Sycamore–Peñasquitos 230-kV Transmission Line Project

Addendum to the Final Environmental Impact Report

May 2016

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May 2016

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1 INTRODUCTION

1.1 BACKGROUND

San Diego Gas & Electric (SDG&E; the Applicant), a regulated California utility, filed an application (Application A. 14-04-011) for a Certificate of Public Convenience and Necessity (CPCN) with the California Public Utilities Commission (CPUC) for the Sycamore-Peñasquitos 230 Kilovolt (kV) Transmission Line Project (Proposed Project) on April 7, 2014. The CPUC circulated a Draft Environmental Impact Report (EIR) for the Proposed Project for a 45-day public review period starting November 17, 2015. The CPUC published a Final EIR for the Proposed Project on March 7, 2016. The CPUC has not issued a decision on the Proposed Project.

The Proposed Project is located in San Diego County, California within the City of San Diego and the City of Poway (Figure 1.1-1). SDG&E seeks to construct, operate, and maintain a new 16.7-mile-long 230-kV transmission line between the existing SDG&E Sycamore Canyon and Peñasquitos Substations (Figure 1.1-2).

The CPUC received a comment on the Final EIR from a member of the public who expressed concerns regarding the electromagnetic field (EMF) values presented in the Final EIR. Upon further review, the CPUC found and confirmed an error identified by the commenter in the Final EIR. The CPUC requested SDG&E prepare a revised magnetic field management plan (FMP) to revise this error.

On May 3, 2016, SDG&E filed testimony of Don Houston, Michael J. Silva, and Willie Thomas in the proceeding for the Proposed Project. The testimony included a revised FMP. The testimony also included comments about the feasibility of Mitigation Measures Utilities-1 and Utilities-3. While the CPUC finds these measures to be feasible, the CPUC suggests revisions to the measures to reduce the potential for substantial construction delays as a result of measure implementation. The revised measures would be effective in reducing significant impacts to utilities to a less than significant level and would not cause a new significant environmental impact.

This addendum constitutes an erratum to the Final EIR and has been prepared to:

1. Present corrected EMF values for the Proposed Project and alternatives and
2. Revise the text of Mitigation Measures Utilities-1 and Utilities-3

The addendum will be considered by the CPUC in conjunction with the Final EIR prior to making a decision on the Proposed Project.

Figure 1.1-1 Project Location

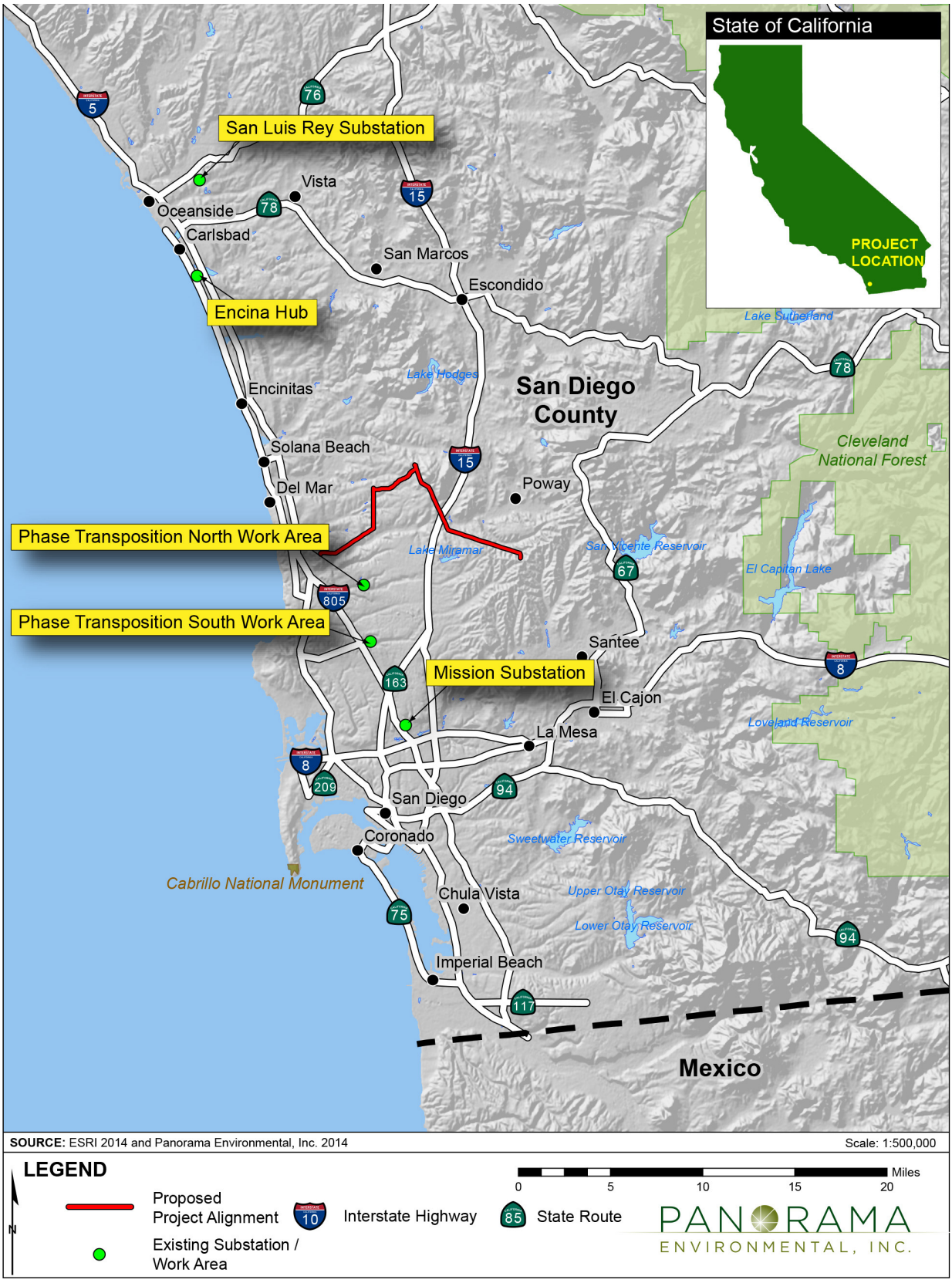
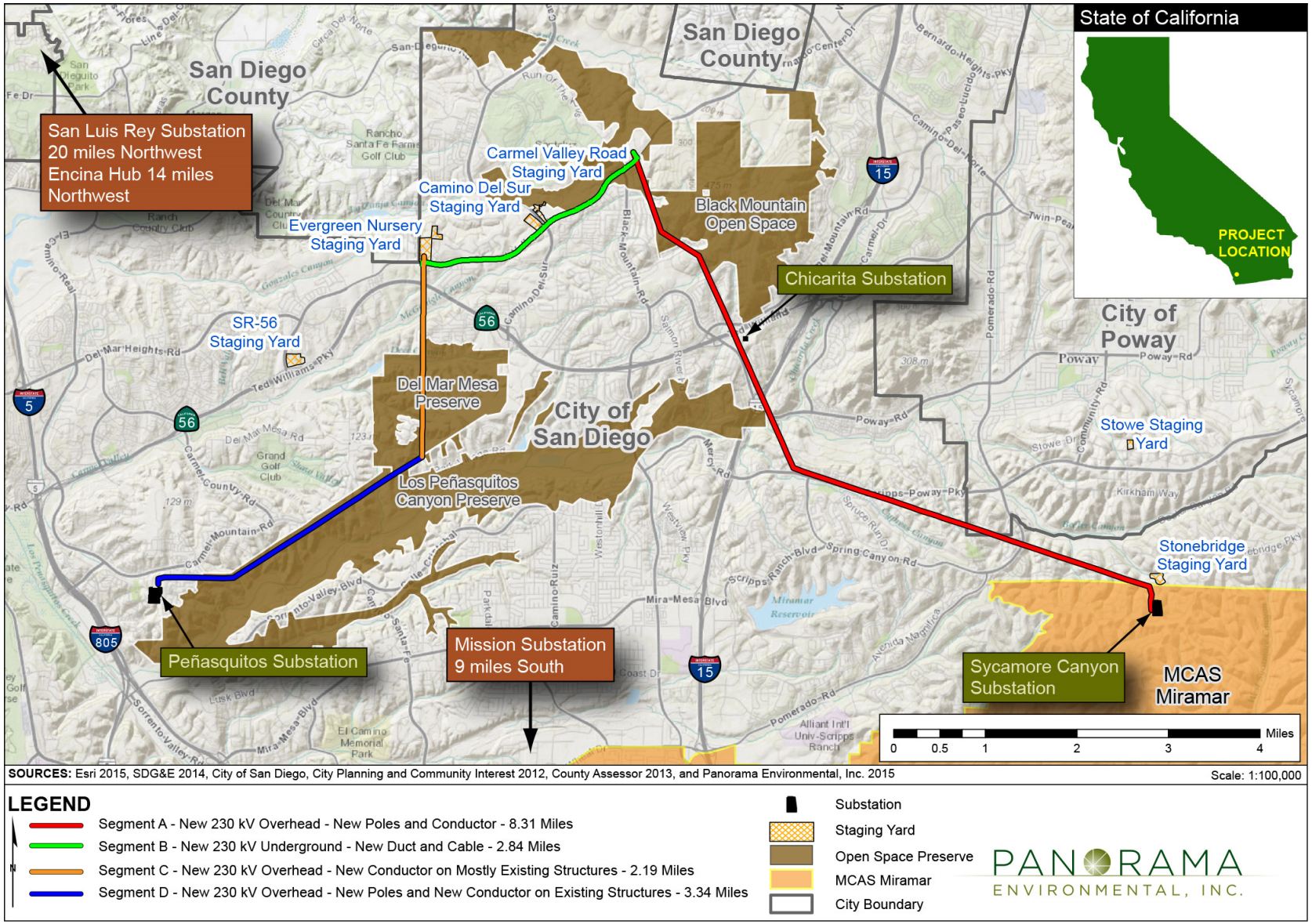


Figure 1.1-2 Project Alignment Overview



1.2 CEQA COMPLIANCE

Pursuant to CEQA Guidelines Section 15088.5, subsection (a), "[a] lead agency is required to recirculate an EIR when significant new information is added to the EIR after public notice is given of the availability of the draft EIR for public review under Section 15087 but before certification. As used in this section, the term 'information' can include changes in the project or environmental setting as well as additional data or other information. New information added to an EIR is not 'significant' unless the EIR is changed in a way that deprives the public of a meaningful opportunity to comment upon a substantial adverse environmental effect of the project or a feasible way to mitigate or avoid such an effect (including a feasible project alternative) that the project's proponents have declined to implement. 'Significant new information' requiring recirculation include, for example, a disclosure showing that:

(1) A new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented.

(2) A substantial increase in the severity of an environmental impact would result unless mitigation measures are adopted that reduce the impact to a level of insignificance.

(3) A feasible project alternative or mitigation measure considerably different from others previously analyzed would clearly lessen the environmental impacts of the project, but the project's proponents decline to adopt it.

(4) The draft EIR was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded."

Pursuant to CEQA Guidelines Section 15088.5, subsection (b), "[r]ecirculation is not required where the new information added to the EIR merely clarifies or amplifies or makes insignificant modifications in an adequate EIR."

The CPUC has not yet certified the Final EIR for the Proposed Project. As described in this addendum, the correction of EMF values and the revisions to Mitigation Measures Utilities-1 and Utilities-3 will not result in new significant effects and will not increase the severity of the project's significant effects. The modified mitigation measures are also not considerably different from others previously analyzed. Thus, the modifications do not trigger the need to recirculate pursuant to CEQA Guidelines §15088.5. The analysis in the addendum provides the basis for this conclusion.

2 REVISIONS TO THE FINAL EIR

2.1 CORRECTED EMF VALUES

This section describes revisions to the Final EIR to correct the predicted EMF values for the Proposed Project and alternatives.

2.1.1 Revised Electric and Magnetic Field Management Plan

SDG&E provided the CPUC with the revised Magnetic Field Management Plan (FMP) in response to CPUC Data Request #23 (SDG&E 2016). The revised FMP is contained in Appendix A of this addendum. The revised FMP includes revisions in the predicted EMF levels along the north and south sides of Segment D of the Proposed Project and clarifies the numbering of alternatives for consistency with the Final EIR.

2.1.2 Revisions to the Predicted EMF Levels contained in the Final EIR

The predicted EMF levels presented in the Final EIR were based on earlier revisions of SDG&E's FMP (SDG&E 2015, SDG&E 2014). The revised FMP includes revisions to the EMF levels presented in Table 2.6-1 of the Final EIR. These revisions are shown below in ~~strikethrough~~ and underline.

Table 2.1-1 Existing and Proposed EMF by Transmission Line Segment

Line Segment[1]	Existing (mG)	Proposed (mG)	Change (mG)
Segment A West (north of Chicarita Substation)	16.7	48.9	+32.2
Segment A East (north of Chicarita Substation)	13.0	46.8	+33.8
Segment A West (south of Chicarita Substation)	29.9	48.9	+19.0
Segment A East (south of Chicarita Substation)	17.1	46.8	+29.7
Segment B North	0.0	0.1	+0.1
Segment B South	0.0	0.3	+0.3
Segment C West	18.5	121.9	+103.4
Segment C East	4.5	92.6	+88.1

Line Segment[1]	Existing (mG)	Proposed (mG)	Change (mG)
Segment D North	21.2	~~9.4~~ 71.8	~~-11.8~~ +50.6
Segment D South	2.6	~~135.9~~ 1.8	~~+133.3~~ -0.8

[1] Cardinal directions (i.e., North, South, East, West) indicate the side of the ROW from which the EMF measurement was estimated.

Sources: SDG&E 2014, SDG&E 2015a, SDG&E 2015b, SDG&E 2016

2.1.3 Revisions to Responses to Comments

As a result of the correcting the EMF values in Table 2.6-1, the Final EIR response to comment C105-2 also has been corrected. These revisions are shown below in ~~strikethrough~~ and underline.

C105-2 General Response GR-4 provides an updated table of the existing EMF levels and expected EMF levels after construction of the Proposed Project. North of Proposed Project Segment D, including the area around Laurelcrest Drive, the EMF level was modeled to ~~decrease~~ increase by ~~11.8~~ 50.6 mG. ~~This decreased EMF level is attributed to the opposing currents (i.e., currents moving in opposite directions along parallel transmission lines), which is explained further in response to comment C49-2 and General Response GR-4.~~

2.2 REVISIONS TO MITIGATION MEASURES

This section describes changes to the Final EIR to revise Mitigation Measures Utilities-1 and Utilities-3.

2.2.1 SDG&E Testimony

SDG&E testimony of Don Houston, Michael J. Silva, and Willie Thomas in the proceeding for the Proposed Project identifies two mitigation measures, Mitigation Measure Utilities-1 and Mitigation Measure Utilities-3, as infeasible in whole or in part. These mitigation measures apply to the Proposed Project and all of the alternatives considered in the EIR (*Final EIR Volume III: Chapter 4, Section 4.17 Utilities and Public Service Systems, pages 4.17-29, 4.17-33, 4.17-40, 4.17-46, 4.17-47, 4.17-54, 4.17-55, 4.17-61, 4.17-63, 4.17-71, and 4.17-73*). The CPUC has considered SDG&E's proposed revisions in light of the potential construction delays that could result from mitigation compliance as identified in the testimony.

2.2.2 Mitigation Measure Utilities-1

Mitigation Measure Utilities-1 in the Final EIR states:

> The water supply for project construction activities (e.g., dust control, soil compaction) shall be obtained from non-potable sources and ensured in a water contract through a local water agency or district. SDG&E shall provide verification that water will be obtained from a non-potable source to the CPUC a minimum of 60 days prior to the start

of construction. (*Final EIR Volume III, Section 4.17 Utilities and Public Service Systems, page 4.17-29*)

The purpose of this mitigation measure is to reduce the impact of Proposed Project construction water needs on local water supplies given current drought conditions. The Proposed Project would require 25 million gallons of water for dust control, soil compaction, and landscaping/revegetation during the 12-month construction period. (*Final EIR Volume III: Chapter 2, Section 2.3.9, page 2-56 and Chapter 4, Section 4.17 Utilities and Public Service Systems, page 4.17-28*). Alternatives 3 and 5 would require less water during construction than the Proposed Project *(Final EIR Volume III: Chapter 6, Section 6.4.2, Table 6.4-5 page 6-17 and Section 6.4-4, Table 6.4-9, page 6.4-26*). Alternative 4 would require a comparable amount of water as the Proposed Project.

SDG&E raised the following concerns with Mitigation Measure Utilities-1 in its testimony:

- Inconsistency between the mitigation measure title, which references use of reclaimed water, and the mitigation measure text, which references use of non-potable water.
- Lack of flexibility to use other sources of water (i.e., potable, surface or non-potable water) when: 1) the City of San Diego's North City Water Reclamation Plant (NCWRP) is shut down for maintenance; 2) the processed effluent does not meet tertiary reclaimed water quality standards; or 3) for any other reason that does not allow the NCWRP to meet the reclaimed water needs of the Proposed Project.
- Lack of certainty that existing infrastructure will be suitable to provide a reclaimed water filling location, or that SDG&E could establish a meter somewhere along the transmission alignment due to encroachment and right-of-way concerns (as well as potential additional environmental impacts at the new meter location).
- Potential for other permitting agencies, such as the California Coastal Commission (CCC), to impose other constraints that could prohibit use of reclaimed water in or near environmentally sensitive habitat areas (ESHA).
- Limited supply and use constraints for other reclaimed water sources in the vicinity of the Proposed Project (e.g., City of Del Mar, Olivenhain Water District, City of Poway).
- Inability to satisfy its dust control requirements and construction needs without an adequate reclaimed water supply, which would force construction activities to cease.
- Lack of suitability of reclaimed water to support all anticipated construction activities. The City of San Diego limits use of reclaimed water for construction purposes to soil compaction, dust control and consolidation and compaction of backfill in trenches only. Other water needs on the Proposed Project could include, but are not limited to, concrete mixing and pier foundation drilling, which may not be compatible with the use of reclaimed water.

SDG&E has agreed in staff testimony to use reclaimed water to the extent feasible, and has requested that the mitigation measure be revised as such since SDG&E cannot ensure that reclaimed water will be consistently available to meet the needs of the Proposed Project during the entire construction schedule. SDG&E also requested that the title be revised to "Non-Potable Water Use for Dust Control."

The CPUC investigated SDG&E's claims regarding the availability of reclaimed water and found that reclaimed water supplies may be limited at times due to plant maintenance shut downs or in certain circumstances where secondary or tertiary water quality standards are not being met, are not acceptable for a specified construction use, or do not comply with certain jurisdictional requirements such as those of the CCC. However, it is reasonable to assume, given the City of San Diego's commitment to availability of reclaimed water in the City of San Diego (*Final EIR Volume I, Chapter 3 Comments and Responses, Response D2-61, page 3-497 and Response D3-241, page 3-707*), that reclaimed water will generally be available for construction use under normal circumstances. It is also reasonable to assume that a construction water meter can be established by SDG&E within a designated temporary work site or staging area for the purpose of supplying reclaimed water for construction purposes similar to other development projects (*Final EIR Volume I, Chapter 3 Comments and Responses, Response D2-61, page 3-497 and Attachment 2, Agencies Correspondences, City of San Diego, Partow December 8, 2015*). SDG&E has not provided any supporting information indicating specifically where reclaimed water construction meters would be located for the Proposed Project or its alternatives, nor have they provided sufficient details to justify claims regarding potential additional impacts (e.g., visual, biological resources, traffic, or hazardous materials) associated with the placement of reclaimed water meters.

The title of Mitigation Measure Utilities-1 can result in confusion as commented by SDG&E; therefore, the title has been revised to reflect the use of non-potable water consistent with the text and intended application of the measure. In consideration of the regulatory restrictions and periods when non-potable water may not be available, Mitigation Measure Utilities-1 is revised as follows:

> **Mitigation Measure Utilities-1: Non-Potable ~~Reclaimed~~ Water Use for Dust Control.** The water supply for project construction activities (e.g., dust control, soil compaction) shall be obtained from non-potable sources and ensured in a water contract through a local water agency or district, except where jurisdictional or regulatory requirements restrict the use of non-potable water for a specified construction activity or during limited periods when non-potable water sources are offline and not available. SDG&E shall provide verification that water will be obtained from a non-potable source, or verification of the specific circumstances, requirements, and time frame during which potable water will be used, to the CPUC a minimum of 60 days prior to the start of construction.

The revised mitigation measure requires SDG&E to use non-potable water as the primary construction supply, and substantially limits the use of potable water during construction

consistent with the intention of the mitigation measure. The revisions to the measure provide flexibility to use potable water under circumstances when non-potable water may not be applied due to agency restrictions or during periods when non-potable water is not available for use. These revisions reduce the potential for construction delays during periods when non-potable water is off-line and potential conflicts with future permit requirements (i.e., CCC permit).

2.2.3 Mitigation Measure Utilities-3

Mitigation Measure Utilities-3 in the Final EIR states:

> SDG&E shall notify all utility companies with utilities located within or crossing SDG&E ROW and franchise agreement area to locate and mark existing underground utilities along the entire length of the alignment at least 30 days prior to construction. No subsurface work shall be conducted that would conflict with (i.e., directly impact or compromise the integrity of) a buried utility. In the event of a conflict, the project underground alignment shall be realigned vertically and/or horizontally, as appropriate, to avoid other utilities and provide adequate operational and safety buffering. In instances where separation between City of San Diego sewer mains and the underground duct bank alignment is less than 10 feet, SDG&E shall submit the intended construction methodology to the City of San Diego Public Utilities Department Water and Sewer Development Section for approval at least 30 days prior to construction. Construction methods shall be adjusted as necessary to assure that the integrity of existing sewer mains is not compromised. (*Final EIR Volume III, Section 4.17 Utilities and Public Service Systems, page 4.17-33*)

The purpose of this mitigation measure is to reduce the impact of Proposed Project ground disturbing activities, including grading and trenching, that would be conducted in the same general location as sewer lines constructed of older less stable materials, which could be damaged or rupture as a result of underground placement of the 230-kV duct bank. (*Final EIR Volume III: Chapter 4, Section 4.17 Utilities and Public Service Systems, page 4.17-31*). Alternatives 2, 3, 4, and 5 also could result in a similar impact to buried sewer mains and require compliance with the same mitigation measure (*Final EIR Volume III: Chapter 4, Section 4.17 Utilities and Public Service Systems, pages 4.17-47, 4.17-55, 3.17-63, and 4.17-73*).

SDG&E raised the following concerns with Mitigation Measure Utilities-3 in its testimony:

- Requiring City approval could lead to Proposed Project delays or a lengthy standstill.
- Design and construction of underground electric supply lines is governed by CPUC General Order 128 and safety concerns. Section III, Rule 31.4-A1 of General Order 128 clearly states that underground electric utilities need only adhere to a minimum of 12 inches of clearance (where parallel) and 6 inches of clearance for crossing points.

- The CPUC has exclusive jurisdiction in relation to local government to regulate the design, siting, installation, operation, maintenance, and repair of electric facilities.
- If SDG&E must obtain City approval of underground construction methods, SDG&E cannot ensure that any given underground component of the Proposed Project or the alternatives considered in the Final EIR is feasible to construct.

SDG&E has requested in staff testimony that the mitigation measure be revised to limit the City of San Diego's involvement to "review and comment" instead of "approval" of construction methodology due to concerns that the City of San Diego could choose to not grant approval of the construction method and could thereby substantially delay implementation of the CPUC approved project. The intention of Mitigation Measure Utilities-3 was to allow the City of San Diego the ability to review the proposed construction method and provide input to avoid structural impacts on other buried utilities; however, it is recognized that the CPUC has the sole discretionary authority for siting of electrical utility lines under General Order 131-D and this authority is preemptive over local jurisdictional authority. It is also noted that the CPUC General Order 128 specifies requirements for safe installation of underground electrical utilities that would apply to the Proposed Project and alternatives. To avoid the potential for future conflicts and substantial delays to installation of the underground transmission line, the CPUC has revised Mitigation Measure Utilities-3 as follows:

> **Mitigation Measure Utilities-3: Notify Utility Companies and Adjust Underground Work Locations.** SDG&E shall notify all utility companies with utilities located within or crossing SDG&E ROW and franchise agreement area to locate and mark existing underground utilities along the entire length of the alignment at least 30 days prior to construction. No subsurface work shall be conducted that would conflict with (i.e., directly impact or compromise the integrity of) a buried utility. In the event of a conflict, the project underground alignment shall be realigned vertically and/or horizontally, as appropriate, to avoid other utilities and provide adequate operational and safety buffering. In instances where separation between City of San Diego sewer mains and the underground duct bank alignment is less than 10 feet, SDG&E or its contractor shall submit the intended construction methodology to the City of San Diego Public Utilities Department Water and Sewer Development Section for review and comment ~~approval~~ at least 30 days prior to construction. Construction methods shall be adjusted as feasible, safe and consistent with good utility practice ~~necessary~~ to assure that the integrity of existing sewer mains is not compromised.

This revision includes requirements for SDG&E to maintain safe distances from other buried utilities consistent with General Order 128 and provides the City of San Diego with an opportunity to review and comment on the construction method to reduce potential impacts; however, it removes the requirement for a separate City approval process.

3 ENVIRONMENTAL ANALYSIS

3.1 REVISED EMF VALUES

The CPUC does not consider EMF to be an environmental issue in the context of CEQA because: (a) there is no agreement among scientists that EMF creates a potential health risk, and (b) CEQA does not include standards for defining any potential risk or impact from EMF. The corrections to EMF values presented in this addendum would not result in any new significant environmental impacts or any substantial increases in the severity of previously identified significant impacts because EMF is not considered to be an environmental impact within the context of CEQA. The corrections to EMF values do not trigger the need to recirculate pursuant to CEQA Guidelines Section 15088.5.

3.2 REVISED MITIGATION MEASURES

3.2.1 Mitigation Measure Utilities-1

The Proposed Project would require the use of up to 25 million gallons of water for dust control and compaction. Alternatives 3 and 5 would require slightly less water than the Proposed Project due to underground construction with less area requiring water for dust control. The CPUC determined in the Draft EIR and Final EIR that the use of up to 25 million gallons of potable water would have a significant impact on water resources due to the on-going drought conditions in the State of California. The Draft EIR and Final EIR applied Mitigation Measure Utilities-1, which requires use of non-potable water for dust control and compaction, to reduce impacts to water supplies to a less-than-significant level.

Impacts to water supplies would remain less than significant with the application of Mitigation Measure Utilities-1, as revised in this addendum. The revision to Mitigation Measure Utilities-1 presented in Section 2.2.2 above only allows for the use of potable water in a small set of circumstances; where non-potable water is not allowed due to regulatory restrictions or when non-potable water sources are taken off line for short periods of time. Non-potable water will remain the primary source of dust control and compaction water with the revisions contained in this addendum. Revised Mitigation Measure Utilities-1 would still substantially reduce the impact of the Proposed Project and Alternatives on water supplies. The impact would therefore remain less than significant with the revisions to Mitigation Measure Utilities-1 contained in this addendum.

3.2.2 Mitigation Measure Utilities-3

The Proposed Project and Alternatives 3, 4, and 5 include construction of an underground 230-kV transmission line in roads containing existing utility lines. The construction of the transmission line could damage existing buried utility lines, which would be a significant impact. Mitigation Measure Utilities-3, as written in the Draft EIR required SDG&E to locate utilities prior to construction and to realign the transmission line to provide adequate separation and avoid conflicts with existing utilities. The City of San Diego, in their comments on the Draft EIR, requested that SDG&E submit their design plans for the underground transmission line to the City of San Diego Public Utilities Department Water and Sewer Development Section for approval. Mitigation Measure Utilities-3 was revised in the Final EIR to require that SDG&E obtain City approval of the construction method where the underground utility is within 10 feet of existing City utility lines.

The revision to Mitigation Measure Utilities-3 contained in this addendum replaces the requirement for City approval with a requirement for City review and adds that any changes need to be consistent with standards for safety to ensure compatibility with existing standards outlined in General Order 128. With the revision contained in this addendum, Mitigation Measure Utilities-3 still requires SDG&E to mark the locations of existing utilities and realign their transmission line to avoid conflicts with existing utilities. The revised measure also requires that SDG&E coordinate with the City on construction methods to avoid damage to City buried utility lines. Mitigation Measure Utilities-3, as revised in this addendum, is equally effective at minimizing impacts on existing utility lines to the mitigation measure contained in the Final EIR. Impacts would remain less than significant with the revisions to Mitigation Measure Utilities-3 contained in this addendum.

4 CONCLUSION

The correction of the predicted EMF levels and proposed changes to the mitigation measures would not result in any new significant environmental impacts or any substantial increases in the severity of significant impacts. The revisions to the Final EIR do not otherwise trigger the need to recirculate the EIR pursuant to CEQA Guidelines Section 15088.5.

5 REFERENCES

SDG&E. 2014. "Detailed Magnetic Field Management Plan for the Sycamore to Penasquitos 230 kV Transmission Line Project." *Appendix H to Application of SDG&E (U 902 E) for a Certificate of Public Convenience and Necessity for the Sycamore-Penasquitos 230 Kilovolt Transmission Line Project.*

—. 2016. "Magnetic Field Management Plan for Alternative Routes on the Final Environmental Impact Report for the Proposed Sycamore to Peñasquitos 230 kV Transmission Line Project." April 18.

—. 2015. "SXPQ ED10-SDGE Partial Response 3: Q1-subpart 3 on EMF." September 29.

APPENDIX A:
MAGNETIC FIELD MANAGEMENT PLAN FOR ALTERNATIVE ROUTES IN THE FINAL EIR

Magnetic Field Management Plan for Alternative Routes in the Final Environmental Impact Report for the Proposed Sycamore to Peñasquitos 230 kV Transmission Line Project

Project Engineer: **Willie Thomas,** Transmission Engineering & Design Manager

Project Designer: **Flynn Ortiz,** Transmission Engineering & Design Advisor

Work Order No.: **WO 13128**

In-Service Date: **May 2017**

Power and Transmission Lines: **TL 23001, TL 23004, TL 23051, TL230XX, TL13804, TL13820, TL13811, TL 675, TL 6906, Tl 6920**

Central File No.: ELA 140.B.XX

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Date: 04/18/2016

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I. Introduction

On April 7, 2014, SDG&E filed application A.14-04-011 with the California Public Utilities Commission ("Commission") for a Certificate of Public Convenience and Necessity ("CPCN") for the proposed Sycamore-Peñasquitos 230 kilovolt ("kV") Transmission Line Project. Included with the Application was SDG&E's Magnetic Field Management Plan ("FMP") for the proposed project.

On March 7, 2016, the Commission issued the Final Environmental Impact Report ("FEIR") identifying five alternatives retained for EIR analysis and ranking alternative routes for the proposed Project.

This document constitutes the revised FMP for the ranked alternative routes. It does not address substation connections or substation FMPs, which are unchanged from that included in the FMP for the original proposed Project. As such, this FMP consists of project descriptions for each alternative route, and summary data tables showing magnetic field values calculated at the edges of the right-of-way ("ROW") or easement for such alternatives. Maps of the Proposed Project and FEIR alternative routes are included at the end of this FMP.

The results of the calculations are discussed in Section IX. Due to the preliminary design status of the alternative underground routes, calculated values provided at the edges of ROW for these routes are based on "typical" duct package placement as discussed in Section IX.

II. Magnetic Field Management Design Guidelines

Per Commission EMF policy, SDG&E applies its *EMF Design Guidelines for Electrical Facilities* ("Guidelines") to all new electric power line, transmission line and substation projects for possible reduction of public exposure to magnetic fields. Consistent with these Guidelines and with the Commission order, the transmission and power lines associated with the FEIR alternative routes were considered and evaluated for possible magnetic field management measures. The results of this assessment are contained in this document.

Per SDG&E's Guidelines,[1] magnetic field assessment and calculations referenced in this document do not include electric distribution lines.

This document deals solely with magnetic fields. Moreover, reducing the magnetic field strength is but one of many factors to be considered in planning and designing a transmission system, along with other issues such as safety, environmental concerns, reliability, insulation and electrical clearance requirements, aesthetics, cost, operations and maintenance.

III. Magnetic Field Management Methodology

In Decision 06-01-042, the Commission notes that modeling is used to compare the relative effectiveness of field-reduction options and is not to be used to predict post-construction field levels. Decision 06-01-042 also notes that "[U]tility modeling methodology is intended to compare differences between alternative EMF mitigation measures and not determine actual EMF amounts;"[2] and that "modeling indicates relative differences in magnetic field reductions

[1] For distribution facilities, utilities would apply no-cost and low-cost measures by integrating reduction measures into construction and design standards, rather than evaluating no-cost and low-cost measures for each project. [at 1]
[2] Commission Decision D.06-01-042, Finding of Fact 14, p. 20.

between different transmission line construction methods, but does not measure actual environmental magnetic fields."[3]

Per its EMF Guidelines, SDG&E will:

- Apply the Guidelines to the power and transmission line facilities included in the FEIR identified alternative routes.
- Identify and implement appropriate "no-cost" measures, i.e., those that will not increase overall project costs but can reduce the magnetic field levels.
- Identify and implement appropriate "low-cost" measures, i.e., those measures costing in the range of 4% of the total budgeted project cost that can reduce the magnetic field levels by 15% or more at the edge of the right-of-way (ROW).
- When a sufficiency of "low-cost" measures is available to reduce magnetic field levels, such that it is difficult to stay within the 4% cost guideline, apply these "low-cost" measures by priority, per the Guidelines.

The 15% minimum reduction required for low-cost measures is in addition to any field reduction attained due to no-cost measures. It is not cumulative.

Magnetic field values for the easterly overhead segments were calculated using the RESICALC program developed and maintained by the Electric Power Research Institute (EPRI). Magnetic field values for the westerly overhead segments and portions of the alternatives for which design differs from the original proposed project were calculated using the EMF Workstation modeling program, also developed and maintained by EPRI. The projected high-current load case "2017 heavy summer" was used in all calculations. For the purpose of evaluating the field management measures, magnetic field values were calculated and compared at a height of one meter above ground.

To evaluate the effectiveness of various magnetic field reduction measures, calculated values for a given measure were compared to calculated values without the measure. Magnetic field values were calculated and compared at the adjacent parallel property lines, or edges of ROW, as appropriate, per Commission policy.[4]

IV. Proposed Project Segments

The original proposed Project included the four electric transmission segments listed below.

- Segment A – Construction of approximately 8.31 miles of new 230 kV transmission line on new tubular steel poles all within existing SDG&E ROW located between the existing Sycamore Canyon Substation and Carmel Valley Road.
- Segment B – Install approximately 2.84 miles of new 230 kV underground transmission line in Carmel Valley Road utilizing existing franchise position for almost the entire segment.
- Segment C – Install approximately 2.19 miles of new 230 kV conductor on existing 230 kV steel structures and one new tubular steel pole all within existing SDG&E ROW located between Carmel Valley Road and Peñasquitos Junction.

[3] Ibid, p.11.

[4] The appropriate location for measuring EMF mitigation is the utility ROW [right-of-way] as this is the location at which utilities may maintain access control. [Commission Decision D.06-01-042, Finding of Fact 17, p. 20.]

- Segment D – Install approximately 2.84 miles of new 230 kV conductor on existing 230 kV steel lattice towers all within existing SDG&E ROW located between Peñasquitos Junction and Peñasquitos Junction.

V. FEIR Project Alternatives

Section ES.5.2 of the FEIR [at ES-13], *Alternatives Fully Evaluated in the EIR*, identified these five alternatives retained for detailed analysis in the EIR:

- **Alternative 1**: Eastern Cable Pole at Carmel Valley Road (Option 1b).
- **Alternative 2**: Eastern Cable Pole at Pole P40 and Underground Alignment Through City Open Space (2a) or City Water Utility Service Road (2b).
- **Alternative 3**: Los Peñasquitos Canyon Preserve to Mercy Road Underground, a 5.9-mile underground routing alternative along the Proposed Project route that would avoid the northern portion of Segment A and all of Segments B and C.
- **Alternative 4**: Segment D 69 kV Partial Underground Alignment, a 3.1-mile routing alternative along the Proposed Project route that would eliminate new pole installation along 2.8 miles of Segment D.
- **Alternative 5**: Pomerado Road to Miramar Area North Combination Underground/Overhead. This alternative would underground the majority of the transmission line described as part of the Proposed Project along a new route, with the east and west ends, where the transmission line would be in an overhead position, within existing SDG&E ROWs. This alternative would install 11.5 miles of underground transmission line and 2.8 miles of overhead transmission line.

VI. Route Combinations of Alternatives and Proposed Project Segments

Section ES.8.2 of the FEIR, *Identify Environmentally Superior Alternative* [at ES-62], ranks eight alternatives, which include various combinations of the alternatives listed in ES.5.2 and/or Segments of the Proposed Project. The eight ranked alternatives include options for rankings 4 and 7, resulting in a total of ten alternatives, including the "No Project Alternative." Table ES.8-1 of the FEIR, *Summary of Alternatives Analyzed* [at ES-64], provides a summary of how the alternatives would or could be combined with other alternatives.

Table 1 below provides a description of the FEIR route combinations derived from ES.8.2 (other than the No Project Alternative).

Table 1. Routes by Alternative Ranking

Route	Route Composition (UG = Underground, OH = Overhead)
#1	• Alternative 5, 230 kV Underground – Pomerado Road to Miramar Area North • Alternative 5, 230 kV Overhead – Miramar Area North • Proposed Project in Segment A between the Sycamore Canyon Substation and Stonecroft Trail

Table 1. Routes by Alternative Ranking	
Route	**Route Composition (UG = Underground, OH = Overhead)**
#2	• Alternative 2, Eastern Cable Pole at P40 and UG Alignment through City Open Space (Option 2a) • Alternative 4, Segment D 69 kV Partial UG Alignment • Proposed Project Segments A, B, C and Segment D (230 kV only)
#3	• Alternative 1, Cable Pole at Carmel Valley Road • Alternative 4, Segment D 69 kV Partial UG Alignment • Proposed Project Segments A, B, C and Segment D (230 kV only)
#4A	• Alternative 4, Segment D 69 kV Partial UG Alignment • Proposed Project Segments A, B, C and Segment D (230 kV only)
#4B	• Alternative 4, Segment D 69 kV Partial UG Alignment • Alternative 3, Los Peñasquitos Canyon Preserve to Mercy Road 230 kV UG • Proposed Project in OH Segment A (Sycamore Canyon Substation to Ivy Hill Dr.) • Proposed Project OH Segment D (230 kV only)
#5	• Alternative 2, Eastern Cable Pole at Pole P40 and UG Alignment Through City Open Space (Option 2a) or City Water Utility Service Road (Option 2b) • Proposed Project in all other locations
#6	• Alternative 1, Eastern Cable Pole at Carmel Valley Road (Option 1b) • Proposed Project in all other locations
#7A	Proposed Project
#7B	• Alternative 3, Los Peñasquitos Canyon Preserve to Mercy Road 230 kV UG • Proposed Project in OH Segment A (Sycamore Canyon Substation to Ivy Hill Dr.) • Proposed Project OH Segment D

VII. Magnetic Field Reduction Measures Adopted or Rejected

Per SDG&E's Guidelines, the following magnetic field reduction measures were considered for the routes identified in Table 1, for those portions of power lines TL 675, TL 6906, TL 6920, TL 13804, TL 13811, TL 13820, and transmission lines TL 23001, TL 23004, and proposed TL 230XX, within scope of the routes.

A. Increase conductor height by increasing structure height
B. Locate power lines closer to the centerline of the corridor
C. Phase circuits to reduce magnetic fields.
D. Reduce conductor (phase) spacing.
E. Increase trench depth.

Tables 2 through 10 below provide a summary of magnetic field reduction methods adopted or rejected for each of the nine route combinations in Table 1 above.

Table 2: Route Combination #1
Magnetic Field Reduction Measures Adopted or Rejected

Segment(s)	Location	Adjacent Land Use	Reduction Measure	Estimated Cost to Adopt	Measure Adopted? (Yes/No)	Reason(s) if not adopted
Partial A and **Alt. 5, 230 kV OH – Miramar Area North**	Within existing ROW and franchise	1, 2, 3, 4, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	No	Prevented by other tie lines within the corridor and separation requirements
			Reduce conductor (phase) spacing.	No-Cost	No	Design uses optimum phase spacing
			Phase circuits to reduce magnetic fields	No-Cost	No	Design uses optimum phasing
Partial A	Within existing ROW and franchise	1, 2, 3, 4, 6	Increase structure height (increase the height of the conductor from ground level)	No-Cost	Yes	N/A
				Low-cost	No	Not 15% or more reduction
Alt. 5, 230 kV OH – Miramar Area North	Within existing ROW and franchise	1, 2, 3, 6	Increase structure height (increase the height of the conductor from ground level)	No-Cost	No	Design uses existing structures
				Low-cost	No	Not 15% or more reduction
Alt. 5, 230 kV UG – Pomerado Road to Miramar Area North	Within existing ROW and franchise	1, 2, 3, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	Yes, as possible	Dependent on location of other utilities within the roadway and separation requirements
			Phase circuits to reduce magnetic fields	No-Cost	Yes	N/A
			Increase trench depth	Low-Cost	No	Modeling for additional 3 feet of depth showed necessary 15% reduction could not be achieved

Numbered land use categories are: (1) Schools, licensed day care and hospitals; (2) Residential; (3) Commercial/Industrial; (4) Recreational; (5) Agricultural; (6) Undeveloped land

Table 3: Route Combination #2
Magnetic Field Reduction Measures Adopted or Rejected

Segment(s)	Location	Adjacent Land Use	Reduction Measure	Estimated Cost to Adopt	Measure Adopted? (Yes/No)	Reason(s) if not adopted
A, C, D (230 kV only) and **Alt. 2 Cable Pole**	Within existing ROW and franchise	1, 2, 3, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	No	Prevented by other tie lines within the corridor and separation requirements
			Reduce conductor (phase) spacing	No-Cost	No	Design uses optimum phase spacing
A, D (230 kV only) and **Alt. 2 Cable Pole**	Within existing ROW	1, 2, 3, 6	Increase structure height (increase the height of the conductor from ground level)	No-Cost	Yes	N/A
				Low-cost	No	Not 15% or more reduction
			Phase circuits to reduce magnetic fields	No-Cost	No	Design uses optimum phasing
C	Within existing ROW and franchise	1, 2, 3, 6	Increase structure height (increase the height of the conductor from ground level)	No-Cost	No	Design uses existing structures
				Low-cost	No	Not 15% or more reduction
			Phase circuits to reduce magnetic fields	No-Cost	Yes	N/A
B	Within existing ROW and franchise	1, 2, 3, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	Yes, as possible	Dependent on location of other utilities within the roadway
Alt. 2 UG Options		4, 6	Reduce conductor (phase) spacing	No-Cost	No	Design uses optimum phase spacing
Alt. 4 - Segment D 69 kV Partial UG Alignment			Phase circuits to reduce magnetic fields	No-Cost	Yes	N/A
		1, 2, 3, 6	Increase trench depth	Low-Cost	No	Modeling for additional 3 feet of depth showed necessary 15% reduction could not be achieved

Numbered land use categories are: (1) Schools, licensed day care and hospitals; (2) Residential; (3) Commercial/Industrial; (4) Recreational; (5) Agricultural; (6) Undeveloped land

Table 4: Route Combination #3
Magnetic Field Reduction Measures Adopted or Rejected

Segment(s)	Location	Adjacent Land Use	Reduction Measure	Estimated Cost to Adopt	Measure Adopted? (Yes/No)	Reason(s) if not adopted
A, C, D (230 kV only) and **Alt. 1**	Within existing ROW and franchise	1, 2, 3, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	No	Prevented by other tie lines within the corridor and separation requirements
			Reduce conductor (phase) spacing	No-Cost	No	Design uses optimum phase spacing
A, D (230 kV only) and **Alt. 1**	Within existing ROW	1, 2, 3, 4, 6	Increase structure height (increase the height of the conductor from ground level)	No-Cost	Yes	N/A
				Low-cost	No	Not 15% or more reduction
			Phase circuits to reduce magnetic fields	No-Cost	No	Design uses optimum phasing
C	Within existing ROW and franchise	1, 2, 3, 4, 6	Increase structure height (increase the height of the conductor from ground level)	No-Cost	No	Design uses existing structures
				Low-cost	No	Not 15% or more reduction
			Phase circuits to reduce magnetic fields	No-Cost	Yes	N/A
B	Within existing ROW and franchise	1, 2, 3, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	Yes, as possible	Dependent on location of other utilities within the roadway and separation requirements
			Reduce conductor (phase) spacing	No-Cost	No	Design uses optimum phase spacing
Alt. 4 - Segment D 69 kV Partial UG Alignment			Phase circuits to reduce magnetic fields	No-Cost	Yes	N/A
			Increase trench depth	Low-Cost	No	Modeling for additional 3 feet of depth showed necessary 15% reduction could not be achieved

Numbered land use categories are: (1) Schools, licensed day care and hospitals; (2) Residential; (3) Commercial/Industrial; (4) Recreational; (5) Agricultural; (6) Undeveloped land

Table 5: Route Combination #4A
Magnetic Field Reduction Measures Adopted or Rejected

Segment(s)	Location	Adjacent Land Use [3]	Reduction Measure	Estimated Cost to Adopt	Measure Adopted? (Yes/No)	Reason(s) if not adopted
A, D (230 kV only)	Within existing ROW and franchise	1, 2, 3, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	No	Prevented by other tie lines within the corridor and separation requirements
			Reduce conductor (phase) spacing	No-Cost	No	Design uses optimum phase spacing
			Increase structure height (increase conductor height from ground level)	No-Cost	Yes	N/A
				Low-cost	No	Not 15% or more reduction
			Phase circuits to reduce magnetic fields	No-Cost	No	Design uses optimum phasing
C	Within existing ROW and franchise	1, 2, 3, 6	Increase structure height (increase conductor height from ground level)	No-Cost	No	Design uses existing structures
				Low-cost	No	Not 15% or more reduction
			Phase circuits to reduce magnetic fields	No-Cost	Yes	N/A
B **Alt. 4 - Segment D 69 kV Partial UG Alignment**	Within existing ROW and franchise	1, 2, 3, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	Yes, as possible	Dependent on location of other utilities within the roadway and separation requirements
			Reduce conductor (phase) spacing	No-Cost	No	Design uses optimum phase spacing
			Phase circuits to reduce magnetic fields	No-Cost	Yes	N/A
			Increase trench depth	Low-Cost	No	Modeling for additional 3 feet of depth showed necessary 15% reduction could not be achieved

Numbered land use categories are: (1) Schools, licensed day care and hospitals; (2) Residential; (3) Commercial/Industrial; (4) Recreational; (5) Agricultural; (6) Undeveloped land

Table 6: Route Combination #4B
Magnetic Field Reduction Measures Adopted or Rejected

Segment(s)	Location	Adjacent Land Use	Reduction Measure	Estimated Cost to Adopt	Measure Adopted? (Yes/No)	Reason(s) if not adopted
A, D (230 kV only)	Within existing ROW and franchise	1, 2, 3, 4, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	No	Prevented by other tie lines within the corridor and separation requirements
			Increase structure height (increase the height of the conductor from ground level)	No-Cost	Yes	N/A
				Low-cost	No	Not 15% or more reduction
			Reduce conductor (phase) spacing.	No-Cost	No	Design uses optimum phase spacing
			Phase circuits to reduce magnetic fields	No-Cost	No	Design uses optimum phasing
Alt 3 - Los Peñasquitos Canyon Preserve to Mercy Road 230 kV UG and **Alt. 4 - Segment D 69 kV Partial UG Alignment**	Within existing ROW and franchise	1, 2, 3, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	Yes, as possible	Dependent on location of other utilities within the roadway and separation requirements
			Phase circuits to reduce magnetic fields	No-Cost	Yes	N/A
			Increase trench depth	Low-Cost	No	Modeling for additional 3 feet of depth showed necessary 15% reduction could not be achieved

Numbered land use categories are: (1) Schools, licensed day care and hospitals; (2) Residential; (3) Commercial/Industrial; (4) Recreational; (5) Agricultural; (6) Undeveloped land

Table 7: Route Combination #5
Magnetic Field Reduction Measures Adopted or Rejected

Segment(s)	Location	Adjacent Land Use	Reduction Measure	Estimated Cost to Adopt	Measure Adopted? (Yes/No)	Reason(s) if not adopted
A, C, D and **Alt. 2 Cable Pole**	Within existing ROW and franchise	1, 2, 3, 4, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	No	Prevented by other tie lines within the corridor and separation requirements
			Reduce conductor (phase) spacing	No-Cost	No	Design uses optimum phase spacing
A, D and **Alt. 2 Cable Pole**	Within existing ROW	1, 2, 3, 4, 6	Increase structure height (increase the height of the conductor from ground level)	No-Cost	Yes	N/A
				Low-cost	No	Not 15% or more reduction
			Phase circuits to reduce magnetic fields	No-Cost	No	Design uses optimum phasing
C	Within existing ROW and franchise	1, 2, 3, 4, 6	Increase structure height (increase the height of the conductor from ground level)	No-Cost	No	Design uses existing structures
				Low-cost	No	Not 15% or more reduction
			Phase circuits to reduce magnetic fields	No-Cost	Yes	N/A
B **Alt. 4 - Segment D 69 kV Partial UG Alignment** **Alt. 2 UG Options**	Within existing ROW and franchise	1, 2, 3, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	Yes, as possible	Dependent on location of other utilities within the roadway and separation requirements
			Reduce conductor (phase) spacing	No-Cost	No	Design uses optimum phase spacing
			Phase circuits to reduce magnetic fields	No-Cost	Yes	N/A
			Increase trench depth	Low-Cost	No	Modeling for additional 3 feet of depth showed necessary 15% reduction could not be achieved

Numbered land use categories are: (1) Schools, licensed day care and hospitals; (2) Residential; (3) Commercial/Industrial; (4) Recreational; (5) Agricultural; (6) Undeveloped land

Table 8: Route Combination #6
Magnetic Field Reduction Measures Adopted or Rejected

Segment(s)	Location	Adjacent Land Use	Reduction Measure	Estimated Cost to Adopt	Measure Adopted? (Yes/No)	Reason(s) if not adopted
A, C, D and **Alt. 1 Cable Pole**	Within existing ROW and franchise	1, 2, 3, 4, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	No	Prevented by other tie lines within the corridor and separation requirements
			Reduce conductor (phase) spacing	No-Cost	No	Design uses optimum phase spacing
A, D and **Alt. 1 Cable Pole**	Within existing ROW	1, 2, 3, 4, 6	Increase structure height (increase the height of the conductor from ground level)	No-Cost	Yes	N/A
				Low-cost	No	Not 15% or more reduction
			Phase circuits to reduce magnetic fields	No-Cost	No	Design uses optimum phasing
C	Within existing ROW	1, 2, 3, 4, 6	Increase structure height (increase the height of the conductor from ground level)	No-Cost	No	Design uses existing structures
				Low-cost	No	Not 15% or more reduction
			Phase circuits to reduce magnetic fields	No-Cost	Yes	N/A
B	Within existing ROW and franchise	1, 2, 3, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	Yes, as possible	Dependent on location of other utilities within the roadway and separation requirements
			Reduce conductor (phase) spacing	No-Cost	No	Design uses optimum phase spacing
			Phase circuits to reduce magnetic fields	No-Cost	Yes	N/A
			Increase trench depth	Low-Cost	No	Modeling for additional 3 feet of depth showed necessary 15% reduction could not be achieved

Numbered land use categories are: (1) Schools, licensed day care and hospitals; (2) Residential; (3) Commercial/Industrial; (4) Recreational; (5) Agricultural; (6) Undeveloped land

Table 9: Route Combination #7A
Magnetic Field Reduction Measures Adopted or Rejected

Segment(s)	Location	Adjacent Land Use	Reduction Measure	Estimated Cost to Adopt	Measure Adopted? (Yes/No)	Reason(s) if not adopted
A, C, D	Within existing ROW and franchise	1, 2, 3, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	No	Prevented by other tie lines within the corridor and separation requirements
			Reduce conductor (phase) spacing	No-Cost	No	Design uses optimum phase spacing
A, D	Within existing ROW	1, 2, 3, 6	Increase structure height (increase the height of the conductor from ground level)	No-Cost	Yes	N/A
				Low-cost	No	Not 15% or more reduction
			Phase circuits to reduce magnetic fields	No-Cost	No	Design uses optimum phasing
C	Within existing ROW	1, 2, 3, 4, 6	Increase structure height (increase the height of the conductor from ground level)	No-Cost	No	Design uses existing structures
				Low-cost	No	Not 15% or more reduction
			Phase circuits to reduce magnetic fields	No-Cost	Yes	N/A
B	Within existing ROW and franchise	1, 2, 3, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	Yes, as possible	Dependent on location of other utilities within the roadway and separation requirements
			Reduce conductor (phase) spacing	No-Cost	No	Design uses optimum phase spacing
			Phase circuits to reduce magnetic fields	No-Cost	Yes	N/A
			Increase trench depth	Low-Cost	No	Modeling for additional 3 feet of depth showed necessary 15% reduction could not be achieved

Numbered land use categories are: (1) Schools, licensed day care and hospitals; (2) Residential; (3) Commercial/Industrial; (4) Recreational; (5) Agricultural; (6) Undeveloped land

Table 10: Route Combination #7B
Magnetic Field Reduction Measures Adopted or Rejected

Segment(s)	Location	Adjacent Land Use	Reduction Measure	Estimated Cost to Adopt	Measure Adopted? (Yes/No)	Reason(s) if not adopted
A, D	Within existing ROW and franchise	1, 2, 3, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	No	Prevented by other tie lines within the corridor and separation requirements
			Increase structure height (increase the height of the conductor from ground level)	No-Cost	Yes	N/A
				Low-cost	No	Not 15% or more reduction
			Reduce conductor (phase) spacing	No-Cost	No	Design uses optimum phase spacing
			Phase circuits to reduce magnetic fields	No-Cost	No	Design uses optimum phasing
Alt. 3 - Los Peñasquitos Canyon Preserve to Mercy Road 230 kV UG	Within existing ROW and franchise	1, 2, 3, 6	Locate power lines closer to center of the utility corridor to extent possible	No-Cost	Yes, as possible	Dependent on location of other utilities within the roadway
			Phase circuits to reduce magnetic fields	No-Cost	Yes	N/A
			Increase trench depth	Low-Cost	No	Modeling for additional 3 feet of depth showed necessary 15% reduction could not be achieved

Numbered land use categories are: (1) Schools, licensed day care and hospitals; (2) Residential; (3) Commercial/Industrial; (4) Recreational; (5) Agricultural; (6) Undeveloped land

VIII. Summary of Magnetic Field Reduction Measures Adopted or Rejected

As identified in Section VII, several no-cost magnetic field reduction measures were recommended for the Proposed Project segments and the FEIR Alternatives. No low-cost measures were recommended.

Table 11 below identifies those "no-cost" and "low-cost" measures which were appropriate to consider for the Alternatives and the Proposed Project segment, and whether the measures were adopted.

Table 12 below provides the rationale for adoption or rejection of those measures which were considered.

Table 11. Magnetic Field Reduction Measures Considered

Segment or Alternative	Reduction Measure Considered	Measure Adopted?	Est. Cost to Adopt
Alternative 1, Eastern Cable Pole at Carmel Valley Road (Option 1b) **Alternative 2**, Eastern Cable Pole at Pole P40	Locate power lines closer to center of the utility corridor to extent possible	No	N/A
	Increase conductor height by increasing structure height	Yes	No-cost
	Phase circuits to reduce magnetic fields	No	N/A
	Reduce conductor (phase) spacing	No	N/A
Alternative 2 Underground Options 2a or 2b, Eastern Cable Pole at Pole P40 **Alternative 3**, Los Peñasquitos Canyon Preserve to Mercy Road Underground **Alternative 4**, Segment D 69 kV Partial Underground Alignment **Alternative 5 Underground**, Pomerado Road to Miramar Area North	Locate power lines closer to center of the utility corridor to extent possible	As possible	No-cost
	Phase circuits to reduce magnetic fields	Yes	No-cost
	Increase trench depth	No	N/A
Alternative 5 Overhead, Miramar Area North	Locate power lines closer to center of the utility corridor to extent possible	No	N/A
	Increase conductor height by increasing structure height	No	N/A
	Increase conductor height by increasing structure height	No	N/A
	Phase circuits to reduce magnetic fields	No	N/A
	Reduce conductor (phase) spacing	No	N/A
Proposed Project Segment A (Overhead)	Locate power lines closer to center of the utility corridor to extent possible	No	N/A
	Increase conductor height by increasing structure height	Yes	No-cost
	Phase circuits to reduce magnetic fields	No	N/A
	Reduce conductor (phase) spacing	No	N/A

Table 11. Magnetic Field Reduction Measures Considered			
Segment or Alternative	**Reduction Measure Considered**	**Measure Adopted?**	**Est. Cost to Adopt**
Proposed Project Segment B (Underground)	Locate power lines closer to center of the utility corridor to extent possible	As possible	No-cost
	Phase circuits to reduce magnetic fields	Yes	No-cost
	Increase trench depth	No	N/A
Proposed Project Segment C (Overhead)	Locate power lines closer to center of the utility corridor to extent possible	No	N/A
	Increase conductor height by increasing structure height	No	N/A
	Phase circuits to reduce magnetic fields	No	N/A
	Reduce conductor (phase) spacing	No	N/A
Proposed Project Segment D (Overhead)	Locate power lines closer to center of the utility corridor to extent possible	No	N/A
	Increase conductor height	Yes	No-cost
	Phase circuits to reduce magnetic fields	No	N/A
	Reduce conductor (phase) spacing	No	N/A

Table 12. Reasons Magnetic Field Reduction Measures Were Adopted or Rejected		
Reduction Measure Rejected	**Segments Where Considered**	**Reason(s) Reduction Measure Was Adopted or Rejected**
Locate power lines closer to center of the utility corridor to extent possible	All	For overhead Segments A, C and D and the overhead portion of Alternative 5, this measure was rejected as both a no-cost and a low-cost magnetic field reduction solution due to other structures and tie lines within the corridor and separation requirements. For underground Segment B and Alternatives 3 and 4, and the underground portions of Alternatives 2 and 5, this no-cost measure would be adopted to the extent possible dependent on location of other utilities within the roadway and separation requirements.
Increase conductor height by increasing structure height	OH Segments A, C, D and Alternatives 1, 2 and 5	For overhead Segments A and D, this measure was adopted as a no-cost magnetic field reduction solution since the proposed design height above ground for the new structures in these segments averages an increase of 11 feet (to 41 ft. from 30 ft.) to be consistent with the heights of the existing structures. For Alternatives 1 and 2, this measure was adopted as a no-cost magnetic field reduction solution since the cable poles would be taller than the Proposed Project cable pole. For overhead Segment C and the overhead portion of Alternative 5, this measure was rejected as a no-cost magnetic field reduction solution because the design uses existing structures, and was rejected as a low-cost magnetic field reduction solution because it would not achieve a minimum 15% reduction at the edges of ROW.

Table 12. Reasons Magnetic Field Reduction Measures Were Adopted or Rejected		
Reduction Measure Rejected	**Segments Where Considered**	**Reason(s) Reduction Measure Was Adopted or Rejected**
Phase circuits to reduce magnetic fields	All	For overhead Segments A and D, the overhead portion of Alternative 5, and the Alternative 1 and 2 cable poles, this measure was rejected as both a no-cost and a low-cost magnetic field reduction solution because the design provides lowest milligauss values at the edges of ROW compared with other phasing arrangements. For underground Segment B, the phases of the two 69 kV circuits can "reversed" to achieve reduction at the edges of ROW as a no-cost reduction measure. For Alternatives 3 and 4 and the underground portions of Alternatives 2 and 5, the bundled phases of the single 230 kV circuit can be split and "reversed" to achieve reduction at the edges of ROW as a no-cost reduction measure. For overhead Segment C, the new 230 kV circuit can be phased the same as the existing 230 kV circuit since the power flows are in opposite directions; this no-cost measure would be adopted since it would achieve reduction at the edges of ROW.
Reduce conductor (phase) spacing	All	This measure was rejected as both a no-cost and a low-cost magnetic field reduction solution for all segments and alternatives, since the circuit design for all overhead and underground uses optimum phase spacing based on SDG&E construction standards.
Increase trench depth	UG Segment B and Alternatives 2, 3, 4 and 5	For 230 kV underground Segment B, Alternative 3, and the underground portions of Alternatives 2 and 5, calculations show that the adopted no-cost measure of reverse-phasing already reduces magnetic field values at the edge of ROW by 91% to 98%. For 69 kV underground Alternative 4, calculations show that the adopted no-cost measure of reverse-phasing already reduces magnetic field values at the edge of ROW by 55% to 65%. Increasing trench depth was considered as a possible low-cost magnetic field reduction solution. For the underground segments and alternatives, modeling for an additional three feet of depth showed that the necessary 15% reduction to qualify as a possible low-cost measure could not be achieved at both edges of ROW. Therefore, this measure was rejected as a low-cost solution. As noted above for these underground segments and alternatives, SDG&E would, to the extent possible, locate power lines closer to center of the road ROWs, dependent on location of other utilities within the roadway and separation requirements. This no-cost measure is often more effective in reducing fields at the near edge of ROW than increasing trench depth. The CPUC noted in D.06-01-042 that: 1) "placing a transmission line underground should normally provide sufficient mitigation" [at 12]; 2) "underground transmission lines typically reduce magnetic fields in comparison to overhead line construction [at 12];" 3) "underground lines are usually more costly than overhead line construction [at 12]; and 4) "[N]on-routine mitigation measures should only be considered under unique circumstances." [at 18]

IX. Calculated Magnetic Field Values for Segments and Alternatives

Each of the nine combined routes identified in Section V is a combination of one or more of the Proposed Project Segments A, B, C and D (to one extent or another) and alternative segments identified in the FEIR. The segments evaluated for magnetic field reduction are:

1) Proposed Project Overhead Segment A (partial or complete)
2) Proposed Project Underground Segment B
3) Proposed Project Overhead Segment C
4) Proposed Project Overhead Segment D (with and without 69 kV)
5) Alternative 2, Underground options related to relocation of the Cable Pole at Pole P40
6) Alternative 3, Los Peñasquitos Canyon Preserve to Mercy Road 230 kV Underground
7) Alternative 4, Segment D 69 kV Partial Underground Alignment
8) Alternative 5, 230 kV Underground (Pomerado Road to Miramar Area North)
9) Alternative 5, 230 kV Overhead (Miramar Area North)

Unlike possible low-cost measures for which a minimum reduction of 15% at the edge of ROW must be demonstrated, no-cost measures are applied, where feasible, as long as some percent reduction can be achieved.

The tables in this section show calculated magnetic field values in milligauss at the edges of ROW or edges of easement for the segments associated with these nine ranked alternative routes. Calculations were performed for power and transmission lines only, and exclude all electric distribution lines, whether stand-alone, underbuilt on poles or underground.

No calculations were performed for the Alternative 1 and 2 cable pole relocations due to their limited scope.

As noted previously, the design status of the alternative routes is preliminary. In particular, SDG&E has not yet finalized locations for the underground duct packages in the roadways. For the underground segments, calculated milligauss values are provided at "Near Edge" and "Far Edge" for road ROW widths ranging from 60 feet to 120 feet for Alternatives 2, 3 and 5, and from 70 feet to 108 feet for Alternative 4, based on the center of the duct package being 20 feet from the "Near Edge ROW."

Proposed Project Segments A, B, C and D

The calculated milligauss values in the tables below are reproduced for Segments A, B and C from the FMP for the Proposed Project, and for Segment D from SDG&E's response to Energy Division Data Request #18 for overhead Segment D.

Calculated Magnetic Field Values* for Proposed Project Overhead Segment A					
Standard Design Height Above Ground, 30 feet		Initial Design Height Above Ground, 41 feet		Percent Reduction Standard Hgt. vs Design Hgt.	
West	**East**	**West**	**East**	**West**	**East**
59.4	46.3	48.9	46.5	18%	0%
Calculated Magnetic Field Values* for Proposed Project Underground Segment B					
UG, Standard 3-foot cover, Phasing ABC/ABC		UG, Standard 3-foot cover, Phasing ABC/CBA		Percent Reduction ABC/ABC vs ABC/CBA	
South	**North**	**South**	**North**	**South**	**North**
8.4	4.4	0.3	0.1	96%	98%

Calculated Magnetic Field Values* for Proposed Project Overhead Segment C					
Initial Phasing ABC/CBA		Reverse Phasing ABC/ABC		Percent Reduction ABC/CBA vs ABC/ABC	
West	**East**	**West**	**East**	**West**	**East**
140.9	142.4	122.3	91.0	13%	36%
Calculated Magnetic Field Values* for Proposed Project Overhead Segment D					
Initial Design with 69 kV Overhead		Alternative Design without 69 kV Overhead		Percent Reduction w/69 kV vs w/o 69 kV	
South	**North**	**South**	**North**	**South**	**North**
1.8	71.8	3.3	79.1	-82%	-10%

Note: A minus percent reduction indicates an increase in magnetic field value.

* Calculated values are for design comparison only and not meant to predict actual magnetic field levels.

Alternative 2 UG, Alternative 3 UG and **Alternative 5 UG**

Ranges in predominant ROW width: Alternative 3, 60' to 157'; Alternative 5, 70' to 120'

Calculated Magnetic Field Values* for Alternatives 2, 3 and 5						
	UG, Standard 3-foot cover, Phasing ABC/ABC		UG, Standard 3-foot cover, Phasing ABC/CBA		Percent Reduction ABC/ABC vs ABC/CBA	
Street Width (ft.)	**Near Edge ROW**	**Far Edge ROW**	**Near Edge ROW**	**Far Edge ROW**	**Near Edge ROW**	**Far Edge ROW**
60	46.4	13.0	3.9	0.6	91.5%	95.5%
70	46.4	8.4	3.9	0.3	91.5%	96.4%
80	46.4	5.9	3.9	0.2	91.5%	96.9%
100	46.4	3.3	3.9	0.1	91.5%	97.6%
120	46.4	2.2	3.9	0.0	91.5%	98.1%

* Calculated values are for design comparison only and not meant to predict actual magnetic field levels.

Alternative 4, 69 kV Partial Underground Alignment for Segment D

Ranges in predominant ROW width: East Ocean Air Dr., 70 ' to 108'; Carmel Mountain Rd., 98' to 108'

Calculated Magnetic Field Values* for Alternative 4						
If duct package placed on north or west side of street						
	UG, Standard 3-foot cover, Phasing ABC/ABC		UG, Standard 3-foot cover, Phasing ABC/CBA		Percent Reduction ABC/ABC vs ABC/CBA	
Street Width (ft.)	**Near Edge ROW**	**Far Edge ROW**	**Near Edge ROW**	**Far Edge ROW**	**Near Edge ROW**	**Far Edge ROW**
70	18.5	3.2	8.3	1.2	55.2%	62.7%
98	18.5	1.4	8.3	0.5	55.2%	61.8%
108	18.5	1.1	8.3	0.4	55.2%	61.7%
If duct package placed on south or east side of street						
	UG, Standard 3-foot cover Phasing ABC/ABC		UG, Standard 3-foot cover Phasing ABC/CBA		Percent Reduction ABC/ABC vs ABC/CBA	
Street Width (ft.)	**Near Edge ROW**	**Far Edge ROW**	**Near Edge ROW**	**Far Edge ROW**	**Near Edge ROW**	**Far Edge ROW**
70	17.6	3.3	6.1	1.4	65.5%	58.0%
98	17.6	1.4	6.1	0.6	65.5%	58.4%
108	17.6	1.1	6.1	0.5	65.5%	58.3%

* Calculated values are for design comparison only and not meant to predict actual magnetic field levels.

Alternative 5, OH

The Alternative 5 overhead 230 kV segment is divided into these four sub-segments based on varying cross-sectional circuit placement:

1) Carroll Canyon Road to Mira Sorrento Place
2) Mira Sorrento Place to Wateridge Circle
3) Wateridge Circle to Sorrento Valley Blvd
4) Sorrento Valley Blvd to Peñasquitos Substation

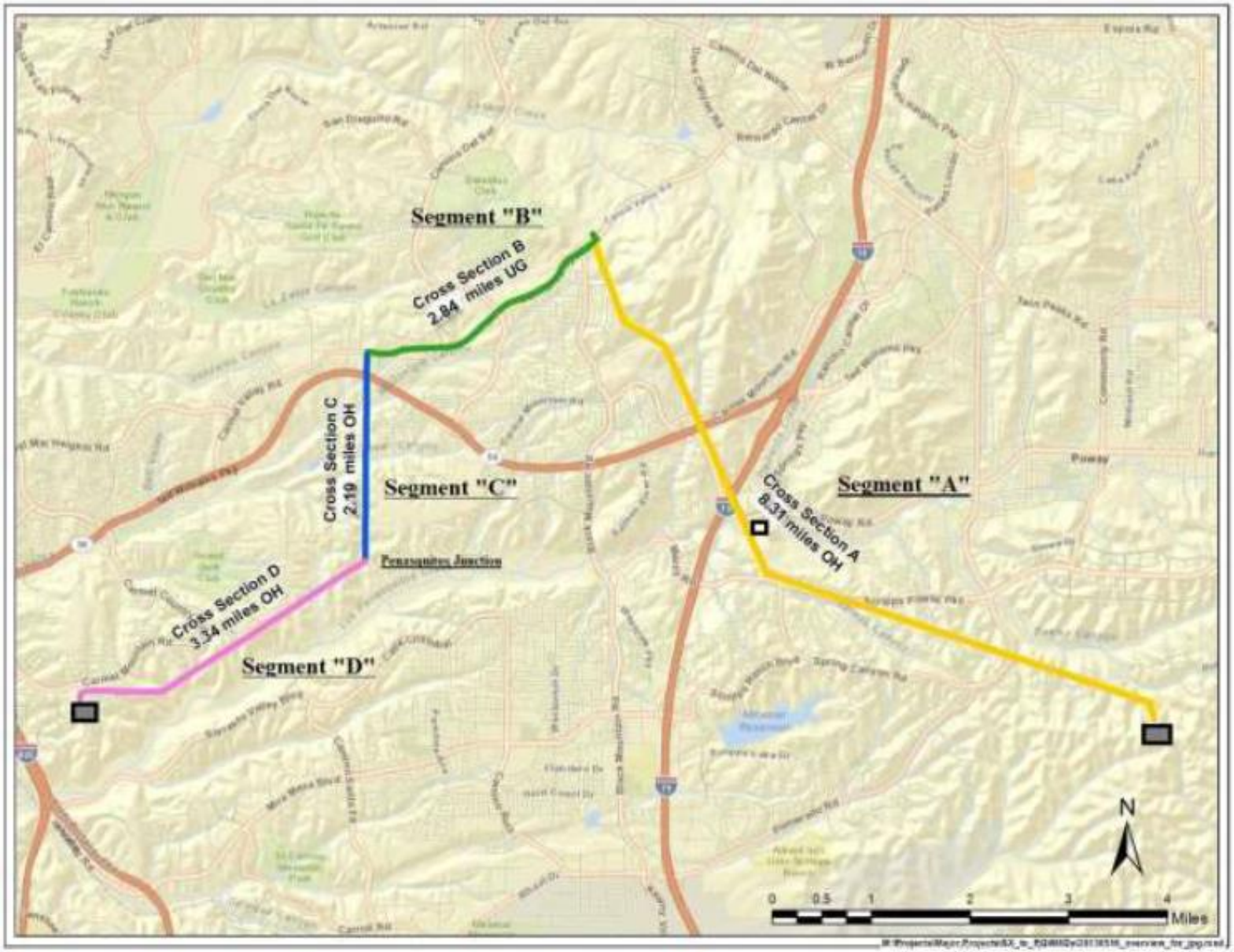
Calculated Magnetic Field Values* for Alternative 5						
	New 230 kV, Standard Phasing ABC/ABC		New 230 kV, Reverse Phasing ABC/CBA		Percent Reduction ABC/ABC vs ABC/CBA	
Sub-segment	**West**	**East**	**West**	**East**	**West**	**East**
1	23.5	79.1	25.0	46.3	-6.3%	41.4%
2	35.4	61.8	58.6	59.6	-65.5%	3.5%
3	41.0	65.4	12.3	55.8	70.0%	14.6%
4	35.4	62.5	43.0	58.3	-21.4%	6.7%

Note: A minus percent reduction indicates an increase in magnetic field value.

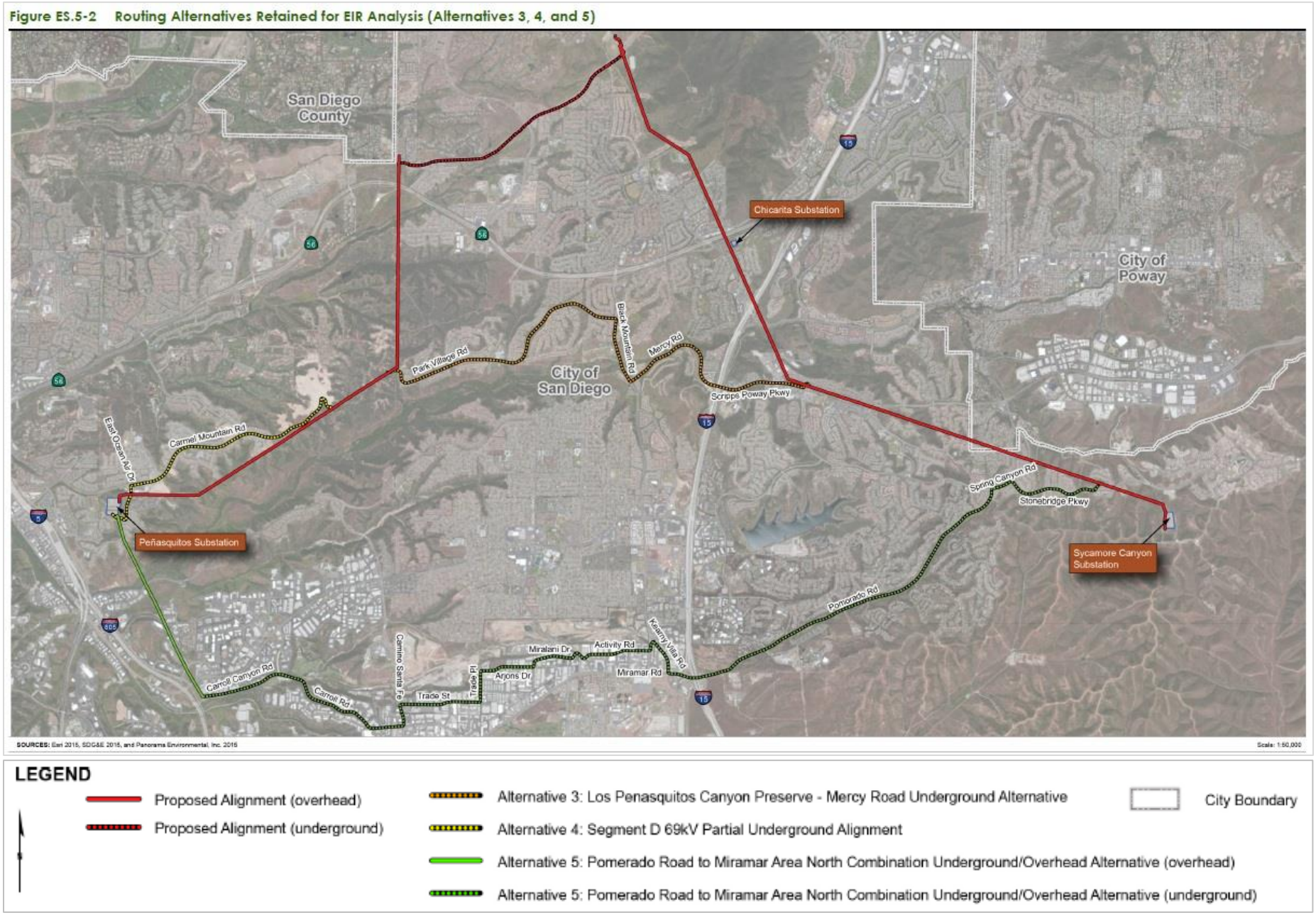
* Calculated values are for design comparison only and not meant to predict actual magnetic field levels.

Maps of the Routes Retained in the FEIR for the Project

Proposed Route



Alternatives 3, 4 and 5 (reproduced from FEIR, Panorama Environmental, Inc.)



Cable Pole Alternatives (reproduced from FEIR, Panorama Environmental, Inc.)