

A STUDY OF AERONAUTICAL CONSIDERATIONS

Associated With The Proposed

DEVERS-MIRAGE 115kV TRANSMISSION SYSTEM SPLIT and
DEVERS-COACHELLA VALLEY 220kV LOOP-IN PROJECT

For The

SOUTHERN CALIFORNIA EDISON COMPANY

By

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Introduction

The Southern California Edison Company (SCE) has retained *Stoner Associates* to evaluate a planned improvement project involving certain existing electrical power transmission lines¹ and associated substations in the Coachella Valley area of California's Riverside County. The project is generally referred to as "the Devers-Mirage 115kV System Split and Devers-Coachella Valley 220kV Loop-in". SCE is specifically interested in identifying any special aeronautical considerations for the project construction that may arise out of its proximity to aviation related land and airspace uses.

This study is based on information provided by SCE in March, August, and November of 2007. This report considers preliminary project plans included in SCE's November 6, 2007 draft of its *Proponents Environmental Assessment* (PEA). Plans were evaluated with respect to four public-use airports: Banning Municipal (BNG), Bermuda Dunes (UDD), Jacqueline Cochran Regional (TRM), and Palm Springs International (PSP). There are no military runways or public-use heliports in the area. The project sites are sufficiently distant from BNG and TRM to render them immaterial. Therefore, the project analyses are only relevant to PSP and UDD.

Project Description

To maintain electric system reliability, enhance operational flexibility, and serve projected electrical demand, SCE proposes to split its existing 115kV electrical power subtransmission system in the Coachella Valley region between its existing Devers and

¹ The term "transmission" as used in this report includes structures designed to support 220kV and 115kV power. There is generally no distinction made for "subtransmission" as used in the PEA.

Mirage transmission substations. In support of the split, SCE plans to create two new 220kV transmission lines into its Mirage Substation by looping in the existing Devers-Coachella Valley 220kV Transmission Line to create the Devers-Mirage No. 2 and Coachella Valley-Mirage 220kV feeds to the station.

Scope of Work

To accomplish the split in the 115kV system and provide quality of power supply, SCE plans to construct new and upgrade existing facilities at existing substations and along their associated transmission lines.

SUBSTATIONS

Substation work is summarized as follows:

Devers Sub – W/O Desert Hot Springs (PEA § 3.4.1)

Proposed improvements at Devers Substation include the replacement of four existing 115kV circuit breakers and the installation of new line protection relays and fifteen 115kV lightning arrestors to accommodate the new Devers-Eisenhower-Thornhill and Devers-Capwind-Mirage-Tamarisk 115kV transmission lines. Associated concrete foundations and steel supports will also be required.

The aboveground heights of this equipment will not exceed that of existing pole or tower structures in or near the substation. No new poles or towers are planned for this location.

Mirage Sub-Near Thousand Palms (PEA § 3.4.2)

Major 220kV equipment to be installed at Mirage Substation Includes a new transformer bank, five circuit breakers, ten disconnect switches, fifteen station post insulators, and

six metering potential transformers. New 115kV equipment includes five circuit breakers, ten disconnect switches, nine potential transformers, and twenty-seven post insulators.

In conjunction with work to reconfigure the switchback positions, concrete foundations and steel transformer racks, switch supports, and dead-end racks will be required. Transformer and dead-end racks will be various sizes, but are not expected to exceed 60 feet above the ground. Therefore, none of these facilities are likely to exceed the heights of existing poles and towers within or near the substation. (See "Transmission Line" discussion below).

Concho Sub – Palm Desert (PEA § 3.4.3)

The proposed substation improvements include only the installation of new line protection relays. No Major equipment, switchrack configurations, structural steel racks or concrete pads are planned for this location.

Indian Wells Sub (PEA § 3.4.4)

The proposed improvements at Indian Wells Substation involve only the replacement of protection relays for the existing 115kV transmission lines. No major equipment, switchrack configurations, or structural steel racks are planned for this location.

Santa Rosa Sub – Rancho Mirage (PEA §3.4.5)

Proposed improvements at Santa Rosa Substation include connecting the Santa Rosa-Mirage-Tamarisk 115kV transmission line and the Santa Rosa-Mirage line, and the installation of new line protection relays. No major equipment, switchrack configurations, or structural steel racks will be installed at this location.

Eisenhower Sub – Palm Springs (PEA §3.4.6)

Proposed improvements at Eisenhower Substation will require the replacement of three existing 115kV circuit breakers, the installation of a new disconnect switch, a potential transformer, and fifteen lightning arrestors. Concrete foundations, steel transformer, lightning arrestor, and switch supports will be required.

None of the substation improvements are likely to exceed the heights of two new engineered Tubular Steel Poles (TSPs) to be installed inside the substation. (See discussion of transmission line improvements below).

Farrell Sub – Palm Springs (PEA §3.4.7)

Major equipment to be installed at Farrell Substation includes a 115kV circuit breaker, three disconnect switches, a potential transformer, and three 115kV lightning arrestors. Concrete foundations, steel supports, and a dead-end rack will be required. The support structures will be approximately eight feet high and the dead-end rack is estimated to reach 27 feet above grade.

Garnet Sub – North Palm Springs (PEA §3.4.8)

The proposed improvements at Garnet Substation involve only the installation of the new Garnet-Farrell 115kV transmission line and new line protection relays. No major equipment or switchrack configurations are planned at this location.

Thornhill Sub – Palm Springs (PEA §3.4.9)

The proposed improvements at Thornhill Substation include the conversion of the existing Thornhill-Tamarisk 115kV transmission line to the new Thornhill-Devers-Eisenhower line and the installation of new protection relays. No major equipment, switchrack configurations, or structural steel racks or supports are needed at this location.

Tamarisk Sub – Rancho Mirage (PEA §3.4.10)

Proposed work at Tamarisk Substation involves the conversion of existing 115kV transmission lines to the new lines in accordance with the split. New components include the replacement of a 115kV circuit breaker in an existing position and installation of new line protection relays. The elevation of structures within the station are not expected to change significantly.

TRANSMISSION LINES

The proposed transmission line improvements that involve aboveground construction or alterations are along existing routes and right-of-way (ROW)². However, not all portions of these lines will be new, altered or rebuilt. For purposes of analyzing the aeronautical relevance, the parts of these lines that will be affected by construction are grouped and considered in six general locations. Alternate routes were not considered probable, so they are not evaluated.

115KV SYSTEM SPLIT

Area I – Mirage Substation South (PEA §3.1.1)

115kV transmission line improvements in this area include:

- Replace approximately 1,783 feet of the existing Mirage-Tamarisk single-circuit line with a new double-circuit line on new Light Weight Steel (LWS) poles in the existing ROW from Mirage Substation to Calle Desierto.
- Build a new single-circuit line on new support structures on the existing ROW approximately 2,447 feet between Calle Francisco and Calle Desierto. Two new TSPs will be installed at Calle Francisco where the line will continue south to Calle Desierto on LWS poles.

² ROW, as used in this report, includes SCE easements, fee-owned land, and franchise rights in the public way.

- Construct a new single-circuit line on wood poles in the existing ROW from Calle Desierto approximately 1,293 feet through the Tri-Palms golf course.
- Replace approximately 2,130 feet of the existing Devers-Capwind-Concho-Mirage line with a new double-circuit line on LWS poles from the golf course south to Highway I-10. Install three additional arms and insulators on the existing two double-circuit TSPs at I-10 to accommodate the freeway crossing.
- Replace an existing single-circuit wood pole near the intersection of Portola Avenue and Gerald Ford Drive in the City of Palm Desert with a new double-circuit TSP.

The maximum heights of poles to be constructed or altered in this area are not expected to exceed 102 feet above the ground at their sites.

Area II – Intersection of Dinah Shore Drive and Bob Hope Drive (PEA §3.1.1)

Two TSPs, one LWS pole, and one wood pole at the intersection of Dinah Shore Drive and Bob Hope Drive in Rancho Mirage will be replaced with four TSPs and three LWS poles. Three 115kV pole switches will be installed. Certain line conductors will be reconfigured to accommodate the split. Heights of structures at this location are not expected to exceed 100 feet above their ground levels.

Area III – Varner Road and Date Palm Drive (PEA Fig. 3.3-2)

Modifications in this area involve the removal of six existing 115kV transmission wood poles east of Date Palm Drive along and near Varner Road. Three of these will be replaced with new wood poles near their present locations. Another will be replaced with a new TSP on the south side of Varner Road. A new wood pole will be added on the south side of Varner Road about one span east of the new TSP.

Although the precise spacing, locations, and heights of these poles cannot be specifically determined until final engineering is completed, it is assumed that the new TSP will be the tallest and will not exceed 102 feet above the ground at its site.

Area IV – Eisenhower Substation (PEA § 3.3.2.4)

Although the 115kV transmission lines in this area will be reconfigured to accommodate the split, existing poles along the ROW are not expected to be affected. However, preliminary plans call for the removal of a TSP and the installation of two TSPs inside the substation. There are presently two TSPs inside Eisenhower Substation that are nominally 70 feet high. SCE anticipates that the elevations of the new TSPs are likely to be five to ten feet higher.

Area V – Farrell Sub North and West to Garnet Sub (PEA §3.3.2.4)

The existing Devers-Farrell-Windland 115kV Transmission Line will be rebuilt to create the new double-circuit Farrell-Garnet 115kV line along the existing ROW.

Approximately 138 single-circuit wood poles will be replaced by eight TSPs and approximately 161 double-circuit LWS poles along the existing route for about 5.3 miles between Farrell Substation in Palm Springs and Garnet Substation in North Palm Springs.

The specific placement and heights of the new poles are pending final engineering. The maximum height of the LWS poles is estimated at 65 feet above the ground. The TSPs could reach as high as 102 feet depending on their locations.

220KV LOOP-IN

Area VI – Mirage Substation North (PEA §3.5)

SCE proposes to create two new 220kV transmission lines by looping in the existing Devers-Coachella Valley 220kV line creating the Devers-Mirage No. 2 and the

Coachella Valley-Mirage 220kV transmission lines within existing ROW directly north of Mirage Substation. This section of the project will start at Mirage Substation and continue approximately 0.81 mile north to 30th Avenue, which is the approximate intersection of the existing northwest to southeast Devers-Coachella Valley 220kV ROW. It will involve the removal of four existing lattice steel towers (LSTs) and the construction of eight new LSTs and one TSP plus associated conductors, insulators, ground wires, and equipment.

The specific sites and heights of these structures will be determined by final engineering. However, the maximum heights above grade are not expected to exceed 163 feet for the LSTs or 142 feet for the TSP.

TELECOMMUNICATIONS SYSTEM

In addition to the proposed enhancements to the electrical system SCE proposes to install new fiber-optic equipment for relays at the affected substations. All telecommunications equipment will be installed within existing buildings. Project plans call for utilizing existing telecommunications cable between Mirage Substation and the SCE Palm Springs District Office in Cathedral City. The cable will be transferred from existing poles to the new 115kV transmission poles planned for installation in their existing ROW. The cable will occupy a lower grade on new or existing poles. Therefore, this system is not relevant to aeronautical considerations.

DISTRIBUTION SYSTEM

In accordance with SCE practice pursuant to California Public Utilities Commission General Order 95, overhead electrical power facilities for nominal voltages of less than

115kV are placed on a lower elevation when attached to transmission poles. Where applicable to this project, existing distribution facilities will be transferred from the old to the new transmission poles, so they are not considered relevant to our analysis of aeronautical considerations.

Study Criteria

Criteria used for these analyses are derived from federal, state, and local government rules, policies, and guidelines that are relevant to study questions. The criteria are interrelated and are discussed in the following publications:

Federal Aviation Administration (FAA)

- FAA Advisory Circular 150/5300-13 – “Airport Design”.
- Federal Aviation Regulations (FAR) Part 77 – “Objects Affecting Navigable Airspace” [14 CFR 77].
- “Airport / Facilities Directory – Southwest U.S.”

California Department of Transportation

- Division of Aeronautics (DOA) – “Airport Land Use Planning Handbook”.

City of Palm Springs, California

- “Palm Springs International Airport Master Plan Study”, March 2003.

County of Riverside, California

- Airport Land Use Commission – “Riverside County Airport Land Use Compatibility Plan,” October 2004.

FAA Criteria

The Federal Aviation Administration (FAA) establishes land use criteria around airports in two ways. The first generally addresses land uses near runway ends. The second addresses structure heights through obstruction clearance criteria.

Land Use Criteria

The FAA's "Airport Design" advisory circular (AC 150/5300-13) establishes a series of land use guidelines in areas beyond runway boundaries. The nature of these uses is related to defined "areas" or "zones".

Runway Protection Zone (RPZ) – The runway protection zone is recent FAA terminology for what the agency once called the "clear zone." The advisory circular defines it as "an area off the runway end intended to enhance the protection of people and property on the ground." The RPZ is trapezoidal in shape and centered about the extended runway centerline. It begins 200 feet beyond the area usable for aircraft takeoff and landing. The dimensions are functions of the design aircraft, type of operation, and visibility minimums. The RPZ is made up of the runway object free area (OFA) and the controlled activity area (defined below). The advisory circular states, "RPZ land use standards have recommendation status for that portion of the RPZ not controlled by the airport owner." PSP is owned and controlled by the City of Palm Springs.

The advisory circular contains the following language regarding land uses: "While it is desirable to clear all objects from the RPZ, some uses are permitted, provided they do not attract wildlife, are outside of the Runway OFA, and do not interfere with navigational aids."

The dimensions of the RPZs for each runway at PSP vary. For purposes of this study, only the approach ends of Runway 13R-31L are considered because they are nearest the proposed project sites, and therefore, the most relevant. The elements of the RPZ for each end of Runway 13R-31L are defined below.

Runway Object Free Area (OFA) – extends 1,000 feet beyond the runway end at a width of 800 feet. However, the advisory circular states, “Extension of the runway object free area beyond the standard length to the maximum extent feasible is encouraged.” According to the advisory circular, “objects non-essential for air navigation or aircraft ground maneuvering purposes are not to be placed in the OFA. This includes parked airplanes and agricultural operations.”

Controlled Activity Area – that portion of the RPZ beyond and to the sides of the Runway OFA. The outside dimensions of this area coincide with those of the RPZ for Runway 13R-31L. That is, the trapezoid expands from an inner width of 1,000 feet to 1,750 feet at its outer boundary, which is 2,700 feet beyond the runway end.

The practical limits of the RPZ at PSP are determined by the airport property boundaries along Ramon Road and East Vista Chino. Beyond that, development is controlled through the City of Palm Springs land use plans. The project sites are outside of the RPZs for all runways.

Height Criteria

Part 77, “Objects Affecting Navigable Airspace”, of the Federal Aviation Regulations (14 CFR 77) establishes a series of “imaginary surfaces” in the airspace surrounding a runway or helicopter landing area. These surfaces are meant to ensure an obstruction-free volume of airspace for pilots using the facility. Ideally, no object, natural or man-

made, should penetrate any imaginary surface defined in Part 77. This benefits the safety of aircraft using the landing area as well as the safety of persons and property on the ground. In addition, Caltrans' DOA applies Part 77's obstruction clearance criteria when granting airport permits and continues to enforce them during its annual inspections.

NOTICE REQUIREMENT

Imaginary surfaces define what are considered "obstructions" to air navigation. Any new structure or alteration of an existing structure proposed within 20,000 feet of a public-use runway that would penetrate a 100-to-1 "notice surface", starting at the elevation of the nearest runway at its nearest point, must be submitted to the FAA for an obstruction evaluation. The FAA's study results in a determination that a structure would or would not be an "obstruction" or, more critically, a "hazard." (Some obstructions are determined not to be hazards.) Note that this general report does not trigger the need for a submittal to the FAA. That is needed only when a specific structure is proposed and then only if the structure would penetrate the notice surface.

Part 77 defines the types of objects that may require notice as:

- "Any object of natural growth, terrain, or permanent or temporary construction or alteration, including equipment or materials used therein, and apparatus of a permanent or temporary character;" and
- "Alteration of any permanent or temporary existing structure by a change in its height (including appurtenances), or lateral dimensions, including equipment or materials used therein".
- "Any construction or alteration of more than 200 feet in height above the ground level at its site."

Notices must be filed at least 30 days before the date the proposed construction or alteration is to begin, and should be based on accurate engineering. (Note that the FAA has proposed modifying the regulation to require advance notice of at least 60 days.)

When applying Part 77 criteria, a structure's proposed top elevation above mean sea level (MSL) is considered, rather than its height above the ground. The terrain near Palm Springs International Airport generally rises gradually toward the northeast so structures proposed to the north and east could be more critical from an obstruction perspective than same-height structures proposed in the opposite directions.

There are two parallel runways at PSP. The longest runway, 13R-31L, is nearest to the project, and therefore controls the analyses. The recorded elevation of the northwest end of this runway, which is designated Runway 13R, is 477 feet MSL and concerns project activity at Farrell Substation and Area III and Area V locations. The opposite end, designated Runway 31L, is recorded to be 398 feet MSL and is of concern with respect to Tamarisk, Eisenhower, and Thornhill substations and to Area IV construction.

AIRSPACE

For purposes of Identifying potential obstructions to airspace associated with PSP, the applicable imaginary surfaces are defined as follows:

Primary Surface – a rectangle in plan view surrounding the runway with a width of 1,000 feet for PSP Runway 31L and 500 feet for Runway 13R. The primary surface extends 200 feet beyond the end of the runway pavement. The elevation of any point on the primary surface is equivalent to the elevation of the nearest point of the runway surface.

Approach Surface – a trapezoidal-shaped plane that extends up and out from the ends of the primary surface. The approach surface for PSP Runway 31L has a 50-to-one slope (50 feet horizontal to one foot vertical) for the first 10,000 feet of length starting at the runway end elevation, then a 40-to-one slope for an additional 40,000 feet. The elevation of any point on the initial portion of the surface can be determined by measuring its distance from the surface's edge, dividing that distance by 50 and adding the result to the runway end elevation (398 feet MSL). The Approach Surface becomes 16,000 feet wide at a distance of 50,000 feet from the edge of the Primary Surface. The Approach Surface for Runway 13R has a 34-to-one slope from its end elevation of 477 feet MSL. It extends 10,000 feet, where it becomes 3,500 feet wide.

Transitional Surfaces – planes extending to the sides of the flight paths up and out from the primary and approach surfaces. They have a seven-to-one slope (seven feet horizontal to one foot vertical). They extend outward until they meet the horizontal surface (see below). The Transitional Surface elevation at any point is determined by dividing its distance from the nearest point on the Primary or Approach Surface edge (as applicable) by seven and then adding that number to the corresponding approach or primary surface elevation.

Horizontal Surface – a horizontal plane at an elevation of 150 feet above the established airport elevation of 477 feet MSL at PSP. This surface surrounds the centerline of the runway for a distance of 10,000 feet. The horizontal surface elevation at PSP is 627 feet MSL

Conical Surface – extends outward and upward from the periphery of the Horizontal Surface at a slope of 20-to-one for a horizontal distance of 4,000 feet.

PSP Airport Master Plan

The airport began as an Army Air Corps landing field in 1939. After World War II, the ground leases were transferred to the city and the property was later purchased in fee from the Agua Caliente Indian Tribe. The city has continued to improve the facility as a commercial airport since then.

A new Airport Master Plan was developed by Coffman Associates, Inc. and adopted by the Palm Springs City Council in 2002. Improvements outline in the Master Plan include the extension of Runway 13R-31L to 10,000 feet and the installation of a precision instrument approach system for Runway 31L. These elements of the plan are relevant to this project study.

RCALUCP

The Riverside County Airport Land USE Compatibility Plan (RCALUCP) was prepared pursuant to Chapter 4, Article 3.5 of the California Public Utilities Code and adopted by the Riverside County Airport Land Use Commission in March 2005. The plan projects “Airport Activity” to increase from 109,500 aircraft operations in 2002 to 170,260 in 2020. It also establishes policies for land use and planned population densities based on noise impacts generated by airport operations in six “Compatibility Zones” for communities surrounding PSP.

The RCALUCP states that the “Compatibility Plan” is based on the Airport Master Plan adopted by the Palm Springs City Council in 2002. The expansion of Runway 13R-31L has been completed, but the precision instrument approach procedure for Runway 31L remains proposed. However, the FAA recognizes the plan for this instrument

procedure, so it applies to this project study. The RCALUCP further states, “no other runway system changes are indicated in the Master Plan.”

Analysis

LAND USE

Our review of all elements of the project scope reveals no conflicts with the RCALUCP, the PSP Airport Master Plan, or FAA land use criteria. Eisenhower Substation is nearest to and directly aligned with the final approach path to PSP Runways 31L and 31R. However, at approximately 3,400 feet from the nearest point of the nearest runway, the substation is beyond the limits of their associated RPZs and outside the airport property. The commercial area in which the substation is located is fully developed.

AIRSPACE

Substations

The project generally involves work at ten SCE substations in the Coachella Valley. Of these, six are sufficiently distant from PSP and UDD to place them well beyond the 20,000 ft. limit of the Part 77 FAA notice requirement.

Farrell, Tamarisk, Thornhill, and Eisenhower substations are within 20,000 feet of the PSP runways. The top elevations of substation structures at these stations are expected to be significantly lower than the ceilings of applicable 100:1 slopes that would otherwise trigger the need for FAA notice filings. However, new 115kV transmission poles inside Eisenhower Substation are likely to require such notices (see “Transmission Lines” discussion below).

No permanent structures at the projects's substations are expected to reach an aboveground elevation of 200 feet or more.

Transmission Lines

Proposed transmission line poles and towers at Area I (Mirage South), Area II (Dinah Shore & Bob Hope), and Area VI (Mirage North) are all beyond the 20,000 ft. Part 77 notice distances from PSP and UDD runways. None of the structures planned for these groups are anticipated to exceed 200 feet above the ground.

We used the United States Geological Survey (U.S.G.S.) Cathedral City, Calif. 15 Minute Quadrangle map to estimate the distance from the PSP runways to the Area III (Varner & Date Palm) structures. It appears that some or all of these poles could lie within the FAA notice boundaries for one or both runways. If a pole in this area lies within the notice limit, the FAA would likely determine that it is not an obstruction to the navigable airspace because it is beyond the lateral distances that define the PSP Conical Surfaces. Additionally, we estimate that the rise in terrain from the PSP established referenced point of 477 feet MSL to the tallest pole, which would not exceed 102 feet above grade, is only about 20 to 40 feet. This difference is well below the FAR Part 77.23(2) obstruction standard of approximately 230 feet.

The Area IV (Eisenhower Substation) preliminary plan calls for increasing the height of two 70 ft. steel poles inside Eisenhower Substation. In the absence of surveyed data, the locations and elevations of these poles with respect to the airspace associated with PSP Runway 31L were estimated from the U.S.G.S Cathedral City 15 Minute Quadrangle map. Existing pole #2101889 is nearest to the runway at a linear distance of approximately 3,500 feet. Its ungraded ground elevation is estimated at 370 feet MSL. These estimates indicate that an 80 ft. TSP (estimated at 82 feet above grade to include a two ft. high concrete footing) would penetrate the 100-to-one notice

requirement by about 19 feet. That is, the ground elevation difference is 398 ft. less 370 ft. or 28 ft., which is added to the 100:1 slope clearance of 35 ft. to yield a maximum clearance of 63 ft. above the ground at the site of the pole before the slope is penetrated. Although surveyed data would probably change these estimates, it is unlikely that a notice filing would be avoided.

Using the above estimates, the top of an 82 ft. pole would be approximately 12 feet under a precision instrument approach surface for Runway 31L and therefore would not be expected to be considered an obstruction. However, it should be noted that the FAA is authorized to deviate from these standards when, in its judgment, the clearance is insufficient. Consequently, the FAA could recommend that these poles be marked and/or lighted in accordance with its Advisory Circular No. 70/7460-1K.

We estimate that approximately 10,000 feet, or about 35%, of the new Area V transmission line running easterly from Garnet Substation will be constructed beyond the 20,000 ft. limit for required notices to the FAA. The remaining 65% of the line running southeasterly to Gene Autry Trail and then south to Farrell Substation falls within the 20,000 ft. notice distance from the edge of PSP Runway 13R. Aboveground elevations of the 161 LWS poles planned for this line will vary depending on their individual locations, lengths, and portions that are set below finished grade. Also, the specific locations and heights of the four TSPs are yet to be determined. The ground elevation at Farrell Substation is approximately equal to that of PSP Runway 13R, which is 477 ft. MSL. The terrain slopes gradually upwards to the north, where it reaches approximately 640 feet MSL at the edge of the notice boundary. We estimate the 100:1 notice slope is about 40 feet above the ground at Farrell Substation, about 67 feet above the point where the line turns westerly towards Garnet Substation from Gene Autry Trail, and approximately 37 feet above the ground at the edge of the 20,000 ft. notice limit. Consequently, most if not all of the poles within the notice area are likely to

penetrate the 100:1 slope. Each pole in this area that is found by survey to penetrate the slope must be noticed to the FAA in accordance with FAR Part 77 Subpart B.

Notwithstanding the notice requirements, we would not expect any of the poles to penetrate the Part 77 airspace for PSP. Approximately 7,700 feet of the line to the north of Farrell Substation lies under the PSP Horizontal Surface. Because the substation elevation is roughly equivalent to that of the runway, the Horizontal Surface is 150 feet above the station's ground level elevation. At the outer boundary of the Horizontal surface, the surface is estimated to be about 102 feet above the ground. (The reduced clearance is due to the rising ground level elevation along Gene Autry Trail). We have no information that would indicate that the line configuration at this point in its route would require a 100 ft. TSP. Therefore, poles between these two points are not expected to obstruct the Horizontal Surface. The remaining portion of the line extending to the notice boundary lies under the Conical Surface with increasing vertical clearance from the outer edge of the Horizontal Surface. We estimate that the ground elevation increases approximately 20 feet for each 1,000 feet of distance north of the Horizontal Surface boundary as the Conical Surface increases 50 feet per 1,000 feet of linear distance. Therefore, for each 200 ft. span toward the I-10, the clearance of each pole under the Conical Surface can be expected to increase by at least six feet.

WIRES

Depending upon their locations and/or elevations, wires are often considered the most dangerous obstacles to safe air navigation. Except where wires traverse canyons, spans of electrical power conductors (and ground wires where used) do not exceed the aboveground elevations of their associated support structures. In general, the terrain throughout this project area slopes gradually and all of the support structures to be constructed or altered are significantly lower than 200 feet above grade. Consequently, no wire spans included in this project are expected to exceed 200 feet above the ground

at any point. Therefore, unless otherwise indicated by final engineering, consideration of filing notices of proposed construction or alteration with the FAA would be limited to support structures.

CRANES

The project plan indicates that cranes of various sizes will be used to facilitate construction activities at certain locations. Notwithstanding the above discussions of permanent structures, any use of a crane for construction at any given location should also be evaluated for a potential need to notice the FAA. A crane to be used at a site that is within 20,000 feet of a public-use runway and that is expected to reach a height that will penetrate a slope of one foot of elevation for each 100 feet from the nearest point of the nearest runway must be noticed to the FAA. Additionally, a crane that is expected to extend 200 feet or more above the ground at any site must be noticed. The planned use of a crane at substations and transmission line route sites that are otherwise exempt from the notice requirement should be evaluated with respect to the 200 ft. rule.

Specified work at substations that does not involve the erection of transmission poles or the use of a tall crane is not expected to exceed the heights of nearby poles. Consequently, such work is not presumed material with respect to aeronautical considerations.

Conclusions And Recommendations

The project as outlined in this study is not expected to have significant effects on aeronautical operations or land uses in the Coachella Valley. This study indicates that the project's permanent structures, when completed, are not expected to obstruct the

navigable airspace at public-use aircraft landing areas and, therefore, are not likely to hamper aeronautical operations in the area.

Federal and state laws require advance notice of the construction of several transmission poles along a portion of the line between Farrell and Garnet substations and at Eisenhower Substation as outlined in this report. We recommend that affected structures be surveyed to determine the NAD 83 coordinates of their precise locations, distances from PSP Runway 13R-31L, and their respective MSL elevations after grading. New poles at Area III (Varner & Date Palm) should also be surveyed to determine the need for FAA notice(s). Additionally, if final engineering should identify any points along any wire spans that, at any expected temperature, are likely to reach 200 feet or more above the ground, survey data should accompany required notices of proposed construction or alteration to the FAA. Survey data will serve to verify the estimates used in this report and to determine the significance of associated errors. These data will also be necessary in the event that SCE wishes to challenge an FAA determination pursuant to the appeals provisions of the regulation.

Notices should be submitted to the FAA electronically in accordance with FAA procedures and as far in advance of construction as possible. FAR Par 77 requires the FAA to acknowledge receipt of each notice and to perform an aeronautical study of the proposed construction or alteration outlined therein. The study results in an FAA “determination” of the effect of the proposal on the “safe and efficient use of the airspace”. The determination is normally held valid for a term of 18 months from the date of its issuance. Consequently, the timing of each notice should be coordinated with the project’s construction schedule in order to avoid the need to seek an extension of the determination or to refile the notice.

In addition to the transmission lines, final design of the modifications to the project's substations and associated structures (including landscaping) should recognize the Part 77 height criteria discussed above. It should particularly reflect the desirability of a comfortable margin of space below the airspace surfaces.

Construction managers should be aware of the need to mitigate certain activities that may impact aviation safety (e.g. production of dust and glare or the use of cranes).

If the top of an extended crane does not significantly exceed the elevation of the completed pole, the airspace is not likely to be obstructed. The FAA may request specific information regarding the use of a construction crane. The use of a crane that reaches a vertical distance of 200 feet or more above the ground at any site must be separately noticed to the FAA by filing Form 7460-1.

The FAA may recommend obstruction marking and/or lighting of a structure in any of its determinations.

If SCE decides to utilize helicopters to support the project's construction work, specific activities should be closely coordinated with the FAA Flight Standards District Office in Riverside, California to ensure safe operations within the PSP control area.

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