake in the life of the building. Recently, the Uniform Building Code has adopted provisions for incorporation of strong ground shaking into the design of all structures. Our recommendations for geotechnical parameters to be used in the structural seismic design of the home are presented in Section 5.05, "Building Code Seismic Design Parameters."

4.04 Site Drainage

To minimize infiltration of surface runoff and subsequent weakening and swelling of the soils underlying the house, drainage should be carefully controlled at the site. Surface and subsurface drainage improvements should be designed to collect and channel water to appropriate outlets. These improvements should include positive surface gradients along with systems utilizing drainrock, perforated pipe, solid pipe, and gutters.

5.00 RECOMMENDATIONS

This report is issued with the understanding that it is the responsibility of the owner or the owner's representative to ensure that the information and recommendations contained in this report are called to the attention of all concerned parties. In addition, it is the responsibility of the owner or owners representative to ensure these recommendations are incorporated into the plans and that the necessary steps are taken to see that the contractors or subcontractors carry out such recommendations in the field.

5.01 Site Preparation and Earthwork

The site of the proposed residence should initially be cleared of selected trees and bushes and then stripped to sufficient depth to remove surface vegetation and weeds; these materials should be removed from the site. If foundation elements are exposed during the site clearing or foundation construction, then the exposed elements, slabs, or retaining walls should be removed from the site.

It is our understanding that there will not be a substantial amount of grading for this portion of the lot in order to construct the proposed home. We were told that the proposed grading will likely be less than two to three feet of cut and fill. The previously mapped landslide margin should be staked and clearly marked onsite by the surveyor in order to avoid grading or construction into the landslide area. After the site is cleared and stripped, the pier wall should be constructed along the margin of the previously mapped landslide prior to performing any grading or construction at the northeast corner of this lot.

After the site for the residence is cleared and stripped and the pier wall is constructed, any excavation and/or filling operations required for this area can be made. Any filling operations on slopes steeper than 6:1 (horizontal to vertical) should be keyed and benched into competent soils and/or the weathered

bedrock materials. We should note that loose soils resulting from excavations or pier drilling should either be removed from the site or placed and compacted as engineered fill.

All on-site soils below the stripped layer having an organic content of less than 3 percent by volume are suitable for use as fill. However, we should note that clayey soils are very difficult to moisture condition and compact when there is excessive moisture from winter rains. In addition, due to the expansive nature of the clayey surface soils, minor cracking of asphalt pavements (requiring periodic maintenance) should be anticipated.

Any fill placed at the site should not contain rocks or lumps greater than 6 inches in greatest dimension with not more than 15 percent larger than 2.5 inches. In addition, imported fill material used at the site should be a non-expansive material with a plasticity index of 12 or less. The fill should be compacted to at least 90 percent relative compaction by mechanical means only as determined by ASTM Test Designation D1557-91 for fills less than 5 feet in height. Fill should be compacted to at least 95 percent relative compaction for fills greater than 5 feet in height. Fill should be placed on a firm, unyielding base surface in lifts not exceeding 8 inches in uncompacted thickness.

We recommend that all new cut or fill slopes at the site have a maximum inclination of 2:1. At this inclination, the cut and fill slopes will probably be subjected to some minor erosion and/or sloughing, thus requiring periodic maintenance of the slopes. We recommend the existing fill slopes and any new cut or fill slopes be planted with erosion-resistant vegetation and an erosion control netting system be installed. A landscape architect experienced in erosion control planting should be consulted prior to selection of the type of vegetation to be used.

5.02 Surface Drainage

Positive surface drainage should be provided adjacent to the residence so as to direct surface water away from the foundations of the building into closed pipes that discharge downslope of the proposed residence. Flexible drain pipe (flexline), 2000-pound crush pipe, leachfield, and ASTM F810 pipe are not recommended for use in the surface water drainage system because of the likelihood of damage to the pipe during installation due to the weak strength of these pipes. In addition, these drainpipes are sometimes difficult to clean with mechanical equipment without damaging the pipe. We recommend the use of Schedule 40 PVC, SDR 35 PVC or ABS, Contech A-2000 PVC drainpipe, or equivalent for the drain system. Ponding of surface water should not be allowed in any areas adjacent to the structure. Concentrated flows of water should not be allowed across any slopes as erosion or weakening of surface soils could occur. In particular, berms or drainage ditches should be installed behind the road cut slope to divert surface water flow away from the top of the slope.

We also recommend that rainwater collected on the roof of the building be transported through gutters, downspouts, and closed pipes that lead to suitable discharge facilities downslope of the residence. The most desirable location to discharge the water is onto the downslope street, or into an existing storm drain system under the downslope street (subject to City and/or County regulations).

Although there are other methods to discharge the water within your property, the water eventually drains onto the downslope property and can cause future problems. Therefore, we would strongly encourage you to negotiate with a downslope neighbor to obtain a drainage easement so the water collected from your property can be placed into a pipe which crosses your downslope neighbor's property and discharges to an appropriate drainage discharge facility.

If this easement is granted, you will have maintenance responsibilities for this drainpipe. If a drainage easement cannot be granted, the collected surface water may be discharged onto the slope downhill of the residence with the understanding that there may be a higher risk of future problems resulting from the discharged water. In order to minimize, but not eliminate, this risk, we recommend the collected water discharge into an energy dissipator. We should note that suitable discharge facilities do not include so called "dry wells" and these should be avoided.

Some nominal maintenance of the drainage facilities should be expected after the initial construction has been completed. To assist in maintaining proper drainage and erosion control measures for the site, we have included a "Guide to the Maintenance of Hillside Home Sites" in Appendix B.

Should ownership of this property change hands, the new owner should be informed of the existence of this report, not adversely change the grading or drainage facilities, and understand the importance of maintaining proper surface drainage.

5.03 Pier Wall

A pier wall should be constructed along the margin of the landslide, as shown on the site plan (Appendix A). The pier wall should consist of a row of large-diameter reinforced concrete piers that are founded in the underlying bedrock and spaced no further apart than 8 feet, center to center. Based on our subsurface investigation, the depth to firm rock and below the tension zone in this portion of the site is believed to be on the order of 18 feet below existing ground surface. With piers spaced no further than 8 feet on center, it can be assumed that the soil and rock will effectively arch between adjacent piers and therefore lagging will not be necessary.

The wall should be designed to withstand a uniform horizontal earth pressure of 1000 pounds per square foot (psf) over the upper 18 feet of the wall (i.e., 18 kips per running foot of wall). This active pressure value has not included hydrostatic pressure due to groundwater.

The lateral active load can be assumed to be resisted by passive pressure. The passive pressure can be assumed to start at a depth of 18 feet with an initial value of 400 psf and increase at a rate of 400 psf per foot of depth below 18 feet up to a maximum value of 10,000 psf. This value can be assumed to be acting over 1.5 times the diameter of the individual pier shafts. It is noted that wall pressures could be resisted with drilled tiebacks. However, the tiebacks would need to extend a significant distance into the upslope property or the existing road and could interfere with future pier installation for the house at the northeast corner of this lot. Furthermore, permission would have to be obtained from the County and/or the homeowner association within which the tiebacks extend. Since the concept of the proposed wall has not been determined at this time, we have not presented tieback criteria. With the relatively large loads as given above, it may be necessary to construct multiple rows of staggered piers interconnected with grade beams in order to spread out the loads. It is anticipated the wall as proposed above will undergo some amount of deflection in the event that the full loads as specified are developed. The underground pier retaining wall should therefore not be connected to the house foundation and/or other site improvements.

Since surface sandy clay material and bedrock tension were encountered in the WLA boring, it is susceptible to "cave-in" during pier wall drilling, especially at depths below groundwater level. As a result, it is our opinion that casing of the drilled pier holes is required for the pier construction. Even though groundwater was not encountered in the WLA boring, groundwater may fluctuate with weather and time of year. The bottom of pier excavations should be reasonably free of loose cuttings and soil

fall-in prior to installing reinforcing steel and placing concrete. It is our recommendation the contractor be made aware of the subsurface conditions outlined in this report and he obtain construction equipment appropriately sized to perform the recommended work. In particular, the piers must extend a minimum of 18 feet below the ground surface, which is likely about 10 feet into bedrock. Equipment capable of performing this recommendation should be employed. Any accumulated water in pier excavations should be removed prior to placing reinforcing steel and concrete, or the concrete should be tremied from the bottom of the hole. Care should be taken during concrete placement to avoid "mushrooming" at the top of the pier because distress in the building may result from expansive soil uplift forces on the "mushroom caps." Each pier should be drilled and poured on the same day.

The proper handling of spoils excavated during the pier drilling is very important. If these materials are left in a loose condition on a slope, they will have a tendency to creep down hill and/or erode during periods of heavy rainfall. Therefore, we recommend these materials be removed from the site, placed and compacted as engineered fill.

Observations during pier drilling operations should be performed by a representative of our firm to confirm that anticipated conditions are being encountered. If drilling refusal is encountered, we can coordinate a review of the conditions and drilling equipment adequacy, as well as conduct discussions with the project structural engineer.

5.04 House Foundation

It is our understanding that the house will be constructed at the extreme northeast corner of the lot. WLA have mapped the margin of the landslide which is shown on the site plan (Appendix A). The proposed house footprint should be cited outside of the landslide margin. In addition, we have recommended above that a pier wall be installed along the landslide margin. Thus, the house foundations and structure should not be connected to the pier wall.

As such, we recommend the proposed residence be supported on drilled, cast-in-place, straight-shaft piers, which are designed to develop their load carrying capacity through friction between the sides of the piers and the surrounding subsurface materials. The house piers should not be connected to the pier wall at the margin of the landslide, and should be setback at least 5 feet from the pier wall. Friction piers should have a minimum diameter of 16 inches, and there should be a minimum center-to-center spacing of at least three pier diameters between adjacent piers.

Beyond the 20-foot special design zone, the piers should generally extend to a depth adequate to provide at least 10 feet of embedment into competent underlying bedrock, which is at least 18 feet below the ground surface.

Within the 20-foot special design zone, the piers should extend to a depth at least 10 feet into competent bedrock underlying the tension zone, which is at least 28 feet below the ground surface.

To determine whether these depths are adequate to carry the structural loads of the residence, the following allowable (factored) skin friction values should be used:

- 500 pounds per square foot for dead plus live loads (factor of safety ≈ 2)
- 650 pounds per square foot for all loads, including wind or seismic (factor of safety ≈ 1.5).

These values can be used starting at a depth of 8 feet for the piers situated beyond the special design zone and at a depth of 18 feet for the piers situated within the special design zone.

All house piers should be designed for a pressure of 65 pounds per square foot. These loads should be considered to act as uniform loads spread over a depth of 8 feet for the piers beyond the special design zone and over a depth of 18 feet for the piers within the special design zone, and across the width of the foundation area.

Lateral loads on the piers may be resisted by passive pressures acting against the sides of the piers. We recommend an allowable passive pressure equal to an equivalent fluid weighing 400 pounds per square foot per foot of depth to a maximum value of 4000 pounds per square foot (factor of safety ≈ 2). This value can be assumed to be acting against 1.5 times the diameter of the individual pier shafts starting at a depth of 12 feet. Passive resistance should be disregarded for the uppermost 8 feet of the pier embedment beyond the special design zone and for the uppermost 18 feet of pier embedment within the special design zone.

The surficial soils may have a tendency to creep downhill, creating a void along the downslope sides of the piers and leaving them unsupported. Therefore, we recommend the piers be designed as free-standing columns, in accordance with the requirements of the 1997 Uniform Building Code, Section 1910, for the upper 8 feet beyond the special design zone and for the upper 18 feet within the special design zone.

The bottom of pier excavations should be reasonably free of loose cuttings and soil fall-in prior to installing reinforcing steel and placing concrete. It is our recommendation the contractor be made aware of the subsurface conditions outlined in this report and he obtain construction equipment appropriately sized to perform the recommended work. In particular, the piers must extend a minimum of 18 feet below ground surface beyond the special design zone and a minimum of 28 feet below the ground surface within the special design zone. Equipment capable of performing this recommendation should be employed. Any accumulated water in pier excavations should be removed prior to placing reinforcing steel and concrete, or the concrete should be tremied from the bottom of the hole. Care should be taken during concrete placement to avoid "mushrooming" at the top of the pier because distress in the building may result from expansive soil uplift forces on the "mushroom caps".

Due to the high groundwater at the site and the significant potential for caving of the pier walls, special construction techniques are strongly recommended for pier installation. One common technique for pier drilling in caving soil consists of casing the hole as drilling proceeds, installing the reinforcing steel, and then pulling the casing out as the concrete is tremied from the bottom of the hole. Other techniques involve the use of drilling "mud" to hold the borehole open during drilling, and then tremying the concrete from the bottom of the hole. The procedures involved for pier installation under these conditions are not trivial. We strongly recommend a contractor experienced in pier installation procedures for caving soils below the groundwater table be retained to perform this work.

The piers should be tied together in at least one direction with grade beams and tie beams that extend up and down the slope between the piers, as well as across the slope between the piers. The maximum horizontal distance between the grade beams and tie beams should be approximately 20 feet. The grade beams and tie beams should be designed to span between the piers in accordance with structural requirements. In order to minimize the possible detrimental effects of the expansive soils, we recommend either a 4-inch void be created at the bottom of all grade beams and tie beams, or the grade beams be designed to resist an ultimate (non-factored) uplift pressure of 2000 pounds per square foot. If a void is

used, our firm should review and approve the method of forming the void prior to construction of the grade beams and tie beams. We should note that if styrofoam is used to form the void beneath the grade beams or tie beams, it must be removed upon completion of the concrete placement. If the grade beams or tie beams are to retain soil, they should be designed to resist the appropriate lateral earth pressures provided in Section 5.07, "Retaining Walls."

The proper handling of spoils excavated during the pier drilling is very important. If these materials are left in a loose condition on a slope, they will have a tendency to creep downhill and/or erode during periods of heavy rainfall. Therefore, we recommend these materials be removed from the site, placed and compacted as engineered fill, or placed as wall backfill where settlement would not cause a problem.

The floor system should be structurally supported and derive all of its support from the pier-and-grade beam foundations.

5.05 Building Code Seismic Design Parameters

Based on our review of the site geology and the 1997 Uniform Building Code (UBC), we recommend an S_D soil profile for the seismic design of the structures. The nearest active fault is the Hayward fault, located approximately 10 km (approximately 6.2 miles) to the southwest. It is a Type A fault as identified in Table 16-U of the 1997 UBC. The site is located within Seismic Zone 4 as determined from Figure 16-2 of the 1997 UBC. We recommend near-source factors of $N_a = 1.0$ and $N_v = 1.2$.

5.06 Slabs-on-Grade

5.06.1 Living Area Slabs

Interior slabs-on-grade are not recommended for this project, due to unstable near-surface soils.

5.06.2 Garage and Exterior Slabs

We recommend that any exterior slabs-on-grade (including the garage slabs) be supported on a minimum of 12 inches of imported, compacted, non-expansive fill. In areas of existing fill, we recommend all of the old, existing fill underlying any proposed slabs be removed and recompacted to the requirements of structural fill. If all of the old fill under proposed slabs cannot be removed, then some settlement, tilting, and cracking of the slab should be expected.

In order to minimize volume change of the subgrade soils, these materials should be scarified to a depth of 6 inches, moisture conditioned to slightly above optimum water content, and compacted to the requirements for structural fill. Prior to the construction of the slabs, the subgrade surface should be proof-rolled to provide a smooth, firm surface for slab support.

The slabs should be structurally independent from the perimeter grade beams and be free floating. Score joints should be provided at a maximum spacing of 10 feet in both directions. The slabs should be appropriately reinforced according to structural requirements; concentrated loads may require additional reinforcing. Minor movement of the concrete slab with resulting cracking should be expected. Therefore, partition walls or doorway trim boards should not be supported directly on the concrete slab and steps to the house from the slab area should be created with a void between the steps and the house foundations. The recommendations presented above, if properly implemented, should help minimize the magnitude of this cracking. It has been our experience the installation of wire mesh for slab reinforcement is often not

performed properly during construction of the slab. As a result, we recommend steel bar reinforcement be used to reinforce any proposed slabs.

5.07 Retaining Walls

Retaining walls should be supported on pier foundations designed in accordance with Section 5.04, "House Foundation." Retaining walls must be designed to resist both ultimate (non-factored) lateral earth pressures and any additional lateral loads caused by surcharge loads on the adjoining ground surface. We recommend walls be designed to resist the equivalent fluid pressures indicated in the table below. The appropriate design values should be chosen based on the condition of the wall (restrained or unrestrained) and the angle of the slope behind the wall. Unrestrained wall pressures should only be considered applicable where it would be structurally and architecturally acceptable for the wall to laterally deflect 2 percent of the wall height.

Condition	Cut Slopes		Fill Slopes	
	4:1[1] or flatter	2:1	4:1 or flatter	2:1
Unrestrained	50 pcf[2]	70 pcf	55 pcf	75 pcf
Restrained	65 pcf	85 pcf	75 pcf	95 pcf

1 Inclination behind wall, horizontal to vertical.
2 "pcf" signifies "pounds per cubic foot" equivalent fluid pressure.

- A linear interpolation should be used to determine design values for retaining walls where the slope behind the wall is between 4:1 and 2:1. Slopes steeper than 2:1 are not anticipated at the site.

- For surcharge loads, increase the ultimate (non-factored) design pressures behind the wall by an additional uniform pressure equivalent to one-half (for restrained condition) or one-third (for unrestrained condition) of the maximum anticipated surcharge load applied to the surface behind the wall.

The above pressures assume sufficient drainage will be provided behind the walls to prevent the build-up of hydrostatic pressures from surface and subsurface water infiltration. Adequate drainage may be provided by a subdrain system consisting of a 4-inch, rigid, perforated pipe, bedded in ¾-inch, clean, open-graded rock. As shown on Figure 2, the recommended location of the subdrain pipe is behind the heel of the footing. Although we have observed that the subdrain pipe is often placed on top of the heel of the footing, it has been our experience this may lead to moisture seeping through the wall resulting in dampness and staining on the opposite wall face despite the application of waterproofing. However, if such seepage or dampness is acceptable (in front of landscape walls, for example), then the subdrain pipe may be placed on top of the heel of the footing. To prevent ponding of water on top of the heel of the footing, we recommend that the top of the heel be sloped to drain away from the wall with a minimum positive gradient of 5 percent. The perforated drainpipe should sloped to drain with a minimum positive gradient of 2 percent. The entire rock/pipe unit should be wrapped in an approved, non-woven, polyester geotextile such as Mirafi 140N or 140NL, or a 4-ounce equivalent. The rock and fabric placed behind the wall should be at least one foot in width and should extend to within one foot of finished grade. The upper one foot of backfill (6 inches for walls less than 5 feet in height) should consist of on-site, compacted, relatively impervious soils (an impermeable plug). We should note that flexible, perforated pipe

(flexline), 2000-Pound Crush, Leachfield, and ASTM F810 pipe are not acceptable for use in the subdrain because of the likelihood of damage to the pipe during installation and the difficulty of future cleaning with mechanical equipment without damaging the pipe. We recommend the use of Schedule 40 PVC, SDR 35 PVC or ABS, Contech A-2000 PVC drainpipe, or equivalent for the drain system. The subdrain pipe should be connected to a system of closed pipes (non-perforated) that lead to suitable discharge facilities. At the location where the perforated subdrain pipe connects with the solid discharge drainpipe, drainrock backfill should be discontinued. A "clay plug" should be constructed out of relatively impervious soils to direct collected water into the perforated pipe and minimize the potential for water collecting around the solid drainpipe and saturating the adjacent soils. We recommend waterproofing be applied to any proposed retaining walls where applicable. The specification of the type of waterproofing and the observation of its installation should be performed by the architect and/or structural engineer.

In addition, the "high" end and all 90-degree bends of the subdrain pipe should be connected to a riser which extends to the surface and acts as a cleanout. The number of cleanouts can be reduced by installing "sweep" 90-degree bends or pairs of 45-degree bends in succession instead of using "tight" 90-degree bends. "Sweep" 90-degree bends are similar to those used in sanitary sewer pipe connections.

Lined surface ditches with a minimum width of 18 inches should be provided behind any walls that will have an exposed sloping surface steeper than 4:1 behind them. These ditches, which will collect runoff water from the slopes, should be sloped to drain (minimum 2 percent positive gradient) to suitable discharge facilities. If the lined surface ditches consist of reinforced concrete, expansion joints should be provided every 10 feet. The top of the walls should extend at least one foot above the ditch (6 inches for walls less than 5 feet in height). All structural backfill placed behind retaining walls should be compacted in accordance with the requirements provided in Section 5.01, "Site Preparation and Earthwork."

5.08 Plan Review

We recommend our firm be provided the opportunity for a general review of the geotechnical aspects of the final plans and specifications for this project in order that the geotechnical recommendations may be properly interpreted and implemented in the design and specifications. Specific items which we recommend our firm review and which the plans should contain include, but are not limited to, the following:

- General: a citation of this geotechnical investigation report (in the general notes);
- Pier wall and house foundations: pier dimensions and depth of embedment, void below grade beams, as applicable;
- Slabs: import fill depth, recompaction of subgrade, as required;
- Retaining walls: foundation requirements (as noted in Item 2 above), wall drain system, impermeable plug above drain, surface ditch and freeboard, as needed; and
- Drainage: gradient away from structure, downspout collector pipes, surface or subdrain collector system, crawlspace drainage, and discharge location.

If our firm is not accorded the privilege of making the recommended review, we can assume no responsibility for misinterpretation of our recommendations.

5.09 Construction Observation

The analysis and recommendations submitted in this report are based in part upon the data obtained from the WLA test trench and soil boring. The nature and extent of variations across the site may not become evident until construction. If variations then become apparent, it will be necessary to re-evaluate the recommendations of this report.

We recommend our firm be retained to provide geotechnical engineering services during the earthwork, foundation construction, and drainage phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction. Specifically, we recommend a representative of our firm observe the following aspects of the construction:

1. Earthwork: site clearing and debris removal, excavations, subgrade preparation for slabs or filling, compaction operations including retaining wall or trench backfill, as applicable;

2. Foundations: pier drilling, void below grade beams, footing trench excavations; and

3. Drainage: retaining wall subdrains, downspouts, area drains, surface ditches, positive surface gradients adjacent to the home, crawlspace drainage, discharge location.

In order to effectively accomplish these observations, we recommend a pre-construction meeting be held to develop a mechanism for proper communications throughout the project. We also request the client or the client's representative (the contractor) contact our firm at least two working days prior to the commencement of any of the items listed above. If our representative makes a site visit in response to a request from the client or the client's representative and it turns out that the visit was not necessary, our charges for the visit will still be forwarded to the client.

5.10 Wet Weather Construction

Although it is possible that construction can proceed during or immediately following the wet winter months, a number of geotechnical problems may occur which may increase costs and cause project delays. The water content of on-site soils may increase during the winter and rise significantly above optimum moisture content for compaction of subgrade or backfill materials. If this occurs, the contractor may be unable to achieve the recommended levels of compaction without using special measures and would likely have to:

1. Wait until the materials are dry enough to become workable;

2. Dispose of the wet soils and import dry soils; and

3. Use lime or cement on the native materials to absorb water and achieve workability.

If utility trenches, pier holes, or footing excavations are open during winter rains, then caving of the trenches, pier walls, or footing excavations may occur. Also, if the pier holes or footing trenches fill with water during construction, or if saturated materials are encountered at the anticipated bottom of the excavations, the piers or footings may need to be extended to greater depths to reach adequate support capacity than would be necessary if dry weather construction took place.

We should also note it has been our experience increased clean-up costs will occur, and greater safety hazards will exist, if the work proceeds during the wet winter months. Furthermore, engineering costs to observe construction are increased because of project delays, modifications, and rework.

5.11 Future Performance

All people who own or occupy homes on hillsides should realize landslide movements are always a possibility, although generally the likelihood is very low that such an event will actually occur. The probability that landsliding will occur is substantially reduced by the proper maintenance of drainage measures at the site (see detailed discussion in Appendix B). Therefore, the homeowner should recognize their responsibility for performing such maintenance. Consequently, we recommend a copy of our report be provided to any future homeowners of the property if the home is sold, so they will also be aware of their maintenance responsibilities.

If you have any questions concerning this letter, please call us.

Very truly yours,

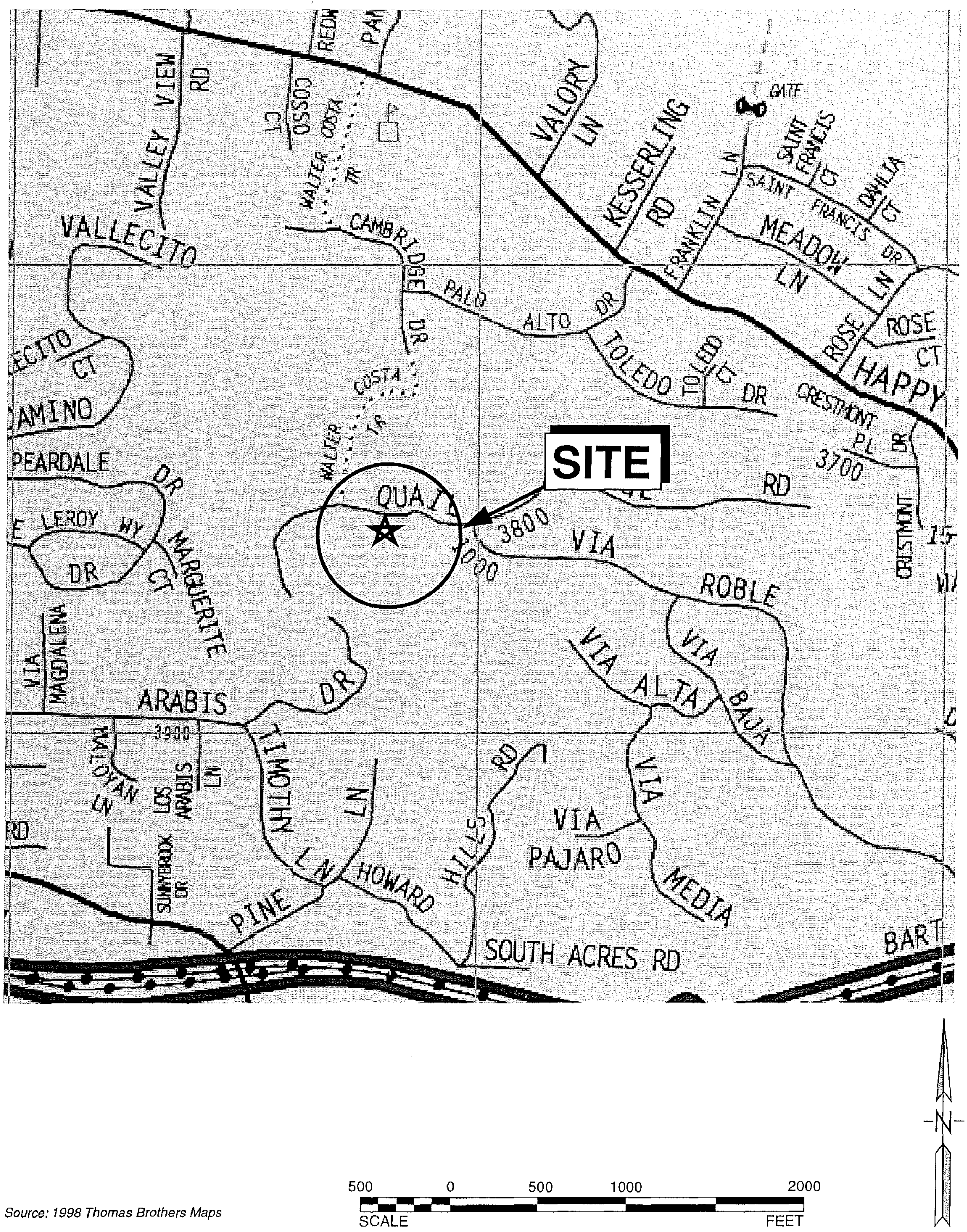
REGISTERED PROFESSIONAL ENGINEER
PHILIP C. TSE
No. 2236
Exp. 06/30/05
GEOTECHNICAL
STATE OF CALIFORNIA

Philip Tse, G.E.
Associate Engineer

PT/sn

Copies: Addressee (2)

Quail Ridge Report - revised



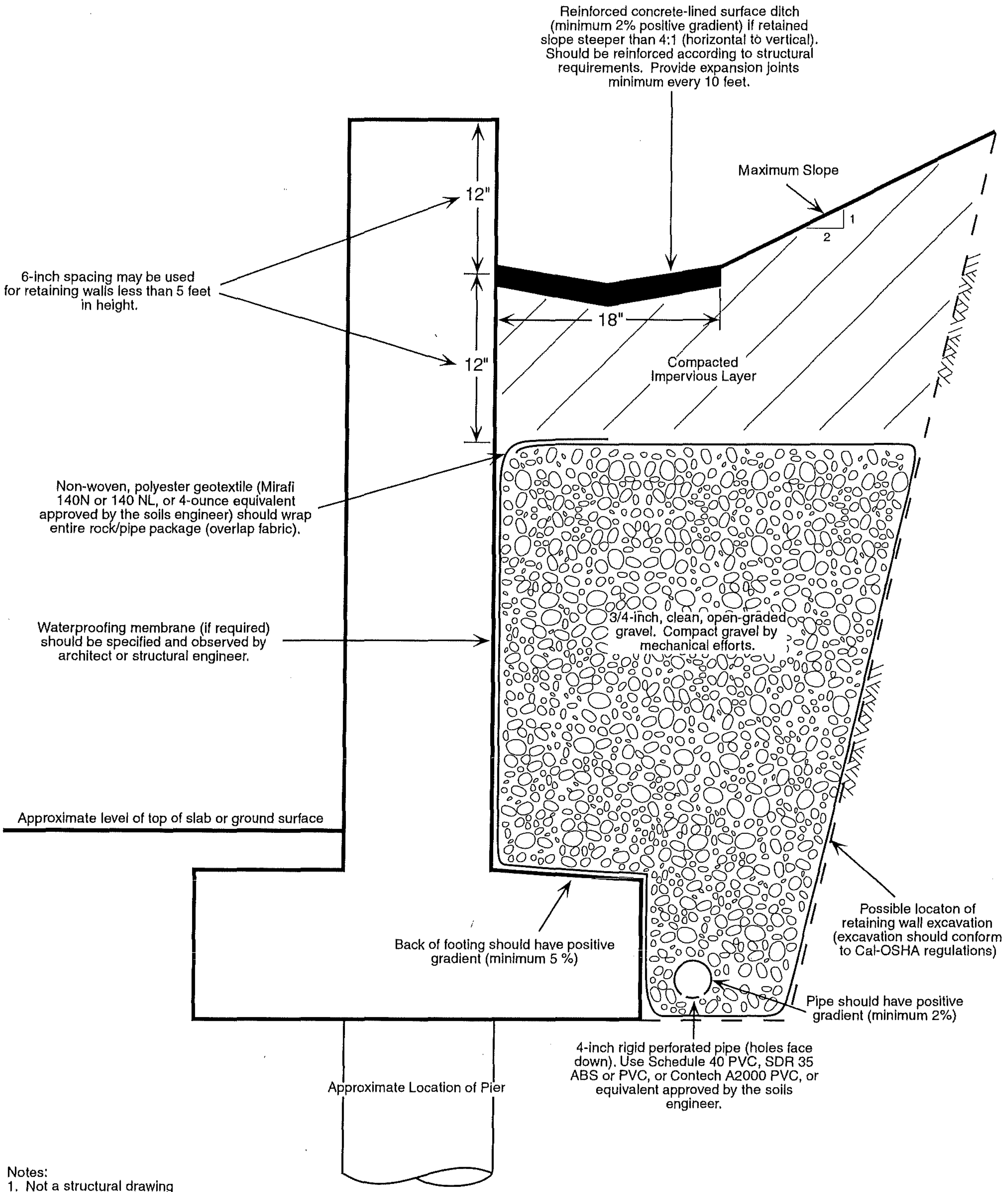
Source: 1998 Thomas Brothers Maps

ALAN KROPP
& ASSOCIATES
Geotechnical Consultants

VICINITY MAP

QUAIL RIDGE ROAD RESIDENCE
Lafayette, California

PROJECT NO.	DATE	FIGURE 1
1729-1B	**November 2003**	



Notes:
1. Not a structural drawing
2. All dimensions should be considered minimums
3. See text for further discussion of detail

NOT TO SCALE

ALAN KROPP
& ASSOCIATES

Geotechnical Consultants

TYPICAL RETAINING WALL SUBDRAIN DETAIL

QUAIL RIDGE ROAD RESIDENCE
Lafayette, California

PROJECT NO.	DATE	FIGURE 2
1729-1B	**November 2003**	

APPENDIX A

William Lettis & Associates
Geologic Investigation of 3933 Quail Ridge Road
Lafayette, California

WLA

Geologic Investigation of Proposed Homesite on Click Property, 3393 Quail Ridge Road, Lafayette, California

Prepared for:

Alan Kropp & Associates, Inc.
2140 Shattuck Avenue
Berkeley, CA 94704

Prepared by:

William Lettis & Associates, Inc.
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February 2004

WLA
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February 18, 2004

Messrs. Alan Kropp & Philip Tse
Alan Kropp & Associates, Inc.
2140 Shattuck Avenue
Berkeley, CA 94704

RE: Geologic investigation of Proposed Homesite on Click property, 3933 Quail Ridge Rd., Lafayette, California

Dear Alan and Philip:

Introduction

This letter report presents the results from the William Lettis & Associates, Inc. (WLA) geologic investigation of the proposed residential homesite on the Click property located at 3933 Quail Ridge Road in Lafayette, California (Figure 1). The WLA study was performed under subcontract to Alan Kropp & Associates, Inc. (AKA), as part of the AKA geotechnical investigation for the proposed residential structure. Jeff Bachhuber, C.E.G. (Principal Engineering Geologist) and Sean Sundermann (Staff Geologist) from WLA performed the geologic investigation.

The property owner, Mr. Matt Click, is proposing to construct a single-level, single family residence on the extreme northeast corner of the property. We understand that the house will have a raised structural steel platform supported on a pier and grade beam foundation. The proposed house location is above and east of the lateral margin of an active (unstabilized) landslide that occurred on the property in 1997. The 1997 slide damaged a former house on the landslide-affected part of the lot, and extended under a portion of Quail Ridge Road. The damaged structure was removed, the site was partially regraded, and Quail Ridge Road was rebuilt on a tieback wall and geogrid-reinforced fill buttress by Engineered Soil Repairs (ESR) in 1999. Our investigation focused on evaluation of the stability of the proposed homesite, and determination of the location and characteristics of the eastern lateral margin of the landslide that bounds the west and south margins of the proposed Click homesite.

The WLA investigation included subsurface exploration of the site with a boring and test pit, and characterization of the geologic conditions and properties to be used for input in the AKA geotechnical investigation. The AKA investigation will evaluate the suitability of the site foundation conditions, evaluate possible stabilization or defense measures to counter future sliding, and develop grading and foundation recommendations. We note that the 1997 landslide on the Click property was not stabilized, and is subject to future movements that could significantly damage any structures constructed on, or across the margin of, the landslide. It is therefore necessary to locate the proposed house a sufficient distance away from the landslide margin to prevent future damages to the structure. A recommended

"Special Design Zone" is established adjacent to the slide margin as discussed in a later section of this report. No structure should be constructed within this special design zone unless specific engineering stabilization measures, such as pier walls or regrading, are used to stabilize the slide margin and allow safe construction within the special design zone. These stabilization measures shall be designed by a qualified licensed geotechnical engineer. Optional stabilization measures are discussed in the AKA geotechnical report.

Numerous studies by various geologic/geotechnical consultants (including WLA and AKA) were performed after the 1997 landslide to determine the cause and characteristics of the slide, and exploratory borings, test pits, and monitoring systems were made in the slide mass to identify and measure slide movement locations and magnitudes. Some of this information is available in the WLA and AKA office files, and was reviewed for this current study. In addition to the past landslide studies, Mr. Click provided a copy of the 1999 design plans for the Quail Ridge Road repair that was performed by ESR, and extended partly onto the Click property. The property owner, and any future homeowners that purchase the property, should review these past studies to be fully aware of the landslide conditions, past movements and damage, and potential future risks associated with the proposed new house.

Scope of Work and Limitations

The scope of the WLA investigation included the following:

1. Review of published and unpublished information in the WLA project file and office;
    - pre and post-landslide aerial photographs
    - detailed landslide map (1997)
    - WLA exploratory borings and test pits in the slide mass (1997)
2. site visual inspection and mapping;
3. excavation and logging of an exploratory boring within the proposed house site area;
4. excavation and logging of an exploratory test pit adjacent to the south margin of the proposed house site and across the active landslide margin;
5. geologic analysis and preparation of a site map and cross section; and,
6. preparation of this letter report.

The proposed house site location was defined in the field by the property owner, and is within the extreme northeast corner of the property east of the landslide and adjacent to Quail Ridge Road. The exact location of a house structure has not yet been determined, and is partly dependent on the results of this study. A site survey and topographic map were performed by DeBolt Civil Engineering, and formed the basis for our selection of the exploration locations. The locations of the WLA site explorations and active landslide margin are shown on a copy of a portion of the DeBolt topographic map in Figure 2.

This report has been prepared for the exclusive use of Mr. Click and his consultants for the specific application to the proposed residential development in accordance with generally accepted geologic and geotechnical engineering practices. No other warranty, expressed or implied, is made. In the event that the nature, design, or location of the home differs from what has been noted above, or if any additional facilities are proposed, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and the conclusions of the report modified or verified in writing.

The findings of this report are valid as of the present date. However, the passing of time will likely change the conditions of the existing property due to natural processes or the works of man. In addition, due to legislation or the broadening of knowledge, changes in the applicable or appropriate standards may occur. Accordingly, the findings of this report may be invalidated, wholly or partly, by changes beyond our control. Therefore, this report should not be relied upon after three years without being reviewed by our office. This report should be provided to any future purchasers or owners of the property.

Background

The property is located on the south-facing slope of a small ridge between Happy Valley and Highway 24, and south of Quail Ridge Road (Figure 1). The site is on the south limb of the Happy Valley Syncline, and underlain by Tertiary Orinda Formation (Contra Costa Group) non-marine sedimentary bedrock that strikes to the northwest and dips north into the axis of the syncline at inclinations between 35 and 40 degrees (Crane, 1988, Haydon, 1995). Interbedded sandstone, conglomerate, siltstone, and claystone was encountered underlying the proposed house site at depths of between about 2 and 5 feet (Figure 3).

Published landslide maps (e.g., Nilsen, 1975; Haydon, 1995) show previously-existing landslides (prior to the 1997 slide) in the swales to the west and east of the site, but do not show the 1997 landslide. This landslide also was not described in the pre-development subdivision and lot geotechnical and foundation reports by ENGEO (1975) and Hallenbeck-McKay & Associates, Inc. (1978). The results from exploratory test pits and borings made in the central part of the landslide mass during the previous WLA/AKA landslide investigations (1997) showed that the 1997 slide occurred along 6- to 24-inch thick brown clay zones in bedrock at depths of about 30 to 40 feet, and possibly with minor displacements along similar clay zones at 60 foot-depth. The previous WLA exploratory test pits provided evidence for past ancient landsliding in the bedrock along the approximate boundaries of the 1997 landslide. This suggests that the 1997 slide occurred along pre-existing planes of weakness in the bedrock. Pre-slide aerial photographs show the site to be located within a broad swale area that possibly defined the extent of an ancient landslide. The proposed Click homesite area is primarily located on an apparently in-place bedrock spur ridge that bounds the swale area, and did not show evidence of past landslide activity on the aerial photographs.

Some grading, primarily cutting, was performed on the site during demolition of the previous landslide-damaged house, and stabilization and reconstruction of Quail Ridge Road. This grading extends partly into the house site area of the planned Click residence, and backfilled a depression and 4- to 6-foot high scarp that formed along the 1997 slide margin below the homesite area. The original ground surface above the landslide lateral margin was excavated and lowered several feet in some areas, and slightly filled in others, obscuring the location of the lateral slide margin that formerly was well-expressed as a steep scarp and disrupted ground area. Because of this post-landslide grading, the location of the lateral slide margin is difficult to determine, and requires the use of exploratory test pits.

A detailed landslide map showing the slide lateral margins was prepared by WLA in 1997. Additionally, post-landslide aerial phographs flown in December, 1997, clearly show the outlines of the landslide. Our interpreted location of the slide margin is shown on Figure 2, and was compiled by superpositioning of the 1997 landslide map with the DeBolt topographic map, examination of the post-slide aerial photographs, and extrapolation of the slide margin location and geometry from our new WLA Trench T-1 that is described below. We believe that the margin location shown on Figure 2 has a locational margin-of-error of about 5 feet to either side of the map line.

The proposed house site location is bounded by the lateral landslide margin, and has an area of approximately 2,000 to 3,000 square feet. The size of the house footprint will be significantly constrained by required setbacks from the property lines, and the landslide lateral margin.

WLA Site Exploration

The WLA site exploration program consisted of one exploratory boring (WLA T-1), and one exploratory test pit (WLA B-1). The locations of the explorations are shown on Figure 2.

Exploratory Test Pit WLA T-1

Exploratory test pit WLA T-1 was excavated on August 18, 2003 across the slide margin and adjacent to the southern margin of the proposed house site location. The test pit was 45 feet long, 5 to 6 feet deep, and 3 feet wide. The test pit was oriented perpendicular to the slide margin at an azimuth of N24E. WLA geologists cleaned and examined the pit walls to identify soil and bedrock units and structures, and to locate and measure the landslide lateral margin. A detailed log was prepared of the south wall of the test pit, and is included in Attachment A. A well-defined slide margin that juxtaposed slide debris against in-place bedrock and colluvium was observed in the lower part of the trench. Uphill (east) of the landslide margin, consistently north-dipping sandstone and conglomerate bedrock was encountered underlying a 1- to 3-foot thick mantle of stiff, sandy and silty clay fill and colluvium. The base of the colluvium (colluvium-bedrock contact) was irregular and marked by deep soil tongues. Bedrock was interbedded, moderately weathered, weakly cemented (friable) sandstone and conglomerate that exhibited a relatively consistent strike of between 305 to 330 degrees, and northward dip (into the slope) of between 35 and 40 degrees. The slide contact was sharp, and had a strike of 324 degrees, and southwest dip of 54 degrees.

A secondary slide margin, defined by a bedrock fracture with 6- to 8-inch vertical offsets of bedding, was located in dilated bedrock immediately behind the main slide margin. A 5- to 10-foot wide, near-vertical, dilated bedrock zone with numerous closely-spaced tensional fractures was observed behind the secondary and main lateral margins. Rock bedding was not displaced by the tensional fractures, and no indications of significant lateral movements were observed in this zone. The colluvial soil overlying the bedrock tension zone was not deformed, suggesting that the tension zone may have formed by ancient landsliding and slope relaxation prior to deposition of the colluvium (perhaps many hundreds of years ago). Bedrock bedding contacts and structure appeared to be stable and in-place above the tensional zone. The landslide debris south and west of the lateral margin consisted of intermixed, translated, clay, rock blocks, and fill that is in a stiff condition. A layer of drainrock was encountered in the extreme downhill end of the trench, about 5 feet west of the slide margin. This drain rock was presumably placed as part of a subsurface drain during reconstruction of Quail Ridge Road by ESR in 1999.

Bedrock observed in the trench is weakly cemented, but exhibits good foundation strength properties. Pocket penetrometer soundings both in the bedrock, and overlying stiff clayey colluvium, exceeded 4.5 tons per square foot. The trench remained dry during excavation and logging, and no seeps or wet zones were encountered.

Exploratory Boring WLA B-1

Exploratory boring WLA B-1 was drilled on September 29, 2003 along the west-central boundary of the proposed house site location (Figure 2) where the fill and overburden soils are believed to be thickest. This location also is along the downhill margin of the proposed house site location nearest the slide margin, and represents the likely worst-case condition for house foundations and possible slide stabilization structures. The boring was drilled with a truck-mounted rig using 6-inch diameter hollow stem augers. The boring was drilled dry, and extended to a depth of 45 feet. The boring was logged by a WLA geologist, and boring logs are included in Attachment A. Samples were collected in the boring using an automatically-tripped, 140 pound hammer with a 30-inch drop. The following sampling tubes were used to collect samples: 3-inch outside diameter Shelby tubes; 3-inch outside diameter driven split spoon ("Modified California") sampler with 2.5-inch diameter brass liner tubes; and, Standard Penetration Test (SPT) drive sampler. Sampling was near continuous for the upper 12 feet of the boring, and thereafter spaced between 2.5 and 3 feet to the bottom of the boring. Samples were retrieved and examined by the WLA geologist, and sealed in labeled plastic bags or capped sample tubes for transport to the WLA office. The samples were described on the boring logs, and delivered to AKA for laboratory testing.

Subsurface stratigraphy encountered in the boring consisted of a 7-foot thick upper layer of stiff (SPT "N" blow counts of 12), silty SAND-CLAY (SC-CL) colluvium overlying sedimentary bedrock that extended to the bottom of the hole. The bedrock was similar to that observed in WLA T-1, and included: (1) an upper layer of moderately weathered, dense (SPT N count of 18 to 33) silty SANDSTONE between 7 and 18.5 foot depth; (2) slightly to moderately weathered, dense to very dense (SPT N count 55 to 76) SILTY SANDSTONE-SILTSTONE between 18.5 feet and 37 feet; and, (3) slightly to moderately weathered, very dense (SPT N count 50 to 60) CLAYSTONE from 37 feet to the bottom of the hole at 45 feet. No landslide failure planes or clay seams, similar to those encountered at the base of the 1997 slide, were encountered in the boring, and the bedrock at the boring location appears to be in-place and stable. No free groundwater was encountered in the boring. The boring was backfilled with cement grout upon completion.

Geologic Cross Section

Figure 3 is an interpreted geologic cross section that was developed by WLA geologists using a hand level and tape, and information from the exploratory boring and test pit. The location and geometry of the slide margin were extrapolated from the WLA T-1 test pit and previous mapping, and bedrock bedding was extrapolated from the WLA T-1 test pit. Evaluation of the cross section suggests that the buried bedrock surface is relatively flat under the proposed house site location, and steepens southward below boring WLA B-1 into the axis of the 1997 slide mass. A bedrock tension zone, similar to that observed behind the slide lateral margin in WLA T-1, is shown on the cross section between the boring the extrapolated slide margin.

Based on examination of the cross section, it appears that future movements of the 1997 landslide will be constrained to the area of the existing landslide lateral margin and the bedrock tension zone extending for about 10 feet uphill from the lateral margin. Possible future slide movements are not believed likely to extend significantly eastward beyond the tension zone, and into the proposed house site location. The cross section suggests that large-scale eastward slide enlargement would be partly constrained by the rising bedrock surface behind the lateral margin, and failure planes would need to be substantially flatter than the current lateral margins that are inclined between 54 and 85 degrees. The weathered bedrock behind the tension zone did not exhibit low-strength planes of structural weakness, and likely possesses sufficient strength to resist low-angled slide planes. Additionally, the bedrock bedding is favorably inclined into the slope, and movements in the bedrock tension zone likely would be topple or raveling-type movements into the slide lateral margin zone. The old colluvium above the bedrock tension zone in WLA T-1 did not appear to have experienced significant slide-induced movements, and the bedrock tension cracks appear to have formed prior to deposition of the colluvium. This suggests a substantial antiquity for the bedrock tension cracks. Based on this information, large-scale enlargement of the slide margin into the in-place, stable bedrock uphill from the bedrock tension zone is not believed to be likely.

Recommendations

Based on the past history of sliding and observed conditions, it is likely that the unstabilized landslide mass located west of the lateral slide margin will be subject to future creeping-type movements, and possible large-scale movements. Any structures that cross, or encroach against, the slide margin are subject to large-scale deformations (vertical and lateral movements on the order of several feet or more) that could cause substantial damage or structural collapse and a life-safety hazard to inhabitants. The dilated tension zone in bedrock immediately behind (east of) the slide lateral margin is potentially subject to future small- to moderate-magnitude (inches to a couple of feet) of lateral and vertical movements in response to future displacement of the main slide. Such displacements in the tension zone could cause damage to any structures sited over this zone.

We define a 20-foot wide "Special Design Zone" adjacent to (east of) the slide margin as shown on Figure 2. The 20-foot wide special design zone includes the bedrock tension zone, and an additional buffer zone of 10 feet behind the tension zone. No structures should be sited within the special design zone without specific engineering stabilization and foundation design measures to allow safe construction within the zone. This special design zone is believed to provide a relatively high level of safety against future slide movements that are similar to those that occurred in 1997, and ancient past slides in the bedrock. The recommended special design zone was made as narrow as possible, balanced by the need to include the rock tension zone and uncertainty in the location and behavior of the slide margin. It may be feasible to stabilize the margin of the slide adjacent to the proposed house site location using a drilled pier wall or other method to stabilize the slope and allow safe encroachment of the structure within the recommended 20 foot special design zone. Such a design should be developed by a qualified geotechnical engineer, and factor future large-scale movements of the unstabilized part of the slide.

Future slide movements should not significantly encroach past the special design zone during a single catastrophic event. However, it is possible that the slide could progressively enlarge eastward in a series of separate slide events. The recommended special design zone should allow sufficient warning to permit safe evacuation of residents, and provide time to respond to the slide with possible emergency stabilization measures. The house structure should be supported on engineered deep pier and grade beam foundations that extend into the sound and stable bedrock. This will provide an extra level of safety for the house. Drainage should be well-controlled on the site, and prevented from flowing into, and saturating, the slide area.

Closure

Please call us at 925-256-6070 if you have any questions regarding this report.

Sincerely,
WILLIAM LETTIS & ASSOCIATES, INC.

Jeffrey L. Bachhuber, C.E.G.
Principal Engineering Geologist

Sean Sundermann
Staff Geologist

References

Crane, R.C., 1988, Geologic 7.5 Minute quadrangle map of the Briones Valley Quadrangle: in, Northern California Geological Society, Field Trip Guide to the Geology of the San Ramon Valley and Environs, April 30, 1988, map scale 1:24,000.

ENGEO, 1975, Tiffany Hills Development Lafayette, California Soil and Geologic Study, unpublished consulting report to the Group Designers, Inc.

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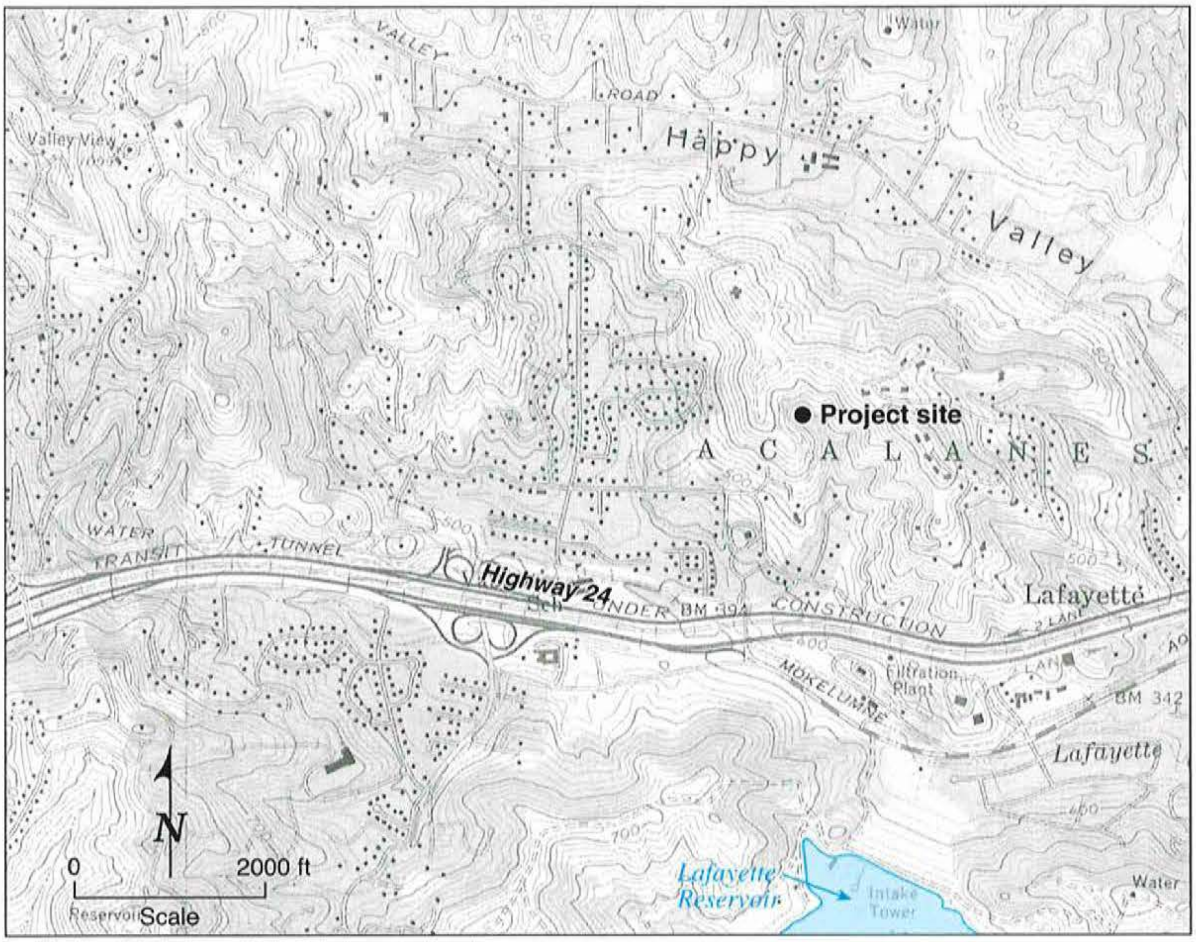
ATTACHMENTS – TEST PIT AND BORING LOGS



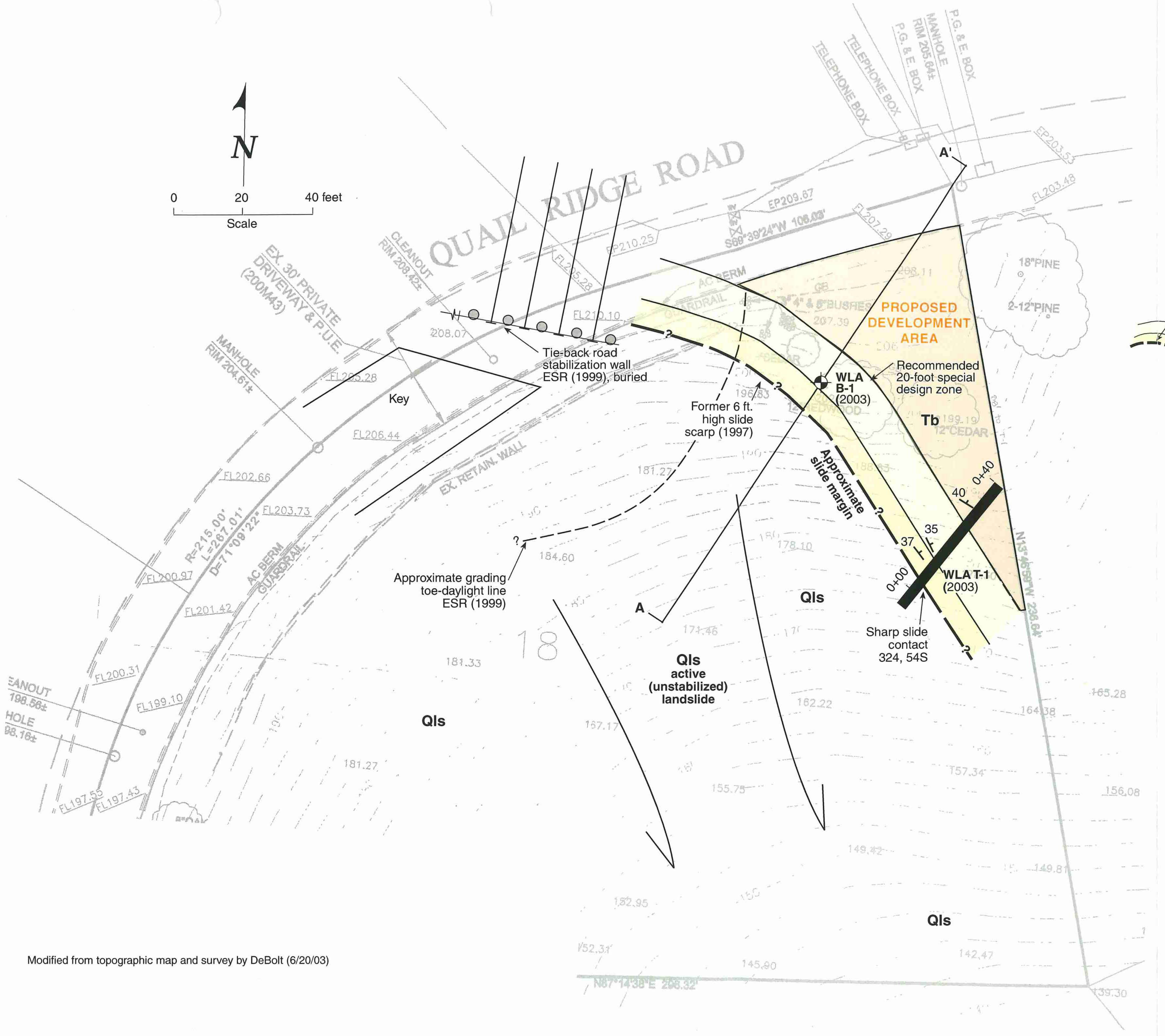
Modified from USGS Briones Valley 7.5 minute quadrangle

QUAIL RIDGE RD.-CLICK

Site Location Map

WLA William Lettis & Associates, Inc. | Figure 1

1623 Quail Ridge Rd.



Modified from topographic map and survey by DeBolt (6/20/03)

Explanation

WLA B-1 ⊕	Location of exploratory boring by WLA
WLA T-1 ▬	Location of exploratory test pit by WLA
Landslide margin 20-foot special design zone Rock tension zone	No structure should be constructed within the special design zone unless specific engineering stablization measures, such as pier walls or regrading, are used to stabilize the slide margin. These stabilization measures shall be designed by a qualified, licensed geotechnical engineer
Qls	Active landslide mass (unsuitability) and movement direction subject to future large-scale movements
Tb	Tertiary Contra Costa Group bedrock; interbedded sandstone, siltstone, and claystone, forms a resistant ridge east of slide margin; overlain by 1 to 5 feet of soil
37 ⟍	Bedrock bedding strike and dip
A — A'	Cross section location (Figure 3)

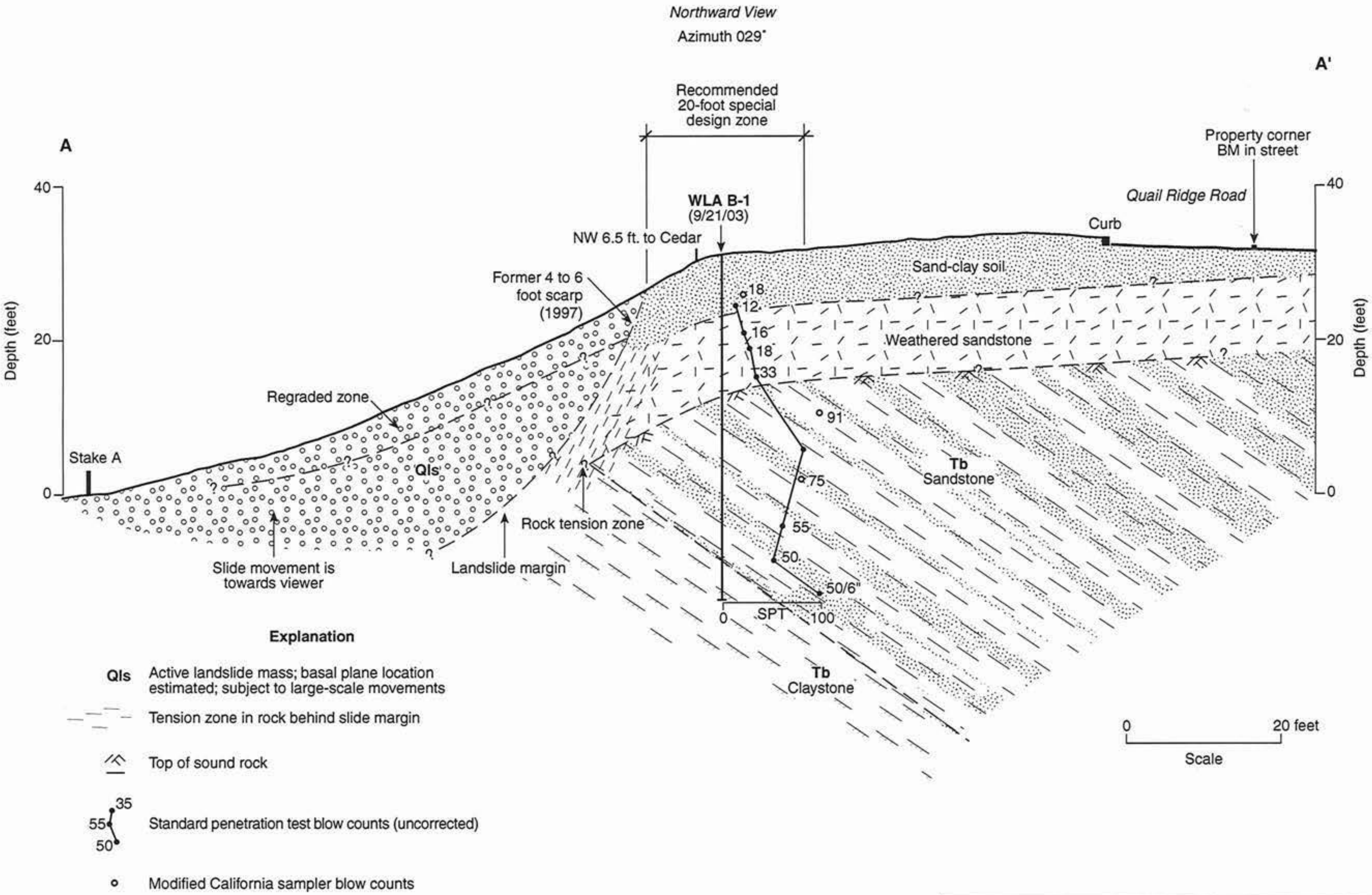
Note: Refer to extensive studies performed by Alan Kropp & Associates, Inc., William Lettis & Associates (1997-1998) for additional information on the active landslide on the subject property.

QUAIL RIDGE RD. - CLICK

Site Geologic Map and Exploration Locations

WLA William Lettis & Associates, Inc. Figure 2

1623 Quail Ridge Road



Explanation

Qls Active landslide mass; basal plane location estimated; subject to large-scale movements

Tension zone in rock behind slide margin

Top of sound rock

35
55
50
Standard penetration test blow counts (uncorrected)

○ Modified California sampler blow counts

▨ Bedrock bedding apparent dip, extrapolated from WLA T-1

Note: Topography based on a hand level and tape survey by Jeff Bachhuber and Sean Sundermann on 9/29/03.

QUAIL RIDGE RD.-CLICK

Geologic Cross Section A-A'

WLA William Lettis & Associates, Inc. Figure 3

1623 Quail Ridge Road

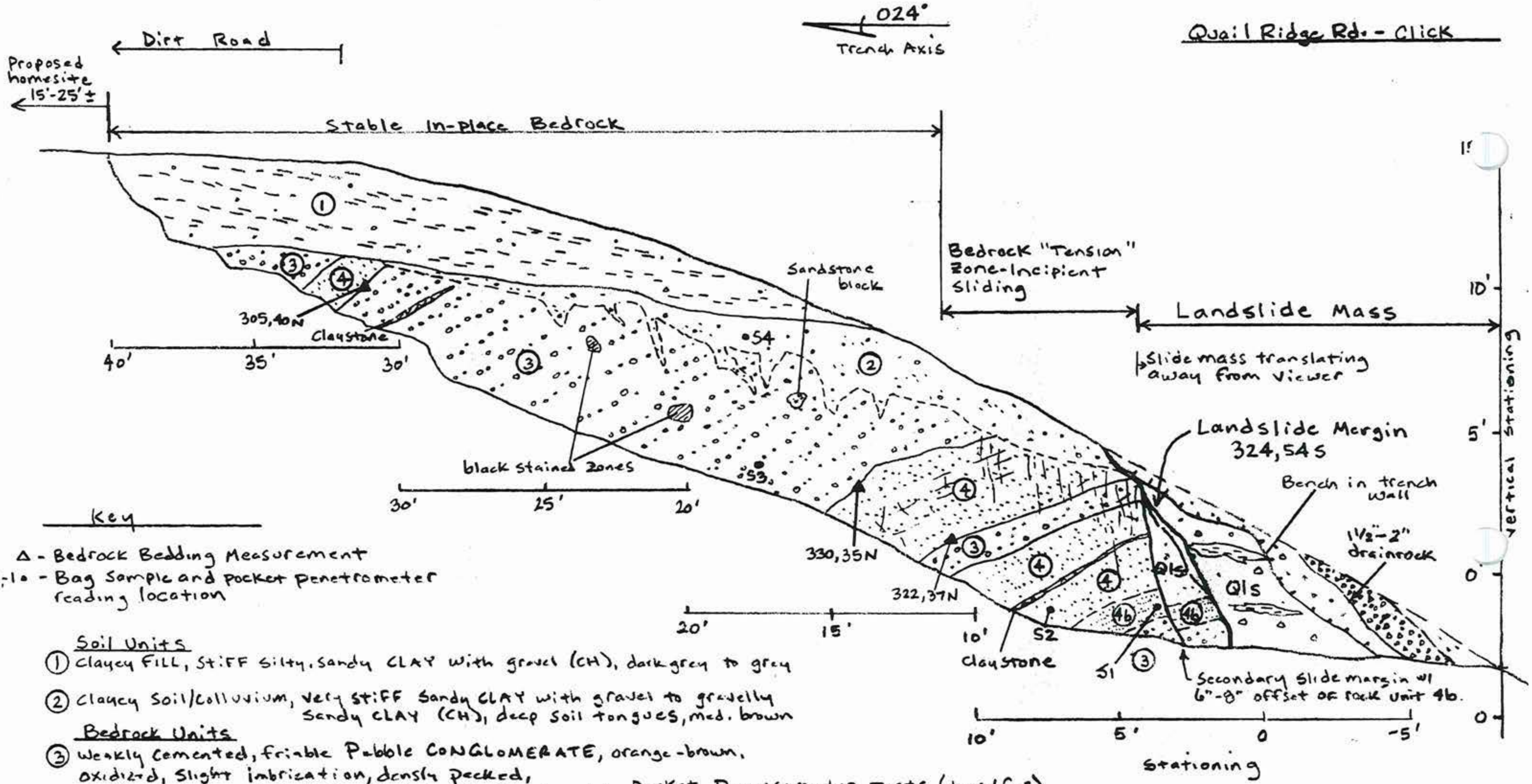
Alan Kropp Associates, Inc (AKA)

Logged by: Jeff Bachhuber, C.E.G.

Sean Sundermann

August 18, 2003

Trench 3' wide



Key

Δ - Bedrock Bedding Measurement

S-1• - Bag sample and pocket penetrometer reading location

Soil Units

① Clayey FILL, Stiff silty, sandy CLAY with gravel (CH), dark grey to grey

② Clayey Soil/Colluvium, very stiff Sandy CLAY with gravel to gravelly Sandy CLAY (CH), deep soil tongues, med. brown

Bedrock Units

③ Weakly cemented, friable Pebble CONGLOMERATE, orange-brown, oxidized, slight imbrication, densly packed, Contains black-stained zones, clasts ¼-2", subrounded

④ Medium to coarse weakly cemented, friable SANDSTONE, tan, clayey zones and fine-grained zones (4b), locally Jointed

Landslide Mass

Mixed clayey fill (post- landslide grading) and clayey, rocky debris, medium stiff

Pocket Penetrometer Tests (tons/ft²)

S-1	4-4.5+
S-2	4.5+
S-3	4.5+
S-4	4.5+

WLA

BORING LOG

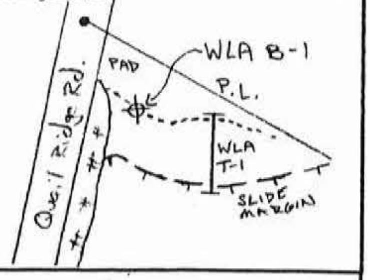
Page 1 of 3

Project: Quail Ridge - Click

Job No.: 1623

Boring No.: WLA B-1

Boring Location:



Type & Diameter of Boring: Hollow Stem Auger

Elevation @ Top of Hole / Total Depth: ± 196 el

Sampling Method: 3"φ Shelby; 3"φ O.D. ModCal; 1.4" SPT

Sample Driving Hammer and Drop: 140 lb. auto-trip 30" drop

Drilling Contractor and Rig: V&W CME 850

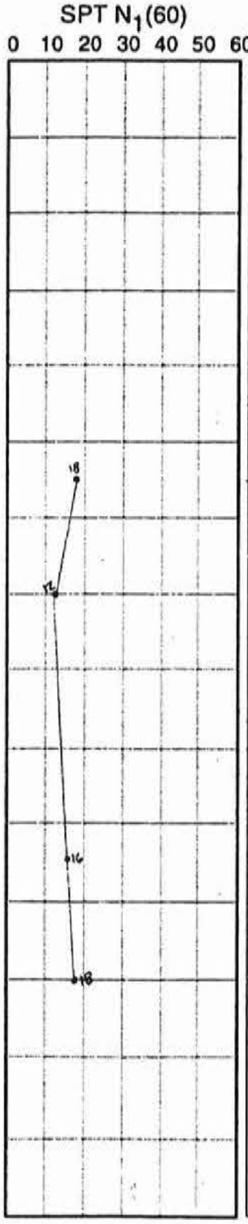
Date Started: 9/29/03

Date Completed: 9/29/03

Depth to groundwater: Not Encountered

Logged By: S. Sundermann / J. Bochhuber

Notes:



Uncorrected Blows per 6-inch drive	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Torvane (TSF)	Description	Remarks
	2–4		1-1 ☒	24			SAND-CLAY, silty; mottled tan to red-brown; angular sandstone rock fragments up to 1" diameter; medium dense; poorly sorted; well graded (Colluvium)	250 psi
1 A 6 B 12 C	4–5.5	SC-CL	1-2 ☒	8	>4.5		↓	
6 6 6	5.5–7		1-3 ▮	12	4.5		Grades coarser and darker color (brown-gray) TOP OF BEDROCK	
	7–9		1-4 ☒	24			SANDSTONE with silt; light tan to brown-yellow; fine grained; weakly cemented; slight to moderate weathering; sub-horizontal laminations and oxidation streaks	200-500 psi
1 A 4 B 12 C	9–10.5	SP-SW	1-5 ☒	4	>4.5			
7 8 10	10.5–12		1-6 ▮	16				
	13	SANDSTONE					SANDSTONE, silty, with clay; light gray to tan; very fine to fine grained; soft; weakly cemented; slight to moderate weathering; discontinuous joints	
	14–15		1-7 ☒	8	>4.5			500 psi

▩ 3.0-inch O.D. split spoon sampler

☒ ~~2.5~~ 3.0-inch O.D. ~~split spoon~~ Shelby sampler

▮ Standard Penetration Test (SPT) sampler

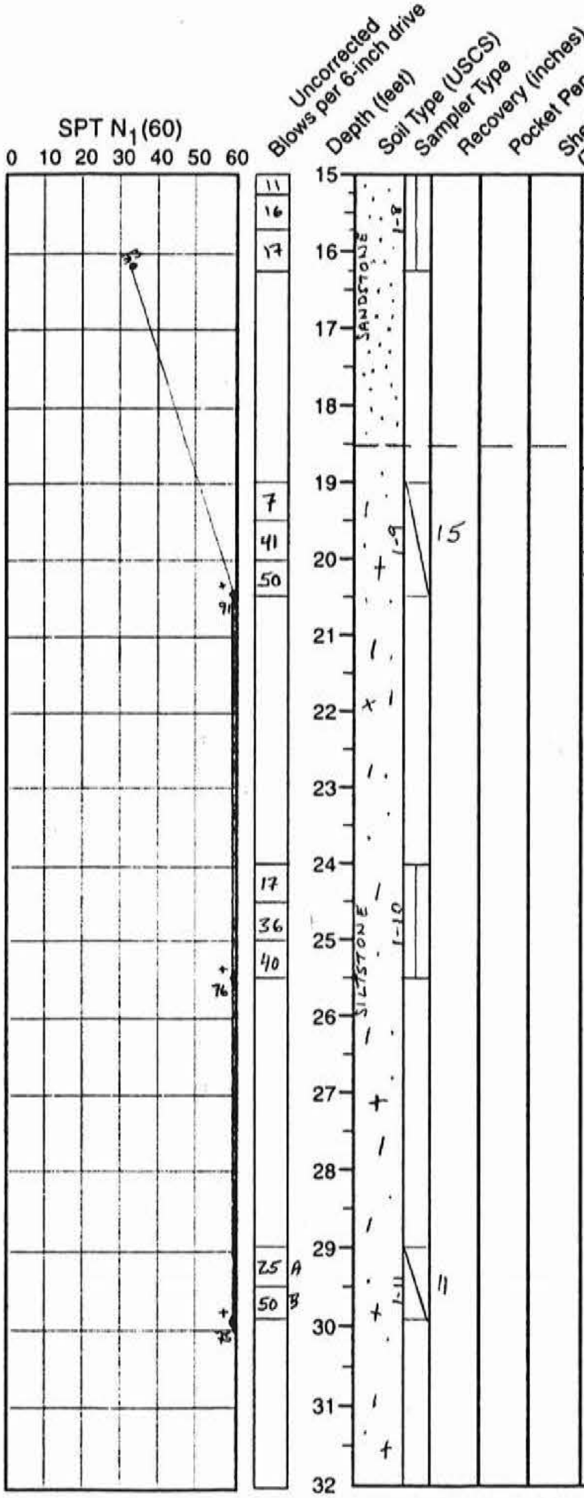
B-1

WLA

BORING LOG

Page 2 of 3

Project	Job No.	Boring No.
Quail Ridge - Click	1623	WLA B-1



Description

SANDSTONE, silty, with clay; light gray to tan; very fine to fine grained; soft; weakly cemented; Slight to moderate weathering; discontinuous joints

Silty SANDSTONE to Sandy SILTSTONE; tan to light orange-brown; sub-horizontal laminations and oxidation streaks; slightly weathered; weak to moderate weakly cemented; fine-grained; stained and oxidized discontinuous joints

Coarsens Downward

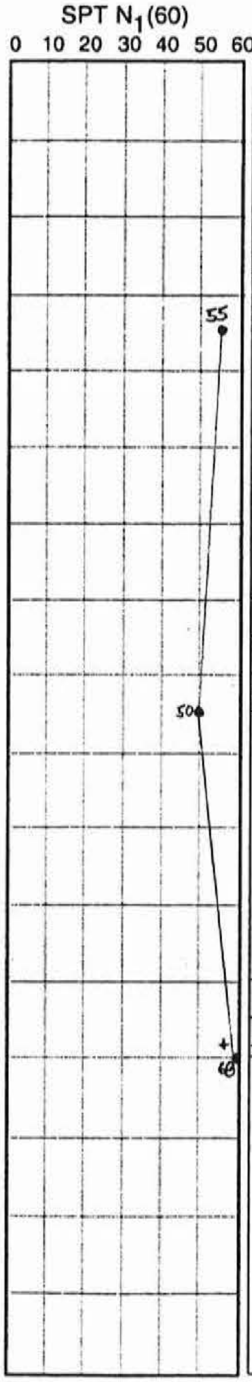
Remarks

▨ 3.0-inch O.D. split spoon sampler ☒ 2.5-inch I.D. split spoon sampler ■ Standard Penetration Test (SPT) sampler

BORING LOG

Page 3 of 3

Project Quail Ridge - Click	Job No. 1623	Boring No. WLA B-1



Uncorrected Blows per 6-inch drive	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Torvane (TSF)
14 25 30	34	1-12	▯	18		
9 16 34	39	1-13	▯	17		
18 50	44	1-14	▯	11 R		

Depth scale: 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49

CLAYSTONE

Description | **Remarks**

Silty SANDSTONE to Sandy SILTSTONE; tan to light orange-brown; sub-horizontal laminations and oxidation streaks; slightly weathered; weak to moderately cemented; medium-grained; stained and oxidized discontinuous joints.

CLAYSTONE; micaceous with calcium carbonate blebs; light gray to gray; low plasticity; weakly to moderately cemented; soft; discontinuous joints.

Bottom of Hole @ 44.9'
No Free groundwater encountered
Backfilled with neat cement by tremmie method 9/29/03

▨ 3.0-inch O.D. split spoon sampler ☒ 2.5-inch I.D. split spoon sampler ▯ Standard Penetration Test (SPT) sampler

APPENDIX B

GUIDE TO THE MAINTENANCE OF HILLSIDE HOME SITES

During the wet winter season, homeowners, particularly those living in houses placed on fill (man-placed earth) or in the vicinity of excavated (cut) slopes, become concerned about the condition of their building site. In general, modern design and construction practice minimizes the probability of serious landsliding (slope failure). The grading codes of the local jurisdictions (cities and counties) in California concerning filled land, excavation, terracing, and slope construction are among the most stringent in the country and, if followed, are adequate to meet almost any natural occurrence. Therefore, the concern of the homeowner should be directed toward maintaining slopes, drainage provisions, and facilities so that they will perform as designed.

The following discussion, general recommendations, and simple precautions are presented to help the homeowner maintain their hillside building site.

The general public often regards the natural terrain as stable — "terra firma." This is, of course, an erroneous concept. Nature is always at work altering the landscape. Hills and mountains are worn down by mass wasting (erosion, sliding, creeping, etc.) and the valleys and lowlands collect these products. Thus the natural process is toward leveling the terrain. Periodically (over tens of millions of years), major land movements rebuild mountains and hills, and these processes begin again. In some areas these processes are very slow, and in others they are more rapid.

Development of hillsides for residential use is carried out, as far as possible, to enhance the natural stability of the site and to minimize the potential for instability resulting from the grading necessary to provide home sites, streets, yards, and other improvements. This has been done by the developer and designers on the basis of geologic and soil mechanics investigations. In order to be successful, the slope, drainage provisions, and facilities must be maintained by the homeowner.

Homeowners are accustomed to maintaining their homes. They expect to paint their houses periodically, replace wiring, clean out clogged plumbing, and repair roofs. Maintenance of the home site, particularly on hillsides, should be considered on the same basis, or even on a more serious basis because neglect can result in serious consequences. In most cases, lot and site maintenance can be taken care of along with landscaping, and can be carried out more economically than repair after neglect.

Most slope and hillside lot problems are associated with water. Uncontrolled water from a broken pipe, cesspool, or wet weather causes most damage. Wet weather is the largest cause of slope problems, particularly in California where rain is intermittent, but may be torrential. Therefore, drainage and erosion control are the most important aspects of home site stability; these provisions must not be altered without competent professional advice. Further, maintenance must be carried out to assure their continued operation.

As geotechnical engineers concerned with the problems of building sites in hillside developments, we offer the following list of recommended "Do's and Don'ts" as a guide to homeowners.

----- ----- -----

1. DO check roof drains, gutters and down spouts to be sure they are clear. Depending on your location, if you do not have roof gutters and down spouts, you may wish to install them because roofs, with their wide, flat area can shed tremendous quantities of water. Without gutters or other adequate drainage, water falling from the eaves collects against foundation and basement walls, which can be undesirable.

2. DO clear surface and terrace drainage ditches, and check them frequently during the rainy season. Use a shovel, if necessary. Ask your neighbors to do likewise.

3. DO be sure that all drainage ditches have outlet drains that are open. This should be tested during dry weather and can usually be done with a hose. If blockage is evident, you may have to clear the drain mechanically.

4. DO check all drains at top of slopes to be sure they are clear and that water will not overflow the slope itself, causing erosion.

5. DO keep subsurface drain openings (weep-holes) clear of debris and other material which could block them in a storm.

6. DO check for loose fill above and below your property if you live on a slope or terrace.

7. DO monitor hoses and sprinklers. During the rainy season, little, if any, irrigation is required. Over-saturation of the ground is unnecessary, increases watering costs, and can cause subsurface drainage.

8. DO watch for water backup of drains inside the house and toilets during the rainy season, as this may indicate drain or sewer blockage.

9. DO exercise ordinary precaution. Your house and building site were constructed to meet certain standards which should protect against any natural occurrence if you do your part in maintaining them.

----- ----- -----

1. DON'T block terrace drains and brow ditches on slopes or at the tops of cut or fill slopes. These are designed to carry away runoff to a place where it can be safely distributed. Generally, a little shovel work will remove any accumulation of dirt and other debris which may clog the drain. If several homes are located on the same terrace, it is a good idea to check with your neighbors. Water backed up on their property may eventually reach you. Water backed up in surface drains will tend to overflow and seep into the terraces, creating less stable slopes. Maintain the ground surface upslope of lined ditches to ensure that surface water is collected in the ditch and is not permitted to be trapped behind or under the lining.

2. DON'T permit water to collect or pond on your home site. Water gathering here will tend to either seep into the ground (loosening fill or natural ground), or will overflow into the slope and begin erosion. Once erosion is started, it is difficult to control and severe damage may result rather quickly.

3. DON'T connect roof drains, gutters, or down spouts to subsurface drains. Rather, arrange them so that water either flows off your property in a specially designed pipe or flows out into a paved driveway or street. The water then may be dissipated over a wide surface or, preferably, may be carried away in a paved gutter or storm drain. Subdrains are constructed to take care of ordinary subsurface water and cannot handle the overload from roofs during a heavy rain.

4. DON'T permit water to spill over slopes, even where this may seem to be a good way to prevent ponding. This tends to cause erosion and, in the case of fill slopes, can eat away carefully designed and constructed sites.

5. DON'T drop loose soil or debris over slopes. Loose soil soaks up water more readily than compacted fill. It is not compacted to the same strength as the slope itself and will tend to slide when laden with water; this may even affect the soil beneath the loose soil. The sliding may clog terrace drains below or may cause additional damage in weakening the slope. If you live below a slope, try to be sure that loose fill is not dumped above your property.

6. DON'T discharge water into subsurface blanket drains close to slopes. Trench drains are sometimes used to get rid of excess water when other means of disposing of water are not readily available. Overloading these drains saturates the ground and, if located close to slopes, may cause slope failure in their vicinity.

7. DON'T discharge surface water into septic tanks or leaching fields. Not only are septic tanks constructed for a different purpose, but they will tend, because of their construction, to naturally accumulate additional water from the ground during a heavy rain. Overloading them artificially during the rainy season is bad for the same reason as subsurface subdrains, and is doubly dangerous since their overflow can pose a serious health hazard. In many areas, the use of septic tanks should be discontinued as soon as sewers are made available.

8. DON'T over-irrigate slopes. Naturally, ground cover of ice plant and other vegetation will require some moisture during the hot summer months, but during the wet season, irrigation can cause ice plant and other heavy ground cover to pull loose. This not only destroys the cover, but also starts serious erosion. In some areas, ice plant and other heavy cover can cause surface sloughing when saturated due to the increase in weight and weakening of the near-surface soil. Planted slopes should be planned where possible to acquire sufficient moisture when it rains.

9. DON'T let water gather against foundations, retaining walls, and basement walls. These walls are built to withstand the ordinary moisture in the ground and are, where necessary, accompanied by subdrains to carry off the excess. If water is permitted to pond against them, it may seep through the wall, causing dampness and leakage inside the basement. Further, it may cause the foundation to swell up, or the water pressure could cause structural damage to walls.

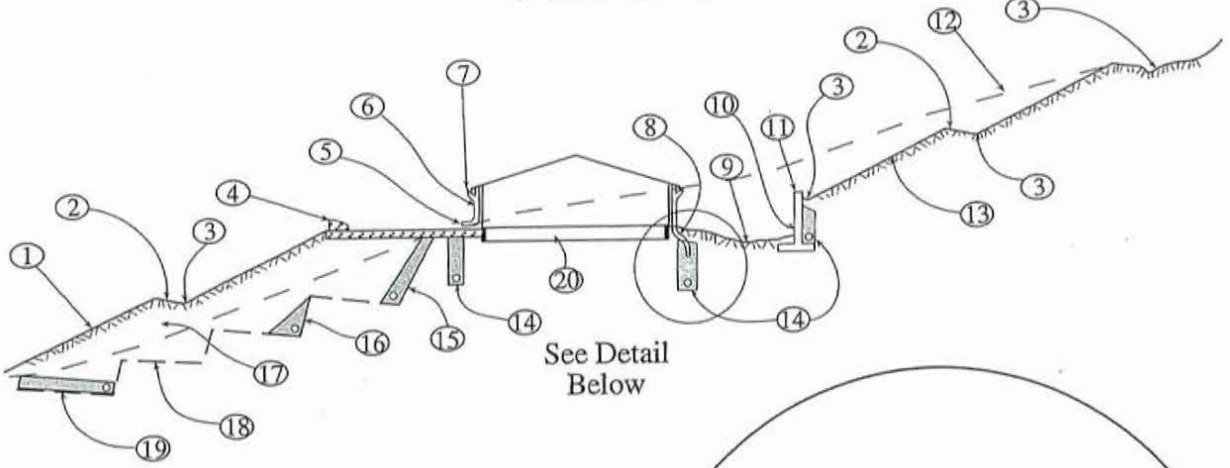
10. DON'T try to compact soil behind walls or in trenches by flooding with water. Not only is flooding the least efficient way of compacting fine-grained soil, but it could damage the wall foundation or saturate the subsoil.

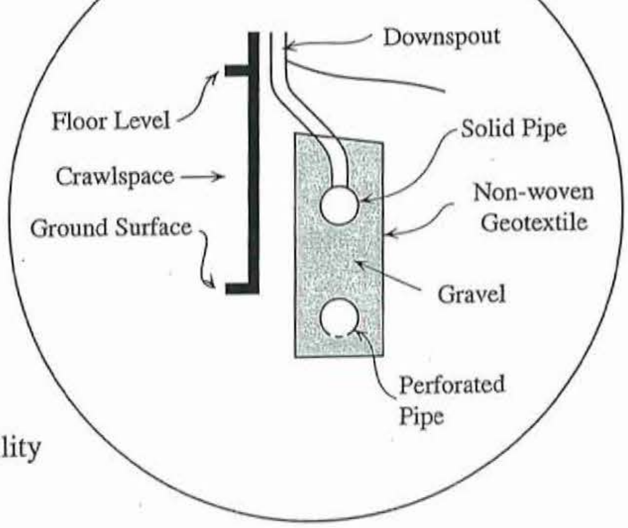
11. DON'T leave a hose and sprinkler running on or near a slope, particularly during the rainy season. This will enhance ground saturation which may cause damage.

12. DON'T block ditches which have been graded around your house or the lot pad. These shallow ditches have been put there for the purpose of quickly removing water toward the driveway, street or other positive outlet. By all means, do not let water become ponded above slopes by blocked ditches.

A typical slope section showing various grading and drainage requirements, as well as terms used for hillside developments, is attached.

TYPICAL SLOPE SECTION
(Not to Scale)





DETAIL
(Not to Scale)

CONDITIONS:

① Fill Slope
② Drainage Terrace
③ Lined Ditch
④ Curb to Prevent Slope Erosion
⑤ Drain Pipe Provided with Positive Outlet on Paved Surface
⑥ Downspout
⑦ Roof Gutter
⑧ Drain Pipe Connected to Solid Pipe and Discharged to an Approved Drainage Facility
⑨ Drainage Swale
⑩ Weep Holes Through Retaining Wall
⑪ Retaining Wall
⑫ Original Ground Surface
⑬ Cut Slope
⑭ Subdrain
⑮ Curtain Drain
⑯ Wedge Drain
⑰ Fill Compacted to Engineering Specifications and Benched into Competent Material
⑱ Bench
⑲ Blanket Drain
⑳ Crawlspace

Note: Acknowledgment is hereby made to the San Diego Chapter of the California Council of Civil Engineers and Land Surveyors

ALAN KROPP
& ASSOCIATES
Geotechnical Consultants

TYPICAL SLOPE DETAIL

FIGURE B-1

APPENDIX C

SEIDELMAN ASSOCIATES, INC.
2427 CHERRY HILLS DRIVE
LAFAYETTE, CALIFORNIA 94549
(925) 930-0646
(925) 930-0828 (FAX)

April 28, 2004

Mr. & Mrs. Matt Click
929 Everett St
El Cerrito, CA 94530

RE: POTENTIAL FOR SLIDE STABILIZATION AND HOUSE SITING

Dear Mr. & Mrs. Click:

During our recent phone conversation, you indicated to me the City of Lafayette's question regarding the suitability of the landslide area for construction of your residence on Quail Ridge Road. The parcel of land that slid a few years ago was over 300' wide, 1,100' long, and over 50' in depth. The slide encroached on nearly a half-dozen properties. As you may know, the upper reaches of the slide were stabilized with a buttress and drain. The lower 75% of the slide mass remains unstable, with a safety factor that falls well below what is normally considered safe to build on. The present unstable area encroaches on at least two parcels, and is not suitable for use other than open space or as a gardening or farming site. We would strongly advise that you locate your house on an area underlain by bedrock that was not involved in the deep-seated landslide that has so severely affected past developments on the site. While anything is repairable, given sufficient money, the immensity of the slide and the number of properties involved do not provide for a reasonable chance of stabilizing the unstable area. In fact, the process of reconstructing the major slide area could result in a de-stabilization during the construction process of numerous surrounding lots. This would result in a large, justifiable concern for the adjacent property owners that the construction process might damage their residences.

Construction in the confined, stable building envelope with structural support situated between your residence and the active slide zone, is the best technical solution that allows some reasonable use of the existing lot.

We hope this has provided you with the information you need to proceed in this matter. Should you have any further questions, please don't hesitate to give us a call.

Sincerely,

SEIDELMAN ASSOCIATES, INC.

PAUL J. SEIDELMAN
No. GE 000761
Exp. 3-31-06

Paul Seidelman
President
RCE 29683

SEIDELMAN ASSOCIATES
2427 CHERRY HILLS DRIVE
LAFAYETTE, CALIFORNIA 94549
(925) 930-0646
(925) 930-0828 (FAX)

RECEIVED
SEP 15 2005
CITY OF LAFAYETTE
PLANNING DEPT.

June 6, 2005

Mr. & Mrs. Matt Click
824 Golfclub Circle
Pleasant Hill, CA 94523

RE: Discussion of Peer Review and the Results of Trenching at 3933 Quail Ridge Road in Lafayette, California

Dear Mr. & Mrs. Click:

At your request we have reviewed the letter prepared by Cal Engineering and Geology and dated 22 July, 2004. Our work also consisted of reviewing the following documents:

1. Alan Kropp & Associates, Inc. Geotechnical Investigation: Quail Ridge Road Residence, 3933 Quail Ridge Road, dated November 25, 2003
2. William Lettis & Associates, Inc: Geologic Investigation of the proposed home site on the Click Property, 3933 Quail Ridge Road, Lafayette, California
3. GeoForensics, Inc: Proposed new residence, Lot 18 Quail Ridge Road, June 13, 2004.

Additionally, we should point out that we were the first responders to the landslide that occurred on Quail Ridge. We installed inclinometers adjacent to the right-of-way on the weekend that the slide initiated, and located the failure surface at the outer edge of the private road 50' below the road surface, where our inclinometer sheared off less than 24 hours after placement. This work was completed at the request of the homeowner, Mr. Bakar, whose home is situated immediately adjacent to and above the crown scarp of the large landslide failure. The Bakar residence had a zero setback from the crown of the slide, and was supported by piers that extended to bedrock. The house remained intact, with little or no cracking associated with the landslide, despite it's front foundation being undermined by the slide, the piers penetrated deep enough to maintain support of the residence.

We understand that some of the early workers on this landslide have postulated a larger, deep-seated slide whose central access is situated east of what is now the eastern boundary of the slide that has been recently active. However, during the actual earthwork, the postulated failure surface was found not to extend eastward of the existing lateral scarp. In fact, all of the geotechnical evidence that is objective and not interpretive supports the conclusion that the limit of the landslide activity is presented by the boundary clearly demonstrated in the recent, large-scale activation of the slide.

In order to add to the body of information concerning the quality of the materials along the eastern flank of the landslide, we trenched perpendicular to the lateral margin, and located bedrock exactly where anticipated at a depth of about 13' below the ground surface. A second trench was excavated in the flat area centrally located on the proposed building pad. That excavation also encountered sandstone bedrock at a depth of 12', and was supportive of the exploratory work completed by WLA.

Based on the observations made during construction, the investigations by WLA & AKA, and our own trenches, we conclude that the activation of the landslide fully mobilized the slide mass, and that the adjoining bedrock areas to the north and east remain intact and stable.

As a part of the reconstruction of the roadway, a fully-drained substantial buttress fill was put in place. This creates a situation quite different than the physical conditions present prior to the landslide activation. Two factors are permanently altered. The watertable is dramatically limited by the drainage system associated with the buttress. A second major change is that a substantial reduction in driving forces has been achieved by the buttressing of the crown area at the head of the slide.

During the active period of sliding, it was apparent that a very high watertable existed in the slide mass, and that the safety factor of the slide was only marginally reduced below unity. This was apparent from the amount of movement that occurred, and the rate at which the movement occurred. The force in balance could not have amounted to more than a few percent.

It is our opinion that the recommendations of the Alan Kropp and William Lettis reports are appropriate, and present a safe way to construct a residence on the limited remaining bedrock-supported site. We further believe that it is quite unlikely that the unrepaired portion of this slide will become active again in the future, unless its activation is accompanied by an earthquake during a wet winter. Static reactivation, given the reduced soil loading and poor water pressures, is highly unlikely.

The present proposed building site can be structurally secured against anything short of a massive migration of the slide into the bedrock adjacent to it. There is no evidence that this has occurred in the geologic past, and the possibility of this occurring in the geologic future has been substantially abated by the repairs completed after the recent activation.

We do recommend installing very substantial concrete caissons into bedrock. These excavations can be inspected by geologic personnel to ensure that their depth is sufficient to resist any reasonable soil pressures or bedrock pressures that might be postulated based on geologic structure. We anticipate pier depths of around 40', with pier diameters of 30", but the possibility exists that they may have to extend even deeper to provide the maximum possible protection. The finalization of the caisson depths should be determined individually, as they are drilled, by using downhole inspection.

In conclusion, we are of the opinion that the site will be more stable than any of the adjacent sites that are developed if the site is designed as proposed by Alan Kropp & Associates, Inc. and William Lettis & Assocaites, Inc. We have indicated to you that we can provide the engineering designs and inspection services required to implement the recommended foundation installation.

We hope this has provided you with the information you need to proceed in this matter. Should you have any further questions, please don't hesitate to give us a call.

Sincerely,

SEIDELMAN ASSOCIATES

Paul Seidelman
Owner
RCE 29683

SEIDELMAN ASSOCIATES
2427 CHERRY HILLS DRIVE
LAFAYETTE, CALIFORNIA 94549
(925) 930-0646
(925) 930-0828 (FAX)

June 24, 2008

Mr. Robi Reddy
3000F Danville Blvd., #268
Alamo, CA 94507

Re: Geotechnical Investigation of Portion of Lot at 3933 Quail Ridge Road, Lafayette, California

Dear Mr. Reddy:

At your request, we have completed our geotechnical investigation of a portion of your property at 3933 Quail Ridge Road in Lafayette, California.

The subject lot has a history of extreme landslide activity over most of the parcel's land area. This study was undertaken for the purpose of evaluating the stability of the extreme north corner of the subject parcel. The area, in question, is situated adjacent to the landslide scarp that developed in January, 1997. During the extensive period of landslide activity, there was no apparent involvement of the area presently under study.

The scope of our investigation included a review of the numerous reports and studies prepared for the original development and subsequent repair of the subdivision. Based on these studies, we undertook to install a large diameter boring in order to conduct "down hole logging" of the boring throughout its 70' depth. The *hole was logged by representatives from Cal Engineering and Geology, Seidelman Associates* and *Joyce Associates* on April 17, 2008.

Based on these data, we have developed recommendations for the construction of foundations for a single family residence and garage over a portion of the parcel that is not affected by landslide activity.

We hope this has provided you with the information necessary to proceed in this matter. Should further questions arise, please don't hesitate to give us a call.

Sincerely,

SEIDELMAN ASSOCIATES

Paul Seidelman
Principal Engineer
GE 761
RCE 29683 CEG 1086

PAUL J. SEIDELMAN
No. GE 000751
Exp. 3-31-09

INTRODUCTION

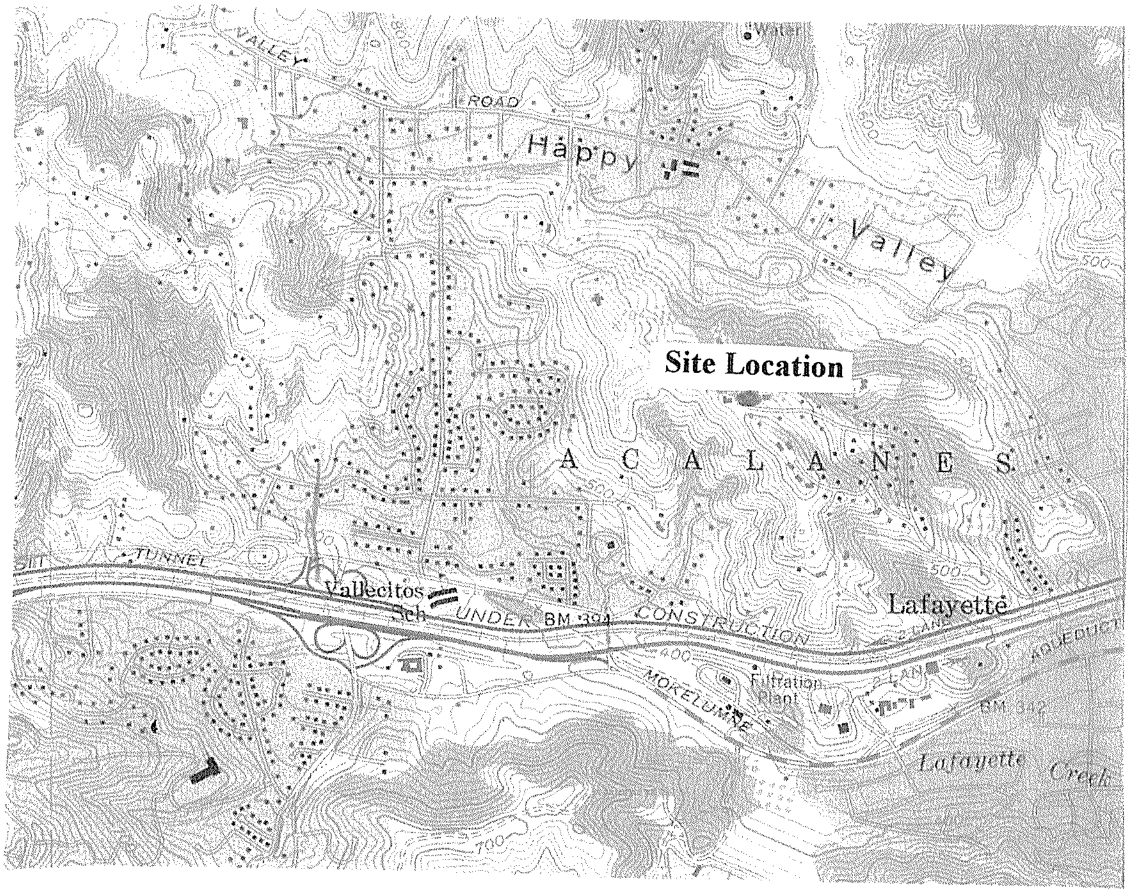
The site for the following study is located at 3933 Quail Ridge Road, Lafayette, CA. **See Site Location Map**. The purpose of the study is to evaluate land stability over a portion of Lot 18 of Subdivision 4770. The Parcel was created in April 1977, and employed a geotechnical investigation provided by *Hallenbeck, McKay and Associates* (1973), and *ENGEO, Inc.* (1975). The Parcel was developed with a residential structure in the late 1970s. In January 1997, a large, deep-seated, translational landslide became active over much of the subject parcel and several of the adjacent parcels. The landslide had a maximum width of just over 200 feet, and had a length of nearly 1,000 feet. The landslide activity resulted in the complete loss of the residential structure at the subject site.

Subsequent to investigations by *GeoForensics, Inc.*, a repair was undertaken by *Engineered Soil Repairs* of Walnut Creek, California. The repair consisted of three main elements:

- Stabilization of the property adjacent to the crown scarp of the landslide. This was accomplished by installing a pin-pile wall consisting of 28 vertical piles with 27 tie-backs into bedrock. The wall would allow excavation of the slide mass adjacent to the crown scarp by retaining the home sites and improvements adjacent to the 50 feet plus excavation.

- With the stabilizing wall in place, a large massive material was excavated in front of the wall to the depth of the landslide failure plane and for a width of approximately 80 feet. The geo-grid reinforcement zone underlies Quail Ridge Road and extends below the road approximately 10-15 feet. Thus, a buttress nearly 200 feet in width by 70 feet in length, by nearly 60 feet in depth, was constructed in front of the tied back, pin-pile wall. A drainage system was installed beneath the geo-grid reinforced buttress to complete the stabilizing buttress. The drain is accessed through a manhole on Quail Ridge Road, where a pump removes and

SITE LOCATION MAP



discharges the collected sub-surface water. A back up generator and pump are available at the site.

- The balance of the landslide, nearly 850 feet below the buttress, was graded to drain smoothly to the south. This work was completed in November 2001.

During the winter of 2005-2006, there was a pump failure in the wet pit on Quail Ridge Road. This resulted in complete saturation of the landslide mass and a reactivation of the slide mass below the reinforced earth buttress, and entirely within the lateral confines of the earlier landslide. The pump situation was repaired and there have been no further events since that time.

During 2003, *Alan Kropp & Associates, Inc.* and *William Lettis and Associates, Inc.* prepared reports for redevelopment of 3933 Quail Ridge Road. Those reports contained the results of a sub-surface trench and one small diameter boring. The reports also reviewed the history and literature associated with the property. Those reports may be found in **Appendix B** to this report.

In August 2004, *Seidelman Associates* made two trench excavations confirming the location of the lateral scarp in the same area where *William Lettis and Associates* had trenched. These new trenches were excavated in order to confirm the location of the lateral margin of the slide (not visible at that time). Since that time, the minor activation, due to a pump failure, has manifested the slide margins quite clearly.

In April 2008, *Seidelman Associates* conducted down hole logging operations on the proposed building site. The excavation consisted of a 30 inch diameter bucket-auger hole, excavated to a depth of 70 feet. The bore hole was formally logged by *Joyce Associates* as a sub-contractor to *Seidelman Associates*. Mr.

Seidelman also examined the boring, as did representatives from *Cal Engineering and Geology.* **Appendix A**

SCOPE OF WORK

The scope of work performed in this investigation included a review of available soil and geologic data for the area, the excavation of one, large diameter, down hole exploratory boring, a site reconnaissance, engineering analyses of the field and laboratory data and the preparation of this report. The data obtained and the analyses performed were for the purpose of providing design and construction criteria for site earthwork, structural foundations, retaining walls and pavements. Seismic considerations are also provided.

This report has been prepared for your use and the use of your consultants for specific application to the subject property in accordance with generally accepted geologic, soil and foundation practices. The recommendations contained herein are based on our analysis of the soil and rock conditions, based on the data provided in this study, as well as the *Alan Kropp, William Letttis,* and *GeoForensics* reports for the same area.

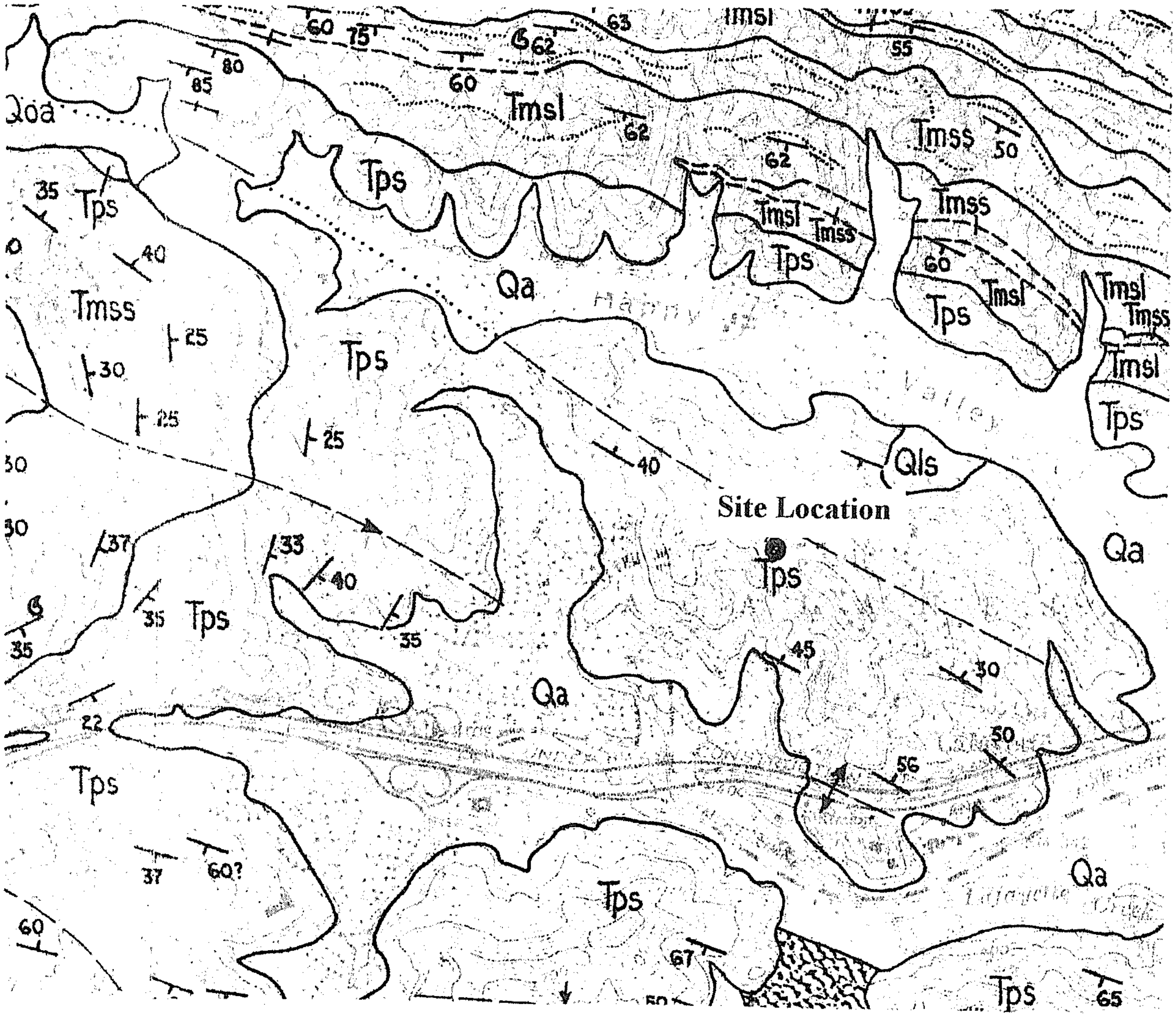
A. Geology

The site is underlain by marine deposits of siltstone, sandstone and conglomerate belonging to the Orinda Formation. The geologic units are steeply dipping to the northeast at 30 to 60 degrees. The subject site is bounded to the south and southwest by landslide deposits that have been historically active. Structurally, the site is located on the southwest limb of a northwest trending syncline. **See Geologic Map, *Dibblee, 1977.***

B. Subsurface

The proposed building site, is underlain by three feet of artificial fill. Beneath the surficial soil, there are sandstones and pebble conglomerates to a depth of 18 feet. These units are, in turn, underlain by sandstones that extend to a depth of 37

GEOLOGIC MAP



feet, with the balance of the bedrock geology consisting of siltstones and sandstones inter-bedded to a depth of 70 feet.

The surface soils at the site are clay-rich and appear to extend to a depth of two to four feet.

The bedrock units tend to weather into soils that are clay rich and contain smetitic clays. The surface soils at the site classify as CH clays. These clays tend to be expansive and have a high plasticity index. The soils also tend to creep on slopes at least to a depth of six to eight feet. **See Appendix A.**

C. Seismicity

Geologists recognize the San Francisco Bay Area as one of the most active seismic regions in the United States. The region lies within the zone of influence by the San Andreas Fault, the Hayward Fault, the Calaveras Fault and the Concord Fault. The closest known active fault in the vicinity is the Hayward Fault, located approximately seven kilometers to the west of the site. The Concord Fault is located approximately fourteen kilometers east of the subject site. No field conditions were identified that might indicate the presence of an active fault at the subject site. This conclusion is supported by our review of the literature and previous mapping for the area. Based on this information, it is unlikely that surface rupture due to faulting will occur at the site.

Intense ground shaking is likely during a major earthquake on any one of the active fault systems. Seismologists have not yet reached the point where they can accurately predict the location and magnitude of an earthquake, though research in this field has greatly increased. Nevertheless, based on current technology as well as historical evidence, it is reasonable to assume that at least one moderate to severe earthquake will impact the area during the design life of the proposed structure.

As with all hillside projects in the area, the project owners will have to accept the highly unlikely possibility of ground rupture due to faulting or seismically induced landsliding. There is also a high probability of intense ground shaking and/or lateral and vertical soil movement that occurs in seismically active areas. These hazards are not elevated when compared to other hillslope sites in the general area.

D. Landsliding Analysis and Discussion

As we discussed earlier, much of the parcel under study is underlain by a deep-seated bedrock landslide that was quite active 10 years ago. Additionally, there are at least two other bedrock landslides in the general vicinity; thus, care must be taken to thoroughly evaluate landslide potentials. These conditions provided the motivation for the large diameter, deep boring that was constructed at the site. The results of that investigation reached the conclusion that the bedrock slide that failed in 1997 was fully expressed by the boundary surface rupture that appeared during that active period of sliding. No bedrock rupture failure surface extends beneath the ridge divide that is the subject of this investigation.

This conclusion is also supported by the bedrock observations made during the stabilization of the head scarp for the slide. In a letter report to Mr. Joe Chang, 3927 Quail Ridge Road, issued by *GeoForensics, Inc.* in June 14, 2004, **"In 2000 and 2001 our office was engaged by the Homeowner's group to observe, document, and consult upon the construction of our recommended mitigation plan. During the construction work completed by Engineered Soil Repairs (ESR), excavations up to 65 feet deep along the roadway alignment were made to remove slide materials. The excavations were deeper towards the northeastern side of the slide than the southwestern side. Although we had postulated that there may be an old landslide plane which passed northeastward beyond the mapped active slide limits to the adjacent drainage swale on your property, during the deep excavation work, no such slide plane was observed. Therefore, we concluded that the probability of an existing slide extension to the east was unlikely."**

On November 25, 2003 *Alan Kropp and Associates* issued a report prepared for Mr. and Mrs. Matt Click. The report addressed the same house building site being evaluated in this report. The Alan Kropp report concludes on Page 3, "it is our opinion the extreme northeast corner of the lot is suitable for construction of a new home from a geotechnical standpoint". The report presents extensive subsurface studies completed at that time by *William Lettis and Associates,* as well as Alan Kropp. **See Appendix .**

Thus, all of the investigators, *Seidelman Associates, Joyce Associates, GeoForensic, Inc., Alan Kropp Associates* and *William Lettis and Associates, Inc.* are in agreement that the subject building site at the northeast corner of the large parcel, that failed in 1997, is suitable for construction of a new residence, provided that stringent adherence to foundation recommendations be incorporated into the plans and specifications for the development of foundation systems for the new structure.

E. Foundation Design Requirements

The detailed trench logs, prepared by *William Lettis and Associates, Inc.*, found tension failures in the bedrock up to eight feet above the ground rupture associated with the landslide movements of 1997. Thus, we recommend construction of drilled pier supports for the house structure be located no closer to the landslide scarp than eight feet.

The first row of piers, adjacent to the landslide scarp, should be spaced at no greater than eight foot centers. Each pier should have a diameter of not less than 24 inches, and should extend to a depth of not less than 40 feet. A second row of piers, approximately 20 feet easterly of the primary row of piers should extend to similar depths at similar diameters. Bond beams, at least 24 inches in width and height, should extend from the lower line of piers to the upper line of piers. This will create a restrained condition of loading for the lower piers, but will also lessen the bending moments in each pier by restraining rotation of the pier top. We concur with Alan Kropp's recommendation for the lower row of piers to be supportive of an 18 foot depth. However, we see no reason to apply significantly elevated lateral loading to these piers, and concur with the pressure chart prepared by William Lettis and Associates indicating a restrained at rest pressure of 85 lbs pcf for cutslopes and 95 pcf for fill slopes. A third row of piers may be placed eastward of the middle row and constructed to a depth of 20 feet. The bond beams should connect through to this final row of piering. The bond beams may be designed as grade beams and used for support of the house. Connections between the bond beams and the piers should be designed as moment carrying and restraining to the top of each pier. The row of piers, constructed eight feet from the active scarp, should be capped with a sub-surface grade beam that extends to a depth of five feet. Each pier shall be designed as a column capable of supporting 25,000 lbs. vertical load, with horizontal loads determined by wind, seismic and lateral ground pressures. Tiebacks may be employed within the geometric confines of the parcel.

Based on our large diameter boring, none of the piers for the house will encounter the water table, and all of the holes will penetrate firm, competent bedrock materials. However, it is advisable to set reinforcement cages immediately after drilling and to place concrete soon thereafter. This will ensure hole cleanliness and minimize dryout or shrinkage of the excavated hole.

Slab-on-Grade

Unsupported slab-on-grade construction is only recommended for garages and patios. All concrete-on-grade should be designed as a pier-supported, structural mat. The minimum required mat slab thickness shall be 6 inches. Garage mat slabs should be constructed on a vapor barrier consisting of 10 mil visqueen or PVC overlain by two inches of sand. It is advisable to install a capillary break of pea gravel, four inches in thickness beneath the PVC liner .

F. Drainage

Drainage on the subject building site, will include the collection and removal of all roof and landscape watering areas. Additionally, the five foot retaining wall paralleling the landslide scarp, should be fitted with a back wall drain. These waters, in their entirety, should be conveyed to the base of the landslide at the downhill edge of the property.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

A. General Specifications

The following general specifications are intended to be used as guidelines for the planning, design, and construction phases of the project. We strongly recommend that all final foundation, grading, and drainage plans for the proposed project be reviewed by SEIDELMAN ASSOCIATES prior to their implementation in order to ensure that they fulfill the intent and requirement of this report. Additionally, we recommend that the pier drilling preparation, foundation steel reinforcement, engineered fills, and drainage systems be inspected by a representative of SEIDELMAN ASSOCIATES. In order to ensure proper scheduling, **ALL REQUIRED INSPECTIONS SHOULD BE SCHEDULED AT LEAST 48 HOURS IN ADVANCE.** It is requested that at least 7 days notice be given prior to commencement of the project.

B. Earthwork

1. Clearing and Site Preparation

Prior to the placement of any fill, the site should be cleared of all obstruction including any buried utility or irrigation lines, fences, trees, including tree roots greater that ½ inch in diameter. These should be stripped from any areas receiving fill, a foundation, a pavement structure, base rock, slabs-on-grade, patios, or any other improvement. Holes resulting from the removal of underground obstruction that extend below the proposed finish grade should be cleared and backfilled with suitable material compacted to the requirement given under Item B.5, "Compaction." Organically contaminated soil or other deleterious material that is generated from stripping operations shall not be used as fill, but may be used in landscaped areas as approved by the soils engineer. All clearing, grubbing, stripping, and site preparation for the project shall be accomplished by the contractor to the satisfaction of the soils engineer.

2. Excavations

Based on our experience with the soil and bedrock units in the project area, normal excavating equipment will be suitable for all general excavations.

3. Sub grade Preparation

After the site has been properly cleared and stripped and any necessary excavations made, the exposed soils in those areas scheduled to receive structural fill, slabs-on-grade or pavements, should be scarified to a depth of six inches, moisture conditioned to at least 4% above optimum water content and compacted to the appropriate requirements for structural fill.

4. Materials for Fill

All on-site soils below the stripped layer and having an organic content of less than three percent by volume can be used as fill except where base rock material is required beneath the roadways, walkways, or slabs. However, all fill placed at the site, including on-site soils, should not contain rocks or lumps larger than six inches in greatest dimension with not more than 15% larger than 2 ½ inches. In addition, any required import fill should be predominantly granular with a plasticity index of 15 or less. Representative samples of on-site materials to be used for fill shall be tested in the laboratory by the soils engineer in order to determine the physical characteristics of the soil materials. In areas to receive fill, moisture condition and compact all soils within two feet of the existing grade. All wet areas shall be thoroughly drained.

5. Compaction

All structural fill less than five feet thick should be compacted to at least 90% relative density as determined by ASTM Test Designation D1557-78. Moisture content should be maintained at not less than 4% above optimum. Fill thickness beneath building sites should be as uniform as possible. Structural fill or wall backfill, greater than five feet deep, should be entirely compacted to at least 90% relative compaction.

Inspection of the fill placement shall be provided by the soils engineer. Moisture/density testing and determination during construction shall be made by the soils engineer. When moisture/density test results on the newly constructed fill fall below the specification required by the soils engineer, the particular layer or portion shall be reworked until the required density and/or moisture content has been attained. No additional fill shall be placed over an area until the previous lift has been tested and found to meet the specified density and moisture requirements and is approved by the soils engineer.

6. Trench Backfill

Pipeline trenches should be backfilled with fill placed in lifts of approximately eight inches in uncompacted thickness. However, thicker lifts may be used provided the method of compaction is approved by the soils engineer and the required minimum degree of compaction is achieved. If on-site soil is used, the material should be compacted to at least 85 percent relative compaction by mechanical means only. Imported sand can also be used for back-filling trenches, provided it is compacted to at least 90 percent relative compaction. If imported sand is used, sufficient water should be added during the trench back-filling operations to prevent the soil from bridging during compaction. Trenches should be carefully evaluated for their potential to carry unexpected water. Outlet subdrains may be needed.

In slab and pavement areas, the upper three feet of trench backfill should be compacted to at least 90 % relative compaction for on-site soils, and 95% where imported sand backfill is used. In addition, the upper six inches of all trench backfill in pavement areas should be compacted to at least 95 % relative compaction.

Where sand backfill utility trenches enter the building pad, we recommend that they be backfilled by an impermeable soil plug or mastic sealant to minimize moisture change in the highly to critically expansive clays beneath the slab. In addition, where sand backfilled utility trenches cross planter areas and pass below pavements or concrete sidewalks, they should be sealed to minimize soil volume change below asphalt and concrete areas.

7. Slopes

Cutslopes should be no steeper than 2:1 and should be inspected for adverse structural or soil characteristics. Mitigation of these adverse features may require reduction in cutslope steepness or retention by retaining structures.

8. Construction During Wet Weather Conditions

If construction is interrupted by weather or some other adverse condition, fill operations will not be resumed until field conditions, as determined by the soils engineer, are within the specified acceptable limits.

FINAL REVIEW AND INSPECTION PROCEDURES

We recommend that all final plans for the repairs be reviewed by SEIDELMAN ASSOCIATES prior to their implementation in order to ensure that they fulfill the recommendations of this report. Also, during the construction phase of the project, we recommend that inspections be made during any foundation construction, drainage construction, or any structures or measures that are constructed as a result of the recommendations contained in this report.

TO ENSURE PROPER SCHEDULING, THESE INSPECTIONS MUST BE SCHEDULED AT LEAST 48 HOURS PRIOR TO THE PLACEMENT OF ANY CONCRETE OR OTHER PERMANENT IMPROVEMENT.

LIMITATIONS OF THE INVESTIGATION

The recommendations contained within this report are based upon the assumption that the soil and geologic conditions at the project site do not deviate from those presented in this report. If any unusual soil or geologic conditions are encountered during construction, or if proposed repair plans change, SEIDELMAN ASSOCIATES should be notified so that we may provide supplemental recommendations.

Construction outside of the currently designated proposed building site is not covered by this report. Additional soil and geologic studies should precede any development of these areas. Some statements in this report are true of the entire area. However, specific statements, conclusions, and recommendations apply only to those areas within the proposed building site. As with all hillside developments there is always the possibility that unforeseen adverse geologic conditions may be encountered that may result in substantial design changes and cost increases. You should be prepared for such contingencies.

THIS REPORT IS ISSUED WITH THE UNDERSTANDING THAT IT IS THE RESPONSIBILITY OF THE OWNER OR THEIR REPRESENTATIVE TO ENSURE THAT THE CONTENTS OF THIS REPORT ARE CALLED TO THE ATTENTION OF THE ENGINEERS FOR THE PROJECT AND INCORPORATED INTO PROJECT PLANS, SPECIFICATIONS, AND ACTUAL CONSTRUCTION. MOREOVER, IT IS THE OWNER'S RESPONSIBILITY TO SEE THAT THE CONTRACTORS CARRY OUT THE RECOMMENDATIONS IN THE FIELD.

The findings in this report are valid as of the present time. However, the passing of time may change the conditions of the property due to natural processes or the works of humans. in addition, legislation or the broadening or knowledge may require additional recommendations. Accordingly, the findings of this report may be invalidated, entirely or in part, by changes beyond our control. Therefore, this report should not be relied upon after a period of 3 years, or if additional damage occurs in or around the building envelope without a review by an engineering geologist and a soils engineer.

The conclusions and recommendations presented in this report are the result of geologic and engineering analyses based on our interpretations of the surface and subsurface conditions. This report has been prepared according to generally accepted geologic and soils engineering practices. No other warranty is given. Should the final development plans vary from those described in this report we should be notified so that we can evaluate the need to revise our recommendations.

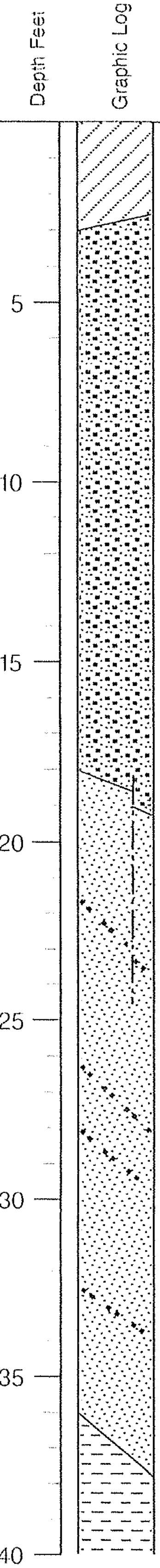
APPENDIX A

BORE HOLE LOGS

Log of Boring LD-1

Project Name Quail Ridge Road
Job Number
Drilling Method 30 inch Bucket Auger

Location Lafayette, CA
Date Completed 04/17/08
Depth 70 ft.
Elevation:



BROWN SILTY CLAY (CL) hard, dry with gravel (Fill)

Set casing to 4.5 feet

YELLOWISH BROWN GRAVELLY SANDSTONE AND PEBBLE CONGLOMERATE, friable, deeply weathered, tight, moist, no visible stratification

Locally black with manganese coatings. Bedding @N15W35NE

Becomes moderately weathered, lightly cemented

With intermixed zones of light brown silty sandstone, friable, moderately weathered, tight, moist

Occasional small roots along verticle shears

Bedding @ N15W24E at contact between gravelly sandstone above and sandstone below. Contact offset several inches by vertical fracture @N89E90, with roots along fracture

YELLOWISH BROWN SANDSTONE, thick bedded, friable, lightly cemented, moderately weathered, coarse grained, tight

Bedding on gravel lense @ N38E41SE, contact offset by vertical shear @N85E90, offset approximately 12" vertical, with roots along shear

with occasional lenses of gravelly sandstone

Becomes medium to coarse grained, with lenses of gravelly sandstone

Bedding on base of gravelly sandstone lense @N30W38NE

with inclusions of gray siltstone within sandstone (rip-up clasts)

with vertical shear @N35E90

Bedding on base of conglomerate lense @ N10W31E

Contact between sandstone above siltstone below @N10W42NE

BROWNISH GRAY SILTSTONE WITH SAND, friable, little weathered, very tight, moist, locally grades more sandy

Becomes medium gray, wet

SEIDELMAN ASSOCIATES

Log of Boring LD-1, 0 to 40 Feet
Quail Ridge Road
Lafayette, California

Log of Boring LD-1

Project Name Quail Ridge Road

Job Number

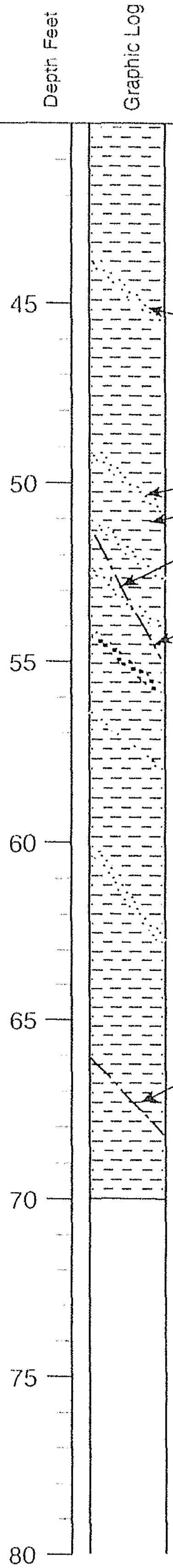
Drilling Method 30 inch Bucket Auger

Location Lafayette, CA

Date Completed 04/17/08

Depth 70 ft.

Elevation:



MEDIUM GRAY SILTSTONE WITH SAND, friable, little weathered, very tight, wet, locally grades more sandy, with some interbedded sandstone and gravelly sandstone

Yellowish Brown Sandstone, medium grained, laminated, friable, little weathered, moist
Top contact @N20W42NE, bottom contact @N14W52NE

Brown Sandstone bed, 5" thick, friable, bedding @ N18W60NE
Tuffaceous siltstone bed, sandy, moderately plastic, wet, no visible shearing
Seepage at 51 feet (uppermost seepage zone)
Shear zone: Light gray clay seam 1/8" thick @ N75W65NE
Seepage at sandstone bed
Bedding in sandstone @ N13W40NE
shear zone @ N73W54NE

6" gravel lense, bedding @N45W40NE

Seepage increasing
1" thick gravelly sandstone, bedding @ N26W37NE
Siltstone becomes dark gray, clayey to sandy with some intermixed silty sandstone, friable, tight, little weathered, with occasional gravels and localized seepage

Bedding in sandstone @ N32W60NE

Shear zone consisting of 1.5" thick stiff gray clay seam @N20W47NE
additional seepage.

Boring drilled to 70 feet, visually logged to 67 feet

Boring drilled on 4/16/08; logged on 4/17/08
water level at 8:00 am on 4/17/08 (prior to cleaning or logging) was 69 feet

SEIDELMAN ASSOCIATES

Log of Boring LD-1, 40 to 70 Feet
Quail Ridge Road
Lafayette, California

APPENDIX B

GEOTECHNICAL REPORTS

- Alan Kropp & Associates, Inc.
- William Lettis & Associates, Inc.

GEOTECHNICAL INVESTIGATION
QUAIL RIDGE ROAD RESIDENCE
NORTHEAST CORNER OF LOT

3933 QUAIL RIDGE ROAD
LAFAYETTE, CALIFORNIA

ALAN KROPP
& ASSOCIATES, INC.

GEOTECHNICAL
CONSULTANTS

ALAN KROPP, CE, GE
JAMES R. LOTT, CE, GE
MARLENE K. JACKSON, CE, GE
PHILIP C. TSE, CE, GE
JANETTE PROSSER, GE
DONALD L. IPPY, GE

November 25, 2003
1729-1B, L-25867

Mr. and Mrs. Matt Click
2364-A Westcliffe Lane
Walnut Creek, CA 94597

RE: Geotechnical Investigation
Quail Ridge Road Residence
Northeast Corner of Lot
3933 Quail Ridge Road
Lafayette, California

Dear Mr. and Mrs. Click:

At your request, we have performed a geotechnical investigation for the proposed home to be constructed on the extreme northeast corner of the site located at 3933 Quail Ridge Road in Lafayette, California. It should be noted that a large landslide occurred in 1997 which severely damaged a previous home on this property. The damaged home was demolished and removed from the site. The upper portion of the landslide was repaired and rebuilt to support the portion of Quail Ridge Road above the site. The repair was designed and performed by Engineered Soil Repairs (ESR) in 1999. The repair included the installation of a tieback wall to depths on the order of 45 to 50 feet deep, excavation for a buttress keyway, and construction of a geo-grid reinforced fill buttress. Based on the repair plan prepared by ESR, William Lettis & Associates (WLA) have sketched the site plan with the approximate location of the tieback wall and the approximate location of the fill daylight line near the northeast corner of the site. In summary, major remedial work has been performed to restore Quail Ridge Road, which was also badly damaged during the landslide. However, the landslide within the site was not removed or repaired.

1.00 PROPOSED CONSTRUCTION

A copy of the topographic survey plan dated June 20, 2003 and prepared by DeBolt Civil Engineering was provided to us on July 15, 2003 for our use during subsurface investigation and report preparation. Based on our discussions with you, we understand a conceptual development plan is available at this time; however, you agree to amend the plan as needed in accordance with our findings. For the purpose of our investigation, we assume the new residence will be one story, with a raised structural steel platform, and supported by a pier-and-grade beam foundation. Building loads are anticipated to be typical for this type of construction.

2.00 PURPOSE

The purpose of our investigation was to evaluate the general geotechnical suitability of the extreme northeast corner of the lot for a possible new house and to provide geotechnical engineering design and construction criteria for the following aspects of the work:

- Site preparation and earthwork,
- Surface drainage,
- Pier wall construction at the margin of the mapped landslide,
- House foundations,
- Building code seismic design parameters,
- Retaining walls, and
- Upslope subdrain.

3.00 SCOPE

As outlined in our proposal dated July 25, 2003, the scope of our work to accomplish the stated purpose included:

- Reconnaissance of the entire site and portions of the immediate surrounding properties to evaluate current geotechnical and site conditions;
- A review of published geotechnical materials with data relevant to the site;
- A review of geotechnical consultants' materials from our files and other firms which have been supplied to us;
- An examination of aerial photographs of the area;
- A subsurface exploration program consisting of drilling exploratory test borings and excavation of test pits in the area to evaluate the subsurface materials for this phase of work;
- Laboratory index, classification and strength tests on surface and subsurface samples from the site, as required, to evaluate the properties of the materials recovered;
- Geotechnical engineering analyses of the collected data; and
- Preparation of a geotechnical investigation report for the site which would present the results of our studies and provide geotechnical design and construction criteria for the geotechnical aspects of the proposed home.

During the course of this project, we completed the field exploration program by drilling one test boring to about 45 feet deep and excavating one test trench of about 45 feet long in the area to evaluate the subsurface materials.

The scope of our services did not include an environmental assessment or investigation for the presence of hazardous or toxic materials in the soil, groundwater, or air on, below, or around this site.

This report has been prepared for the exclusive use of you and your consultants for specific application to the proposed residence in accordance with generally accepted geotechnical engineering practices. No

other warranty, expressed or implied, is made. In the event that the nature, design, or location of the home differs significantly from what has been noted above, or if any additions are proposed, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and the conclusions of this report modified or verified in writing.

The findings of this report are valid as of the present date. However, the passing of time will likely change the conditions of the existing property due to natural processes or the works of man. In addition, due to legislation or the broadening of knowledge, changes in applicable or appropriate standards may occur. Accordingly, the findings of this report may be invalidated, wholly or partly, by changes beyond our control. Therefore, this report should not be relied upon after three years without being reviewed by this office.

We have performed this geotechnical investigation with WLA. WLA performed the geological subsurface investigation, including the excavating and logging of the test trench and drilling and logging of the test boring, at the site. WLA has performed aerial photograph examination, has reviewed reports and files from other consultants during the landslide studies for this site, and has prepared a geologic report (dated November 18, 2003). WLA's report is included as Appendix A of this report.

Since the descriptions and discussions of site condition and history, geotechnical setting, and subsurface information have been reported under WLA's geologic report, we will not duplicate these items in this report.

4.00 EVALUATIONS AND CONCLUSIONS

4.01 General Site Suitability

WLA has mapped the margin of the landslide based on the test trench data and the previous subsurface data from other consultants' reports for the landslide studies on this lot. Based on the subsurface data collected from our field investigation program, it appears to us the extreme northeast corner of the lot is outside the limits of the previous landslide. Since the previous landslide has not been removed or repaired and only remedial work has been performed to restore Quail Ridge Road, the project owners need to understand and accept the risk that a future landslide may still occur within the lot and may impact the stability of the extreme northeast corner of the lot even though it is situated outside of the mapped landslide margin. If the project owners elect to construct a new home at the extreme northeast corner of the lot, a drilled pier wall should be installed at the margin of the landslide in order to separate the northeast corner of the lot from the landslide mass.

As such, it is our opinion the extreme northeast corner of the lot is suitable for the construction of a new home from a geotechnical standpoint. However, all of the conclusions and recommendations presented in this report should be incorporated in the design and construction of the project to minimize possible soil and foundation problems.

We understand from you that the proposed house footprint will be planned for the extreme northeast corner of the site in order to be further away from the landslide margin; however, this planning concept may situate the proposed footprint over the sideyard setback zone. It is our opinion from a geotechnical standpoint that it is preferable to situate the house farther away from the landslide margin and to possibly encroach on the sideyard setback zone. However, this concept should be submitted to the County for approval.

The primary considerations for foundation design at the site are:

- Surface soils and bedrock tension zone due to previous landslide,
- Strong ground shaking, and
- Site drainage.

Each of these conditions is discussed individually below.

4.02 Surface Soil and Bedrock Tension Zone

Based on the test boring and test trench data, we have encountered up to about 7 feet of sandy clay soil near the surface. The surface soil was underlain by highly weathered bedrock material to about 18 feet deep. In addition, a portion of the highly weathered bedrock has experienced bedrock tension due to previous landsliding within a zone of about 7 feet horizontally directly behind the landslide mass. In other words, the surface soil (up to about 7 feet) and highly weathered bedrock (up to about 11 feet), (i.e., a total thickness of 18 feet within a 7-foot zone behind the landslide mass), may be identified as surface soils and bedrock tension zone. This tension zone of 18 feet in thickness may be susceptible to lateral movement especially if the landslide becomes active again in the future. Since the proposed home will be constructed on sloping terrain and since the previous landslide on the lower portion of the subject lot has not been removed or repaired, WLA has recommended in their report that a special design zone of 20 feet wide should be established in the planning, design and construction for the proposed house in the northeast corner of this site. Thus, we recommend the following:

- A line of drilled pier wall should be constructed along the margin of the previously mapped landslide. All the piers should extend through the upper 18 feet of tension zone, and at least 15 feet into underlying firm and less weathered bedrock. In addition, due to the potential instability of the tension zone, the pier wall should be designed to resist a substantial creep load.

- Within the 20-foot special design zone, the portion of the proposed residence should be supported on drilled, cast-in-place friction piers. The piers should extend through the upper 18 feet of potential unstable soils, and at least 10 feet into the underlying firm bedrock materials. In addition, due to the potential for downward creep of the overlying soil and tension materials, the piers should be designed to resist creep load.

- Beyond the 20-foot special design zone, the portion of the proposed residence should be supported on drilled, cast-in-place friction piers. The piers should extend through the upper 8 feet of soils, and at least 10 feet into the underlying firm bedrock material. In addition, due to the potential for downward creep of the overlying soil, the piers should be designed to resist creep load.

- We also recommend a subdrain, which penetrates through the fill into the underlying native soils, be constructed upslope of the home and surface drainage be carefully controlled at the site because an increase in the soil moisture content tends to promote slope creep.

4.03 Earthquake Hazards

As noted earlier, the subject site is located in the highly seismic San Francisco Bay Area, and there is a strong probability that a moderate to severe earthquake will occur during the life of the structure. The site

is not mapped in the immediate proximity of any active or inactive faults; therefore, the likelihood of fault rupture directly below the proposed home is low.

During strong earthquakes, various forms of ground failure can occur, such as liquefaction, lateral spreading, and lurch cracking. The existing upper 18 feet of tension zone can also undergo renewed movements as the result of the earthquake shaking. However, our evaluation of the ground conditions at the subject site indicate it is very unlikely the site is susceptible to ground failure during an earthquake.

The proposed home will almost certainly experience strong ground shaking during a major earthquake in the life of the building. Recently, the Uniform Building Code has adopted provisions for incorporation of strong ground shaking into the design of all structures. Our recommendations for geotechnical parameters to be used in the structural seismic design of the home are presented in Section 5.05, "Building Code Seismic Design Parameters."

4.04 Site Drainage

To minimize infiltration of surface runoff and subsequent weakening and swelling of the soils underlying the house, drainage should be carefully controlled at the site. Surface and subsurface drainage improvements should be designed to collect and channel water to appropriate outlets. These improvements should include positive surface gradients along with systems utilizing drainrock, perforated pipe, solid pipe, and gutters.

5.00 RECOMMENDATIONS

This report is issued with the understanding that it is the responsibility of the owner or the owner's representative to ensure that the information and recommendations contained in this report are called to the attention of all concerned parties. In addition, it is the responsibility of the owner or owners representative to ensure these recommendations are incorporated into the plans and that the necessary steps are taken to see that the contractors or subcontractors carry out such recommendations in the field.

5.01 Site Preparation and Earthwork

The site of the proposed residence should initially be cleared of selected trees and bushes and then stripped to sufficient depth to remove surface vegetation and weeds; these materials should be removed from the site. If foundation elements are exposed during the site clearing or foundation construction, then the exposed elements, slabs, or retaining walls should be removed from the site.

It is our understanding that there will not be a substantial amount of grading for this portion of the lot in order to construct the proposed home. We were told that the proposed grading will likely be less than two to three feet of cut and fill. The previously mapped landslide margin should be staked and clearly marked onsite by the surveyor in order to avoid grading or construction into the landslide area. After the site is cleared and stripped, the pier wall should be constructed along the margin of the previously mapped landslide prior to performing any grading or construction at the northeast corner of this lot.

After the site for the residence is cleared and stripped and the pier wall is constructed, any excavation and/or filling operations required for this area can be made. Any filling operations on slopes steeper than 6:1 (horizontal to vertical) should be keyed and benched into competent soils and/or the weathered

bedrock materials. We should note that loose soils resulting from excavations or pier drilling should either be removed from the site or placed and compacted as engineered fill.

All on-site soils below the stripped layer having an organic content of less than 3 percent by volume are suitable for use as fill. However, we should note that clayey soils are very difficult to moisture condition and compact when there is excessive moisture from winter rains. In addition, due to the expansive nature of the clayey surface soils, minor cracking of asphalt pavements (requiring periodic maintenance) should be anticipated.

Any fill placed at the site should not contain rocks or lumps greater than 6 inches in greatest dimension with not more than 15 percent larger than 2.5 inches. In addition, imported fill material used at the site should be a non-expansive material with a plasticity index of 12 or less. The fill should be compacted to at least 90 percent relative compaction by mechanical means only as determined by ASTM Test Designation D1557-91 for fills less than 5 feet in height. Fill should be compacted to at least 95 percent relative compaction for fills greater than 5 feet in height. Fill should be placed on a firm, unyielding base surface in lifts not exceeding 8 inches in uncompacted thickness.

We recommend that all new cut or fill slopes at the site have a maximum inclination of 2:1. At this inclination, the cut and fill slopes will probably be subjected to some minor erosion and/or sloughing, thus requiring periodic maintenance of the slopes. We recommend the existing fill slopes and any new cut or fill slopes be planted with erosion-resistant vegetation and an erosion control netting system be installed. A landscape architect experienced in erosion control planting should be consulted prior to selection of the type of vegetation to be used.

5.02 Surface Drainage

Positive surface drainage should be provided adjacent to the residence so as to direct surface water away from the foundations of the building into closed pipes that discharge downslope of the proposed residence. Flexible drain pipe (flexline), 2000-pound crush pipe, leachfield, and ASTM F810 pipe are not recommended for use in the surface water drainage system because of the likelihood of damage to the pipe during installation due to the weak strength of these pipes. In addition, these drainpipes are sometimes difficult to clean with mechanical equipment without damaging the pipe. We recommend the use of Schedule 40 PVC, SDR 35 PVC or ABS, Contech A-2000 PVC drainpipe, or equivalent for the drain system. Ponding of surface water should not be allowed in any areas adjacent to the structure. Concentrated flows of water should not be allowed across any slopes as erosion or weakening of surface soils could occur. In particular, berms or drainage ditches should be installed behind the road cut slope to divert surface water flow away from the top of the slope.

We also recommend that rainwater collected on the roof of the building be transported through gutters, downspouts, and closed pipes that lead to suitable discharge facilities downslope of the residence. The most desirable location to discharge the water is onto the downslope street, or into an existing storm drain system under the downslope street (subject to City and/or County regulations).

Although there are other methods to discharge the water within your property, the water eventually drains onto the downslope property and can cause future problems. Therefore, we would strongly encourage you to negotiate with a downslope neighbor to obtain a drainage easement so the water collected from your property can be placed into a pipe which crosses your downslope neighbor's property and discharges to an appropriate drainage discharge facility.

If this easement is granted, you will have maintenance responsibilities for this drainpipe. If a drainage easement cannot be granted, the collected surface water may be discharged onto the slope downhill of the residence with the understanding that there may be a higher risk of future problems resulting from the discharged water. In order to minimize, but not eliminate, this risk, we recommend the collected water discharge into an energy dissipator. We should note that suitable discharge facilities do not include so called "dry wells" and these should be avoided.

Some nominal maintenance of the drainage facilities should be expected after the initial construction has been completed. To assist in maintaining proper drainage and erosion control measures for the site, we have included a "Guide to the Maintenance of Hillside Home Sites" in Appendix B.

Should ownership of this property change hands, the new owner should be informed of the existence of this report, not adversely change the grading or drainage facilities, and understand the importance of maintaining proper surface drainage.

5.03 Pier Wall

A pier wall should be constructed along the margin of the landslide, as shown on the site plan (Appendix A). The pier wall should consist of a row of large-diameter reinforced concrete piers that are founded in the underlying bedrock and spaced no further apart than 8 feet, center to center. Based on our subsurface investigation, the depth to firm rock and below the tension zone in this portion of the site is believed to be on the order of 18 feet below existing ground surface. With piers spaced no further than 8 feet on center, it can be assumed that the soil and rock will effectively arch between adjacent piers and therefore lagging will not be necessary.

The wall should be designed to withstand a uniform horizontal earth pressure of 1000 pounds per square foot (psf) over the upper 18 feet of the wall (i.e., 18 kips per running foot of wall). This active pressure value has not included hydrostatic pressure due to groundwater.

The lateral active load can be assumed to be resisted by passive pressure. The passive pressure can be assumed to start at a depth of 18 feet with an initial value of 400 psf and increase at a rate of 400 psf per foot of depth below 18 feet up to a maximum value of 10,000 psf. This value can be assumed to be acting over 1.5 times the diameter of the individual pier shafts. It is noted that wall pressures could be resisted with drilled tiebacks. However, the tiebacks would need to extend a significant distance into the upslope property or the existing road and could interfere with future pier installation for the house at the northeast corner of this lot. Furthermore, permission would have to be obtained from the County and/or the homeowner association within which the tiebacks extend. Since the concept of the proposed wall has not been determined at this time, we have not presented tieback criteria. With the relatively large loads as given above, it may be necessary to construct multiple rows of staggered piers interconnected with grade beams in order to spread out the loads. It is anticipated the wall as proposed above will undergo some amount of deflection in the event that the full loads as specified are developed. The underground pier retaining wall should therefore not be connected to the house foundation and/or other site improvements.

Since surface sandy clay material and bedrock tension were encountered in the WLA boring, it is susceptible to "cave-in" during pier wall drilling, especially at depths below groundwater level. As a result, it is our opinion that casing of the drilled pier holes is required for the pier construction. Even though groundwater was not encountered in the WLA boring, groundwater may fluctuate with weather and time of year. The bottom of pier excavations should be reasonably free of loose cuttings and soil

fall-in prior to installing reinforcing steel and placing concrete. It is our recommendation the contractor be made aware of the subsurface conditions outlined in this report and he obtain construction equipment appropriately sized to perform the recommended work. In particular, the piers must extend a minimum of 18 feet below the ground surface, which is likely about 10 feet into bedrock. Equipment capable of performing this recommendation should be employed. Any accumulated water in pier excavations should be removed prior to placing reinforcing steel and concrete, or the concrete should be tremied from the bottom of the hole. Care should be taken during concrete placement to avoid "mushrooming" at the top of the pier because distress in the building may result from expansive soil uplift forces on the "mushroom caps." Each pier should be drilled and poured on the same day.

The proper handling of spoils excavated during the pier drilling is very important. If these materials are left in a loose condition on a slope, they will have a tendency to creep down hill and/or erode during periods of heavy rainfall. Therefore, we recommend these materials be removed from the site, placed and compacted as engineered fill.

Observations during pier drilling operations should be performed by a representative of our firm to confirm that anticipated conditions are being encountered. If drilling refusal is encountered, we can coordinate a review of the conditions and drilling equipment adequacy, as well as conduct discussions with the project structural engineer.

5.04 House Foundation

It is our understanding that the house will be constructed at the extreme northeast corner of the lot. WLA have mapped the margin of the landslide which is shown on the site plan (Appendix A). The proposed house footprint should be cited outside of the landslide margin. In addition, we have recommended above that a pier wall be installed along the landslide margin. Thus, the house foundations and structure should not be connected to the pier wall.

As such, we recommend the proposed residence be supported on drilled, cast-in-place, straight-shaft piers, which are designed to develop their load carrying capacity through friction between the sides of the piers and the surrounding subsurface materials. The house piers should not be connected to the pier wall at the margin of the landslide, and should be setback at least 5 feet from the pier wall. Friction piers should have a minimum diameter of 16 inches, and there should be a minimum center-to-center spacing of at least three pier diameters between adjacent piers.

Beyond the 20-foot special design zone, the piers should generally extend to a depth adequate to provide at least 10 feet of embedment into competent underlying bedrock, which is at least 18 feet below the ground surface.

Within the 20-foot special design zone, the piers should extend to a depth at least 10 feet into competent bedrock underlying the tension zone, which is at least 28 feet below the ground surface.

To determine whether these depths are adequate to carry the structural loads of the residence, the following allowable (factored) skin friction values should be used:

- 500 pounds per square foot for dead plus live loads (factor of safety ≈ 2)
- 650 pounds per square foot for all loads, including wind or seismic (factor of safety ≈ 1.5).

These values can be used starting at a depth of 8 feet for the piers situated beyond the special design zone and at a depth of 18 feet for the piers situated within the special design zone.

All house piers should be designed for a pressure of 65 pounds per square foot. These loads should be considered to act as uniform loads spread over a depth of 8 feet for the piers beyond the special design zone and over a depth of 18 feet for the piers within the special design zone, and across the width of the foundation area.

Lateral loads on the piers may be resisted by passive pressures acting against the sides of the piers. We recommend an allowable passive pressure equal to an equivalent fluid weighing 400 pounds per square foot per foot of depth to a maximum value of 4000 pounds per square foot (factor of safety ≈ 2). This value can be assumed to be acting against 1.5 times the diameter of the individual pier shafts starting at a depth of 12 feet. Passive resistance should be disregarded for the uppermost 8 feet of the pier embedment beyond the special design zone and for the uppermost 18 feet of pier embedment within the special design zone.

The surficial soils may have a tendency to creep downhill, creating a void along the downslope sides of the piers and leaving them unsupported. Therefore, we recommend the piers be designed as free-standing columns, in accordance with the requirements of the 1997 Uniform Building Code, Section 1910, for the upper 8 feet beyond the special design zone and for the upper 18 feet within the special design zone.

The bottom of pier excavations should be reasonably free of loose cuttings and soil fall-in prior to installing reinforcing steel and placing concrete. It is our recommendation the contractor be made aware of the subsurface conditions outlined in this report and he obtain construction equipment appropriately sized to perform the recommended work. In particular, the piers must extend a minimum of 18 feet below ground surface beyond the special design zone and a minimum of 28 feet below the ground surface within the special design zone. Equipment capable of performing this recommendation should be employed. Any accumulated water in pier excavations should be removed prior to placing reinforcing steel and concrete, or the concrete should be tremied from the bottom of the hole. Care should be taken during concrete placement to avoid "mushrooming" at the top of the pier because distress in the building may result from expansive soil uplift forces on the "mushroom caps".

Due to the high groundwater at the site and the significant potential for caving of the pier walls, special construction techniques are strongly recommended for pier installation. One common technique for pier drilling in caving soil consists of casing the hole as drilling proceeds, installing the reinforcing steel, and then pulling the casing out as the concrete is tremied from the bottom of the hole. Other techniques involve the use of drilling "mud" to hold the borehole open during drilling, and then tremying the concrete from the bottom of the hole. The procedures involved for pier installation under these conditions are not trivial. We strongly recommend a contractor experienced in pier installation procedures for caving soils below the groundwater table be retained to perform this work.

The piers should be tied together in at least one direction with grade beams and tie beams that extend up and down the slope between the piers, as well as across the slope between the piers. The maximum horizontal distance between the grade beams and tie beams should be approximately 20 feet. The grade beams and tie beams should be designed to span between the piers in accordance with structural requirements. In order to minimize the possible detrimental effects of the expansive soils, we recommend either a 4-inch void be created at the bottom of all grade beams and tie beams, or the grade beams be designed to resist an ultimate (non-factored) uplift pressure of 2000 pounds per square foot. If a void is

used, our firm should review and approve the method of forming the void prior to construction of the grade beams and tie beams. We should note that if styrofoam is used to form the void beneath the grade beams or tie beams, it must be removed upon completion of the concrete placement. If the grade beams or tie beams are to retain soil, they should be designed to resist the appropriate lateral earth pressures provided in Section 5.07, "Retaining Walls."

The proper handling of spoils excavated during the pier drilling is very important. If these materials are left in a loose condition on a slope, they will have a tendency to creep downhill and/or erode during periods of heavy rainfall. Therefore, we recommend these materials be removed from the site, placed and compacted as engineered fill, or placed as wall backfill where settlement would not cause a problem.

The floor system should be structurally supported and derive all of its support from the pier-and-grade beam foundations.

5.05 Building Code Seismic Design Parameters

Based on our review of the site geology and the 1997 Uniform Building Code (UBC), we recommend an S_D soil profile for the seismic design of the structures. The nearest active fault is the Hayward fault, located approximately 10 km (approximately 6.2 miles) to the southwest. It is a Type A fault as identified in Table 16-U of the 1997 UBC. The site is located within Seismic Zone 4 as determined from Figure 16-2 of the 1997 UBC. We recommend near-source factors of $N_a = 1.0$ and $N_v = 1.2$.

5.06 Slabs-on-Grade

5.06.1 Living Area Slabs

Interior slabs-on-grade are not recommended for this project, due to unstable near-surface soils.

5.06.2 Garage and Exterior Slabs

We recommend that any exterior slabs-on-grade (including the garage slabs) be supported on a minimum of 12 inches of imported, compacted, non-expansive fill. In areas of existing fill, we recommend all of the old, existing fill underlying any proposed slabs be removed and recompacted to the requirements of structural fill. If all of the old fill under proposed slabs cannot be removed, then some settlement, tilting, and cracking of the slab should be expected.

In order to minimize volume change of the subgrade soils, these materials should be scarified to a depth of 6 inches, moisture conditioned to slightly above optimum water content, and compacted to the requirements for structural fill. Prior to the construction of the slabs, the subgrade surface should be proof-rolled to provide a smooth, firm surface for slab support.

The slabs should be structurally independent from the perimeter grade beams and be free floating. Score joints should be provided at a maximum spacing of 10 feet in both directions. The slabs should be appropriately reinforced according to structural requirements; concentrated loads may require additional reinforcing. Minor movement of the concrete slab with resulting cracking should be expected. Therefore, partition walls or doorway trim boards should not be supported directly on the concrete slab and steps to the house from the slab area should be created with a void between the steps and the house foundations. The recommendations presented above, if properly implemented, should help minimize the magnitude of this cracking. It has been our experience the installation of wire mesh for slab reinforcement is often not

performed properly during construction of the slab. As a result, we recommend steel bar reinforcement be used to reinforce any proposed slabs.

5.07 **Retaining Walls**

Retaining walls should be supported on pier foundations designed in accordance with Section 5.04, "House Foundation." Retaining walls must be designed to resist both ultimate (non-factored) lateral earth pressures and any additional lateral loads caused by surcharge loads on the adjoining ground surface. We recommend walls be designed to resist the equivalent fluid pressures indicated in the table below. The appropriate design values should be chosen based on the condition of the wall (restrained or unrestrained) and the angle of the slope behind the wall. Unrestrained wall pressures should only be considered applicable where it would be structurally and architecturally acceptable for the wall to laterally deflect 2 percent of the wall height.

Condition	**Cut Slopes**		**Fill Slopes**	
	4:1[1] or flatter	2:1	4:1 or flatter	2:1
Unrestrained	50 pcf[2]	70 pcf	55 pcf	75 pcf
Restrained	65 pcf	85 pcf	75 pcf	95 pcf

1 Inclination behind wall, horizontal to vertical.
2 "pcf" signifies "pounds per cubic foot" equivalent fluid pressure.

- A linear interpolation should be used to determine design values for retaining walls where the slope behind the wall is between 4:1 and 2:1. Slopes steeper than 2:1 are not anticipated at the site.

- For surcharge loads, increase the ultimate (non-factored) design pressures behind the wall by an additional uniform pressure equivalent to one-half (for restrained condition) or one-third (for unrestrained condition) of the maximum anticipated surcharge load applied to the surface behind the wall.

The above pressures assume sufficient drainage will be provided behind the walls to prevent the build-up of hydrostatic pressures from surface and subsurface water infiltration. Adequate drainage may be provided by a subdrain system consisting of a 4-inch, rigid, perforated pipe, bedded in ¾-inch, clean, open-graded rock. As shown on Figure 2, the recommended location of the subdrain pipe is behind the heel of the footing. Although we have observed that the subdrain pipe is often placed on top of the heel of the footing, it has been our experience this may lead to moisture seeping through the wall resulting in dampness and staining on the opposite wall face despite the application of waterproofing. However, if such seepage or dampness is acceptable (in front of landscape walls, for example), then the subdrain pipe may be placed on top of the heel of the footing. To prevent ponding of water on top of the heel of the footing, we recommend that the top of the heel be sloped to drain away from the wall with a minimum positive gradient of 5 percent. The perforated drainpipe should sloped to drain with a minimum positive gradient of 2 percent. The entire rock/pipe unit should be wrapped in an approved, non-woven, polyester geotextile such as Mirafi 140N or 140NL, or a 4-ounce equivalent. The rock and fabric placed behind the wall should be at least one foot in width and should extend to within one foot of finished grade. The upper one foot of backfill (6 inches for walls less than 5 feet in height) should consist of on-site, compacted, relatively impervious soils (an impermeable plug). We should note that flexible, perforated pipe

(flexline), 2000-Pound Crush, Leachfield, and ASTM F810 pipe are not acceptable for use in the subdrain because of the likelihood of damage to the pipe during installation and the difficulty of future cleaning with mechanical equipment without damaging the pipe. We recommend the use of Schedule 40 PVC, SDR 35 PVC or ABS, Contech A-2000 PVC drainpipe, or equivalent for the drain system. The subdrain pipe should be connected to a system of closed pipes (non-perforated) that lead to suitable discharge facilities. At the location where the perforated subdrain pipe connects with the solid discharge drainpipe, drainrock backfill should be discontinued. A "clay plug" should be constructed out of relatively impervious soils to direct collected water into the perforated pipe and minimize the potential for water collecting around the solid drainpipe and saturating the adjacent soils. We recommend waterproofing be applied to any proposed retaining walls where applicable. The specification of the type of waterproofing and the observation of its installation should be performed by the architect and/or structural engineer.

In addition, the "high" end and all 90-degree bends of the subdrain pipe should be connected to a riser which extends to the surface and acts as a cleanout. The number of cleanouts can be reduced by installing "sweep" 90-degree bends or pairs of 45-degree bends in succession instead of using "tight" 90-degree bends. "Sweep" 90-degree bends are similar to those used in sanitary sewer pipe connections.

Lined surface ditches with a minimum width of 18 inches should be provided behind any walls that will have an exposed sloping surface steeper than 4:1 behind them. These ditches, which will collect runoff water from the slopes, should be sloped to drain (minimum 2 percent positive gradient) to suitable discharge facilities. If the lined surface ditches consist of reinforced concrete, expansion joints should be provided every 10 feet. The top of the walls should extend at least one foot above the ditch (6 inches for walls less than 5 feet in height). All structural backfill placed behind retaining walls should be compacted in accordance with the requirements provided in Section 5.01, "Site Preparation and Earthwork."

5.08 Plan Review

We recommend our firm be provided the opportunity for a general review of the geotechnical aspects of the final plans and specifications for this project in order that the geotechnical recommendations may be properly interpreted and implemented in the design and specifications. Specific items which we recommend our firm review and which the plans should contain include, but are not limited to, the following:

- General: a citation of this geotechnical investigation report (in the general notes);
- Pier wall and house foundations: pier dimensions and depth of embedment, void below grade beams, as applicable;
- Slabs: import fill depth, recompaction of subgrade, as required;
- Retaining walls: foundation requirements (as noted in Item 2 above), wall drain system, impermeable plug above drain, surface ditch and freeboard, as needed; and
- Drainage: gradient away from structure, downspout collector pipes, surface or subdrain collector system, crawlspace drainage, and discharge location.

If our firm is not accorded the privilege of making the recommended review, we can assume no responsibility for misinterpretation of our recommendations.

5.09 Construction Observation

The analysis and recommendations submitted in this report are based in part upon the data obtained from the WLA test trench and soil boring. The nature and extent of variations across the site may not become evident until construction. If variations then become apparent, it will be necessary to re-evaluate the recommendations of this report.

We recommend our firm be retained to provide geotechnical engineering services during the earthwork, foundation construction, and drainage phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction. Specifically, we recommend a representative of our firm observe the following aspects of the construction:

1. Earthwork: site clearing and debris removal, excavations, subgrade preparation for slabs or filling, compaction operations including retaining wall or trench backfill, as applicable;
2. Foundations: pier drilling, void below grade beams, footing trench excavations; and
3. Drainage: retaining wall subdrains, downspouts, area drains, surface ditches, positive surface gradients adjacent to the home, crawlspace drainage, discharge location.

In order to effectively accomplish these observations, we recommend a pre-construction meeting be held to develop a mechanism for proper communications throughout the project. We also request the client or the client's representative (the contractor) contact our firm at least two working days prior to the commencement of any of the items listed above. If our representative makes a site visit in response to a request from the client or the client's representative and it turns out that the visit was not necessary, our charges for the visit will still be forwarded to the client.

5.10 Wet Weather Construction

Although it is possible that construction can proceed during or immediately following the wet winter months, a number of geotechnical problems may occur which may increase costs and cause project delays. The water content of on-site soils may increase during the winter and rise significantly above optimum moisture content for compaction of subgrade or backfill materials. If this occurs, the contractor may be unable to achieve the recommended levels of compaction without using special measures and would likely have to:

1. Wait until the materials are dry enough to become workable;
2. Dispose of the wet soils and import dry soils; and
3. Use lime or cement on the native materials to absorb water and achieve workability.

If utility trenches, pier holes, or footing excavations are open during winter rains, then caving of the trenches, pier walls, or footing excavations may occur. Also, if the pier holes or footing trenches fill with water during construction, or if saturated materials are encountered at the anticipated bottom of the excavations, the piers or footings may need to be extended to greater depths to reach adequate support capacity than would be necessary if dry weather construction took place.

We should also note it has been our experience increased clean-up costs will occur, and greater safety hazards will exist, if the work proceeds during the wet winter months. Furthermore, engineering costs to observe construction are increased because of project delays, modifications, and rework.

5.11 Future Performance

All people who own or occupy homes on hillsides should realize landslide movements are always a possibility, although generally the likelihood is very low that such an event will actually occur. The probability that landsliding will occur is substantially reduced by the proper maintenance of drainage measures at the site (see detailed discussion in Appendix B). Therefore, the homeowner should recognize their responsibility for performing such maintenance. Consequently, we recommend a copy of our report be provided to any future homeowners of the property if the home is sold, so they will also be aware of their maintenance responsibilities.

If you have any questions concerning this letter, please call us.

Very truly yours,

Philip Tse, G.E.
Associate Engineer

PHILIP C. TSE
No. 2236
Exp 03/30/05

PT/sn

Copies: Addressee (2)

WLA

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Messrs. Alan Kropp & Philip Tse
Alan Kropp & Associates, Inc.
2140 Shattuck Avenue
Berkeley, CA 94704

November 18, 2003

RE: Geologic investigation of Proposed Homesite on Click property, 3933 Quail Ridge Rd., Lafayette, California

Dear Alan and Philip:

Introduction

This letter report presents the results from the William Lettis & Associates, Inc. (WLA) geologic investigation of the proposed residential homesite on the Click property located at 3933 Quail Ridge Road in Lafayette, California (Figure 1). The WLA study was performed under subcontract to Alan Kropp & Associates, Inc. (AKA), as part of the AKA geotechnical investigation for the proposed residential structure. Jeff Bachhuber, C.E.G. (Principal Engineering Geologist) and Sean Sundermann (Staff Geologist) from WLA performed the geologic investigation.

The property owner, Mr. Matt Click, is proposing to construct a single-level, single family residence on the extreme northeast corner of the property. We understand that the house will have a raised structural steel platform supported on a pier and grade beam foundation. The proposed house location is above and east of the lateral margin of an active (unstabilized) landslide that occurred on the property in 1997. The 1997 slide damaged a former house on the landslide-affected part of the lot, and extended under a portion of Quail Ridge Road. The damaged structure was removed, the site was partially regraded, and Quail Ridge Road was rebuilt on a tieback wall and geogrid-reinforced fill buttress by Engineered Soil Repairs (ESR) in 1999. Our investigation focused on evaluation of the stability of the proposed homesite, and determination of the location and characteristics of the eastern lateral margin of the landslide that bounds the west and south margins of the proposed Click homesite.

The WLA investigation included subsurface exploration of the site with a boring and test pit, and characterization of the geologic conditions and properties to be used for input in the AKA geotechnical investigation. The AKA investigation will evaluate the suitability of the site foundation conditions, evaluate possible stabilization or defense measures to counter future sliding, and develop grading and foundation recommendations. We note that the 1997 landslide on the Click property was not stabilized, and is subject to future movements that could significantly damage any structures constructed on, or across the margin of, the landslide. It is therefore necessary to locate the proposed house a sufficient distance away from the landslide margin to prevent future damages to the structure. A recommended "Special Design Zone" is established adjacent to the slide margin as discussed in a later section of this report. No structure should be constructed within this special design zone unless specific engineering stabilization measures, such as pier walls or regrading, are used to stabilize the slide margin and allow safe construction within the special design zone. These stabilization measures shall be designed by a qualified licensed geotechnical engineer. Optional stabilization measures are discussed in the AKA geotechnical report.

Numerous studies by various geologic/geotechnical consultants (including WLA and AKA) were performed after the 1997 landslide to determine the cause and characteristics of the slide, and exploratory borings, test pits, and monitoring systems were made in the slide mass to identify and measure slide movement locations and magnitudes. Some of this information is available in the WLA and AKA office files, and was reviewed for this current study. In addition to the past landslide studies, Mr. Click provided a copy of the 1999 design plans for the Quail Ridge Road repair that was performed by ESR, and extended partly onto the Click property. The property owner, and any future homeowners that purchase the property, should review these past studies to be fully aware of the landslide conditions, past movements and damage, and potential future risks associated with the proposed new house.

Scope of Work and Limitations

The scope of the WLA investigation included the following:

1. Review of published and unpublished information in the WLA project file and office;
    - pre and post-landslide aerial photographs
    - detailed landslide map (1997)
    - WLA exploratory borings and test pits in the slide mass (1997)
2. site visual inspection and mapping;
3. excavation and logging of an exploratory boring within the proposed house site area;
4. excavation and logging of an exploratory test pit adjacent to the south margin of the proposed house site and across the active landslide margin;
5. geologic analysis and preparation of a site map and cross section; and,
6. preparation of this letter report.

The proposed house site location was defined in the field by the property owner, and is within the extreme northeast corner of the property east of the landslide and adjacent to Quail Ridge Road. The exact location of a house structure has not yet been determined, and is partly dependent on the results of this study. A site survey and topographic map were performed by DeBolt Civil Engineering, and formed the basis for our selection of the exploration locations. The locations of the WLA site explorations and active landslide margin are shown on a copy of a portion of the DeBolt topographic map in Figure 2.

The WLA investigation was scoped to fit within the approved project budget developed between AKA and Mr. Click, and is suitable for the conceptual siting of the house and preliminary geotechnical engineering. An additional exploratory test pit should be excavated and logged by a qualified engineering geologist across the landslide lateral scarp, and extending through the central part of the final building footprint area, to provide an additional data point regarding the location and geometry of the slide lateral margin in the exact location of the house. We do not anticipate that the exposures from the future test pit would significantly modify the location of the slide margin shown on Figure 2, but will provide additional data to verify the margin location for final house or stabilization design.

This report has been prepared for the exclusive use of Mr. Click and his consultants for the specific application to the proposed residential development in accordance with generally accepted geologic and geotechnical engineering practices. No other warranty, expressed or implied, is made. In the event that the nature, design, or location of the home differs from what has been noted above, or if any additional facilities are proposed, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and the conclusions of the report modified or verified in writing.

The findings of this report are valid as of the present date. However, the passing of time will likely change the conditions of the existing property due to natural processes or the works of man. In addition, due to legislation or the broadening of knowledge, changes in the applicable or appropriate standards may occur. Accordingly, the findings of this report may be invalidated, wholly or partly, by changes beyond our control. Therefore, this report should not be relied upon after three years without being reviewed by our office. This report should be provided to any future purchasers or owners of the property.

Background

The property is located on the south-facing slope of a small ridge between Happy Valley and Highway 24, and south of Quail Ridge Road (Figure 1). The site is on the south limb of the Happy Valley Syncline, and underlain by Tertiary Orinda Formation (Contra Costa Group) non-marine sedimentary bedrock that strikes to the northwest and dips north into the axis of the syncline at inclinations between 35 and 40 degrees (Crane, 1988, Haydon, 1995). Interbedded sandstone, conglomerate, siltstone, and claystone was encountered underlying the proposed house site at depths of between about 2 and 5 feet (Figure 3).

Published landslide maps (e.g., Nilsen, 1975; Haydon, 1995) show previously-existing landslides (prior to the 1997 slide) in the swales to the west and east of the site, but do not show the 1997 landslide. This landslide also was not described in the pre-development subdivision and lot geotechnical and foundation reports by ENGEO (1975) and Hallenbeck-McKay & Associates, Inc. (1978). The results from exploratory test pits and borings made in the central part of the landslide mass during the previous WLA/AKA landslide investigations (1997) showed that the 1997 slide occurred along 6- to 24-inch thick brown clay zones in bedrock at depths of about 30 to 40 feet, and possibly with minor displacements along similar clay zones at 60 foot-depth. The previous WLA exploratory test pits provided evidence for past ancient landsliding in the bedrock along the approximate boundaries of the 1997 landslide. This suggests that the 1997 slide occurred along pre-existing planes of weakness in the bedrock. Pre-slide aerial photographs show the site to be located within a broad swale area that possibly defined the extent of an ancient landslide. The proposed Click homesite area is primarily located on an apparently in-place bedrock spur ridge that bounds the swale area, and did not show evidence of past landslide activity on the aerial photographs.

Some grading, primarily cutting, was performed on the site during demolition of the previous landslide-damaged house, and stabilization and reconstruction of Quail Ridge Road. This grading extends partly into the house site area of the planned Click residence, and backfilled a depression and 4- to 6-foot high scarp that formed along the 1997 slide margin below the homesite area. The original ground surface above the landslide lateral margin was excavated and lowered several feet in some areas, and slightly filled in others, obscuring the location of the lateral slide margin that formerly was well-expressed as a steep scarp and disrupted ground area. Because of this post-landslide grading, the location of the lateral slide margin is difficult to determine, and requires the use of exploratory test pits.

A detailed landslide map showing the slide lateral margins was prepared by WLA in 1997. Additionally, post-landslide aerial phographs flown in December, 1997, clearly show the outlines of the landslide. Our interpreted location of the slide margin is shown on Figure 2, and was compiled by superpositioning of the 1997 landslide map with the DeBolt topographic map, examination of the post-slide aerial photographs, and extrapolation of the slide margin location and geometry from our new WLA Trench T-1 that is described below. We believe that the margin location shown on Figure 2 has a locational margin-of-error of about 5 feet to either side of the map line.

The proposed house site location is bounded by the lateral landslide margin, and has an area of approximately 2,000 to 3,000 square feet. The size of the house footprint will be significantly constrained by required setbacks from the property lines, and the landslide lateral margin.

WLA Site Exploration

The WLA site exploration program consisted of one exploratory boring (WLA T-1), and one exploratory test pit (WLA B-1). The locations of the explorations are shown on Figure 2.

Exploratory Test Pit WLA T-1

Exploratory test pit WLA T-1 was excavated on August 18, 2003 across the slide margin and adjacent to the southern margin of the proposed house site location. The test pit was 45 feet long, 5 to 6 feet deep, and 3 feet wide. The test pit was oriented perpendicular to the slide margin at an azimuth of N24E. WLA geologists cleaned and examined the pit walls to identify soil and bedrock units and structures, and to locate and measure the landslide lateral margin. A detailed log was prepared of the south wall of the test pit, and is included in Attachment A. A well-defined slide margin that juxtaposed slide debris against in-place bedrock and colluvium was observed in the lower part of the trench. Uphill (east) of the landslide margin, consistently north-dipping sandstone and conglomerate bedrock was encountered underlying a 1- to 3-foot thick mantle of stiff, sandy and silty clay fill and colluvium. The base of the colluvium (colluvium-bedrock contact) was irregular and marked by deep soil tongues. Bedrock was interbedded, moderately weathered, weakly cemented (friable) sandstone and conglomerate that exhibited a relatively consistent strike of between 305 to 330 degrees, and northward dip (into the slope) of between 35 and 40 degrees. The slide contact was sharp, and had a strike of 324 degrees, and southwest dip of 54 degrees.

A secondary slide margin, defined by a bedrock fracture with 6- to 8-inch vertical offsets of bedding, was located in dilated bedrock immediately behind the main slide margin. A 5- to 10-foot wide, near-vertical, dilated bedrock zone with numerous closely-spaced tensional fractures was observed behind the secondary and main lateral margins. Rock bedding was not displaced by the tensional fractures, and no indications of significant lateral movements were observed in this zone. The colluvial soil overlying the bedrock tension zone was not deformed, suggesting that the tension zone may have formed by ancient landsliding and slope relaxation prior to deposition of the colluvium (perhaps many hundreds of years ago). Bedrock bedding contacts and structure appeared to be stable and in-place above the tensional zone. The landslide debris south and west of the lateral margin consisted of intermixed, translated, clay, rock blocks, and fill that is in a stiff condition. A layer of drainrock was encountered in the extreme downhill end of the trench, about 5 feet west of the slide margin. This drain rock was presumably placed as part of a subsurface drain during reconstruction of Quail Ridge Road by ESR in 1999.

Bedrock observed in the trench is weakly cemented, but exhibits good foundation strength properties. Pocket penetrometer soundings both in the bedrock, and overlying stiff clayey colluvium, exceeded 4.5 tons per square foot. The trench remained dry during excavation and logging, and no seeps or wet zones were encountered.

Exploratory Boring WLA B-1

Exploratory boring WLA B-1 was drilled on September 29, 2003 along the west-central boundary of the proposed house site location (Figure 2) where the fill and overburden soils are believed to be thickest. This location also is along the downhill margin of the proposed house site location nearest the slide margin, and represents the likely worst-case condition for house foundations and possible slide stabilization structures. The boring was drilled with a truck-mounted rig using 6-inch diameter hollow stem augers. The boring was drilled dry, and extended to a depth of 45 feet. The boring was logged by a WLA geologist, and boring logs are included in Attachment A. Samples were collected in the boring using an automatically-tripped, 140 pound hammer with a 30-inch drop. The following sampling tubes were used to collect samples: 3-inch outside diameter Shelby tubes; 3-inch outside diameter driven split spoon ("Modified California") sampler with 2.5-inch diameter brass liner tubes; and, Standard Penetration Test (SPT) drive sampler. Sampling was near continuous for the upper 12 feet of the boring, and thereafter spaced between 2.5 and 3 feet to the bottom of the boring. Samples were retrieved and examined by the WLA geologist, and sealed in labeled plastic bags or capped sample tubes for transport to the WLA office. The samples were described on the boring logs, and delivered to AKA for laboratory testing.

Subsurface stratigraphy encountered in the boring consisted of a 7-foot thick upper layer of stiff (SPT "N" blow counts of 12), silty SAND-CLAY (SC-CL) colluvium overlying sedimentary bedrock that extended to the bottom of the hole. The bedrock was similar to that observed in WLA T-1, and included: (1) an upper layer of moderately weathered, dense (SPT N count of 18 to 33) silty SANDSTONE between 7 and 18.5 foot depth; (2) slightly to moderately weathered, dense to very dense (SPT N count 55 to 76) SILTY SANDSTONE-SILTSTONE between 18.5 feet and 37 feet; and, (3) slightly to moderately weathered, very dense (SPT N count 50 to 60) CLAYSTONE from 37 feet to the bottom of the hole at 45 feet. No landslide failure planes or clay seams, similar to those encountered at the base of the 1997 slide, were encountered in the boring, and the bedrock at the boring location appears to be in-place and stable. No free groundwater was encountered in the boring. The boring was backfilled with cement grout upon completion.

Geologic Cross Section

Figure 3 is an interpreted geologic cross section that was developed by WLA geologists using a hand level and tape, and information from the exploratory boring and test pit. The location and geometry of the slide margin were extrapolated from the WLA T-1 test pit and previous mapping, and bedrock bedding was extrapolated from the WLA T-1 test pit. Evaluation of the cross section suggests that the buried bedrock surface is relatively flat under the proposed house site location, and steepens southward below boring WLA B-1 into the axis of the 1997 slide mass. A bedrock tension zone, similar to that observed behind the slide lateral margin in WLA T-1, is shown on the cross section between the boring the extrapolated slide margin.

Based on examination of the cross section, it appears that future movements of the 1997 landslide will be constrained to the area of the existing landslide lateral margin and the bedrock tension zone extending for about 10 feet uphill from the lateral margin. Possible future slide movements are not believed likely to extend significantly eastward beyond the tension zone, and into the proposed house site location. The cross section suggests that large-scale eastward slide enlargement would be partly constrained by the rising bedrock surface behind the lateral margin, and failure planes would need to be substantially flatter than the current lateral margins that are inclined between 54 and 85 degrees. The weathered bedrock behind the tension zone did not exhibit low-strength planes of structural weakness, and likely possesses sufficient strength to resist low-angled slide planes. Additionally, the bedrock bedding is favorably inclined into the slope, and movements in the bedrock tension zone likely would be topple or raveling-type movements into the slide lateral margin zone. The old colluvium above the bedrock tension zone in WLA T-1 did not appear to have experienced significant slide-induced movements, and the bedrock tension cracks appear to have formed prior to deposition of the colluvium. This suggests a substantial antiquity for the bedrock tension cracks. Based on this information, large-scale enlargement of the slide margin into the in-place, stable bedrock uphill from the bedrock tension zone is not believed to be likely.

Recommendations

Based on the past history of sliding and observed conditions, it is likely that the unstabilized landslide mass located west of the lateral slide margin will be subject to future creeping-type movements, and possible large-scale movements. Any structures that cross, or encroach against, the slide margin are subject to large-scale deformations (vertical and lateral movements on the order of several feet or more) that could cause substantial damage or structural collapse and a life-safety hazard to inhabitants. The dilated tension zone in bedrock immediately behind (east of) the slide lateral margin is potentially subject to future small- to moderate-magnitude (inches to a couple of feet) of lateral and vertical movements in response to future displacement of the main slide. Such displacements in the tension zone could cause damage to any structures sited over this zone.

We define a 20-foot wide "Special Design Zone" adjacent to (east of) the slide margin as shown on Figure 2. The 20-foot wide special design zone includes the bedrock tension zone, and an additional buffer zone of 10 feet behind the tension zone. No structures should be sited within the special design zone without specific engineering stabilization and foundation design measures to allow safe construction within the zone. This special design zone is believed to provide a relatively high level of safety against future slide movements that are similar to those that occurred in 1997, and ancient past slides in the bedrock. The recommended special design zone was made as narrow as possible, balanced by the need to include the rock tension zone and uncertainty in the location and behavior of the slide margin. It may be feasible to stabilize the margin of the slide adjacent to the proposed house site location using a drilled pier wall or other method to stabilize the slope and allow safe encroachment of the structure within the recommended 20 foot special design zone. Such a design should be developed by a qualified geotechnical engineer, and factor future large-scale movements of the unstabilized part of the slide.

Future slide movements should not significantly encroach past the special design zone during a single catastrophic event. However, it is possible that the slide could progressively enlarge eastward in a series of separate slide events. The recommended special design zone should allow sufficient warning to permit safe evacuation of residents, and provide time to respond to the slide with possible emergency stabilization measures. The house structure should be supported on engineered deep pier and grade beam foundations that extend into the sound and stable bedrock. This will provide an extra level of safety for the house. Drainage should be well-controlled on the site, and prevented from flowing into, and saturating, the slide area.

As discussed previously, we recommend that an additional exploratory test pit be sited across the slide margin, and extending onto the central portion of the final house site location to verify the location of the slide margin for final house layout and design.

Closure

Please call us at 925-256-6070 if you have any questions regarding this report.

Sincerely,
WILLIAM LETTIS & ASSOCIATES, INC.

Jeffrey L. Bachhuber, C.E.G.
Principal Engineering Geologist

Sean Sundermann
Staff Geologist

References:

Crane, R.C., 1988, Geologic 7.5 Minute quadrangle map of the Briones Valley Quadrangle: in, Northern California Geological Society, Field Trip Guide to the Geology of the San Ramon Valley and Environs, April 30, 1988, map scale 1:24,000.

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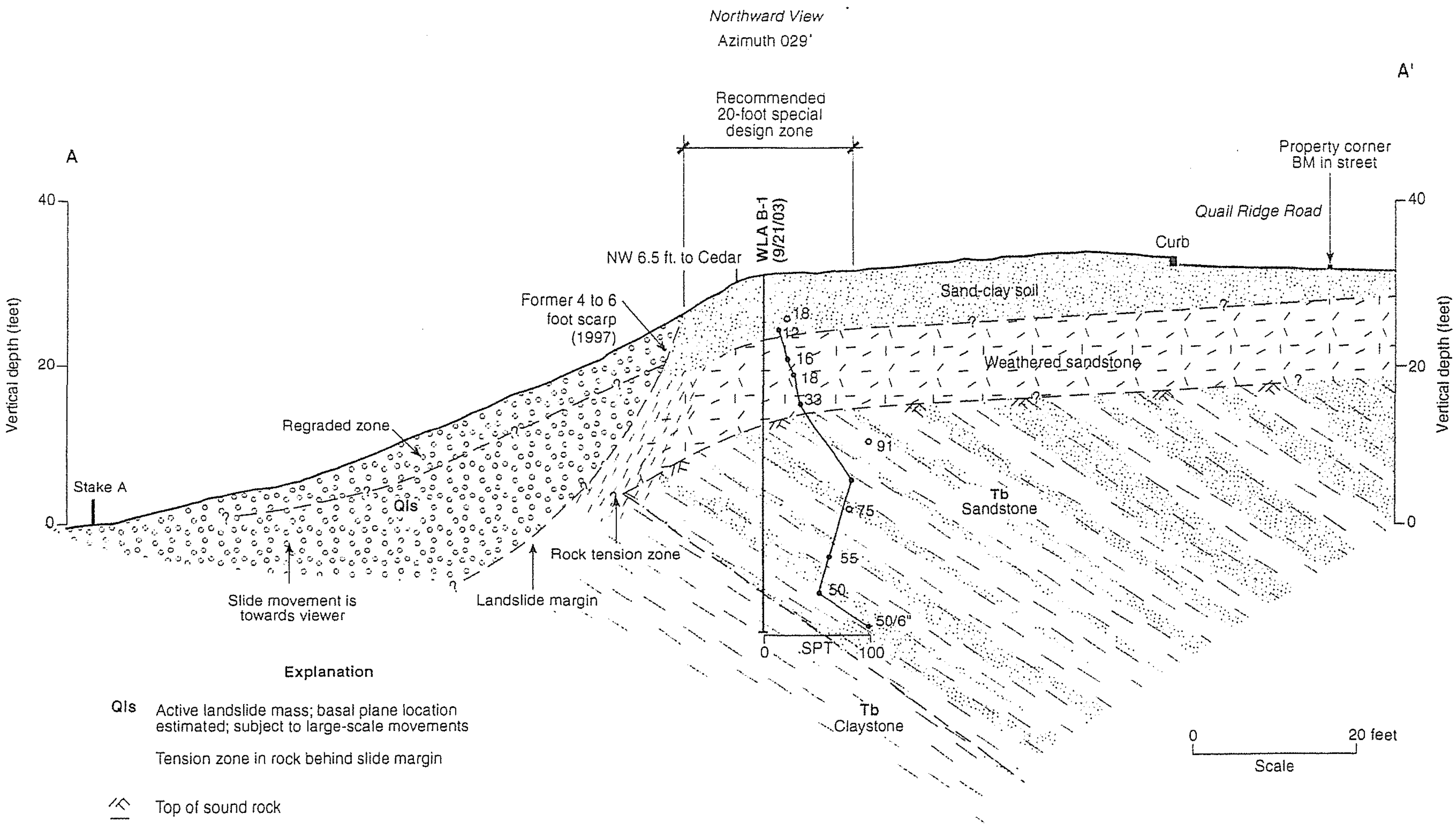
Nilsen, T., 1975, Preliminary Photointerpretation Map of Landslides and Surficial Deposits of the Briones Valley 7.5-Minute Quadrangle: U.S. Geol. Survey Open File Map No. 75-277-8.



Explanation

Qls Active landslide mass; basal plane location estimated; subject to large-scale movements

Tension zone in rock behind slide margin

Top of sound rock

35 55 50 Standard penetration test blow counts (uncorrected)

○ Modified California sampler blow counts

Bedrock bedding apparent dip, extrapolated from WLA T-1

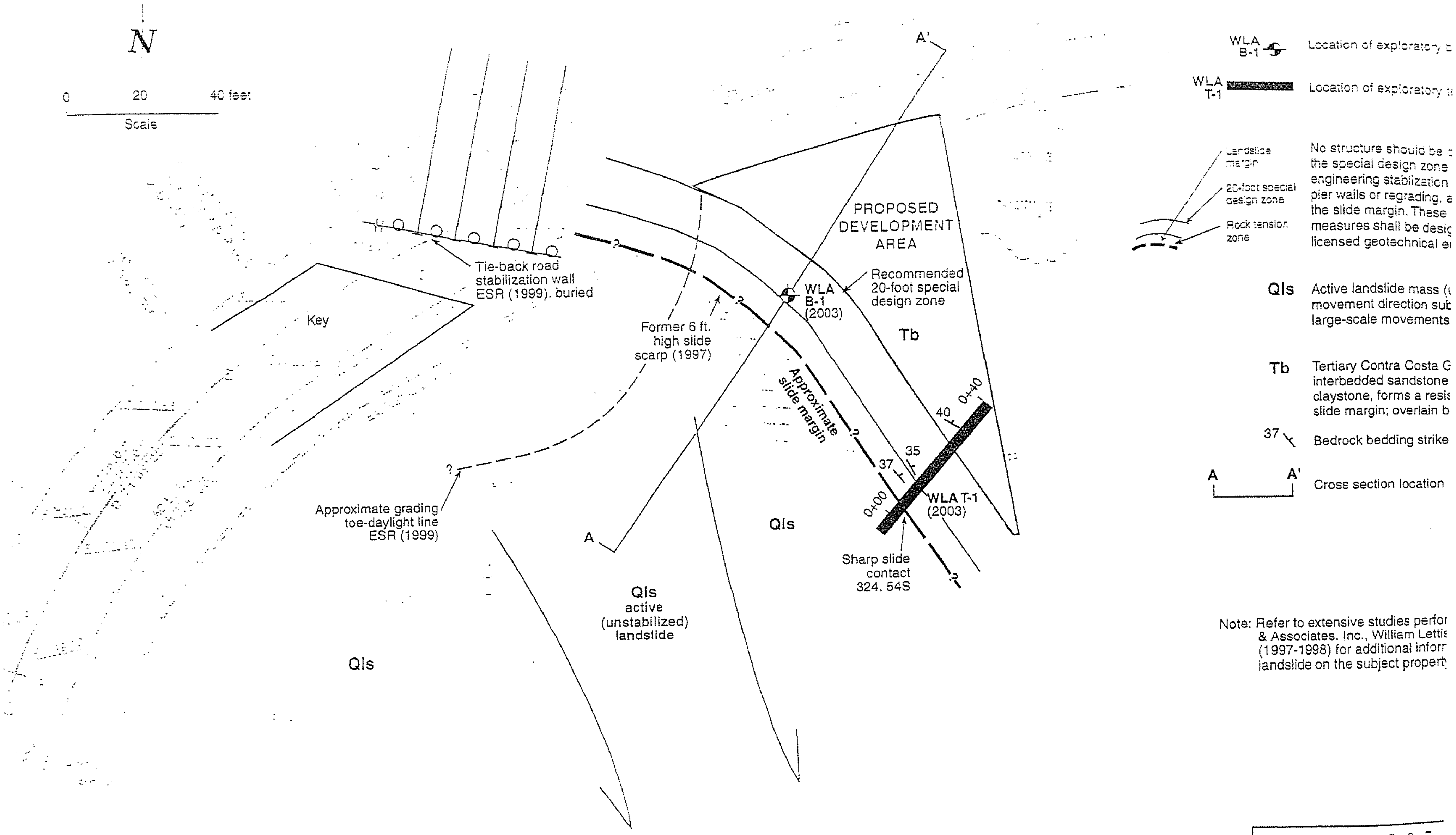
Note: Topography based on a hand level and tape survey by Jeff Bachhuber and Sean Sundermann on 9/29/03.

QUAIL RIDGE RD. - CLICK

Geologic Cross Section A-A'

WLA William Lettis & Associates, Inc. Figure 3

1623 Quail Ridge Road



Note: Refer to extensive studies perfor & Associates, Inc., William Lettis (1997-1998) for additional inforr landslide on the subject propert

Q U A I L R I D G E

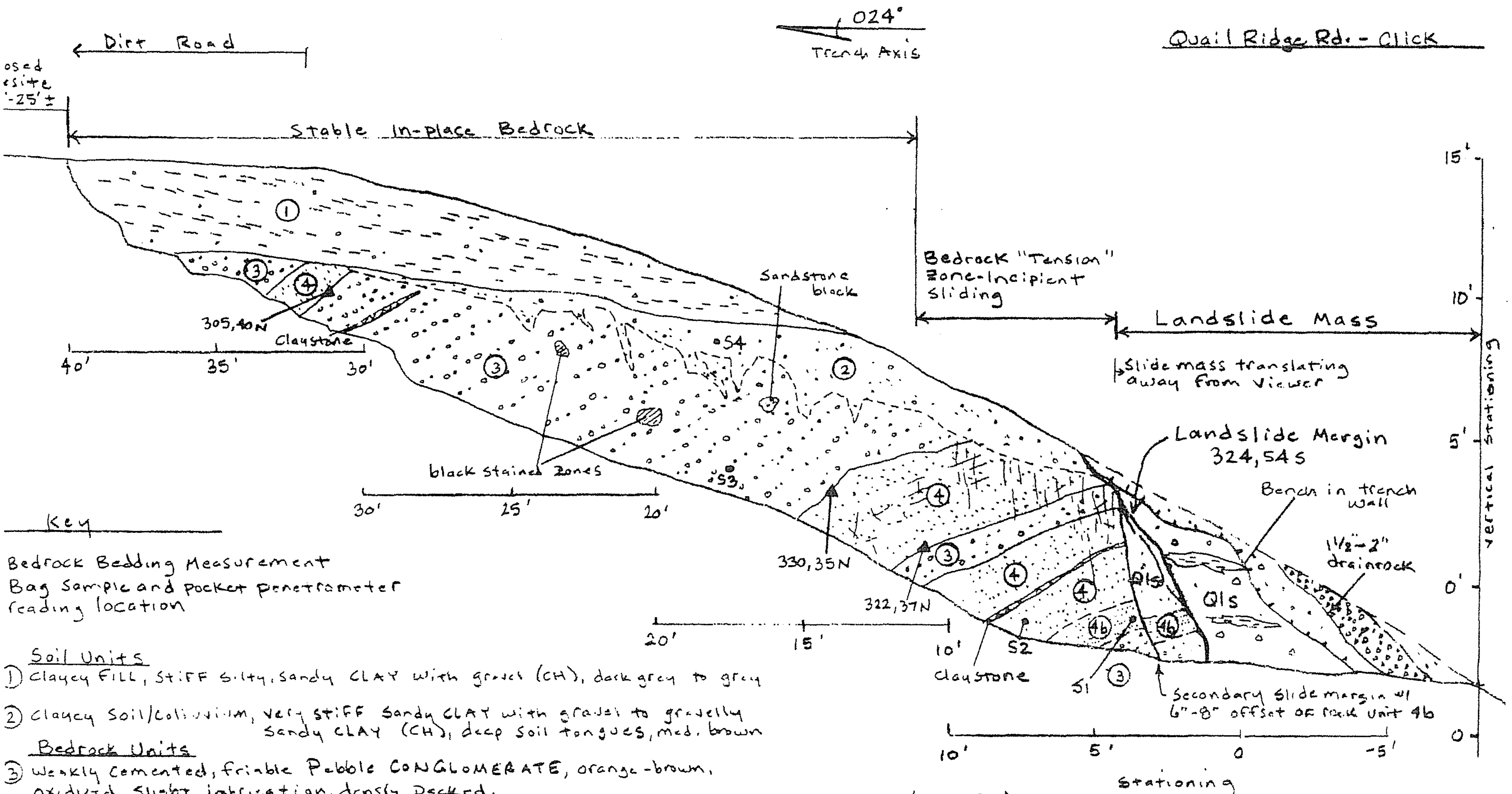
Site Geologi
Exploratior

ATTACHMENTS – TEST PIT AND BORING LOGS

[illegible]ian [illegible]tis [illegible]ax, [illegible] (w[illegible] for
Alan Kropp Associates, Inc (AKA)
Logged by: Jeff Bachhuber, C.E.G.
Sean Sandelmann

August 18, 2003
Trench 3' wide

Quail Ridge Rd. - Click



Key

Bedrock Bedding Measurement
Bag Sample and pocket penetrometer reading location

Soil Units

① Clayey FILL, stiff silty, sandy CLAY with gravel (CH), dark grey to grey

② Clayey soil/colluvium, very stiff sandy CLAY with gravel to gravelly sandy CLAY (CH), deep soil tongues, med. brown

Bedrock Units

③ Weakly cemented, friable Pebble CONGLOMERATE, orange-brown, oxidized, slight imbrication, densly packed, contains black-stained zones, clasts 1/4-2", subrounded

④ Medium to coarse weakly cemented, friable SANDSTONE, tan, clayey zones and fine-grained zones (4b), locally jointed

Landslide Mass

Pocket Penetrometer Tests (tons/ft²)

S-1	4-4.5+
S-2	4.5+
S-3	4.5+
S-4	4.5+

B-1

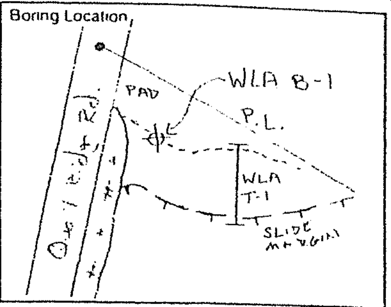
WLA

BORING LOG

Page 1 of 3

Project: Quail Ridge - Click
Job No.: 1623
Boring No.: WLA B-1
Type & Diameter of Boring: Hollow Stem Auger
Elevation @ Top of Hole / Total Depth: ±196 ft
Sampling Method: 3"ϕ Shelby; 3"ϕ O.D. ModCal; 1.4" SPT
Sample Driving Hammer and Drop: 140 lb auto-trip 30 in
Drilling Contractor and Rig: V&W CME 850
Date Started: 9/29/03
Date Completed: 9/29/03
Depth to groundwater: Not Encountered
Logged By: S. Sor[illegible] / J. [illegible]
Notes:

Boring Location



Depth (feet)	SPT N1(60)	Uncorrected Blows per 6-inch drive	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Torvane (TSF)	Description	Remarks
0–2									
2–4			1-1	3.0-inch O.D. Shelby sampler	24	>4.5		SAND-CLAY, silty; mottled tan to red-brown; angular sandstone rock fragments up to 1" diameter; medium dense; poorly sorted; well graded (Colluvium)	250 psi
4–5.5	18	1 A 6 B 12 C	SC-CL 1-2	3.0-inch O.D. Shelby sampler	8	4.5			
5.5–7	12	6 6 6	1-3	SPT sampler	12			↓ Grades coarser and darker color (brown-gray) TOP OF BEDROCK	
7–9			1-4	3.0-inch O.D. Shelby sampler	24	>4.5		SANDSTONE with silt; light tan to brown-yellow; fine grained; weakly cemented; slight to moderate weathering; sub-horizontal laminations and oxidation streaks	200-500 psi
9–10.5	16	1 A 4 B 12 C	SP-SW 1-5	3.0-inch O.D. Shelby sampler	4				
10.5–12	18	7 8 10	1-6	SPT sampler	16				
12–14			SANDSTONE					SANDSTONE, silty, with clay; light gray to tan; very fine to fine grained; soft; weakly cemented; slight to moderate weathering; discontinuous joints	
14–15			1-7	3.0-inch O.D. Shelby sampler	8	>4.5			500 psi

▨ 3.0-inch O.D. split spoon sampler

☒ 3.0 ~~2.5~~-inch O.D. Shelby ~~split spoon~~ sampler

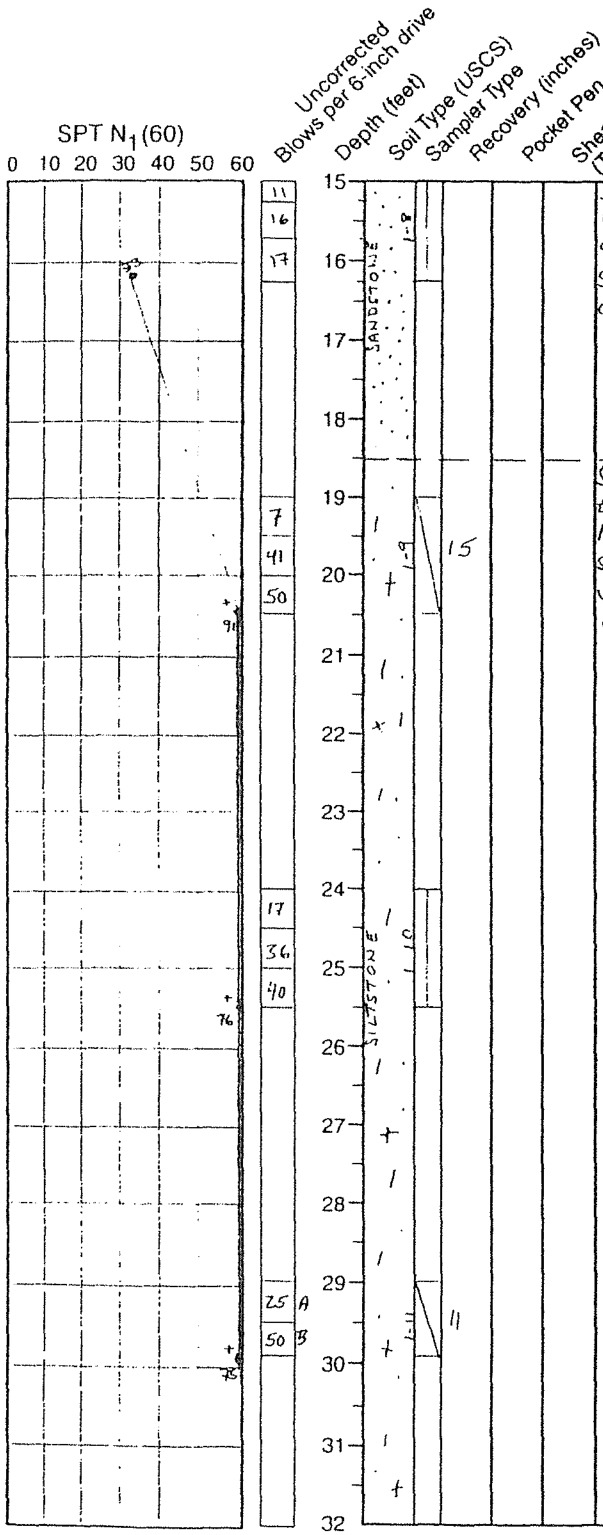
▮ Standard Penetration Test (SPT) sampler

B-

BORING LOG

Page 2 of 3

Project	Job No.	Boring No.
Quail Ridge - Click	1633	WLA B-1



Description

SANDSTONE, silty, with clay; light gray to tan; wet, fine to ine grained; sels; weakly cemented; Slight to moderate weathering; discontinuous joints

Silty SANDSTONE to Sandy SILTSTONE; tan to light orange-brown; sub-horizontal laminations and oxidation streaks; slightly weathered; weak to moderate weakly cemented; fine-grained; stained and oxidized discontinuous joints

Coarsens Downward

Remarks

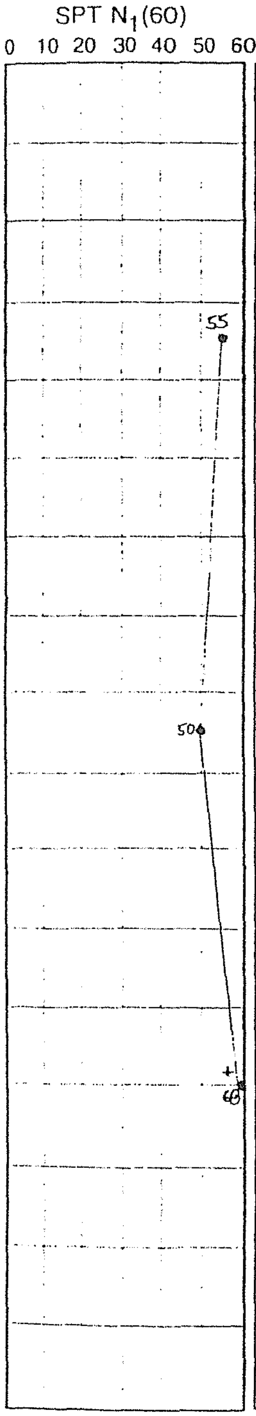
▨ 3.0-inch O.D. split spoon sampler ☒ 2.5-inch I.D. split spoon sampler ▮ Standard Penetration Test (SPT) sampler

WLA

BORING LOG

Page 3 of 3

Project	Job No.	Boring No.
Quail Ridge - Click	1623	WLA B-1



Uncorrected Blows per 6-inch drive	Depth (feet)	Soil Type (USCS)	Sampler Type	Recovery (inches)	Pocket Pen. (TSF)	Shear Torvane (TSF)	Description	Remarks
	32						Silty SANDSTONE to Sandy SILTSTONE; tan to light orange-brown; sub-horizontal laminations and oxidation streaks; slightly weathered; weak to moderately cemented; medium-grained; stained and oxidized discontinuous joints.	
	33							
14 25	34		1-12	18				
30	35							
	36							
	37						CLAYSTONE; micaceous with calcium carbonate blebs; light gray to gray; low plasticity; weakly to moderately cemented; soft; discontinuous joints.	
	38							
9 16	39		1-13	17				
34	40							
	41	CLAYSTONE						
	42							
	43							
18 50	44		1-14	11				
	45			R			Bottom of Hole @ 44 9' No Free groundwater encountered Backfilled with neat cement by tremmie method 9/29/03	
	46							
	47							
	48							
	49							

▨ 3.0-inch O.D. split spoon sampler ☒ 2.5-inch I.D. split spoon sampler ▮ Standard Penetration Test (SPT) sampler

SEIDELMAN ASSOCIATES
2427 CHERRY HILLS DRIVE
LAFAYETTE, CALIFORNIA 94549
(925) 930-0646
(925) 930-0828 (FAX)

July 17, 2008

Mr. William Marquand, AIA
3498 Monroe Avenue
Lafayette, CA 94549

RE: Foundation Location Limits – 3933 Quail Ridge, Lafayette

Dear Mr. Marquand:

As we discussed on the phone, it would be helpful for all, in planning the residential development of the subject property, to indicate on a map the location of the slide margin as discussed in our report dated, June 24, 2008. We have attached a portion of a topographic map developed for the site. On that map, we have indicated the location of the pin-pile wall on which the house foundation margin may be placed. The line shown on the map was developed by reviewing the trench location from the William Lettis study, and our field review of the slide margin as it became visible during the recent reactivation of the lower slide body. The surveyor also indicated both the bottom and the top of the newly revealed slide scarp. For the most part, we have located the foundation margin above the lower scarp, and along the alignment of the upper scarp as revealed by the recent movement. We also left two stakes in the field located by our trenching some three years ago.

In response to your question regarding the relationship between the landslide and the new house, the proposed structure will not add any loads to the existing landslide, and if the recommendations in our report are followed in regards to drainage, the redeveloped lot will in no way influence the old landslide.

We hope this has provided you with the information you need to proceed in this matter. Should you have any further questions, please don't hesitate to give us a call.

Sincerely,

SEIDELMAN ASSOCIATES

Paul Seidelman
Principal Engineer
RCE 29683
GE 761

SEIDELMAN ASSOCIATES
2427 CHERRY HILLS DRIVE
LAFAYETTE, CALIFORNIA 94549
(925) 930-0646
(925) 930-0828 (FAX)

July 24, 2008

Mr. Bill Marquand
3498 Monroe Avenue
Lafayette, CA 94549

RE: Alternative Development Feasibility – 3933 Quail Ridge, Lafayette

Dear Mr. Marquand:

Based on your recent email, your discussions with the City of Lafayette indicated their question regarding what, if any, alternative development plans are feasible for the subject lot. As you know, this was the subject of extensive legal negotiations at the time of the landslide failure. Numerous experts and insurance companies, and interested parties, discussed alternative ways of handling the very large landslide that had occurred.

The landslide is nearly 1,300 feet in total length, and extends well offsite onto the parcel of land below (see attached map). Alteration of the active landslide mass is highly dangerous, as it will remove lateral confining pressures on the left and right flank of the slide mass. The repair of five years ago addressed this problem in the crown area only by installing deep (70 foot) wide flange beams with tiebacks to stabilize the crown area during excavation for the buttress fill necessary to support the crown area. The conclusion at the time of repair was that it would cost many millions of dollars to install this support feature to the flanks of the landslide, and that it was therefore not economically feasible, as the repair exceeded the value of the parcel and house by over 100% at that time.

Since that time, the cost of grading has greatly accelerated due to the cost of fuel and heavy equipment. We would broadly estimate that application of the repair procedures necessary to make the lot buildable in the area of the slide would require 2.5 to 4 million dollars in grading and structural expense. Furthermore, there would be an elevated risk of landslide renewal during the repair process. Such a renewal could adversely affect the existing repair which moved two years ago, placing the reinforced earth buttress in an altered condition. Thus, the alternative to the present proposal has extreme costs and increased risk to existing parcels associated with it. The present proposal in no way adds to the loading on the existing repair and slide mass, an in no way reduces the support for the adjoining properties. In fact, it represents an extension of the crown support wall to the north and east of the existing wall terminus. Thus, it adds onto the existing systems that are supporting the crown area.

We have employed accepted engineering procedures and our professional opinions and conclusions are made in accordance with generally accepted soil and foundation engineering principles and practices for reconnaissance level investigations. However, we do not undertake the guarantee of land or site improvements. This warranty is in lieu of all other warranties either expressed or implied.

We hope this has provided you with the information you need to proceed in this matter. Should you have any further questions, please don't hesitate to give us a call.

Sincerely,

SEIDELMAN ASSOCIATES

Paul Seidelman
Principal Engineer
RCE 29683
GE 761
CEG 1086

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NOV 18 2008
CITY OF LAFAYETTE
ENGINEERING DEPT.

5 November 2008

Tony Coe, P.E.
City of Lafayette
Engineering Division
3675 Mt. Diablo Boulevard Suite 210
Lafayette, California 94549-1968

RE: Second Geotechnical and Geologic Review
Proposed Development at 3933 Quail Ridge Road
Lafayette, California

Dear Mr. Coe:

At your request, we have completed our second geologic and geotechnical review of the recent geotechnical report and addendum letters prepared by Seidelman Associates (SA) for the proposed development of 3933 Quail Ridge Road in Lafayette, California. This letter contains our review comments pertaining to the Seidelman report and letters. This letter also contains our comments from our 2004 review of the geotechnical and geologic reports prepared Alan Kropp & Associates (AKA) and William Lettis Associates (WLA) for a previously proposed project on the property.

The following documents were recently reviewed during the course of this second peer review:

1. A geotechnical report prepared by Seidelman Associates dated June 24, 2008 titled *Geotechnical Investigation of Portion of Lot at 3933 Quail Ridge Road, Lafayette, California.*

2. An addendum letter prepared by Seidelman Associates dated July 17, 2008 regarding *Foundation Location Limits - 3933 Quail Ridge, Lafayette.*

3. An addendum letter prepared by Seidelman Associates dated July 24, 2008 regarding *Alternative Development Feasibility - 3933 Quail Ridge, Lafayette.*

4. A letter prepared by Seidelman Associates dated November 1, 2005 addressed to Mr. & Mrs. Matt Click regarding *Your Parcel on Quail Ridge.*

5. A letter prepared by Seidelman Associates dated June 6, 2005 to Mr. & Mrs. Matt Click regarding *Discussion of Peer Review and the results of Trenching at 3933 Quail Ridge Road in Lafayette, California.*

6. Plan sheet C1.3 titled *Site Geology* prepared by Seidelman Associates for the Reddy Residence 3933 Quail Ridge Road, Lafayette, California, dated October 2008.

We previously reviewed the following documents as part of our initial review of a previously proposed project for the property in 2004:

A. A geotechnical report prepared by Alan Kropp & Associates, Inc. (AKA) dated November 25, 2003 titled *Geotechnical Investigation Quail Ridge Road Residence Northeastern Corner of Lot 3933 Quail Ridge Road Lafayette, California;*

B. A geologic report prepared by William Lettis & Associates, Inc. (WLA) dated November 18, 2003 titled *Geologic Investigation of Proposed Homesite on Click Property, 3933 Quail Ridge Rd., Lafayette, California;* and

C. Site development plans including untitled and anonymously prepared architectural plans for the Click residence dated March 17, 2004 and civil engineering plans prepared by DeBolt Civil Engineering dated April 20, 2004 *Preliminary Grading and Drainage Plan Click Residence 3933 Quail Ridge Road.*

We have also reviewed numerous documents provided to us by the City pertaining to the landslide on the property and adjacent properties which reactivated in 1997 and was partially stabilized between 1998-2001. Among the documents reviewed were the following geotechnical reports and letters:

D. A preliminary geotechnical design report prepared by GeoForensics, Inc. (GFI) dated June 24, 2004 titled *Quail Ridge Slide Quail Ridge Road Lafayette, California PRELIMINARY DESIGN CONCEPTS;*

E. A geotechnical design report prepared by GFI dated September 17, 1998 titled *Quail Ridge Slide Quail Ridge Road Lafayette, California GEOTECHNICAL RECOMMENDATIONS FOR PROPOSED HEADSCARP STABILIZATION*;

F. An interim geotechnical construction letter report prepared by GFI dated May 13, 1999 titled *Quail Ridge Slide Quail Ridge Road Lafayette, California CONSTRUCTION OBSERVATIONS OF WINTERIZATION WORK*;

G. A series of geotechnical peer review letters prepared by Sanders Associates GeoStrutural Engineers, Inc. (SAGE) on behalf of the City of Lafayette regarding technical review of the proposed landslide headscarp stabilization project;

H. A series of response letters and calculations and plans prepared by GFI and Engineered Soil Repairs, Inc. (ESR) that provide responses to issues raised by SAGE in their letters; and

I. A geotechnical construction observations and testing report prepared by GFI dated January 7, 2002 titled *Quail Ridge Landslide Mitigation Lafayette, California GEOTECHNICAL OBSERVATIONS AND TESTING OF CONSTRUCTION.*

This review has included the examination of the above referenced materials for pertinent information regarding the technical feasibility of the currently proposed project. We also made reconnaissance level observations of the project site, observed and logged a large diameter boring excavated as part of the recent Seidelman Associates exploratory work, reviewed several published geologic maps of the area, and reviewed aerial photographs of the site which were in our office files.

SITE HISTORY

It is proposed to construct a new home in the northeast corner of the lot at 3933 Quail Ridge Road. This lot and the private street and portions of the adjoining properties are the site of a large landslide which occurred in 1997. The landslide was approximately 240 feet wide by 680 feet long and had an estimated maximum depth of more than 60 feet. The landslide closed the road, created a 20 foot high headscarp directly below the property at 3954 Quail Ridge Road, and severely damaged the home at the 3933 Quail Ridge property. The damaged home was eventually demolished and removed from the site. A repair of the headscarp and road was completed between 1998 and 2001. The repair system was designed and constructed by ESR. Geotechnical recommendations and geotechnical observations and testing during construction were provided by GFI. The repair system included the installation of a tieback retaining wall up to 50 feet high, excavation for a buttress keyway, and construction of a geosynthetic reinforced earth retaining structure. The majority of the landslide mass was left in place below the road and no stabilization measures were implemented for these displaced materials.

In 2004 a proposed project to develop the northeast corner of the property was presented to the City of Lafayette. We reviewed the geologic and geotechnical aspects of the proposed project and prepared a review letter dated 22 July 2004. The July 2004 peer review letter identified several items which warranted additional investigation and consideration on the part of the geotechnical consultant and the design team at that time. In response to the July 2004 review letter, Seidelman Associates prepared their letter dated June 2005. Seidelman then completed additional trenching of the landslide headscarp along the edge of the proposed building pad and presented the trenching results in their November 2005 letter.

During the winter of 2005-2006, a failure of a pumping system installed during ESR's 1998-2001 work on the landslide led to re-activation of the landslide mass left below the headscarp repair. The movement associated with the reactivated landslide more caused the headscarp below the edge of the proposed building pad to be more clearly identifiable.

In April 2008 Seidelman conducted downhole logging of a large diameter boring excavated from within the proposed building pad. Representatives of our firm were also present during the drilling and logging of the large diameter boring. Based on the results of the downhole logging and other prior investigative work, Seidelman prepared their June 2008 report and the two addendum letters which together provide their findings and recommendations regarding the geologic and geotechnical aspects of the currently proposed project.

PROPOSED PROJECT

The landslide deposit which became active in 1997 encompassed approximately 80 percent of the lot at 3933 Quail Ridge Road. A triangular portion of the lot in the extreme northeast corner of the property was not involved in the active landsliding of 1997. In 2004 it was proposed to develop this portion of the lot with a new 2200 square foot single family residence. The proposed building area is shaped like a right triangle with an 80 foot base along the Quail Ridge Road frontage and a 110 foot height down the slope. The reports prepared by AKA and WLA were intended to evaluate the geotechnical and geologic feasibility of constructing a new home at this location and to provide design and construction recommendations, as appropriate. Our July 2004 peer review addressed this previously proposed project.

For this second review we have been provided with only the geotechnical report, letters, and single plan sheet prepared by Seidelman since 2005. We have not been provided with any additional or revised site improvement or development plans other than those submitted by the Clicks in 2004.

SUMMARY OF FIRST GEOLOGIC AND GEOTECHNICAL REVIEW

Our 2004 review revealed that development of the proposed residence may be possible from a geotechnical and geologic perspective. However, based on the data and analyses that were provided and reviewed, it was our opinion that the proposed project had not been demonstrated to be geotechnically feasible. Additional mapping and subsurface exploration was deemed necessary in order to fully characterize the geologic conditions and to develop effective geotechnical design recommendations which would result in the construction of a project which is stable over the long-term. In our 2004 review letter we requested the following information:

a) all available subsurface information developed by AKA, WLA, and GFI be incorporated into the geotechnical report for the proposed development

b) it be demonstrated that the larger slide either 1) does not exist beneath the proposed building site, or 2) is stable in its current and future configurations

c) additional subsurface exploration consisting of drilling and downhole logging large diameter boring(s) to determine if there is a landslide below the building site

d) exploratory trenches be excavated as warranted along the active landslide margin and at the location of the postulated margin of the larger landslide scarp along the eastern drainage ravine may also be necessary

e) unless additional exploration described above demonstrates the stability of the bedrock tension zone, a no-build setback of at least 10 feet should be considered/required

f) the passive pressure value be re-evaluated based on the development of an accurate cross-section for the slope below the west side of then-proposed pier wall and for the house foundation piers within the 20 foot Special Design Zone defined by AKA

g) a plan should be prepared showing all areas where any grading or development of any sort should be prohibited and a resulting no-build easement be required as part of the conditions of approval for the project

h) the mapped lateral scarp and the Special Design Zone identified by AKA should be shown clearly on all plan sheets

i) the final location of the house should be determined only after the additional subsurface work recommended above has been completed

j) placement of any fill should not be allowed unless it can be demonstrated that the fill will not adversely impact the stability of the slide area.

k) landscaping which requires any irrigation and hardscape areas such as drainage ditches, walkways, and patios not be allowed in the landslide area

l) the geotechnical consultant and geologic consultant should review the plans and meet with the design team to discuss their review

REVIEW OF RECENTLY SUBMITTED DOCUMENTS

Based on our review of the documents provided to us since our initial review in 2004, it is our opinion that many of the critical issues and comments from our original review letter have been addressed. Specifically, in our opinion the additional exploration work completed by Seidelman in 2004 and 2008 demonstrates that the proposed triangular building area is not underlain by a landslide deposit (see items a, b, c, d, and h, above). The findings presented within the June 24, 2008 Seidelman report together with the November 1, 2005 Seidelman letter prepared for the previous property owners present clear findings regarding the geologic conditions at the site and the relative stability of northeast corner of the parcel.

Some of our original comments summarized above have not been addressed and a few of the recommendations provided in the Seidelman report and letters are not entirely clear to us. We recommend that additional clarification be requested regarding the following items:

1. The June 24, 2008 report references exploratory trenches excavated and logged by Seidelman in August 2004, but does not mention or reference the November 1, 2005 letter regarding the trenching. Consideration should be given to appending that letter and its attachments to the June 24, 2008 report.

2. On page 7 of the June 24, 2008, report it is recommended that "..construction of drilled pier supports for the house be located no closer than eight feet" to the edge of the landside scarp. However, on the site geology figure attached to the July 17, 2008 Seidelman letter (C1.2), there is a row of piers identified by a callout as "(N) CONC. PIERS TO BEDROCK, RET. WALL ON TOP" located right on the headscarp without any setback. It is not clear if the piers identified in the callout on C1.2 are house foundation piers or are for a separate stabilization structure as was recommended in the AKA report. As shown, the pier locations conflict with the recommendations on page 7 of the June 24, 2008 report. This conflict should be corrected.

3. The recommendations for the foundation piers provide lateral loading design criteria which differs from that previously recommended by AKA. In our opinion the criteria provided by Seidelman is reasonable even though it differs from AKA's. However, the June 24, 2008 report by Seidelman does not provide design criteria for passive pressures or design criteria for tiebacks. This information will be required for the structural design of the house foundation system.

4. Figure C1.2 which was transmitted with the July 17, 2008 Seidelman letter does not show the locations of the test trenches which were excavated and logged by Seidelman in 2004. These should be added to the figure for completeness.

5. The drainage recommendations included in the June 24, 2008 report indicate that the collected drainage should be "...conveyed to the base of the landslide at the downhill edge of the property." Since base of the landslide is not located on the 3393 Quail Ridge Road property does this mean the water will be conveyed down the entire length of the landslide and discharge on the adjacent property? This should be clarified and appropriate drainage and maintenance easements should be obtained as needed.

6. No specific recommendations regarding "no-grading" or "no-improvements" zones are provided in the June 24, 2008 Seidelman report. In our opinion, in order to develop the property, these types of restrictions are warranted and recommendations should be provided in a manner similar to those presented in the AKA report.

7. It is not clear from the June 24, 2008 report if a different site development plan has been prepared since our first review in 2004. If, or when, a plan is developed, items g through l summarized above should be addressed.

CLOSURE

This review has been performed by request of the City of Lafayette. Our role has been to provide technical advice to assist the City in its discretionary permit decisions, and we are afforded the same protection under state law. Our services have been limited to the review of the documents listed above and a visual review of the property. We have no control over the future construction on this property and make no representations regarding its future conditions.

We trust this provides you with the information you require. We appreciate the opportunity to be of service to you. If you have any questions, please feel free to give us a call. We have employed accepted geotechnical engineering procedures, and our professional opinions and conclusions are made in accordance with generally accepted geotechnical engineering principles and practices. This standard is in lieu of all warranties, either expressed or implied.

Yours truly,

CAL ENGINEERING & GEOLOGY, INC.

Phillip Gregory, P.E., G.E.
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
PHILLIP O. GREGORY
No. Geo GE 2193
No Civil C 40728
Exp. 3/31/09
CIVIL-GEOTECHNICAL
STATE OF CALIFORNIA

Mitchell D. Wolfe, R.G., C.E.G.
Principal Geologist

PROFESSIONAL GEOLOGIST
MITCHELL WOLFE
EG 1487
Exp. 7/31/09
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

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NOV 2 5 2008

CITY OF LAFAYETTE
PLANNING DEPT.

SEIDELMAN ASSOCIATES
2427 CHERRY HILLS DRIVE
LAFAYETTE, CALIFORNIA 94549
(925) 930-0646
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November 20, 2008

Mr. Tony Coe
City of Lafayette
Engineering Division
3675 Mt. Diablo Boulevard, Suite 210
Lafayette, California 94549

RE: Response to CE&G Peer Review - 3933 Quail Ridge Road

Dear Mr. Coe:

The following are responses to the review provided by Phil Gregory of **Cal Engineering and Geology**. We have numbered our responses in accordance with Mr. Gregory's items 1-7, as shown on page 5 and 6 of his letter.

1. The information developed subsequent to our report of November, 2005, supercedes the information presented in the earlier report, as both of our trenches constructed at that time present information that is significantly improved upon by subsequent exploration. The trench on top of the side ridge intersects the location of our large diameter, down hole log, bore hole. The down hole, bore log hole discloses much more information than the earlier trench. The side hill trench, constructed in 2005, has the purpose of identifying the old scarp line. This was necessary because the William Lettis trench provided only one point along the old scarp line. As you know, the landslide became slightly activated two years ago and the entire lateral scarp became obviously visible. Subsequent to that landslide movement, a new topographic map was prepared and presented with this scarp information clearly shown. Thus, the older trench becomes superfluous.

2. The recommendations of Alan Kropp are no longer pertinent, as he is no longer the engineer of record for this project and his recommendations are no longer being presented by the applicant. The recommendations under review are those of Seidelman Associates and none others.

3. The present report discusses the stability of the site and its appropriateness for development with a residential structure. A design level report will be presented with the application for building permit. This report will contain the necessary wall design criteria. Our present thinking is that the wall alignment will follow the scarp line and consist of 40 foot deep piers, 24 inches in diameter. The design criteria for the piers will discount the upper 15 feet as non-supportive, and will commence with a passive resistance of 250 pcf, commencing 15 feet below the ground surface. The wall will be

designed to retain an active pressure of 65 pcf and an at rest pressure of 95 pcf. Tie-backs will have a minimum unsupported length of 15 feet, followed by frictional contact with bedrock materials amounting to 1,000 lbs psf of tie-back surface area contact.

4. Same answer as given in item 1.

5. We recognize that two alternatives exist to drain the project. The first is to obtain the necessary easements to convey the water into the creek below the dormant landslide area. The second alternative envisions a cistern with pump and backup power to convey collected drainage waters to the street above.

6. Upon completion of the project, those areas outside of the designated development area should remain in their present category of no grading and no improvements.

7. A different site development plan and geotechnical engineer and architect have been employed by the present owner. The previous data, developed by William Lettis and Alan Kropp, have been employed in our evaluations and recommendations. However, the project is somewhat different than the earlier project.

We hope this has provided you with the information you need to proceed in this matter. Should you have any further questions, please don't hesitate to give us a call.

Sincerely,

SEIDELMAN ASSOCIATES

Paul Seidelman
Principal Engineer
GE 761
RCE 29683

REGISTERED PROFESSIONAL ENGINEER
PAUL J. SEIDELMAN
No. GE 000761
Exp. 3-31-09
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CITY OF LAFAYETTE
ENGINEERING DEPT.

17 December 2008

Tony Coe, P.E.
City of Lafayette
Engineering Division
3675 Mt. Diablo Boulevard Suite 210
Lafayette, California 94549-1968

RE: Third Geotechnical and Geologic Review
Proposed Development at 3933 Quail Ridge Road
Lafayette, California

Dear Mr. Coe:

At your request, we have completed our third geologic and geotechnical review of the proposed development of 3933 Quail Ridge Road in Lafayette, California. We initially prepared a review letter dated 2004 that included comments relating to the project originally proposed in 2004. Our second review letter dated 5 November 2008 included comments regarding the currently proposed project and additional subsurface exploration data developed by Seidelman Associates (SA) after our initial review letter. Detailed information regarding the history of the project and our previous review comments are included in the 5 November 2008 letter. This third review has focused on a November 20, 2008 letter prepared by Seidelman Associates (SA) regarding "Response to CE&G Peer Review - 3933 Quail Ridge Road."

November 20, 2008 Letter from Seidelman Associates

The Seidelman Associates response letter addresses each of the seven comments included in our November 5, 2008 review letter. Our review of the letter revealed that all of the comments have been reasonably addressed and/or will be more completely addressed when a design level geotechnical report and site development plans are prepared, as indicated in several of the responses. At this point, it is our opinion that the geologic and geotechnical work completed for the site has demonstrated that the site is it geotechnically feasible to construct a single family residence at the site. After the design level geotechnical report and site development plan have been completed, we recommend that they be provided for our review and comment.

Limitations

This review has been performed by request of the City of Lafayette. Our role has been to provide technical advice to assist the City in its discretionary permit decisions, and we are afforded the same protection under state law. Our services have been limited to the review of the documents listed above and a visual review of the property. We have no control over the future construction on this property and make no representations regarding its future conditions.

Closing

We trust this provides you with the information you require. We appreciate the opportunity to be of service to you. If you have any questions, please feel free to give us a call. We have employed accepted geotechnical engineering procedures, and our professional opinions and conclusions are made in accordance with generally accepted geotechnical engineering principles and practices. This standard is in lieu of all warranties, either expressed or implied.

Yours truly,

CAL ENGINEERING & GEOLOGY, INC.

Phillip Gregory, P.E., G.E.
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
PHILLIP O. GREGORY
No. Geo GE 2193
No Civil C 40728
Exp. 3/31/09
CIVIL-GEOTECHNICAL
STATE OF CALIFORNIA

Matt Wolf

Mitchell D. Wolfe, R.G., C.E.G.
Principal Geologist

PROFESSIONAL GEOLOGIST
MITCHELL WOLFE
EG 1487
Exp. 7/31/09
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

APPENDIX D

Letter of Transmittal

Date:12/08/14

To:

ATTN: LINDY CHAN
LAFAYETTE PLANNING DEPARTMENT
(BY HAND and EMAIL)

From:
Ravi Reddy/ RSR Development Co.
3000F Danville Blvd #268
Alamo, CA 94507

Tel: 415-287-3988

RE: HDP08-12 REDDY
3933 QUAIL RIDGE Road, Lafayette , CA
RESPONSE TO GEOTECHNICAL QUESTIONS ATTACHED

Dear LINDY:

We are pleased to submit our engineer's Response to the PC's questions regarding the above.

Thank again for your help !

Best regards,
Ravi Reddy
Tel: 415-287-3988
Email: rreddy@rsrdevelopment.com

Peters & Ross

Geotechnical & Geoenvironmental

Consultants

December 8, 2014
Project No. 14200.001

Mr. Ravi Reddy
RSR Development Co.
3000F Danville Blvd., #268
Alamo, CA 94507

RE: 3933 Quail Ridge Road – Response to Geotechnical Questions Regarding Hillside Development Permit No. HDP08-12 Reddy

Dear Mr. Reddy:

At your request the undersigned reviewed the geotechnical questions developed by the City of Lafayette Planning Commission and a letter dated August 14, 2012, by GeoForensics, Inc. In addition we reviewed the following documents:

1. *Potential For Slide Stabilization and House Siting*, dated April 28, 2004, by Seidelman Associates, Inc.
2. *Geotechnical Investigation of Portion of Lot at 3933 Quail Ridge Road, Lafayette, California*, dated June 24, 2008, by Seidelman Associates, Inc.
3. *Foundation Location Limits – 3933 Quail Ridge, Lafayette*, dated July 17, 2008, by Seidelman Associates, Inc.
4. *Alternative Development Feasibility – 3933 Quail Ridge, Lafayette*, dated July 24, 2008, by Seidelman Associates, Inc.
5. *Second Geotechnical and Geologic Review, Proposed Development at 3933 Quail Ridge Road, Lafayette, California*, dated November 5, 2008, by Cal Engineering & Geology
6. *Response to CE&G Peer Review – 3933 Quail Ridge Road*, dated November 20, 2008, by Seidelman Associates
7. *Third Geotechnical and Geologic Review, Proposed Development at 3933 Quail Ridge Road, Lafayette, California*, dated December 17, 2008, by Cal Engineering & Geology

SUMMARY

The following are Peters & Ross responses to the questions posed by the Planing Commision. We have numbered our responses in accordance with the attached six bullet items.

1. The unrepaired portions of the 1997 landslide are still moving. Based on the response that Seidelman Associates provided in their letter dated November 20, 2008, it is Peters & Ross understanding that a soldier pile and tie back wall will be constructed along the top scarp, separating the triangular portion of the lot (proposed for development) and the active slide zone. Peters & Ross will prepare a detailed design report that will contain the design criteria for the soldier pile and tie back wall so that the house foundation can be located immediately behind the wall.
2. Seidelman addressed the question of repairing the portion of the slide located on the Reddy property in his letter dated July 24, 2008. He said that to repair the Reddy property would be on the order of 2.5 to 4.0 million 2008 dollars. These costs have increased making the repair economically unfeasible.
3. Mr. Seidelman passed away and Mr. Reddy has hired Peters & Ross to address these comments. GeoForensics in their August 14, 2012, letter states that both Joyce Associates and the Cal Engineering & Geology (the Town’s consultant) concluded that the discontinuities observed in the large diameter boring, logged by Joyce Associates and included in the June 24, 2008, Seidelman report, were “tectonic shears” and not old (ancient) landslide planes. William Lettis & Associates in their report dated February 18, 2004, which is included in Appendix B of Seidelman’s June 24, 2008 report, states that the proposed building envelope is located on an apparently in-place bedrock spur ridge that did not show evidence of past (ancient) landslide activity on the historic aerial photographs.
4. The short term risk of development were addressed in Seidelman’s July 17, 2008, letter in which he states that the proposed structure will not add any loads to the landslide. For this project the soldier piles and tie backs will be installed with drilling equipment. It has been our experience with large landslide mitigation efforts that drilling equipment imparts low level vibrations into the landslide mass; thus the risk of impacting the slide mass is low. Details of how the soldier piles and tiebacks will be installed and how materials will be staged at the site so as to not load the landslide mass will be addressed in the design report. William Lettis & Associates in their February 18, 2004, report states that large-scale enlargement of the slide margin into the in-place, stable bedrock uphill from the bedrock tension zone is not believed to be likely. It is Peters & Ross opinion that the long term risk of slide enlargement will be higher without the implementation of the soldier pile and tieback wall.
5. Appropriate screening can be accommodated on the triangle as well as within the landslide mass. A landscape architect that is versed in biotechnical and soil bioengineering should be consulted as to what type of woody vegetation should be used.
6. Figure 2 of William Lettis & Associates report shows that the proposed soldier pile and tie back wall would be an extension of work done by Engineered Soils Repair in 1999. The proposed soldier pile and tieback wall poses no risk to previous repairs.

Rather the proposed wall will provide further stability to Quail Ridge Road and the surrounding homes.

Limitations

Peters & Ross services consist of professional opinions that are made in accordance with generally accepted geotechnical engineering principles and practices. The opinions presented in this report are based on a site reconnaissance and review of published and unpublished literature. This warranty is in lieu of all other warranties either expressed or implied.

If you have any questions concerning the results of our observations, please call us.

Very truly yours,

Peter K. Mundy, P.E., G.E.
Geotechnical Engineer 2217

REGISTERED PROFESSIONAL ENGINEER
PETER K. MUNDY
No. 2217
Expires 3/15
GEOTECHNICAL
STATE OF CALIFORNIA

- City Engineer / Geotechnical Engineers
    - Is the *1997 landslide* still moving? Neighbors who were impacted by the slide indicate that there continues to be movement which has affected their fencing, pavement, foundation, etc. If the slide is still moving, how does that impact the Planning Commission's determination on siting?
    - Is it possible to repair the *1997 slide* on the Reddy property in order to build a house outside of the triangle? If technically feasible, what would be involved, what would the process be, and what would the estimated cost be?

This was answered by Seidelman in 2004
let me know if you don't have the memo

    - Seidelman has indicated that the *ancient slide* affecting the triangular building site is not a problem; however for other projects in Lafayette, he has argued that ancient slides are ominous. Clarify the analysis of the ancient slide, what information is he is relying on and how he is interpreting it, and why it is not a problem.
    - What is the short term and long term risk associated with developing the triangle in terms of reactivating the slide, exacerbating downslope creep, vibration and other potential impacts from
    - Can the site support new trees that could screen development on the triangle or in the vicinity of the prior residence?
    - What is the relationship between the prior repairs and the proposed development? Would construction on the triangle pose a risk to the partial slide repair? (e.g. drilling piers for the new house, which could damage the tie-backs from the slide repair)

HDP08-12/3933 Quail Ridge Road/Lafayette Proposed Residence/Reddy

Chan, Lindy <lcoburn@ci.lafayette.ca.us> Wed, Jul 9, 2014 at 1:36 PM
To: PB Commercial Invstmts <pbcommercial@gmail.com>

Hi Ravi,

It was nice seeing you too. Attached are the PC questions and GeoForensics letter for your geotechnical engineer to respond to. Our City Attorney is working on responses to legal questions posed by the Planning Commission as well.

Please let me know if you have any questions.

Thank you,

Lindy Chan

Senior Planner

City of Lafayette

Direct: (925) 299-3202 | Main: (925) 284-1976

www.lovelafayette.org

How are we doing? Please take a moment to complete our customer satisfaction survey here!

From: PB Commercial Invstmts [mailto:pbcommercial@gmail.com]
Sent: Friday, June 27, 2014 12:54 PM
To: Chan, Lindy
Subject: Re: HDP08-12/3933 Quail Ridge Road/Lafayette Proposed Residence/Reddy

[Quoted text hidden]

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2 attachments

HDP08-12 Public Geotech Letter 2012.08.15-.pdf
127K

HDP08-12 Geotechnical Questions.pdf

Appendix C

CalEEMod Output Files - Landslide Stabilization Alternative

3933 Quail Ridge Road

Contra Costa County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	1.00	Dwelling Unit	1.10	4,500.00	3

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	58
Climate Zone	4			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	499.66	**CH4 Intensity (lb/MWhr)**	0.022	**N2O Intensity (lb/MWhr)**	0.005

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Intensity factors per CPUC 2011 and SB 100 goals

Land Use - Max sf of house

Construction Phase - 1-yr grading for landslide repair

Grading -

Trips and VMT -

Woodstoves -

Area Coating -

Energy Use -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	4.00	260.00
tblConstructionPhase	PhaseEndDate	7/9/2020	7/2/2021
tblConstructionPhase	PhaseEndDate	6/11/2020	6/4/2021
tblConstructionPhase	PhaseEndDate	9/5/2019	8/28/2020
tblConstructionPhase	PhaseEndDate	6/25/2020	6/18/2021
tblConstructionPhase	PhaseStartDate	6/26/2020	6/19/2021
tblConstructionPhase	PhaseStartDate	9/6/2019	8/29/2020
tblConstructionPhase	PhaseStartDate	6/12/2020	6/5/2021
tblGrading	MaterialExported	0.00	97,000.00
tblGrading	MaterialImported	0.00	97,000.00
tblLandUse	LandUseSquareFeet	1,800.00	4,500.00
tblLandUse	LotAcreage	0.32	1.10
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.022
tblProjectCharacteristics	CO2IntensityFactor	641.35	499.66
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.005

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.1016	1.9810	0.5366	3.8800e-003	0.4389	0.0379	0.4768	0.1630	0.0351	0.1980	0.0000	369.9473	369.9473	0.0323	0.0000	370.7550
2020	0.2760	4.3063	1.6033	8.6000e-003	0.6470	0.1024	0.7494	0.2737	0.0961	0.3698	0.0000	804.5346	804.5346	0.0770	0.0000	806.4595
2021	0.1374	0.8033	0.7708	1.3100e-003	5.2000e-004	0.0405	0.0411	1.4000e-004	0.0391	0.0392	0.0000	108.3543	108.3543	0.0200	0.0000	108.8530
Maximum	**0.2760**	**4.3063**	**1.6033**	**8.6000e-003**	**0.6470**	**0.1024**	**0.7494**	**0.2737**	**0.0961**	**0.3698**	**0.0000**	**804.5346**	**804.5346**	**0.0770**	**0.0000**	**806.4595**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.1016	1.9810	0.5366	3.8800e-003	0.4389	0.0379	0.4768	0.1630	0.0351	0.1980	0.0000	369.9472	369.9472	0.0323	0.0000	370.7549
2020	0.2760	4.3063	1.6033	8.6000e-003	0.6470	0.1024	0.7494	0.2737	0.0961	0.3698	0.0000	804.5344	804.5344	0.0770	0.0000	806.4593
2021	0.1374	0.8033	0.7708	1.3100e-003	5.2000e-004	0.0405	0.0411	1.4000e-004	0.0391	0.0392	0.0000	108.3542	108.3542	0.0200	0.0000	108.8529
Maximum	**0.2760**	**4.3063**	**1.6033**	**8.6000e-003**	**0.6470**	**0.1024**	**0.7494**	**0.2737**	**0.0961**	**0.3698**	**0.0000**	**804.5344**	**804.5344**	**0.0770**	**0.0000**	**806.4593**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**8-1-2019**	**10-31-2019**	1.0593	1.0593
2	**11-1-2019**	**1-31-2020**	1.5271	1.5271
3	**2-1-2020**	**4-30-2020**	1.4213	1.4213
4	**5-1-2020**	**7-31-2020**	1.4387	1.4387
5	**8-1-2020**	**10-31-2020**	0.8223	0.8223
6	**11-1-2020**	**1-31-2021**	0.5374	0.5374
7	**2-1-2021**	**4-30-2021**	0.4910	0.4910
8	**5-1-2021**	**7-31-2021**	0.2764	0.2764
		Highest	1.5271	1.5271

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0269	2.1000e-004	0.0160	2.0000e-005		1.2800e-003	1.2800e-003		1.2800e-003	1.2800e-003	0.1271	0.0433	0.1705	2.5000e-004	1.0000e-005	0.1789
Energy	1.6000e-004	1.3400e-003	5.7000e-004	1.0000e-005		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004	0.0000	3.3847	3.3847	1.1000e-004	5.0000e-005	3.4014
Mobile	2.3400e-003	0.0108	0.0264	9.0000e-005	8.1500e-003	8.0000e-005	8.2300e-003	2.1900e-003	7.0000e-005	2.2600e-003	0.0000	8.4596	8.4596	3.0000e-004	0.0000	8.4672
Waste						0.0000	0.0000		0.0000	0.0000	0.2558	0.0000	0.2558	0.0151	0.0000	0.6337
Water						0.0000	0.0000		0.0000	0.0000	0.0207	0.1125	0.1332	2.1300e-003	5.0000e-005	0.2016
Total	**0.0294**	**0.0123**	**0.0430**	**1.2000e-004**	**8.1500e-003**	**1.4700e-003**	**9.6200e-003**	**2.1900e-003**	**1.4600e-003**	**3.6500e-003**	**0.4036**	**12.0001**	**12.4036**	**0.0179**	**1.1000e-004**	**12.8828**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0269	2.1000e-004	0.0160	2.0000e-005		1.2800e-003	1.2800e-003		1.2800e-003	1.2800e-003	0.1271	0.0433	0.1705	2.5000e-004	1.0000e-005	0.1789
Energy	1.6000e-004	1.3400e-003	5.7000e-004	1.0000e-005		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004	0.0000	3.3847	3.3847	1.1000e-004	5.0000e-005	3.4014
Mobile	2.3400e-003	0.0108	0.0264	9.0000e-005	8.1500e-003	8.0000e-005	8.2300e-003	2.1900e-003	7.0000e-005	2.2600e-003	0.0000	8.4596	8.4596	3.0000e-004	0.0000	8.4672
Waste						0.0000	0.0000		0.0000	0.0000	0.2558	0.0000	0.2558	0.0151	0.0000	0.6337
Water						0.0000	0.0000		0.0000	0.0000	0.0207	0.1125	0.1332	2.1300e-003	5.0000e-005	0.2016
Total	**0.0294**	**0.0123**	**0.0430**	**1.2000e-004**	**8.1500e-003**	**1.4700e-003**	**9.6200e-003**	**2.1900e-003**	**1.4600e-003**	**3.6500e-003**	**0.4036**	**12.0001**	**12.4036**	**0.0179**	**1.1000e-004**	**12.8828**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	8/29/2019	8/30/2019	5	2	
2	Grading	Grading	8/31/2019	8/28/2020	5	260	
3	Building Construction	Building Construction	8/29/2020	6/4/2021	5	200	
4	Paving	Paving	6/5/2021	6/18/2021	5	10	
5	Architectural Coating	Architectural Coating	6/19/2021	7/2/2021	5	10	

Acres of Grading (Site Preparation Phase): 1

Acres of Grading (Grading Phase): 97.5

Acres of Paving: 0

Residential Indoor: 9,113; Residential Outdoor: 3,038; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

<u>OffRoad Equipment</u>

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	6.00	231	0.29
Building Construction	Forklifts	1	6.00	89	0.20
Site Preparation	Graders	1	8.00	187	0.41
Paving	Pavers	1	6.00	130	0.42
Paving	Rollers	1	7.00	80	0.38
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	6.00	187	0.41
Paving	Paving Equipment	1	8.00	132	0.36
Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Building Construction	Welders	3	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	3	8.00	0.00	24,250.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.8000e-003	0.0000	5.8000e-003	2.9500e-003	0.0000	2.9500e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.7100e-003	0.0195	7.8900e-003	2.0000e-005		8.8000e-004	8.8000e-004		8.1000e-004	8.1000e-004	0.0000	1.5467	1.5467	4.9000e-004	0.0000	1.5589
Total	**1.7100e-003**	**0.0195**	**7.8900e-003**	**2.0000e-005**	**5.8000e-003**	**8.8000e-004**	**6.6800e-003**	**2.9500e-003**	**8.1000e-004**	**3.7600e-003**	**0.0000**	**1.5467**	**1.5467**	**4.9000e-004**	**0.0000**	**1.5589**

3.2 Site Preparation - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-005	2.0000e-005	2.2000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0575	0.0575	0.0000	0.0000	0.0575
Total	**3.0000e-005**	**2.0000e-005**	**2.2000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0575**	**0.0575**	**0.0000**	**0.0000**	**0.0575**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.8000e-003	0.0000	5.8000e-003	2.9500e-003	0.0000	2.9500e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.7100e-003	0.0195	7.8900e-003	2.0000e-005		8.8000e-004	8.8000e-004		8.1000e-004	8.1000e-004	0.0000	1.5467	1.5467	4.9000e-004	0.0000	1.5589
Total	**1.7100e-003**	**0.0195**	**7.8900e-003**	**2.0000e-005**	**5.8000e-003**	**8.8000e-004**	**6.6800e-003**	**2.9500e-003**	**8.1000e-004**	**3.7600e-003**	**0.0000**	**1.5467**	**1.5467**	**4.9000e-004**	**0.0000**	**1.5589**

3.2 Site Preparation - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-005	2.0000e-005	2.2000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0575	0.0575	0.0000	0.0000	0.0575
Total	**3.0000e-005**	**2.0000e-005**	**2.2000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0575**	**0.0575**	**0.0000**	**0.0000**	**0.0575**

3.3 Grading - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2591	0.0000	0.2591	0.1152	0.0000	0.1152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0618	0.6976	0.2874	6.1000e-004		0.0320	0.0320		0.0295	0.0295	0.0000	55.1051	55.1051	0.0174	0.0000	55.5410
Total	**0.0618**	**0.6976**	**0.2874**	**6.1000e-004**	**0.2591**	**0.0320**	**0.2912**	**0.1152**	**0.0295**	**0.1447**	**0.0000**	**55.1051**	**55.1051**	**0.0174**	**0.0000**	**55.5410**

3.3 Grading - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0368	1.2630	0.2313	3.2200e-003	0.1712	4.9700e-003	0.1761	0.0440	4.7500e-003	0.0488	0.0000	310.7371	310.7371	0.0143	0.0000	311.0950
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2800e-003	9.6000e-004	9.7800e-003	3.0000e-005	2.7600e-003	2.0000e-005	2.7800e-003	7.3000e-004	2.0000e-005	7.5000e-004	0.0000	2.5009	2.5009	7.0000e-005	0.0000	2.5026
Total	**0.0381**	**1.2639**	**0.2411**	**3.2500e-003**	**0.1739**	**4.9900e-003**	**0.1789**	**0.0448**	**4.7700e-003**	**0.0495**	**0.0000**	**313.2380**	**313.2380**	**0.0144**	**0.0000**	**313.5976**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2591	0.0000	0.2591	0.1152	0.0000	0.1152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0618	0.6976	0.2874	6.1000e-004		0.0320	0.0320		0.0295	0.0295	0.0000	55.1051	55.1051	0.0174	0.0000	55.5409
Total	**0.0618**	**0.6976**	**0.2874**	**6.1000e-004**	**0.2591**	**0.0320**	**0.2912**	**0.1152**	**0.0295**	**0.1447**	**0.0000**	**55.1051**	**55.1051**	**0.0174**	**0.0000**	**55.5409**

3.3 Grading - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0368	1.2630	0.2313	3.2200e-003	0.1712	4.9700e-003	0.1761	0.0440	4.7500e-003	0.0488	0.0000	310.7371	310.7371	0.0143	0.0000	311.0950
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2800e-003	9.6000e-004	9.7800e-003	3.0000e-005	2.7600e-003	2.0000e-005	2.7800e-003	7.3000e-004	2.0000e-005	7.5000e-004	0.0000	2.5009	2.5009	7.0000e-005	0.0000	2.5026
Total	**0.0381**	**1.2639**	**0.2411**	**3.2500e-003**	**0.1739**	**4.9900e-003**	**0.1789**	**0.0448**	**4.7700e-003**	**0.0495**	**0.0000**	**313.2380**	**313.2380**	**0.0144**	**0.0000**	**313.5976**

3.3 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.4534	0.0000	0.4534	0.2220	0.0000	0.2220	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1168	1.3049	0.5583	1.2200e-003		0.0592	0.0592		0.0545	0.0545	0.0000	107.1699	107.1699	0.0347	0.0000	108.0365
Total	**0.1168**	**1.3049**	**0.5583**	**1.2200e-003**	**0.4534**	**0.0592**	**0.5126**	**0.2220**	**0.0545**	**0.2765**	**0.0000**	**107.1699**	**107.1699**	**0.0347**	**0.0000**	**108.0365**

3.3 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0666	2.3416	0.4407	6.3400e-003	0.1882	7.7000e-003	0.1959	0.0502	7.3700e-003	0.0576	0.0000	611.7636	611.7636	0.0272	0.0000	612.4440
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3200e-003	1.6800e-003	0.0174	5.0000e-005	5.4900e-003	4.0000e-005	5.5300e-003	1.4600e-003	3.0000e-005	1.4900e-003	0.0000	4.8149	4.8149	1.2000e-004	0.0000	4.8178
Total	**0.0689**	**2.3433**	**0.4581**	**6.3900e-003**	**0.1937**	**7.7400e-003**	**0.2014**	**0.0517**	**7.4000e-003**	**0.0591**	**0.0000**	**616.5784**	**616.5784**	**0.0273**	**0.0000**	**617.2619**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.4534	0.0000	0.4534	0.2220	0.0000	0.2220	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1168	1.3049	0.5583	1.2200e-003		0.0592	0.0592		0.0545	0.0545	0.0000	107.1698	107.1698	0.0347	0.0000	108.0363
Total	**0.1168**	**1.3049**	**0.5583**	**1.2200e-003**	**0.4534**	**0.0592**	**0.5126**	**0.2220**	**0.0545**	**0.2765**	**0.0000**	**107.1698**	**107.1698**	**0.0347**	**0.0000**	**108.0363**

3.3 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0666	2.3416	0.4407	6.3400e-003	0.1882	7.7000e-003	0.1959	0.0502	7.3700e-003	0.0576	0.0000	611.7636	611.7636	0.0272	0.0000	612.4440
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3200e-003	1.6800e-003	0.0174	5.0000e-005	5.4900e-003	4.0000e-005	5.5300e-003	1.4600e-003	3.0000e-005	1.4900e-003	0.0000	4.8149	4.8149	1.2000e-004	0.0000	4.8178
Total	**0.0689**	**2.3433**	**0.4581**	**6.3900e-003**	**0.1937**	**7.7400e-003**	**0.2014**	**0.0517**	**7.4000e-003**	**0.0591**	**0.0000**	**616.5784**	**616.5784**	**0.0273**	**0.0000**	**617.2619**

3.4 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0904	0.6581	0.5869	9.8000e-004		0.0354	0.0354		0.0342	0.0342	0.0000	80.7863	80.7863	0.0150	0.0000	81.1612
Total	**0.0904**	**0.6581**	**0.5869**	**9.8000e-004**		**0.0354**	**0.0354**		**0.0342**	**0.0342**	**0.0000**	**80.7863**	**80.7863**	**0.0150**	**0.0000**	**81.1612**

3.4 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0904	0.6581	0.5869	9.8000e-004		0.0354	0.0354		0.0342	0.0342	0.0000	80.7862	80.7862	0.0150	0.0000	81.1611
Total	**0.0904**	**0.6581**	**0.5869**	**9.8000e-004**		**0.0354**	**0.0354**		**0.0342**	**0.0342**	**0.0000**	**80.7862**	**80.7862**	**0.0150**	**0.0000**	**81.1611**

3.4 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1006	0.7568	0.7159	1.2200e-003		0.0380	0.0380		0.0367	0.0367	0.0000	100.7589	100.7589	0.0180	0.0000	101.2086
Total	**0.1006**	**0.7568**	**0.7159**	**1.2200e-003**		**0.0380**	**0.0380**		**0.0367**	**0.0367**	**0.0000**	**100.7589**	**100.7589**	**0.0180**	**0.0000**	**101.2086**

3.4 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1006	0.7568	0.7159	1.2200e-003		0.0380	0.0380		0.0367	0.0367	0.0000	100.7588	100.7588	0.0180	0.0000	101.2085
Total	**0.1006**	**0.7568**	**0.7159**	**1.2200e-003**		**0.0380**	**0.0380**		**0.0367**	**0.0367**	**0.0000**	**100.7588**	**100.7588**	**0.0180**	**0.0000**	**101.2085**

3.4 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Paving - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.8700e-003	0.0387	0.0443	7.0000e-005		2.0800e-003	2.0800e-003		1.9100e-003	1.9100e-003	0.0000	5.8825	5.8825	1.8600e-003	0.0000	5.9291
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.8700e-003**	**0.0387**	**0.0443**	**7.0000e-005**		**2.0800e-003**	**2.0800e-003**		**1.9100e-003**	**1.9100e-003**	**0.0000**	**5.8825**	**5.8825**	**1.8600e-003**	**0.0000**	**5.9291**

3.5 Paving - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-004	1.4000e-004	1.4900e-003	0.0000	5.2000e-004	0.0000	5.2000e-004	1.4000e-004	0.0000	1.4000e-004	0.0000	0.4362	0.4362	1.0000e-005	0.0000	0.4365
Total	**2.0000e-004**	**1.4000e-004**	**1.4900e-003**	**0.0000**	**5.2000e-004**	**0.0000**	**5.2000e-004**	**1.4000e-004**	**0.0000**	**1.4000e-004**	**0.0000**	**0.4362**	**0.4362**	**1.0000e-005**	**0.0000**	**0.4365**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.8700e-003	0.0387	0.0443	7.0000e-005		2.0800e-003	2.0800e-003		1.9100e-003	1.9100e-003	0.0000	5.8825	5.8825	1.8600e-003	0.0000	5.9291
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.8700e-003**	**0.0387**	**0.0443**	**7.0000e-005**		**2.0800e-003**	**2.0800e-003**		**1.9100e-003**	**1.9100e-003**	**0.0000**	**5.8825**	**5.8825**	**1.8600e-003**	**0.0000**	**5.9291**

3.5 Paving - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-004	1.4000e-004	1.4900e-003	0.0000	5.2000e-004	0.0000	5.2000e-004	1.4000e-004	0.0000	1.4000e-004	0.0000	0.4362	0.4362	1.0000e-005	0.0000	0.4365
Total	**2.0000e-004**	**1.4000e-004**	**1.4900e-003**	**0.0000**	**5.2000e-004**	**0.0000**	**5.2000e-004**	**1.4000e-004**	**0.0000**	**1.4000e-004**	**0.0000**	**0.4362**	**0.4362**	**1.0000e-005**	**0.0000**	**0.4365**

3.6 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0317					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.0900e-003	7.6300e-003	9.0900e-003	1.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004	0.0000	1.2766	1.2766	9.0000e-005	0.0000	1.2788
Total	**0.0328**	**7.6300e-003**	**9.0900e-003**	**1.0000e-005**		**4.7000e-004**	**4.7000e-004**		**4.7000e-004**	**4.7000e-004**	**0.0000**	**1.2766**	**1.2766**	**9.0000e-005**	**0.0000**	**1.2788**

3.6 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0317					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.0900e-003	7.6300e-003	9.0900e-003	1.0000e-005		4.7000e-004	4.7000e-004		4.7000e-004	4.7000e-004	0.0000	1.2766	1.2766	9.0000e-005	0.0000	1.2788
Total	**0.0328**	**7.6300e-003**	**9.0900e-003**	**1.0000e-005**		**4.7000e-004**	**4.7000e-004**		**4.7000e-004**	**4.7000e-004**	**0.0000**	**1.2766**	**1.2766**	**9.0000e-005**	**0.0000**	**1.2788**

3.6 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.3400e-003	0.0108	0.0264	9.0000e-005	8.1500e-003	8.0000e-005	8.2300e-003	2.1900e-003	7.0000e-005	2.2600e-003	0.0000	8.4596	8.4596	3.0000e-004	0.0000	8.4672
Unmitigated	2.3400e-003	0.0108	0.0264	9.0000e-005	8.1500e-003	8.0000e-005	8.2300e-003	2.1900e-003	7.0000e-005	2.2600e-003	0.0000	8.4596	8.4596	3.0000e-004	0.0000	8.4672

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	9.52	9.91	8.62	21,819	21,819
Total	9.52	9.91	8.62	21,819	21,819

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Single Family Housing	0.586711	0.038259	0.185486	0.120728	0.016377	0.005053	0.010699	0.024311	0.001622	0.001773	0.005406	0.002738	0.000835

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	1.8337	1.8337	8.0000e-005	2.0000e-005	1.8412
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	1.8337	1.8337	8.0000e-005	2.0000e-005	1.8412
NaturalGas Mitigated	1.6000e-004	1.3400e-003	5.7000e-004	1.0000e-005		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004	0.0000	1.5510	1.5510	3.0000e-005	3.0000e-005	1.5602
NaturalGas Unmitigated	1.6000e-004	1.3400e-003	5.7000e-004	1.0000e-005		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004	0.0000	1.5510	1.5510	3.0000e-005	3.0000e-005	1.5602

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	29065.1	1.6000e-004	1.3400e-003	5.7000e-004	1.0000e-005		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004	0.0000	1.5510	1.5510	3.0000e-005	3.0000e-005	1.5602
Total		**1.6000e-004**	**1.3400e-003**	**5.7000e-004**	**1.0000e-005**		**1.1000e-004**	**1.1000e-004**		**1.1000e-004**	**1.1000e-004**	**0.0000**	**1.5510**	**1.5510**	**3.0000e-005**	**3.0000e-005**	**1.5602**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	29065.1	1.6000e-004	1.3400e-003	5.7000e-004	1.0000e-005		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004	0.0000	1.5510	1.5510	3.0000e-005	3.0000e-005	1.5602
Total		**1.6000e-004**	**1.3400e-003**	**5.7000e-004**	**1.0000e-005**		**1.1000e-004**	**1.1000e-004**		**1.1000e-004**	**1.1000e-004**	**0.0000**	**1.5510**	**1.5510**	**3.0000e-005**	**3.0000e-005**	**1.5602**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	8090.57	1.8337	8.0000e-005	2.0000e-005	1.8412
Total		**1.8337**	**8.0000e-005**	**2.0000e-005**	**1.8412**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	8090.57	1.8337	8.0000e-005	2.0000e-005	1.8412
Total		**1.8337**	**8.0000e-005**	**2.0000e-005**	**1.8412**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0269	2.1000e-004	0.0160	2.0000e-005		1.2800e-003	1.2800e-003		1.2800e-003	1.2800e-003	0.1271	0.0433	0.1705	2.5000e-004	1.0000e-005	0.1789
Unmitigated	0.0269	2.1000e-004	0.0160	2.0000e-005		1.2800e-003	1.2800e-003		1.2800e-003	1.2800e-003	0.1271	0.0433	0.1705	2.5000e-004	1.0000e-005	0.1789

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.1700e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0176					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	5.8900e-003	1.3000e-004	8.5700e-003	2.0000e-005		1.2400e-003	1.2400e-003		1.2400e-003	1.2400e-003	0.1271	0.0312	0.1583	2.4000e-004	1.0000e-005	0.1665
Landscaping	2.2000e-004	9.0000e-005	7.4300e-003	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0121	0.0121	1.0000e-005	0.0000	0.0124
Total	**0.0269**	**2.2000e-004**	**0.0160**	**2.0000e-005**		**1.2800e-003**	**1.2800e-003**		**1.2800e-003**	**1.2800e-003**	**0.1271**	**0.0433**	**0.1705**	**2.5000e-004**	**1.0000e-005**	**0.1789**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.1700e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0176					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	5.8900e-003	1.3000e-004	8.5700e-003	2.0000e-005		1.2400e-003	1.2400e-003		1.2400e-003	1.2400e-003	0.1271	0.0312	0.1583	2.4000e-004	1.0000e-005	0.1665
Landscaping	2.2000e-004	9.0000e-005	7.4300e-003	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0121	0.0121	1.0000e-005	0.0000	0.0124
Total	**0.0269**	**2.2000e-004**	**0.0160**	**2.0000e-005**		**1.2800e-003**	**1.2800e-003**		**1.2800e-003**	**1.2800e-003**	**0.1271**	**0.0433**	**0.1705**	**2.5000e-004**	**1.0000e-005**	**0.1789**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.1332	2.1300e-003	5.0000e-005	0.2016
Unmitigated	0.1332	2.1300e-003	5.0000e-005	0.2016

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	0.065154 / 0.0410754	0.1332	2.1300e-003	5.0000e-005	0.2016
Total		**0.1332**	**2.1300e-003**	**5.0000e-005**	**0.2016**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	0.065154 / 0.0410754	0.1332	2.1300e-003	5.0000e-005	0.2016
Total		**0.1332**	**2.1300e-003**	**5.0000e-005**	**0.2016**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.2558	0.0151	0.0000	0.6337
Unmitigated	0.2558	0.0151	0.0000	0.6337

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	1.26	0.2558	0.0151	0.0000	0.6337
Total		**0.2558**	**0.0151**	**0.0000**	**0.6337**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	1.26	0.2558	0.0151	0.0000	0.6337
Total		**0.2558**	**0.0151**	**0.0000**	**0.6337**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

3933 Quail Ridge Road

Contra Costa County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	1.00	Dwelling Unit	1.10	4,500.00	3

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	58
Climate Zone	4			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	499.66	**CH4 Intensity (lb/MWhr)**	0.022	**N2O Intensity (lb/MWhr)**	0.005

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Intensity factors per CPUC 2011 and SB 100 goals

Land Use - Max sf of house

Construction Phase - 1-yr grading for landslide repair

Grading -

Trips and VMT -

Woodstoves -

Area Coating -

Energy Use -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	4.00	260.00
tblConstructionPhase	PhaseEndDate	7/9/2020	7/2/2021
tblConstructionPhase	PhaseEndDate	6/11/2020	6/4/2021
tblConstructionPhase	PhaseEndDate	9/5/2019	8/28/2020
tblConstructionPhase	PhaseEndDate	6/25/2020	6/18/2021
tblConstructionPhase	PhaseStartDate	6/26/2020	6/19/2021
tblConstructionPhase	PhaseStartDate	9/6/2019	8/29/2020
tblConstructionPhase	PhaseStartDate	6/12/2020	6/5/2021
tblGrading	MaterialExported	0.00	97,000.00
tblGrading	MaterialImported	0.00	97,000.00
tblLandUse	LandUseSquareFeet	1,800.00	4,500.00
tblLandUse	LotAcreage	0.32	1.10
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.022
tblProjectCharacteristics	CO2IntensityFactor	641.35	499.66
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.005

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	2.3122	45.2042	12.4272	0.0881	9.1454	0.8828	9.9979	3.6041	0.8122	4.3926	0.0000	9,256.3220	9,256.3220	0.8194	0.0000	9,276.8076
2020	2.1619	42.2726	13.1881	0.0873	7.3135	0.7960	8.0883	3.1544	0.7688	3.8705	0.0000	9,144.4034	9,144.4034	0.8021	0.0000	9,164.4551
2021	6.5550	13.6361	12.8994	0.0221	0.1068	0.6843	0.6843	0.0283	0.6608	0.6608	0.0000	2,001.2200	2,001.2200	0.4133	0.0000	2,010.1517
Maximum	**6.5550**	**45.2042**	**13.1881**	**0.0881**	**9.1454**	**0.8828**	**9.9979**	**3.6041**	**0.8122**	**4.3926**	**0.0000**	**9,256.3220**	**9,256.3220**	**0.8194**	**0.0000**	**9,276.8076**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	2.3122	45.2042	12.4272	0.0881	9.1454	0.8828	9.9979	3.6041	0.8122	4.3926	0.0000	9,256.3220	9,256.3220	0.8194	0.0000	9,276.8076
2020	2.1619	42.2726	13.1881	0.0873	7.3135	0.7960	8.0883	3.1544	0.7688	3.8705	0.0000	9,144.4034	9,144.4034	0.8021	0.0000	9,164.4551
2021	6.5550	13.6361	12.8994	0.0221	0.1068	0.6843	0.6843	0.0283	0.6608	0.6608	0.0000	2,001.2200	2,001.2200	0.4133	0.0000	2,010.1517
Maximum	**6.5550**	**45.2042**	**13.1881**	**0.0881**	**9.1454**	**0.8828**	**9.9979**	**3.6041**	**0.8122**	**4.3926**	**0.0000**	**9,256.3220**	**9,256.3220**	**0.8194**	**0.0000**	**9,276.8076**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.1525	0.0209	1.4229	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3250	26.7034	0.0253	1.4400e-003	27.7654
Energy	8.6000e-004	7.3400e-003	3.1200e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004		9.3683	9.3683	1.8000e-004	1.7000e-004	9.4240
Mobile	0.0132	0.0633	0.1600	5.3000e-004	0.0486	4.6000e-004	0.0491	0.0130	4.3000e-004	0.0134		53.1106	53.1106	1.9900e-003		53.1604
Total	**1.1665**	**0.0916**	**1.5860**	**3.1100e-003**	**0.0486**	**0.1910**	**0.2396**	**0.0130**	**0.1910**	**0.2040**	**20.3783**	**68.8039**	**89.1822**	**0.0275**	**1.6100e-003**	**90.3497**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.1525	0.0209	1.4229	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3250	26.7034	0.0253	1.4400e-003	27.7654
Energy	8.6000e-004	7.3400e-003	3.1200e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004		9.3683	9.3683	1.8000e-004	1.7000e-004	9.4240
Mobile	0.0132	0.0633	0.1600	5.3000e-004	0.0486	4.6000e-004	0.0491	0.0130	4.3000e-004	0.0134		53.1106	53.1106	1.9900e-003		53.1604
Total	**1.1665**	**0.0916**	**1.5860**	**3.1100e-003**	**0.0486**	**0.1910**	**0.2396**	**0.0130**	**0.1910**	**0.2040**	**20.3783**	**68.8039**	**89.1822**	**0.0275**	**1.6100e-003**	**90.3497**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	8/29/2019	8/30/2019	5	2	
2	Grading	Grading	8/31/2019	8/28/2020	5	260	
3	Building Construction	Building Construction	8/29/2020	6/4/2021	5	200	
4	Paving	Paving	6/5/2021	6/18/2021	5	10	
5	Architectural Coating	Architectural Coating	6/19/2021	7/2/2021	5	10	

Acres of Grading (Site Preparation Phase): 1

Acres of Grading (Grading Phase): 97.5

Acres of Paving: 0

Residential Indoor: 9,113; Residential Outdoor: 3,038; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	6.00	231	0.29
Building Construction	Forklifts	1	6.00	89	0.20
Site Preparation	Graders	1	8.00	187	0.41
Paving	Pavers	1	6.00	130	0.42
Paving	Rollers	1	7.00	80	0.38
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	6.00	187	0.41
Paving	Paving Equipment	1	8.00	132	0.36
Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Building Construction	Welders	3	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	3	8.00	0.00	24,250.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.7996	0.0000	5.7996	2.9537	0.0000	2.9537			0.0000			0.0000
Off-Road	1.7123	19.4821	7.8893	0.0172		0.8824	0.8824		0.8118	0.8118		1,704.9189	1,704.9189	0.5394		1,718.4044
Total	**1.7123**	**19.4821**	**7.8893**	**0.0172**	**5.7996**	**0.8824**	**6.6819**	**2.9537**	**0.8118**	**3.7655**		**1,704.9189**	**1,704.9189**	**0.5394**		**1,718.4044**

3.2 Site Preparation - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0324	0.0243	0.2311	6.3000e-004	0.0657	4.3000e-004	0.0662	0.0174	4.0000e-004	0.0178		62.5917	62.5917	1.7300e-003		62.6351
Total	**0.0324**	**0.0243**	**0.2311**	**6.3000e-004**	**0.0657**	**4.3000e-004**	**0.0662**	**0.0174**	**4.0000e-004**	**0.0178**		**62.5917**	**62.5917**	**1.7300e-003**		**62.6351**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.7996	0.0000	5.7996	2.9537	0.0000	2.9537			0.0000			0.0000
Off-Road	1.7123	19.4821	7.8893	0.0172		0.8824	0.8824		0.8118	0.8118	0.0000	1,704.9189	1,704.9189	0.5394		1,718.4044
Total	**1.7123**	**19.4821**	**7.8893**	**0.0172**	**5.7996**	**0.8824**	**6.6819**	**2.9537**	**0.8118**	**3.7655**	**0.0000**	**1,704.9189**	**1,704.9189**	**0.5394**		**1,718.4044**

3.2 Site Preparation - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0324	0.0243	0.2311	6.3000e-004	0.0657	4.3000e-004	0.0662	0.0174	4.0000e-004	0.0178		62.5917	62.5917	1.7300e-003		62.6351
Total	**0.0324**	**0.0243**	**0.2311**	**6.3000e-004**	**0.0657**	**4.3000e-004**	**0.0662**	**0.0174**	**4.0000e-004**	**0.0178**		**62.5917**	**62.5917**	**1.7300e-003**		**62.6351**

3.3 Grading - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9986	0.0000	4.9986	2.5384	0.0000	2.5384			0.0000			0.0000
Off-Road	1.4197	16.0357	6.6065	0.0141		0.7365	0.7365		0.6775	0.6775		1,396.3909	1,396.3909	0.4418		1,407.4359
Total	**1.4197**	**16.0357**	**6.6065**	**0.0141**	**4.9986**	**0.7365**	**5.7351**	**2.5384**	**0.6775**	**3.2159**		**1,396.3909**	**1,396.3909**	**0.4418**		**1,407.4359**

3.3 Grading - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.8601	29.1441	5.5897	0.0734	4.0811	0.1156	4.1967	1.0482	0.1106	1.1588		7,797.3394	7,797.3394	0.3759		7,806.7366
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0324	0.0243	0.2311	6.3000e-004	0.0657	4.3000e-004	0.0662	0.0174	4.0000e-004	0.0178		62.5917	62.5917	1.7300e-003		62.6351
Total	**0.8925**	**29.1684**	**5.8208**	**0.0740**	**4.1468**	**0.1160**	**4.2628**	**1.0657**	**0.1110**	**1.1767**		**7,859.9311**	**7,859.9311**	**0.3776**		**7,869.3717**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9986	0.0000	4.9986	2.5384	0.0000	2.5384			0.0000			0.0000
Off-Road	1.4197	16.0357	6.6065	0.0141		0.7365	0.7365		0.6775	0.6775	0.0000	1,396.3909	1,396.3909	0.4418		1,407.4359
Total	**1.4197**	**16.0357**	**6.6065**	**0.0141**	**4.9986**	**0.7365**	**5.7351**	**2.5384**	**0.6775**	**3.2159**	**0.0000**	**1,396.3909**	**1,396.3909**	**0.4418**		**1,407.4359**

3.3 Grading - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.8601	29.1441	5.5897	0.0734	4.0811	0.1156	4.1967	1.0482	0.1106	1.1588		7,797.3394	7,797.3394	0.3759		7,806.7366
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0324	0.0243	0.2311	6.3000e-004	0.0657	4.3000e-004	0.0662	0.0174	4.0000e-004	0.0178		62.5917	62.5917	1.7300e-003		62.6351
Total	**0.8925**	**29.1684**	**5.8208**	**0.0740**	**4.1468**	**0.1160**	**4.2628**	**1.0657**	**0.1110**	**1.1767**		**7,859.9311**	**7,859.9311**	**0.3776**		**7,869.3717**

3.3 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9986	0.0000	4.9986	2.5384	0.0000	2.5384			0.0000			0.0000
Off-Road	1.3498	15.0854	6.4543	0.0141		0.6844	0.6844		0.6296	0.6296		1,365.7183	1,365.7183	0.4417		1,376.7609
Total	**1.3498**	**15.0854**	**6.4543**	**0.0141**	**4.9986**	**0.6844**	**5.6830**	**2.5384**	**0.6296**	**3.1680**		**1,365.7183**	**1,365.7183**	**0.4417**		**1,376.7609**

3.3 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.7826	27.1658	5.3366	0.0726	2.2492	0.0899	2.3391	0.5986	0.0860	0.6846		7,718.0843	7,718.0843	0.3589		7,727.0559
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0295	0.0214	0.2061	6.1000e-004	0.0657	4.2000e-004	0.0661	0.0174	3.9000e-004	0.0178		60.6008	60.6008	1.5100e-003		60.6384
Total	**0.8121**	**27.1872**	**5.5427**	**0.0732**	**2.3149**	**0.0903**	**2.4052**	**0.6160**	**0.0864**	**0.7024**		**7,778.6850**	**7,778.6850**	**0.3604**		**7,787.6943**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9986	0.0000	4.9986	2.5384	0.0000	2.5384			0.0000			0.0000
Off-Road	1.3498	15.0854	6.4543	0.0141		0.6844	0.6844		0.6296	0.6296	0.0000	1,365.7183	1,365.7183	0.4417		1,376.7609
Total	**1.3498**	**15.0854**	**6.4543**	**0.0141**	**4.9986**	**0.6844**	**5.6830**	**2.5384**	**0.6296**	**3.1680**	**0.0000**	**1,365.7183**	**1,365.7183**	**0.4417**		**1,376.7609**

3.3 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.7826	27.1658	5.3366	0.0726	2.2492	0.0899	2.3391	0.5986	0.0860	0.6846		7,718.0843	7,718.0843	0.3589		7,727.0559
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0295	0.0214	0.2061	6.1000e-004	0.0657	4.2000e-004	0.0661	0.0174	3.9000e-004	0.0178		60.6008	60.6008	1.5100e-003		60.6384
Total	**0.8121**	**27.1872**	**5.5427**	**0.0732**	**2.3149**	**0.0903**	**2.4052**	**0.6160**	**0.0864**	**0.7024**		**7,778.6850**	**7,778.6850**	**0.3604**		**7,787.6943**

3.4 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.0305	14.7882	13.1881	0.0220		0.7960	0.7960		0.7688	0.7688		2,001.1595	2,001.1595	0.3715		2,010.4467
Total	**2.0305**	**14.7882**	**13.1881**	**0.0220**		**0.7960**	**0.7960**		**0.7688**	**0.7688**		**2,001.1595**	**2,001.1595**	**0.3715**		**2,010.4467**

3.4 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.0305	14.7882	13.1881	0.0220		0.7960	0.7960		0.7688	0.7688	0.0000	2,001.1595	2,001.1595	0.3715		2,010.4467
Total	**2.0305**	**14.7882**	**13.1881**	**0.0220**		**0.7960**	**0.7960**		**0.7688**	**0.7688**	**0.0000**	**2,001.1595**	**2,001.1595**	**0.3715**		**2,010.4467**

3.4 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.4 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8125	13.6361	12.8994	0.0221		0.6843	0.6843		0.6608	0.6608		2,001.2200	2,001.2200	0.3573		2,010.1517
Total	**1.8125**	**13.6361**	**12.8994**	**0.0221**		**0.6843**	**0.6843**		**0.6608**	**0.6608**		**2,001.2200**	**2,001.2200**	**0.3573**		**2,010.1517**

3.4 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8125	13.6361	12.8994	0.0221		0.6843	0.6843		0.6608	0.6608	0.0000	2,001.2200	2,001.2200	0.3573		2,010.1517
Total	**1.8125**	**13.6361**	**12.8994**	**0.0221**		**0.6843**	**0.6843**		**0.6608**	**0.6608**	**0.0000**	**2,001.2200**	**2,001.2200**	**0.3573**		**2,010.1517**

3.4 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.5 Paving - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7739	7.7422	8.8569	0.0135		0.4153	0.4153		0.3830	0.3830		1,296.8664	1,296.8664	0.4111		1,307.1442
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.7739**	**7.7422**	**8.8569**	**0.0135**		**0.4153**	**0.4153**		**0.3830**	**0.3830**		**1,296.8664**	**1,296.8664**	**0.4111**		**1,307.1442**

3.5 Paving - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0443	0.0311	0.3048	9.5000e-004	0.1068	6.7000e-004	0.1075	0.0283	6.2000e-004	0.0289		94.9852	94.9852	2.1800e-003		95.0397
Total	**0.0443**	**0.0311**	**0.3048**	**9.5000e-004**	**0.1068**	**6.7000e-004**	**0.1075**	**0.0283**	**6.2000e-004**	**0.0289**		**94.9852**	**94.9852**	**2.1800e-003**		**95.0397**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7739	7.7422	8.8569	0.0135		0.4153	0.4153		0.3830	0.3830	0.0000	1,296.8664	1,296.8664	0.4111		1,307.1442
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.7739**	**7.7422**	**8.8569**	**0.0135**		**0.4153**	**0.4153**		**0.3830**	**0.3830**	**0.0000**	**1,296.8664**	**1,296.8664**	**0.4111**		**1,307.1442**

3.5 Paving - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0443	0.0311	0.3048	9.5000e-004	0.1068	6.7000e-004	0.1075	0.0283	6.2000e-004	0.0289		94.9852	94.9852	2.1800e-003		95.0397
Total	**0.0443**	**0.0311**	**0.3048**	**9.5000e-004**	**0.1068**	**6.7000e-004**	**0.1075**	**0.0283**	**6.2000e-004**	**0.0289**		**94.9852**	**94.9852**	**2.1800e-003**		**95.0397**

3.6 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	6.3361					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2189	1.5268	1.8176	2.9700e-003		0.0941	0.0941		0.0941	0.0941		281.4481	281.4481	0.0193		281.9309
Total	**6.5550**	**1.5268**	**1.8176**	**2.9700e-003**		**0.0941**	**0.0941**		**0.0941**	**0.0941**		**281.4481**	**281.4481**	**0.0193**		**281.9309**

3.6 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	6.3361					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2189	1.5268	1.8176	2.9700e-003		0.0941	0.0941		0.0941	0.0941	0.0000	281.4481	281.4481	0.0193		281.9309
Total	**6.5550**	**1.5268**	**1.8176**	**2.9700e-003**		**0.0941**	**0.0941**		**0.0941**	**0.0941**	**0.0000**	**281.4481**	**281.4481**	**0.0193**		**281.9309**

3.6 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0132	0.0633	0.1600	5.3000e-004	0.0486	4.6000e-004	0.0491	0.0130	4.3000e-004	0.0134		53.1106	53.1106	1.9900e-003		53.1604
Unmitigated	0.0132	0.0633	0.1600	5.3000e-004	0.0486	4.6000e-004	0.0491	0.0130	4.3000e-004	0.0134		53.1106	53.1106	1.9900e-003		53.1604

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	9.52	9.91	8.62	21,819	21,819
Total	9.52	9.91	8.62	21,819	21,819

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Single Family Housing	0.586711	0.038259	0.185486	0.120728	0.016377	0.005053	0.010699	0.024311	0.001622	0.001773	0.005406	0.002738	0.000835

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	8.6000e-004	7.3400e-003	3.1200e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004		9.3683	9.3683	1.8000e-004	1.7000e-004	9.4240
NaturalGas Unmitigated	8.6000e-004	7.3400e-003	3.1200e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004		9.3683	9.3683	1.8000e-004	1.7000e-004	9.4240

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	79.6304	8.6000e-004	7.3400e-003	3.1200e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004		9.3683	9.3683	1.8000e-004	1.7000e-004	9.4240
Total		**8.6000e-004**	**7.3400e-003**	**3.1200e-003**	**5.0000e-005**		**5.9000e-004**	**5.9000e-004**		**5.9000e-004**	**5.9000e-004**		**9.3683**	**9.3683**	**1.8000e-004**	**1.7000e-004**	**9.4240**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	0.0796304	8.6000e-004	7.3400e-003	3.1200e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004		9.3683	9.3683	1.8000e-004	1.7000e-004	9.4240
Total		**8.6000e-004**	**7.3400e-003**	**3.1200e-003**	**5.0000e-005**		**5.9000e-004**	**5.9000e-004**		**5.9000e-004**	**5.9000e-004**		**9.3683**	**9.3683**	**1.8000e-004**	**1.7000e-004**	**9.4240**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.1525	0.0209	1.4229	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3250	26.7034	0.0253	1.4400e-003	27.7654
Unmitigated	1.1525	0.0209	1.4229	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3250	26.7034	0.0253	1.4400e-003	27.7654

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0174					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0963					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.0363	0.0200	1.3403	2.5200e-003		0.1895	0.1895		0.1895	0.1895	20.3783	6.1765	26.5548	0.0252	1.4400e-003	27.6133
Landscaping	2.4900e-003	9.5000e-004	0.0826	0.0000		4.6000e-004	4.6000e-004		4.6000e-004	4.6000e-004		0.1486	0.1486	1.4000e-004		0.1521
Total	**1.1525**	**0.0209**	**1.4229**	**2.5200e-003**		**0.1900**	**0.1900**		**0.1900**	**0.1900**	**20.3783**	**6.3250**	**26.7034**	**0.0253**	**1.4400e-003**	**27.7654**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0174					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0963					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.0363	0.0200	1.3403	2.5200e-003		0.1895	0.1895		0.1895	0.1895	20.3783	6.1765	26.5548	0.0252	1.4400e-003	27.6133
Landscaping	2.4900e-003	9.5000e-004	0.0826	0.0000		4.6000e-004	4.6000e-004		4.6000e-004	4.6000e-004		0.1486	0.1486	1.4000e-004		0.1521
Total	**1.1525**	**0.0209**	**1.4229**	**2.5200e-003**		**0.1900**	**0.1900**		**0.1900**	**0.1900**	**20.3783**	**6.3250**	**26.7034**	**0.0253**	**1.4400e-003**	**27.7654**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

3933 Quail Ridge Road

Contra Costa County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	1.00	Dwelling Unit	1.10	4,500.00	3

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	58
Climate Zone	4			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	499.66	**CH4 Intensity (lb/MWhr)**	0.022	**N2O Intensity (lb/MWhr)**	0.005

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Intensity factors per CPUC 2011 and SB 100 goals

Land Use - Max sf of house

Construction Phase - 1-yr grading for landslide repair

Grading -

Trips and VMT -

Woodstoves -

Area Coating -

Energy Use -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	4.00	260.00
tblConstructionPhase	PhaseEndDate	7/9/2020	7/2/2021
tblConstructionPhase	PhaseEndDate	6/11/2020	6/4/2021
tblConstructionPhase	PhaseEndDate	9/5/2019	8/28/2020
tblConstructionPhase	PhaseEndDate	6/25/2020	6/18/2021
tblConstructionPhase	PhaseStartDate	6/26/2020	6/19/2021
tblConstructionPhase	PhaseStartDate	9/6/2019	8/29/2020
tblConstructionPhase	PhaseStartDate	6/12/2020	6/5/2021
tblGrading	MaterialExported	0.00	97,000.00
tblGrading	MaterialImported	0.00	97,000.00
tblLandUse	LandUseSquareFeet	1,800.00	4,500.00
tblLandUse	LotAcreage	0.32	1.10
tblProjectCharacteristics	CH4IntensityFactor	0.029	0.022
tblProjectCharacteristics	CO2IntensityFactor	641.35	499.66
tblProjectCharacteristics	N2OIntensityFactor	0.006	0.005

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	2.2872	44.5085	11.9833	0.0894	9.1454	0.8828	9.9956	3.6041	0.8122	4.3904	0.0000	9,395.3816	9,395.3816	0.7963	0.0000	9,415.2901
2020	2.1398	41.6459	13.1881	0.0886	7.3135	0.7960	8.0867	3.1544	0.7688	3.8690	0.0000	9,285.0247	9,285.0247	0.7810	0.0000	9,304.5496
2021	6.5550	13.6361	12.8994	0.0221	0.1068	0.6843	0.6843	0.0283	0.6608	0.6608	0.0000	2,001.2200	2,001.2200	0.4135	0.0000	2,010.1517
Maximum	**6.5550**	**44.5085**	**13.1881**	**0.0894**	**9.1454**	**0.8828**	**9.9956**	**3.6041**	**0.8122**	**4.3904**	**0.0000**	**9,395.3816**	**9,395.3816**	**0.7963**	**0.0000**	**9,415.2901**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	2.2872	44.5085	11.9833	0.0894	9.1454	0.8828	9.9956	3.6041	0.8122	4.3904	0.0000	9,395.3816	9,395.3816	0.7963	0.0000	9,415.2901
2020	2.1398	41.6459	13.1881	0.0886	7.3135	0.7960	8.0867	3.1544	0.7688	3.8690	0.0000	9,285.0247	9,285.0247	0.7810	0.0000	9,304.5496
2021	6.5550	13.6361	12.8994	0.0221	0.1068	0.6843	0.6843	0.0283	0.6608	0.6608	0.0000	2,001.2200	2,001.2200	0.4135	0.0000	2,010.1517
Maximum	**6.5550**	**44.5085**	**13.1881**	**0.0894**	**9.1454**	**0.8828**	**9.9956**	**3.6041**	**0.8122**	**4.3904**	**0.0000**	**9,395.3816**	**9,395.3816**	**0.7963**	**0.0000**	**9,415.2901**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.1525	0.0209	1.4229	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3250	26.7034	0.0253	1.4400e-003	27.7654
Energy	8.6000e-004	7.3400e-003	3.1200e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004		9.3683	9.3683	1.8000e-004	1.7000e-004	9.4240
Mobile	0.0161	0.0602	0.1616	5.7000e-004	0.0486	4.5000e-004	0.0491	0.0130	4.2000e-004	0.0134		57.5475	57.5475	1.9600e-003		57.5965
Total	**1.1695**	**0.0885**	**1.5876**	**3.1500e-003**	**0.0486**	**0.1910**	**0.2396**	**0.0130**	**0.1910**	**0.2040**	**20.3783**	**73.2408**	**93.6191**	**0.0275**	**1.6100e-003**	**94.7858**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.1525	0.0209	1.4229	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3250	26.7034	0.0253	1.4400e-003	27.7654
Energy	8.6000e-004	7.3400e-003	3.1200e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004		9.3683	9.3683	1.8000e-004	1.7000e-004	9.4240
Mobile	0.0161	0.0602	0.1616	5.7000e-004	0.0486	4.5000e-004	0.0491	0.0130	4.2000e-004	0.0134		57.5475	57.5475	1.9600e-003		57.5965
Total	**1.1695**	**0.0885**	**1.5876**	**3.1500e-003**	**0.0486**	**0.1910**	**0.2396**	**0.0130**	**0.1910**	**0.2040**	**20.3783**	**73.2408**	**93.6191**	**0.0275**	**1.6100e-003**	**94.7858**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	8/29/2019	8/30/2019	5	2	
2	Grading	Grading	8/31/2019	8/28/2020	5	260	
3	Building Construction	Building Construction	8/29/2020	6/4/2021	5	200	
4	Paving	Paving	6/5/2021	6/18/2021	5	10	
5	Architectural Coating	Architectural Coating	6/19/2021	7/2/2021	5	10	

Acres of Grading (Site Preparation Phase): 1

Acres of Grading (Grading Phase): 97.5

Acres of Paving: 0

Residential Indoor: 9,113; Residential Outdoor: 3,038; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	6.00	231	0.29
Building Construction	Forklifts	1	6.00	89	0.20
Site Preparation	Graders	1	8.00	187	0.41
Paving	Pavers	1	6.00	130	0.42
Paving	Rollers	1	7.00	80	0.38
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	6.00	187	0.41
Paving	Paving Equipment	1	8.00	132	0.36
Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Building Construction	Welders	3	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	3	8.00	0.00	24,250.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.7996	0.0000	5.7996	2.9537	0.0000	2.9537			0.0000			0.0000
Off-Road	1.7123	19.4821	7.8893	0.0172		0.8824	0.8824		0.8118	0.8118		1,704.9189	1,704.9189	0.5394		1,718.4044
Total	**1.7123**	**19.4821**	**7.8893**	**0.0172**	**5.7996**	**0.8824**	**6.6819**	**2.9537**	**0.8118**	**3.7655**		**1,704.9189**	**1,704.9189**	**0.5394**		**1,718.4044**

3.2 Site Preparation - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0319	0.0197	0.2506	6.9000e-004	0.0657	4.3000e-004	0.0662	0.0174	4.0000e-004	0.0178		69.0806	69.0806	1.8700e-003		69.1274
Total	**0.0319**	**0.0197**	**0.2506**	**6.9000e-004**	**0.0657**	**4.3000e-004**	**0.0662**	**0.0174**	**4.0000e-004**	**0.0178**		**69.0806**	**69.0806**	**1.8700e-003**		**69.1274**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.7996	0.0000	5.7996	2.9537	0.0000	2.9537			0.0000			0.0000
Off-Road	1.7123	19.4821	7.8893	0.0172		0.8824	0.8824		0.8118	0.8118	0.0000	1,704.9189	1,704.9189	0.5394		1,718.4044
Total	**1.7123**	**19.4821**	**7.8893**	**0.0172**	**5.7996**	**0.8824**	**6.6819**	**2.9537**	**0.8118**	**3.7655**	**0.0000**	**1,704.9189**	**1,704.9189**	**0.5394**		**1,718.4044**

3.2 Site Preparation - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0319	0.0197	0.2506	6.9000e-004	0.0657	4.3000e-004	0.0662	0.0174	4.0000e-004	0.0178		69.0806	69.0806	1.8700e-003		69.1274
Total	**0.0319**	**0.0197**	**0.2506**	**6.9000e-004**	**0.0657**	**4.3000e-004**	**0.0662**	**0.0174**	**4.0000e-004**	**0.0178**		**69.0806**	**69.0806**	**1.8700e-003**		**69.1274**

3.3 Grading - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9986	0.0000	4.9986	2.5384	0.0000	2.5384			0.0000			0.0000
Off-Road	1.4197	16.0357	6.6065	0.0141		0.7365	0.7365		0.6775	0.6775		1,396.3909	1,396.3909	0.4418		1,407.4359
Total	**1.4197**	**16.0357**	**6.6065**	**0.0141**	**4.9986**	**0.7365**	**5.7351**	**2.5384**	**0.6775**	**3.2159**		**1,396.3909**	**1,396.3909**	**0.4418**		**1,407.4359**

3.3 Grading - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.8356	28.4531	5.1262	0.0747	4.0811	0.1133	4.1944	1.0482	0.1084	1.1566		7,929.9101	7,929.9101	0.3527		7,938.7267
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0319	0.0197	0.2506	6.9000e-004	0.0657	4.3000e-004	0.0662	0.0174	4.0000e-004	0.0178		69.0806	69.0806	1.8700e-003		69.1274
Total	**0.8675**	**28.4728**	**5.3768**	**0.0754**	**4.1468**	**0.1137**	**4.2605**	**1.0657**	**0.1088**	**1.1744**		**7,998.9907**	**7,998.9907**	**0.3545**		**8,007.8541**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9986	0.0000	4.9986	2.5384	0.0000	2.5384			0.0000			0.0000
Off-Road	1.4197	16.0357	6.6065	0.0141		0.7365	0.7365		0.6775	0.6775	0.0000	1,396.3909	1,396.3909	0.4418		1,407.4359
Total	**1.4197**	**16.0357**	**6.6065**	**0.0141**	**4.9986**	**0.7365**	**5.7351**	**2.5384**	**0.6775**	**3.2159**	**0.0000**	**1,396.3909**	**1,396.3909**	**0.4418**		**1,407.4359**

3.3 Grading - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.8356	28.4531	5.1262	0.0747	4.0811	0.1133	4.1944	1.0482	0.1084	1.1566		7,929.9101	7,929.9101	0.3527		7,938.7267
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0319	0.0197	0.2506	6.9000e-004	0.0657	4.3000e-004	0.0662	0.0174	4.0000e-004	0.0178		69.0806	69.0806	1.8700e-003		69.1274
Total	**0.8675**	**28.4728**	**5.3768**	**0.0754**	**4.1468**	**0.1137**	**4.2605**	**1.0657**	**0.1088**	**1.1744**		**7,998.9907**	**7,998.9907**	**0.3545**		**8,007.8541**

3.3 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9986	0.0000	4.9986	2.5384	0.0000	2.5384			0.0000			0.0000
Off-Road	1.3498	15.0854	6.4543	0.0141		0.6844	0.6844		0.6296	0.6296		1,365.7183	1,365.7183	0.4417		1,376.7609
Total	**1.3498**	**15.0854**	**6.4543**	**0.0141**	**4.9986**	**0.6844**	**5.6830**	**2.5384**	**0.6296**	**3.1680**		**1,365.7183**	**1,365.7183**	**0.4417**		**1,376.7609**

3.3 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.7609	26.5432	4.9230	0.0739	2.2492	0.0884	2.3376	0.5986	0.0846	0.6832		7,852.4193	7,852.4193	0.3377		7,860.8608
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0291	0.0174	0.2248	6.7000e-004	0.0657	4.2000e-004	0.0661	0.0174	3.9000e-004	0.0178		66.8871	66.8871	1.6400e-003		66.9280
Total	**0.7900**	**26.5606**	**5.1478**	**0.0745**	**2.3149**	**0.0888**	**2.4037**	**0.6160**	**0.0850**	**0.7010**		**7,919.3064**	**7,919.3064**	**0.3393**		**7,927.7888**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9986	0.0000	4.9986	2.5384	0.0000	2.5384			0.0000			0.0000
Off-Road	1.3498	15.0854	6.4543	0.0141		0.6844	0.6844		0.6296	0.6296	0.0000	1,365.7183	1,365.7183	0.4417		1,376.7609
Total	**1.3498**	**15.0854**	**6.4543**	**0.0141**	**4.9986**	**0.6844**	**5.6830**	**2.5384**	**0.6296**	**3.1680**	**0.0000**	**1,365.7183**	**1,365.7183**	**0.4417**		**1,376.7609**

3.3 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.7609	26.5432	4.9230	0.0739	2.2492	0.0884	2.3376	0.5986	0.0846	0.6832		7,852.4193	7,852.4193	0.3377		7,860.8608
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0291	0.0174	0.2248	6.7000e-004	0.0657	4.2000e-004	0.0661	0.0174	3.9000e-004	0.0178		66.8871	66.8871	1.6400e-003		66.9280
Total	**0.7900**	**26.5606**	**5.1478**	**0.0745**	**2.3149**	**0.0888**	**2.4037**	**0.6160**	**0.0850**	**0.7010**		**7,919.3064**	**7,919.3064**	**0.3393**		**7,927.7888**

3.4 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.0305	14.7882	13.1881	0.0220		0.7960	0.7960		0.7688	0.7688		2,001.1595	2,001.1595	0.3715		2,010.4467
Total	**2.0305**	**14.7882**	**13.1881**	**0.0220**		**0.7960**	**0.7960**		**0.7688**	**0.7688**		**2,001.1595**	**2,001.1595**	**0.3715**		**2,010.4467**

3.4 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.0305	14.7882	13.1881	0.0220		0.7960	0.7960		0.7688	0.7688	0.0000	2,001.1595	2,001.1595	0.3715		2,010.4467
Total	**2.0305**	**14.7882**	**13.1881**	**0.0220**		**0.7960**	**0.7960**		**0.7688**	**0.7688**	**0.0000**	**2,001.1595**	**2,001.1595**	**0.3715**		**2,010.4467**

3.4 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.4 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8125	13.6361	12.8994	0.0221		0.6843	0.6843		0.6608	0.6608		2,001.2200	2,001.2200	0.3573		2,010.1517
Total	**1.8125**	**13.6361**	**12.8994**	**0.0221**		**0.6843**	**0.6843**		**0.6608**	**0.6608**		**2,001.2200**	**2,001.2200**	**0.3573**		**2,010.1517**

3.4 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8125	13.6361	12.8994	0.0221		0.6843	0.6843		0.6608	0.6608	0.0000	2,001.2200	2,001.2200	0.3573		2,010.1517
Total	**1.8125**	**13.6361**	**12.8994**	**0.0221**		**0.6843**	**0.6843**		**0.6608**	**0.6608**	**0.0000**	**2,001.2200**	**2,001.2200**	**0.3573**		**2,010.1517**

3.4 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.5 Paving - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7739	7.7422	8.8569	0.0135		0.4153	0.4153		0.3830	0.3830		1,296.8664	1,296.8664	0.4111		1,307.1442
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.7739**	**7.7422**	**8.8569**	**0.0135**		**0.4153**	**0.4153**		**0.3830**	**0.3830**		**1,296.8664**	**1,296.8664**	**0.4111**		**1,307.1442**

3.5 Paving - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0437	0.0252	0.3340	1.0500e-003	0.1068	6.7000e-004	0.1075	0.0283	6.2000e-004	0.0289		104.8368	104.8368	2.3800e-003		104.8963
Total	**0.0437**	**0.0252**	**0.3340**	**1.0500e-003**	**0.1068**	**6.7000e-004**	**0.1075**	**0.0283**	**6.2000e-004**	**0.0289**		**104.8368**	**104.8368**	**2.3800e-003**		**104.8963**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.7739	7.7422	8.8569	0.0135		0.4153	0.4153		0.3830	0.3830	0.0000	1,296.8664	1,296.8664	0.4111		1,307.1442
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.7739**	**7.7422**	**8.8569**	**0.0135**		**0.4153**	**0.4153**		**0.3830**	**0.3830**	**0.0000**	**1,296.8664**	**1,296.8664**	**0.4111**		**1,307.1442**

3.5 Paving - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0437	0.0252	0.3340	1.0500e-003	0.1068	6.7000e-004	0.1075	0.0283	6.2000e-004	0.0289		104.8368	104.8368	2.3800e-003		104.8963
Total	**0.0437**	**0.0252**	**0.3340**	**1.0500e-003**	**0.1068**	**6.7000e-004**	**0.1075**	**0.0283**	**6.2000e-004**	**0.0289**		**104.8368**	**104.8368**	**2.3800e-003**		**104.8963**

3.6 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	6.3361					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2189	1.5268	1.8176	2.9700e-003		0.0941	0.0941		0.0941	0.0941		281.4481	281.4481	0.0193		281.9309
Total	**6.5550**	**1.5268**	**1.8176**	**2.9700e-003**		**0.0941**	**0.0941**		**0.0941**	**0.0941**		**281.4481**	**281.4481**	**0.0193**		**281.9309**

3.6 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	6.3361					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2189	1.5268	1.8176	2.9700e-003		0.0941	0.0941		0.0941	0.0941	0.0000	281.4481	281.4481	0.0193		281.9309
Total	**6.5550**	**1.5268**	**1.8176**	**2.9700e-003**		**0.0941**	**0.0941**		**0.0941**	**0.0941**	**0.0000**	**281.4481**	**281.4481**	**0.0193**		**281.9309**

3.6 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0161	0.0602	0.1616	5.7000e-004	0.0486	4.5000e-004	0.0491	0.0130	4.2000e-004	0.0134		57.5475	57.5475	1.9600e-003		57.5965
Unmitigated	0.0161	0.0602	0.1616	5.7000e-004	0.0486	4.5000e-004	0.0491	0.0130	4.2000e-004	0.0134		57.5475	57.5475	1.9600e-003		57.5965

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	9.52	9.91	8.62	21,819	21,819
Total	9.52	9.91	8.62	21,819	21,819

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Single Family Housing	0.586711	0.038259	0.185486	0.120728	0.016377	0.005053	0.010699	0.024311	0.001622	0.001773	0.005406	0.002738	0.000835

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	8.6000e-004	7.3400e-003	3.1200e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004		9.3683	9.3683	1.8000e-004	1.7000e-004	9.4240
NaturalGas Unmitigated	8.6000e-004	7.3400e-003	3.1200e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004		9.3683	9.3683	1.8000e-004	1.7000e-004	9.4240

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	79.6304	8.6000e-004	7.3400e-003	3.1200e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004		9.3683	9.3683	1.8000e-004	1.7000e-004	9.4240
Total		**8.6000e-004**	**7.3400e-003**	**3.1200e-003**	**5.0000e-005**		**5.9000e-004**	**5.9000e-004**		**5.9000e-004**	**5.9000e-004**		**9.3683**	**9.3683**	**1.8000e-004**	**1.7000e-004**	**9.4240**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	0.0796304	8.6000e-004	7.3400e-003	3.1200e-003	5.0000e-005		5.9000e-004	5.9000e-004		5.9000e-004	5.9000e-004		9.3683	9.3683	1.8000e-004	1.7000e-004	9.4240
Total		**8.6000e-004**	**7.3400e-003**	**3.1200e-003**	**5.0000e-005**		**5.9000e-004**	**5.9000e-004**		**5.9000e-004**	**5.9000e-004**		**9.3683**	**9.3683**	**1.8000e-004**	**1.7000e-004**	**9.4240**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.1525	0.0209	1.4229	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3250	26.7034	0.0253	1.4400e-003	27.7654
Unmitigated	1.1525	0.0209	1.4229	2.5300e-003		0.1900	0.1900		0.1900	0.1900	20.3783	6.3250	26.7034	0.0253	1.4400e-003	27.7654

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0174					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0963					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.0363	0.0200	1.3403	2.5200e-003		0.1895	0.1895		0.1895	0.1895	20.3783	6.1765	26.5548	0.0252	1.4400e-003	27.6133
Landscaping	2.4900e-003	9.5000e-004	0.0826	0.0000		4.6000e-004	4.6000e-004		4.6000e-004	4.6000e-004		0.1486	0.1486	1.4000e-004		0.1521
Total	**1.1525**	**0.0209**	**1.4229**	**2.5200e-003**		**0.1900**	**0.1900**		**0.1900**	**0.1900**	**20.3783**	**6.3250**	**26.7034**	**0.0253**	**1.4400e-003**	**27.7654**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0174					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0963					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	1.0363	0.0200	1.3403	2.5200e-003		0.1895	0.1895		0.1895	0.1895	20.3783	6.1765	26.5548	0.0252	1.4400e-003	27.6133
Landscaping	2.4900e-003	9.5000e-004	0.0826	0.0000		4.6000e-004	4.6000e-004		4.6000e-004	4.6000e-004		0.1486	0.1486	1.4000e-004		0.1521
Total	**1.1525**	**0.0209**	**1.4229**	**2.5200e-003**		**0.1900**	**0.1900**		**0.1900**	**0.1900**	**20.3783**	**6.3250**	**26.7034**	**0.0253**	**1.4400e-003**	**27.7654**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation