D. COMPARISON OF ALTERNATIVES

D.1 INTRODUCTION

This section summarizes and compares the environmental advantages and disadvantages of the Proposed Project and the alternatives evaluated in this EIR (see Figure D-1). This comparison is based on the environmental impacts of the Proposed Project and each alternative, as identified in Sections C.2 through C.13.

Section D.2 describes the process used for comparing alternatives. Section D.3 presents the environmentally superior "Build Scenario," including a map of the environmentally superior transmission line routes and substation locations (Figure D-2). Section D.4 then compares the Environmentally Superior Build Scenario with the No Project Alternative, and identifies the resulting Environmentally Superior Alternative for this EIR. Section D.5 includes detailed summary tables for each of the four project areas (Pleasanton, Dublin/San Ramon, North Livermore, and Tesla Connection/Phase 2), comparing the impacts of each alternative to the proposed route.

D.2 COMPARISON METHODOLOGY

Following is the methodology that was used to compare alternatives in this EIR:

Step 1: An alternatives screening process (described in Section B.5) was used to identify the alternatives that have the potential to eliminate significant impacts of the Proposed Project.

Step 2: The environmental impacts of the proposed and the alternative route segments were identified in Sections C.2 through C.13, including the potential impacts of transmission line and substation construction and operation. Key impacts are summarized for each area in Section D.3, and more detailed impact comparisons are presented in Section D.5.

Step 3: The environmental impacts of the alternatives in each area/phase were compared to the comparable segment of the proposed route. This comparison was performed for each of the 11 environmental issue areas. The conclusion of this process resulted in a determination as to the environmental superiority of the project components in each of the four geographic areas or phases of the project (Pleasanton, Dublin/San Ramon, and North Livermore, and the Phase 2 portion of the project). This information is summarized in Sections D.3.1 to D.3.4.

Step 4: The best environmental components for each area were evaluated as to their ability to work in combination. The conclusion of this analysis is presented in Section D.3.5.

CEQA does not provide specific direction regarding the methodology of alternatives comparison. Each project must be evaluated for the issues and impacts that are most important; this will vary depending on the project type and the environmental setting. For the Tri-Valley 2002 Capacity Increase Project, potential impacts in four environmental issue areas are considered to be most important in this analysis:

- Visual resources
- Land use and recreation
- Biological resources
- Construction and operational impacts on nearby residents.

These issues were considered to have more weight in the comparison because they are primarily long-term impacts that will be present for the life of the project: permanent visual intrusion of project components in scenic areas; changes in the character of land uses, especially recreational lands; and permanent loss of small amounts of habitat for various species. Construction and operational impacts are included in this comparison as important impacts, even though they are generally considered to be less than significant (Class III) due to their short-term nature, because they can be disturbing to residents and businesses in more densely developed areas.

D.3 ENVIRONMENTALLY SUPERIOR "BUILD" ALTERNATIVE

Determination of which of the project alternatives are environmentally superior is quite difficult and depends on the balancing of many factors. In order to meet the CEQA requirements to identify an environmentally superior alternative, the most important impacts in each area were identified and compared (see detailed comparison tables in Section D.4). The following sections (D.3.1 through D.3.4) summarize the benefits and impacts of each alternative, and state whether the Proposed Project or which of the "build" alternatives is considered to be environmentally superior within each area. Section D.3.5 addresses the optimum combination of environmentally superior "build" alternatives. The Proposed Project and all alternatives are described in detail in Section B.6 and illustrated on Figure D-1.

Placeholder: Figure D-1 **Proposed Project and all EIR Alternative**

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Placeholder: Figure D-1 Proposed Project and all EIR Alternative (page 2 of 2**)**

D.3.1 PLEASANTON AREA

The Proposed Project in the Pleasanton area would consist of a 5.5 mile-long transmission line (2.8 mile overhead, a 2.7 mile underground), and upgrades to the Vineyard Substation. Table D-1 summarizes advantages and disadvantages of these proposed and alternative routes. The shaded row indicates the environmentally superior alternative.

Table D-1 Alternatives Comparison -- Pleasanton Area Summary *

Proposed/Alternative	Advantages	Disadvantages
Proposed Vineyard Substation with 2.8 miles overhead and 2.7 miles underground	• Shortest overall route (5.5 miles) • Most overhead portions of route not visible from sensitive areas	• Underground construction and operational impacts on narrow residential streets • Overhead construction through undisturbed corridor would affect habitat • Several large landslides mapped; southern terminus adjacent to Verona fault zone
S1 Alternative (Vineyard-Isabel-Stanley)	• Best consolidation of utility uses in existing corridors (highway and utility) • Eliminates construction through narrow residential streets	• One of the longest routes (6.7 miles) • Greatest number of recorded of cultural resources • Significant visual impact in Sycamore Grove Regional Park; impact on recreational trail users • Residences east of Isabel Avenue affected by adverse (not significant) visual impact • Longest overall route (22% longer than proposed) • Least underground construction minimizes noise, dust, and traffic impacts
S2 Alternative (Vineyard-Bernal)	• Length comparable to Proposed Project (5.8 miles) • Least visual impact due to maximizing underground construction • Use of larger streets allows greater setback from adjacent land uses	• Significant visual impact in Sycamore Grove Regional Park; impact on recreational trail users • Greatest vineyard frontage (1.8 miles) • Most disruptive to traffic; most air quality and noise impacts from underground construction
S2 with S2A Alternative (n/s access road west of Sycamore Grove Regional Park) (see Section C.13 for analysis)	• No construction in Sycamore Grove Regional Park • Eliminates visual impact (entire 6.1 mile transmission line underground)	• Potential disturbance to Del Valle Water Treatment Plant during construction • Adds 0.8 miles of underground construction and associated impacts to S2 Alternative
S4 Alternative (Eastern Open Space)	• Eliminates construction through narrow residential streets	• Greatest disturbance of habitat, especially underground construction cross-country south of Vineyard Ave • Greatest potential for impact to California red-legged frog proposed critical habitat • Second longest route overall (6.6 miles, 18% longer than proposed)

* Impacts at Vineyard Substation would be the same under all alternatives.

The S2 Alternative with the S2A Alternative segment (resulting from mitigation recommending that the transmission line route be moved to the west, out of the Sycamore Grove Regional Park) is environmentally superior to the other Pleasanton area routes. This alternative would be completely underground, so visual impacts are eliminated, and it follows disturbed corridors (adjacent to or within existing roadways). Construction impacts along Vineyard Avenue would be minimized with mitigation measures proposed in Section C.

D.3.2 NORTH LIVERMORE AREA

The Proposed Project in the North Livermore area includes a 3.8-mile overhead transmission line and a new five-acre substation. Two substation site alternatives were evaluated, in addition to several alternatives that would have different segments of the transmission line underground. Table D-2 summarizes advantages and disadvantages. The shaded row indicates the environmentally superior alternative.

Table D-2 Alternatives Comparison – North Livermore Area Summary

Proposed/Alternative	Advantages	Disadvantages
Proposed North Livermore Substation and Transmission Lines (Manning Road and N. Livermore Avenue)	• Utilizes PG&E Co.'s existing vacant easement along Manning Road	• Substation and 3.8 miles of transmission lines would be highly visible in scenic area • Close to Greenville fault (potential for strong ground motion) • Potential conflict with future regional trail along Manning Road
Proposed Substation with P1 Alternative (1 mile underground along N. Livermore)	• Less overhead transmission line visible in scenic area (2.8 miles overhead; 1 mile underground)	• Significant visual impact of substation and east-west line would remain • High liquefaction and corrosive soil potential affecting underground segment
Proposed Substation with P2 Alternative (3.8 miles underground along N. Livermore and Manning)	• Less overhead transmission line visible in scenic area (no overhead; 3.8 miles underground)	• Greatest construction impacts associated with underground cable installation • Significant visual impact of substation would remain • High liquefaction and corrosive soil potential affecting underground segment
Proposed with P3 mitigation (2.8 miles underground along May School Road)	• Shortest route to proposed substation site that eliminates overhead lines (2.8 miles; all underground)	• Greater construction impacts associated with underground cable installation • Significant visual impact of substation would remain • High liquefaction and corrosive soil potential affecting underground segment
L1: Raymond Road (at Lorraine Road)	• Least construction (1 mile underground; no overhead) • Use of existing, disturbed corridor (Raymond Road)	• Significant impacts to groundwater hydrology and biological resources adjacent to bird's beak protected area • Potential impacts on operation of FCC facility • Significant visual impact of substation in rural setting
L2: Hartman Road (near Las Positas College)	• Adjacent to major (future) roadway • Closest to areas of immediate growth and commercial development • Least visual impact of all North Livermore substation alternatives	• Nearly twice as long as Proposed (7.3 miles) • There are no existing roads in the substation area so construction impacts and disturbance of habitat would be more severe. • Substation study area is near a seasonal wetland • Crosses two potentially active faults • Construction through an existing drainage (future Hartman Road) • Passes Livermore Municipal Airport and Water Treatment Plant • Parallel to Hwy 84 construction; crosses SR 84, I-580, and UPRR tracks

In the North Livermore area, the proposed North Livermore Substation site is preferred, with a 2.8-mile underground route along May School Road. This underground route was proposed as a mitigation measure to reduce potential air quality impacts associated with the longer underground route (P2

Alternative). The substation site would result in a significant and unavoidable (**Class I**) visual impact, but impacts in nearly all other issue areas would be less than for the L1 and L2 Alternatives.

D.3.3 DUBLIN/SAN RAMON AREA

The Proposed Project in Dublin/San Ramon would be a new five-acre substation in undeveloped private land near the Alameda/Contra Costa County line, and 4.9 miles of overhead transmission line (from North Livermore Avenue to the Proposed Dublin Substation). Table D-3 summarizes the key comparison factors in this area. The shaded row indicates the environmentally superior alternative.

Table D-3 Alternatives Comparison – Dublin/San Ramon Area Summary

Proposed/Alternative	Advantages	Disadvantages
Proposed Dublin Substation and Transmission Line from North Livermore	• Substation site is not visible to public	• Significant visual impact along 4.9 mile transmission line route between N. Livermore and Proposed Dublin Substation; substation would be visually inconsistent with existing rural landscape • Requires construction of several access roads and construction/operational disturbance of transmission line corridor • Potential impacts to California red-legged frog proposed critical habitat • Many landslides along transmission line route
D1 Alternative (transmission line from Vineyard Substation)	• Shortest route (2.8 miles) • Substation in area zoned for commercial land use, closer to center of highest demand for electricity • Transmission line traverses disturbed industrial area (gravel preserve) • Flat terrain at substation site	• Substation would be visually inconsistent with existing rural landscape • Substation within future commercial area reduces area available for development • Potential for reduction of gravel resource availability in future • Transmission line crossing of I-580 Freeway
D2 Alternative (transmission line from San Ramon Substation)	• Transmission line route passes through more developed areas than proposed route (adjacent to ongoing construction/ residential development) • Eliminates visual impacts associated with transmission line between North Livermore Avenue and proposed Dublin Substation	• Potential construction disturbance (underground transmission line into substation) of many residences near San Ramon Substation • Construction associated with 20 miles of reconductoring could affect sensitive biological species and cultural resources • Visual impact from Tassajara Road of transmission line in rural setting
D2 Alternative with Mitigation A-6 (direct connection to San Ramon-Pittsburg 230 kV line; addressed in Section C.13.3)	• Eliminates construction at/near San Ramon Substation • Eliminates need for construction disturbance and cost associated with underground construction	• See D2 above.

In conclusion, the D1 Alternative is environmentally superior for the Dublin/San Ramon area. The transmission line route is primarily within the gravel preserve so would have minimal visual impacts or construction disturbance to the public. The substation site is in the commercially-zoned portion of the Dublin Ranch development, in an area where commercial and industrial growth is focused and there is a high demand for electricity.

D.3.4 TESLA CONNECTION/PHASE 2

PG&E Co.'s proposed Phase 2 connection to the Tesla Substation would require 10 miles of transmission line construction between the existing Contra Costa-Newark 230 kV line and the Tesla Substation in eastern Alameda County. Table D-4 summarizes advantages and disadvantages; the shaded row indicates the environmentally superior alternative.

Table D-4 Alternatives Comparison – Tesla Connection/Phase 2 Summary

Proposed/Alternative	Advantages	Disadvantages
Proposed Phase 2	• Avoids vineyard disturbance • Shorter transmission line than Stanislaus Corridor (10 miles)	• Underground construction and operational impacts on narrow residential streets • Overhead construction through undisturbed corridor • Significant visual impact in vicinity of Brushy Peak Preserve and adverse impact at I-580 crossing
Proposed Phase 2 with Brushy Peak alternative segment	• Visual impact shifted to south of park entrance • No major roadway crossings	• Crosses near/over two residences • Two landslides mapped • Significant visual impact in vicinity of Brushy Peak Preserve
Stanislaus Corridor	• Uses existing utility corridor • Two sets of existing lattice towers would be removed and replaced by taller towers with smaller footings, spaced farther apart	• Construction disturbance to vineyards • 14-17* miles longer than Proposed Phase 2
Switching Station Site 1 (westernmost site)	• Eliminates need to construct new transmission line to Tesla • Adjacent to Tesla-Newark transmission corridor • Flat terrain with easy access from Hwy 84 • Outside of park	• Located in or near active Verona fault zone • Potential California red-legged frog habitat • Close to Highway 84 (scenic corridor)
Switching Station Site 2 (near Del Valle Water Plant)	• Eliminates need to construct new transmission line to Tesla • Adjacent to Tesla-Newark transmission corridor • Existing paved roadway provides route for underground transmission line • Outside of park	• Significant visual impact from Sycamore Grove Regional Park • Potential California red-legged frog habitat area • Construction disturbance to Zone 7 operations and personnel
Switching Station Site 3 (in Sycamore Grove Regional Park)	• Eliminates need to construct new transmission line to Tesla • Adjacent to Tesla-Newark transmission corridor	• Potential California red-legged frog habitat • Located within the Sycamore Grove Regional Park adjacent to recreational trail • Significant visual impact in park

* Total length depends on which route would connect with Stanislaus Corridor: 14 miles from S1/S2 Alternative and 17 miles from Proposed/S4 Alternative.

Between PG&E Co.'s proposed Phase 2 and the construction of a new transmission line in the Stanislaus Corridor, the Stanislaus Corridor is environmentally superior due to it being an existing, occupied transmission corridor. However, assuming that Phase 2 is ultimately required, this alternative would have much greater impacts than any of the Switching Station alternatives, which would require no additional transmission line construction. The selection of the Switching Station site is partly driven by the location of the Pleasanton Area transmission line's tap to the Contra Costa-Newark 230 kV line (in the Tesla-Newark corridor), and partly by the site-specific impacts of the station. Given that the

S2/S2A alternative has been identified as environmentally superior in the Pleasanton Area (Section D.3.1), the Switching Station Site 2 is environmentally superior for Phase 2.

D.3.5 COMBINATION OF "BUILD" ALTERNATIVES

Each component of the Proposed Project and the related alternatives could conceivably be combined with components from the other areas. However, some of these combinations can be either (a) inefficient because they would require duplicative transmission lines in essentially parallel corridors (i.e., the combination of the Proposed South Area route or the S4 Alternative with the L2 Alternative), or (b) electrically infeasible due to the restriction on the capacity of underground transmission line segments (which would prevent adequate electricity to serve three substations from passing through the lines). Therefore, after determination of the environmentally superior alternative in each area (Sections D.3.1 through D.3.5), these alternatives were evaluated for their ability to work together.

One configuration of alternatives (S1 or S2 combined with D1 and L2) would have required all three area substations to be connected to the Contra Costa-Newark 230 kV line through one double-circuit loop. Because each of these alternatives includes an underground segment, this combination of alternatives would not be able to provide sufficient power to the substations. Had all of these alternatives been found environmentally superior, the Switching Station would need to be constructed immediately to allow a direct connection of two substations to the more highly rated Tesla-Newark line. However, because these three alternatives were not found to be environmentally superior, the Switching Station would not be required until Phase 2 (or, depending on construction of large power plants and future transmission in the region, possibly never, as discussed in Section A.2).

Phase 1

PG&E Co.'s Proposed Project would have all three substations (Vineyard, North Livermore, and Dublin) connected to the Contra Costa-Newark 230 kV line, at two different locations: the North Livermore and Dublin Substations would be connected in the North Livermore area where the CC-N line runs north-south, and the Vineyard Substation would connect to the CC-N line south of Highway 84. The environmentally superior Pleasanton Area S2/S2A transmission line route would also connect to the CC-N line in the Tesla-Newark corridor near the Del Valle Water Treatment Plant, and the D1 Alternative would continue north from the Vineyard Substation. The proposed North Livermore Substation would be connected to the north-south CC-N line, due east of May School Road (one mile south of the Proposed Project's tap point).

Phase 2

At the time when the CC-N line becomes overloaded, PG&E Co.'s Phase 2 would allow for connection of the North Livermore and Dublin Substations directly to the Tesla Substation. The Stanislaus Corridor Alternative would allow the same direct connection, but the Vineyard Substation (and also the Dublin Substation, with the D1 Alternative) would be connected to Tesla. However, as discussed in Section D.3.5, the Switching Station Alternative eliminates the need for construction of many miles of transmission lines by allowing access to Tesla's power at a tap in Tesla-Newark corridor.

Conclusion

As illustrated in Figure D-2, the Environmental Superior "Build" Scenario would be substantially shorter overall than the Proposed Project. However, it also includes more miles of underground line. Table D-5 summarizes the comparison of the Proposed Project with the Environmentally Superior "Build" Scenario.

Table D-5 Mileage Comparison: Proposed Project vs. Environmentally Superior Build Scenario

	Overhead Transmission		Underground Transmission		Total Miles
	Phase 1	Phase 2	Phase 1	Phase 2	
Proposed Project	10.7	10.0	2.7	0	23.5
Environmentally Superior Build	2.3	0	9.1	0	11.4

D.3.6 ILLUSTRATION OF THE ENVIRONMENTALLY SUPERIOR "BUILD" SCENARIO

As explained in Sections D.3.1 through D.3.5, the following alternatives were found to be environmentally superior in each area:

- **Pleasanton Area**: The S2 Alternative (Vineyard Avenue) with the S2a Alternative/mitigation segment (adjacent to the access road to the Del Valle Water Treatment Plant) is environmentally superior.
- **North Livermore Area**: The proposed North Livermore Substation with the P3 Alternative/mitgation segment (underground along May School Road) is environmentally superior.
- **Dublin/San Ramon Area:** The D1 Alternative is environmentally superior.
- **Phase 2:** The Switching Station Site 2, south of the Del Valle Water Treatment Plant and adjacent to the Tesla-Newark Corridor, is environmentally superior.

Figure D-2 illustrates the Environmentally Superior "Build" Scenario for the entire project area.

Placeholder: Figure D-2 **Environmentally Superior Project**

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Placeholder: Figure D-2 Environmentally Superior Project (page 2 of 2**)**

D.4 NO PROJECT ALTERNATIVE COMPARED WITH THE ENVIRONMENTALLY SUPERIOR "BUILD" SCENARIO

As shown in Tables D.5-1 through D.5-4, the Proposed Project would result in a range of construction and operational impacts, many of which can be reduced with implementation of mitigation. However, if the Proposed Project or an alternative is not constructed, PG&E Co. will be forced to respond to growing demand by expanding its existing system to the extent that is possible, and by curtailing service if growth in demand exceeds the transmission system's capacity or reliability requirements for essential services (such as hospitals).

It is possible that delaying implementation of the Proposed Project will result in other alternatives being formulated, or currently infeasible alternatives becoming more likely. As an example, development of local power generation facilities could partially address the Tri-Valley region's transmission constraints (as discussed in Section A.2.6). However, many of these small generation facilities would be required in order to supply the power needed to fully address the present limits on electric service. The impacts of thermal power generation, even small-scale, can also be significant (air quality degradation, noise and use of hazardous substances), although often mitigable as well.

The combination of components which has emerged from the EIR analysis as the Environmentally Superior "Build" Scenario minimizes the impacts of adding transmission capacity to the growing Tri-Valley region to the maximum extent feasible:

- The Vineyard Substation modifications are minor and the impacts of the underground S2A transmission line route would be short-term, associated with construction.
- Under Alternative D1, the new Dublin Substation would be constructed and operated in a commercially-zoned area and once again, the impacts of the D1 transmission line will largely be short-term, associated with construction.
- Under the Proposed Project with the P3 Alternative/mitigation segment, the impacts of the North Livermore transmission line are similarly reduced to short-term, construction-related impacts associated with undergrounding.
- Under the Switching Station 2/Phase 2 Alternative, the construction and permanent visual impacts of 10 miles of new transmission line and towers across the Altamont Hills proposed in Phase 2 by PG&E Co. are avoided (as are those associated with 14-17 miles in the Stanislaus Corridor Alternative).

The new North Livermore Substation under the Environmentally Superior Build Scenario presents the greatest operational (long-term) impact since it would be sited in a relatively undeveloped area, with a Class I (significant, unavoidable) visual impact. As discussed in Section E.1.2, wherein a Class I growth-inducement impact was found for the Proposed Dublin and North Livermore project components, the need for the additional electrical capacity associated with the Proposed North Livermore Project component in the next five years (the horizon for the Proposed Project) is in question, given the very long-term nature of the North Livermore Specific Plan (development over the next eight to 20 years), as well as the recent passage of Measure D. This is the one component of the

Environmentally Superior Build Scenario which could arguably be supplanted by the No Project Alternative, particularly since the new Dublin/D1 Substation would be able to serve North Livermore development along the I-580 corridor (i.e., where that development is starting, proximate to the L2 Alternative).

Similarly, as already discussed, the need for a Phase 2 has been cast into doubt by power flow studies performed by the California Independent System Operator in conjunction with PG&E Co., which show that this additional service from the Tesla Substation is likely not to be necessary, due to transmission system improvements underway and expected. Therefore, the No Project Alternative would be environmentally superior to the Phase 2 "build" scenario, even though it is the relatively benign Switching Station Site 2.

Therefore, the Complete Environmentally Superior Alternative would be:

- **Pleasanton Area**: The S2 Alternative (Vineyard Avenue) with the S2A Alternative/mitigation segment (adjacent to the access road to the Del Valle Water Treatment Plant) is environmentally superior.
- **North Livermore Area**: No Project is environmentally superior.
- **Dublin/San Ramon Area:** The D1 Alternative is environmentally superior.
- **Phase 2:** No Project is environmentally superior.

D.5 DETAILED COMPARISONS OF ALTERNATIVES

This section presents a summary comparison of the impacts of the Proposed Project and alternatives. For each project area, tables show the differences in environmental impact for each issue area. The tables are:

- Table D.5-1, Pleasanton Area Comparison of Alternatives
- Table D.5-2, North Livermore Area Comparison of Alternatives
- Table D.5-3, Dublin/San Ramon Area Comparison of Alternatives
- Table D.5.4, Tesla Connection/Phase 2 Comparison of Alternatives

Table D.5-1 Pleasanton Area Comparison of Alternatives

Impact	Proposed Project (South Area only)	S1 Alternative	S2 Alternative	S4 (with proposed)
Air Quality				
Construction PM10 and exhaust emissions (Class II and Class III). Higher emissions levels would be associated with more underground vs. overhead construction activities	2.7 miles underground; 2.8 miles overhead	1.1 miles underground; 5.6 miles more overhead	4.7 miles underground; 1.1 miles overhead	3.2 miles underground; 3.4 mile more of overhead
Operational Emissions (local generation only)	emissions are negligible	emissions are negligible	emissions are negligible	emissions are negligible
Biological Resources				
Temporary and permanent loss of wetland plant communities (Class II)	Temporary impacts may occur to a Seasonal Wetland drainage during tower construction and permanent impacts will occur to an Alkali-Freshwater Marsh due to access road construction.	If wetland plant communities are avoided, no impacts will occur.	If wetland plant communities are avoided, no impacts will occur.	No impacts are anticipated.
Temporary and permanent loss of upland plant communities (Class II)	Permanent impacts to Non-Native Annual Grassland and Blue Oak Woodland may occur due to tower and access road construction along the approximately 3 miles new of transmission line.	Permanent impacts to upland plant communities would be less than the Proposed Project, as approximately 2 miles would be affected.	Permanent impacts to upland plant communities would be less than the Proposed Project, as approximately 0.5 miles would be affected by tower construction and the remainder of impacts would be temporary due to undergrounding.	Permanent impacts due to approximately 3 miles of tower construction would be similar to the Proposed Project; however, total impacts would be greater due to additional temporary impacts of undergrounding of the remaining 1.5 miles of transmission line.
Wildlife habitat removal (Class II/III)	Less wildlife habitat removal than S4 Alternative, but greater impacts to wildlife habitat than S1 and S2 Alternatives.	Less wildlife habitat removal than proposed route and S4 Alternative.	Less wildlife habitat removal than proposed route and S4 Alternative.	Greatest impacts to wildlife habitat.
Wildlife habitat disturbance (Class III)	Less wildlife habitat disturbance than S4 Alternative, but greater impacts to wildlife habitat than S1 and S2 Alternatives.	Less wildlife habitat disturbance than Proposed Route and S4 Alternative.	Less wildlife habitat disturbance than Proposed Route and S4 Alternative	Greatest impacts to wildlife habitat.
Direct mortality and direct disturbance to wildlife (Class II)	Less direct mortality and disturbance to wildlife than S4 Alternative, but greater impacts to wildlife than S1 and S2 Alternatives.	Less direct mortality and direct disturbance to wildlife than Proposed Route and S4 Alternative.	Less direct mortality and direct disturbance to wildlife than Proposed Route and S4 Alternative.	More increased direct mortality and disturbance to wildlife than Proposed Route, S1 Alternative, and S2 Alternative.
Overland travel disturbance of plant communities (Class II)	Impacts to Non-Native Grassland and Blue Oak Woodland may occur along approximately 3 miles of the Proposed Project.	Impacts would be less than the Proposed Project, as only one-half mile of the S1 Alternative route would require overland travel.	Impacts would be less than the Proposed Project, as only one-half mile of the S2 Alternative route would require overland travel.	Impacts would be greater than the Proposed Project as overland travel would be required through approximately 4.5 miles of Non-Native Annual Grassland and Blue Oak Woodland.
Indirect impacts to wildlife due to increased human presence and access (Class II)	Less direct mortality and disturbance to wildlife than S4 Alternative, but greater impacts to wildlife than S1 and S2 Alternatives.	Less indirect impact to wildlife than Proposed Route and S4 Alternative.	Less indirect impact to wildlife than Proposed Route and S4 Alternative.	Greatest impacts to wildlife.

Table D.5-1 Pleasanton Area Comparison of Alternatives

Impact	Proposed Project (South Area only)	S1 Alternative	S2 Alternative	S4 (with proposed)
Increased predation (Class III)	Greater risk of increased predation of wildlife than S1 Alternative and S2 Alternative, but less risk of increased predation than S4 Alternative.	Less impact from increased predation than Proposed Route and S4 Alternative.	Less impact from increased predation than Proposed Route, S1 Alternative, and S1Alternative.	Greater risk of increased predation of wildlife than S1 Alternative, S2 Alternative and Proposed Route.
Bird collisions (Class II)	Less risk of bird collisions than S4 Alternative, but greater risk of collisions than S1 or S2 Alternatives.	Less risk of bird collisions than Proposed Route and S4 Alternative, but greater risk of collisions than S2 Alternative.	No significant impacts	Greatest risk of bird collision.
Temporary and permanent loss of special status plant species and their habitats (Class II)	Potential impacts may occur during tower and access road construction along approximately 3 miles of the Proposed Project.	Potential impacts would be less than the Proposed Project, as construction would only impact approximately 2 miles of the route, 1.5 miles of which is ruderal and unlikely to support rare plants.	Potential impacts would be less than the Proposed Project, as construction would impact approximately one-half mile of potential habitat along the route.	Potential permanent impacts along the would be similar to the Proposed Project, however, temporary impacts would be greater along the 1.5 miles of undergrounded line.
Overland travel disturbance of special status plant species and their habitats (Class II)	Potential impacts may occur along approximately 3 miles of the Proposed Project.	Impacts would be less than the Proposed Project, as only one-half mile of the S1 Alternative route would require overland travel.	Impacts would be less than the Proposed Project, as only one-half mile of the S2 Alternative route would require overland travel.	Impacts would be greater than the Proposed Project as overland travel would be required through approximately 4.5 miles of the route.
Impacts to Alameda whipsnake critical habitat (Class II)	Less impact to Alameda whipsnake critical habitat than S4 Alternative.	No impact to Alameda whipsnake critical habitat	No impact to Alameda whipsnake habitat.	Greatest impact to Alameda whipsnake habitat.
Impacts to California red-legged frog proposed critical habitat (Class II)	Greater impact than S1 or S2 Alternatives.	Less impact to California red-legged frog proposed critical habitat than Proposed Route and S4 Alternative.	Less impact to California red-legged frog proposed critical habitat than Proposed Route and S4 Alternative.	Greatest impact to California red-legged frog proposed critical habitat.
Impacts to other special status wildlife species (Class II)	Greater impact to special status wildlife species than S1 Alternative and S2 Alternative, but less impact than S4 Alternative.	Less impact to special status wildlife species and their habitats than Proposed Route and S4 Alternative.	Less impacts to special status wildlife species and their habitats than Proposed Route and S4 Alternative.	Greatest impact to special status wildlife species.
Cultural Resources				
Inadvertent impacts to recorded, reported and known cultural (Class II)	None	CA-Ala-475H CA-Ala-519H Transcontinental Railroad grade Railroad grade feature	None	None
Previously unrecorded cultural resources could be discovered during ground disturbing construction activities l (Class II)	Low potential for both prehistoric and historic resources	Low potential for both prehistoric and historic resources	Low potential for both prehistoric and historic resources	Low potential for both prehistoric and historic resources

Table D.5-1 Pleasanton Area Comparison of Alternatives

Impact	Proposed Project (South Area only)	S1 Alternative	S2 Alternative	S4 (with proposed)
Portions of the project will pass through, cross or are adjacent to recognized parks, preserves, and recreational areas that may contain cultural resources. (Class II).	None	Shadow Cliffs Regional Recreation Area Sycamore Grove Regional Park	Sycamore Grove Regional Park	None
Geology				
Landslide(Class III)	Several large landslides mapped	None mapped	None mapped	Small landslides mapped
Liquefaction Potential (Class III)	None	Moderate	Low	Low
Erosion (Class III)	High, Steep slopes, thin soils	Low, flat, highly developed	Low, flat, mostly along roadways	High, steep slopes, thin soils
Mineral Resources (Class III)	None-few	Moderate, roadways	Moderate, roadways	None
Ground Subsidence (Class III)	Low	Low	Low	Low
Surface fault rupture (Class III)	X-over Verona fault, OH zoned	X-over Las Positas fault, not zoned	X-over Las Positas fault, not zoned	Same as Proposed
Strong ground motions (Class III)	High, close to Calaveras, Verona, Pleasanton faults	Moderate, close to Las Positas, Livermore faults	Moderate, close to Las Positas fault, closer to Livermore	Same as Proposed
Settlement (Class III)	Low, bedrock soils	Low, mostly paved	Low, mostly paved	Same as Proposed
Expansive, soft or loose soils (Class III)	Moderate	Low	Low	Moderate
Corrosive soils (Class III)	Moderate to high	Low	Low	Moderate to high
Towers west of Isabel Avenue could preclude mining of aggregate resources (Class II)	Not applicable.	Approximately 6 or 7 tower locations.	Not applicable.	Not applicable.
Hydrology				
Increased stream channel erosion, sediment transport, and alteration of existing drainage pattern due to road building activities(Class II)	0.8 mi of gravel road construction, 4-6 culvert crossings of ephemeral tributaries	No new road construction, no identified culvert creek crossings	No new road construction, no identified culvert creek crossings	0.4 mi of gravel road construction, 2-3 culvert crossings of ephemeral tributaries
Increased hillslope erosion, sediment transport to local channels, and reduction of surface water quality due to tower construction and road building activities (Class II)	2.8 mi overhead line, 2.7 mi underground line, route runs through rugged (more erosive) hillslope terrain south of Pleasanton, construction adjacent to un-named tributary creek in hill country	5.6 mi of overhead line, 1.1 mi of underground line, route runs through flatter (less erosive) terrain	1.1 mi of overhead line, 4.7 mi of underground line, route runs through flatter (less erosive) terrain	3.4 mi of overhead line, 3.2 mi of underground line, route runs through rugged (more erosive) hillslope terrain south of Pleasanton, construction adjacent to un-named tributary creek in hill country
Construction related surface water and groundwater contamination (Class II)	2.8 mi overhead line, 2.7 mi underground line	5.6 mi of overhead line, 1.1 mi of underground line	1.1 mi of overhead line, 4.7 mi of underground line	3.4 mi of overhead line, 3.2 mi of underground line
Construction of towers and substation and impacts to groundwater quality (Class II)				

Table D.5-1 Pleasanton Area Comparison of Alternatives

Impact	Proposed Project (South Area only)	S1 Alternative	S2 Alternative	S4 (with proposed)
Construction of underground transmission line and impacts to surface and groundwater water hydrology and quality (Class II)	2.7 mi underground line with potential for greater construction impacts (sedimentation and groundwater disturbance)	1.1 mi of underground line along Vineyard Ave.	4.7 mi of underground line along Vineyard Ave.	3.2 mi of underground line along Vineyard Ave.
Horizontal dry boring of Arroyo Valle (Class II)	Required	Not required	Required	Required
Vineyard Substation upgrades and related hydrology, erosion, and sediment transport impacts (Class II)	Substation upgrade required (same conditions for each alternative)	Substation upgrade required (same conditions for each alternative)	Substation upgrade required (same conditions for each alternative)	Substation upgrade required (same conditions for each alternative)
Operational impacts to surface water and groundwater quality at substation (Class II)	Increased use of fuels and lubricants (same condition for each alternative)	Increased use of fuels and lubricants (same condition for each alternative)	Increased use of fuels and lubricants (same condition for each alternative)	Increased use of fuels and lubricants (same condition for each alternative)
Land Use				
Construction could interfere with grape harvesting south of Vineyard Avenue (Class II)	Not applicable.	Roughly 0.8 miles of vineyard frontage potentially affected.	Roughly 1.8 miles of vineyard frontage potentially affected.	Not applicable.
The overhead alignment through Sycamore Grove Regional Park would be visually incompatible with recreational use of the park and would conflict with conservation easements held by a regional land trust (Class II)	Not applicable.	Approximately 2,000 feet of alignment within park.	Approximately 2,000 feet of alignment within park.	Not applicable.
Potential loss of farmland impacts to scenic route. (Class II)	Not applicable.	The overhead/underground transition structure east of Highway 84 would remove one-half acre of Farmland of Statewide Importance from potential agricultural production and would be inconsistent with Alameda County Scenic Route policies		Not applicable.
Short-term construction impacts to future school. (Class II)	Not applicable.	Not applicable.	Construction noise, dust, and air emissions could conflict with use of a planned elementary school on Vineyard Avenue	
Noise				
Residents or workers in the vicinity of project construction would be affected by intermittent and continuous noise levels during transmission line and substation upgrade construction (Class III).	Route is adjacent to single family residential units between Milepost 4.0 to 5.4.	Route is adjacent to some single family residential units along Foley Road, Vineyard, Isabel Avenue, and north of Concannon Boulevard. Existing ambient levels are higher than the proposed route.	Route is adjacent to residential receptors along Foley Road, Vineyard. Fire Station 5 is on Vineyard Avenue. Existing ambient levels are higher than the proposed route.	There are no sensitive receptors along this route until it joins Alternative S2 on Vineyard Avenue. Route is adjacent to residential receptors along Vineyard. Fire Station 5 is on the south side of Vineyard Avenue. Ambient noise levels are less than proposed route until Vineyard Avenue, where ambient levels are elevated over the proposed route.

Table D.5-1 Pleasanton Area Comparison of Alternatives

Impact	Proposed Project (South Area only)	S1 Alternative	S2 Alternative	S4 (with proposed)
Corona noise generated by overhead lines during adverse weather conditions, could be audible at some sensitive receptor locations (Class III).	The portion of the proposed route that is overhead is not in the vicinity of any residential receptors.	The portion of the S1 Alternative that would be overhead is adjacent to residences on Foley Road. Isabel Avenue, and north of Concannon Boulevard.	The portion of the S2 Alternative that would be overhead is adjacent to 2 residences on Foley Road.	The portion of the S4 Alternative that is overhead is not in the vicinity of any sensitive receptors.
Long-term substation noise levels could disturb adjacent sensitive receptors (Class III).	Substation operational noise impacts would be the same between the Pleasanton Area Proposed Project and the transmission line alternatives.			
Public Health				
Electronic Interference with TV, Radio, and electronic equipment. (Class II)	Second highest potential impact from section of overhead line although in an area which may remain undeveloped.	Highest potential impact due to longest overhead length in developed areas.	Lowest potential impact due to least amount of overhead line and in an area which may remain undeveloped.	Similar impact to Proposed due to same section of overhead line.
Induced currents and shock hazards. (Class II)	Second highest potential impact from section of overhead line.	Highest potential impact due to longest overhead length.	Lowest potential impact due to least amount of overhead line.	Similar impact to Proposed due to same section of overhead line.
Corona and audible noise. (Class III)	Second highest potential impact from section of overhead line.	Highest potential impact due to longest overhead length.	Lowest potential impact due to least amount of overhead line.	Similar impact to Proposed due to same section of overhead line.
Asynchronous pacing of cardiac pacemakers. (Class III)	Second highest potential impact from section of overhead line.	Highest potential impact due to longest overhead length.	Lowest potential impact due to least amount of overhead line.	Similar impact to Proposed due to same section of overhead line.
Public perceived impact of Electric and Magnetic fields (EMF) (Class III)	High potential impact due public perception for UG portion within residential street and long section of overhead line.	High potential impact due to long overhead length in developed areas although Isabel and Stanley corridors may not be perceived as residential.	Lowest potential impact due to least amount of overhead line and Vineyard UG may not be perceived as residential.	UG portion similar impact to S2 combined with higher potential impact for long section of overhead line in the Proposed.
Socioeconomics: no impacts identified				
Traffic and Transportation				
Transmission lines crossing over roadways would require temporary road closures (Class III).	Project would underground transmission lines entire distance of developed path. No impact.	Alternative would cross SR 84 and Stanley Boulevard (twice). Minimal traffic disruption due to road closures.	Alternative would cross SR 84 then would travel underground for the remainder of the route. Minimal traffic disruption due to road closures.	Similar to S2 but smaller roadway distance affected
Construction of the underground transmission line segments would require lane closures and cause disruptions on roadways (Class II).	Project would trench a number of residential streets and a segment of Bernal Avenue, an arterial with ADT of 10,000 plus vehicles.	Alternative would trench a segment of Vineyard Avenue (SR 84 to Isabel Ave.). Shorter distance fewer homes, less daily traffic, easier to divert around.	Major trenching effort on Vineyard Ave., from SR 84 to Bernal Ave under Bernal Ave. to substation. Alternative would be most disruptive to ground transportation.	Similar to S2 but smaller roadway distance affected

Table D.5-1 Pleasanton Area Comparison of Alternatives

Impact	Proposed Project (South Area only)	S1 Alternative	S2 Alternative	S4 (with proposed)
Traffic generation related to construction of the project (Class III).	Average trench crew / overhead line crew is 10-12 workers. Average spoils removal 12-haul truck trips daily. Average trench equipment and repaving equipment 10 pieces total. This level of activity not enough to impact local or regional roadway capacity or operations, except for limited periods of time.	Average trench crew / overhead line crew is 10-12 workers. Average spoils removal 12-haul truck trips daily. Average trench equipment and repaving equipment 10 pieces total. This level of activity not enough to impact local or regional roadway capacity or operations, except for limited periods of time.	Average trench crew / overhead line crew is 10-12 workers. Average spoils removal 12-haul truck trips daily. Average trench equipment and repaving equipment 10 pieces total. This level of activity not enough to impact local or regional roadway capacity or operations, except for limited periods of time.	Similar to S2 but smaller roadway distance affected
Physical damage to roads and sidewalks (Class II).	Project would encompass shortest roadway route. Would trench more than Alternative S1.	Least trenching required, however longest total route along, over and within paved right-of-ways.	Physical damage highest with this alternative due to trenching. This alternative represent the 2nd longest route all of which is underground.	Similar to S2 but smaller roadway distance affected
Restricted Access to Properties (Class II).	Due to the number of cul-de-sacs located off Hearst Dr. and the density of residential land uses in the near vicinity this Alternative would rank highest in terms of restricting access to property.	Alternative would be least restrictive in that the majority of its path would be along a parkway and between an arterial with limited intersections, homes or businesses and railroad tracks.	This alternative would be most restrictive given the extent of trenching.	Similar to S2 but smaller roadway distance affected
Disruption to pedestrian and bicycle circulation (Class III)	Proposed project would potentially disrupt existing local pedestrian and bicycle facilities. Temporary disruption with rerouting if necessary.	Lower level of ped/bike facility disruption compared to Proposed Project.	Would disrupt ped/bike facilities at level similar to Proposed Project.	Similar to S2 but smaller roadway distance affected
Disruption to Traffic and Bicycle / Pedestrian Safety (Class II)	Proposed project likely to be most disruptive to vehicle, ped. and bike safety, due to density and residential character of area.	Alternative least likely to disrupt circulation. Majority of line is overhead and away from built residential areas.	Similar to Proposed Project in terms of affecting vehicle ped. and bike safety. Path of transmission lines travel through less built-up area than project.	Similar to S2 but smaller roadway distance affected
Emergency response vehicles could be blocked or impeded by construction activities (Class II)	Proposed project has potential to affect emergency vehicle access and movement due to trenching in vicinity of residential areas.	Alternative would have less of a potential to affect emergency vehicle access. Less trenching and less development along transmission line path.	Alternative would potentially affect emergency vehicle access and circulation at least to the level of the project and perhaps more given the length of underground segment.	Similar to S2 but smaller roadway distance affected
Construction Equipment storage, staging areas and construction related parking spaces. (Class III).	Existing Vineyard Substation and GE Property located off SR 84 used as lay down areas. Other property would be leased if needed.	Existing Vineyard Substation and GE Property located off SR 84 used as lay down areas. Other property would be leased if needed.	Existing Vineyard Substation and GE Property located off SR 84 used as lay down areas. Other property would be leased if needed.	Similar to S2 but smaller roadway distance affected
Disruption to scheduled public and school bus service. (Class II).	Proposed project could disrupt scheduled public and school bus service on Bernal Avenue due to lane closures and trenching.	Alternative would have less of a potential to affect bus service because majority of lines are overhead.	This alternative would potentially disrupt scheduled public and school bus service on Bernal Avenue and Vineyard Avenue. Affect would be similar to Proposed Project.	Similar to S2 but smaller roadway distance affected

Table D.5-1 Pleasanton Area Comparison of Alternatives

Impact	Proposed Project (South Area only)	S1 Alternative	S2 Alternative	S4 (with proposed)
Conflict with Caltrans or other local roadway construction projects. (Class II)	Proposed project would not likely conflict with planned roadway projects. The widening of Bernal Avenue near Vineyard Avenue in the project area is not scheduled for at least two to three years.	This alternative could potentially conflict with the Caltrans improvement project currently underway in the Isabel Parkway corridor.	This alternative would potentially conflict with the planned realignment of a segment of Vineyard Avenue as part of the Vineyard Corridor Specific Plan.	Similar to S2 but smaller roadway distance affected
Potential impacts to UP railroad (Class II)	Proposed Project would not interfere with railroad operations.	Alternative could potentially conflict with existing freight and passenger rail operations along the north side of Stanley Boulevard.	Alternative would not interfere with railroad operations.	Similar to S2 but smaller roadway distance affected
Visual Resources				
Significant adverse visual impacts resulting from the visibility of new structures.	No significant visual impacts.	Adverse visual impact to a valued landscape resulting from the placement of new structures of the Alternative S1/S2/L2 common segment near Sycamore Grove Trail in Sycamore Grove Regional Park and near Route 84 (a county-designated scenic route). Inconsistency with Alameda County General Plan Scenic Route Element Principle regarding protection of scenic routes (**Class II**). Mitigation would result in undergrounding of all facilities.		Intrusion of built structures of industrial character into a valued landscape consisting of natural land and vegetative forms as viewed from the Ruby Hill Golf Course and residential development (**Class II**). Mitigation would reduce visibility of aboveground facilities but would not eliminate aboveground structures.
Adverse but not significant visual impacts resulting from the visibility of new structures (may include policy inconsistency).	Introduction of additional transmission line structures into the viewshed of Route 84 (**Class III**).	Introduction of additional structures of industrial character into a predominantly natural appearing rural landscape as viewed from Arroyo Road (**Class III**).		None
	Intrusion of new transition structure into the viewshed of the Kottinger Ranch residential development (**Class III**).	Intrusion of additional built structures into the viewshed of Isabel Avenue and Vineyard Avenue (resulting in an inconsistency with Alameda County General Plan Scenic Route Element Principle and City of Livermore Visual Resources Policy ([J]) (**Class III**). Intrusion of additional built structures into the viewshed of the swimming beach and lake at Shadow Cliffs Regional Recreation Area (**Class III**).		

Table D.5-2 Dublin/San Ramon Area Comparison of Alternatives

Impact	Proposed Project	D1 (transmission line and substation)	D2 (transmission line, substation + reconductoring)
Air Quality			
Construction PM10 and exhaust emissions (Class II and Class III). Higher emissions levels would be associated with underground vs. overhead construction activities	No Underground 4.9 miles overhead	0.5 miles underground 2.3 miles overhead	No Underground 4.7 miles overhead 20 miles of reconductoring
Biological Resources			
Temporary and permanent loss of wetland plant communities	Temporary impacts may occur to a Seasonal Wetland drainage during tower construction and permanent impacts will occur to an Alkali-Freshwater Marsh due to access road construction.	No significant impacts	Impacts to wetland plant communities may increase, decrease or be equal to those along the proposed route, depending on tower and access road placement.
Temporary and permanent loss of upland plant communities	Permanent impacts to Non-Native Annual Grassland may occur due to approximately 4 miles of tower and access road construction along the new transmission line route.	Permanent impacts to ruderal Non-Native Annual Grassland due to tower construction are less than the Proposed Project because the D1 alternative route is only approximately 2.5 miles, of which half consists of Developed Areas.	Permanent impacts to grassland due to construction along the D2 alternative would be equal to the Proposed Project; however, impacts to Heritage Trees and other vegetation may be greater due to access for reconductoring.
Direct mortality and direct disturbance to wildlife	Impacts may occur during construction and maintenance along the 4 miles alignment.	No significant impacts	Impacts may be greater than Proposed and D1 due to longer distance (4 new miles, 22 reconductored miles) of reconductoring the line and its associated disturbance
Overland travel disturbance of plant communities	Impacts may occur along the approximately 4 miles of new transmission line.	Very limited impacts may occur, as the D1 alternative is located along established roads.	Impacts may occur along the new transmission line route (approximately 4 miles) as well as along portions of the 22-mile San Ramon-Pittsburg line to be reconductored.
Indirect impacts to wildlife due to increased human presence and access	Impacts during construction and maintenance of new transmission line may occur	No significant impacts	Impacts greater than Proposed and D1 may occur due to longer distance of reconductoring line and its associated disturbance
Temporary and permanent loss of special status plant species and their habitats	Impacts could occur during construction along the approximately 4 miles of new transmission line.	Impacts unlikely	Impacts could occur during construction along the new transmission line route, approximately 4 miles. Also, the number of potential rare plants is greater and potential impacts are increased due to vegetation removal during reconductoring.
Overland travel disturbance of special status plant species and their habitats	Impacts may occur along the approximately 4 miles of new transmission line.	Impacts unlikely	Impacts could occur along the approximately 4 miles of new transmission line, as well as along portions of the San Ramon-Pittsburg line to be reconductored.
Impacts to Alameda whipsnake critical habitat	No significant impacts	No significant impacts	Impacts may occur during reconductoring
Impacts to California red-legged frog proposed critical habitat	Impacts may occur along the new transmission line.	No significant impacts	Impacts greater than those of the Proposed Route and D1 may occur due to greater distance.

Table D.5-2 Dublin/San Ramon Area Comparison of Alternatives

Impact	Proposed Project	D1 (transmission line and substation)	D2 (transmission line, substation + reconductoring)
Impacts to other special status wildlife species	No significant impacts	No significant impacts	Potential impacts to salt marsh harvest mouse and rails may occur along the northernmost one-mile of the San Ramon-Pittsburg line.
Cultural Resources			
Inadvertent impacts to recorded, reported and known cultural (Class II)	None	Transcontinental Railroad grade	Prehistoric site CA-CCo-500 Historic site CA-CCo-502H Black Diamond Mines District (NRHP) Major Native American trail, the Juan Bautista de Anza National Historic Trail [1776], and the Contra Costa Canal.
Previously unrecorded cultural resources could be discovered during ground disturbing construction activities (Class II)	Low potential for both prehistoric and historic resources	Low potential for both prehistoric and historic resources	Low potential for both prehistoric and historic resources
Portions of the project will pass through, cross or are adjacent to recognized parks, preserves, and recreational areas that may contain cultural resources. (Class II).	None	None	Black Diamond Mines District (NRHP) in EBRPD Black Diamond Mines Regional Preserve (includes the Cumberland Mine) Mount Diablo State Park
Geology			
Landslide (Class III)	High, site adjacent to several landslides and debris flows, route "mostly landslide"	No mapped landslides, level terrain	Moderate: site same as proposed, but fewer landslides along shorter route
Liquefaction Potential (Class III)	Moderate at Dublin Substation site, low along route	Moderate at site, low to moderate along route	Moderate at site, moderate along route
Erosion (Class III)	Moderate at site, moderate along route (construction)	Low at site, low along route	Moderate at site, low to moderate along route (construction)
Mineral Resources (Class III)	None, outside resource area	Moderate, crosses gravel pits along truck route	Same as proposed
Ground Subsidence (Class III)	Low	Low	Low
Surface fault rupture (Class III)	No faults crossed	No faults crossed	Crosses Pleasanton fault near SR substation
Strong ground motions (Class III)	Moderate, near several active faults, mostly bedrock	Moderate, near several active faults, mostly alluvium, gravel	Moderate, closer to Calaveras fault, crosses Pleasanton fault, largely bedrock
Settlement (Class III)	Low to moderate,	Low to moderate	Low to moderate
Expansive, soft or loose soils (Class III)	High at site, high along route	High at site, moderate to high along route	High at site, moderate to high along route, less important along buried section
Corrosive soils (Class III)	High	Moderate to high	High
Hydrology			
Increased stream channel erosion, sediment transport, and alteration of existing drainage pattern due to road building activities (Class II)	Potential for increased channel erosion from increased runoff to adjacent degraded stream (see Impact 6-18)	Flat substation site distant from any stream reduces significance of this impact	Potential for increased channel erosion from increased runoff to adjacent degraded stream (see Impact 6-18)

Table D.5-2 Dublin/San Ramon Area Comparison of Alternatives

Impact	Proposed Project	D1 (transmission line and substation)	D2 (transmission line, substation + reconductoring)
Increased hillslope erosion, sediment transport to local channels, and reduction of surface water quality due to tower construction and road building activities (Class II)	Road building activities occur locally near the Proposed Dublin Substation, grading to prepare substation site is significant, 4 mi of overhead line	No significant earth moving or road building activities required, 2.3 mi of overhead line and ~0.5 mi of underground line	Road building activities occur locally near the Proposed Dublin Substation, grading to prepare substation site is significant, 8 mi of overhead line, 1 mi of underground line
Construction related surface water and groundwater contamination (Class II)	4.9 mi of overhead line, 5-acre substation	1.6 mi of overhead line and ~0.5 mi of underground line, 5-acre substation site	4.0 mi of overhead line, 0.6 mi of underground line, new 5-acre substation, modifications to San Ramon Substation
Construction of towers and substation and impacts to groundwater quality (Class II)			
Construction of underground transmission line and impacts to surface water hydrology and quality (Class II)	Not relevant	0.5 mi of underground line, horizontal boring of I-580 freeway	1 mi of underground line
Construction of underground transmission line and impacts to groundwater hydrology (Class II)	Not relevant	0.5 mi of underground line, horizontal boring of I-580 freeway	1 mi of underground line
Construction of underground transmission line and impacts to groundwater quality (Class II)	Not relevant	0.5 mi of underground line, horizontal boring of I-580 freeway	1 mi of underground line
Construction of Dublin Substation and erosion and sediment transport impacts (Class II)	Significant grading work and some road building activity to prepare substation site. Site is on sloping bluff adjacent to an actively eroding stream	Not relevant	Significant grading work and some road building activity to prepare substation site. Site is on sloping bluff adjacent to an actively eroding stream
Creek crossing at Dublin Substation (Class II)	New crossing required to gain access to tower construction site	Not relevant	New crossing required to gain access to tower construction site
Dublin Substation construction and related surface water quality and groundwater quality impacts (Class II)	Construction impacts are intensified due to proximity of creek	Not relevant	Construction impacts are intensified due to proximity of creek
Increased runoff and channel erosion due to operation of Dublin Substation (Class II)	Increased runoff into adjacent degraded stream could potentially intensify stream erosion	Not relevant	Increased runoff into adjacent degraded stream could potentially intensify stream erosion
Operational impacts of Dublin Substation (and other substations) to surface water and groundwater quality (Class II)	Potential release of fuels and oil at 5-acre substation	Potential release of fuels and oil at 5-acre substation	Potential release of fuels and oil at 5-acre substation and upgraded San Ramon substation
Land Use			
The substation would be incompatible with the planned surrounding office, commercial, and residential land uses. (Class II)	Not applicable.	Substation incompatible.	Not applicable.
Construction noise, dust, and odor would adversely affect neighboring residents. (Class III)	Approximately five residences affected.	One residence affected.	Approximately three existing residences affected.

Table D.5-2 Dublin/San Ramon Area Comparison of Alternatives

Impact	Proposed Project	D1 (transmission line and substation)	D2 (transmission line, substation + reconductoring)
The overhead alignment would pass adjacent to a planned community park and planned recreational trail (Class III)	Not applicable.	Not applicable.	Approximately 1.7 miles of alignment incompatible.
Helicopter noise during reconductoring could disturb residents and businesses, as well as recreational visitors in Mount Diablo State Park (Class III)	Not applicable.	Not applicable.	Tower locations along roughly 15 miles of alignment.
Noise			
Residents or workers in the vicinity of project construction would be affected by intermittent and continuous noise levels during transmission line and substation upgrade construction (Class III).	Sensitive receptors adjacent to the route are 3 farm residences, and one single-family residence approximately 2,000 feet southwest of the proposed substation site.	The Alternative D1 route is adjacent to single-family residential development just south of I-50. There are currently no sensitive receptors in the vicinity of the Alternative D1 substation site.	Single-family residential units, rectangular section of an 18-hole course with residential units stretching to the south. An elementary school is approximately 850 feet south of the existing substation. A nursery borders the substation on its east boundary. The alignment passes 80 feet north of several residential receptors. One single-family residence is 2,000 feet southwest of the proposed substation site.
Corona noise generated by overhead lines during adverse weather conditions, could be audible at some sensitive receptor locations (Class III).	All portions of the proposed transmission line route in the Dublin area are overhead	There are no sensitive receptors adjacent to the overhead line portion of Alternative D1	There is one residence roughly 1,000 feet to the south of the Alternative D2 overhead line.
Substation noise levels would disturb adjacent sensitive receptors (Class III).	A residence is approximately 2,000 feet southwest of the substation site.	There are no sensitive receptors in the vicinity of the Alternative D1 substation site.	Same as the Proposed Project
Public Health			
Electronic Interference with TV, Radio, and electronic equipment. (Class II)	Medium potential impact due to long overhead length although in presently undeveloped area.	Low potential impact since UG line used in developed areas and overhead segment in undeveloped or industrial area.	Highest potential impact due to longest overhead length in developed areas.
Induced currents and shock hazards. (Class II)	Medium potential impact due to long overhead length although in presently undeveloped area.	Low potential impact since UG line used in developed areas and overhead segment in undeveloped or industrial area.	Highest potential impact due to longest overhead length in developed areas.
Corona and audible noise. (Class III)	Medium potential impact due to long overhead length although in presently undeveloped area.	Low potential impact since UG line used in developed areas and overhead segment in undeveloped or industrial area.	Highest potential impact due to longest overhead length in developed areas.
Asynchronous pacing of cardiac pacemakers. (Class III)	Medium potential impact due to long overhead length although in presently undeveloped area.	Low potential impact since UG line used in developed areas and overhead segment in undeveloped or industrial area..	Highest potential impact due to longest overhead length in developed areas.

Table D.5-2 Dublin/San Ramon Area Comparison of Alternatives

Impact	Proposed Project	D1 (transmission line and substation)	D2 (transmission line, substation + reconductoring)
Public perceived impact of Electric and Magnetic fields (EMF) (Class III)	Medium potential impact due to long overhead length although in presently undeveloped area.	Low potential impact since UG line used in developed areas and overhead segment in undeveloped or industrial area.	Highest potential impact due to longest overhead length in developed areas.
Socioeconomics: No impacts			
Traffic			
Transmission lines crossing over roadways and other physical barriers would require temporary road closures (Class III).	Transmission lines cross over two rural arterials.	Transmission lines cross over Stanley Blvd.	Transmission lines cross over three rural arterials.
Construction of the underground transmission line segments would require lane closures and cause disruptions on roadways (Class II).	No underground installation.	Underground south of I-580 to substation approximately ¼ mile underground undeveloped area.	Approximately ¼ mile underground undeveloped area.
Traffic generation related to construction of the project (Class III).	Construction related traffic generation for this segment would be relatively low.	Construction related traffic generation for this segment would be relatively low.	Construction related traffic generation for this segment would be relatively low.
Physical damage to roads and sidewalks (Class II).	Low potential.	Some potential related to trenching.	Some potential related to trenching.
Restricted Access to Properties (Class II).	Low potential.	Some potential related to trenching	Some potential related to trenching
Disruption to pedestrian and bicycle circulation (Class III)	Low potential.	Low potential.	Low potential but this is a developed residential area.
Disruption to Traffic and Bicycle / Pedestrian Safety (Class II)	Low potential.	Low potential.	Low potential but this is a developed residential area.
Emergency response vehicles could be blocked or impeded by construction activities (Class II)	Low potential.	Low potential.	Low potential but this is a developed residential area.
Construction Equipment storage, staging areas and construction related parking spaces. (Class III).	Low potential.	Low potential.	Low potential, but this is a developed residential area.
Disruption to scheduled public and school bus service. (Class II).	None	None	None
Conflict with Caltrans or other local roadway construction projects. (Class II)	None	Potential (low) conflict with interchange improvement plans. Potential conflict with Specific Area Plan north of I-580.	None
Potential impacts to UP railroad.	None	Potential impact due to UP track crossing, (Class 1I1)	None
Visual Resources			
Significant adverse visual impacts resulting from the visibility of new structures (Class II)	Visual impact of overhead lines between North Livermore Avenue and Dublin Substation	None	None

Table D.5-2 Dublin/San Ramon Area Comparison of Alternatives

Impact	Proposed Project	D1 (transmission line and substation)	D2 (transmission line, substation + reconductoring)
Visual impacts resulting from the visibility of new structures (may include policy inconsistency) (Class III).	Introduction of industrial-appearing facility into a rural, undeveloped landscape as a result of construction of the proposed Dublin Substation	Minor adverse visual impact on adjacent residential and commercial uses as a result of construction of the alternative South Dublin Substation.	Adverse visual impact on adjacent residential areas as a result of modifications of the existing San Ramon Substation.
Visual impacts resulting from the visibility of new structures (may include policy inconsistency) (Class III)		Minor adverse visual impact on views from El Charro Road as a result of the introduction of new structures in the viewshed, and to the west, of El Charro Road. Structures would appear more compatible with existing landscape than is the case for the Proposed Project or D2 Alternative.	Intrusion of additional built structures into a predominantly rural, undeveloped landscape as viewed from Tassajara Road.

Table D.5-3 North Livermore Area Comparison of Alternatives

Impact	Proposed Project (from CC-N line to B13.2))	P1 (compared to equivalent segment of proposed route)	P2 (compared to equivalent segment of proposed route)	L1 (transmission line and substation)	L2 (transmission line and substation)
Air Quality					
Construction PM10 and exhaust emissions (Class II and Class III). Higher emissions levels would be associated with underground vs. overhead construction activities	No Underground; 3.1 miles overhead	1.0 mile underground; 2.1 miles overhead	3.8 miles underground; No overhead	1.0 mile underground; No overhead	3.6 miles underground 3.7 miles overhead
Biological Resources					
Temporary and permanent loss of wetland plant communities	Proposed Project will avoid impacts to wetland plant communities.	Same as Proposed Project	Impacts may be greater than the Proposed Project due to construction of the line under 4 Seasonal Wetland drainages.	No significant impacts	Impacts may be greater than the Proposed Project due to construction of the line under a Seasonal Wetland drainage, an Alkali-Freshwater Marsh.
Temporary and permanent loss of upland plant communities	Permanent impacts to Non-Native Annual Grassland and Agricultural Area due to tower and substation construction will occur along the approximately 3.8 miles of new transmission line.	Permanent impacts will be less than the Proposed Project, as one-mile of the route will be replaced by temporary impacts due to undergrounding.	Permanent impacts will be much less than the Proposed Project, as the route will be replaced by temporary impacts due to undergrounding.	Impacts due to line and substation construction will be less than the Proposed Project, as the route is less than one mile and will consist of temporary impacts due to undergrounding.	Permanent impacts will be less than the Proposed Project along the one-mile overhead portion of the L2 alternative, but temporary impacts will be greater along the 2.5-mile underground portion (some of which is Developed Area).
Direct mortality and direct disturbance to wildlife	Impacts may occur during construction and maintenance	Impacts may occur during construction and maintenance	Impacts may occur during construction and maintenance	Impacts would be less than other alternatives due to short distance of route	Impacts may occur along the northern portion, but would be less than those of the Proposed Project
Overland travel disturbance of plant communities	Impacts may occur, although they would be very limited considering the close proximity of the line to existing roads.	Same as Proposed Project.	Same as Proposed Project.	Impacts would be less than the Proposed Project due to the shorter distance of the route.	Impacts would be greater than the Proposed Project because there are no existing roads along the northern portion of the route.
Indirect impacts to wildlife due to increased human presence and access	Impacts may occur during construction of the new transmission line	Impacts may occur during construction of the new transmission line	Impacts may occur during construction of the new transmission line	No significant impacts	Impacts may occur along the northern portion, but would be less than those of the Proposed Project
Increased predation	The new line may result in an adverse, but not significant, impact	Predation would be decreased by undergrounding	Predation would be decreased by undergrounding	No significant impacts	No significant impacts

Table D.5-3 North Livermore Area Comparison of Alternatives

Impact	Proposed Project (from CC-N line to B13.2))	P1 (compared to equivalent segment of proposed route)	P2 (compared to equivalent segment of proposed route)	L1 (transmission line and substation)	L2 (transmission line and substation)
Bird collisions	New line may result in an adverse, but not significant, bird collision impact	Bird collisions would be slightly decreased by undergrounding	Bird collisions would be less than those of the Proposed Project and P1	No significant impacts	No significant impacts
Temporary and permanent loss of special status plant species and their habitats	Impacts may occur during construction of the approximately 3-mile transmission line route.	Same as Proposed Project.	Permanent impacts would be less than the Proposed Project due to replacement by temporary impacts from undergrounding.	Impacts would be greater than the Proposed Project due to an increased potential for rare plants to occur in the Alkali Meadow and due to potential hydrologic impacts to rare plants near the route in Springtown.	Permanent impacts would be greater than the Proposed Project due to construction of the substation in Non-Native Annual Grassland or Seasonal Wetland (depending on location) as opposed to the Proposed substation which would be constructed in an Agricultural Area.
Overland travel disturbance of special status plant species and their habitats	Impacts may occur, although they would be very limited considering the close proximity of the line to existing roads.	Same as Proposed Project.	Same as Proposed Project.	Impacts would be greater than the Proposed Project due to the increased potential for rare plants to occur in the Alkali Meadow, despite the shorter route.	Impacts would be greater than the Proposed Project because there are no existing roads along the northern portion of the route.
Impacts to Alameda whipsnake critical habitat	No significant impacts	No significant impacts	No significant impacts	No significant impacts	No significant impacts
Impacts to California red-legged frog proposed critical habitat	New line may impact critical habitat, including dispersal and estivation habitat	Same as Proposed Project	Same as Proposed Project	No significant impacts	Impacts would be less than those of the Proposed Project, P1 and P2
Impacts to other special status wildlife species	New line may impact California tiger salamander estivation habitat	Same as Proposed Project	Same as Proposed Project	No significant impacts	No significant impacts
Hydrologic impacts to special status plants	No significant impacts	No significant impacts	No significant impacts	Significant impacts may occur to rare plants at Springtown due to impacts to subsurface hydrology from undergrounding of the line.	No significant impacts
Cultural Resources					
Inadvertent impacts to recorded, reported and known cultural (Class II)	None	None	None	None	CA-Ala-519H Transcontinental Railroad grade
Previously unrecorded cultural resources could be discovered during ground disturbing construction activities (Class II)	Low potential for both prehistoric and historic resources	Low potential for both prehistoric and historic resources	Low potential for both prehistoric and historic resources	Low potential for both prehistoric and historic resources	Low potential for both prehistoric and historic resources

Table D.5-3 North Livermore Area Comparison of Alternatives

Impact	Proposed Project (from CC-N line to B13.2))	P1 (compared to equivalent segment of proposed route)	P2 (compared to equivalent segment of proposed route)	L1 (transmission line and substation)	L2 (transmission line and substation)
Geology					
Landslide(Class III)	None	Same as proposed	Same as proposed	Same as proposed	Same as proposed
Liquefaction Potential (Class III)	Moderate, at tower locations	High, all along underground segment	High, all along underground segment	High, all along underground segment	Moderate, all along underground segment
Erosion (Class III)	Low	Moderate, with trenching	Moderate, with trenching	Moderate, with trenching	Moderate, with trenching
Mineral Resources (Class III)	Entirely MRZ-1 and MRZ-4, not significant	Same as proposed	Same as proposed	Entirely MRZ-1	Crosses MRZ-2 and MRZ-3, not in gravel pits
Ground Subsidence (Class III)	Low	Low, along trenches	Low, along trenches	Low, along trenches	Low, along trenches
Surface fault rupture (Class III)	Low, no faults	Same as proposed	Same as proposed	Same as proposed	Moderate, crosses two potentially active fault traces
Strong ground motions (Class III)	Moderate, close to Greenville fault	Low, close to Greenville, buried underground	Low, close to Greenville, buried underground	Low, further from Greenville, buried underground	Low, further from Greenville, buried underground
Settlement (Class III)	Low	Low, along trenches	Low, along trenches	Low, along trenches	Low, along trenches
Expansive, soft or loose soils (Class III)	Moderate	Moderate, along trenches	Moderate, along trenches	Moderate, along trenches	Moderate, along trenches
Corrosive soils (Class III)	Moderate, at towers	High, all along underground line	High, all along underground line	High, all along underground line	Moderate, portion of route in non-corrosive soils
Hydrology					
Increased stream channel erosion, sediment transport, and alteration of existing drainage pattern due to road building activities (Class II)	Not relevant	Not relevant	Not relevant	Not relevant	Potentially relevant depending upon alignment of Hartman Rd in relation to existing tributary channel
Increased hillslope erosion, sediment transport to local channels, and reduction of surface water quality due to tower construction and road building activities (Class II)	3.8 mi overhead line	2.8 mi overhead, 1.0 mi underground	3.8 mi underground	1 mi underground line,	1.7 mi overhead, 2.6 mi underground
Construction related surface water and groundwater contamination (Class II)	3.8 mi overhead line and 5-acre substation	2.8 mi overhead, 1.0 mi underground, and 5-acre substation site	3.8 mi underground and 5-acre overhead site	1 mi underground line, and 5-acre substation site	1.7 mi overhead, 2.6 mi underground, and 5-acre substation site
Construction of towers and substation and impacts to groundwater quality (Class II)					
Construction of underground transmission line and impacts to surface water hydrology and quality and groundwater (Class II)	Not relevant	1.0 mi underground line	3.8 mi underground line	1 mi underground line	2.6 mi underground line

Table D.5-3 North Livermore Area Comparison of Alternatives

Impact	Proposed Project (from CC-N line to B13.2))	P1 (compared to equivalent segment of proposed route)	P2 (compared to equivalent segment of proposed route)	L1 (transmission line and substation)	L2 (transmission line and substation)
Construction of underground transmission line and impacts to groundwater hydrology (Class I & II)	Not relevant	Not significant, underground line runs parallel to groundwater flow	Portion of underground line runs perpendicular to groundwater flow, could be potentially significant to Sprigtown Allkali Sink	Very significant, underground line would potentially block shallow groundwater flows to Springtown Alkalki Sink	Potentially significant depending upon alignment of Hartman Rd, the underground line, and the depth to groundwater
North Livermore Substation and construction related water quality and groundwater quality impacts (Class II)	Substation upgrade required (same conditions for each alternative)	Substation upgrade required (same conditions for each alternative)	Substation upgrade required (same conditions for each alternative)	Substation upgrade required (same conditions for each alternative)	Substation upgrade required (same conditions for each alternative)
Operational impacts to surface and groundwater quality at Substation (Class II)	Increased use of fuels and lubricants (same condition for each alternative)	Increased use of fuels and lubricants (same condition for each alternative)	Increased use of fuels and lubricants (same condition for each alternative)	Increased use of fuels and lubricants (same condition for each alternative)	Increased use of fuels and lubricants (same condition for each alternative)
Horizontal dry boring of Arroyo Las Positas (Class II)	Not relevant	Not relevant	Not relevant	Not relevant	Required
Land Use					
The underground alignment would interfere with groundwater flow into the North Livermore Alkali Sink Reserve, in conflict with North Livermore Specific Plan Resource Conservation Program 2E (Class I)	Not applicable.	Not applicable.	Not applicable.	Recharge interference from approximately 1 mile of alignment.	Not applicable.
The underground crossing of the Livermore fault would conflict with Livermore Seismic Safety Policy (b). (Class I)	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Unsafe fault crossing.
Presence of the transmission line would degrade views along designated scenic routes, in conflict with Alameda County Scenic Route Element policies (Class II)	Approximately 2.8 miles of alignment in conflict.	Approximately 0.8 mile of alignment in conflict.	Not applicable.	Not applicable.	Not applicable.
The North Livermore Substation would conflict with North Livermore Specific Plan policies establishing the May School Road Greenbelt, a regional multi-use trail corridor, and the use of drought-tolerant, native plant species (Class II)	Same degree of impact as Variants P-1 and P-2.	Same degree of impact as Proposed Project and Variant P-2.	Same degree of impact as Proposed Project and Variant P-1.	Not applicable.	Not applicable.

Table D.5-3 North Livermore Area Comparison of Alternatives

Impact	Proposed Project (from CC-N line to B13.2))	P1 (compared to equivalent segment of proposed route)	P2 (compared to equivalent segment of proposed route)	L1 (transmission line and substation)	L2 (transmission line and substation)
The North Livermore Substation would conflict with North Livermore Specific Plan Rural Area Standards & Design Guidelines Policy 7.6.2(b), which calls for development of a regional multi-use trail corridor. (Class II)	Approximately 1.8 miles of trail alignment in conflict.	Approximately 0.8 mile of trail alignment in conflict.	Not applicable.	Not applicable.	Not applicable.
The Alternative L1 substation could conflict with operations at the FCC monitoring station on Lorraine Road. (Class II)	Not applicable.	Not applicable.	Not applicable.	Interference from substation.	Not applicable.
The Alternative L1 substation would conflict with North Livermore Specific Plan Urban Area Community Design Policy 7.13.6, which prohibits the use of low-pressure sodium lights. (Class II)	Not applicable.	Not applicable.	Not applicable.	Conflict from substation lighting.	Not applicable.
Conflict with zoning ordinance regarding tall structures near airports. (Class II)	Not applicable.	Not applicable.	Not applicable.	Not applicable.	The overhead section north of Stanley Boulevard would exceed the height limit in the Livermore Zoning Ordinance for structures within 5,000 feet of an airport runway
Noise					
Residents or workers in the vicinity of project construction would be affected by intermittent and continuous noise levels during transmission line and substation upgrade construction (Class III).	22 residences are located in the vicinity of the Proposed Route, one of which is located approximately 200 feet east of the proposed substation.	Receptors along North Livermore Road would be exposed to louder construction noise for a longer period of time compared to the Proposed Project because of underground construction	Receptors along North Livermore Road and in the north valley would be exposed to louder construction noise for a longer period of time compared to the Proposed Project because of underground construction	A single-family residential neighborhood, a farm house, and 4 residences are located in the vicinity of the Alternative L1 route.	A single-family residential neighborhood, offices, and Las Positas College are located in the vicinity of the Alternative L2 route.
Corona noise generated by overhead lines during adverse weather conditions, could be audible at some sensitive receptor locations (Class III).	All portions of the proposed transmission line route in the Dublin area are overhead	This route involves 1.0 mile of underground line along North Livermore Road	Alternative P2 is entirely underground	Alternative L1 is entirely underground	Single-family residential units are east of the overhead portion.

Table D.5-3 North Livermore Area Comparison of Alternatives

Impact	Proposed Project (from CC-N line to B13.2))	P1 (compared to equivalent segment of proposed route)	P2 (compared to equivalent segment of proposed route)	L1 (transmission line and substation)	L2 (transmission line and substation)
Substation noise levels would disturb adjacent sensitive receptors (Class II and III).	A residence is approximately 200 feet east of the substation site.	Same as Proposed	Same as Proposed	Two residences are approximately 150 feet from the substation site.	There are no sensitive receptors in the vicinity of the Alternative L2 substation site.
Public Health					
Electronic Interference with TV, Radio, and electronic equipment. (Class II)	Medium potential impact due to long overhead length although in presently undeveloped area.	Less impact than Proposed due to UG segment, more impact than P2 due to overhead segment.	Low potential impact since UG line used.	Low potential impact since UG line used.	Highest potential impact due to longest overhead length in developed areas.
Induced currents and shock hazards. (Class II)	Medium potential impact due to long overhead length although in presently undeveloped area.	Less impact than Proposed due to UG segment, more impact than P2 due to overhead segment.	Low potential impact since UG line used.	Low potential impact since UG line used.	Highest potential impact due to longest overhead length in developed areas.
Corona and audible noise. (Class III)	Medium potential impact due to long overhead length although in presently undeveloped area.	Less impact than Proposed due to UG segment, more impact than P2 due to overhead segment.	Low potential impact since UG line used.	Low potential impact since UG line used.	Highest potential impact due to longest overhead length in developed areas.
Asynchronous pacing of cardiac pacemakers. (Class III)	Medium potential impact due to long overhead length although in presently undeveloped area.	Less impact than Proposed due to UG segment, more impact than P2 due to overhead segment.	Low potential impact since UG line used.	Low potential impact since UG line used.	Highest potential impact due to longest overhead length in developed areas.
Public perceived impact of Electric and Magnetic fields (EMF) (Class III)	Medium potential impact due to long overhead length although in presently undeveloped area.	Less impact than Proposed due to UG segment, more impact than P2 due to overhead segment.	Low potential impact since UG line used.	Low potential impact since UG line used.	Highest potential impact due to longest overhead length in developed areas.
Socioeconomics					
Operation of conventional substation would have adverse impact on FCC facility (Class I)	Not applicable	Not applicable	Not applicable	A substation at this location would interfere with operations of FCC facility.	
Traffic/Transportation					
Transmission lines crossing over roadways would require temporary road closures (Class III).	Overhead transmission line installation along rural roads. Would cross over Manning Road. Minor impacts in terms of closing roads.	Alternative would underground lines along west side of N. Livermore Road. Fewer crossings but greater disruption than Proposed Project.	Alternative would underground P1 segment plus 2.8 miles additional line underground from CC-N to mile post 13.2 . Fewer crossings but greater disruption than Proposed Project. and Variant P1.	No cross over, line underground. Disruption to local roads due to trenching but no closures due to cross over.	Alternative crosses SR 84, but then follows Vineyard and Isabel corridor. Underground from south of airport , under I-580 and into N. Livermore Specific Plan Area.

Table D.5-3 North Livermore Area Comparison of Alternatives

Impact	Proposed Project (from CC-N line to B13.2))	P1 (compared to equivalent segment of proposed route)	P2 (compared to equivalent segment of proposed route)	L1 (transmission line and substation)	L2 (transmission line and substation)
Construction of the underground transmission line segments would require lane closures and cause disruptions on roadways (Class II).	No underground for this segment .	Underground segment less than 1 mile on N. Livermore Avenue.	Underground segment less than 1 mile on N Livermore Avenue and additional 2.8 miles to the east.	Line underground length of Raymond Road. Less distance than P2 Variant.	Transmission line underground from SR 84 to Vineyard and from Jack London Boulevard to vicinity of Las Positas College. This alternative would create more lane closures and disruption than the other segments.
Traffic generation related to construction of the project (Class III).	Construction related traffic generation for this segment would be relatively low.	Trenching would require some haul truck trips. But overall low level of project vehicle activity against low rates of background traffic .	Trenching would require some haul truck trips. But overall low level of project vehicle activity against low rates of background traffic .	This alternative would generate traffic levels similar to the P1 variant.	Construction of this alternative would generate considerably more vehicle trips than the others , but trips would be dispersed over a greater area and would not result in any significant impacts.
Physical damage to roads and sidewalks (Class II).	Proposed project segment would be overhead and would not likely create significant pavement damage.	Variant would trench approximately 1 mile of roadway.	Variant would trench approximately 3 miles of roadway.	Alternative would trench approximately 1 mile of roadway.	Alternative would trench over 3 mile of roadway in urban area.
Disruption to pedestrian and bicycle circulation (Class III)	Minimal to no disruption (rural area).	Minimal disruption (rural area).	Minimal disruption (rural area).	Minimal disruption (rural area).	Potential disruption (Urban area)
Disruption to Traffic and Bicycle / Pedestrian Safety (Class II)	Minimal to no disruption (rural area).	Minimal disruption (rural area).	Minimal disruption (rural area).	Minimal disruption (rural area).	Potential disruption (Urban area)
Emergency response vehicles could be blocked or impeded by construction activities (Class II)	Minimal disruption (rural area).	Minimal disruption (rural area).	Minimal disruption (rural area).	Minimal disruption (rural area).	Potential disruption (Urban area)
Construction Equipment storage, staging areas and construction related parking spaces. (Class III).	Minor Disruption	Minor Disruption	Minor Disruption	Minor Disruption	Potential disruption given the urban characteristics of the transmission line route.
Disruption to scheduled public and school bus service. (Class II).	No Disruption.	No Disruption.	No Disruption.	No Disruption.	Potential disruption as underground installation crosses public bus routes.
Conflict with Caltrans or other local roadway construction projects. (Class II)	None	None	None	None	Potential conflict with Isabel Corridor construction and with planned roadway improvements associated with N Livermore Specific Area Plan.

Table D.5-3 North Livermore Area Comparison of Alternatives

Impact	Proposed Project (from CC-N line to B13.2))	P1 (compared to equivalent segment of proposed route)	P2 (compared to equivalent segment of proposed route)	L1 (transmission line and substation)	L2 (transmission line and substation)
Potential impacts to UP railroad (Class II)	None	None	None	None	Potential temporary disruption where transmission line crosses over UP tracks at Stanley Boulevard.
Visual Resources					
Significant adverse visual impacts resulting from the visibility of new structures (Class I and Class II)	Introduction of new structures of industrial character into a scenic, rural valley (Class I)	Adverse visual impact on scenic views from North Livermore Avenue, Manning Road, and nearby residences resulting from the construction of the Proposed Project east-west route and North Livermore Substation (Class I)	Adverse visual impact on scenic views from North Livermore Avenue, Manning Road, and nearby residences resulting from the construction of the proposed North Livermore Substation (Class I)	Adverse visual impact on scenic rural landscapes as viewed from Raymond Road, Dagnino Road, Lorraine Road, and nearby residences as a result of construction of the Alternative Raymond Road Substation (Class I).	Adverse visual impact to a valued landscape resulting from the placement of new structures of the Alternative S1/S2/L2 common segment near Sycamore Grove Trail in Sycamore Grove Regional Park and near Route 84 (a county-designated scenic route). Inconsistency with Alameda County General Plan Scenic Route Element Principle regarding protection of scenic routes (Class II).
Significant adverse visual impacts resulting from the visibility of new structures.	Adverse visual impact on scenic views from North Livermore Avenue, Manning Road, and nearby residences resulting from the construction of the proposed North Livermore Substation (Class I).				
Adverse but not significant visual impacts resulting from the visibility of new structures (may include policy inconsistency).	None	None	None	None	Introduction of additional structures of industrial character into a predominantly natural appearing rural landscape as viewed from Arroyo Road (Class III).

Table D.5-3 North Livermore Area Comparison of Alternatives

Impact	Proposed Project (from CC-N line to B13.2))	P1 (compared to equivalent segment of proposed route)	P2 (compared to equivalent segment of proposed route)	L1 (transmission line and substation)	L2 (transmission line and substation)
Adverse but not significant visual impacts resulting from the visibility of new structures (may include policy inconsistency).	None	None	None	None	Intrusion of additional built structures into the viewshed of Isabel Avenue and Vineyard Avenue (resulting in an inconsistency with Alameda County General Plan Scenic Route Element Principle and City of Livermore Visual Resources Policy ([J]) (**Class III**). Intrusion of additional built structures into the viewshed of Isabel Avenue/Future Route 84 (**Class III**).

Table D.5-4 Phase 2 Comparison of Alternatives

Impact	Proposed Phase 2 (from CC-N to Tesla)	Stanislaus Corridor Alternative S2**	Proposed Project that would be replaced by Brushy Peak Alt.	Brushy Peak Alternative *
Air Quality				
Construction PM10 and exhaust emissions (Class II and Class III). Higher emissions levels would be associated with the longer route	No underground; 10.0 miles overhead	No underground; 14/2 miles overhead	No underground; 1.2 miles overhead with no sharp angles	No underground; 1.5 miles overhead with two sharp angles. Poles that are on sharp angles need relatively deeper foundations, which involve more soil handing/excavating
Biological Resources				
Temporary and permanent loss of wetland plant communities	The Proposed Project will avoid impacts to wetland plant communities.	Depending on tower placement, the Stanislaus Corridor may avoid impacts to wetland plant communities.	The Proposed Project will avoid impacts to wetland plant communities	Depending on tower placement, the Brushy Peak Alternative may avoid impacts to wetland plant communities.
Temporary and permanent loss of upland plant communities	Permanent impacts to Non-Native Annual Grassland will result from tower and access road construction along approximately 10 miles the new transmission line route.	Permanent impacts to Non-Native Annual Grassland, Agricultural Areas, and possibly to woodland communities (depending on tower placement), resulting from tower construction along the approximately 17-mile route would be greater than the Proposed Project due to longer distance.	Permanent impacts to Non-Native Annual Grassland due to tower construction along the new transmission line route, approximately 1 mile.	Same as Proposed Project
Wildlife habitat removal	New line will adversely affect wildlife habitat, but not significantly	Less habitat removal than Proposed Project and Brushy Peak new line construction.	Same as Proposed Project	Not significantly different than Proposed Project
Wildlife habitat disturbance	Adverse but not significant; disturbance to wildlife will depend upon seasonality of the construction.	Less disturbance to wildlife than Proposed Project or Brushy Peak since towers will be replaced, not newly constructed	Same as Proposed Project	Not significantly different than Proposed Project
Direct mortality and direct disturbance to wildlife	Impacts may occur during construction and maintenance	Impacts would be less than the Proposed Project and Brushy Peak	Same as Proposed Project	Not significantly different than Proposed Project
Overland travel disturbance of plant communities	Although some roads exist, impacts may occur along portions of the approximately 10 miles of new transmission line construction.	Although some roads exist, impacts along the approximately 17-mile route may be greater than the Proposed Project.	Although some roads exist, impacts may occur along this one-quarter mile portion of the new transmission line route.	Same as Proposed Project
Indirect impacts to wildlife due to increased human presence and access	Impacts during construction and maintenance of the new transmission line may occur	Impacts would be less than the Proposed Project and Brushy Peak	Same as Proposed Project	Not significantly different than Proposed Project

Table D.5-4 Phase 2 Comparison of Alternatives

Impact	Proposed Phase 2 (from CC-N to Tesla)	Stanislaus Corridor Alternative S2**	Proposed Project that would be replaced by Brushy Peak Alt.	Brushy Peak Alternative *
Increased predation	An adverse, but not significant, increase in predation	A slightly reduced impact compared to Proposed Project because total number of towers would be reduced	Same as Proposed Project	Not significantly different than Proposed Project
Electrocution of birds	No significant impacts	No significant impacts	No significant impacts	No significant impacts
Bird collisions	An adverse, but not significant, increase in bird collisions	No significant increase compared to existing conditions	Same as Proposed Project	Not significantly different than Proposed Project
Temporary and permanent loss of special status plant species and their habitats	Impacts may occur during construction of the approximately 10-mile transmission line route.	Impacts may be slightly greater than the Proposed Project during construction of 11.5 miles of the Stanislaus Corridor (the remaining 5.5 miles are Agricultural or Developed Areas).	Impacts may occur during construction of the approximately 10-mile transmission line route.	Same as Proposed Project
Overland travel disturbance of special status plant species and their habitats	Although some roads exist, impacts may occur along portions of the approximately 10 miles of new transmission line construction.	Although some roads exist, impacts may be slightly greater due to overland travel along 11.5 miles of the Stanislaus Corridor (the remaining 5.5 miles are Agricultural or Developed Areas).	Although some roads exist, impacts may occur along this one-quarter mile portion of the new transmission line route.	Same as Proposed Project
Impacts to Alameda whipsnake critical habitat	No significant impacts	No significant impacts	No significant impacts	No significant impacts
Impacts to California red-legged frog proposed critical habitat	Construction of the new line may affect critical habitat, including dispersal and estivation habitat	Tower replacement could impact dispersal and estivation habitat	Same as Proposed Project	Not significantly different than Proposed Project
Impacts to other special status wildlife species	California tiger salamander, San Joaquin kit fox, and burrowing owl may be adversely affected, but not significantly	Fewer special status species are likely to be affected, but California tiger salamander may be affected if estivation habitat is disturbed	Same as Proposed Project	Not significantly different than Proposed Project
Cultural Resources				
Inadvertent impacts to recorded, reported and known cultural resources identified in or adjacent to the project (Class II)	Juan Bautista de Anza National Historic Trail Transcontinental Railroad Grade	Transmission lines Juan Bautista de Anza National Historic Trail	none	none
Previously unrecorded cultural resources could be discovered during ground disturbing construction activities (Class II)	Low potential for both prehistoric and historic resources	Low potential for both prehistoric and historic resources	Low potential for both prehistoric and historic resources	Low potential for both prehistoric and historic resources
Portions of the project will pass through, cross or are adjacent to recognized parks, preserves, and recreational areas that may contain cultural resources. (Class II).	EBRPD Brushy Peak Park	None	EBRPD Brushy Peak Park	EBRPD Brushy Peak Park

Table D.5-4 Phase 2 Comparison of Alternatives

Impact	Proposed Phase 2 (from CC-N to Tesla)	Stanislaus Corridor Alternative S2**	Proposed Project that would be replaced by Brushy Peak Alt.	Brushy Peak Alternative *
Geology				
Landslide (Class III)	8.9 miles of "mostly landslide"	2.2 miles of "mostly landslide"	No mapped landslides	Two landslides mapped
Liquefaction Potential (Class III)	Low	Moderate	Low	Low
Erosion (Class III)	Moderate	Low to moderate	Moderate	Moderate
Mineral Resources (Class III)	None	Crosses reserve areas of MRZ-2 and MRZ-3	None	None
Ground Subsidence (Class III)	None	Low	Low	Low
Surface fault rupture (Class III)	Crosses over Greenville fault	Crosses over Greenville and Verona faults, near Las Positas fault	Low	Low
Strong ground motions (Class III)	Crosses Greenville fault, close to Midway fault, mostly bedrock	Crosses Greenville, Verona faults, parallel to Las Positas fault, abundant Q sediments	Close to Greenville fault	Close to Greenville fault
Settlement (Class III)	Low	Low	Low	Low
Expansive, soft or loose soils (Class III)	Moderate to high	Moderate to high	Moderate	Moderate
Corrosive soils (Class III)	Moderate to high	Moderate to high	Moderate to high	Moderate to high
Hydrology				
Increased stream channel erosion, sediment transport, and alteration of existing drainage pattern due to road building activities(Class II)	~10 mi of overhead line through Altamont Hills	~14-17 mi overhead line through Altamont Hills	~ 10 mi of overhead line through Altamont Hills	Similar distance of overhead line through hills between Brushy Peak and Proposed Route
Increased hillslope erosion, sediment transport to local channels, and reduction of surface water quality due to tower construction and road building activities (Class II)	~10 mi of overhead line through Altamont Hills	~14-17 mi overhead line through Altamont Hills, more likely to make use of existing roads and trails along Stanislaus Corridor, an existing easement	~ 10 mi of overhead line through Altamont Hills	Similar distance of overhead line through hills between Brushy Peak and Proposed Route
Construction related surface water and groundwater contamination (Class II)	10 mi of overhead line, adjacent to BFI landfill	14-17 mi of overhead line, no known contaminant sites	10 mi of overhead line, adjacent to BFI landfill	10 mi of overhead line, adjacent to BFI landfill
Potential soil and groundwater contamination hazard due to Phase 2 proximity to BFI Altamont Landfill (Class II)	Potentially significant, route is adjacent to BFI Landfill	No known contaminant sites	Potentially significant, route is adjacent to BFI Landfill	Potentially significant, route is adjacent to BFI Landfill
Hydrology, water quality, and groundwater impacts caused by modifications at Tesla Substation	Substation upgrade required (same conditions for each alternative)	Substation upgrade required (same conditions for each alternative)	Substation upgrade required (same conditions for each alternative)	Substation upgrade required (same conditions for each alternative)
Operation impacts to surface water quality and groundwater quality at Tesla Substation	Increased use of fuels and lubricants (same condition for each alternative)	Increased use of fuels and lubricants (same condition for each alternative)	Increased use of fuels and lubricants (same condition for each alternative)	Increased use of fuels and lubricants (same condition for each alternative)

Table D.5-4 Phase 2 Comparison of Alternatives

Impact	Proposed Phase 2 (from CC-N to Tesla)	Stanislaus Corridor Alternative S2**	Proposed Project that would be replaced by Brushy Peak Alt.	Brushy Peak Alternative *
Land Use				
The overhead transmission line would require the removal of existing windmills located in a Wind Resource Area, in conflict with East County Area Plan policies 161 and 162. (Class II)	Approximately 20 windmills affected.	Less than 20 windmills affected.	Not applicable.	Not applicable.
The Phase 2 alignment would visually degrade the recreational experience in Brushy Peak Regional Preserve and conflict with the EBRPD Master Plan. (Class II)	Crossing at Laughlin Road.	Not applicable.	Crossing at Laughlin Road.	Not applicable.
Construction of the Stanislaus Corridor would disturb and possibly interfere with existing land uses along the alignment. (Class II)	Not applicable.	Disturbance in vicinity of Mileposts V7 and V7.8.	Not applicable.	Not applicable.
New support towers along the Stanislaus Corridor would displace existing productive grape vineyards and deprive their owners of income. (Class II)	Not applicable.	Displacement along approximately 1.9 miles of alignment.	Not applicable.	Not applicable.
Noise				
Residents or workers in the vicinity of project construction would be affected by intermittent and continuous noise levels during transmission line and substation upgrade construction (Class III).	An East Bay Regional Park District Office and two residences are in the vicinity of the Proposed Phase 2 route.	A farm residence and a ranch house are in the vicinity of the Stanislaus Corridor Alternative.	Does not pass adjacent to a residence	Passes 350 south of two residences
Corona noise generated by overhead lines during adverse weather conditions, could be audible at some sensitive receptor locations (Class III).	All portions of the Proposed Phase 2 line are overhead	All portions of the Stanislaus Corridor Alternative are overhead	All portions of the Proposed Phase 2 line are overhead	The Brushy Peak Alternative is entirely overhead
Public Health				
Electronic Interference with TV, Radio, and electronic equipment. (Class II)	Medium potential impact from long section of overhead line although in an area which may remain undeveloped.	Medium potential impact since section of overhead line in an existing line corridor, however overhead section to Livermore Lab is new segment.	Impacts equivalent.	Impacts equivalent.
Induced currents and shock hazards. (Class II)	Medium potential impact from long section of overhead line although in an area which may remain undeveloped.	Medium potential impact since section of overhead line in an existing line corridor, however overhead section to Livermore Lab is new segment.	Impacts equivalent.	Impacts equivalent.
Corona and audible noise. (Class III)	Medium potential impact from long section of overhead line although in an area which may remain undeveloped.	Medium potential impact since section of overhead line in an existing line corridor, however overhead section to Livermore Lab is new segment.	Impacts equivalent.	Impacts equivalent.

Table D.5-4 Phase 2 Comparison of Alternatives

Impact	Proposed Phase 2 (from CC-N to Tesla)	Stanislaus Corridor Alternative S2**	Proposed Project that would be replaced by Brushy Peak Alt.	Brushy Peak Alternative *
Asynchronous pacing of cardiac pacemakers. (Class III)	Medium potential impact from long section of overhead line although in an area which may remain undeveloped.	Medium potential impact since section of overhead line in an existing line corridor, however overhead section to Livermore Lab is new segment.	Impacts equivalent.	Impacts equivalent.
Public perceived impact of Electric and Magnetic fields (EMF) (Class III)	Medium potential impact from long section of overhead line although in an area which may remain undeveloped.	Medium potential impact since section of overhead line in an existing line corridor, however overhead section to Livermore Lab is new segment.	Impacts equivalent.	Impacts equivalent.
Socioeconomics – No impacts				
Traffic/Transportation				
Transmission lines crossing over roadways and other physical barriers would require temporary road closures (Class III).	Transmission lines cross I-580 and three rural arterials.	Transmission lines cross three to four rural roads.	Overhead lines cross Laughlin Road.	No difference.
Construction of the underground transmission line segments would require lane closures and cause disruptions on roadways (Class II).	None.	None.	None.	None.
Traffic generation related to construction of the project (Class III).	Construction related traffic generation for this segment would be relatively low.	Construction related traffic generation for this segment would be relatively low.	Construction related traffic generation for this segment would be relatively low.	Construction related traffic generation for this segment would be relatively low.
Physical damage to roads and sidewalks (Class II).	Very low.	Very low	Very low	Very low
Restricted Access to Properties (Class II).	Very low	Very low	Very low	Very low
Disruption to pedestrian and bicycle circulation (Class III)	Very low	Very low	None	None
Disruption to Traffic and Bicycle / Pedestrian Safety (Class II)	Very low	Very low	None	None
Emergency response vehicles could be blocked or impeded by construction activities (Class II)	Very low	Very low	None	None
Construction Equipment storage, staging areas and construction related parking spaces. (Class III).				
Disruption to scheduled public and school bus service. (Class II).	None	None	None	None
Disruption to scheduled passenger rail service. (Class III)	None	None.	None.	None
Conflict with Caltrans or other local roadway construction projects. (Class II)	None	None	None	None

Table D.5-4 Phase 2 Comparison of Alternatives

Impact	Proposed Phase 2 (from CC-N to Tesla)	Stanislaus Corridor Alternative S2**	Proposed Project that would be replaced by Brushy Peak Alt.	Brushy Peak Alternative *
Potential impacts to UP railroad	Transmission lines cross over UP tracks vicinity of Altamont Pass Road Over	None	None	None
Visual Resources				
Significant adverse visual impacts resulting from the visibility of new structures.	Intrusion of built structures of industrial character into a predominantly rural, agricultural and undeveloped landscape lacking similar structures between Mileposts B5 and B10 in the North Livermore Valley foothills (Class II). Only effective mitigation is the selection of the Stanislaus Alternative.	None	Significant visual impact on scenic rural landscapes, future recreation area, and nearby residences resulting from introduction of transmission structures in the vicinity of Brushy Peak Preserve and Laughlin Road (Class II). Only effective mitigation is the selection of the Stanislaus Alternative.	Significant visual impact on scenic rural landscapes, future recreation area, and nearby residences resulting from introduction of transmission structures in the vicinity of Brushy Peak Preserve and Laughlin Road (Class II). Only effective mitigation is the selection of the Stanislaus Alternative.
Adverse but not significant visual impacts resulting from the visibility of new structures (may include policy inconsistency).	Introduction of additional structures of industrial character into the viewshed of a state-designated Eligible scenic highway and county-designated scenic highway, at the I-580 spanning point (Class III).	Replacement of existing transmission line structures (two lattice structure lines) with new tubular design transmission structures in the South Livermore wine region (Class III). There would be a net reduction of aboveground structures and impacted acreage.	None	None