Appendix 8: Alternatives Comparison

Introduction

This appendix provides information on alternatives evaluated by Southern California Edison (SCE) and the California Public Utilities Commission (CPUC) in response to concerns raised by the public about the aesthetic effects of the proposed Viejo System Project and requests to consider placing the proposed 66 kV circuit underground.

SCE evaluated several route alternatives to the proposed Viejo System Project in accordance with Section IX.B.1.c of California Public Utilities Commission (CPUC) General Order 131-D. During the initial planning phases of the project, SCE considered various route alternatives and alternative substation locations for the project. In addition to the proposed project, two additional variations were judged to be feasible and capable of meeting project objectives and were, therefore, carried forward for analysis in the Proponent's Environmental Assessment (PEA). These alternatives were:

- Viejo System Project, as proposed by SCE in Application No. 03-03-043 and evaluated in the Viejo System Project Mitigated Negative Declaration/Initial Study (PEA Option 1A);
- Viejo System Project, with combined overhead and underground transmission line construction (PEA Option 1B); and
- Viejo System Project, with proposed 66 kilovolt (kV) subtransmission line constructed entirely underground within city streets (PEA Option 1C).

In response to comments, the CPUC also considered the following:

- Undergrounding the proposed 66 kV subtransmission line within the existing transmission right-of-way (ROW); and
- Alternative tower design (monopole structure).

The following sections describe these alternatives. Each of the alternatives has been evaluated for its ability to reduce potential environmental effects of the proposed project, as well as technical and engineering feasibility. Although CEQA criteria do not include consideration of construction cost or EMF factors, these issues are also discussed to help evaluate the overall feasibility of each alternative. Therefore, the analysis in this appendix focuses on each alternative's potential environmental impacts and various feasibility issues with regard to engineering. General information on cost and electric and magnetic fields (EMF) is also presented, but is not utilized to evaluate the alternatives because EMF and cost are not criteria for determining significance of impacts under CEQA.

Environmental Factors

The following criteria have been used to evaluate the comparative merits of each alternative based on their environmental effects:

- Impacts to environmental resources;
- Creation of new utility corridors and number of roadway and utility crossings; and
- Minimization of issues related to land use impacts and disturbances.

Technical and Economic Factors

Although certain technical and economic factors are not considered when conducting environmental analysis pursuant to CEQA, the alternatives have been briefly evaluated based on the following project feasibility criterion applied to transmission line projects:

- Impacts to system reliability, maintenance, and outage response times, and ability to construct line within requirements of CPUC General Order 95;
- Length of new line and number of transmission line structures;

- Accessibility to construct and maintain structures and conductors; and
- Substantial construction and maintenance costs.

Viejo System Project (PEA Option 1A – Proposed Project)

The Viejo System Project study area consists of the proposed substation site and a 3.1-mile segment of the existing 220 kV and 66 kV transmission corridor located between the proposed substation site and the existing Chiquita Substation. The proposed project would occur within this existing alignment, with the exception of the 4.1-mile fiber optic cable, which would be located in city streets. The proposed substation site is located in the City of Lake Forest and within the Foothill Ranch Master Planned Community. The site is owned by SCE and is vacant. The transmission corridor is located in the Cities of Lake Forest and Mission Viejo. Figure 1 of the MND/IS, Regional Vicinity Map, shows the location of proposed substation site and the existing transmission corridor. The 12.5-acre substation site is located about one-quarter mile north of El Toro Road, one mile east of Santa Margarita Parkway, and just northeast of the State Route (SR) 241 Foothill Transportation Corridor.

SCE proposes to construct a new substation (Viejo Substation) with 220/66 kV and 66/12 kV transformation, four 12 kV distribution lines, and one 66 kV subtransmission line (together, the proposed Viejo System Project) to improve reliability and meet projected electrical load requirements in the south Orange County area. The project consists of adding a new 66 kV circuit within an existing transmission corridor that currently contains two 220 kV transmission lines on lattice steel towers (LST) and two 66 kV circuits, on double-circuited tubular steel poles (TSP). Nineteen existing double-circuited poles would be replaced with thirteen H-frame structures that would carry the two existing 66 kV circuits, a new 66 kV circuit, and would also have capacity for an additional fourth circuit in the future (see Table B.1-1 in the MND/IS).

Please see the MND/IS for a detailed evaluation of this alternative (i.e., the proposed project).

Viejo System Project, With Combined Overhead and Underground Construction (PEA Option 1B)

This option would contain the same elements as the Viejo System Project as proposed but the 66 kV subtransmission line would be constructed partially underground (see Figure 8-1). The overhead segment would be approximately 1.1 miles long and would be constructed within the existing 220 kV corridor south from the proposed Viejo Substation towards the existing Chiquita Substation. The remaining 2.5-mile segment of the 66 kV subtransmission line would be constructed underground within existing city streets. The total length of the line would be longer than the proposed project (by approximately 0.5 miles), because it would follow city streets thereby taking a less direct route. Construction of the underground segment would require trenching through city streets, installing a conduit system and necessary vaults, and pulling cable from Chiquita Substation north towards the overhead segment in the existing transmission line corridor.

The overhead segment of this alternative would begin at the Viejo Substation and extend south on six H-frame structures. These would be the same H-frame structures proposed and described in the MND/IS. The overhead lines would dead-end and be directed underground via a 75-foot TSP riser pole at Santa Margarita Parkway between Flamenco and Pinecrest Parks, near the proposed HF-08 (see IS Figure 7). From this point, the proposed Viejo-Chiquita 66 kV line would continue west underground within vaults located under Santa Margarita Parkway and turn south under Marguerite Parkway to Olympiad Road. From Olympiad Road, the line would cross Alicia Parkway and be directed into the Chiquita Substation, which is located on the southeast corner of Olympiad Road and Alicia Parkway, where it would transition underground from a Chiquita Substation pedestal riser to the 75-foot TSP riser on Santa Margarita Parkway.

The proposed 66 kV overhead segment from Viejo Substation to Santa Margarita Parkway within the existing ROW would require approximately six new H-frame structures and one riser pole. Mixed-use commercial, residential, and parklands are located along the streets south of Santa Margarita Parkway. Construction methods for the overhead portion would be the same as those described for the proposed Viejo System Project in the MND/IS. The types of equipment that would be used for installing the overhead and underground portions are listed in Table 8-1. The specific components of undergrounding are described below.

Table 8-1. Construction Equipment

Vehicle Type for Overhead Installation	Vehicle Type for Underground Installation
Hydraulic Crane 120 to 180 ton	Ditch witch/trenching tractor
Material Truck	Material Truck
Manlift	Dump Truck
Well Drilling Rig	Backhoe
Cement Truck	Well Drilling Rig
Crew Pickup	Cement Truck
Power Line Construction Derrick trucks	Crew Pickup
Three Reel Rope Dolly	Asphalt Paver
Three Reel Wire Dolly	Crew Vehicles
Tractor\Trailer	
Helicopter	

Components of Undergrounding

Riser Pole Construction. The riser pole is the point at which overhead lines are converted to underground lines, and would be approximately 75 feet tall. The underground cables would be routed down from the pole cross arms through plastic conduits. One riser pole would be constructed within the existing 220 kV corridor near its intersection with Santa Margarita Parkway and one would be constructed outside the Chiquita Substation.

Digging and Trenching. A 19-inch wide and six-foot deep trench would be required to place the conduits underground. After the pavement is cut and hauled away, trenching would be performed with a backhoe and other machinery specifically designed for this purpose. Spoils would be placed alongside the trench and used for backfill.

Vault Installation. Vaults would be below grade (i.e., below the surface) concrete enclosures where the conduit segments terminate. The vault dimensions would likely be approximately 15 feet long by 12 feet wide by 8 feet deep, constructed of reinforced concrete and buried within the existing roadways. The vaults are constructed specifically for use in roadways and can accommodate vehicle loads without damage. Vaults house equipment and splices for underground circuits. Because there is a practical limit to the length of cable supplied on a reel, vaults would be located where necessary (approximately every 1,500 feet, on average) to allow splicing of the cable ends together.

Duct Bank Installation. Conduits are positioned in a specific configuration and held in the trench by a frame (duct bank). After placement, the duct bank would be encased in approximately three feet of concrete. The concrete encasement provides improved heat conduction and protection from accidental dig-ins. The duct banks commonly used for 66 kV installation have a rectangular cross-section of 19 by 23 inches.

Backfill Placement. Once the concrete cured, spoils would be used to backfill the trench and return the excavation to original grade. If installation is under a paved roadway, the paved area that was cut for the cable installation would be repaved to match the existing roadway.

Cable Pulling. After the conduit and the riser poles have been constructed, the cable is installed. Starting at one end, cable is pulled from the first vault up through the riser pole. Cable is then pulled through to the next vault, and so on, until the last length of cable has been pulled through the last riser pole. Once installed, the cable is ready to be spliced, terminated, tested, and energized. This would require the installation of two cables per phase, resulting in the use of all six available conduits.

Cut-over. The final step in the process involves energizing the new cable. To accomplish this, the circuit is temporarily taken out of service. Once the line is out of service, crews can safely connect the existing overhead lines to the new underground cables at the riser pole. When this job is finished, the line is returned to service, and energy would flow through the underground conductors.

Construction Schedule

SCE estimates that the completion of the underground substructure would take approximately 143 days. This duration does not take into account potential problems such as unmarked underground facilities or limited work schedule on public streets. As with all SCE underground construction, Underground Service Alert would be contacted to ensure minimal impact to other co-located utilities. Traffic control would be used during all public street work in accordance with work safety measures and traffic control plans in the Work Area Protection and Traffic Control Manual (CJUTCC, 1999). The installation of the cable portion would take approximately 118 days.

The overhead portion could be completed in approximately 48 days barring unforeseen problems. The overhead portion would require minimal street work with the exception of the standard wire stringing safeguards such as guard poles set at Los Alisos Boulevard and El Toro Road. Since the submittal of its application in March 2003, SCE determined that it would be necessary to use a helicopter for stringing conductor across the Foothill Transportation Corridor. The use of a helicopter is required at this location due to the topography of the site and the need to string conductor across the Transportation Corridor. The Foothill Transportation Corridor, as it crosses Also Creek and El Toro Road, is elevated well above ground level. The stringing would require the use of a helicopter for approximately eight hours and would be used during daylight hours only. This last action would require a Caltrans encroachment permit as discussed in Section B.1.11 of the MND/IS.

Evaluation of Environmental Factors

For those issue areas where there would be a difference in environmental impacts between the alternative and the proposed project, an analysis is provided in relation to the evaluation factors described above. The environmental impacts of this alternative would be identical to those described in detail in the MND/IS for the overhead portions of the proposed project for all issue areas. For the underground portion, the differences are as follows:

- **Aesthetics.** The southern segment between Santa Margarita Parkway and the Chiquita Substation would be installed underground within existing roads with little remaining visual evidence of its installation. This transition underground would be marked by a 75-foot riser pole near the location of proposed H-frame HF-10, which could potentially result in a negative visual impact. During construction, equipment and construction activity would be visible from neighboring properties and passing motorists. For the underground portion of this alternative, no visual impacts associated with the installation of new overhead structures would occur. The implementation of this alternative would have reduced visual impacts compared to the proposed project. While this option would have a greater number of structures (see Design, below) than would implementation of the proposed project, these are existing structures. The project as proposed would have an adverse but less-than-significant visual impact on the surrounding environment, while this option would eliminate the permanent visual impact associated with the new H-frame structures.
- **Air Quality.** Construction emissions for the overhead segment of this alternative would generate daily emission levels similar to those shown in Table B.3-4 and Appendix 4 of the MND/IS. Construction of the underground segment would cause less emissions of fugitive dust because the activity in streets

would occur on paved surfaces. Emissions from heavy equipment would be similar to those of the proposed project because although increased use of the roller and trencher would occur, there would be a decreased need for the crane and forklift during underground cable installation. Similar to the proposed project appropriate measures would be implemented to control fugitive dust emissions associated with ground-disturbing activities and minimize possible nuisances. Mitigation measures would be necessary to reduce emissions from heavy equipment exhaust. Once in operation, minor emissions from vehicle trips for maintenance purposes would be similar to the proposed project.

- **Biology.** South of El Toro Road, construction activities associated with undergrounding would not result in impacts to biological resources. Locating construction activities away from vegetated areas, including native and landscaped areas, would decrease the potential for unanticipated impacts to biological resources as compared to the proposed project.
- **Cultural Resources.** The transmission ROW is underlain by the Oso Member of the Capistrano Formation, Quaternary Non-Marine Terrace Deposits, the La Vida and Soquel Members of the Puente Formation, the Monterey Formation, the Topanga Formation, Quaternary Alluvium and Colluvium, and Quaternary Landslide Deposits. These geologic units and formations are highly sensitive and, therefore, construction of the underground portion of this alternative may result in the destruction of significant paleontological resources unless proper mitigation measures are implemented. While it is likely that sufficient mitigation measures could be developed to reduce potential impacts to a less-than-significant level, without extensive survey, the potential for significant impacts would still exist. Due to soil and land disturbance associated with undergrounding, the impacts of this alternative would be slightly greater than the proposed project.
- **Geology and Soils.** For the undergrounding portion south of Santa Margarita Parkway, appropriate control measures would need to be implemented to minimize erosion of excavated material during construction. In addition, due to the flexion inherent in overhead transmission lines, the lines can generally withstand surface fault ruptures. However, since buried transmission lines have less flexion, they are more susceptible to impacts from surface fault ruptures. Therefore, there is a higher likelihood of damage to the underground portions of the transmission line due to seismic and geologic conditions than would be experienced by the proposed project, which may in turn result in greater occurrences of needed repairs than overhead lines. Therefore, undergrounding has a greater potential for geologically-related impacts. Due to soil and land disturbance associated with undergrounding, the impacts of this alternative would be slightly greater than the proposed project.
- **Noise.** Construction noise impacts associated with the overhead portion would be the same as those described for the proposed Viejo System Project. Construction of the underground segment would occur within urban arterial roads within residential and commercial portions of the City of Mission Viejo. This would cause increased noise levels for additional residential areas along Santa Margarita Parkway, Marguerite Parkway, and Olympiad Road. This alternative would also increase the adverse effect of vibration because of the need to excavate a continuous trench in bedrock. Similar to the proposed project, the increased noise and vibration levels would be short-term, and they would need to comply with local noise ordinances, but they would be of a longer duration because of the slower pace of trenching for underground cable installation. Operational noise impacts would be similar to the proposed project, except that no corona noise would occur south of Santa Margarita Parkway to the Chiquita Substation.
- **Public Services and Utilities.** Construction activities could inadvertently disrupt existing co-located underground utilities, possibly leading to short-term service interruptions. Further investigation would be needed to ensure this option could be installed without disrupting other existing underground utilities, and the availability of adequate space within the right-of-way. However, implementation of standard practices, such as contacting Underground Service Alert before excavation, could reduce potential construction impacts to a less-than-significant level, if space exists within the right-of-way

for the new transmission line. If space is not available for the transmission line, Option 1B may not be technically feasible to construct or significant impacts could occur through displacement of existing utilities. The southern segment would be constructed within urban arterials, traveling down a portion of Olympiad Road. Construction activities may occur adjacent to the Fire Station 31, located on the north side of Olympiad Road just south of Melinda Road. To avoid obstructions to Fire Department ingress and egress, construction would occur in the lane furthest from the fire station or within the southbound lanes opposite the facility. This alternative would have a greater potential for co-location accidents and emergency access disruptions than the proposed project.

- **Recreation.** From Santa Margarita Parkway south to the Chiquita Substation, the project would be constructed within urban arterials and thus have no impact on recreation resources. With this alternative, the potential temporary recreational disruptions associated with the proposed project would not be experienced. However, this alternative would require a 75-foot tubular steel pole (TSP) transition structure at Santa Margarita Parkway (between Flamenco and Pinecrest Parks) to direct the line from the overhead portion to the underground conduits. Located between the parks, this structure would have no permanent impacts to access or use of these parks.
- **Transportation and Circulation.** From Santa Margarita Parkway south to the Chiquita Substation, the project would be constructed within urban arterial streets. At least one traffic lane would be blocked during construction. Implementation of this alternative would result in a significant amount of additional temporary construction impacts within public road rights-of-way compared to the proposed project's overhead alignment, which would have little direct effect on roadways. This alternative would cause a much greater likelihood of disrupting travel on Santa Margarita Parkway, Marguerite Parkway, and Olympiad Road. This would increase the likelihood of obstructing access to any properties along the underground route, which would require additional mitigation measures to coordinate with businesses and residences and preserve continuous access, reducing potential impacts to less-than-significant levels. Additionally, Orange County Transit Authority (OCTA) bus routes occur along portions of the underground route. During construction, the bus routes and their associated bus stops could be temporarily disrupted by lane closures and impeded access to designated bus stops. Mitigation would consist of coordinating with OCTA to temporarily reroute buses or relocating bus stops. Operation of the subtransmission line would require periodic maintenance visits to inspect vaults and related infrastructure. These are anticipated to occur once per month and are not anticipated to adversely affect traffic. The underground segment is not anticipated to generate maintenance traffic.

Evaluation of Technical and Economic Factors

Following are the feasibility, engineering, and cost differences between the combined overhead/underground alternative and the proposed project:

- **Engineering.** Transmission line structures used to support overhead transmission lines must meet the requirements of the California Public Utilities Commission, General Order No. 95, Rules for Overhead Electric Line Construction. This design code and the National Electrical Safety Code include loading requirements related to wind conditions. Transmission support structures are designed to withstand different combinations of loading conditions including extreme winds. These design requirements include use of safety factors that consider the type of loading as well as the type of material used (e.g., wood, steel, or concrete). Failures of transmission line support structures are extremely rare and are typically the result of anomalous loading conditions such as tornadoes or ice-storms. Overhead transmission lines consist of a system of support structures and interconnecting wire that is inherently flexible. Industry experience has demonstrated that under earthquake conditions structure and member vibrations generally do not occur or cause design problems. Overhead transmission lines are designed for dynamic loading under variable wind conditions that generally exceed earthquake loads. Design codes stipulate minimum burial depths for underground transmission lines. For underground lines, a major challenge is design and routing of the underground duct bank around/past other existing underground utilities, such as water and sewer lines, which typically results in burial deeper than code minimums. Avoiding potential damage to the transmission cables due to "dig-ins" is accomplished by enclosing the cable conduits in a concrete duct bank. Underground transmission lines are susceptible to ground motion and displacements that may occur under earthquake loading. Earthquake conditions could result in damage or faults to underground transmission lines.

- **Design.** The length of this alternative would 3.6 miles (0.5 miles longer than the proposed project) with 2.5 miles of trenching within city streets. This alternative would have approximately six fewer of the new H-frame structures than the proposed project and would, therefore, not be replacing any corresponding structures south of Santa Margarita Parkway. The existing structures that are currently within the ROW would remain in place, thereby resulting in a greater total number of structures than the proposed project because none of the structures proposed to be removed would be eliminated. In addition, this alternative would require a 75-foot tubular steel pole (TSP) transition structure at Santa Margarita Parkway (between Flamenco and Pinecrest Parks) to direct the line from the overhead portion underground.

- **Cost.** Due to the greater length of this alternative (by approximately 0.5 miles) and the trenching required for the underground portion, the implementation of this alternative would be expected to cost more than the proposed project, based on costs of similar past projects.

EMF Effects

The underground portion of the transmission line would be installed in duct banks within city streets. City streets can be expected to have magnetic fields in areas directly above existing underground electric distribution lines or in the vicinity of existing overhead distribution lines. The existing environment is expected to include magnetic fields only in these areas with existing underground distribution lines. The field from underground distribution circuits will vary depending upon the line's current, arrangement of the phases, and the burial depth. The magnetic field from buried transmission lines depends greatly on the type of construction. Typically, magnetic fields would be higher for underground cables than for overhead transmission lines, because the field source is only a few feet from the ground surface. With overhead lines, the conductors are much further from the ground surface. However, due to the close spacing of the underground cables, the magnetic field is more concentrated near underground transmission cables and decreases more rapidly with distance from the cable, resulting in a greatly reduced width of exposure to magnetic fields compared with overhead portions of the line. The new underground line would introduce a new source of EMF into the area (i.e., outside of the existing transmission ROW). The magnetic field exposure of this alternative would be: 1) within roadways, exposing the driving public to magnetic fields depending on distance from the cable; and 2) on sidewalks, exposing pedestrians and adjacent land uses to magnetic fields. For the proposed 66 kV circuit, the magnetic field levels are anticipated to be similar to underground distribution lines, with the highest field levels directly above the cables ranging up to 30 mG and dropping to less than 2 mG at sidewalks along the street.

Viejo System Project, With the 66 kV Subtransmission Line Constructed Entirely Underground Within City Streets (PEA Option 1C)

This option would include the same proposed Viejo Substation and additional 66 kV line as the proposed project described in the MND/IS, but the 66 kV subtransmission line would be constructed entirely underground within city streets (see Figure 8-2). Construction of the underground line would require approximately 4.4 miles of trenching through city streets, installing a conduit system and necessary vaults, and pulling cable from the proposed Viejo Substation to Chiquita Substation.

The route would begin at the Viejo Substation site, travel underground within the substation site access road to the intersection of Definition Road and Icon Street, and then travel within Definition to Glenn Ranch Road. At Glenn Ranch Road, the line would turn and travel southwest within Glenn Ranch Road, then southwest within Portola Parkway under the SR 241 Foothill Transportation Corridor and south on Santa Margarita Parkway (i.e., Portola Road) to Marguerite Parkway. The line would then turn and travel south within Marguerite Parkway to Olympiad Road, cross Alicia Parkway and turn into Chiquita Substation located on the southeast corner of Olympiad Road and Alicia Parkway. Construction would require trenching within city streets, installing ducts, and crossing the bridge at El Toro Road and Portola/Santa Margarita Parkway via preinstalled cells or attach to the underside of the bridge over Aliso Creek. This alternative would require 15 vaults to complete the route from a Chiquita Substation pedestal riser to the proposed Viejo Substation.

Construction methods would be the same as those described for the underground segment of PEA Option 1B described above. Underground Service Alert would be contacted to ensure minimal impact to other co-located utilities. The time allotted for the completion of the underground substructure would be approximately 249 days, barring any unforeseen problems (i.e., unmarked underground facilities, and/or limited work schedule on public streets). Traffic control would be used during all public street work in accordance with work safety measures and traffic control plans in the Work Area Protection and Traffic Control Manual (CJUTCC, 1999). The installation and completion of the cable portion would take approximately 187 days.

Equipment used would be same the as those described in Table 1 above for the underground portion of PEA Option 1B.

This route is entirely underground within SCE's proposed Viejo Substation site access road and urban roadways. The study area from Glenn Ranch Road south to SR 241 is primarily undeveloped or light industrial. The area south of SR 241 includes mixed-use commercial developments, parklands and residential areas. With the exception of Definition Road located just north of the Viejo Substation site, all potentially affected roadways are main arterials through the Cities of Lake Forest and Mission Viejo.

Evaluation of Environmental Factors

For those issue areas where there would be a difference in environmental impacts between this alternative and the proposed project, an analysis is provided in relation to the evaluation factors described above. The impacts of this alternative are as follows:

- **Aesthetics.** With the exception of the overhead structures adjacent to the substations, the transmission line would be installed underground. Therefore, long-term aesthetic impacts would be minimal. During construction, equipment and related activity would be temporarily visible from neighboring properties and passing motorists. The majority of the aesthetic impacts that would be experienced as a result of the proposed project would not occur with implementation of this underground alternative. The existing 66 kV and 220 kV transmission lines would remain above ground, resulting in no substantial change in the appearance of the transmission corridor.
- **Air Quality.** Construction of subtransmission line entirely underground would cause less emissions of fugitive dust because the activity in streets would occur on paved surfaces, and emissions from heavy equipment would be similar to those of the proposed project. Although increased use the roller and trencher would occur during underground cable installation, there would be a decreased need for the crane and forklift. Similar to the proposed project, appropriate measures would be implemented to control fugitive dust emissions associated with ground-disturbing activities and minimize possible nuisances, and mitigation measures would be necessary to reduce emissions from heavy equipment exhaust. Once in operation, minor emissions from vehicle trips for maintenance purposes would be similar to the proposed project.

- **Biology.** Construction of the subtransmission line entirely within city streets would effectively reduce or eliminate potential impacts to biological resources.
- **Cultural Resources.** The portion of this alternative north of the Viejo Substation site would traverse known cultural sites CA-ORA-825 and -826, which are also located within the Upper Aliso Creek Historic District. CA-ORA-825 was originally recorded as an extensive lithic scatter with the potential for subsurface deposits and CA-ORA-826 was originally recorded as small lithic scatter. Due to the lack of artifacts discovered during the 1980 survey, no subsurface testing was conducted. No new cultural material was identified as a result of recent investigations. However, recent testing by SCE concluded that these sites are located under approximately 40 feet of fill, placed by the Foothill Ranch Company during road construction. Given the depth of fill over these sites, it is likely that these sites could be avoided as SCE estimates construction would require trenching of approximately six feet deep and no more than seven to eight feet. However, to consider Option 1C for approval, additional testing would need to be done and evaluated in a future CEQA document. The subtransmission line route is underlain by Oso Member of the Capistrano Formation, Quaternary Non-Marine Terrace Deposits, the Monterey Formation, the Topanga Formation, Quaternary Alluvium and Colluvium, and Quaternary Landslide Deposits. These geologic units are highly sensitive and, therefore, construction of the subtransmission line may result in the destruction of significant paleontological resources unless proper mitigation measures are implemented to ensure less-than-significant impacts.
- **Geology and Soils.** During construction, site-appropriate control measures would need to be implemented to minimize erosion of excavated material from trenching. In addition, since buried transmission lines have less flexion, they are more susceptible to impacts from surface fault ruptures. Therefore, there is a higher likelihood of damage to the transmission line due to seismic and geologic conditions than would be experienced by the proposed project, which may in turn result in greater occurrences of needed repairs. Due to soil and land disturbance associated with undergrounding, the impacts of this alternative would be slightly greater than the proposed project.
- **Hydrology and Water Quality.** Aliso Creek crosses below a bridge at the intersection of El Toro Road and Portola Parkway. The transmission line would have to pass through a conduit attached to the bridge structure. However, since the line would be attached to an existing bridge and no work would occur in the stream channel, there would be no impacts to hydrology or water quality associated with this crossing.
- **Noise.** Construction of the subtransmission line would occur within urban arterial roads within industrial, residential, and commercial portions of the City of Lake Forest and the City of Mission Viejo. This would cause increased noise levels for additional residential areas along Santa Margarita Parkway, Marguerite Parkway, and Olympiad Road. Similar to the proposed project, the increased noise levels would be short-term, and they would need to comply with local noise ordinances, but they would be of a longer duration because of the slower pace of trenching for underground cable installation. Operational noise impacts would be similar to the proposed project, except that no corona noise would occur.
- **Public Services and Utilities.** Construction activities could inadvertently disrupt existing co-located underground utilities, possibly leading to short-term service interruptions. Further investigation would be needed to ensure this option could be installed without disrupting other existing utilities already in the streets' rights-of-way. However, implementation of standard practices, such as contacting Underground Service Alert before excavation, could reduce potential construction impacts to a less-than-significant level, if space exists for the new transmission line. If space is not available for the transmission line, significant impacts could occur through displacement of existing utilities. Given that this alternative would be entirely within city streets, there is a potential for temporary disruption of emergency service access. As such, this alternative would have a greater potential for co-location accidents and emergency access disruptions than the proposed project.

- **Recreation.** With this alternative, no disruption to recreation facilities would occur and the potential temporary recreational access impacts of the proposed project would not be experienced.
- **Transportation and Circulation.** Impacts associated with construction of this alternative would be similar to those described for the southern segment of the previous alternative (PEA Option 1B). Construction of the underground route would disrupt travel and obstruct access to properties along Definition Road, Glenn Ranch Road, Portola Parkway, Santa Margarita Parkway, Marguerite Parkway, and Olympiad Road, and this alternative would require additional measures to coordinate with businesses and residences and preserve continuous access. Additionally, measures would be needed for coordinating with OCTA for minimizing disruption of bus routes. Operation of the subtransmission line would also require periodic maintenance visits to inspect vaults and related infrastructure approximately once per month, which would not adversely affect traffic.

Evaluation of Technical and Economic Factors

Following are the feasibility, engineering, and cost differences between this underground alternative and the proposed project:

- **Engineering.** As described above for the combined overhead/underground alternative (PEA Option 1B), underground transmission lines are susceptible to ground motion and displacements that may occur under earthquake loading. Earthquake conditions could result in damage or faults to underground transmission lines. Given that this alternative would be entirely underground, the risk of damage during an earthquake is greater than with the proposed project using all overhead construction.

- **Design.** The length of this alternative would be 4.4 miles (1.3 miles longer than the proposed project). This alternative would have approximately 10 fewer of the new H-frame structures than the proposed project. This alternative would not result in the removal of any of the existing structures that are currently within the transmission corridor ROW. This alternative would require trenching within 4.4 miles of city streets, installing ducts, and crossing the bridge at El Toro Road and Portola/Santa Margarita Parkway via preinstalled cells or attachment to the underside of the bridge over Aliso Creek. These additional technical issues would add complexity to the design process, likely increasing both design time and project cost. This alternative would require 15 underground vaults to complete the route from a Chiquita Substation pedestal riser to the proposed Viejo Substation. While most of the structures associated with this option would be underground, there would be several aboveground access points for maintenance activities. The visual impact of these structures would be minimal and not substantially different from the existing urban environment along city streets.

- **Cost.** Due to the length of this alternative and the trenching required, the implementation of this alternative would be expected to cost more than the proposed project, based on costs of similar past projects.

EMF Effects

This alternative would be installed in duct banks within city streets. City streets can be expected to have magnetic fields in areas directly above existing underground electric distribution lines or in the vicinity of existing overhead distribution lines. The existing environment is expected to include magnetic fields only in these areas with existing underground distribution lines. The field from underground distribution circuits will vary depending upon the line's current, arrangement of the phases, and the burial depth. The magnetic field from buried transmission lines depends greatly on the type of construction. Typically, magnetic fields would be higher for underground cables than for overhead transmission lines, because immediately above the underground cable the field source is only a few feet from the ground surface.

With overhead conductors, the conductors are much further from the ground surface. However, due to the close spacing of the underground cables, the magnetic field is more concentrated near underground transmission cables and decreases more rapidly with distance from the cable, resulting in a greatly reduced width of exposure to magnetic fields compared with overhead portions of the line. The new underground line would introduce a new source of EMF into the area. The magnetic field exposure of the proposed project would be: 1) within roadways exposing the driving public to magnetic fields depending on distance from the cable; and 2) on sidewalks, exposing pedestrians and adjacent land uses to magnetic fields. For the proposed 66 kV circuit, the magnetic field levels are anticipated to be similar to underground distribution lines, with the highest field levels directly above the cables ranging up to 30 mG and dropping to less than 2 mG at sidewalks along the street.

Additional Alternatives Considered by the CPUC

Undergrounding the Proposed 66 kV Subtransmission Line within the Existing Right-of-Way

In their PEA, SCE briefly evaluated the feasibility of installing the proposed Viejo-Chiquita 66 kV line underground within the existing 220/66 kV transmission corridor. The large number of vaults (potentially up to approximately 35) required to hold the cable in place, as indicated in the Transmission Underground Standards Manual, presented feasibility concerns for SCE, including the following:

- Cable pulling equipment would not be able to pull cable without breaking or the underground cable, or ripping the ducts out of the ground due to a combination of rough terrain and the fact that the weight of the underground cable would exceed the limits of the pulling equipment;
- Extensive access roads would have to be constructed for trenching and to reach the vaults;
- Water drainage and erosion issues, and
- Lack of availability of space to install the substructures without undermining some of the existing pole footings.

Because of these issues, SCE did not consider undergrounding the 66 kV subtransmission line in the existing 220 kV corridor to be a viable alternative.

The CPUC conducted its own preliminary investigation of the feasibility of placing the proposed 66 kV line underground in the existing transmission corridor. The existing transmission line ROW presents a number of challenges to establishing a conventional underground transmission line duct bank, including:

- Extremely rugged terrain with steeply sloping ravine areas;
- Amount of shallow bedrock that could be encountered when building a duct bank within the existing ROW; and
- Due to the potential need for use of the entire width of the ROW, the existing transmission line structures within the ROW may have to be removed and placed back in upon completion of undergrounding.

Components of Undergrounding

Overcoming the described challenges of undergrounding in the existing ROW may be possible through the use of non-conventional duct bank construction. Duct banks are typically built with minimal slope so that the cable can be more easily pulled into place and remain in position once installed. A potential solution would require routing the duct bank in a switchback configuration back and forth across the steep terrain in order to minimize the slope in any given duct bank section. Typically, duct banks are 1,500 feet apart in relatively flat areas. Duct placement in steep terrain and sloped areas such as the proposed ROW is likely to require much shorter duct bank sections and may necessitate a pulling vault at each turning point.

Use of this configuration could easily result in the actual length of duct bank being two to three times as long as the linear distance actually covered. Therefore, for a two-mile line section the total duct bank would be four to six miles in length. It is anticipated that this type of construction could require disturbance over the entire width of the ROW.

In addition, construction in shallow bedrock greatly increases the difficulty of excavation and the time to build the duct bank. A significant concern of building the proposed line within the shallow bedrock of the existing ROW would be heating of the energized cables. Power flow in underground cables generates heat that needs to be dissipated into the surrounding soil to avoid cable overheating. Bedrock is a poor conductor of heat, which could result in heat build-up along the duct bank that could weaken the cable insulation leading to failure of the underground cable. This issue may be overcome by the design and construction of the duct bank, but could potentially entail excavating a much larger trench than typically used in order to place a thermal sand backfill around the duct bank to improve heat transfer.

In view of the issues outlined above, it is anticipated that using underground construction in lieu of overhead along the southern two miles of ROW could result in much higher project costs than would typically be assumed for a conventional duct bank. It would also require additional time to build.

Construction Schedule

With regard to construction time, all of the factors mentioned above, such as steep terrain, increased ground disturbance issues, and rock excavation, are expected to substantially increase the time required for duct bank construction. Assuming an actual duct bank length of four miles, construction within the ROW could require as much as 18 weeks per mile of duct bank and 15 weeks per mile to install and splice the cable. Recognizing that the cable installation can begin before the entire duct bank is complete, the total construction time is estimated to be 20 to 22 months.

Evaluation of Environmental Factors

For those issue areas where there would be a difference in environmental impacts between this alternative and the proposed project, an analysis is provided in relation to the evaluation factors described above. The impacts of this alternative are as follows:

- **Aesthetics.** With the exception of the overhead transition structures that would need to be adjacent to the substation, the transmission line would be installed underground. Therefore, long-term aesthetic impacts of this alternative would be minimal. During construction, equipment and related activity would be temporarily visible from neighboring properties and passing motorists. The temporary view of construction equipment activities would be much longer than with the proposed project due to the amount of trenching required for this alternative and the slower rate of construction than the proposed project. The majority of the aesthetic impacts that would be experienced as a result of the proposed project would not occur with implementation of this underground alternative.
- **Air Quality.** Construction of subtransmission line entirely underground within the existing ROW would cause greater levels emissions of fugitive dust because the activity would occur entirely on unpaved surfaces and a substantially greater amount of loose material would have to be excavated and handled for creating the continuous trench. Emissions from heavy equipment would be similar to those of the proposed project and the underground segments of other alternatives (e.g., PEA Option 1C), except that a greater total number of haul truck trips would be needed to remove bedrock excavated from the trench. Similar to the proposed project, appropriate measures would be implemented to control fugitive dust emissions associated with ground-disturbing activities and minimize possible nuisances, and mitigation measures would be necessary to reduce emissions from heavy equipment exhaust.
- **Biology.** Construction requirements associated with the underground installation of the proposed subtransmission line within the existing right-of-way (ROW) would increase the potential for impacts

to sensitive biological resources along the ROW. South of Los Alisos Boulevard, the ROW crosses an urban park containing Oso Creek, an ephemeral drainage bordered by dense riparian scrub. Construction in this area would require the removal of non-native grassland and mature riparian vegetation including willows (*Salix* sp.), mule fat (*Baccharis* sp.), and other riparian trees. This alternative would result in disturbance to waters of the State and require additional permitting through the California Department of Fish and Game. Undergrounding activities would also increase the potential for impacts to nesting birds. Clearing, grubbing, and trenching activities would require the removal of large quantities of both native and landscaped vegetation located along the ROW. Due to the number of vaults required for underground construction permanent access roads would be required, increasing the total amount of habitat disturbed during construction. Restoration of the area after construction would replace some of the lost vegetation; however, current pipeline safety requirements typically limit the size and amount of vegetation restored along transmission line routes. The extent and duration of construction along the existing ROW would also impact large numbers of non-sensitive species and have the potential to disrupt wildlife movement for extended periods of time. Soils disturbance from construction activities would also increase the potential for impacts to surface waters as a result of erosion and off-site sediment transport.

- **Cultural Resources.** There is a greater potential to encounter cultural resources due to the greater ground disturbance experienced with this alternative. In addition, the ROW is underlain by the Oso Member of the Capistrano Formation, Quaternary Non-Marine Terrace Deposits, the La Vida and Soquel Members of the Puente Formation, the Monterey Formation, the Topanga Formation, Quaternary Alluvium and Colluvium, and Quaternary Landslide Deposits. These geologic units and formations are highly sensitive and, therefore, construction of the underground portion of this alternative may result in the destruction of significant paleontological resources unless proper mitigation measures are implemented. While appropriate mitigation measures could likely be developed, the potential for adverse impacts would be higher than with the proposed project. Due to the amount of soil and land disturbance associated with undergrounding, the impacts of this alternative would be slightly greater than the proposed project.
- **Geology and Soils.** During construction, appropriate control measures would need to be implemented to minimize erosion of excavated material from trenching. In addition, since buried transmission lines have less flexion, they are more susceptible to impacts from surface fault ruptures. Therefore, there is a higher likelihood of damage to the transmission line due to seismic and geologic conditions than would be experienced by the proposed project, which may in turn result in greater occurrences of needed repairs. Due to soil and land disturbance associated with undergrounding, the impacts of this alternative would be slightly greater than the proposed project.
- **Noise.** Installation of the underground subtransmission line in the ROW would occur within shallow bedrock, which would cause a much greater intensity of noise during construction. An increased need for rock drilling and excavation would prolong the effects of intense peak noise levels. This alternative would also increase the adverse effect of vibration because of the need to excavate a continuous trench in bedrock. Similar to the proposed project, the construction noise and vibration would be short-term, and they would need to comply with local noise ordinances, but they would be of a longer duration because of the slower pace of trenching for underground cable installation.
- **Public Services and Utilities.** Construction activities could inadvertently disrupt existing co-located underground utilities, possibly leading to short-term service interruptions. However, implementation of standard practices, such as contacting Underground Service Alert before excavation, would reduce potential construction impacts. This alternative would have slightly greater potential for co-location accidents than the proposed project given the amount of trenching required.
- **Recreation.** Given the amount of trenching required and the requirement for construction of access roads for vault placement, it is likely that the recreational resources along the ROW would experience

long periods of closure or access disruptions. Specifically, since the ROW traverses Florence Joyner Olympiad Park, Crestwood Park, and Pinecrest Park, portions of these parks would likely have to be closed during construction to allow for trenching, vault and duct bank installation, cable pulling, and restoration of the park back to its original state. In addition, the access roads required for the vaults would have to remain in place for maintenance of the line during operation. Due to the extensive coverage area of the likely switchback arrangement, much of the existing right-of-way, including current parkland, could remain inaccessible even after construction is complete. There is a potential for significant short- and long-term impacts to recreational resources as a result of this alternative. Therefore, this alternative would have much greater impacts on recreational resources due to access disruptions.

- **Transportation and Circulation.** Impacts associated with construction of this alternative would be similar to those described for the proposed project, except that a greater total number of haul truck trips would be needed to remove bedrock excavated from the trench.

Evaluation of Technical and Economic Factors

Following are the feasibility, engineering, and cost differences between this underground alternative and the proposed project:

- **Engineering.** Construction of an underground transmission line would require more construction due to the continuous trench, whereas overhead transmission line construction would result in construction disturbance primarily at individual structure sites. In addition, the potential need for use of the entire width of the ROW for undergrounding may result in the removal of the existing transmission line structures within the ROW, which would have to be replaced upon completion of project. As described above for the SCE's underground alternatives, underground transmission lines are susceptible to ground motion and displacements that may occur under earthquake loading. Earthquake conditions could result in damage or faults to underground transmission lines. Given that this alternative would be entirely underground, the risk of damage under earthquake conditions is greater than with the proposed project using overhead construction.

- **Design.** The length of this alternative would be about 4.0 to 6.0 miles (approximately 0.9 to 2.9 miles longer than the proposed project). This alternative would have approximately 11 fewer of the new H-frame structures of the proposed project. However, this alternative would not result in the removal of any of the existing structures that are currently within the ROW. This alternative would require two aboveground structures to transition the underground line into the Viejo and Chiquita Substations. These aboveground transition structures likely would be located near proposed towers HF-13 and HF-01, respectively.

- **Cost.** Due to the amount of trenching required in rough terrain and shallow bedrock within the existing ROW, the implementation of this alternative would require a longer construction schedule and would be expected to cost more than the proposed project, based on costs of similar past projects.

EMF Effects

This alternative would be installed in duct banks within the existing ROW. The magnetic field from buried transmission lines depends greatly on the type of construction. Typically, magnetic fields would be higher for underground cables than for overhead transmission lines, because immediately above the underground cable the field source is only a few feet from the ground surface. With overhead conductors, the conductors are much further from the ground surface. However, due to the close spacing of the underground cables, the magnetic field is more concentrated near underground transmission cables and decreases more rapidly with distance from the cable, resulting in a greatly reduced width of exposure to magnetic fields compared with overhead portions of the line. The magnetic field exposure of this alternative would be: (1) within recreation areas exposing recreationists to magnetic fields depending on distance from the cable; and (2) to adjacent residences.

Alternative Tower Design (Monopole Structure)

The CPUC also considered an alternative 66 kV transmission line structure design that would be a large TSP monopole rather than the H-frame structures as proposed by SCE. These monopole structures would be capable of carrying three 66 kV circuits, but would not have capacity for a future fourth circuit. This alternative would be identical to the proposed project as described in the MND/IS (i.e., PEA Option 1A), except that the transmission line structures would have one pole at the base rather than the proposed two-leg H-frames. Two visual simulations have been prepared to show the appearance of the monopole structures relative to the existing conditions within the ROW. Figures 8-3 and 8-4 present these visual simulations. MND/IS Figures 11, 12, 19, and 20 (proposed project Key View Points (KVPs) 1 and 5) illustrate the existing conditions and with proposed project conditions at the same KVPs in Figures 8-3 and 8-4.

For the most part, construction methods and requirements and project operation would be identical to the proposed project as described in the MND/IS. The alternative monopole tower design would include the following features:

- On average, 136 feet total structure height;
- Total of 5 arms spaced at 8 feet increments along the pole shaft, at elevations of 136 feet, 128 feet, 120 feet, 112 feet, and 104 feet;
- Pole top diameter of 34 inches; and
- Pole base diameter of 80 inches.

The insulator arrangements would be essentially the same configuration as those described for the proposed project H-frame structure, except the monopole structures would be 16 feet taller. The monopole structures would also be larger diameter than the individual legs of the proposed H-frame structures. The towers would be located in the same locations as the H-frames for the proposed project discussed in the MND/IS. Proposed project tower locations are shown on MND/IS Figure 7.

Evaluation of Environmental Factors

Environmental impacts of this alternative generally would be identical to those described in detail in the MND/IS for the proposed project for all issue areas except:

- **Aesthetics.** The monopole design offers some improvements compared to the proposed project in terms of visual impacts, but also presents some drawbacks. The monopole structures would be approximately 25 feet taller than the H-frame structures of the proposed project, on average, and the shaft diameter (nearly seven feet) of the monopole would be greater than either of the two individual pole shafts in each H-frame structure. These features would add to the bulk and visual prominence of the monopoles, but would be offset by the fact that the monopoles would have only a single pole shaft compared to the two pole shafts of the H-frame structure. In addition, the monopoles would not have the long horizontal cross arms of the H-frame and, instead, would have shorter side arms on each side of the monopole. Therefore, the monopole design has two drawbacks compared to the H-frames – taller height and thicker vertical pole shaft – but offers the advantage of a structure with only a single vertical pole shaft. The monopole design would have slightly reduced bulk and a simpler structural design than the H-frame structures, which reduces the overall visual prominence of the tower structures. Overall, the monopoles would have slightly less adverse visual impact than the proposed H-frame structures.

- **Noise.** Construction noise impacts associated with this alternative would be similar to those described for the proposed project, except that slightly less rock drilling noise would occur for the single pole foundation when compared to the two-footed configuration of the proposed project.
- **Transportation and Circulation.** Impacts associated with construction of this alternative would be similar to those described for the proposed project, except that the total number of haul truck trips might be slightly reduced because of the simpler configuration of the monopole structures when compared to the H-frames of the proposed project.

Evaluation of Technical and Economic Factors

The feasibility, engineering considerations, and cost factors for the monopole structures would be similar to the proposed project.

Conclusion

In general, underground construction and trenching involves greater short-term construction-related impacts (for example, traffic disruption and noise) than overhead construction. There is also a greater potential to encounter contaminated soils and cultural resources due to the greater amount of ground disturbance. However, underground construction within city streets results in potentially less impacts to biological resources, aesthetics, and recreational resources along the existing right-of-way.

The Combined Overhead/Underground (PEA Option 1B) and Underground in City Streets (PEA Option 1C) Options would capture some of the benefits associated with underground (i.e., aesthetic improvement), but would be subject to additional impacts associated with underground construction within existing city streets (e.g., traffic disruption and noise).

The Monopole Option developed by the CPUC would have similar impacts as the proposed project, but would have a different visual appearance, and potentially slightly less noise and traffic impacts than the proposed project. From a visual standpoint, the monopole design offers the advantage of a structure with only a single vertical pole shaft, but has two drawbacks compared to the proposed H-frame structures – taller height and thicker vertical pole shaft.

The Underground in Existing Transmission Corridor Option presents substantial technical and environmental problems and, at this time, is not considered feasible.

While all options except the Underground in Existing Transmission Corridor Option appear to be feasible and it seems possible to fully mitigate potential impacts, the analysis presented herein is preliminary and not conclusive. To consider adoption of any option or alternative other than the proposed project would require full CEQA environmental analysis and recirculation of a new CEQA document for public review and comment.

Table 8-2 provides a summary comparison of the alternative options to the proposed Viejo System Project (PEA Option 1A) to provide a snapshot overview of the comparative merits of each option.

Table 8-2. Summary Comparison of Alternatives to the Proposed Project

Evaluation Factor	Combined Overhead/ Underground (PEA Option 1B)	Underground in City Streets (PEA Option 1C)	Underground the New 66 kV Circuit in the Existing ROW	Monopole Structure
ENVIRONMENTAL FACTORS				
Environmental Impacts	Better than proposed project: • Aesthetics • Biological Resources Worse than proposed project: • Cultural Resources • Geology and Soils • Noise • Public Services and Utilities • Transportation and Circulation	Better than proposed project: • Aesthetics • Air Quality • Biological Resources • Recreation Worse than proposed project: • Cultural Resources • Geology and Soils • Noise • Public Services and Utilities • Transportation and Circulation	Better than proposed project: • Aesthetics Worse than proposed project: • Air Quality • Biological Resources • Cultural resources • Geology and Soils • Noise • Public Services and Utilities • Recreation • Transportation and Circulation	Better than proposed project: • Aesthetics • Noise • Transportation and Circulation Worse than proposed project: • None
Creation of Utility Corridors	Creates new electrical transmission corridor in city streets for underground portion	Creates an entirely new electrical transmission corridor in city streets	Does not create a new electrical transmission corridor	Does not create a new electrical transmission corridor
Land Use Disturbances	Greater disruptions to land uses immediately adjacent to ROW during construction due to longer construction duration for underground portion and future maintenance activities that would require roadway disturbance for underground portion	Greater disruptions to land uses immediately adjacent to ROW during construction due to longer construction duration and longer route for underground portion. Greater disruptions due to future maintenance activities that would require roadway disturbance	Greater disruptions to land uses immediately adjacent to ROW during construction due to longer construction duration and longer route for underground portion. Greater disruptions due to future maintenance activities that would require roadway disturbance	Similar to proposed project
Schedule	Approximately 7 months	More than 12 months	20-22 months	Similar to proposed project (about one year)
PUBLIC HEALTH FACTORS				
EMF Levels	Potentially greater than proposed project on the surface directly above the underground portion of the route, but decreasing more rapidly with distance from the line.	Potentially greater than proposed project on the surface directly above the underground route, but decreasing more rapidly with distance from the line.	Potentially greater than proposed project near the ground within the transmission ROW, but decreasing more rapidly with distance from the line.	Similar to proposed project
TECHNICAL AND ECONOMIC FACTORS				
System Reliability	Feasible	Feasible	Not feasible	Feasible, similar to proposed project
Engineering and Design	Feasible	Feasible	Not feasible	Feasible, similar to proposed project

Evaluation Factor	Combined Overhead/ Underground (PEA Option 1B)	Underground in City Streets (PEA Option 1C)	Underground the New 66 kV Circuit in the Existing ROW	Monopole Structure
Length of Line	3.6 miles	4.4 miles	4-6 miles	3.1 miles, similar to proposed project
Number Transmission Structures in Right-of-Way	Greater than proposed project	Greater than proposed project	Greater than proposed project	Similar to proposed project
Construction and Operation Access	Feasible	Feasible	Potentially feasible	Feasible, similar to proposed project
Construction and Maintenance Cost	Greater than proposed project	Greater than proposed project	Much greater than proposed project	Similar to proposed project

Figure 8-1

Option 1B route map

Figure 8-2

Option 1C route map

Figure 8-3

Key Viewpoint 1

Florence Joyner Olympiad Park

Visual Simulation – Monopole

Figure 8-4

Key Viewpoint 5

Sweet Meadow

Visual Simulation – Monopole