Letter 4

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March 7, 2011

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

Re: Hetfield Project; Draft EIR dated January 14, 2011

I am writing to comment on the Hetfield Estates Subdivision Environmental Impact Report prepared by Mills Associates dated January 14, 2011 ("DEIR"). I wanted to bring to the attention of the Moraga Planning Commission, the Moraga Planning Department, and to Moraga's consultant, Mills Associates, that there are a number of significant issues the DEIR fails to resolve, without which I believe the proposed DEIR should not be approved. Some of my primary comments and concerns are listed below.

1. The Geological Investigation Upon Which the DEIR is Based is Incomplete and Defective.

The DEIR states that, after the Town Council hearing that required a Focused EIR, ENGEO "developed a proposed scope of work for a supplemental geotechnical investigation" which 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)" (page 3-11 of the DEIR).

The DEIR goes on to say "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" (DEIR, at page 3-12). This is not what occurred. While we did reach some agreement where some of the bore holes would be placed, both William Cotton and I requested a phased investigation that would lead to more detailed subsurface investigation of slide depths by using 24-inch diameter bore holes (using a 24" bucket auger drill) that could be viewed by all of the parties' consultants, if the smaller diameter drilling did not provide the information necessary to clearly determine the depth of the landslides on the proposed site. A copy of an e-mail on the subject from William Cotton of Cotton Shires to Ray Skinner of ENGEO and to me dated 6 August 2009 is attached to this letter.

Both William Cotton and I disagreed with ENGEO's conclusions that it drew from the core samples. In particular, that because sheared clay and slickensides existed at depths of 30 to 35 feet in landslides #4 and #6 (below the 10 to 15 feet of landslide depth

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identified by Ray Skinner), deep-seated slides could not be ruled out in these locations. Most importantly, the large boreholes (24" bucket auger drills) were never drilled to resolve the disagreement. The disagreements are documented in email correspondences from William Cotton to Ray Skinner on 6 August 2009, and Tim Meltzer and myself on 21 October 2009, each of which are attached to this report. After the core samples were obtained and reviewed, William Cotton and I had informed ENGEO that we did not agree with their conclusions as to the potential depth of the landslides. I thereafter spoke by telephone with Darwin Meyers, a geological consultant to Mills Associates. Mr. Meyers informed me that the developer did not want to spend any additional funds on the drilling investigation.

In addition, there was no opportunity for the homeowners' geotechnical and hydrological consultants to comment on the initial report of new findings by the developer's geotechnical consultant ENGEO. This report was neither reviewed nor made available prior to publishing the DEIR. Hence, there was never an agreement among the consultants about the method and full extent of any detailed approach to evaluating landslide depths. As I understand it, the purpose and intent of the focused geotechnical investigation was to resolve these issues before an EIR can be approved; yet there remain significant concerns regarding the actual depth of the landslide materials.

This renders the DEIR defective because one of the most important aspects of the DEIR, namely, determining the depths of the landslides at the site, remains unresolved. The 24" auger drilling should be required before the proposed DEIR is approved. There are just too many unresolved and significant questions that will directly impact the environmental and cost issues for the DEIR to be approved at this point, including how much soil will have to be trucked out to remove the landslide deposits to the depth of bedrock; the extent and amount of subsurface drainage and accommodating infrastructure if the slides are deeper; the amount of additional soil that will be delivered to the site to make the compacted fill; and the cost of these potential issues.

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2. The Failure to Conduct a Thorough Geological Investigation at the Site Leaves the Safety of the Site at Serious Risk for Construction of a New Housing Development

The bedrock beneath the landslide debris is described as having some sheared and crushed characteristics (DEIR, pg 3-18). Indeed, there was disagreement between the consultants in interpretation as to whether this was bedrock or more landslide debris. If indeed it is bedrock, then should it be considered sufficiently stable and have the desired engineering properties to support a massive fill and housing development? This raises numerous safety and potential liability concerns. The geology should be investigated more deeply, using the 24-inch auger drill as Bill Cotton and I advised ENGEO at the outset. Failing to conduct a thorough geological investigation, as it appeared the Moraga Town Council was seeking, could lead to irreparable environmental damage, increased safety risks, and potentially huge unexpected engineering costs.

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3. The Activity Status of the Fault should be Rated to Determine Future Risks

ENGEO has documented that the fault trace can be followed into overlaying soils and that highly sheared bedrock exists downslope of the trace, under the proposed development, yet the activity status has not been evaluated or reported to establish the future risks of seismic triggering of new landslides within the weakened bedrock that will be left in place between engineered fill. Although current published geologic maps do not show the fault as active, these earlier interpretations were not based upon field investigation as conducted recently by ENGEO. Now that trenches have been excavated across the trace of the fault, ENGEO determined "that the fault could be traced in the trench wall to the surface soils, where the dip angle flattened appreciably (probably due to soil creep)" (DEIR, P. 3-17). Since there is clear evidence that the trace of the fault extends into the surface soils, does this have implications on what the activity status would be? The DEIR does not provide a new evaluation of the potential for movement and, therefore, concern exists that if the structurally weak bedrock is not removed and if there was a seismic event along the fault, there could be new landsliding along the fault in the "weak bedrock zones" posing risk to human life and property. Recall that many of the slides that need to be removed occur in proximity to the fault trace and the initial causes and interrelationship of the fault zone and landsliding is never discussed in the DEIR.

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4. A Significant Portion of Grading and Drain System is Located within the Setback Zone of the Fault.

There is a significant portion of grading and drain system located within the setback zone of the fault, yet the activity status has not been established. Could fault creep potentially damage the subdrain especially for that portion that is practically sitting on the trace as in Figure 3.2-4, Cross Section L-4? Could repair and maintenance be extremely costly, especially if the subdrain needs to be excavated because of breakage? How will the subdrain system be monitored to ensure that it does not develop cracks and leakage? If these costs are not accounted for, the project could be far more costly to the future landowners than initial estimates.

If the 50-foot setback zone is supposed to provide scenic open space, what will be the actual percentage of graded and artificial looking landscape within the zone and will it really provide the appropriate aesthetic intended for remaining open space in Moraga?

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5. There are a Number of Unanswered Questions that Could Lead to Higher Costs than Anticipated

On page 3-36 of the DEIR, it is stated in the Grading Plan that slide debris will be removed from the area planned for grading and development. How much slide material is there that will have to be removed and how much truck traffic will be created? How

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much non-slide debris but expansive soil will there be available to be re-compacted and used for fill? Will soil need to be brought into the site to provide enough materials for the filled buttresses, keyways and to create compacted fill? If so, how much will truck traffic increase as a result of bringing in the needed fill material? What are the projected effects on Sanders Drive, the main street leading to the development site, and how can this be accurately determined until we know the actual depth of the landslides and calculate the quantity of landslide material that will need to be recompacted? These are significant unanswered questions. As long as they remain unanswered and a range of potential costs is not provided, the Planning Commission and other local governmental bodies should be concerned about the potential adverse effects on the environment and adjacent taxpaying citizens in the Town of Moraga that will be influenced by project construction. Answers to these questions and a range of costs can be provided by performing the necessary geotechnical investigation that seems to have been required as part of the Town Council's resolution requiring a Focused EIR (see page 1-1 of the DEIR).

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6. The DEIR Does Not Address Previous Concerns About Future Channel Adjustments that Could Increase Channel Erosion and Sediment Supply in Downstream Larch Creek by Increasing the Frequency of Moderate Flows that Emanate from the Project Drainage System

On page 3-59, the DEIR indicates that sustained discharges of large volumes of water "would continue until the detention basin is empty." However, even though the peak flow is attenuated, this would cause the waning limb of the hydrograph to be extended, thereby sustaining moderately high flows over a longer period than that which would occur naturally. Comments from the previous letter-report of L. Collins and William Cotton, dated 27 February 2009, which were submitted to the Moraga Planning Commission at that time, about potential downstream erosion from sustained higher flows still apply, and have not been addressed in the EIR. As we stated in that letter-report (at page 6), which is attached:

> "The potential influences of both reduced base flow (that can dry up the creek sooner) and extended moderate flows (that have the capability of increasing the length of time that erosive forces are working on the channel bed and banks) needs to be determined."

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On page 3-54 & 3-55, the DEIR states "Cleaner water in the creek would tend to pick up solids to replace the base load of the creek flow as turbulence in the creek decreases following a storm. This would return the creek to the sediment carrying capacity that existed before the water in the creek cleared up." The net effect of this is further erosion of the channel beyond what would occur without the proposed development, and then subsequent unintended sediment deposition somewhere else downstream, which is not in accordance with PS5.5-Streambank Erosion and Flooding Potential and OS3.4 Water Course Capacity (page 3-43 of the DEIR). If the DEIR considers that more channel capacity would be beneficial downstream of Larch Creek, then channel restoration should be planned for rather than allowing haphazard channel erosion to occur that could cause

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damages to private properties and/or siltation to downstream locations. I do not see an analysis in the DEIR that discusses what was the original "sediment carrying capacity of the creek that existed before the channel cleared up," so how can this really be evaluated?

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The discussions and photographs concerning vegetative growth in Larch Creek downstream of the project area are misleading with regard to the influence of vegetation on channel capacity. The photographs show annual vegetation and overhanging vegetation on concrete wall, which during winter season, do not sufficiently interfere with channel capacity. In addition, if there has been any increase in channel capacity to carry the 100-yr flow, it is most likely that increases in discharge from urban runoff has caused it, rather than a loss in the capacity by vegetation as inferred by the DEIR. The DEIR states that the "Hetfield Estates applicant is not responsible for maintaining Larch Creek free of weeds and silt that reduces hydraulic capacity downstream of (sic) project site" (page 3-42), yet they *are* responsible for keeping sediment on site at the project to prevent downstream sedimentation and to prevent an increase in flows that would cause erosion, and channel adjustments downstream of the project to increase natural carrying capacity (See OS2.3-Natural Carrying Capacity, page 3-43). This represents significant environmental impacts and potential property concerns that have not been mitigated. As such, the DEIR should be rejected unless and until these concerns are satisfactorily mitigated.

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7. The DEIR Does Not Sufficiently Address Impacts on Larch Creek Downstream of the Upstream Wetland Mitigation Pond

The channel between the upstream wetland mitigation pond and the discharge outlet for the subdrain and storm drain system might dry out because of reduced base flow (See DEIR, p. 3-57). At present, this section of channel never completely dries out according to some of the local homeowners. The DEIR does not address this impact nor does it state what the effects would be if the 8-Lot Subdivision on Reduced Acreage is approved—thus eliminating all of lots 1 and 6, and part of lot 5, (See Figure 5.1 page 5-3 & 5-4). Why is this not considered a significant impact on aquatic and riparian habitat? The DEIR does not state how long the impacted stretch of channel would be, nor does it address the potential negative impacts on adjacent riparian vegetation, or species dependent upon aquatic habitat. It is stated on page 3-58 of the DEIR that the same amount of runoff would reach Larch Creek, yet this is only relative to downstream of the project site and not true for the potentially dried out reach of the project site.

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The DEIR is misleading on page 3-58 where it states, "Clay soils at the project site allow very little percolation when saturated, so replacing these soils with impervious surfaces would have a smaller effect on the post-development runoff hydrograph for smaller recurrence-interval storms than for a development on sandier soils." Clay soils provide base flow to streams slowly because they can become saturated, often extending base flow into the dry season, as opposed to sandy soils that rapidly release base flow following saturation. Impervious surfaces do not provide base flow because they cannot become saturated. There is no similar comparison of clay soils to impervious surfaces.

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Statements in the DEIR tend to confuse rather than clarify these kinds of issues, which renders making sound planning decisions more difficult, and leaves open potential significant environmental effects from the proposed project. 4-10

8. Extensive Grading in the Open Space Area is not in Accordance with Moraga Regulatory Ordinances

The DEIR states the requirements of PS4.11[a] on page 3-22: "Discourage the use of . . . man-made grading features to mitigate geologic hazards, permitting them only when . . . b) designed to blend with the natural terrain and avoid an artificial structural appearance . . ." Map 3-3.1 of the DEIR (pgs. 3-45 & 3-46) shows that the grading plan does not satisfy the requirements of PS4.11(b). Two major graded fill slopes will be exposed along the entire length of the project. They do not reflect the natural variability of the topography as required. Similarly, the large, nearly flat bench that spans the width of the development portion of the project does not reflect any kind of natural topography found in Moraga. The project shows a large constructed bench above the natural valley. Furthermore, there are several excavated sites that extend into the setback area along the fault zone that will also have constructed benches that do not represent any natural topography found in the vicinity. The landscape will look like a very large and obvious, Southern California-style bench construction that does not blend with the natural form of the terrain. 4-11

9. Private Costs Might Not Be Minimized, Which is Not in Accordance with Moraga Regulatory Ordinances

On page 3-22 of the DEIR, PS4.11(d) states, "Discourage the use of . . . man-made grading features to mitigate geologic hazards, permitting them only when . . . d) designed to ensure minimal public and/or private maintenance costs." The project requires inspection and maintenance costs on an annual basis for the subdrain and surface drain system. The costs are not estimated and could be significant to both private and public entities to address potential problems and assure compliance. In addition, a GHAD is required that seems to be separate from the storm drain monitoring requirement. This includes maintaining grading and drain features within the setback zone adjacent to the fault. There is no estimate of potential costs to either public or private entities or what the kinds of problems and range of costs might be that the GHAD would have to deal with. 4-12

By the very nature of this proposed project, a site with all of the hazard characteristics present (landslides, fault, and expansive soils) is inherently designed to accrue costs rather than prevent them. For example, landslides upslope of the setback zone on the uphill side of the fault are not stabilized and could therefore transport slide debris onto the debris benches and v-ditches. The potential range of cost for hauling sediment away, repairing the v-ditches, and unclogging any drain system could become significant, especially if there is not sufficient access to do them. In the existing plans, there does not appear to be an access road to clear debris benches. If a future access road is needed, it 4-13

will further degrade the integrity of the natural remaining open space that is required in PS4.11(d). In addition, it is stated in the DEIR that there is the potential that the fault could become reactivated (pgs. 3-32 & 3-33). If this occurred, the costs of fixing the subdrains and debris benches could be exorbitant. 4-13

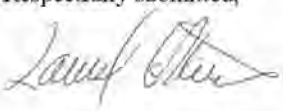
Note that Figure 3.2-3 (DEIR, pgs. 3-23 & 3-24) does not show any color designation for all the grading that extends up to the fault trace above Lot 4 on its southwest uphill corner. 4-14

10. Cumulative Impacts are Not Realistically Assessed

The DEIR states that the individual and cumulative impacts of the proposed project can be mitigated to a level of insignificance. The system of evaluation is inherently flawed to truly accept that there are no cumulative impacts to disturbing, removing, and fragmenting yet another remnant of existing natural landscape. 4-15

Due to the significant issues raised above, the application for approval of the draft Environmental Impact Report should be denied.

Respectfully submitted,



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February 27, 2009

Moraga Planning Commission
323 Rheem Blvd.
Moraga, Ca. 94556

Re: Hetfield Estates; Scope for Focused EIR

Dear Planning Commission Members,

We understand from the Moraga Town Council's Resolution, following the January 14 hearing that a Focused EIR needs to be prepared for the proposed Hetfield Estates project. We have completed a geotechnical review of the Hetfield Estates Subdivision Initial Study and Proposed Mitigated Negative Declaration dated September 30, 2008, and have outlined below some of the significant issues and technical concerns to be analyzed and resolved as part of the Focused EIR.

INTRODUCTION

The proposed Hetfield Estates project is constrained by several geotechnical hazards that have varying levels of risk to the project. The potential hazards have been described as "red flags" in the Mitigated Negative Declaration document (MND) and include: landslides, expansive soils and bedrock, erosion and sedimentation, shallow groundwater, and strong seismic ground shaking. These hazards have been recognized by Engeo Inc., the project geotechnical consultants. Their report, dated September 26, 2005, provides a preliminary assessment of the geologic and seismic hazards of the project and recommends additional and more detailed investigations prior to the Town's approval of the Subdivision Map. The geotechnical peer review consultants for the Town, California Engineering & Geology (CEG), have issued a report dated January 30, 2006, outlining their concerns with the site hazards and some issues with the proposed grading concept. It is our understanding from the MND that a much more extensive "design-level geotechnical investigation" will be undertaken prior to the recordation of the Subdivision Map. The design-level investigation

will specifically address the recognized site hazards as well as the peer review concerns raised by CGE. Those matters should be addressed now as part of the Focused EIR.

RECOMMENDED ACTION

Although some of the geotechnical hazards have been identified by Engeo's preliminary work and CGE has provided sound review recommendations, we expect that both Engeo and CGE clearly recognize that more site work must be completed to sufficiently characterize the geotechnical hazards, hydrology, and groundwater issues to reduce the level of risk to the project. Once this is accomplished, the more specific and focused investigation should provide a well-founded assessment of the amount and extent of excavation, grading, and drainage needed at the site. Without this, reliable mitigation efforts cannot be offered and environmental impacts cannot be properly assessed or mitigated.

The list and explanations that follow below are provided for the Town's review and consideration of the geotechnical concerns at the proposed project site. We recommend that our concerns be provided to the Town's peer review consultant, CEG, and to the project geotechnical consultant, Engeo, Inc.

1. LANDSLIDES AND SLOPE INSTABILITY -- The geologic hazard that constrains the use of the Hetfield Estates property as a residential development is the unknown level of risk imposed by landsliding and slope instability. Engeo has identified six landslide areas (L1-L6) and has stated that 100% of the area proposed for development is underlain by landslides. The depth of landsliding is estimated to be "as much as 40 feet thick". The landslide types include earth slumps and earth flows and therefore are considered to have a complex mechanism of movement. In addition, the natural hillside region located upslope of the proposed residential area has been identified as a potential source of "runoff", "sediment", "debris slides", "debris flows", and "landslide". To reduce the risk, Engeo has proposed that all of the landslide material in the six landslide areas be "over-excavated" and replaced with engineered fill and a subsurface drainage system and that "debris benches" be constructed upslope of the future homes to intercept water, sediment, and slide debris and prevent it from reaching the homes.

   The details of the final designs for the landslide mitigation and the debris benches can only be developed after the design-level geotechnical investigation. It will be critical to determine with sufficient accuracy the depth of the landslides that will be removed and replaced. Without knowing the true depth of the landslides it is not possible to provide a well-constrained estimate of the volume of landslide material that needs to be excavated. Without a close approximation of the landslide volumes, the true cost and environmental impact of the project cannot be adequately assessed. Therefore, it is vital that the depth of these six landslides be determined with sufficient accuracy.

We recommend that the investigation of the deep-seated landslides include a detailed subsurface investigation using bucket-auger (i.e. large-diameter / 24"- 30") drilling equipment or a continuous core drilling operation. Conventional, small diameter "soils" borings do not provide the continuous detail observation afforded by bucket-auger or continuous core drilling that is vital to defining the slip surface of large landslides. It is common to place 3 to 4 boreholes in each landslide in order to properly define the depth and shape of the basal slip surface. The use of either bucket-auger or continuous core drilling is a standard practice in landslide investigations.

Since the landslide maps provided in the MND indicate that the landslides extend from the bottom of the slope to nearly the ridgeline, well beyond the project boundary, the full character of the slides uphill yet outside of the project boundary must be investigated. This must involve determining the depth and mechanism of sliding (rotational or translational) to establish which kind of repair or mitigation design would be required to reduce risk to downhill residences.

2. DEBRIS BENCHES -- The Conceptual Development Plan defines five "debris benches" that are planned to be constructed at the top of the 3:1 fill slope that are proposed to be built be built above the homes. The debris benches are located between 20 to 30 feet above the home sites and the natural hillside extends upslope approximately 100 to 120 feet above the debris benches. The stated purpose of the benches is to intercept runoff and sediment originating higher on the slope and help protect the homes below. There is considerable confusion in the MND document regarding the type of material that will issue from the hillside and be deposited on the debris benches. The list of materials include: runoff (surface water), sediment, slide debris, landslide, and debris flow. The discussion describes the debris benches as "debris catchment areas" for "debris flows" (CGE) and as a "run-out area" for "slide debris" (MND). There is a fundamental difference in sediment, landslide, and debris flow material that should be better defined by the project consultants. In addition, since the mechanism of movement has not been sufficiently characterized, and if the slides extending through and above the project boundary are deep-seated rotational slides, placing debris benches on top of the slides uphill of the project boundary line will not protect downhill properties unless the slides are fully excavated or sufficiently drained. If they need to be excavated, the extent of environmental disturbance beyond the boundary shown in the Conceptual Plan will be significantly greater than indicated.

   We recommend that the geotechnical hazard associated with surface water flow and earth materials (i.e. sediment, slide debris, etc.,) originating from the natural hillside above the proposed home sites be further investigated. There is a concern expressed by CEG that debris flow hazards have not yet been sufficiently addressed. If landslides upslope of

the project boundary are debris flows that have translational movement, they can be extremely hazardous and often result in considerable property damage, personal injury and death to downslope structures and their inhabitants. It is clear that the debris benches are not designed to be catchment basins that could trap and hold water and debris flow material. Engeo should reevaluate the potential for debris flows to initiate on the hillside above the development and estimate the level of risk to the proposed homes. If debris flows are found to be a potential hazard then the design of the debris benches should consider the use of true catchment basins (instead of benches). If debris flows are found to be a potential hazard, then a "design debris flow event" should be estimated and used for determining the necessary size of the catchment basin. If such basins are needed, the extent of environmental disturbance and excavation will be different from that indicated in the Conceptual Plan.

3. IN-CONSTRUCTION GEOLOGIC INSPECTION -- Both Engeo and the City's peer review consultant recognize the critical need to have close geotechnical inspection during the geotechnical investigation, and during landslide stabilization and grading efforts should the project reach the actual development stage. There is some confusion in the MND document regarding the choice of the geotechnical professional that will be responsible for the field inspection, mapping, and documenting the field conditions. Both the project engineering geologist and the geotechnical engineer should be involved. The engineering geologists should be responsible for mapping the landslide keyways, buttresses, and back cuts, identifying the base of the landslides, and the character of the underlying bedrock. The geotechnical engineer should be responsible for the placement and construction of all engineered fills, soil testing, and engineering analysis. Both professionals should be responsible for the production of the final as-built report.

4. FAULT STRUCTURE AND POTENTIAL GROUNDWATER PROBLEMS -- As previously discussed in the January 2009 Watershed Sciences' Technical Memo, the MND did not show the northwest trending fault that runs through all the lots at the proposed project site. The fault trace is indicated on recent geologic maps, such as USGS' Scientific Investigations Map 2918, Contra Costa Quadrangle of the Geologic Map of the San Francisco Bay Region, by Map, R.W. Graymer, B.C. Moring, G.J. Suacedo, C.M. Wenrtworth, E.E. Brabb, and K.L. Knudson, 2006. An adequate geotechnical investigation should start with a site map conveying all geologic features that affect the site, such as the fault and bedrock structure. Sufficient subsurface exploration should be designed to answer design–level questions about what controls the landsliding and distribution of groundwater. For the subsurface investigation, an array of boreholes (above and below the fault or trenches intercepting the fault plane beneath the landslides) must be placed, not only to characterize the depth of slides, but also to define the potential fault/groundwater influences at the site. Careful note of groundwater levels and landslide slip surfaces in all the borings must be taken to design the subdrain

system that might be needed in the landside repair scheme upslope of the six lots. The tasks that should be done during the design-level study should answer questions about whether the fault influences groundwater flow, and if so, how? For example, does the fault create a groundwater barrier, or is there a significant amount of groundwater traveling transversely along the fault from beyond the project limits? If groundwater flow is under artesian pressure, how might it influence slope stability at the southeast buttress boundary, near the proposed location of the wetland mitigation ponds)?

In addition to these groundwater related questions, the risk of hillslope instability along the fault at the project site, even though it is not defined as active, must be assessed in the event of strong or violent seismic shaking from a nearby active fault. It was noted in the test pits dug by ENGEO that there were many slickensided, sheared, and weak conditions below the identified slide deposits. This might indicate that the fault has created very weak bedrock conditions and hence, explain the occurrence of landslides that might be associated with seismic triggering in expansive, mechanically weakened bedrock that lacks surface drainage.

5. PLACEMENT OF MITIGATION PONDS ON ACTIVE LANDSLIDE --The Conceptual Plan shows that six wetland mitigation ponds are to be placed along the southwest side of the proposed project, near lot 6. The ponds are shown to be excavated about 10 feet within the boundary of mapped landslides. The landslides in this area exhibit evidence of relatively recent activity and high creep rates. Buttress fills and other stabilization efforts have not been proposed for this area, which raises serious concern that adding surface water to the toe of the slide area will have the potential for further destabilization of the hillside and creating risk to downstream properties. If mitigation ponds are to be placed in this area, subsurface geotechnical investigation (as discussed above) and a design-plan for stabilization must be conducted on the hillside southeast of the proposed project. This is needed to establish the appropriate level of protection necessary and to define the extent of environmental disturbance (grading, excavation, drainage) that will be needed beyond the existing proposed project limits.

6. GROUND WATER DRAINAGE AND POTENTIAL INFLUENCES ON THE HYDROLOGY OF LARCH CREEK -- The impacts of the project to the hydrology of Larch Creek have not been appropriately assessed when it is unknown how much additional runoff will be added to Larch Creek from the surface and subsurface drainage requirements needed to stabilize and reduce hazards at the site. To properly size the subdrains and drain the buttress fill, an estimate is needed of how much water will be drained from the landslides uphill of the project, from the project site (both surface and subsurface), and from the fault (groundwater potentially traveling transversely along the southeastern fault trace or artesian water below the buttress fill). The size of the proposed mitigation ponds needs to be based

upon this information. The potential influences of both reduced base flow (that can dry up the creek sooner) and extended moderate flows (that have the capability of increasing the length of time that erosive forces are working on the channel bed and banks) needs to be determined. Without sufficient information on how the altered hydrology will effect water and sediment transport, it is not possible to evaluate the potential downstream environmental impacts on channel stability, flood conveyance, and aquatic habitat of Larch Creek.

William R Cotton
Chief Engineering Geologist, CEG 882
Cotton, Shires & Associates, Inc.

Laurel Collins
Director/Geomorphologist
Watershed Sciences

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From: Bill Cotton
Sent: Thursday, August 06, 2009 10:25 AM
To: Ray Skinner
Cc: Laurel Collins
Subject: Proposed Work

Hi Ray,
Your proposal appears to reflect the work tasks that we discussed during our site visit.

Here are my concerns and comments with the proposed subsurface program:

GEOLOGIC MODEL - As you know, I do not necessarily agree that the base of landsliding is at the soil-bedrock contact. I don't believe that the larger landslides are soil failures. While I recognize that that is your working hypothesis at this time I would recommend that you also consider another model of sliding entirely within bedrock. The landslide geomorphology strongly suggests that deeper sections of the bedrock are involved in Landslides #1, #4 & #5. You should be open to both models, and possibly others, when you plan your drilling program. I always feel uncomfortable when a geologist goes into the field "knowing" what he is going to find. That is why this phase of your field work is called "exploration".

EXPERIENCED GEOLOGIST & DRILLING METHODS - You have agreed that you or one of your more experienced geologists will be conducting the subsurface work. It is important that the subsurface data be analyzed during the drilling operation so that changes can be made in the type of drilling (core drilling, bucket-auger, etc). I am going to assume that you will have working-drawings of geologic cross sections through the landslides at the site that they will be used to guide the drilling operation. And that these sections will be updated as the drilling progresses. To me this is the only way that your drilling operation can be an efficient and cost effective program. This can only be done by having experienced geologists on site and in charge of the drilling program.
You have indicated that if core recovery is "poor" you will change to a better drilling technique. I am assuming the "poor" recovery is less than 90-95%. This is especially true within the suspected "target intervals" near the base of landsliding. I would again strongly recommend that you use large-diameter bucket-auger drilling and downhole logging in the larger landslide deposits (Landslide #1, #4, & #5). There is absolutely no other way to provide a better method of viewing the subsurface conditions than downhole logging of the underlying geology. It's 100% exposed!

TEST PITS AND TRENCH - I would recommend that the test pits and the fault trench be done as the first phase of the subsurface work. This would provide a better understanding of the shallow geologic nature of the site and would provide a better basis for the more costly drilling phase of work.
This information may even allow you to refine better the locations and depths for the presently proposed drilling sites. It seems to me that you might have a problem with your fault trench being only 6-8 feet

deep because the soil cover may be considerably thick in the area of the proposed trench.
You will have to have a contingency plan to deepen the trench if an unreasonably thick soil cover is encountered.

SAFETY CONCERNS - Regarding safety measures in your trenching and test pit program I am assuming that all open excavations in excess of 5 feet deep will be properly shored according to OCHA standards. In addition I would check with Mitch Wolfe to determine what additional safety measures might be required by the City.

NOTIFICATION TO INTERESTED PARTIES - I appreciate your efforts to keep all interested parties informed of your proposed subsurface program. The past field meeting was a well done and productive event. I assume that we will continue to be kept updated as you undertake the subsurface work. I would appreciate it if you could give Laurel Collins and me plenty of advance notice before any drilling or subsurface work is performed so we can have one or more representatives present as it proceeds.

Thank you for the opportunity to review your work proposal.

Sincerely,

William R Cotton
CEG 882
COTTON, SHIRES & ASSOCIATES, INC.

cc: Laurel Collins

From: Bill Cotton <bcottonsr@earthlink.net>
Date: October 21, 2009 8:54:46 PM PDT
To: Tim Meltzer <tmeltzer224@comcast.net>
Cc: Laurel Collins <collins@lmi.net>
Subject: ENGEO DRILLING PROGRAM

Hi Tim,

I had a chance to visit the Engeo's lab and inspect the soil/rock cores. They had drilled 9 core holes (EB-1 to EB-9) in the major landslide areas. They have identified six landslides (L1 to L6) and the borings were placed in these landslides to determine the depth of landsliding. I met Ray Skinner at the lab and had a chance to inspect cores from EB-3 and EB-4 from Landslide #4 and EB-6 from Landslide #6. I did not review the other cores because of time constraints and because the cores that I did look at provided sufficient evidence to question Engeo's interpretation.

Ray believes that landsliding is limited to shallow depths of 10 to 15 feet and to be confined to the subsurface contact of the in place bedrock and the soil-like material that overlies the bedrock. I found highly sheared clay intervals in all three cores at deeper depths of 30 to 35 feet. As a consequence, I told Ray that we could not rule out a deeper basal slide surface for Landslide # 4 and Landslide # 6 and I recommended that he consider a new work plan with large-diameter drilling. This drilling method will allow geologists to enter the boreholes and down-hole inspect the critical zones and log their physical characteristics. He said that he did not agree with me and considered the shear zones to be fault/fold related features. He is planning to talk with his client and will let me know the outcome.

Regarding the fault trench. Ted Sayre from my office inspected the trench and the test pits and found that Engeo's logging to be good. A fault was encountered and logged in the south end (uphill) of the trench between the sandstone that makes up the steep hillside and claystone that forms the lower gently sloping terrain. The fault dips 40 - 45 degrees to the south or into the slope. The claystone bedrock showed a consistent dip also into the slope. It is Engeo's conclusion that the fault is located out to the areas designated for development and therefore does not pose a hazard to the proposed residential sites. I concur with these findings.

Laurel had a chance to review the cores and she is in agreement with much of what I have concluded. She has more concerns about the faulting issue then I do. My take is that the landslide issues are far more important hazards for hillside development than fault-related hazards. The chance of landslide damage to the proposed development is far greater than ground rupture damage especially a fault that is outside of the planned residential foot prints.

That's it for now. I'll wait to hear from Ray after he meets with his client. Bill Cotton

LETTER
4
RESPONSE

Laurel Collins
Watershed Sciences
March 7, 2011

4-1 **Comment:** States there was disagreement regarding the diameter and depth of the holes drilled during the supplemental geologic investigation, and therefore, the geological investigation is incomplete and defective.

Response: Prior to finalizing the exploration program, Engeo held a field meeting at the site with William Cotton, Darwin Myers, and Mitch Wolfe. Prior to the meeting, Engeo set out wooden stakes at the location of the proposed boreholes and test pits, as well as at the location of the proposed exploratory trench to evaluate the bedrock fault shown on published geologic maps. Based on the recommendations of the various parties present, some stakes were moved and additional stakes were added. (Use of stakes was intended to guide field personnel when the exploration program was implemented in the field.)

The plan for the borings was to use a dry hole coring method, and to extend each boring 25 feet into the bedrock. At the field meeting, William Cotton expressed a preference for large diameter borings that allow the geologist to enter the borehole and make observations of features exposed on the wall of the boring. Engeo indicated that the proposed continuous coring would be considered successful only if a very high percentage of core was recovered. If the coring proved to be unsuccessful, Engeo agreed to pursue down-hole logging. It should be recognized that every exploration method has limitations and in the case of large diameter holes, groundwater can be a severe problem (i.e., controlling water levels in the boring and the sloughing into the hole that accompanies heavy seepage can adversely affect safety and limit the amount of time to make detailed observations). In this case, Laurel Collins had expressed concerns about the possibility of considerable groundwater within the slide or the effect of the fault in serving as control on the distribution of groundwater in the subsurface. The truck-mounted drills for large diameter holes also require graded roads and pads. Typically, the Town of Moraga desires to have land disturbance kept to a practical minimum during geotechnical exploration. Since there were to be nine borings, construction of pads for the borings and creating rough graded roads to the pads would have involved considerable disturbance to the site (in late September, just prior to the onset of the winter rainy season). Additionally, the availability of equipment sometimes can delay the exploration program.

For these reasons, Engeo proposed an exploration program consisting of seven continuous core boreholes (to evaluate the potential for deep-seated bedrock slides on the site) and two auger borings near the channel of Larch Creek (to provide information on the thickness of alluvium, depth of bedrock, and groundwater conditions in this portion of the property). The Town's peer review geologist considered the proposed exploration program to be consistent with accepted

professional standards. The exploration program was performed during a five-day period (September 27 to October 1, 2010). The various review geologists were invited to the site to view field procedures, and observed exposures in the test pits and exploratory trench through the week of the field program. After completion of the field work, Engeo laid out the core samples in their lab and invited the review geologists to review the samples.

The report issued by Engeo indicates the following: (a) a high percentage of core recovery was achieved (adequate to draw conclusions on the potential for deep-seated bedrock landsliding), and (b) there was no core loss in the critical areas such as the transitions from highly to slightly weathered rock. The comment letter states that slickensides were found in the bedrock core samples that could be slide related. Engeo disagrees with this observation. In all seven core holes, no slickensides were present that could be interpreted as a basal slide plane. There were some intervals of sheared rock in the cores, but those shears were similar to sheared rock seen in the walls of the exploratory trenches. The trenches were not in a landslide area, so those shears are clearly not related to landsliding. They are reasonably interpreted as the result of tight folding of relatively massive claystone bedrock. For additional pertinent information, see Responses to Comments 2-52 and 2-53.

With regard to the distribution of the Supplemental Report issued by Engeo, the project proponent submitted it to the Town of Moraga, and it was reviewed by the EIR geologic consultant and the Town's Peer Review Geologist. It is also available to members of the public upon request.

4-2 **Comment:** States that the incomplete geological investigation results in safety risks and challenges the geological investigation.

Response: With regard to this comment, the six proposed residential lots total approximately 6.75 acres. To date, geologic hazards to these lots have been evaluated by a total of 15 exploratory borings (six logged by Seidelman & Associates), 36 test pits, and three exploratory trenches (total of 54 subsurface data points). In determining how much investigation is required for a project one must consider acceptable risk. For a high-occupancy structure or a critical facility that would be needed in the aftermath of a high magnitude earthquake (fire station, hospital), further investigation may be appropriate. However, to evaluate the outlook for long-term stability for a relatively small, single-family residential project, the scope of the subsurface investigation can be considered adequate. The nature of the landslide hazard and the scope of work on the Hetfield project site are comparable to other residential projects recently processed by the Town of Moraga. In summary, the comment challenges the adequacy of the landslide investigation, but the approach to the investigation was accepted by the Town's Peer Review Geologist as consistent with accepted professional standards, and the Town has no policies that require use of specific drilling technique. The following points are also pertinent to this discussion:

1. The corrective grading plan calls for removal of all slide debris on the six proposed residential lots. The major fill slope of the site is shown to have a proposed gradient of 3:1, to be keyed into bedrock and to be provided with subdrains to ensure that the fill does not become saturated, and to have a debris bench at the top of the major fill slope to intercept mud and water.

Mitigation Measure 3.2-1E requires slope stability analysis. The role of the Town's Peer Review Geologist will ensure that the method of analysis, strength characteristics of the soils and rock, as well as seismic parameters are appropriate to site conditions.

2. When the corrective grading plan is implemented, the project geologist will provide observation services to ensure that all landslide debris is removed. The project geologist will prepare a map of the exposed bedrock on the floor of the excavation to determine that the rock is not part of a slide. Typically, the geologist will look at the following: (a) continuity of the rock as indicated by stratigraphic units (e.g., mapping of sandstone or gravel interbeds within the claystone); (b) measure the orientation of bedding (e.g., is bedding on the floor of the excavation consistent with the known orientation of bedding on the site or is it rotated); and (c) observe the weathering profile (i.e., slide planes are typically characterized by slickensides, groundwater seepage, and/or heavy carbonate mineralization and weathering). If there is evidence that the rock is jumbled and/or disrupted, the grading contractor will be directed to go deeper until the project geologist confirms that competent, in situ rock is present. In summary, there will be a great deal more data generated during grading to confirm and/or modify Engeo's preliminary interpretation that the maximum depth to competent bedrock is not more that 20 feet below the ground surface. For example, the project geotechnical engineers will be providing observation and testing services. The purpose of their work is to ensure that all slide debris is removed from the residential lots. The grading contractor will be required to remove all of the slide debris. If the slide extends below a depth of 20 feet, that would be apparent to the geotechnical engineers. They will observe exposed conditions on the floor of the excavation and would direct the contractor to go deeper until bedrock was exposed throughout the floor of the excavation.

It should also be recognized that the geotechnical engineer is required by the mitigation measures to prepare an as-graded geologic map that would be included in the "grading completion report". (That is a report prepared after grading but prior to the issuance of residential building permits.) The as-graded geologic map would provide information on the orientation of bedding & rock types encountered below the slide. Additionally, the Town's geologist and Public Works Department will be monitoring the earthwork (observing exposed conditions and field operations). The Town's geologist can make unannounced inspections at any time; and he can request that the geotechnical engineer call him to the field to observe the floor of the keyway and other critical features prior to commencement of backfilling. Typically, there is a pre-grading meeting in the field and at that time the Town's geologist will explain what he must see, how much notice must be provided, etc.

4-3 **Comment:** States that the activity of the thrust fault should be evaluated to determine risks of future landslides.

Response: The activity status of the fault was confirmed on the site as discussed in the Supplemental Geotechnical report of Engeo, and summarized in the DEIR (page

3-17). Although site conditions were not suitable to evaluate the activity of the fault, Engeo assumed that the fault could be active, and they recommended a setback that is consistent with State of California standards for setbacks from an active fault.

Engeo has indicated that the corrective grading plan has taken into account the potential for earthquake shaking, as well as the fact that the bedrock within the residential lots is relatively weak. Factors that add conservatism to the design of the project include slope gradient (3:1; not 2:1), width of keyways and buttress, and subdrains.

With regard to the problems of determining the recency of faulting, the logs of Trench T-1 indicate that slickensides extend to the soils, and they flatten as they approach the ground surface. Other similar features were observed in the trench that were not associated with the fault. Specifically, sandstone beds were observed extending into the soil profile. These sandstone beds were more erosion-resistant than the flanking claystone, and hence they are relic beds that project into the soil. Within 2 to 3 feet of the surface, the sandstone beds showed the effects of soil creep, as did the fault. Because Engeo provides an appropriate structural setback, the activity status of the fault need not be further evaluated.

The comment seems to suggest that the relationship of the fault to landsliding has not been evaluated and that this is a key unresolved issue. The commenter should refer to Section 3.2 of the Engeo report, and DEIR Table 3.2-1. Briefly summarized, test pits TP2-2 through TP2-7 were located upslope of the confirmed fault trace. These test pits penetrate bedrock at 2 to 10 feet below the ground surface, and the bedrock was chiefly hard sandstone. The upper boundary of the landslide deposits locally extends upslope of the fault, but upslope of the fault they are relatively thin. The bedrock downslope of the fault is claystone with minor thin sandstone interbeds; upslope from the fault, the rock consists mainly of erosion-resistant sandstone.

4-4 **Comment:** Concerned that a subdrain system is within the thrust fault setback zone. Grading and landscaping won't look like open space.

Response: The first paragraph of this comment expresses concern about the proposed grading and installation of drainage facilities within the setback zone associated with the fault confirmed by Engeo. DEIR Figure 3.2-3 indicates that the corrective grading for the landslide is downslope from the confirmed location of the fault. However, the recommended restricted building zone northeast of the fault is within the area where corrective grading is proposed. Consequently, there would be no subdrains constructed across the mapped fault trace, but the upper portion of the 3:1 fill slope locally extends into the structure setback zone. The fault location is well defined by the exploratory trenches, but this fault is not a feature of regional significance (i.e., it is not regarded as active by the State of California or the U.S. Geological Service (USGS), and the risk associated with the fault is not on a level with the Hayward fault). It is acknowledged that the risk of damage from geologic hazards can never be totally eliminated. The requirement for the project to be annexed to an existing Geologic Hazard Abatement District (GHAD) or the establishment of a stand-alone GHAD would mitigate the potential hazards as a result of geologic hazards. The GHAD would provide funds for the maintenance and repair of damage to specified improvements within the project that may occur in the years

after development. The proposed GHAD will have responsibilities for monitoring of groundwater conditions, maintenance of drainage facilities, and repair of erosion related problems within the boundary of the GHAD. The property owners would fund the GHAD and the GHAD would have responsibility for testing and maintaining the subdrains. (Refer to modified Mitigation Measure 3-2.6 in the ERATA).

The commenter also requests information on costs associated with the long-term monitoring and maintenance of the subdrains. It should be recognized that the formation of the GHAD will include an "Engineer's Report" which will analyze the costs associated with routine monitoring and maintenance, as well as contingencies for repair of major slope damage or other substantial hazards. The cost of funding the GHAD is not required for CEQA compliance. That is because the GHAD budget is dependent upon the number of residential units in the project and the specific responsibilities that are assigned to the GHAD by the Town of Moraga.

Figure C&R-1 is a block diagram that illustrates a birds-eye-view of the proposed grading. This exhibit shows the location of the debris benches, as well grading that is proposed for the residential lots and the on-site road that would provide immediate access to the lots. It does not attempt to show details of landscaping and future improvements to lots. It is based on the corrective grading plan presented in DEIR Figure 3.2-2. Spreading salvaged top soil on the final graded slopes (4 to 6 inches deep) and hydroseeding of the graded area will facilitate dense plant growth during the first winter rainy season.

4-5 **Comment:** Concerned about how much engineered fill material would have to be imported and the impacts of truck traffic.

Response: As proposed, the grading would be balanced on-site. There will be no need to remove the slide material from the site. When properly moisture-conditioned and compacted, the slide debris is suitable for use as engineered fill. Letter 4 infers that the depth to the deepest slide planes could be as much as 30 to 35 feet, rather than the maximum of 20 feet estimated by Engeo on the basis of the core borings and test pits. The commenter also expresses concerns that if the slide proves to be 30 to 35 feet deep, the environmental effects of the project may be greater than forecasted by the DEIR. To address concerns about the consequences of a hypothetical slide that is 30 to 35 feet deep, four figures have been prepared (see Figures C&R-2 through C&R-5). These figures provide a series of geologic cross-sections labeled L1, L4, L5, and L6. The lines of section for the cross-sections can be seen in DEIR Figure 3.2-2. As the legend for the geologic cross-sections indicates, a black line is used to show existing topography; a dashed pink line shows a hypothetical slide plane that is 30 to 35 feet deep; and a violet colored line shows the depth of excavation to address the hypothetical base of landslide. Note that the grading limits and final grades are not changed under this scenario. The depth of removal and replacement would increase, but the grading concept would not change. The corrective grading plan would still remove all of the landslide debris from the six proposed residential lots.

The basic task of the EIR is to identify potentially significant impacts and to either identify mitigation measures to reduce those impacts to less-than-significant, to identify cumulative impacts and to identify any unavoidable adverse impacts. The

EIR is not charged with estimation of the cost associated with implementation of the mitigation measures. (Funding of mitigation measures is a concern of the applicant, but not the responsibility of the EIR).

With regard to construction-related traffic, see Response to Comment 2-57.

4-6 **Comment:** Concerned that discharge from the detention basin would continue longer than pre-project conditions.

Response: The commenter misquotes the EIR. The sentence referenced by the commenter does not say "large volumes of water." It does state that "discharge would continue until the detention basin is empty." Since the rate of discharge to the creek would never be more than the discharge under existing, undeveloped conditions, the erosive forces on Larch Creek due to the velocity of flow would not be significantly greater than under existing conditions, even though the discharge is concentrated in one location.

4-7 **Comment:** Concerned about downstream erosion and subsequent sediment deposition in Larch Creek.

Response: Refer to Response to Comment 4-6. Lower velocities of flow in Larch Creek would not increase erosion. Although the discharge lasts longer, increased erosive forces would not occur since the velocities in the creek would be less. Even if the flow lasts longer during the declining leg of the flow hydrograph, the lower velocities during this phase would suspend fewer soil particles from the creek banks and bottom than would higher velocities in the creek under existing conditions without the detention basin. The majority of the Larch Creek watershed, which exists downstream of Hetfield Place, would continue to contribute flow from storm drain systems that currently serve public streets and residential development in Moraga. These flows would continue after the cessation of a storm event and would discharge "clean water" to the creek that has much greater impact on erosion and subsequent deposition of sediments than the proposed Hetfield Estates project.

The applicant for the proposed Hetfield Estates project complies with the Town of Moraga General Plan Policies PS5.5 and OS3.4. In compliance with the Contra Costa Clean Water Program C.3 Guidelines, a standard for development, the applicant is providing eleven vegetated swales and a detention basin that limits the rate of flow from the proposed project to no more than the pre-project conditions.

Larch Creek channel restoration, while desirable, is not the responsibility of the project applicant. Quantifying the sediment carrying capacity of Larch Creek under existing conditions would require field studies that are beyond the scope of this EIR.

4-8 **Comment:** Concerned about the capacity of Larch Creek downstream of the project site.

Response: The photographs in the DEIR illustrate the flow-capacity of Larch Creek downstream of the project site is adversely affected by vegetative growth as well as small, constricted, earthen creek channels. The only public places where the photographs could be taken was where public streets cross the creek. These photographs

are indicative of conditions all along the creek. It is a fact that vegetative growth restricts flow in natural creek channels. The Manning equation is a commonly used equation to calculate flow velocity and quantity in open channels and pipelines. The higher the coefficient "n" in the equation, the lower the velocity and quantity of flow for a given channel cross-section and slope. The coefficient "n" for a heavily vegetated channel is 0.035 while "n" for a concrete channel is 0.016 (King and Brater, 1963). Therefore, vegetated, earthen channels restrict flow by about two times as much as a concrete-lined channel.

A 1988 KCA Engineers, Inc., report recommends that Larch Creek be transformed to a concrete-lined channel between Larch Avenue and Camino Pablo in order to provide 300 cubic feet per second capacity to accommodate 100-year flood flows. This recommendation was made because of the limited cross-section of the creek channel and the vegetation along the banks that restricts flow. Since the project's detention basin is designed to limit the flow rate from the developed project to no greater than the flow from the existing undeveloped site, any downstream flooding would not be exacerbated. The flow velocity would be no greater than it is now, which is consistent with a goal of the Contra Costa County Clean Water Program C.3 Guidelines.

Presently, sediment leaves the undeveloped site. The project, with its storm drain system, would not increase off-site sediments. The impervious surfaces of the project (roofs and pavement) consist of 3.3 percent of the project site. These surfaces would generate less sediment than native ground or landscaping. Runoff from landscaped areas around the houses would flow to the streets that would also drain to the vegetated swales. The graded areas behind the houses may produce higher sediment loads in the runoff because of the steeper slopes, but the runoff from these areas would reach the streets or residential drainage systems and be conveyed to the vegetated swales. These surfaces would drain to the eleven vegetated swales where sediments would be captured on the filter material.

4-9 **Comment:** Concerned that Larch Creek would dry out upstream of the detention basin discharge location, especially if the 8-lot alternative is constructed.

Response: Refer to Responses to Comments 2-50 and 2-51.

4-10 **Comment:** States that clay soils will transmit water flow as opposed to impervious surfaces.

Response: The project site contains mostly clay soils. When saturated, clay soils resist percolation of water when compared to quick-draining sandy soils. It is true that saturated clay soils would contribute subsurface flows to Larch Creek over a longer period of time than sandy soils thereby extending the descending leg of the runoff hydrograph. However, only 3.3 percent of the project site is covered with impervious surfaces (roofs and pavement). Therefore, the type of soil under impervious surfaces has very little impact when 96.7 percent of the site would remain as exposed soil. Note that prolonged seepage from the clay soils in the summer months would tend to attenuate the concerns of Larch Creek drying out as expressed elsewhere in the comments to the DEIR.

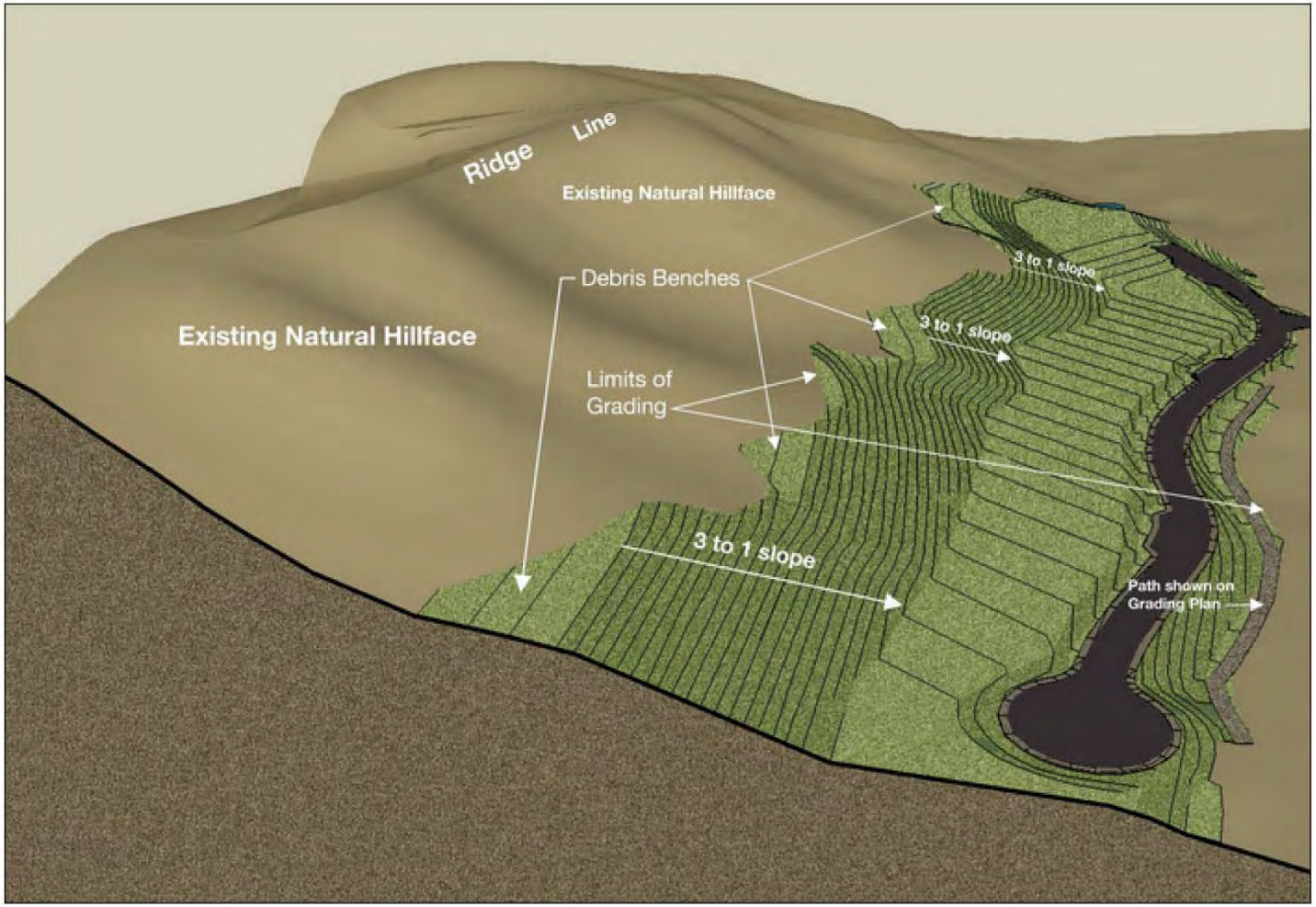
4-11 **Comment:** Concerned about access to and the costs of maintaining debris benches and V-ditches.

Response: The commenter provides an opinion on the interpretation of the Town's Ordinance Code, but does not provide supporting documentation. In response, Figure C&R-1 is a block diagram that shows a view of the corrective grading that looks along the axis of the 3:1 fill slope. Note that the 3:1 slope is not planar, but has a curvature that mimics the existing terrain. Although the existing slope within the area that is subject to corrective grading is hummocky due to landslides, the existing slope gradient is typically 3:1 or flatter. If the Town of Moraga desired more undulations in the fill slope, that variability could be required as a condition of approval. With regard to the debris benches, they would be visible from the ridge crest (e.g., trail users). However, they would be nearly invisible to persons at the grade of the existing neighborhood because the benches are relatively flat. It should be recognized that the growth of annual grasses and volunteer shrubs in the uppermost portion of the 3:1 slope would effectively screen views of the bench from the neighborhood. It should also be noted that there are debris benches in other projects located in Moraga. In those instances, the Town has determined that debris benches are consistent with the regulatory context of those sites.

4-12 **Comment:** Questions the use of a GHAD and the costs to maintain the grading and drainage features within the setback zone adjacent to the fault.

Response: Mitigation Measure 3.2-6 implicitly requires the formation of a GHAD, which shall also include the open space area. The Commenter should refer to the ERATA for the change in language regarding the GHAD requirement. At this point, the duties of the GHAD are not fully defined. In the Planning Commission resolution that certifies the EIR, the mitigation measure requiring the formation of a GHAD would be then included as a condition of approval and the applicant would be required to submit a "Plan of Control" and an "Engineer's Report." The Public Resources Code (Division 17, commencing with Section 26500) provides the legal standards that must be met, and the Town of Moraga would review the documents submitted by the project proponent for adequacy.

The Plan of Control provides background information on the project and its open space areas, and provides an overview of site geologic conditions and hazards. It also provides criteria for GHAD responsibility (i.e., identifies items that are the responsibility of the GHAD and items that are excluded). Perpetual maintenance of drainage facilities can be included in the duties of the GHAD, but the Town may wish the C.3 drainage facilities maintained by another special district; that has not yet been determined. Typically, the Plan of Control will discuss details of maintenance responsibility, addressing prevention, abatement, vegetation control, control of erosion, and control of sedimentation. It may also prioritize GHAD expenditures. Normally, the Plan of Control will indicate that inspections should be undertaken at appropriate intervals, as determined by the GHAD manager (timing, scope, frequency, etc.). It is not established at this time that the GHAD manager will inspect subdrains annually; moreover, such details are not needed at this point in the planning process.



Computer generated perspective of contours from grading plan; 2-foot contour interval.

Source: enVision design

Figure C&R-1 Block Diagram Illustrating Post Grading Conditions as Seen Through Lot 6

Preparation of the Engineer's Report follows preparation of the Plan of Control. It will include a map showing the boundary of the GHAD and will estimate the expenses of ongoing operation of the GHAD, allowing for a larger geologic event at specified intervals. Based on projected costs, the Engineer's Report will recommend an annual assessment, along with provision for adjustments so that assessments keep pace with the consumer price index. Because the number of lots and the size of the development are not established until the Planning Commission acts on the project, it would be premature to prepare the Plan of Control and Engineer's Report at this time. In response to the commenter's concern regarding the cost of the GHAD assessments for future homeowners of the development, this is not considered an environmental impact of the project and is therefore not relevant to determining the adequacy of the EIR.

4-13 **Comment:** Concerned about access to and the costs of maintaining debris benches and V-ditches.

Response: The corrective grading of the site is a development cost. The general standard for engineered slopes in the Town of Moraga is 2:1. The grading criteria for the project limits use of 2:1 slopes to those situations where the vertical height of the slope is 8 feet or less; higher slopes require use of a 3:1 gradient. The confirmed location of the fault is within the higher elevations of the site, and does not invalidate the proposed location of building sites (between the toe of the 3:1 slope and the proposed cul-de-sac street). The DEIR shows the extent of landslide deposits on the property. The slides do extend upslope of the debris benches, within ungraded, permanent open space. Test pits indicate that these uppermost portions of the slides are confined to drainage swales, and that the depth to rock ranges from 2 to 10 feet. The debris benches are sized to contain the debris. The commenter is correct that there are no maintenance access roads to the debris benches. The GHAD would include access easements across residential lots. It is also anticipated that the maintenance would be performed during the dry summer season, and that the maintenance equipment would be able to drive up the 3:1 fill slope to access the debris bench. When maintenance work on the debris bench is completed, the GHAD manager would implement erosion control measures to any disturbed areas. If a homeowner reported a slough of debris onto a bench during the winter, the GHAD manager would make an inspection, and undertake emergency repair work, if deemed necessary (e.g., clearing drainage ditches and culvert inlets). The GHAD would also include the remaining open space area as stated in the ERATA. Also refer to Response to Comment 4-12 regarding the formation of a GHAD.

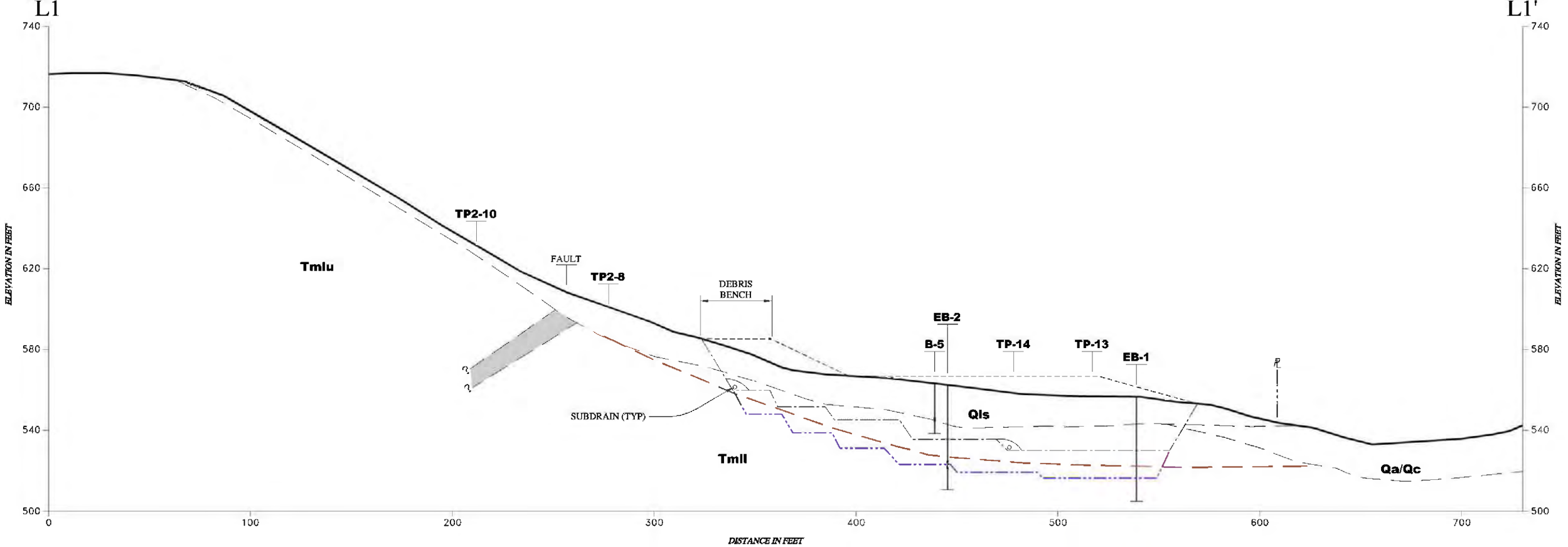
4-14 **Comment:** Notes that there is no color on a portion of Figure 3.2-3.

Response: The commenter correctly notes that a small area near the southwest corner of Lot 4 (just downslope from the fault) had not been colored in on the corrective grading map in Figure 3.2-3. That area should have been shaded orange to indicate "reconstructed slope with engineered fill."

4-15 **Comment:** States that the analysis of cumulative impacts is inadequate.

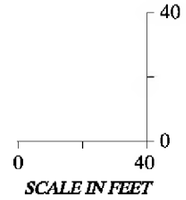
Response: Opinion noted regarding the sufficiency of the Cumulative Impacts discussion. As stated on page 4-2 of the DEIR, the total development area of the

proposed project represents 6.75 acres that would be converted from open space to residential development. This represents a 0.3 percent loss of the overall open space within the Town of Moraga, a negligible amount. The property has existing and future development along its three boundaries. The remainder of the site would remain in open space and would not be fenced off from the open space areas to the north and southeast. Therefore, with the exception of the 6.75 acres of development, the project site and the creek corridor would continue to remain in its natural state. The project site would not be fragmented as stated by the commenter due to its accessibility to the adjoining open space areas.



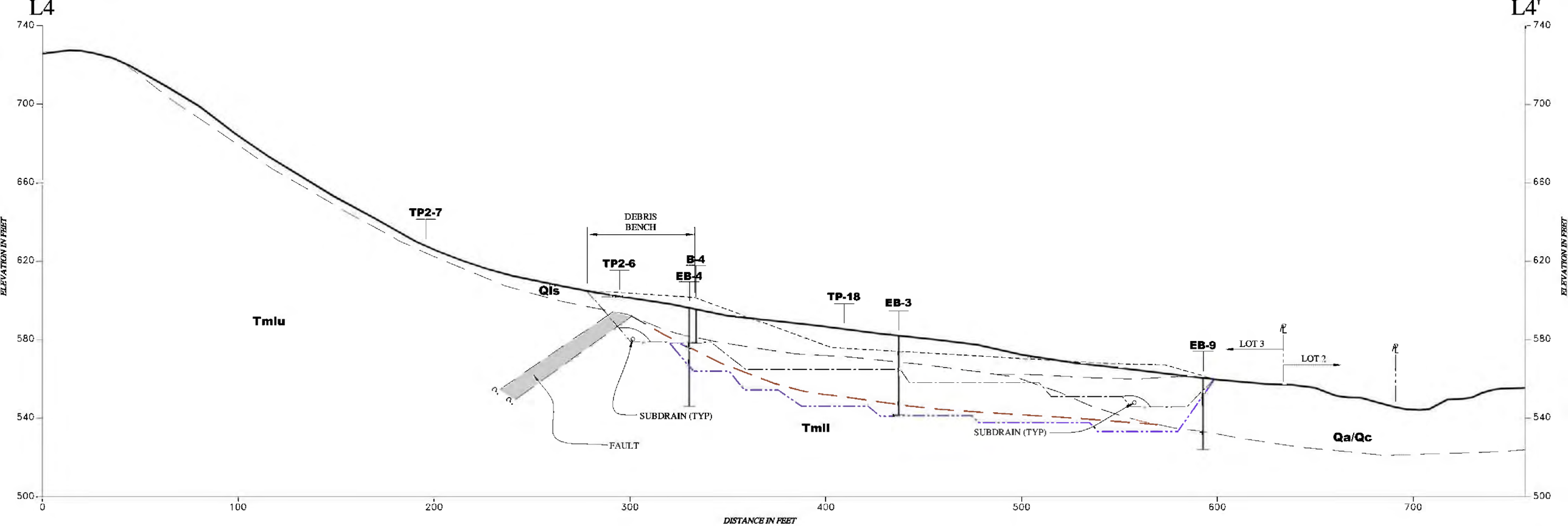
EXPLANATION

Qls	LANDSLIDE
Qa/Qc	ALLUVIUM/COLLUVIUM
Tmlu	MULLHOLLAND FORMATION, UPPER MEMBER
Tmll	MULLHOLLAND FORMATION, LOWER MEMBER
	APPROXIMATE GEOLOGIC CONTACT
	APPROXIMATE EXISTING GROUND SURFACE
	APPROXIMATE PROPOSED FINISHED GRADE AND DEPTH OF REMEDIAL GRADING
	HYPOTHETICAL BASE OF SLIDE SUGGESTED BY COLLINS AND COTTON
	REMEDIAL GRADING TO ADDRESS HYPOTHETICAL BASE OF SLIDE



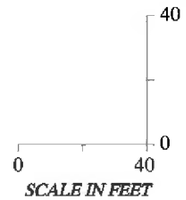
Source: Engeo

Figure C&R-2 Geologic Cross Section L-1 - Hypothetical Slide 30 to 35 feet Deep



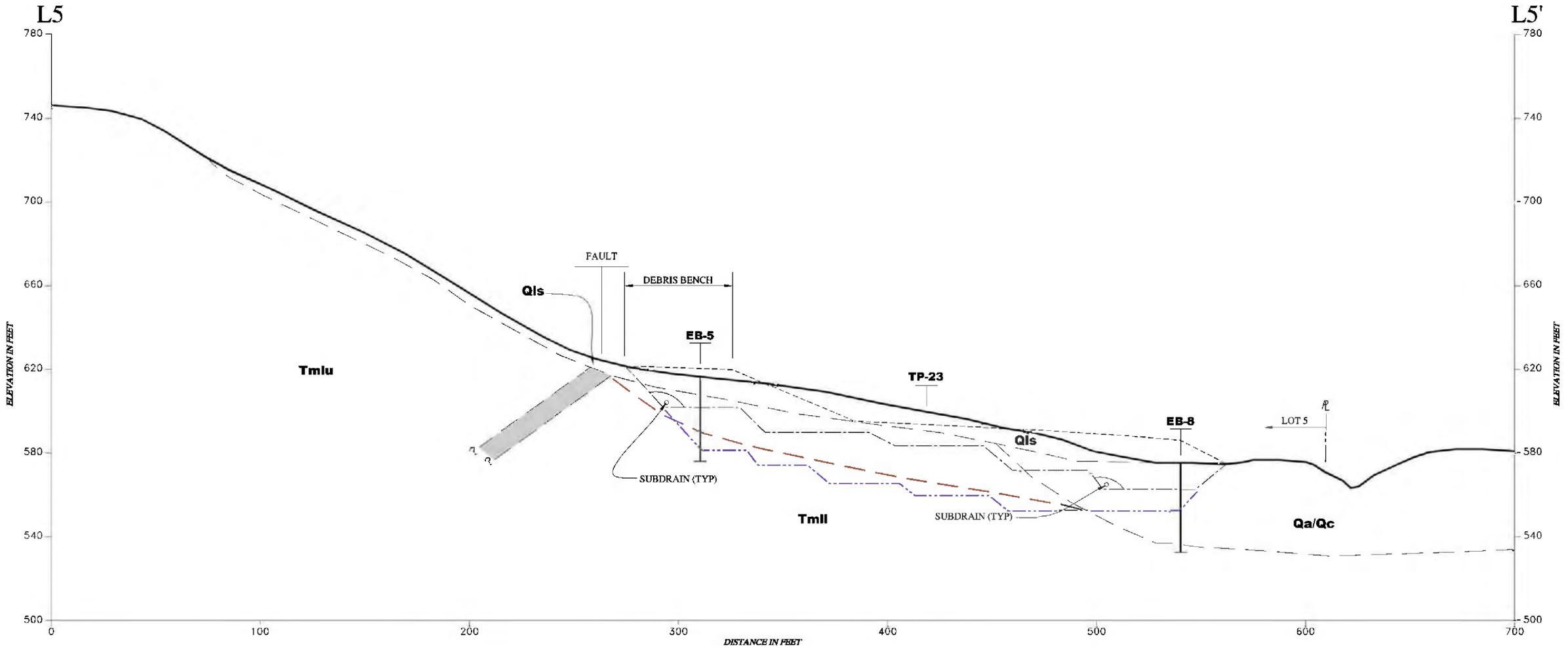
EXPLANATION

Qls	LANDSLIDE
Qa/Qc	ALLUVIUM/COLLUVIUM
Tmlu	MULLHOLLAND FORMATION, UPPER MEMBER
Tmll	MULLHOLLAND FORMATION, LOWER MEMBER
	APPROXIMATE GEOLOGIC CONTACT
	APPROXIMATE EXISTING GROUND SURFACE
	APPROXIMATE PROPOSED FINISHED GRADE AND DEPTH OF REMEDIAL GRADING
	HYPOTHETICAL BASE OF SLIDE SUGGESTED BY COLLINS AND COTTON
	REMEDIAL GRADING TO ADDRESS HYPOTHETICAL BASE OF SLIDE



Source: Engeo

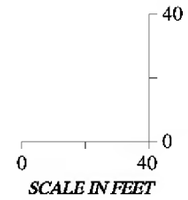
Figure C&R-3 Geologic Cross Section L-4 - Hypothetical Slide 30 to 35 feet Deep



EXPLANATION

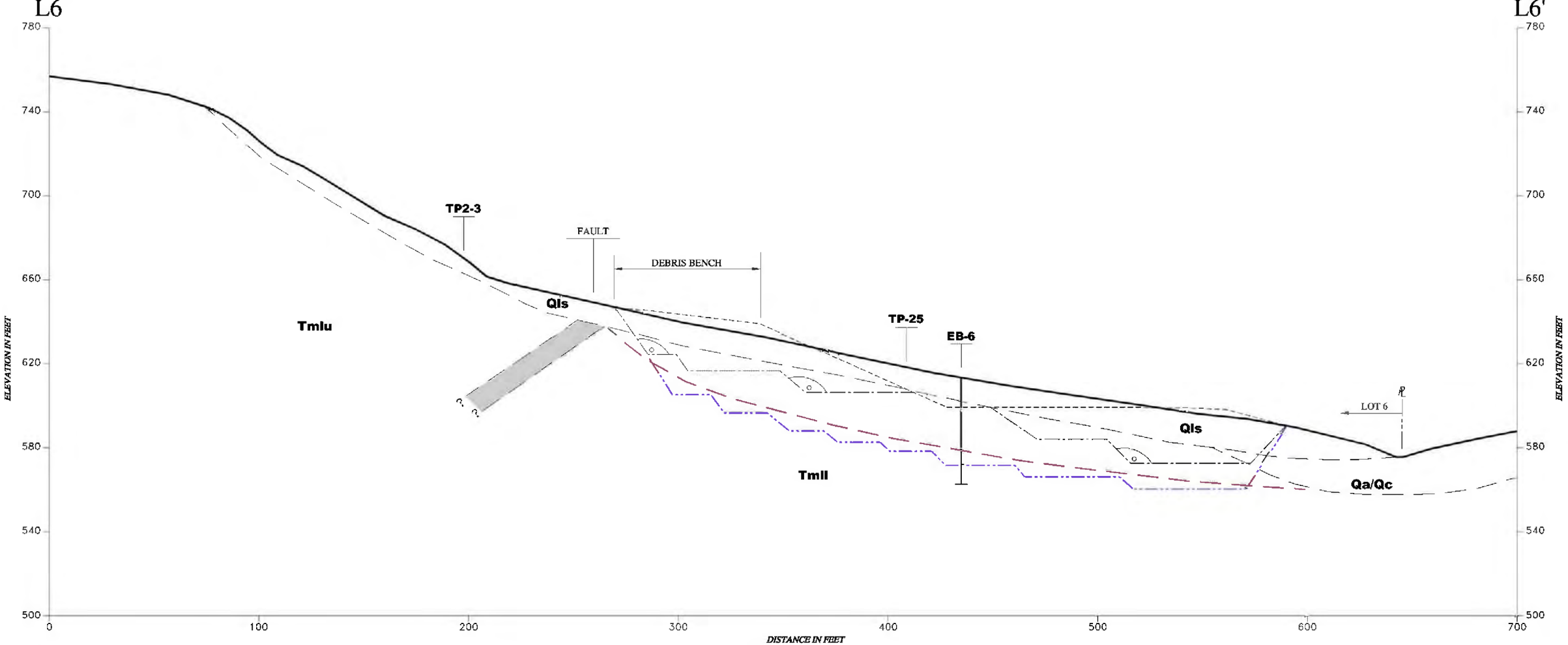
Qls	LANDSLIDE
Qa/Qc	ALLUVIUM/COLLUVIUM
Tmlu	MULLHOLLAND FORMATION, UPPER MEMBER
Tmll	MULLHOLLAND FORMATION, LOWER MEMBER
	APPROXIMATE GEOLOGIC CONTACT
	APPROXIMATE EXISTING GROUND SURFACE

	APPROXIMATE PROPOSED FINISHED GRADE AND DEPTH OF REMEDIAL GRADING
	HYPOTHETICAL BASE OF SLIDE SUGGESTED BY COLLINS AND COTTON
	REMEDIAL GRADING TO ADDRESS HYPOTHETICAL BASE OF SLIDE



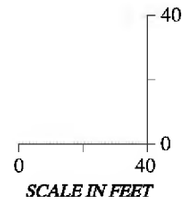
Source: Engeo

Figure C&R-4 Geologic Cross Section L-5 - Hypothetical Slide 30 to 35 feet Deep



EXPLANATION

Qls	LANDSLIDE
Qa/Qc	ALLUVIUM/COLLUVIUM
Tmlu	MULLHOLLAND FORMATION, UPPER MEMBER
Tmll	MULLHOLLAND FORMATION, LOWER MEMBER
	APPROXIMATE GEOLOGIC CONTACT
	APPROXIMATE EXISTING GROUND SURFACE
	APPROXIMATE PROPOSED FINISHED GRADE AND DEPTH OF REMEDIAL GRADING
	HYPOTHETICAL BASE OF SLIDE SUGGESTED BY COLLINS AND COTTON
	REMEDIAL GRADING TO ADDRESS HYPOTHETICAL BASE OF SLIDE



Source: Engeo

Figure C&R-5 Geologic Cross Section L-6 - Hypothetical Slide 30 to 35 feet Deep