HETFIELD ESTATES SUBDIVISION
ENVIRONMENTAL IMPACT REPORT

Prepared for
Town of Moraga

Prepared by
Mills Associates
Lafayette, California

January 14, 2011

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EXECUTIVE SUMMARY

INTRODUCTION

The purpose of this Environmental Impact Report (EIR) is to evaluate environmental consequences that would result with the subdivision of a 58.2-acre parcel. The project site is located in the southeast portion of the Town of Moraga, Contra Costa County, California.

The California Environmental Quality Act (CEQA) requires a lead agency to prepare an Environmental Impact Report (EIR) if the lead agency determines that a proposed project may cause a significant environmental impact. This EIR is intended as an informational document that, in itself, does not determine whether a project will be approved, but aids in the local planning and decision-making process. CEQA Guidelines[1] stipulate that an EIR is not meant to be a technical document. Rather, it is intended to serve as a public disclosure document that: (1) identifies the environmental impacts associated with the proposed project which are expected to be significant or less than significant; (2) describes mitigation measures that could minimize or eliminate significant adverse impacts; and (3) evaluates alternatives to the proposed project. Prior to preparing this EIR, the Town of Moraga issued an Initial Study/Mitigated Negative Declaration which was appealed to the Town Council. The appeal was upheld, thereby resulting in this EIR.

Section 15123 of the CEQA Guidelines provides that an EIR shall contain a brief summary of the proposed action and its consequences. This Executive Summary identifies each potentially significant environmental effect with proposed mitigation measures that would reduce or avoid the effect; areas of concern known to the Lead Agency, including issues raised by the public; and issues to be resolved, including the choice among alternatives and mitigation of the potentially significant effects of the project.

PROJECT DESCRIPTION

The project being evaluated by this EIR is the subdivision of a 58.2-acre parcel into seven lots. Six single-family lots would be located on 6.75 acres, with the remaining lot containing 51.45 acres that would remain in permanent open space. The open space area would be maintained either by a homeowner's association or a special district, e.g., geological hazard abatement district. The six residential lots would range in size from 41,826 square feet (.96 acre) to 59,930 square feet (1.38 acres). The proposed development is located on the northern portion of a remnant parcel that was previously subdivided in 2001 (Subdivision 8444). At that time, the entire parcel contained 65.5 acres and 7.4 acres were developed for single-family housing in the southwest corner of the property.

A complete Project Description is set forth in Chapter 2 of this EIR.

USE OF THIS ENVIRONMENTAL IMPACT REPORT

Upon certification of this EIR, the Town of Moraga Planning Commission will use this document to review and act upon Planned Development application, a Vesting Tentative Map, a Hillside Development permit, and a Conditional Use Permit. The Town's Design Review Board can also use the document when reviewing future house designs.

POTENTIAL AREAS OF CONCERN AND ISSUES TO BE RESOLVED

Based upon written and oral comments received on the previous Initial Study/Mitigated Negative Declaration, the following were identified as potential areas of concern:

- Aesthetics/Visual Impacts,
- Geology/Soils,
- Hydrology/Storm Drainage, and
- General Plan and Moraga Open Space Ordinance (MOSO) Compliance.

SUMMARY OF IMPACTS AND MITIGATION MEASURES

Section 15123(b)(1) of the CEQA Guidelines provides that this Executive Summary shall identify each potentially significant effect with proposed mitigation measures that would reduce or avoid that effect. This information is summarized in Table S-1, "Summary of Significant Impacts and Mitigation Measures." As indicated in this table, there is no evidence that the proposed project would result in a potentially significant impact, either individually or cumulatively, that could not be mitigated to a level of insignificance.

Chapter 3, Environmental Setting, Impacts and Mitigation Measures should be consulted for the full text of impacts and mitigation measures.

ALTERNATIVES

Section 15126(d) of the State CEQA Guidelines requires that the EIR describe a range of reasonable alternatives to the project or to the location of the project that could feasibly accomplish the basic objectives, and to evaluate the comparative merits of the alternatives. Alternatives that reduce or avoid significant impacts may represent an environmentally superior alternative to the proposed project. However, if the environmentally superior

alternative is the "no project" alternative, the EIR must also identify an environmentally superior alternative among the other alternatives.

The EIR identifies the following alternatives to the proposed project:

- No Project,
- Three lots (reduced lot area)
- Eight lots (reduced lot size), and
- Eleven lots (reduced lot size).

In accordance with the State CEQA Guidelines, all reasonable project alternatives have been evaluated for their comparative environmental superiority. Based upon this evaluation, it has been determined that the 8-lot alternative with reduced lot size and reduced development area is the environmentally superior alternative. The impacts assocated with slide repair and loss of wetlands would be eliminated; neighborhood compatibility would be achieved with the smaller lots and a greater amount of open space would remain. This alternative also achieves most of the project applicant's objectives. Many of the mitigation measures would still apply to this alternative.

A summary table (Table S-1) of significant impacts and mitigation measures as a result of this analysis as well as those identified in the Initial Study, is found at the end of this chapter.

Source of Information

State of California Governor's Office of Planning and Research, California Environmental Quality Act (CEQA) Guidelines 2009.

Table S-1
SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
IMPACTS AND MITIGATION MEASURES IDENTIFIED IN THE ENVIRONMENTAL IMPACT REPORT (EIR)		
AESTHETICS / VISUAL RESOURCES		
3.1-1: Site preparation and grading of the building area would create a temporary visual impact for residents abutting the north side of the project site.	**3.1-1A**: The existing tree screen shall be supplemented with similar native species on the site behind the houses at 1108 through 1116, 1140, 1144, and 1156 through 1164 Sanders Drive. Trees shall be planted on lower portions of the creek bank, protected from deer, and maintained prior to the start of site preparation. Tree size shall be no less than 15-gallon size and shall be a mix of native species; e.g., coast live oak, California buckeye, California laurel. The applicant shall submit a tree-planting plan for review and approval by the Town.	Yes
	3.1-1B: The applicant shall post a security bond to assure protection of existing and newly planted trees that are located along the north edge of the property. The term of the bond shall extend at least 36 months beyond the completion of the required subdivision improvements.	
	3.1-1C: Newly planted trees shall be monitored for a period of ten years from the date of installation. Any trees lost during this period shall be replaced and monitored by the developer for the same length of time. Upon completion of the monitoring period, the property owners or a homeowner's association shall replace any trees that may require removal and shall be responsible for maintaining the trees.	

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
3.1-2: Partial views of the project site will be permanently lost with the development of the proposed project.	**3.1-2**: Refer to Mitigation Measures 3.1-1A–C.	Yes
3.1-3: New housing could be considered as out of character with the existing neighborhood.	**3.1-3A:** The massing and stepping of the houses shall be as shown on Figures 2-2 through 2-4. The maximum building height shall be determined through the design review process, but shall not exceed 25 feet from existing grade.	Yes
	3.1-3B: House designs shall be compatible to the adjoining neighborhood; that is, low profile by incorporating low-pitched roofs and roof overhangs.	
	3.1-3C: The final map shall reflect similar house plotting as shown on Figure 3-1 in Appendix B. A minimum distance between new and existing houses shall be no less than 180 feet.	
	3.1-3D: Prior to final map approval, the applicant shall submit design guidelines to ensure that future homebuilders incorporate features in the design that are compatible with the adjoining neighborhood.	
	3.1-3E: Individual landscape plans shall be submitted to the Town's Design Review Board at the time individual house plans are reviewed. The landscape plans shall reflect a mix of native vegetation that will help blend the structures with the natural setting.	
GEOLOGY / GEOTECHNICAL / SOILS		
3.2-1: Landslides have the potential to cause significant damage to improvements and, in extreme cases, loss of life.	**3.2-1A:** A design-level geotechnical and geologic investigation report shall be submitted to the Town of Moraga prior to recordation of the subdivision map. The report, which shall respond to the peer review letter by the Town's Engineering Geologist, shall provide specific criteria and standards to guide site grading, drainage and foundation design.	Yes

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
	In areas of proposed development (i.e., cells), existing landslides and slope repairs shall include (a) removal of slide debris, with the depth of excavation extending into underlying competent material; (b) installation of subsurface drainage measures, (c) replacement of slide debris with compacted engineered fill, (d) construction of surface drainage measures, and (e) planting disturbed areas with erosion-resistant vegetation, as recommended in the design-level geotechnical investigation.	
	3.2-1B: Gradient criteria for engineered slopes as recommended by Engeo shall be required for development of the project site. Any conflicts between future grading plans and these criteria should be interpreted as evidence that special engineering is required (e.g., retaining walls, geogrid reinforcement). Those standards call for use of 3:1 fill slopes as a general standard for the project, with the exception that fill slopes less than 8 feet high may have a 2:1 gradient. Cut slopes are to be avoided.	
	3.2-1C: Grading and drainage plans shall be subject to review of the Town's Public Works Department and the Town's Peer Review Geologist. Appropriately licensed professionals shall prepare the plans.	
	3.2-1D: Buttressing, keying and installation of debris benches shall be provided in the transition areas between open space areas and development as recommended in the design-level geotechnical report.	

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
	3.2-1E: The design-level geotechnical report shall evaluate all major graded slopes and open space hillsides whose performance could affect planned improvements. The slope stability analysis shall be performed for both static and dynamic conditions using an appropriate pseudo-static coefficient.	
	3.2-1F: During grading, the project geotechnical engineer shall observe and approve all keyway excavations, removal of fill and landslide materials down to stable bedrock or in-place material, and installation of all subdrains including their connections. Cut slopes and keyways shall be observed and mapped by the project-engineering geologist who will provide any required slope modification recommendations based on the actual geologic conditions encountered during grading. Written approval from the Town's Public Works Department shall be obtained prior to any modification. Placement of all fill shall be observed and tested by the representative of the geotechnical engineer, and the density test results and reports submitted to the Town to be kept on file.	
	3.2-1G: Prior to recordation of the Final Map, the applicant shall provide a draft deed disclosure recorded against each lot. The disclosure shall provide a detailed citation of the Final Geotechnical Report, indicating that it is available from the developer and from the Town of Moraga; and it shall summarizing the potential geologic hazards and explain the maintenance responsibilities of the property owner, including maintenance of the debris bench and drainage facilities. The language in the draft deed disclosure is subject to review and approval of the Planning Director, and it shall be recorded concurrent with or prior to recordation of the final map.	

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
3.2-2: The existing northwest-trending fault that crosses the site could potentially become reactivated in the event of an earthquake.	**3.2-2**: A structure setback zone that provides a building free corridor along the mapped fault shall be shown and labeled on the Final Map. The zone shall be 125 feet wide and extend 50 feet from the mapped fault on its northeast flank and 75 feet from the mapped fault on the southwest flank. An annotation of the map shall specify that within the structure setback zone, corrective grading of the landslides is allowed, including the installation of subdrains, debris benches and surface drainage facilities. Additionally, necessary maintenance of these improvements is allowed. Any other use shall require review and approval by the Planning Director.	Yes
3.2-3: The proposed project involves placement of engineered fill slopes in an area of moderately steep terrain. Bare soils in area of relatively steep, high graded slopes has the potential to cause significant erosion of unprotected slopes, and create down slope sedimentation problems, both on- and off-site.	**3.2-3A**: Grading activities shall be restricted to the summer construction season (15 April through 1 October). Any earthwork done after 1 October shall be limited to activities directly related to erosion control, unless the Town of Moraga Public Works Department authorizes additional work.	Yes
	3.2-3B: Provide an erosion control plan prior to approval of the grading plan. The following interim control measures shall be employed based on site-specific needs in the project area: • Grading to minimize areas of exposed, erodible material, and to avoid over-concentration of rapidly flowing runoff in unprotected, erodible areas. • The erosion control plans shall include water bars, temporary culverts and swales, mulch and jute netting blanks on exposed slopes, hydro seeding, silt fences, and sediment traps/basins. • Placement of salvaged topsoil on graded 3:1 slopes prior to the onset of winter rains.	

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
	• Because the biggest problem with effective sediment control is lack of maintenance, the erosion control plan must have a comprehensive program for inspection and maintenance during the winter rainy season, including provisions for documenting maintenance activities. • Wherever feasible, isolate runoff from ungraded areas, thereby simplifying erosion control and sediment control measures within the graded area. • Monitor the effectiveness of the erosion control measures throughout the duration of construction.	
	3.2-3C: Provide a "Stormwater Control Plan" that is C.3 compliant, for review and approval of the Moraga Public Works Department. In order to reduce the potential impacts of long-term erosion and sedimentation, the project shall incorporate the appropriate design, construction and continued maintenance of one or more of the following long-term control measures: • The specific measures shall be based on the recommendations of the project geotechnical engineer and hydrologist. • Project plans shall incorporate drainage measures to collect and control surface runoff water on sloping lots, including lined ditches and closed downspout collection systems. • Concentrated runoff shall not be permitted to drain over engineered slopes. • The proposed location of lined drainage ditches shall be specified on the development plan accompanying the design-level geotechnical investigation report, which shall be reviewed by the Town's Peer Review Geologist.	

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
	3.2-3D: Provide low retaining walls with subsurface and surface drainage facilities at the toe of the major fill slopes on the site (at rear of building pads).	
3.2-4: Expansive soils and/or bedrock have the potential to cause significant damage to foundations, slabs and pavements.	**3.2-4A:** The design-level geotechnical investigation shall provide criteria for foundation and pavement design, developed in accordance with the 2007 California Building Code and Ordinance Code requirements on the basis of subsurface exploration and laboratory testing. The constraints on the use of expansive soil near finish grade shall be evaluated in the design-level geotechnical investigation report.	Yes
	3.2-4B: The foundation recommendation shall include provision for measuring corrosivity of soils within area planned for buildings following grading but prior to the issuance of building permits. The ferrous materials and concrete that is in contact with the ground shall be engineered to minimize/ avoid damage from corrosivity.	
3.2-5: Slide debris will be removed from the area planned for grading and development. The corrective grading plan is conservative on the side of safety, but without full-time monitoring by the project geotechnical engineer, grading operations in the field may fall short of the standards and criteria in the approved geotechnical report.	**3.2-5:** Prior to the issuance of the first residential building permit, the applicant shall submit a Grading Completion Report prepared by the project geotechnical engineer. The report shall include the following: • An as-graded geologic map of all cut slopes and keyways exposed during grading. This map shall not be generalized and diagrammatic; it shall show the details of observed features and conditions, and serve to document that all slide debris was removed from the graded areas. • Provide the results of compaction of fill, performed using an ASTM compaction test method. The documentation provided shall include reference to the date, location and elevation of the test.	Yes

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
	• Document any field changes made during construction (i.e., what unexpected condition was encountered, date; what consultation occurred with the Town's Public Works Department/Town Geologist, date; and what remediation was implemented). • Describe the conformance of the as-graded project with the recommendations in the approved geotechnical report.	
3.2-6: Landslides, sedimentation and/or erosion have the potential to cause significant damage to the wetland mitigation ponds. This is considered a *potentially significant impact.*	**3.2-6:** The GHAD Plan of Control for the proposed project shall make provision for the perpetual maintenance of the wetland mitigation ponds. Specifically, the Plan of Control shall provide the following details: • frequency of inspections/ timing of inspections, • outline the design elements of the ponds that are to be inspected by the GHAD Manager (e.g. holding capacity, outfall structure, etc.), • provide objective criteria for triggering the need for sediment removal or re-construction of ponds, • indicate the role of a wetlands biologist in any necessary maintenance operations that involve work within the ponds, • when the GHAD Manager determines the need for maintenance, outline the process to notice the GHAD Board of Directors and resource agencies of the proposed plan for maintenance, and • provide the agencies a reasonable amount of time to comment on the maintenance plan.	Yes

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
HYDROLOGY / DRAINAGE		
3.3-3: The debris benches and storm drain system may not be adequate to accommodate storm runoff from uphill areas.	**3.3-3:** The V–ditches shall be designed to convey the surface runoff from the natural areas above the debris benches resulting from a 100-year, 12-hour storm with saturated soil conditions.	Yes
3.3-5: The subdrain and storm drain systems may not function properly without periodic, long-term maintenance.	**3.3-5A:** Prior to submitting the final map, the applicant shall submit a Stormwater Facilities Operation and Maintenance Plan, including detailed maintenance requirements and a maintenance schedule.	Yes
	3.3-5B: Joint Maintenance Agreement (JMA) shall be established for maintaining and cleaning the Hetfield Estates storm drain system, including subdrains, V–ditches, catch basins and gratings, storm drain pipelines, the detention basin, and the IMPs that are proposed in the Stormwater Control Plan for the proposed project (RMR, 2008a, Table 1). All facilities shall be cleaned prior to the rainy season (mid-October each year) and following every major storm. All Hetfield Estates property owners shall be required to contribute annually to fund the JMA. Potential buyers of Hetfield Estates properties shall be informed of their commitments to the JMA so that they can assess their ability to pay their annual contributions.	
3.3-7: The presence of groundwater in an engineered fill is capable of adversely affecting the stability of engineered slopes.	**3.3-7A:** Lined ditches capable of collecting surface runoff shall be provided at the toe of the engineered slope to collect and transport runoff from the fills to the selected discharge points.	Yes
	3.3-7B: During grading, the location and approximate depth of subdrains shall be established by field survey. At the conclusion of site grading, the project applicant shall submit an as-built drainage plan showing the location and elevation of the subdrains and cleanouts, as well as the surface drainage facilities.	

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
3.3-8: Construction of a storm drain discharge structure and access bridge could impact Larch Creek and the vegetation within the creek corridor.	**3.3-8:** The applicant shall contact the United States Corps of Engineers and the California Department of Fish and Game to obtain required permits and a Streambed Alteration Agreement for construction and operation of a storm drain discharge structure and access bridge over Larch Creek.	Yes
PLANNING AND LAND USE		
3.4-2: A small portion of Lot 1 is located outside the Moraga Open Space Ordinance (MOSO) cell.	**3.4-2:** The applicant shall revise the Conceptual Development Plan to include all of the area within Lot 1 in the MOSO Cell Analysis for both pre- and post-development conditions, prior to approval of the general development plan.	Yes
IMPACTS AND MITIGATION MEASURES IDENTIFIED IN THE INITIAL STUDY / PROPOSED MITIGATED NEGATIVE DECLARATION (IS/MND)		
AIR QUALITY		
III-1: Construction of the proposed project could create potentially significant dust impacts that could affect nearby residents.	**III-1**: During grading and construction activities, the applicant shall implement the following measures to control dust: • Water all active construction areas at least twice daily. • Cover all trucks hauling soil, sand, and other loose materials, or require trucks to maintain at least two feet of freeboard. • Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.	Yes

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
	• Sweep off-site streets leading to the project site daily if soil, sand, or other loose materials are deposited on these streets. • Sweep daily all paved access roads, parking areas, staging areas and entrances at the construction site.	
BIOLOGICAL RESOURCES		
IV-1: The proposed project will have an adverse effect on biological resources.	**IV-1A:** The applicant shall obtain all necessary permits from the Corps, USFWS, and the RWQCB as required by federal and State law to avoid, minimize or offset impacts to any species listed under either the State or federal Endangered Species Acts or protected under any other State or federal law as follows: • Before project implementation, a delineation of waters of the United States, including wetlands that could be affected by development, shall be made by a qualified wetland specialist through the formal CWA Section 404 process. • If based on the verified delineation, it is determined that fill of waters of the United States would result from project implementation, authorization for such fill shall be secured from the Corps through the Section 404 permitting process and from the RWQCB as part of the Section 401 water quality certification process.	Yes

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
	• Consultation or incidental take permitting may be required under the ESA. The applicant shall obtain all legally-required permits from the USFWS for the "take" of protected species under the ESA. • Evidence that the applicant has secured any required authorization from these agencies shall be submitted to the Town of Moraga prior to issuance of any grading or building permits for the project.	
	IV-1B: Following a biological opinion issued by the regulatory agencies as discussed above, measures shall be applied to minimize take within the construction zone. The applicant shall follow the requirements of the biological opinion. Furthermore, a qualified biologist shall be retained by the applicant to oversee construction and ensure that no inadvertent take of Alameda whipsnake or California red-legged frog occurs as a result of development of the site. If no biological opinion is obtained from the regulatory agencies regarding the taking of an endangered species, the following mitigation shall apply:	

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
	• Prior to any grading or grubbing of the site, the biologist shall conduct a preconstruction survey to confirm absence of any California red-legged frog or Alameda whipsnake on the site. During the construction phase of the project, a trained biologist or a trained on-site monitor (such as the construction foreman) shall check the site in the morning and in the evening of construction activities for the presence of California red-legged frog and Alameda whipsnake. This includes checking holes, under vehicles and under boards left on the ground. If any California red-legged frog or Alameda whipsnake are found, construction shall be halted until they disperse naturally, and the monitor shall immediately notify the biologist in charge and the USFWS. Construction shall not proceed until adequate measures are taken to prevent dispersal of any individuals into the construction zone, as directed by the USFWS. Subsequent recommendations made by the USFWS shall be followed. The monitor shall not handle or otherwise harass the animal. The biologist in charge and the on-site monitor shall be aware of all terms and conditions set by USFWS and CDFG on the project. The biologist in charge shall train the on-site monitor in how to identify California red-legged frog and Alameda whipsnake. The biologist in charge shall visit the site at least once a week during construction and confer with the trained on-site monitor.	

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
	• All construction workers shall be informed of the potential presence of California red-legged frog and Alameda whipsnake, that these species are to be avoided, that the foreman must be notified if they are seen, and that construction shall be halted until authorization to proceed is obtained from the USFWS and appropriate protocols for species protection shall be followed. • During construction, all holes shall be covered at night to prevent California red-legged frog and Alameda whipsnake from becoming trapped in holes on the construction site.	
	IV-1C: A qualified biologist shall be retained by the applicant to conduct a trapping and relocation program for any San Francisco dusky-footed woodrats located within the limits of proposed grading and development. A field survey shall be conducted by a qualified biologist to determine whether any woodrat nests occur within the anticipated limits of grading. Any nests within the construction zone shall be relocated to locations proposed as permanent open space on the site and individual woodrats released into their relocated nests. If nest relocation is required, the trapping and relocation effort shall be conducted from August through February outside the breeding season to ensure any young are not inadvertently lost due to the destruction of the protective nest. The trapping and relocation effort shall preferably be conducted within a few days prior to grubbing and vegetation removal to prevent individual woodrats from moving back into the construction zone.	

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
	IV-1D: Any active raptor or loggerhead shrike nests in the vicinity of proposed grading shall be avoided until young birds are able to leave the nest (i.e., fledged) and forage on their own. Avoidance may be accomplished either by scheduling removal of trees and shrubs during the non-nesting period, September through February. Provisions of the pre-construction survey and nest avoidance, if necessary, shall include the following: • If grading is scheduled during the active nesting period (March through August), a qualified wildlife biologist shall be retained by the applicant to conduct a pre-construction nesting survey no more than 30 days prior to initiation of grading to provide confirmation on the presence or absence of active nests in the vicinity. • If active nests are encountered, species-specific measures shall be prepared by a qualified biologist in consultation with the CDFG and implemented to prevent nest abandonment. Buffers and setback zones shall be established as required by CDFG and remain in place until young have fledged the zones. At a minimum, grading in the vicinity of the nest shall be deferred until the young birds have fledged. The perimeter of the nest-setback zone shall be fenced or adequately demarcated, and construction personnel restricted from the area.	

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
	• If permanent avoidance of the nest is not feasible, impacts shall be minimized by prohibiting disturbance within the nest-setback zone until a qualified biologist verifies that the birds have either (a) not begun egg-laying and incubation, or (b) that the juveniles from the nest are foraging independently and capable of independent survival at an earlier date. A survey report by the qualified biologist verifying that the young have fledged shall be submitted to the Town of Moraga prior to initiation of grading in the nest-setback zone.	
IV-2: The proposed project could impact riparian habitat.	**IV-2**: Native grass plants from the stand of creeping wildrye in the vicinity of proposed Lot 3 shall be salvaged and reused as part of revegetating graded slopes. Plants shall be salvaged before grubbing and initial grading, and stored until replanted on the site. The salvage and replanting program shall be prepared by a qualified biologist and incorporated into the Landscaping Plan for the project, preferably as part of the Wetland Mitigation Program specified in **Mitigation Measure IV-3A**.	Yes
IV.3: Development of the site would affect federally protected wetlands.	**IV-3A:** A Final Wetland Mitigation Program shall be prepared by a qualified wetland specialist to provide for the protection, replacement, and management of jurisdictional waters on the site affected by proposed development. The Final Wetland Mitigation Program shall include the following components and meet the following standards:	Yes

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
	• Proposed grading and development shall be redesigned to preferably avoid removal or adverse impacts on areas verified as jurisdictional wetlands, particularly the freshwater seep at the southeastern edge of the "Grading Daylight Limits" on proposed Lot 6. This freshwater seep appears to be larger than currently mapped by the applicant's consultant. • Provide adequate mitigation for any direct or indirect impacts on jurisdictional waters as coordinated with the Corps and/or RWQCB where complete avoidance is infeasible. Replacement wetlands shall be at a minimum of 2:1 ratio and shall be established in suitable locations within undeveloped open space areas, preferably on-site. The wetlands replacement component of the Final Wetland Mitigation Program shall emphasize establishment of native freshwater marsh and seasonal wetlands to enhance existing habitat values. • The wetland replacement component of the Final Wetland Mitigation Program shall specify performance criteria, maintenance and long-term management responsibilities, monitoring requirements, and contingency measures. Monitoring shall be conducted by the qualified wetland specialist for a minimum of five years and continue until the success criteria are met. • The Final Wetland Mitigation Program shall be completed prior to approval of the Final Map for the project to demonstrate feasibility of wetland mitigation, and allow for possible major adjustments to the limits of proposed development, particularly on Lot 6.	

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
	IV-3B: The final trail alignment connecting to the cul-de-sac on proposed Lot 6 should be designed to avoid or minimize passing through the freshwater seeps and seasonal wetlands on this portion of the site. If complete avoidance is not feasible, potential impacts shall be addressed as part of the Final Wetland Mitigation Program outlined in **Mitigation Measure IV-3A.**	
IV.4: Development could potentially interfere with the movement of wildlife species.	**IV-4A**: The portion of the site not proposed for development will be placed in permanent open space to preserve its function as permanent wildlife habitat. Any fencing proposed as part of development on individual lots shall be designed to allow for continued movement by wildlife, or shall be restricted to the vicinity of the building pads. Any fencing, which could obstruct wildlife movement, shall not extend beyond the limits of grading shown in the Conceptual Development Plan.	Yes
	IV-4B: Signage shall be provided at the access points off the cul-de-sac on proposed Lot 6 which indicate that dogs shall be leashed.	

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
IV.5: The proposed project may be in conflict with Town policies.	**IV-5A**: Grading shall be designed to avoid and minimize possible tree removal. This shall be accomplished by expanding the current tree mapping, adjusting the limits of grading to ensure adequate avoidance, and retaining a certified arborist to evaluate potential impacts and make specific recommendations to minimize tree loss or damage. The limits of tree mapping should be expanded to show all trees with trunk diameters of 5 inches or greater within 30 feet of the proposed "Grading Daylight Line" on the Conceptual Development Plan. All mapped trees shall be evaluated by a certified arborist consistent with Section 12.12.070 of the Town of Moraga Tree Preservation Ordinance, and a report shall be repaired to minimize short-term construction damage and long-term decline due to changes in root zone.	Yes
	IV-5B: A construction fence shall be installed around all trees to be protected that will identify the limits of grading and disturbance.	
	IV-5C: A Tree Replacement Program shall be prepared by the applicant's consulting biologist, and implemented as part of the mitigation program for the project. Replacement trees shall be provided at a minimum 3:1 ratio, shall be installed along the edge of the riparian corridor and other locations to be retained as undeveloped open space, and shall be maintained for a minimum of five years to ensure their successful establishment. Replacement tree plantings shall be irrigated for a minimum of two years following initial planting to ensure their survival, and shall be replaced on an annual basis to meet success criteria specified in the Tree Replacement Program.	

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
CULTURAL RESOURCES		
V-1: Potential subsurface cultural resources may exist on the site.	**V-1A:** In the event of the discovery of human remains during construction, pursuant to Section 7050.5 of the Health and Safety Code and Section 5097.94 of the Public Resources Code of the State of California, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains. The Contra Costa County Coroner shall be notified by the developer and shall make a determination as to whether the remains are Native American. If the remains are not subject to his authority, he shall notify the Native American Heritage Commission, who will attempt to identify descendants of the deceased Native American.	Yes
	V-1B: Should evidence of prehistoric cultural resources be discovered during construction, work in the immediate area of the find shall be stopped to allow adequate time for evaluation and mitigation. A qualified professional archaeologist will be called in to make an evaluation of the material; and if significant, develop a mitigation program that includes collection and analysis of the materials, preparation of a report, and curation of the materials at a recognized storage facility under the direction of the Planning Director. Collection and evaluation shall be completed prior to the resumption of grading.	

Significant Impact	Mitigation Measures	Does Implementation of all Mitigation Measure(s) Reduce the Impact to a Less-Than-Significant Level?
PUBLIC SERVICES		
XIII-1: Cumulative development proposed in the town, coupled with the location of the development could delay police response time.	**XIII-1**: The six houses shall be equipped with security alarm systems subject to review and approval of the Town of Moraga Police Department.	Yes
TRANSPORTATION/TRAFFIC		
XV-1: The increase in traffic at the Sanders Drive/Hetfield Place intersection could create a safety hazard if left uncontrolled.	**XV-1:** Both approaches of Hetfield Place shall be stop sign controlled.	Yes

1 INTRODUCTION

1.1 PROPOSED ACTIONS

This Environmental Impact Report (EIR) has been prepared in connection with the proposed subdivision of a 58.2-acre parcel into seven lots. This document will be used during the planning review process of a Planned Development application, a Vesting Tentative Map, a Hillside Development Permit and Conditional Use Permit, and during the design review of future houses.

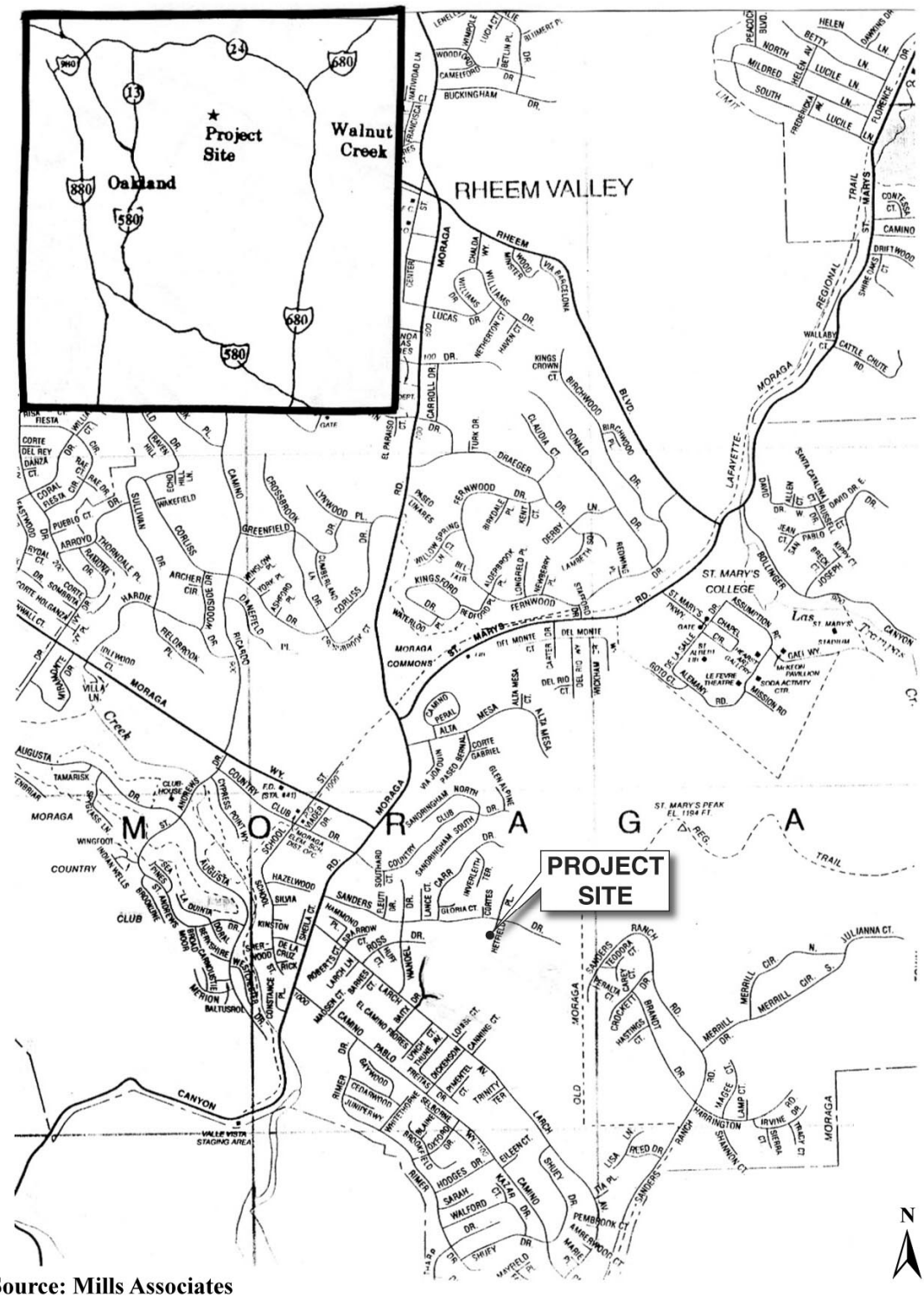
The project site is located in the southeast portion of the Town of Moraga, Contra Costa County, California. Site access will be from Hetfield Place, near the terminus of Sanders Drive, which is accessed from Canyon Road. The property consists of 58.2 acres, of which 6.75 acres would be developed, with the remainder designated for permanent open space. Refer to Figure 1-1, Site Location Map and Regional Setting, and Figure 1-2, Aerial Photo with Project Overlay.

1.2 BACKGROUND

The Town of Moraga issued a Draft Initial Study/Proposed Mitigated Negative Declaration (IS/MND) in April 2008. This document was subject to a 30-day public review period which extended from April 28 to May 27, 2008. During that time, a public hearing was held before the Town of Moraga Planning Commission soliciting public comments on the Draft IS/MND. In response to concerns raised during the public review, the applicant provided additional information as well as modified the tentative map to reflect a seven-lot subdivision rather than a six-lot subdivision. Lot 7 would remain in open space. A Final IS/MND was issued in September 30, 2008, incorporating changes to the project description as well as inclusion of additional information related to grading techniques. The Planning Commission approved the Mitigated Negative Declaration on November 17, 2008.

An appeal to require an EIR was filed on December 1, 2008, by Robert Ellerbeck of 1164 Sanders Drive, Moraga, CA, a resident of the adjoining neighborhood. The appeal was heard by the Town Council on January 14, 2009, and was upheld. The Town Council directed staff to undertake a focused EIR, focusing on the following issues to be addressed in the EIR:

- Geological/geotechnical issues,
- Hydrology/groundwater issues,
- Consistency with MOSO (calculations and high risk questions), and
- Consistency with the General Plan.



Source: Mills Associates

Figure 1-1 Site Location Map and Regional Setting Map

Source: Darwin Myers Associates, RMR

Figure 1-2 Aerial Photo with Project Overlay

Following the Town Council decision to require a focused EIR for the proposed project, the Planning Commission held a public scoping meeting in March 2009. Substantive points raised during the scoping meeting were similar to those raised by the Town Council with the addition of addressing the compatibility of the project with the adjoining neighborhood and including several alternatives to the proposed project.

1.3 PROCEDURES

This Draft EIR has been prepared pursuant to the California Environmental Quality Act (CEQA) and Guidelines for CEQA Implementation as set forth in the California Administrative Code, Title 14, Chapter 3 (referred to as the CEQA Guidelines). The lead agency is the Town of Moraga Planning Department.

CEQA applies to all discretionary projects. CEQA Guidelines Section 15357 defines a discretionary project as one that requires the public agency that would approve or deny the project to exercise judgment. A "project" is an action that has the potential for resulting in a physical change in the environment (CEQA Guidelines Section 15378).

The CEQA process requires that the Lead Agency consider input from other interested agencies, citizen groups, and individuals. CEQA provides for a public process requiring full public disclosure of the expected environmental consequences of the proposed action. The public must be given a meaningful opportunity to comment. CEQA also requires monitoring to ensure that mitigation measures identified in the EIR are carried out.

CEQA requires a public review period for commenting on the EIR. Under Section 15105 of the State CEQA Guidelines, the public review period must be at least 30 days (45 days when a Draft EIR is submitted to the State Clearinghouse for review by State agencies), but no longer than 60 days, except in unusual circumstances. A 45-day review period has been established for this Draft EIR. During the review period, any agency, group or individual may comment in writing on the Draft EIR, and the Lead Agency must respond to each comment on significant environmental issues in the Final EIR.

Written comments regarding this Draft EIR should be received by March 7, 2011 and addressed as follows:

Planning Department
Town of Moraga
329 Rheem Boulevard, Suite 2
Moraga, CA 94556

Or via e-mail at: planning@moraga.ca.us

1.4 METHODOLOGY / SCOPE OF EIR

This Draft EIR addresses the potential effects of approving a seven-lot subdivision located within a Moraga Open Space Ordinance (MOSO) designated parcel. As stated above, the EIR must be completed by the Town of Moraga Planning Department, then be certified by the Planning Commission prior to the Commission's approval of a Planned Development, a Vesting Tentative Map, a Hillside Development Permit, a Conditional Use Permit, and design review of the future house designs.

Pursuant to Section 15082 of the State CEQA Guidelines, the Town of Moraga prepared a Notice of Preparation (NOP), which is included as Appendix B of this Draft EIR.

This Draft EIR reviews various aspects of the environment in the context of possible impacts associated with the implementation of the proposed subdivision. Based upon the direction of the Town Council at its hearing on January 4, 2009, and points raised at the scoping meeting in March 2009, the scope for the EIR includes a discussion of the following topics:

- Geology/Soils,
- Hydrology/Drainage/Groundwater,
- MOSO and General Plan Consistency,
- Aesthetics (Compatibility of project with adjoining residences), and
- Alternatives.

The Initial Study/Proposed Mitigated Negative Declaration identified several impacts associated with the following environmental topics: air quality, biological resources, cultural resources, public services, and traffic. A full discussion of the impacts and recommended mitigation measures are found in the Initial Study, which is provided as Appendix C. Impacts and mitigation measures for these issues are also included in the Summary Table (S-1).

1.5 ORGANIZATION OF THE EIR

Chapter 2 of this Draft EIR describes the proposed project in greater detail and summarizes the general characteristics of the project site.

Chapter 3 describes specific characteristics of the project's regulatory and environmental setting, organized within the framework of the topical areas of focus described in the paragraphs above. This chapter also identifies and discusses potentially significant project-related impacts on those aspects of the environment, including impacts that may be cumulatively significant, and sets forth mitigation measures for these impacts, as appropriate.

The evaluation of impacts in each section is organized in the following manner:

Environmental Setting

This subsection contains a description of the project site's physical environment as it relates to the specific issue area.

Regulatory Setting

This portion of the document identifies federal, state, regional and local regulations that may apply to the proposed project.

Impacts and Mitigation Measures

Impact Evaluation Criteria

The standard or threshold by which impacts are measured is identified, with the objective of determining if an impact may be potentially significant. When relevant, construction and project operation impacts are identified and analyzed.

> **IMPACT #: Each impact is described and listed by number.**
>
> **MITIGATION MEASURE #: Each mitigation measure is described and listed by number.**

Chapter 4 addresses mandatory CEQA sections, including identification of any significant irreversible commitment of resources that the project would entail, environmental effects found not to be significant, unavoidable and irreversible significant impacts of the proposed project, cumulative impacts, and growth-inducing impacts.

Chapter 5 evaluates the following alternatives to the proposed project: (1) No Project; (2) Eight-lot Subdivision (reduced lot size); and (3) Eleven-lot Subdivision (reduced lot size).

Chapter 6 provides a list of report preparers and those consulted during preparation of this EIR.

Following the text of the EIR, several appendices have been included to facilitate full environmental review of the proposed project. The appendices include information concerning Notice of Preparation/Initial Study, plus additional technical supporting documentation.

1.6 INTENDED USES OF THE EIR

In accordance with Section 21080 of the CEQA Guidelines, the Town of Moraga Planning Commission must consider the environmental implications of approving the Vesting Tentative Map for the proposed subdivision prior to making a decision on the proposed project. The Planning Department staff and the Planning Commission will use this document in determining whether the project should be denied or approved. If approved, mitigation measures to reduce significant impacts would become conditions of project approval.

2
PROJECT DESCRIPTION

2.1 PHYSICAL LOCATION

The project site is located in the southeast portion of the Town of Moraga, Contra Costa County, California. Site access will be from Hetfield Place, near the end of Sanders Drive, which is accessed from Canyon Road. The project site is bounded on the north, east and west by single-family residential development with open space land to the south. Beyond Sanders Drive to the north is grazing land. (Refer to Figure 1-1, Project Site Location.)

The project site was part of a larger 65.5-acre parcel that was subdivided in 2001 (Subdivision 8444). A northwest- to southeast-trending ridge extends through the entire property. The proposed development is located north of this ridge, adjacent to the residential development on Sanders Drive. The previous subdivision occurred in the southeast portion of the property, southeast of the ridge and off of Baitx Drive. A relatively flat valley begins at the base of the slope and comprises the northeastern half of the property. A major portion of the northern edge of the property follows an intermittent stream that flows behind the houses on Sanders Drive. The predominant vegetation on the property consists of non-native annual grassland and the site has been used for cattle grazing in the past. (Refer to the Aerial Photo in Figure 1-2.)

The assessor's parcel number for the site is 258-600-006.

2.2 PROJECT DETAILS

The proposed project consists of subdividing the 58.2-acre property into seven lots with lot sizes ranging in size from 41,826 square feet (.96 acre) to 51.45 acres. The lot sizes are as follows:

Lot Number	Previous Lot Size (acres)	Revised Lot Sizes	Change
1	6.13	54,519 s.f. (1.26 ac)	- 4.87 acres
2	2.08	48,163 s.f. (1.10 ac)	-.98 acre
3	2.83	44,216 s.f. (1.01 ac)	- 1.82 acres
4	2.81	41,826 s.f. (.96 ac)	- 1.85 acres
5	2.04	45,398 s.f. (1.04 ac)	- 1.0 acre
6	41.41	59,930 s.f. (1.38 ac)	- 42.79 acres
7	-0-	51.45 acres	+ 51.45 acres

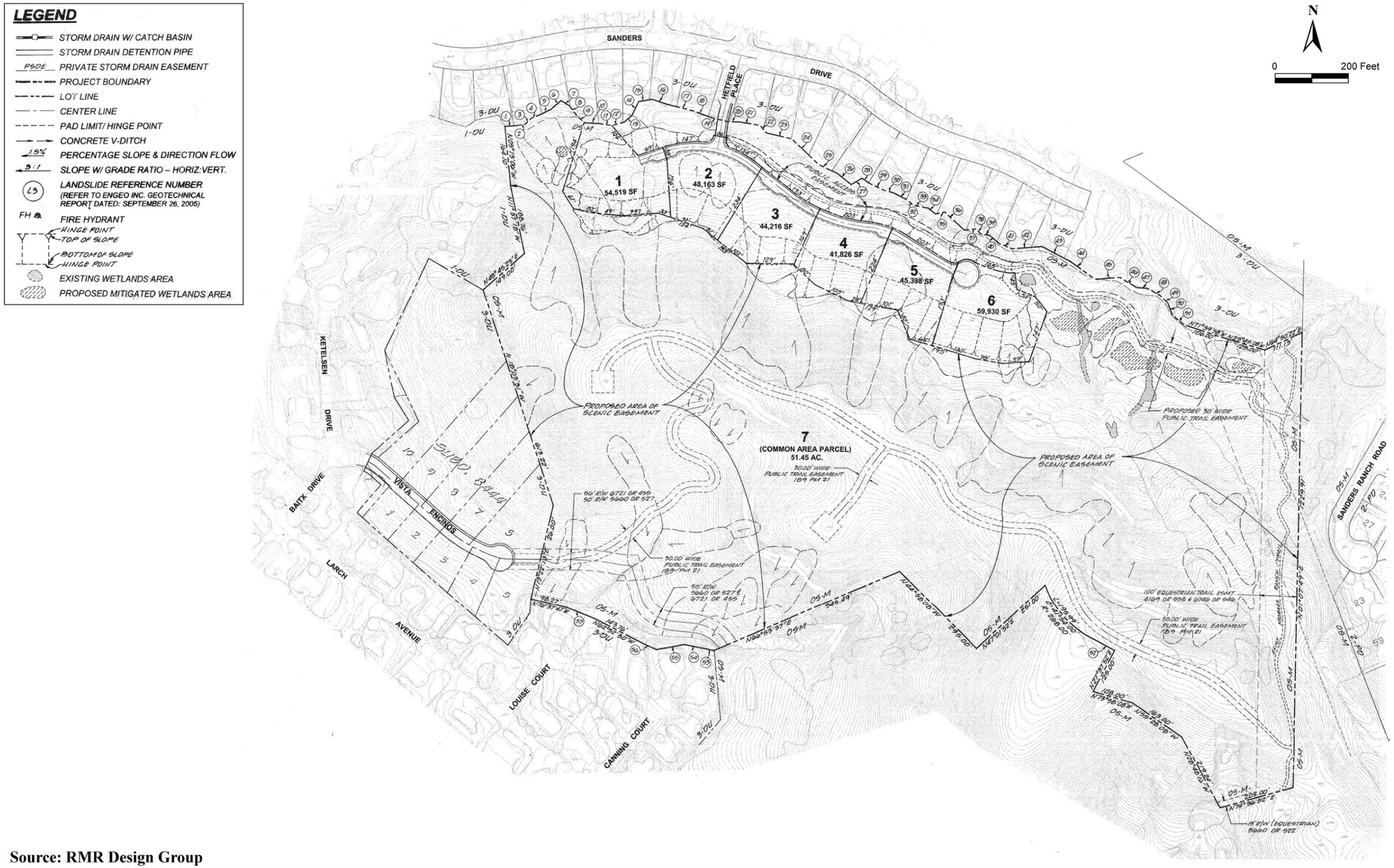
The Conceptual Development Plan shown in Figure 2-1 illustrates the lots with their defined developable areas. Lot 7 will be designated as permanent open space. No future grading or structures will be allowed within the open space area. Maintenance of the open space will be the responsibility of either a homeowners association or a special district, such as a Geologic Hazard Abatement District (GHAD).

Access to the subdivision will be from Hetfield Place, located near the end of Sanders Drive and will require crossing the existing creek. The bridge crossing will have two, 12-foot-wide traffic lanes and a 4.5-foot-wide public access easement. A single, 20-foot-wide private street will serve the six residential lots, ending in a cul-de-sac at Lot 6 in the eastern portion of the site. The street will be constructed to private street standards and will be maintained by the property owners. The revised plan shows the area extending between the six lots and the creek as open space. Within this area are the private roadway and a 5-foot-wide public trail. The open space will provide a buffer between the subdivision and the residences of Sanders Drive, as well as provide protection of the creek corridor. The open space ranges in width from 70 feet at the bridge crossing to a maximum of 140 feet at Lot 1. The 5-foot-wide public trail will extend east to the edge of the property, eventually following the northwest/ southeast ridge. The trail will split off to access two separate knolls. Trail users will be able to exit the property on the south side of the ridge through Subdivision 8444 on Vista Encinos, or through a 100-foot-wide equestrian right-of-way in the southeast corner of the property. Trail users will be able to connect to the regional "Moraga Ranch" trail. Maintenance of the on-site trails will be the responsibility of the homeowners association.

The six residential lots will front on the uphill side of the street. Although house plans have **not** been submitted, the applicant did provide conceptual plans to illustrate the massing and siting of the proposed houses to be used for assessing the visual impacts. These designs represent a worst case condition and are **not** considered a part of the project proposal. The applicant envisions a mix of one- and two-story houses. Lots 3 and 6 would contain one-story houses and lots 1, 2, 4 and 5 would contain two-story houses. The houses would be located along the flatter portion of the site, stepping up the hill where necessary. These particular plans show the houses ranging in size from 5,110 gross square feet to 6,500 gross square feet (including garage). The height of the houses is shown to range from 21 feet 1 inch to 25 feet 9 inches. The Town's Design Review Board would review detailed individual house plans and could require that house be less than what is reflected in this document. (Refer to the street elevations in Figures 2-2 through 2-4.)

The property is currently zoned OSM-DT (Open Space) and, if approved, would be zoned as a Planned Development because it is located on MOSO-designated land. The minimum required lot areas, dimensions, and setbacks will be established through approval of a Conditional Use Permit.

The new houses would be served by East Bay Municipal Utility District (EBMUD), Central Contra Costa Sanitary District (CCCSD), PG&E, and AT&T for cable television. Students would attend schools in the Moraga Elementary School District and the Acalanes Unified School District.



Source: RMR Design Group

Figure 2-1 Conceptual Development Plan

2.3 PROJECT OBJECTIVES

The applicant's objectives for implementing the proposed project include the following:

- Construct and market single-family custom lots that would accommodate homes on estate-sized lots;
- Avoid development on the ridge top and steep slopes;
- Cluster the development on a smaller portion of the property, significantly reducing all project impacts;
- Provide a significant portion of the property as permanent open space;
- Preserve existing wildlife corridors and avoid sensitive plants and wildlife; and
- Construct debris benches and perform slide repair in connection with grading and creation of project lots to ensure future protection of both project homeowners and adjacent homeowners.

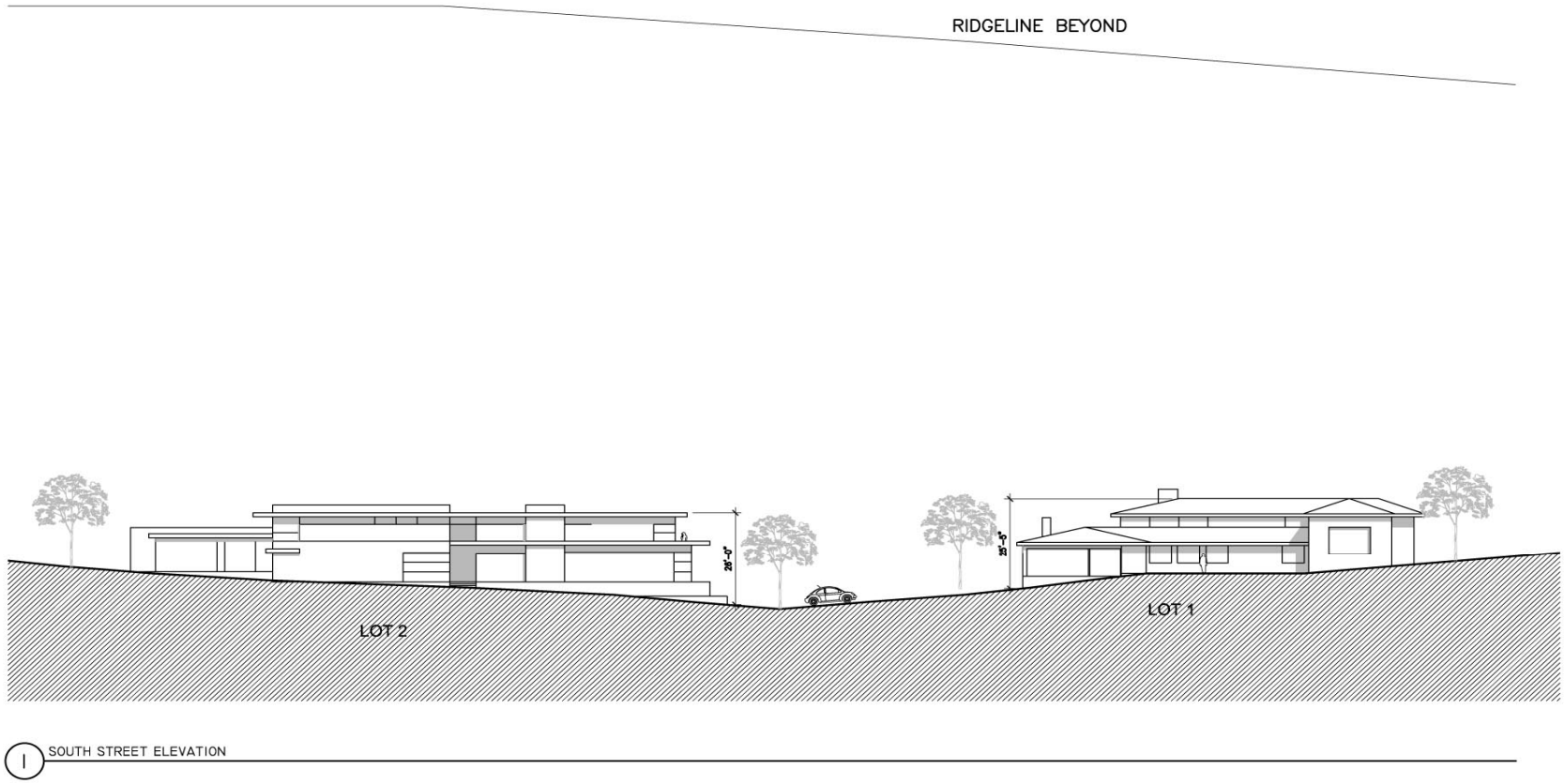
2.4 PROJECT APPROVALS

The proposed project will require approval of a Vesting Tentative Map, a Hillside Development permit, a Conditional Use Permit and design review of future house designs. The Planning Commission will act on the Vesting Tentative Map, Hillside Development permit, and the Conditional Use Permit. The Design Review Board will consider individual house plans.

Sources of Information

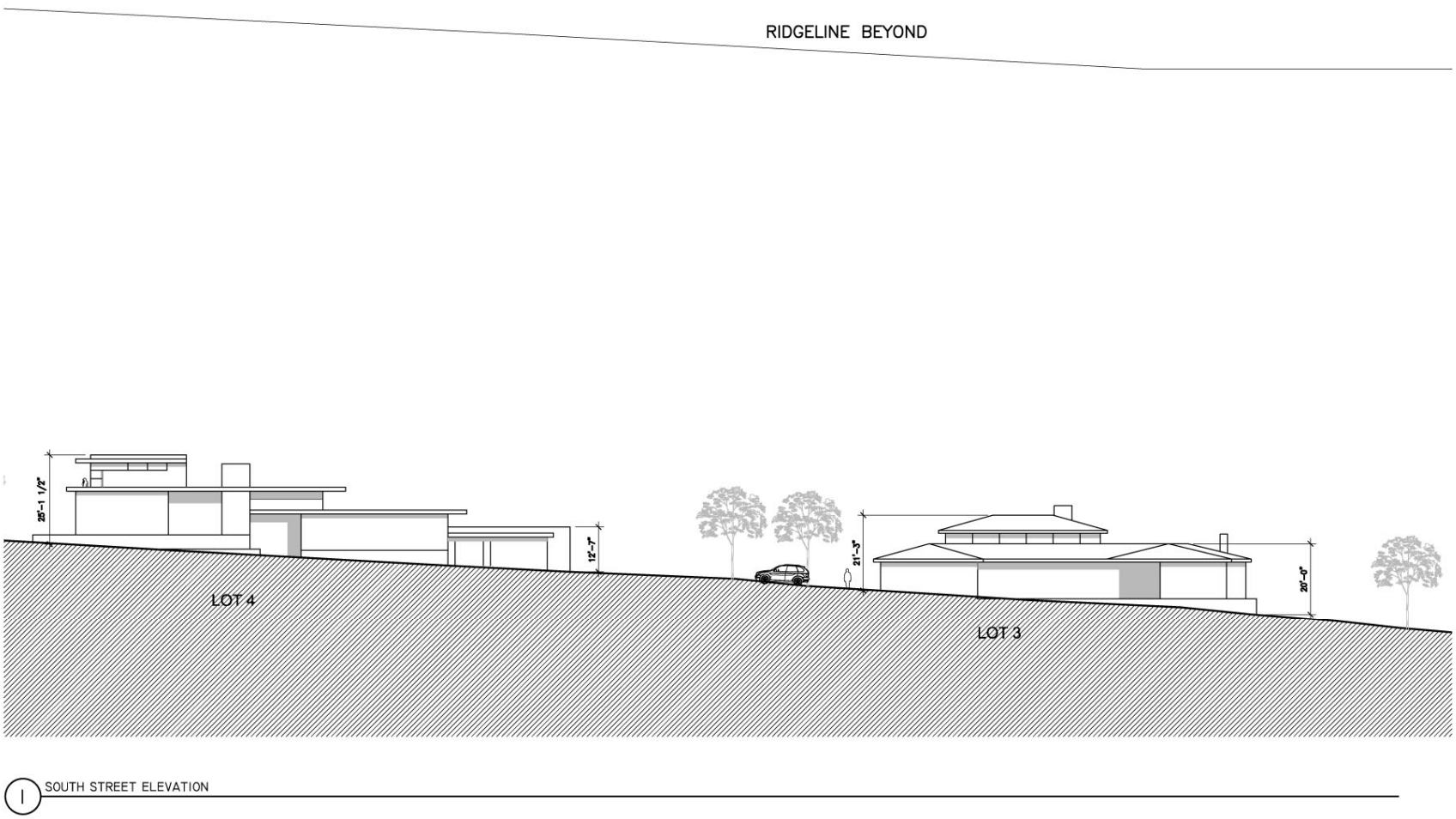
RMR Design Group.2008. Hetfield Estates Subdivision 9051 Revised Conceptual Development Plan, August 27.

Robert Rourke, P.E., AICP, RMR Design Group, telephone communication, February 2007.



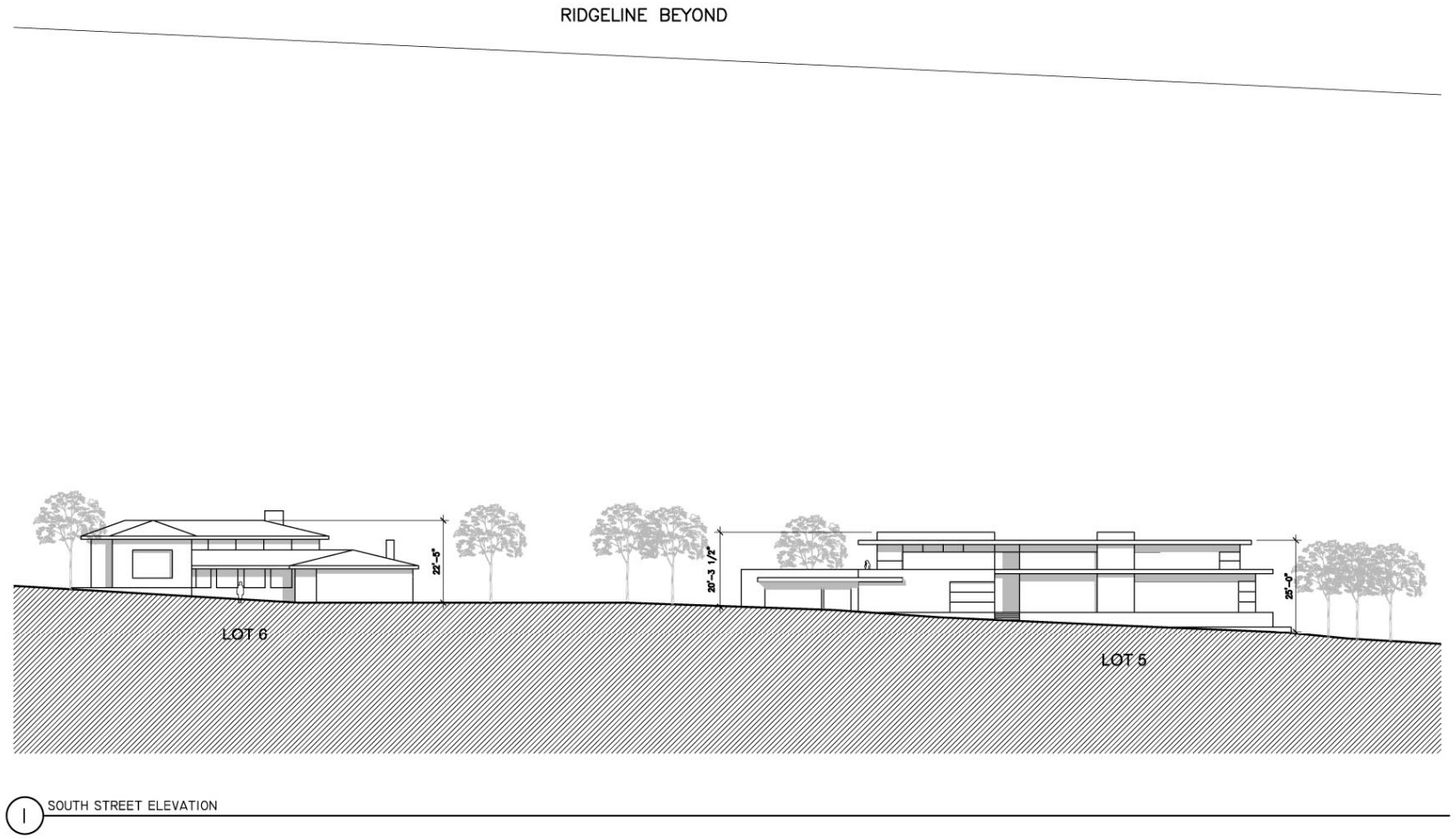
Source: Swatt Architects

Figure 2-2 Street Elevations Lots 1 and 2



Source: Swatt Architects

Figure 2-3 Street Elevations Lots 3 and 4



Source: Swatt Architects

Figure 2-4 Street Elevations Lots 5 and 6

3
ENVIRONMENTAL SETTING, IMPACTS, AND MITIGATION MEASURES

3.1 AESTHETICS / VISUAL RESOURCES

Introduction

The Town Council decision to require the preparation of a Focused EIR did not specifically identify aesthetics/visual resources as one of the environmental issues to be addressed further. They did, however, call for an analysis of the project's consistency with the General Plan, particularly the project's compatibility with the adjoining neighborhood. Numerous public comments on the Initial Study/Proposed Mitigated Negative Declaration also discussed the appropriateness of the project and its potential large-style houses that were evaluated in the IS/MND, the lack of sufficient mitigation and the visual impact of the entire project, including grading, from adjoining residences.

Setting

The project site is located in a small valley that is bisected by Sanders Drive and surrounded on three sides by hills. Sanders Drive is a dead-end street that culminates approximately 1,050 feet from Hetfield Place where the hillside rises to the Sanders Ranch subdivision to the east. Grazing occurs on the hillsides above the homes on the north side of Sanders Drive as well as at the eastern end of the roadway.

The project site is located on the north-facing slope of a northeast-southwest trending ridge on the south side of Sanders Drive. The slope rises at its lowest elevation of 531 feet in the northwest corner of the property to an elevation of 853 feet at the southeast corner. A creek separates the site from the Sanders Drive residential neighborhood. Numerous oaks, bays, willows and Monterey pines provide a buffer along the north edge of the property, adjacent to the creek. A few residents of Sanders Ranch Drive, located to the east, overlook the project site as shown in Photo 1.

The Sanders Drive neighborhood consists primarily of single-story ranch-style homes that were constructed approximately 40 to 50 years ago. Photo 2 illustrates a street view of those houses that abut the project size. Zoning in the neighborhood is R-15 (Residential 15,000 square feet minimum lot size) with the following setbacks:

Front Yard – 20 feet
Side Yard – 10 feet (25 feet aggregate)
Rear Yard – 20 feet

Photo 1: View looking east towards Sanders Ranch Drive – creek and tree screen located on left side of photo.

Photo 2: View of Sanders Drive homes as seen from the cul-de-sac at the northeasterly end of the roadway.

Photo 3: View of backyards on Sanders Drive from proposed Lot 6.

Photo 4: View looking west from Lot 1 of structure on Ross Drive.

Views

Residents of the Sanders Drive neighborhood either have views of the northern, eastern or southern slopes, depending upon whether the homes are located on the north or south side of Sanders Drive. Residents along the south side of Sanders Drive look directly towards the project site from their rear windows. These views are partially screened due to the tree and large bush screen, although three of the residences have direct views of the site as shown in Photo 3. Photo 4 depicts the residence located on Ross Drive that is located adjacent to Lot 1 in the northwest corner of the project site. Due to the height of the northwest/southeast trending ridge, southerly views from Sanders Drive residents abutting the project site do not extend beyond the ridgeline, because the ridge rises between 158 to 187 feet above the residential elevations. The project site and the ridgeline are not designated as a scenic resource or scenic vista in the Town's General Plan.

Regulatory Setting

Town of Moraga General Plan

The following goals and policies are considered when assessing the potential visual impacts of the proposed project.

COMMUNITY DESIGN ELEMENT

CD1 Natural Setting

Goal: Protection and preservation of the natural scenic qualities that make Moraga unique.

Policies:

CD1.1 Location of New Development. To the extent possible, concentrate new development in areas that are least sensitive in terms of environmental and visual resources including:

a) areas of flat or gently sloping topography outside of flood plain or natural drainage areas;

b) the Moraga Center area and Rheem Park area, and

c) infill parcels in areas of existing development.

CD1.2 Site Planning, Building Design and Landscaping. Retain natural topographic features and scenic qualities through sensitive site planning, architectural design and landscaping. Design buildings and other improvements to retain a low visual profile and provide dense landscaping to blend structures with the natural setting.

CD1.3 View Protection. Protect important elements of the natural setting to maintain the Town's semi-rural character. Give particular attention to viewsheds along the Town's scenic corridors, protecting ridgelines, hillside areas, mature native tree groupings, and other significant natural features. Consideration should be given to views both from within the Town and from adjacent jurisdictions….

CD1.4 Canyon and Valley Areas. Protect the scenic and environmental qualities of canyon and valley areas to retain the Town's semi-rural character. Preserve both close-up and distant views of the natural hillside landscape from valley areas….

CD1.5 Ridgelines and Hillside Areas. Protect ridgelines from development. In hillside areas, require new developments to conform to the site's natural setting, retaining the character of existing landforms, preserving significant native vegetation and, with respect to ridgelines, encourage location of building sites so that visual impacts are minimized. When grading land with an average slope of 20 percent or more, require 'natural contour' grading to minimize soil displacement and use of retaining walls. Design buildings and other improvements in accordance with the natural setting, maintaining a low profile and providing dense native landscaping to blend hillside structures with the natural setting.

CD1.6 Vegetation. Emphasize and complement existing mature tree groupings by planting additional trees of similar species …in areas of new development and along drainageways. Encourage the use of native, fire-resistive and drought-tolerant species.

CD4 Single Family Neighborhoods

Goal: High quality residential neighborhoods that preserve their existing scale, character and quality and provide an inviting pedestrian environment to promote walking and biking between neighborhoods.

Policies:

CD4.3 Infill Development. Ensure that new residential development in existing neighborhoods reflects the size, scale, height, setbacks, and character of existing development. While new homes…. should be allowed, they should not create adverse impacts on adjacent properties or detract from overall neighborhood character. All projects should be subject to discretionary review by staff.

CD4.4 New Residential Developments. Design new single-family developments to create high quality pedestrian environments with pathways to adjacent neighborhoods and, where feasible, commercial areas. Ensure that the layout of new residential lots respects the site topography and natural features. Where feasible, avoid standard repetitive lot sizes and shapes in hillside areas.

HOUSING ELEMENT

H1 Housing and Neighborhood Quality

Goal: Continued maintenance and improvement of high-quality, safe and livable housing and residential neighborhoods.

Policies:

H1.4 Design Excellence. Review the design of new housing developments to ensure that they are compatible with the scale and character of the neighborhood in which they are located and the semi-rural character of the Town as a whole, consistent with policies in the Town's Community Design Element.

Impacts and Mitigation Measures

CEQA Significance Criteria

California Environmental Quality Act (CEQA) Appendix G identifies environmental issues to be considered when determining whether a project could have significant effects on the

environment. As identified in Appendix G and relevant to the proposed project, the following criteria are considered when evaluating the aesthetic and visual impacts of the proposed subdivision:

- Have a substantial adverse effect on a scenic vista?
- Substantially degrade the existing visual character or quality of the site and its surroundings?
- Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?

The Town's General Plan policies and any other applicable polices related to visual quality are also considered in determining the significance of impacts. Impacts and mitigation measures related to both on- and off-site viewers are considered. It is noted that there is no quantitative method for assessing visual quality and aesthetic impacts; thus, judgment of the significance of a particular effect may be expected to differ among readers of this document.

It is also important to differentiate between public and private views. The project site, including the ridgeline, is not a designated scenic resource in the Town's General Plan. While private views may be considered by individuals to be just as valuable as those designated in the General Plan, not all private views can be maintained unless individuals are willing to pay for the privilege of securing the view by purchasing the property. Views of the project site from adjoining residents would be considered a private view.

Project Details

The proposed project consists of subdividing the 58.2-acre property into seven lots with lot sizes ranging in size from 41,826 square feet (.96 acre) to 51.45 acres. The Conceptual Development Plan shown in Figure 2-1 illustrates the lots with their defined developable areas. Lot 7 would be designated as permanent open space. No future grading or structures would be allowed within the open space area.

Grading of the site for the subdivision involves removal of some trees and vegetation, slide debris within portions of the developable area, correcting slide areas with the installation of continuous benching, and creation of building pads and a private roadway. The grading concept, as shown on Figure 3.2-3, involves removal of slide debris within the portion of the site planned for development, and retaining the steep upper portion of the ridge in an ungraded "scenic easement." Building pads are shown for Lots 1 and 6, while the other four lots would have gentle slopes (10 percent gradient).

Project Impacts

Grading/Site Preparation Visual Impacts

IMPACT 3.1-1: Site preparation and grading of the building area would create a temporary visual impact for residents abutting the north side of the project site. This is a *potentially significant* impact.

Scenic resources on the project site are limited to the numerous trees located along the northern edge of the property and interspersed on the slope outside the development area. The scraping of vegetation, removal of some trees and site grading would create a temporary visual impact to residents who have views of the site. The proposed grading would require the removal of several regulated trees as defined by the Town's Tree Preservation Ordinance. These include two willows, an oak and a buckeye on Lot 1 and several smaller oaks at the Hetfield Place bridge crossing. Once the subdivision improvement plans have been approved, site preparation can last as long as two years until all improvements are completed and prior to the construction of houses. It is acknowledged that the site could remain vacant for several years before houses are constructed due to the current economy. However, the necessary site improvements would be completed and the site revegetated as a requirement of the erosion control plan. When the houses are constructed and individual lot landscaping is completed, views would be similar to those currently seen within the neighborhood; that is, a landscaped residential subdivision.

Although site preparation and construction of site improvements is considered a temporary visual impact, the following mitigation measures are recommended to reduce the impact to a less-than-significant level.

□ **MITIGATION MEASURES:**

3.1-1A: The existing tree screen shall be supplemented with similar native species on the site behind the houses at 1108 through 1116, 1140, 1144, and 1156 through 1164 Sanders Drive. Trees shall be planted on lower portions of the creek bank, protected from deer, and maintained prior to the start of site preparation. Tree size shall be no less than 15-gallon size and shall be a mix of native species; e.g., coast live oak, California buckeye, California laurel. The applicant shall submit a tree-planting plan for review and approval by the Town.

3.1-1B: The applicant shall post a security bond to assure protection of existing and newly planted trees that are located along the north edge of the property. The term of the bond shall extend at least 36 months beyond the completion of the required subdivision improvements.

3.1-1C: Newly planted trees shall be monitored for a period of ten years from the date of installation. Any trees lost during this period shall be replaced and monitored by the developer for the same length of time. Upon completion of the monitoring period, the property owners or a homeowner's association shall replace any trees that may require removal and shall be responsible for maintaining the trees.

Alteration of Views

IMPACT 3.1-2: Partial views of the project site will be permanently lost with the development of the proposed project. This is considered a *potentially significant* impact.

The project site has served as open space to the residents of Sanders Drive who have enjoyed the bucolic setting and the sense of privacy that the site affords. The residential lots would be clustered along the base of the slope extending behind the residence at 1104 Sanders Drive to behind the residence at 1164 Sanders Drive. Outside of the development area, the rest of the project site would remain in permanent open space. Neighboring residents would have the opportunity to utilize the trails and be able to connect to other trails.

Rather than viewing through a tree screen of a vacant hillside that has been used for cattle grazing and frequented by wildlife, abutting residents would view six houses. The near views of the project site would be permanently altered with the proposed housing development. Residents facing the site would see structures and landscaped yards rather than the lower portion of the undeveloped hillside. The larger lots would have greater sideyard setbacks, which would allow upslope views between houses from the residents below. Unlike the existing neighborhood where lots are less than one-half acre, the smallest lot in the proposed development is .96 acre.

As shown in the Conceptual Development Plan, Figure 2-1, the proposed lots span the width of two or more existing residences. No one existing resident is going to be able to view all of the houses from his/her house or backyard in one glance, due to the space between the new houses and the existing tree screen that will remain. However, where there is a partial existing tree screen, particularly behind 1108 through 1116 Sanders Drive and 1156 through 1164 Sanders Drive, residents would have direct views of the house on Lots 1 and 2 and on Lot 6. Residents of 1140 and 1144 Sanders Drive would also have a partial direct view of the house on Lot 4 due to limited screening on these properties.

Adjoining residents would not lose their views of the upper slope and ridgeline as shown in Appendix B, Figures 3-1 through 3-3. The houses are sited so that they would be located on the flatter portion of the lot, closest to the creek and stepped up the hill. This is consistent with Policy CD1.1 of the General Plan. The distance between the existing houses on Sanders Drive and the new houses would range from 180 feet to 225 feet as shown on Figure 2-1.

General Plan policies call for "new developments to conform to the site's natural setting; retaining the character of existing landforms; preserving significant native vegetation; and with respect to ridgelines, encourage location of building sites so that visual impacts are minimized." The backdrop of the upper portion of the slope and the ridge would not change, and neighbors who currently view the ridge would continue to be able to do so. Protection of the ridge is consistent with General Plan Policies CD1.3 and CD1.5. Except for the bridge crossing location that will necessitate the removal of a few trees, trees along the creek would remain. Landforms would be altered to correct the slides and slumping that currently occurs on the site. However, it is the applicant's intent that the slopes will be reshaped to reflect a natural landscape. (Refer to discussion in Section 3.2, Geology/Soils.)

□ **MITIGATION MEASURE 3.1-2**: Refer to Mitigation Measures 3.1-1A–C.

Neighborhood Compatibility

IMPACT 3.1-3: New housing could be considered as out of character with the existing neighborhood. This is considered a *potentially significant* impact.

General Plan policies (CD1.2, CD4.3, and H1.4) call for new development to retain a low visual profile; reflect size, scale, height and character of existing development; and ensure compatibility with existing neighborhoods. The applicant has provided street elevations of house designs that could fit with the terrain to illustrate potential visual impacts. It is noted that these are **not** the house designs that would eventually be evaluated by the Town's Design Review Board, but have been included in this discussion to illustrate a worst-case condition. The elevations shown in Figures 2-2 through 2-4 show that the graded site can accommodate single story and stepped houses. These plans reflect house sizes ranging in size from 5,110 gross square feet to 6,500 gross square feet (including garage). The height of the houses is proposed to range from 21 feet 1 inch to 25 feet 9 inches. This size house would not be compatible with the size of the houses abutting the project site. Due to the size of the lots however, it is reasonable to assume that future houses could be as large as those shown in Figures 2-2 through 2-4. Even though the future houses could be larger than adjoining residences, neighborhood compatibility can be achieved through architectural design such as incorporating low-pitched roofs and restricting height limits. As called for in General Plan Policy CD1.2, buildings and other improvements must be designed to retain a low visual profile. These are some of the parameters that the Design Review Board considers when evaluating house designs.

□ **MITIGATION MEASURES:**

3.1-3A: The massing and stepping of the houses shall be as shown on Figures 2-2 through 2-4. The maximum building height shall be determined

through the design review process, but shall not exceed 25 feet from finished grade.

3.1-3B: House designs shall be compatible to the adjoining neighborhood; that is, low profile by incorporating low-pitched roofs and roof overhangs.

3.1-3C: The final map shall reflect similar house plotting as shown on Figure 3-1 in Appendix C. A minimum distance between new and existing houses shall be no less than 180 feet.

3.1-3D: Prior to final map approval, the applicant shall submit design guidelines to ensure that future homebuilders incorporate features in the design that are compatible with the adjoining neighborhood.

3.1-3E: Individual landscape plans shall be submitted to the Town's Design Review Board at the time individual house plans are reviewed. The landscape plans shall reflect a mix of native vegetation that will help blend the structures with the natural setting.

Source of Information

Swatt Architects, Inc., 2007. Street Elevations Hetfield Estates Development, March 31.

3.2 GEOLOGY / GEOTECHNICAL / SOILS

Introduction

Background

The Town Council's decision to require preparation of an Environmental Impact Report, identified the need for additional evaluation of potential geologic hazards. At that hearing, comments were received from the public that may be summarized as follows:

- Subsurface data is not sufficient to fully evaluate landslide hazards. Additional borings and deeper borings are needed to characterize the landslide hazard. (At the time of the Town Council's decision to require an EIR, Engeo, Inc. had issued a report documenting an initial investigation of the site (Engeo, 2000). The scope of work for that investigation was limited to (a) literature review, (b) geologic interpretation of aerial photographs, (c) logging of 14 test pits, and (d) evaluation of the data gathered. The subsurface data presented in the Engeo report included five borings from a previous report of Seidelman Associates, 1993.)
- If landslide deposits extend deeper than was forecasted by Engeo in the 2005 report, the volume of earthwork required for the project could be significantly greater (e.g., longer construction period, more disturbance, etc.).
- Technical data on the location and significance of the bedrock fault is inadequate. Conceivably the fault may effect slope stability, or the distribution of groundwater in the subsurface.
- The influence of groundwater has not been sufficiently analyzed. There is an assumption in the Engeo report that subsurface drainage facilities will control groundwater levels. Subdrains and culvert pipes require a commitment to long-term maintenance, and these costs may ultimately be an unmanageable burden on the future property owners.
- Within a site with abundant evidence of active landsliding, the maintenance of trails in the ungraded open spaces implies a commitment to regular maintenance.

Following the Town Council hearing, Engeo developed a proposed scope of work for a supplemental geotechnical investigation. To ensure that the investigation addressed the expectations of interested parties, the work program was distributed for review by the Town Peer Review Geologist, the geologist for the EIR, and the two geologic consultants retained by the neighbors (Laurel Collins and William Cotton). The review included a field meeting at the site where the various geologists provided input to Engeo. The precise location and depth of the borings was established in consultation with all geologists present. In this manner, the locations of some borings were moved and others added. Ultimately, seven

boring locations were selected to address the question of potential deeper/bedrock landslides. The exploration plan was to extend the borings 30 feet into bedrock, and the drilling method was to be a dry core technique that allowed for continuous sampling. Additionally, Engeo included two borings at the planned location of the basal keyway (near toe-of-slope) to establish the depth of excavation for the keyway. Similarly, the proposed locations for test pits were reviewed and adjusted to meet the expectations of all parities. The intent of the test pits was to allow characterization of subsurface conditions in the area of the planned debris benches. (The debris benches are shown on the grading plans at the upper limit of grading, and are intended to intercept slide debris, mud and water originating higher on the hillside, within the permanent open space area.) Additionally, the proposed location of the fault trench was reviewed. In summary, the details of the exploration program were adjusted and expanded, incorporating the comments of all parties. At that time, there was agreement by all geologists that the scope of work for the supplemental geologic investigation was adequate to analyze the questions that had been raised at the Town Council hearing.

Supplemental Investigation

The purpose of the supplemental investigation was to provide sufficient data to make preliminary assessment of geologic and seismic geological hazards; provide general recommendations and criteria for site grading, drainage and foundation design. The report indicates that the recommendations are only suitable for use as a project planning tool. Specific standards and criteria for construction projects will require supplemental geotechnical analysis, which will be performed in conjunction with the processing of construction permits.

The Town's Ordinance Code makes provisions for requiring additional geologic and geotechnical studies during the processing of grading and building permits. Consequently, Engeo's approach of a phased study is consistent with adopted Town of Moraga regulations. The geologic issues to be resolved by the pending application are chiefly land use, density and the grading concept for the project. Construction details are not needed at this time.

Published Mapping

The project site and adjacent region have been mapped by geologists of the U.S. Geological Survey (USGS) and the California Geological Survey (CGS) (formerly California Division of Mines and Geology). The products of the USGS mapping include bedrock geology maps (Graymer, et al., 1994; Dibblee, 1980); and photointerpretative landslide maps (Nilsen, 1975). The CGS prepared bedrock geology, landslide, debris flow susceptibility and landslide susceptibility maps (Majmundar, 1996).

Other pertinent literature includes the Ph.D. Dissertation on J.R. Wagner (Wagner, 1978) and a USGS Professional Paper that evaluates the stratigraphy and engineering geology of hillsides throughout the San Francisco Bay Region (Ellen and Wentworth, 1995).

Setting

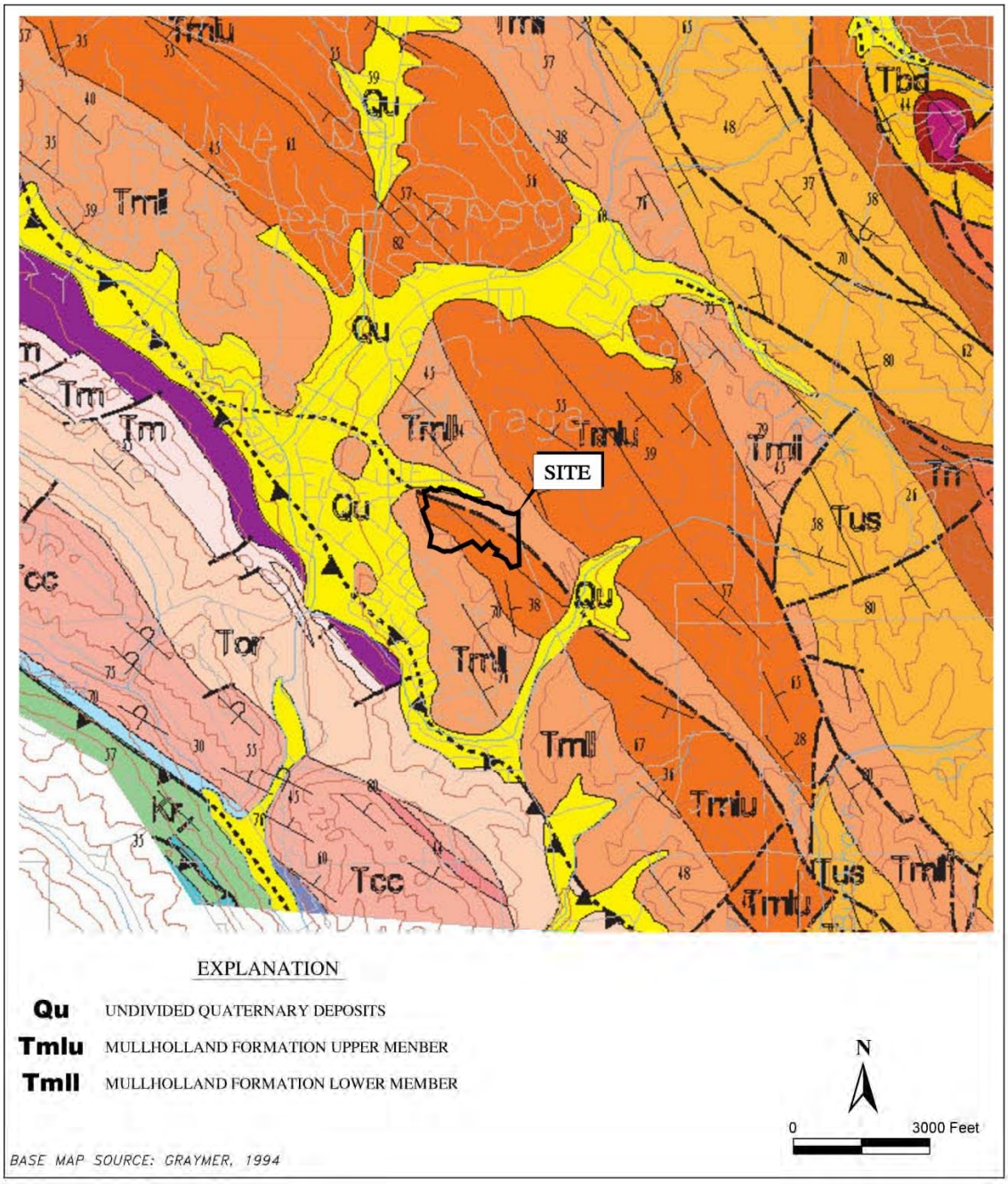
Bedrock Geology

The site is located within an area of faulted and tightly folded bedrock formations. In the Moraga area these formations consist chiefly of Pliocene and Miocene bedrock units. The most recent geologic map of the Moraga area is a map published by the USGS.[5] That map is largely a compilation of previous mapping, with digitizing of the data. Figure 3.2-1 presents a portion of the map and the site is outlined with a heavy black line. According to this map, the site is within the outcrop belt of non-marine sedimentary rocks of Pliocene age which have been tightly folded. The major structural feature is a bedrock fault that trends northwesterly. This fault is indicated to be the contact of the Lower Member of the Mulholland Formation (Tmll) with the Upper Member of the Mulholland Formation (Tmlu). The fault is represented by long dashes on the site, indicating the location shown is approximate. Just northwest of the site the fault is represented by a dotted line, indicating even greater uncertainty in its location. Tmlu consists chiefly of sandstone; Tmll consists chiefly of claystone with interbedded siltstone. The potential building sites are on the northeast portion of the site, where the bedrock is inferred to be within the outcrop belt of Tmll claystone.

The property is not located in an Alquist-Priolo Earthquake Fault Zone. The nearest faults considered active by the California Geological Survey (CGS) and USGS are the Hayward and Calaveras faults. They are mapped approximately 5 miles to the southwest and 8 miles to the southeast of the site, respectively. Although the fault shown crossing the site on Figure 3.2-1 is not regarded as active by government agencies, even inactive faults can have an influence on the movement of groundwater or adversely influence slope stability.

Engineering Geologic Properties of Bedrock

The USGS issued a Professional Paper that characterizes hillside materials in the San Francisco Bay Region (Ellen & Wentworth, 1995). The maps and unit descriptions are intended to provide a guide to the physical nature of the ground from place-to-place in hillside terrain of the region. The report does not classify geologic units according to their slope stability characteristics. Instead, it provides a unit description, emphasizing physical properties that most influence engineering operations in land development. This publication refers to the geologic unit on the portion of the property proposed for residential development as the Mulholland Formation – Lower Member. Key features of this formation may be summarized as follows:



Source: Engeo

Figure 3.2-1 Regional Geologic Map

Composition: Interbedded sandstone and mudstone: minor persistent beds of limestone, tuff, and bentonite. Sandstone and mudstone generally occur in about equal proportions. The sandstone is mostly medium grained, ranging from fine-grained to very coarse grained, and has minor pebbly beds in which pebbles are mostly less than 0.5 inch, but as much as 2 inches in diameter. About one-third of sandstone is well sorted, has interstices partly filled by clay and silt, and has moderate permeability; remainder consists of moderately sorted sand in a silt and clay matrix and has low permeability. Sandstone generally contains minor to some calcite cemented concretions and beds. Mudstone in places is fissile (shale), is variably silty and contains fine sand (grades to siltstone).

Weathering: Most sandstone is weathered or partially weathered to depths of 30 feet, some to depths of more than 50 feet, some well weathered to depths of only 10 feet. Mudstone weathered to depths of 5 to 10 feet.

Surficial Mantle: The soil and colluvium largely clayey, some granular.

Expansivity: Some to much bedrock is expansive (mudstone), some severely expansive. Most mantle significantly expansive, some severely expansive.

Landslide Deposits

USGS Mapping

In 1975, the USGS published surficial deposit maps of the entire San Francisco Bay Region. These maps, which were based on geologic interpretation of 1960s and early 1970s vertical angle aerial photographs, mapped the distribution of alluvial, colluvial and terrace deposits, along with mapping landslides. These maps were published at 1"=2,000'.[6] The potential building sites in the proposed subdivision are located adjacent to the creek, near the north property line. Two landslide complexes are mapped within the portion of the property that is planned for residential development. On this north-facing hillside, approximately 20 acres are mapped as landslide deposits. This map does not classify slides according to type of slide, activity status or depth of slide plane. The intent of this map is to "red flag" sites that require detailed, site-specific investigations.

CGS Mapping

In 1996, the CGS issued a set of maps that include bedrock geology, landslides and slope stability.[7] This landslide map indicates that the two landslides mapped by the USGS within the area proposed for residential development; they encompass nearly 100 percent of the lands being proposed for grading and development. The Relative Slope Stability Map prepared by the CGS classifies the lands being proposed for grading and development as "Area 4," which is defined as the "most susceptible area."

Slope Map

The Moraga General Plan gives consideration to slopes gradients in evaluation of the relative development potential of properties, recognizing the cost and engineering difficulties of grading in areas of steep slopes. The applicant has identified a "cell" on each proposed parcel. Within each cell is the portion of the parcel proposed for grading and development. Calculations submitted with the Vesting Tentative Subdivision Map indicate the average slope within each "cell" is less than 20 percent.

Landslide Repair at 35 Hetfield Place

During 2009, corrective grading occurred on a landslide that was responsible for damage to a residence at 35 Hetfield Place. That residence is located at the north terminus of Hetfield Place, approximately 800 feet north of the site. This landslide does not pose a hazard to the proposed Hetfield subdivision. However, it is an indication of the destructive power of landslides, particularly if they are not removed/stabilized during the land development process. It also provides information on the nature of a landslide within the Hetfield neighborhood. The history of the site and landslide can be summarized as follows:

- Residences at the north end of Hetfield Place were developed in 1961. At that time the County had not adopted a grading ordinance. Review of stereo pairs of historic aerial photographs flown in the early 1960s show evidence of limited corrective grading, largely limited to the site of the subdivision. The 1966 aerial photographs indicate that surplus earth materials were stockpiled higher in the slide area (south of the site).

- In October 1997, Brockman Engineering Contractors did a floor leveling survey that indicated the residence at 35 Hetfield Place was 4.3-inches out-of-level (rear of residence was high.

- In 2006, Seidelman Associates, geotechnical engineers, performed a geotechnical investigation that focused on the portion of the slide at/near 35 Hetfield Place. The resulting report concluded that the residence is located at the toe of a landslide. Near the foundation of the residence, the slide plane was confirmed to be at a depth of 15 to 20 feet below the ground surface.

- In 2008, Alan Kropp & Associates, Inc. (AKA) performed the geotechnical investigation whose purpose was to characterize the off-site portion of the landslide, and to provide recommendations for corrective grading. The scope of the AKA investigation included the logging of 10 auger borings, along with laboratory testing of representative samples and engineering analysis. The data gathered indicated soil up to 30+ feet thick (max.) was sliding over bedrock. The bedrock was found to consist of interbedded siltstone and claystone. Slide planes did not extend into the bedrock.

- In 2009, Engineered Soil Repairs, Inc. was retained to perform the corrective grading. A grading permit issued by the Town of Moraga, and the Town's Public Works Department monitored the earthwork. The estimated volume of the slide was approximately 34,000 cubic yards. The corrective grading plan was based on the recommendations of AKA, and the design is intended to (1) stabilize the off-site portion of the slide and (2) prevent further damage to the residence.

Supplemental Investigation of Engeo

Based on the scope of work previously described, Engeo performed the supplemental subsurface investigation during September 2009. The agreed upon scope of work was intended to address the various questions raised at the Town Council's hearing on the project. With regard to landslides, the focus of the additional deep borings was on Landslides L1, and L4-L6. The location of these slides is presented in Figure 3.2-2. This exhibit also presents an original geologic map of the property based on Engeo's interpretation of the data gathered during their 2009 supplemental investigation. Consequently, it shows the location of all borings, test pits and exploratory trenches, as well as a restricted building zone along the mapped fault trace. The following discussion is intended to highlight and summarize key findings of the Engeo Investigation:

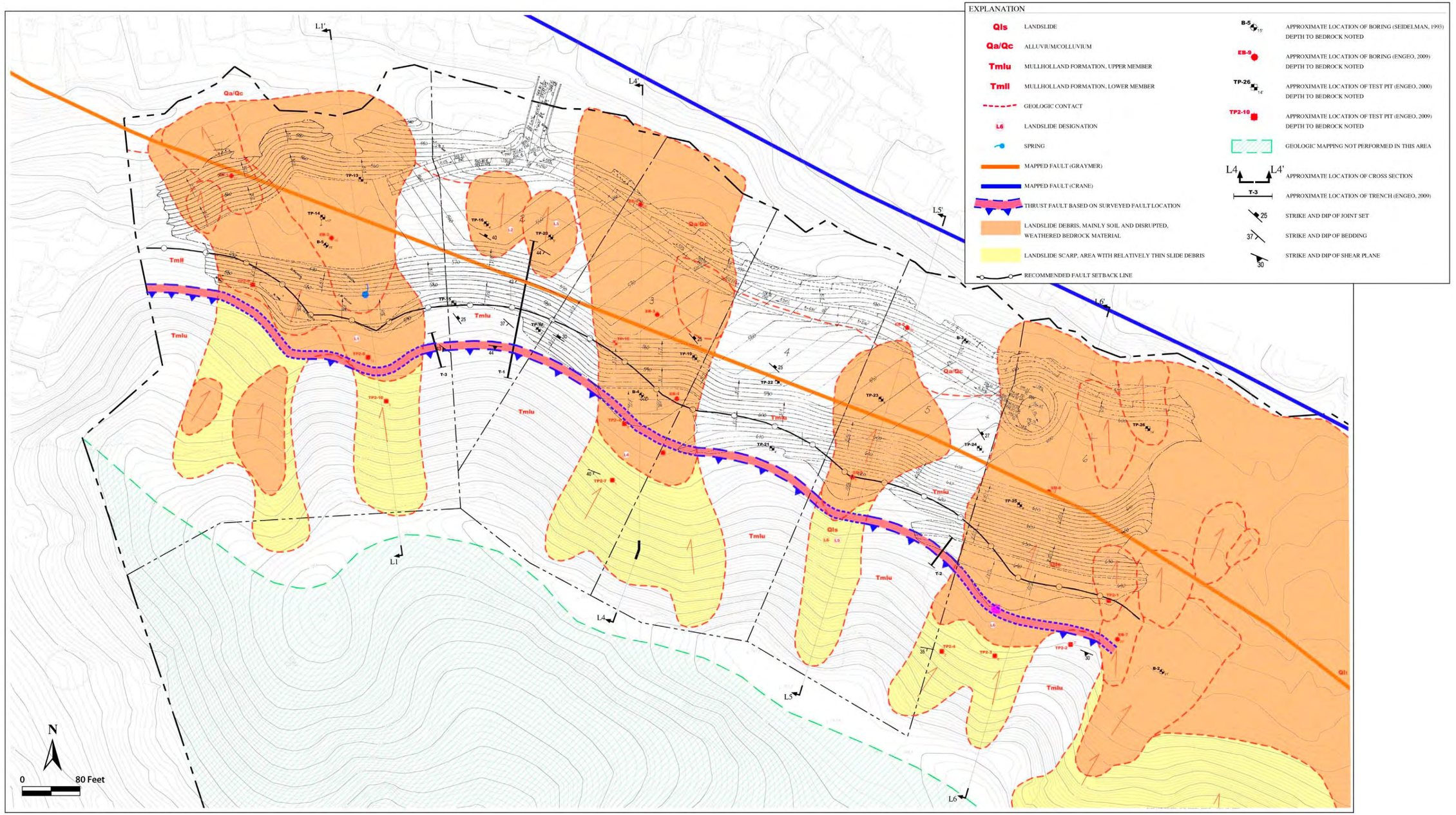
- **Faulting.** The precise location of the fault was confirmed at three locations. Specifically, the fault was located in trenches T-1, T-2 & T-3. In each instance, the fault was the contact, separating sandstone rock upslope of the fault (Tmlu) from the downslope claystone unit (Tmll). The fault plane dipped rather consistently in the southwest at approximately 42 degrees. The fault could be traced in the trench wall to the surface soils, where the dip angle flattened appreciably (probably due to soil creep). The exposures did not establish the relative activity of the fault. Nevertheless, the Engeo report recommends a structure setback from the fault (50 feet on its northeast flank of the fault and 75 feet on the southwest flank). The differing setback standard is due to the fact that the fault appears to be a southwest-dipping thrust fault. The southwest side may, therefore, be more susceptible to ground deformation since it is located over the inclined fault plane. It should be noted that the setbacks recommended for this fault are consistent with State Guidelines for setbacks from active faults in the Alquist-Priolo Zone. As Figure 3.2-2 indicates, the fault setbacks recommended by Engeo do not affect the building sites in the proposed subdivision.

- **Landslides.** As mentioned previously, Engeo logged seven borings that extended through the soils overlying bedrock and were continued 30 feet into the rock. Those borings are labeled EB-1 through EB-7. For each of these borings, the drilling method was dry coring. That allowed continuous sampling, and the recovery was very good. Additionally, two auger borings were located in the northernmost portion of the area's planned grading to determine the depth that would be required for the basal "keyway." Key questions that were answered by the data gathered are presented in Table 3.2-1.

Table 3.2-1

ENGEO EVALUATION OF GEOLOGIC DATA ON LANDSLIDE DEPOSITS

SCARP AREA OF SLIDES	The scarp area of landslides (located just upslope of the fault) indicate that the slide debris is relatively thin and is underlain by sandstone with conglomerate interbeds of the Mulholland Formation – Upper Member. There was no evidence of significant groundwater in this portion of the site.
DOWN-SLOPE PORTION OF SLIDES	Down slope of the fault the terrain flattens, and the slide debris is substantially thicker.(Areas of thicker slide debris are shaded tan in Figure 3.2-2.) Typically the slide debris contains material derived from both the Upper and Lower Members of the Mulholland Formation. The core samples reveal a well-defined slide plane at the contact of the slide debris with the bedrock. This surface is typically characterized by a clay gouge and slickensides.
DEPTH OF SLIDING	An objective of the investigation was to determine if slide planes extend into the bedrock or if the slide debris is confined to the soils that overlie the bedrock. This evaluation is based on several factors, including geomorphic features, the characteristics of the slide debris, orientation of bedding and other factors, along with evaluation of core samples recovered from Borings EB-1 through EB-7. The Engeo report discussion of the data is as follows: (1) if deep seated landslides extended upslope of the fault, large blocks of sandstone would be anticipated to be present with the slide debris (transported downslope by movement of the slide), (2) the fault trace would likely be off-set by active landslide movement, (3) bedding would likely be rotated, and (4) prominent shear planes would be present in the core samples. The features, characteristic of a deep-seated bedrock landslide, were not observed on the site. Engeo acknowledges that some sheared or crushed rock was locally seen in the core samples. However, similar sheared rock was present in Trench T-1, which was clearly not within a slide area. Engeo considers the local pockets of sheared rock to be characteristic of the formation, and likely due, at least in part, to the tight folding of a massive claystone unit. Additionally, the investigation did confirm a fault on the site. The displacement of rock during faulting may be responsible for the isolated shears observed in Trench T-1 and in the cores. The key point is that a well-defined slide plane with their associated clay gouge was not present in the core. Instead, the cores indicate that the first rock encountered in the borings is severely weathered, but within less than 10 feet, the rock grades to moderately-to slightly weathered. Locally, bedding can be observed.
INTERPRE-TATION OF SLIDES	Engeo concludes that the downslope portion of landslides is consistent with a series of nested earthflows that have moved in increments rather than displacement on a single deep seated slide plane. The seven borings that extended 30 feet into the bedrock found no direct evidence of slide planes within the bedrock.



Source: Engeo

Figure 3.2-2 Project Site Geologic Map

- **Corrective Grading.** The mitigation measures recommended by the applicant to achieve stability of the proposed building sites is to remove all landslide debris from the areas being proposed for grading and development, using a gradient of 3:1 (horizontal to vertical) for the proposed fill slopes, and construction of debris benches at the top of the graded slope to intercept mud and slide debris originating in the private open space in the ridge crest area. Where 3:1 gradients are inconsistent with project objectives, special engineering is recommended (e.g. reinforced earth). The Engeo report presents a corrective-grading plan (see Figure 3.2-3). This exhibit shows the line-of-section for a series of cross-sections that are presented in Figures 3.2-4 and 3.2-5. These geologic cross-section show existing topography (heavy black line), location/ depth of boreholes and test pits that are positioned at or near the line-of-section and the proposed final grade (dashed line). It also shows the base of the landslide deposits, the keyways and areas of benching, and typical sections for the location of subdrains. Engeo recommends that their geologist observe and map all exposures of bedrock during grading. This review is intended to document that all slide debris has been removed. If a bedrock slide plane were to be observed during grading, Engeo would provide recommendations to extend the corrective earthwork deeper. That change to the grading would require review by the Town's Peer Review Geologist and review/approval by the Public Works Department.

- **Debris Benches.** Based on the results of their investigation, and the performance of nearby slopes, Engeo concludes that slump block of up to 40 to 70 feet (wide) × 90 to 180 feet (long) × 8 to 12 feet (thick) are foreseeable in the hillside that is upslope of the proposed debris benches. Based on their investigation, the material is cohesive, slow moving and will cease movement when it encounters a flatter slope gradient (represented by the debris benches). Engeo considers the benches to be of adequate width to trap a slump block.

- **Groundwater.** A purpose of the investigation was to further evaluate the role of groundwater conditions on the site and assess the extent to which the fault could influence groundwater movement. In the supplemental investigation, groundwater was encountered in four borings (EB-3, -5, -7 & -8) and in three test pits (TP2-6, -8, & -10). The data indicate that the fault is not serving as a permeability barrier at the depths explored with the test pits, and the volume of water that was encountered was limited to seepage. Typically, the boring and test pit logs in the Engeo report indicate either free moisture on partings or relatively slow seepage. Based on the amount of water encountered on site in the subsurface data points, Engeo concludes that the proposed subdrains are capable of efficiently intercepting groundwater before it can enter the engineered fill, and that the volume of groundwater carried by subdrains will prove to be insignificant relative to the flow regime of the creek.

Regulatory Setting

Town of Moraga Safety Element

With respect to seismic and geologic hazards, that stated goal of the Safety Element is "minimal risk to lives and property due to earthquakes and other geologic hazards." Safety Element policies indicate that at-risk areas require evaluation of geologic hazards and effective mitigation for new development projects. Operative policies that are most applicable to the site are presented below.

PS4.1 Development in Geologic Hazard Area. Prohibit development in geologically hazardous areas, such as slide areas or near known fault lines until appropriate technical evaluation of qualified independent professional geologists, soil engineers and structural engineers is completed to the Town's satisfaction. Allow development only where and to the extent that the geologic hazards have been eliminated, corrected or mitigated to acceptable levels.

PS4.2 Development Review for Geologic Hazards. Require development proposals to address geologic hazards, including but not limited to landslide, surface instability, erosion, shrink-swell (expansiveness), and seismically active faults. Technical reports addressing the geologic hazard of the site shall be prepared by an independent licensed soil engineer, geologist and/or structural engineer, and approved by the Town and at the expense of the developer. All technical reports shall be reviewed by the Town and found to be complete prior to approval of a development plan.

PS4.3 Development Densities in Hazard Areas. Minimize the density of new development in areas prone to seismic and other geologic hazards.

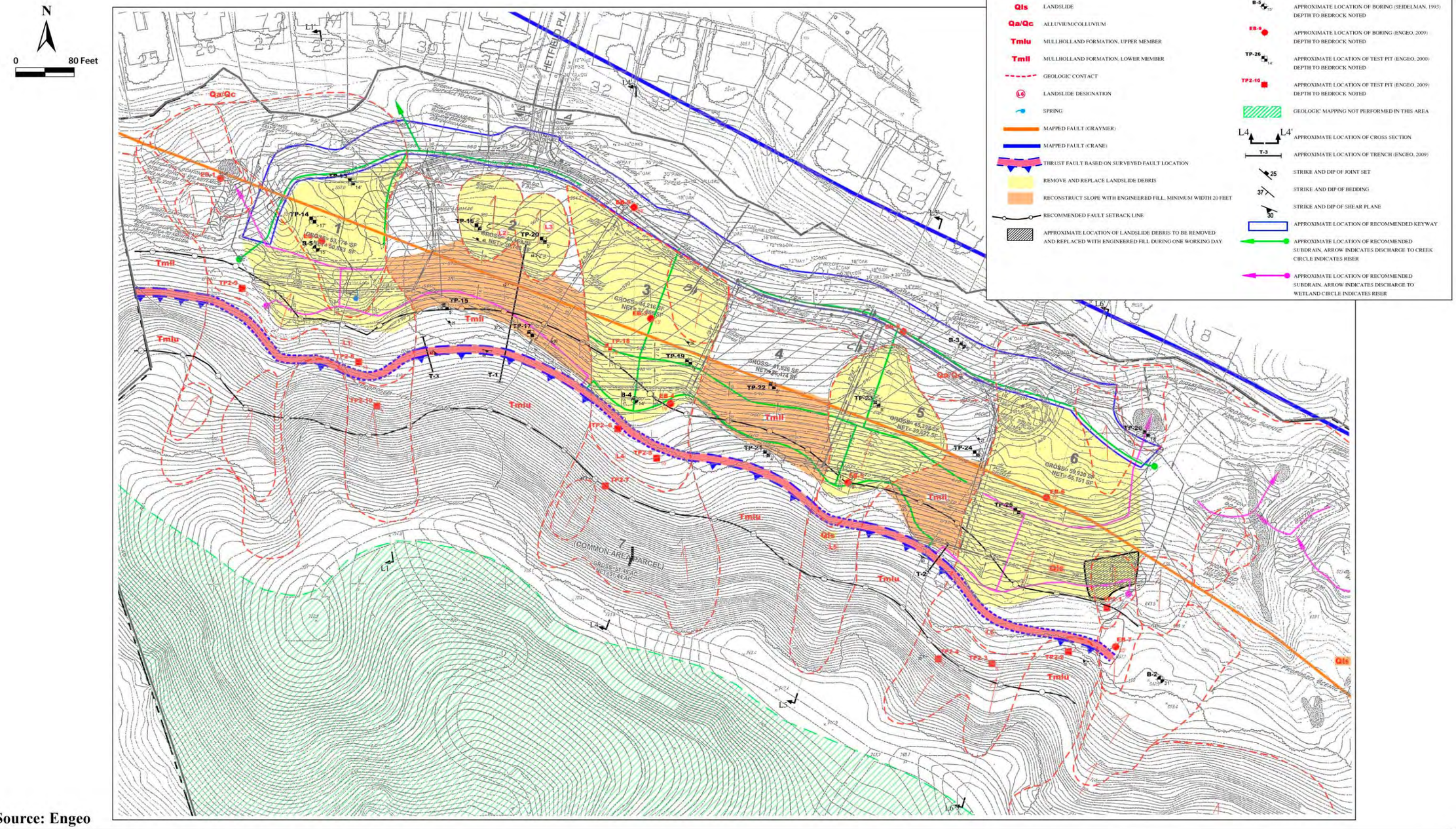
PS4.5 Public Facilities and Utilities in Landslide Areas. Prohibit the financing and construction of public facilities or utilities in potential landslide areas.

PS4.6 Construction Standards. Ensure that all new construction and applicable remodeling/reconstruction project are built to established standards with respect to seismic and geologic safety.

PS4.7 Construction Oversight. Adopt and follow procedures to ensure that the recommendations of the project engineer and the design and mitigating measures incorporated in approved plans are followed through the construction phase.

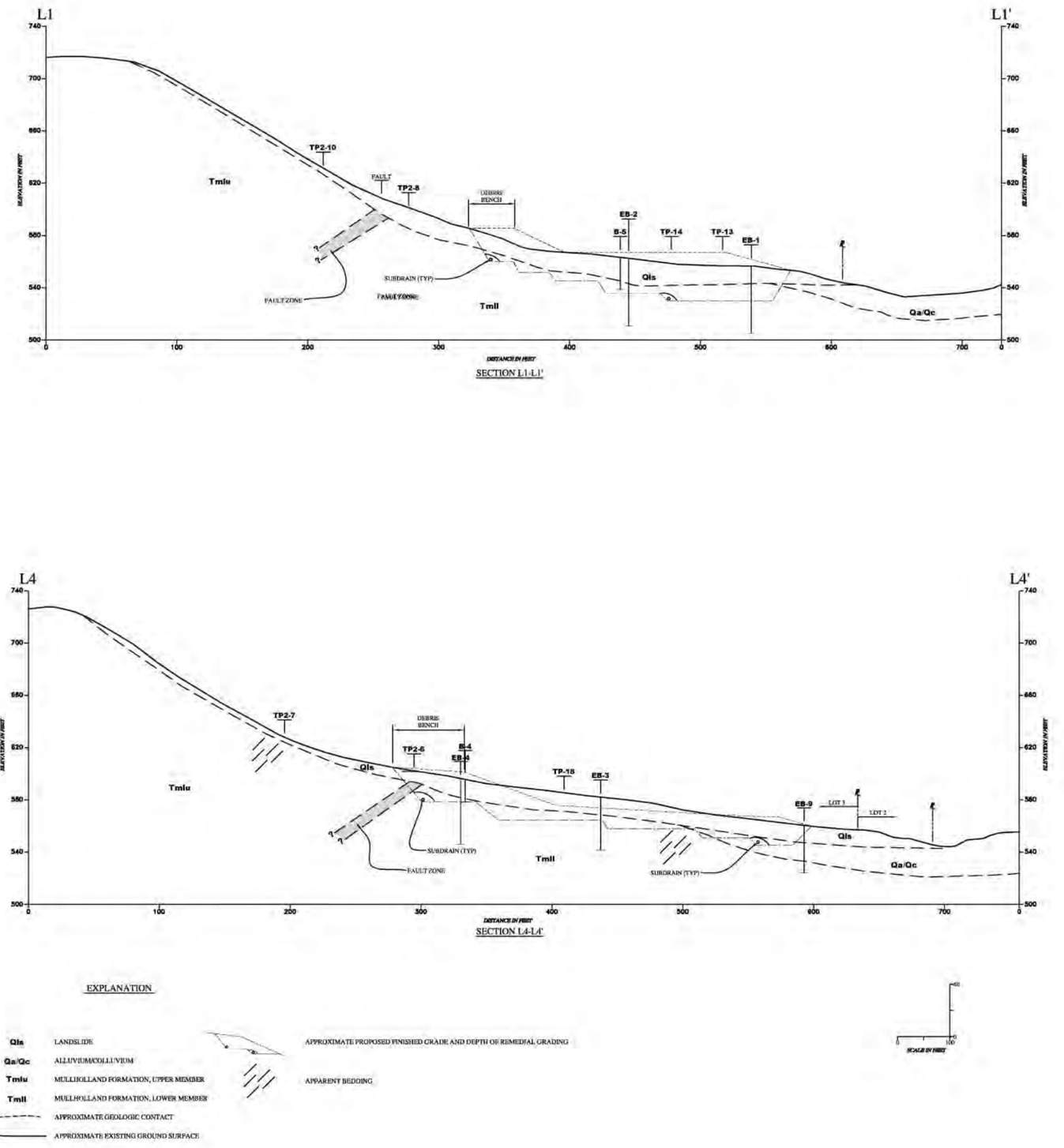
PS4.10 Grading. Grading for any purpose whatsoever may be permitted only in accordance with an approved development plan that is found to be geologically safe and aesthetically consistent with the Town's Guidelines. Land with a predevelopment average slope of 25 percent or greater within the development area shall not be graded except at the specific direction of the Town Council, and only where it can be shown that a minimum amount of grading is proposed in the spirit of, and not incompatible with, the intention and purpose of all other policies of the General Plan. The Town shall develop an average slope limit beyond which grading shall be prohibited unless grading is required for landslide repair or slope stabilization.

PS4.11 Retaining Walls. Discourage the use of retaining walls and other man-made grading features to mitigate geologic hazards, permitting them only when a) required to decrease the possibility of personal injury or property damage, b) designed to blend with the natural terrain and avoid an artificial or structural appearance, c) designed to avoid creating a tunnel effect along roadways and to ensure unrestricted views for vehicular and pedestrian safety, and d) designed to ensure minimal public and/or private maintenance costs.



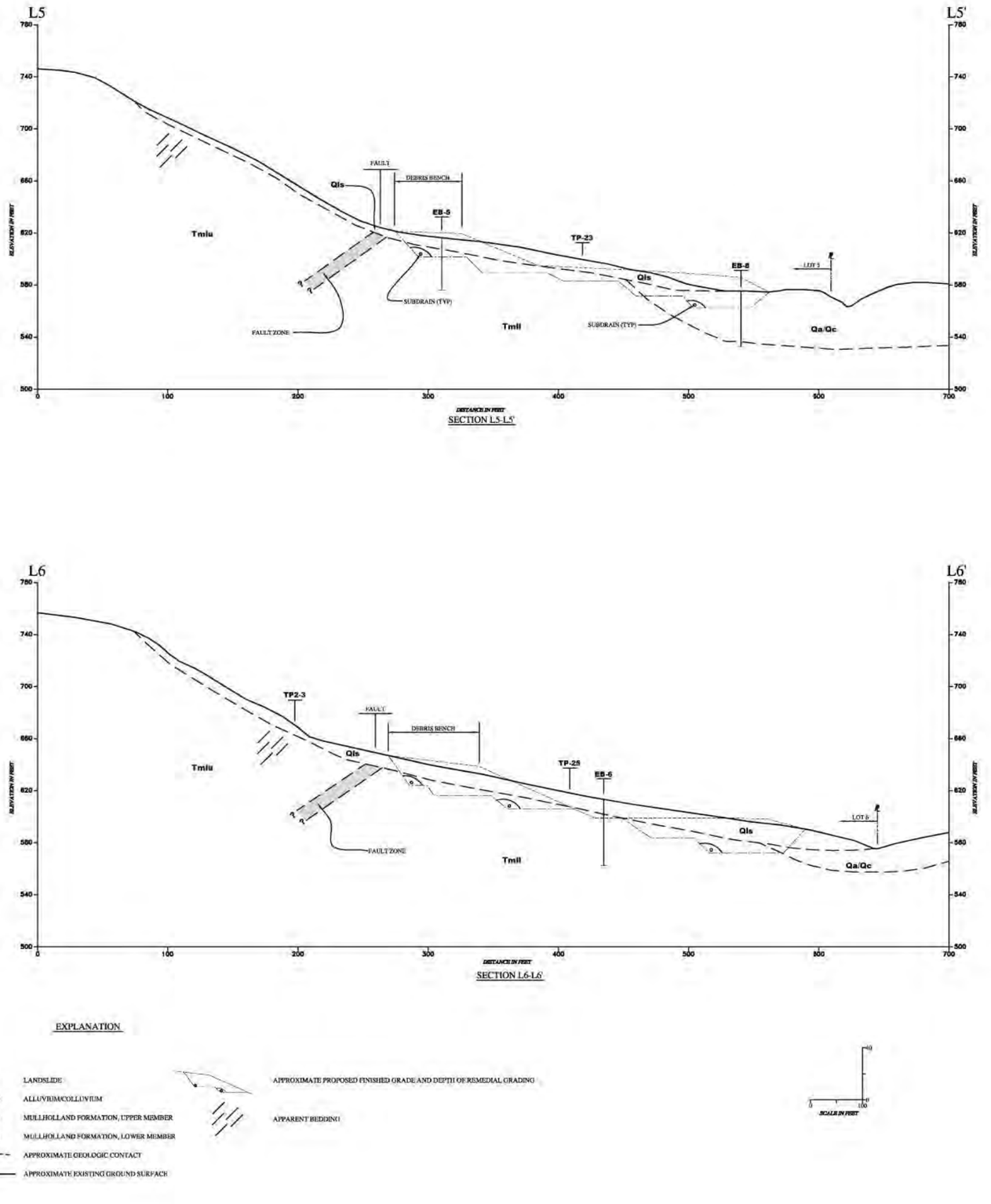
Source: Engeo

Figure 3.2-3 Conceptual Corrective Grading Plan



Source: Engeo

Figure 3.2-4 Geologic Cross Sections L-1 and L-4



Source: Engeo

Figure 3.2-5 Geologic Cross Sections 5and L-6

PS4.12 Maintenance of Hillside Areas. Facilitate successful long-term maintenance of hillside areas held as common open space.

The project would be consistent with the Town's General Plan policies with regard to geology and soils. Through the environmental review process, and in accordance with Policies PS4.1 and PS4.2, geologic studies were conducted on the project site and potential geological impacts that could result from the project have been analyzed and are subject to review and evaluation by the public, Town of Moraga, and other applicable regulatory agencies. In response to Policy PS4.3, the applicant requests approval of a lower density residential project.

With regard to Policy PS4.5, the project description calls for removal of all landslide debris from areas planned for grading and development. Policy PS4.6 pertains to actual construction on the site. The project would require the issuance of a grading permit and building permits. Compliance with the grading and building codes would be expected to keep risks of property damage within generally acceptable limits. Policy PS4.7 pertains to the monitoring of the work performed by the grading/construction contractor. The standard procedures for the Town of Moraga require the project geotechnical engineer to provide observation and testing services during construction, and to issue a "Grading Completion Report" prior to the issuance of residential building permits. Additionally, representatives of the Public Works Department and Town Peer Review Geologist make site visits to observe field procedures and view exposed conditions.

The applicant's civil engineer previously submitted a slope map to the Town indicating that within the areas planned for development and grading, the average slope is less than 25 percent. On that basis, the project appears to comply with the intent of Policy PS4.10. There are no required retaining walls for the project, so there is no conflict with Policy PS4.12. However, a low toe-of-slope retaining wall with associated drainage facilities would likely be desired by future owners (to define the boundary of the rear yard, and to intercept sheetflow runoff from the graded slope before it can flow into the rear yard). Policy PS4.12 seeks to facilitate proper maintenance of common open space. The residential project does not conflict with this policy. The project would create an open space parcel that can serve as visual open space, wildlife habitat watershed, and recreation-related use (trails).

Impacts and Mitigation Measures

CEQA Significance Criteria

California Environmental Quality Act (CEQA) Appendix G identifies environmental issues to be considered when determining whether a project could have significant effects on the environment. As identified in Appendix G and relevant to the proposed project, the following criteria are considered when evaluating the subdivision:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;
  - Strong seismic ground shaking;
  - Seismic-related ground failure, including liquefaction; or
  - Landslides.
- Result in substantial soil erosion or the loss of topsoil.
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on-or off site landslide, lateral spreading, subsidence, liquefaction or collapse.
- 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.

Project Impacts

Slope Stability

IMPACT 3.2-1: Landslides have the potential to cause significant damage to improvements and, in extreme cases, loss of life. This is considered a *potentially significant* impact.

Landslides were mapped in the project area by previous published and unpublished site-specific studies (Nilsen, 1975; Majmundar, 1996; Engeo, 2005). Mapping for these studies indicate landslides are extensive in the lands being considered for residential use. Previous reconnaissance mapping supplemented by limited subsurface exploration (Engeo, 2005) confirmed six landslides within the area proposed for residential development. The 2005 Engeo report concluded that the landslides are primarily slumps and earthflows. Subsurface data in that report indicated that the slide debris consists primarily of surficial materials and severely weathered claystone bedrock. To further evaluate this preliminary interpretation of site conditions, Engeo performed a supplemental investigation (report dated February 5, 2010). That investigation included the logging of seven exploratory borings that were sited within mapped landslides and which extended 30 feet in bedrock; the logging of three trenches that provided information on a bedrock fault that crossed the site, trending northwesterly; and the logging of ten test pits that provided information on the depth to bedrock in the area of the proposed debris benches.

Based on the data gathered during the supplemental investigation, Engeo was better able to characterize site geologic conditions. With regard to landsliding, it is the findings of Engeo's investigation that the slides range up to 20 feet in thickness, have well defined basal slide planes (defined by slickensided clays and a gouge zone). No definitive evidence of landsliding was observed in the claystone bedrock. Furthermore, the investigation found that the segment of the slides that is up-slope of the bedrock fault is relatively thin. Basically,

Engeo concludes that the slides are nested earthflows and slumps, and are considered to be slow moving. Within the development area, slides would be removed/stabilized. The approach to corrective grading is shown in Figure 3.2-3, and cross-sections are presented in Figures 3.2-4 and 3.2-5. These exhibits indicate that all slide debris within areas proposed for grading and development would be removed and replaced with engineered fill. The grading plan for the project indicates that the reconstructed fill slope would have a gradient of 3:1 (horizontal to vertical).

The Supplemental Geotechnical Exploration Report prepared by Engeo is not explicit regarding design details. Those detailed recommendations are not needed for environmental review, but are needed for construction. The Town of Moraga routinely requires the design-level studies as a Condition of Approval.

All of the following mitigation measures are required to reduce the impact of potential landsliding to a less-than-significant level.

□ **MITIGATION MEASURES:**

3.2-1A: A design-level geotechnical and geologic investigation report shall be submitted to the Town of Moraga prior to recordation of the subdivision map. The report, which shall respond to the peer review letter by the Town's Engineering Geologist, shall provide specific criteria and standards to guide site grading, drainage and foundation design.

In areas of proposed development (i.e., cells), existing landslides and slope repairs shall include (a) removal of slide debris, with the depth of excavation extending into underlying competent material; (b) installation of subsurface drainage measures, (c) replacement of slide debris with compacted engineered fill, (d) construction of surface drainage measures, and (e) planting disturbed areas with erosion-resistant vegetation, as recommended in the design-level geotechnical investigation.

3.2-1B: Gradient criteria for engineered slopes as recommended by Engeo shall be required for development of the project site. Any conflicts between future grading plans and these criteria should be interpreted as evidence that special engineering is required (e.g., retaining walls, geogrid reinforcement). Those standards call for use of 3:1 fill slopes as a general standard for the project, with the exception that fill slopes less than 8 feet high may have a 2:1 gradient. Cut slopes are to be avoided.

3.2-1C: Grading and drainage plans shall be subject to review of the Town's Public Works Department and the Town's Peer Review Geologist. Appropriately licensed professionals shall prepare the plans.

3.2-1D: Buttressing, keying and installation of debris benches shall be provided in the transition areas between open space areas and development as recommended in the design-level geotechnical report.

3.2-1E: The design-level geotechnical report shall evaluate all major graded slopes and open space hillsides whose performance could affect planned improvements. The slope stability analysis shall be performed for both static and dynamic conditions using an appropriate pseudo-static coefficient.

3.2-1F: During grading, the project geotechnical engineer shall observe and approve all keyway excavations, removal of fill and landslide materials down to stable bedrock or in-place material, and installation of all subdrains including their connections. Cut slopes and keyways shall be observed and mapped by the project-engineering geologist who will provide any required slope modification recommendations based on the actual geologic conditions encountered during grading. Written approval from the Town's Public Works Department shall be obtained prior to any modification. Placement of all fill shall be observed and tested by the representative of the geotechnical engineer, and the density test results and reports submitted to the Town to be kept on file.

3.2-1G: Prior to recordation of the Final Map, the applicant shall provide a draft deed disclosure recorded against each lot. The disclosure shall provide a detailed citation of the Final Geotechnical Report, indicating that it is available from the developer and from the Town of Moraga; and it shall summarizing the potential geologic hazards and explain the maintenance responsibilities of the property owner, including maintenance of the debris bench and drainage facilities. The language in the draft deed disclosure is subject to review and approval of the Planning Director, and it shall be recorded concurrent with or prior to recordation of the final map.

Fault Rupture

IMPACT 3.2-2: The existing northwest-trending fault that crosses the site could potentially become reactivated in the event of an earthquake. This is considered a *potentially significant* impact**.**

The property is crossed by a northwest-trending fault. Although the California Geological Survey and the U.S. Geological Survey do not consider the fault active, there is an unknown, but potentially significant risk, that the fault could be reactivated. For example, an earthquake on the active Hayward fault could result in minor displacement on subsidiary faults in the vicinity. Additionally, faults can present special foundation problems because they juxtapose rock units with contrasting engineering properties, and a fault can sometimes effect the movement of groundwater.

The following mitigation measure is required to reduce the impact of potential fault rupture to a less-than-significant level.

□ **MITIGATION MEASURE 3.2-2**: A structure setback zone that provides a building free corridor along the mapped fault shall be shown and labeled on the Final Map. The zone shall be 125 feet wide and extend 50 feet from the mapped fault on its northeast flank and 75 feet from the mapped fault on the southwest flank. An annotation of the map shall specify that within the structure setback zone, corrective grading of the landslides is allowed, including the installation of subdrains, debris benches and surface drainage facilities. Additionally, necessary maintenance of these improvements is allowed. Any other use shall require review and approval by the Planning Director.

Erosion and Sedimentation

IMPACT 3.2-3: The proposed project involves placement of engineered fill slopes in an area of moderately steep terrain. Bare soils in area of relatively steep, high graded slopes has the potential to cause significant erosion of unprotected slopes, and create down slope sedimentation problems, both on- and off-site. This is considered a *potentially significant* impact.

There are multiple facets to the subject of erosion and sedimentation. Erosion control requires implementation of measures after major earthmoving activities are completed. Sediment control requires working in a situation where the soil is continually being disturbed.

Erosion control requires use of techniques, which prevent displacement of soil particles by raindrops, moving water or wind. These techniques include erosion control blankets, mulching and establishing vegetation. Sediment control requires the removal of particles suspended in moving water, along with having knowledge of drainage control. Neither of these potential impacts is easily mitigated, and both require an understanding of the limitations of Best Management Practices (BMPs). Erosion and sedimentation are natural geologic processes, which do not conflict with protection of resource values. The problem arises when grading activities result in increased sediment yields that exceed historic conditions. Techniques to reduce sediment from runoff waters include the following:

- restrict the amount of land disturbance;
- keep graded slopes as flat as possible;
- restrict grading to the dry summer season;
- implement BMPs to control erosion and minimize the discharge of sediment into the creek channel.

Since the proposed project would involve significant grading, mitigation measures are required for both: (1) construction-related, short-term erosion and sedimentation; and (2) long-term erosion and sedimentation. With regard to long-term control of sedimentation and protection of water quality, the Town of Moraga requires submittal and approval of a "Stormwater Control Plan." This plan routinely includes technical data and engineering analysis pertaining to hydrology of the site, and provides plans for control of the on-site sources of pollution. The requirements for Stormwater Control Plans are found in the "Stormwater C.3 Guidebook," 4th Edition. A 5th Edition, including new requirements, is expected in summer 2010. Effective implementation of the plan is expected to keep long-term erosion and sedimentation to a practical minimum.

All of the following mitigation measures are required to reduce the impact of potential landsliding to a less-than-significant level.

□ **MITIGATION MEASURES:**

3.2-3A: Grading activities shall be restricted to the summer construction season (15 April through 1 October). Any earthwork done after 1 October shall be limited to activities directly related to erosion control, unless the Town of Moraga Public Works Department authorizes additional work.

3.2-3B: Provide an erosion control plan prior to approval of the grading plan. The following interim control measures shall be employed based on site-specific needs in the project area:

- Grading to minimize areas of exposed, erodible material, and to avoid over-concentration of rapidly flowing runoff in unprotected, erodible areas.
- The erosion control plans shall include water bars, temporary culverts and swales, mulch and jute netting blanks on exposed slopes, hydro seeding, silt fences, and sediment traps/basins.
- Placement of salvaged topsoil on graded 3:1 slopes prior to the onset of winter rains.
- Because the biggest problem with effective sediment control is lack of maintenance, the erosion control plan must have a

comprehensive program for inspection and maintenance during the winter rainy season, including provisions for documenting maintenance activities.

- Wherever feasible, isolate runoff from ungraded areas, thereby simplifying erosion control and sediment control measures within the graded area.
- Monitor the effectiveness of the erosion control measures throughout the duration of construction.

3.2-3C: Provide a "Stormwater Control Plan" that is C.3 compliant, for review and approval of the Moraga Public Works Department. In order to reduce the potential impacts of long-term erosion and sedimentation, the project shall incorporate the appropriate design, construction and continued maintenance of one or more of the following long-term control measures:

- The specific measures shall be based on the recommendations of the project geotechnical engineer and hydrologist.
- Project plans shall incorporate drainage measures to collect and control surface runoff water on sloping lots, including lined ditches and closed downspout collection systems.
- Concentrated runoff shall not be permitted to drain over engineered slopes.
- The proposed location of lined drainage ditches shall be specified on the development plan accompanying the design-level geotechnical investigation report, which shall be reviewed by the Town's Peer Review Geologist.

3.2-3D: Provide low retaining walls with subsurface and surface drainage facilities at the toe of the major fill slopes on the site (at rear of building pads).

Expansive Soils and/or Bedrock

IMPACT 3.2-4: Expansive soils and/or bedrock have the potential to cause significant damage to foundations, slabs and pavements. This is considered a *potentially significant* impact.

Expansive soils (those with a high shrink-swell potential) are described and mapped in the project area by the Soil Survey of Contra Costa County (Welch, 1977), and

confirmed by Engeo, Inc. The Engeo report permits use of expansive native soils as fill, but does not provide specifications and standards for the soils placed to achieve finished grade. Moreover, the occurrence and distribution of expansive bedrock within the building area and its effect on foundation design is not described. Additionally, some soils in the vicinity are known to be corrosive. While those details are not required at this time in the planning process, they will be prior to the issuance of building permits for residences and prior to the installation of subdivision improvements

Both of the following mitigation measures are required to reduce the impact of potential expansive soils to a less-than-significant level.

□ **MITIGATION MEASURES:**

3.2-4A: The design-level geotechnical investigation shall provide criteria for foundation and pavement design, developed in accordance with the 2007 California Building Code and Ordinance Code requirements on the basis of subsurface exploration and laboratory testing. The constraints on the use of expansive soil near finish grade shall be evaluated in the design-level geotechnical investigation report.

3.2-4B: The foundation recommendation shall include provision for measuring corrosivity of soils within area planned for buildings following grading but prior to the issuance of building permits. The ferrous materials and concrete that is in contact with the ground shall be engineered to minimize/ avoid damage from corrosivity.

Grading Plan

IMPACT 3.2-5: Slide debris will be removed from the area planned for grading and development. The corrective grading plan is conservative on the side of safety, but without full-time monitoring by the project geotechnical engineer, grading operations in the field may fall short of the standards and criteria in the approved geotechnical report. This is considered a *potentially significant* impact.

The Corrective Grading Plans for the project is presented in Figure 3.2-3. The grading concept involves removal of slide debris within the portion of the site planned for development, and retaining the steep upper portion of the ridge in an ungraded "scenic easement." A basal keyway cut into bedrock would be constructed in the area of the building sites, subdrains installed, and then placement of engineered fill would commence. The existing creek channel is to be retained. At the rear of the area slated for development, fill slopes with gradients of 3:1 (horizontal to vertical) are indicated, except on Lots 5 and 6. On

Lot 5 the slope transitions from 3:1 to 2½:1, and on Lot 6 the fill slope is to have a gradient of 2½:1. This slope is to have geogrid reinforcement. At the top of the fill slope a debris bench is indicated. The purpose of the bench is to intercept runoff and sediment originating higher on the slope. Additionally, the bench is to serve as a runout area for slide debris originating higher on the slope. The benches will require maintenance over the life of the project (e.g., removal of slide debris and routine maintenance of the ditch).

Note that Lots 1 and 6 have building pads. The remaining lots have gently sloping surfaces (10 percent gradients) to the northwest property line. Runoff from these lots would be intercepted at the northwest property line and conveyed to drainage facilities within the private road easement. In conformance with the grading provisions of the Uniform Building Code (1997), drainage terraces and drainage benches are not required on engineered slopes with gradients of 3:1 or flatter.

The cross-sections, presented in Figure 3.2-4, illustrate the existing topography (solid line), landslide/bedrock contact (dashed line); and approach to corrective grading (which consists of continuous "benching"). The lines-of-section are shown in Figure 3.2-3. These sections indicate the general approach to corrective grading. Each proposed residence is to be constructed on engineered fill (i.e., slide debris replaced with engineered fill). The overall grading concept is to create fill slopes with gradients of 3:1 (horizontal to vertical). Where steeper slopes are required, special engineering such as reinforced earth (geogrid) would be required. Use of 2:1 slope gradients is limited to slopes less than 8 feet high. At the southwest limit of grading, a debris bench is indicated on each section. The bench is a catchment area for shallow slides originating in the upslope area. The future residences would be constructed on engineered fill. The sections indicate the relatively steep slopes that overlook the debris benches would be retained as ungraded open space.

☐ **MITIGATION MEASURE 3.2-5:** Prior to the issuance of the first residential building permit, the applicant shall submit a Grading Completion Report prepared by the project geotechnical engineer. The report shall include the following:

- An as-graded geologic map of all cut slopes and keyways exposed during grading. This map shall not be generalized and diagrammatic; it shall show the details of observed features and conditions, and serve to document that all slide debris was removed from the graded areas.
- Provide the results of compaction of fill, performed using an ASTM compaction test method. The documentation provided shall include reference to the date, location and elevation of the test.
- Document any field changes made during construction (i.e., what unexpected condition was encountered, date; what consultation occurred with the Town's Public Works Department/Town Geologist, date; and what remediation was implemented).

- Describe the conformance of the as-graded project with the recommendations in the approved geotechnical report.

Wetland Mitigation Ponds

IMPACT 3.2-6: Landslides, sedimentation and/or erosion have the potential to cause significant damage to the wetland mitigation ponds. This is considered a *potentially significant impact*.

Landslides are mapped in the area of the proposed wetland mitigation ponds by previous published and unpublished site-specific studies (Nilsen, 1975; Majmundar, 1996; Engeo, 2005). The Vesting Tentative Subdivision Map and associated grading plans indicate corrective grading of landslides is not proposed for the site of the wetland mitigation ponds. Provisions for long-term maintenance of the ponds is not explicit. Such design details are not needed for environmental review, but are needed prior to recordation of the Subdivision Map. One approach to this issue is including language in the GHAD documents assigning maintenance responsibility to the GHAD. The GHAD shall have responsibilities for performing inspections of lands on-site. In the case of subdivision drainage improvements, the GHAD is charged with performing routine maintenance needed to ensure that the facilities function as designed. The Town of Moraga routinely requires that GHAD documents (i.e. Plan of Control; and the Engineer's Report) be submitted for technical review as a Condition of Approval.

The following mitigation measure is required to reduce the impact of potential landsliding, sedimentation and erosion to the wetland mitigation ponds to a less-than-significant level.

☐ **Mitigation Measure 3.2-7**: The GHAD Plan of Control for the proposed project shall make provision for the perpetual maintenance of the wetland mitigation ponds. Specifically, the Plan of Control shall provide the following details:

- frequency of inspections/ timing of inspections,
- outline the design elements of the ponds that are to be inspected by the GHAD Manager (e.g. holding capacity, outfall structure, etc.),
- provide objective criteria for triggering the need for sediment removal or re-construction of ponds,
- indicate the role of a wetlands biologist in any necessary maintenance operations that involve work within the ponds,
- when the GHAD Manager determines the need for maintenance, outline the process to notice the GHAD Board of Directors and resource agencies of the proposed plan for maintenance, and

- provide the agencies a reasonable amount of time to comment on the maintenance plan.

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