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Document Title:	Appendix Y Electric and Magnetic Field Study Report
Description:	This report is an assessment of the electric and magnetic field (EMF) and Electric Field for the Soda Mt. interconnection facilities. This document address CEC data requests TSSN-1 through TSSN-5.
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Soda Mountain Solar / BESS

Interconnection Facilities

(Generation Tie Line and Line Drop at the Substation)

Electric and Magnetic Field

(EV & EMF)

Study Report

November 5, 2024

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1. Executive Summary

The Soda Mt. Project ("Soda Mt") as proposed is a 300 MW (AC) Solar combined with a 300 MW (AC) / 1200 MWh Battery Energy Storage System. The project is located approximately 7 miles southwest of the community of Baker, CA, in unincorporated San Bernardino County. The project includes a generation-tie line, approximately 1 mile in length that runs between the project substation and the switching station. Additionally, to enable the gen tie connection to the switching station, there is a line drop from the transmission line tower to the switching station. The tie line and line drop are operated at 500 kV to match the LADWP Mead-Adelanto 500 kV line voltage.

The Electric Power Research Institute (EPRI) "EMFast" Electric & Magnetic Field Calculator, version #1.5.1.0, was used for this analysis.

The Generation tie line and line drops will be designed in accordance with CPUC GO 95. The small segment of the underground will be designed in accordance with CPUC GO 128

This report is an assessment of the electric and magnetic field (EMF) and Electric Field for the Soda Mt. interconnection facilities. The purpose of the assessment is to check the EMF and Electric Fields levels beneath the proposed 500 kV single circuit and the substation line against public exposure guidelines.

Based on the minimum ground clearance for the proposed 500 kV line (30 ft per GO95) the electric field levels directly under the proposed line are below the ICNIRP limit of 7.8 kV/meter. At minimum clearance level, directly below the line, the electric field was found to be **3.059 kV/meter**. At the design height of the towers and with the design conductor (397.5 kcmil), the electric field was reduced to **0.385 kV/meter.**

The magnetic field levels directly under the proposed generation tie line is well below the levels unis even farther below the International Commission on Non-Ionizing Radiation Protection (ICNIRP) general public exposure reference limit of 2,000 mG. The highest magnetic field, directly under the line, was found to be **60.7 mG** under minimum clearances. At the design height of the towers (conductor at 80 feet above ground), the magnetic field is reduced to **7.8 mG.**

The Line Drop at the Substation was also analyzed. This was done by averaging three points on the line drop which starts at 80' and drops down to 30' at the point of interconnection with the switching station. This resulted in an electric field averaging **1.78 kV/meter** and magnetic field averaging **50.73 mG.**

In every scenario evaluated the Electric and Magnetic Fields were found to be significantly below the acceptable limits. For the proposed design of the Generation tie line, Alternative 3 with

Tubular Steel Poles and 397.5 ACSR conductor in a triangular configuration, the Electric Field was found to be 0.385 kV / meter, 93% below the CEC guideline of 5.5 kv / meter. The Magnetic Field was found to be 7.8 mG, 97% below the CEC guideline of 250 mG.

Similar to the Generation tie line, the short Line Drop segment was also found to have EMF levels below the guidelines. For the Line Drop, the Electric Field averaged 1.78 kV/meter and the Magnetic Field averaged 50.73 mG.

2. Project Overview

The figures below provide an overview of the entire project and a close up of the interconnection facilities, including the project substation, generation tie line, and switching station. The project substation includes a 34.5 kV/500 kV transformer. All facilities and equipment from the 500 kV side of the transformer and the switching station and including the LADWP Mead – Adelanto Line are operated at 500 kV. The Phase to ground voltage is assumed at 288.675 kV (500 kV line voltage / √ 3 = 288.675 kV).

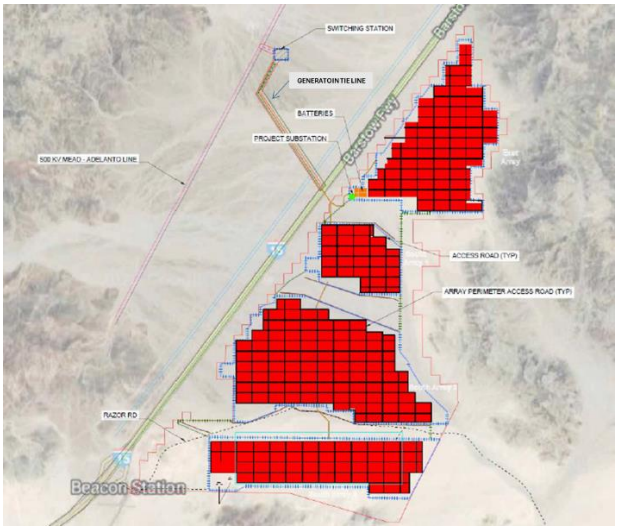

Figure 1- Soda Mt. Project Overview

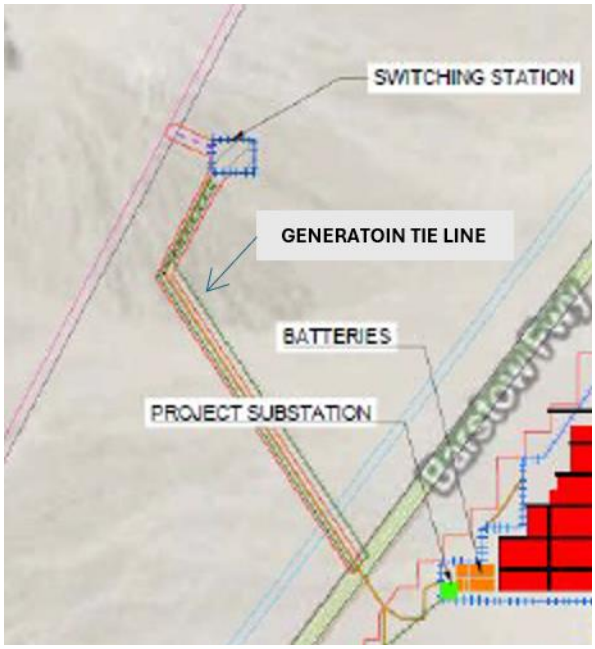

Figure 2 Soda Mt. Substation, Gen tie, and Switching Station

3. Assumptions

The following are assumptions related to the generation tie line, line drops, and switching station used in the analysis.

3.1 Generation Tie Line

The tie line is primarily overhead as shown in the figure above but has a short segment that is underground between the project substation and I-15 (Barstow Fwy). The electric field from underground cables are contained within the cable's insulation and sheath, so there are no external electric fields for analysis. While there is still a magnetic field generated from the underground cable and the field can be higher than for overhead due to the relatively closer distance to ground surface, the magnetic field from underground cables decreases more quickly with distance than overhead lines. For this reason, the analysis of the overhead line segment is relied upon.

There will be 10 to 11 support structures, two of which will be riser poles to enable use of insulated cables to go beneath I-15 via an existing Caltrans culvert.

The loop-in will include 6 new towers which will be VRDX1 lattice structures as specified by LADWP design standards. Two of the new loop-in towers are expected to replace two of the existing structures on the Mead Adelanto line to allow for 90 deg turn into the new Soda Mountain switching station.

3.1.1 Transmission Tower

Two tower types and associated configurations were evaluated for the generation tie line. The first, see figure below, was assumed to be consistent with existing LADWP towers supporting the 500 kV Mead-Adelanto line, and the second being a more modern design utilizing Tubular Steel Poles.

Figure 3 - Existing Mead - Adelanto Line Support Structure

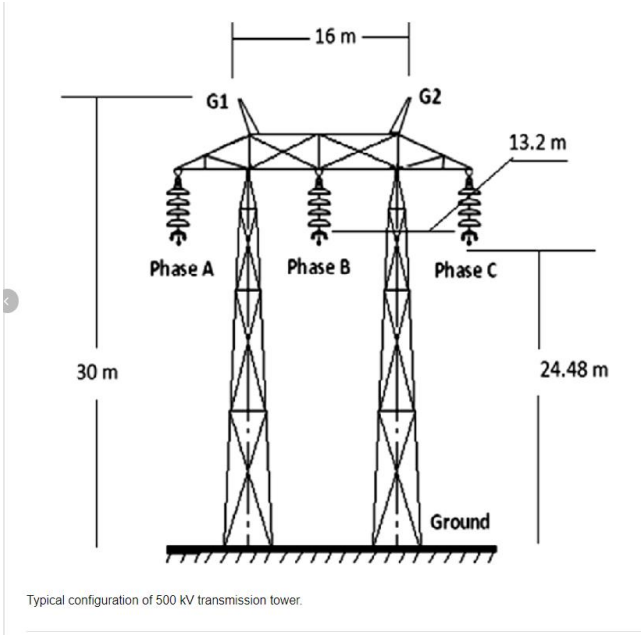

Figure 4 - Assumed Tower Dimensions and Conductor Spacing, Existing Structure Type

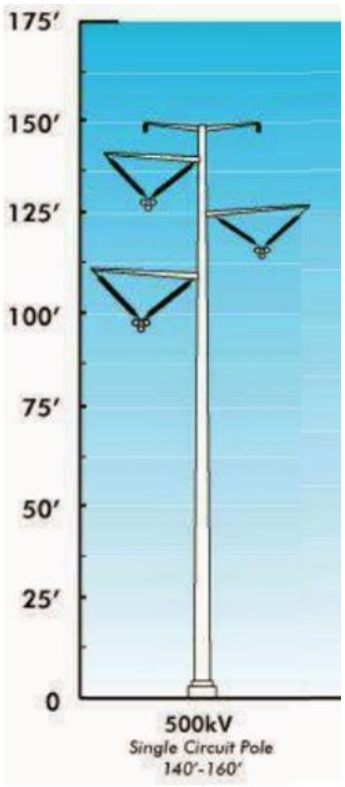

Figure 5 - Assumed Tower Dimensions and Conductor Configuration. TSP

3.1.2 Conductor

Three overhead conductor types are considered. The project, at 300 MW operating at 500 kV will produce 346 Amps. At the required power factor of 0.9, the project will produce 385 Amps. The analysis below assumes 385 Amps in all cases. The following two conductors are considered:

1. Conductor to roughly match existing Mead – Adelanto line
   Conductor: Athabaska, 1946.9 kcmil (ACSR)
   Diameter: 1.504 inches total diameter
   Ampacity at 75°C: 1508 Amps

2. Alternative 1 conductor to be used for the generation tie line
   Conductor: Hawk, 477 kcmil (ACSR)
   Diameter: 0.786 inches total diameter
   Allowable Ampacity: 652 Amps

3. Alternative 2 conductor to be used for the generation tie line
   Conductor: Lark, 397.5 kcmil (ACSR)
   Diameter: 0.806 inches total diameter
   Allowable Ampacity: 594 Amps

3.2 Line Drop into Switching Station

In addition to the generation tie line, there is a line drop from the last pole of the generation tie into the switching station. See figure below. For the line drop, an average of three points are considered to determine the EMF. The three points represent the two end points (80' and 30') and one at roughly mid span (40').

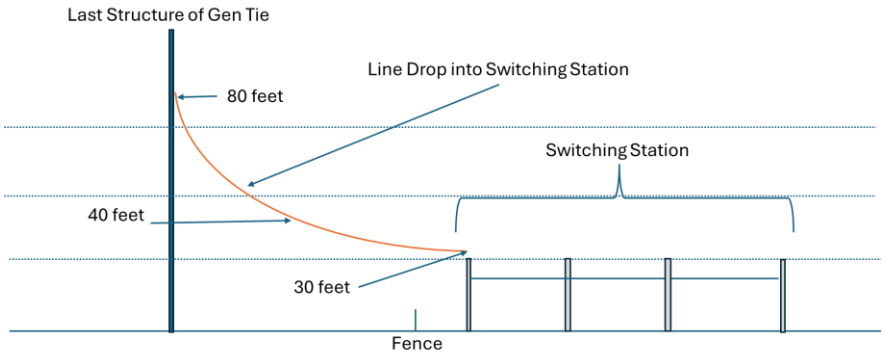

Figure 6 - Line Drop Profile and Elevations

4. Analysis

4.1 Generation Tie Line Electric and Magnetic Field

4.1.1 Tie Line Electric Field

Three alternatives were evaluated for the generation tie line. Each assumes a different conductor size and alternative pole top configurations are considered.

4.1.1.1 Alternative 1: Conductor to Roughly Match existing Mead Adelanto Line

This alternative utilizes a tower configuration similar to the existing Mead-Adelanto line and the 1949.6 kcmil "Athabasca" conductor. The figure below shows the conductor configuration. 1, 2, and 3 are the phase conductors. 4 and 5 are shield wires.

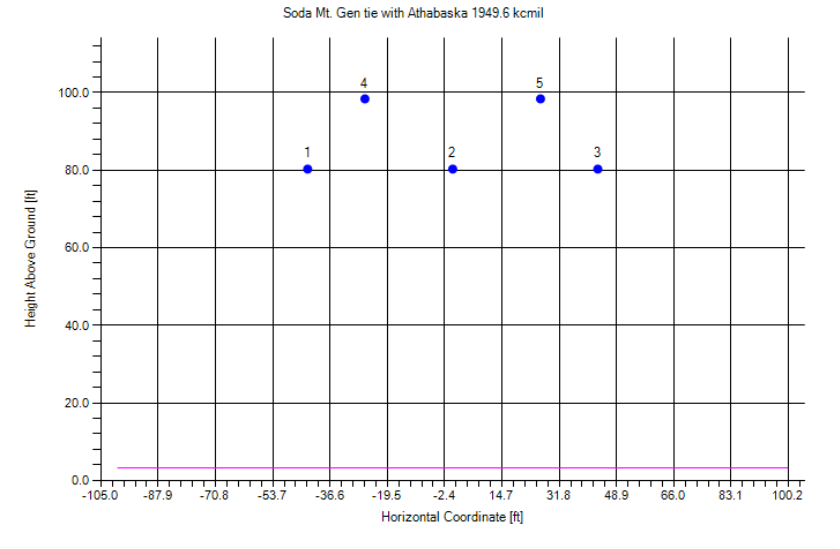

Figure 7 - Conductor Configuration Alternative 1

The highest electric field point was found at 60' from the center line and was 0.943 kV/meter. The plot below shows the electric filed for alternative and is followed by the tabular output.

Table 1 - Alternative 1 Electric Field Tabular Results

Electric Field ----------

Lateral Distance	Ey Magnitude (kV/m)	Max E-Field (kV/m)	Real(Ex)	Imag(Ex)	Real(Ey)	Imag(Ey)
-100.0	0.708	0.709	0.027	-0.009	0.689	-0.161
-90.0	0.794	0.794	0.025	-0.011	0.770	-0.192
-80.0	0.870	0.871	0.019	-0.013	0.840	-0.229
-70.0	0.925	0.925	0.008	-0.015	0.884	-0.272
-60.0	0.943	0.943	-0.008	-0.017	0.886	-0.321
-50.0	0.911	0.911	-0.029	-0.017	0.831	-0.373
-40.0	0.825	0.826	-0.050	-0.013	0.710	-0.420
-30.0	0.695	0.696	-0.068	-0.006	0.528	-0.451
-20.0	0.543	0.546	-0.078	0.007	0.302	-0.452
-10.0	0.410	0.412	-0.080	0.024	0.058	-0.406
0.0	0.353	0.353	-0.073	0.042	-0.176	-0.306
10.0	0.410	0.412	-0.060	0.057	-0.381	-0.153
20.0	0.543	0.546	-0.045	0.064	-0.542	0.036
30.0	0.695	0.696	-0.029	0.062	-0.655	0.232
40.0	0.825	0.826	-0.013	0.050	-0.719	0.405
50.0	0.911	0.911	-6.55E-5	0.033	-0.738	0.534
60.0	0.943	0.943	0.010	0.015	-0.721	0.607
70.0	0.925	0.925	0.017	3.19E-4	-0.678	0.629
80.0	0.870	0.871	0.021	-0.010	-0.618	0.613
90.0	0.794	0.794	0.022	-0.016	-0.551	0.571
100.0	0.708	0.709	0.021	-0.019	-0.485	0.516

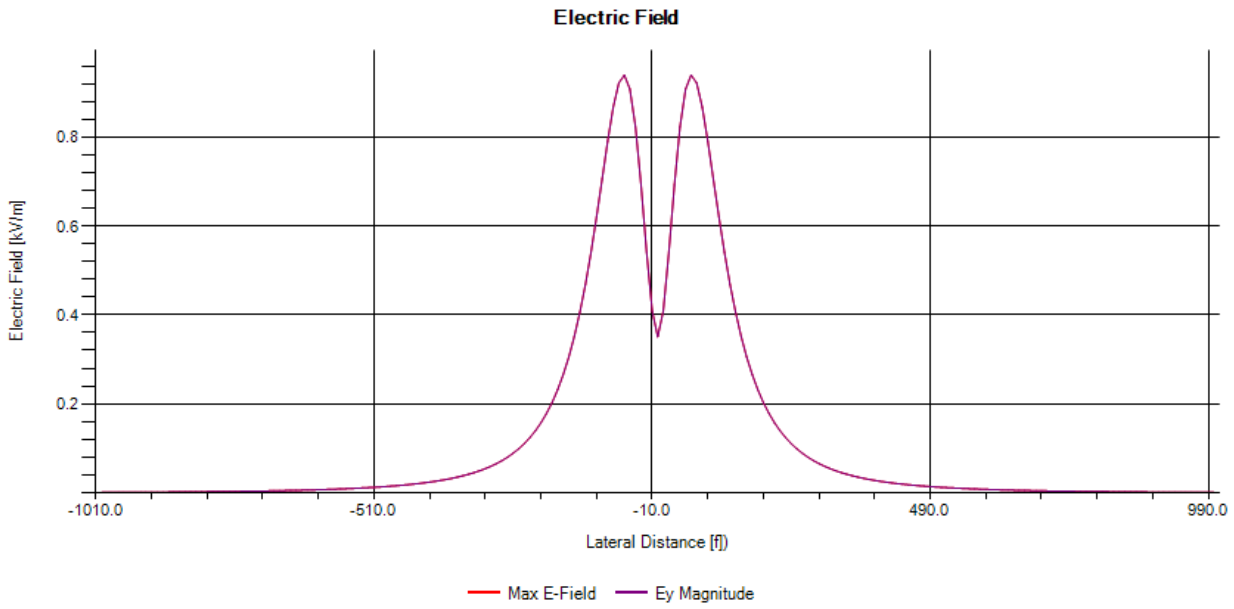

Figure 8 - Alternative 1 Electric Field Plot

4.1.1.2 Alternative 2: Tubular Steel Poles, Triangle Phase Configuration, 477 kcmil

This alternative assumes the use of Tubular Steel poles with conductors in a triangular configuration and 477 kcmil "Hawk" conductor. The figure below shows the conductor configuration. 1, 2, and 3 are the phase conductors. 4 and 5 are shield wires.

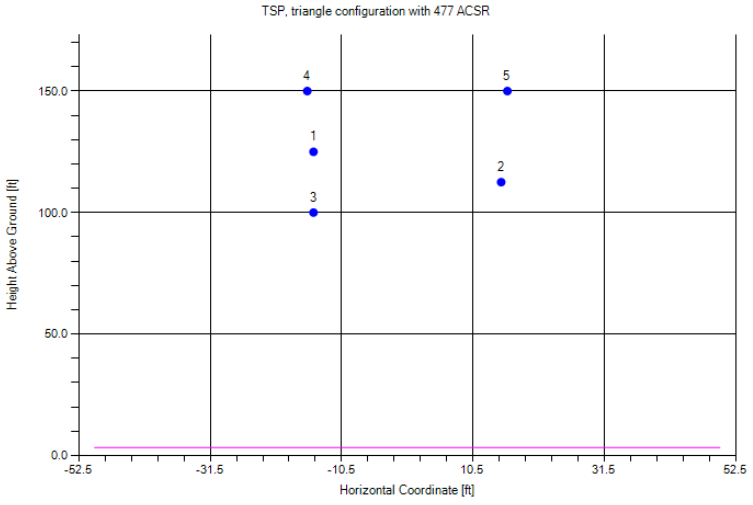

Figure 9 - Conductor Configuration Alternative 2

The highest electric field point was found at 30' from the center line and was 0.384 kV/meter. The plot below shows the electric filed for alternative and is followed by the tabular output. The electric field is not symmetric due to the conductor configuration.

Table 2 - Alternative 2 Electric Field Tabular Output

Electric Field ----------

Lateral Distance	Ey Magnitude (kV/m)	Max E-Field (kV/m)	Real(Ex)	Imag(Ex)	Real(Ey)	Imag(Ey)
-100.0	0.213	0.213	-0.002	0.003	-0.003	0.213
-90.0	0.241	0.241	-0.002	0.003	-0.021	0.240
-80.0	0.270	0.271	-0.003	0.003	-0.045	0.267
-70.0	0.301	0.301	-0.003	0.002	-0.073	0.292
-60.0	0.331	0.331	-0.004	0.002	-0.107	0.313
-50.0	0.356	0.356	-0.004	6.98E-4	-0.145	0.325
-40.0	0.374	0.374	-0.004	-7.04E-4	-0.185	0.325
-30.0	0.383	0.383	-0.004	-0.002	-0.224	0.310
-20.0	0.380	0.380	-0.003	-0.004	-0.260	0.278
-10.0	0.368	0.368	-0.002	-0.006	-0.288	0.229
0.0	0.351	0.351	-0.002	-0.007	-0.308	0.167
10.0	0.333	0.333	-5.09E-4	-0.007	-0.319	0.099
20.0	0.320	0.320	4.3E-4	-0.007	-0.319	0.030
30.0	0.312	0.312	0.001	-0.006	-0.310	-0.032
40.0	0.306	0.306	0.002	-0.005	-0.295	-0.083
50.0	0.300	0.300	0.002	-0.003	-0.275	-0.121
60.0	0.291	0.291	0.002	-0.002	-0.251	-0.147
70.0	0.278	0.278	0.003	-0.001	-0.226	-0.162
80.0	0.262	0.262	0.002	-2.34E-4	-0.201	-0.168
90.0	0.244	0.244	0.002	3.22E-4	-0.178	-0.168
100.0	0.225	0.225	0.002	6.9E-4	-0.156	-0.162

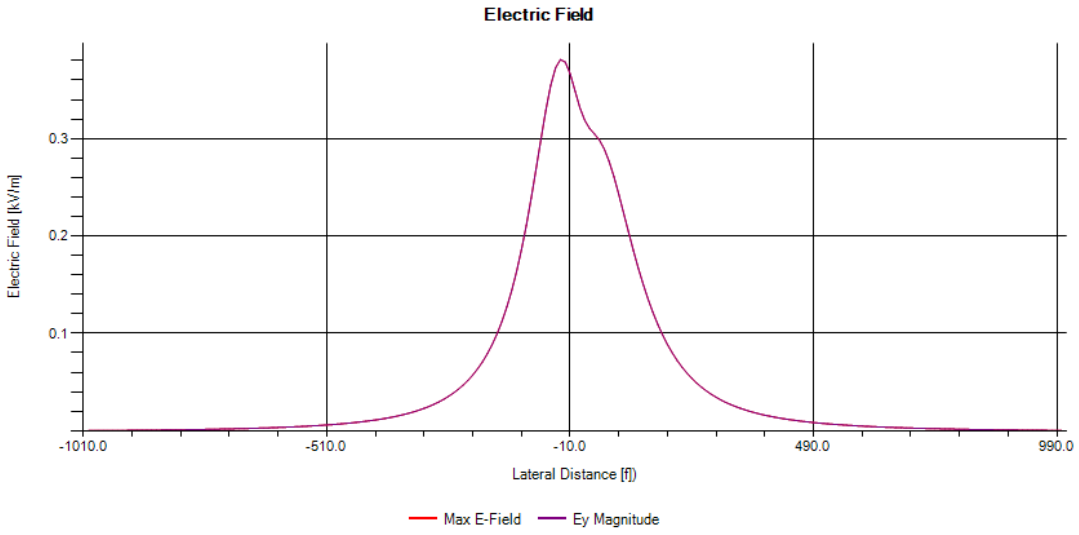

Figure 10 - Alternative 2 Electic Field Plot

4.1.1.3 Alternative 3: Tubular Steel Poles, Triangle Phase Configuration 397.5 kcmil

This alternative assumes the use of Tubular Steel poles with conductors in a triangular configuration and 397.5 kcmil "Lark" conductor. The conductors and shield wires are configured the same as in Alternative 1 above.

The highest electric field point was found at 30' from the center line and was 0.385 kV/meter. The plot below shows the electric filed for alternative and is followed by the tabular output. The electric field is not symmetric due to the conductor configuration.

Table 3 - Alternative 3 Electric Field Tabular Output

Electric Field ----------

Lateral Distance	Ey Magnitude (kV/m)	Max E-Field (kV/m)	Real(Ex)	Imag(Ex)	Real(Ey)	Imag(Ey)
-100.0	0.213	0.214	-0.005	0.009	-0.003	0.213
-90.0	0.241	0.242	-0.007	0.009	-0.021	0.240
-80.0	0.271	0.272	-0.009	0.009	-0.045	0.268
-70.0	0.302	0.303	-0.010	0.008	-0.074	0.293
-60.0	0.332	0.332	-0.012	0.006	-0.107	0.314
-50.0	0.358	0.358	-0.013	0.002	-0.146	0.327
-40.0	0.376	0.376	-0.013	-0.002	-0.186	0.327
-30.0	0.385	0.385	-0.012	-0.008	-0.225	0.312
-20.0	0.382	0.382	-0.011	-0.014	-0.261	0.279
-10.0	0.370	0.370	-0.008	-0.019	-0.290	0.230
0.0	0.353	0.353	-0.005	-0.022	-0.310	0.168
10.0	0.335	0.335	-0.002	-0.023	-0.320	0.099
20.0	0.322	0.322	0.001	-0.022	-0.320	0.030
30.0	0.314	0.314	0.004	-0.019	-0.312	-0.032
40.0	0.308	0.308	0.006	-0.015	-0.296	-0.084
50.0	0.302	0.302	0.007	-0.011	-0.276	-0.122
60.0	0.292	0.292	0.008	-0.007	-0.252	-0.148
70.0	0.280	0.280	0.008	-0.003	-0.227	-0.163
80.0	0.264	0.264	0.008	-7.57E-4	-0.202	-0.169
90.0	0.245	0.245	0.008	0.001	-0.178	-0.169
100.0	0.226	0.226	0.007	0.002	-0.156	-0.163

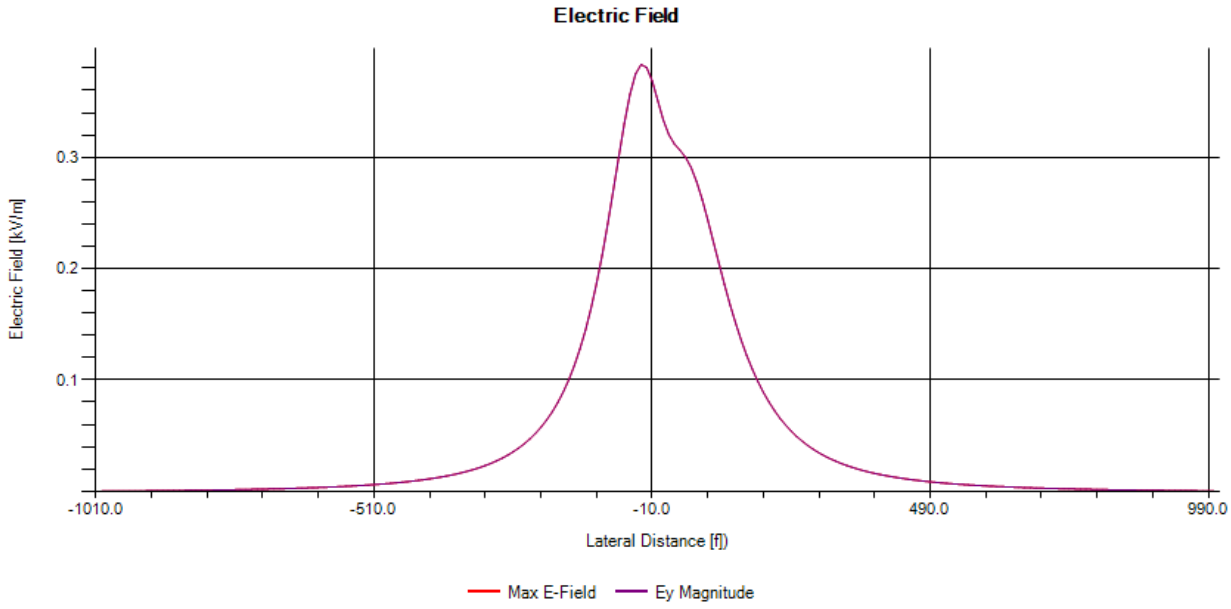

Figure 11- Alternative 3 Electric Field

4.1.1.4 Minimum Ground Clearance

As an additional data point, for alternative 3 above, the electric filed was evaluated at the minimum ground clearance of 30 feet. The figure below shows the conductor configuration. 1, 2, and 3 are the phase conductors. 4 and 5 are shield wires.

The minimum Gound Clerance results would only apply at the mid-span point and are well below the intended design height at mid-span. These results are presented as a worst-case scenario should the line experience excessive sag to the point of minimum clearance level.

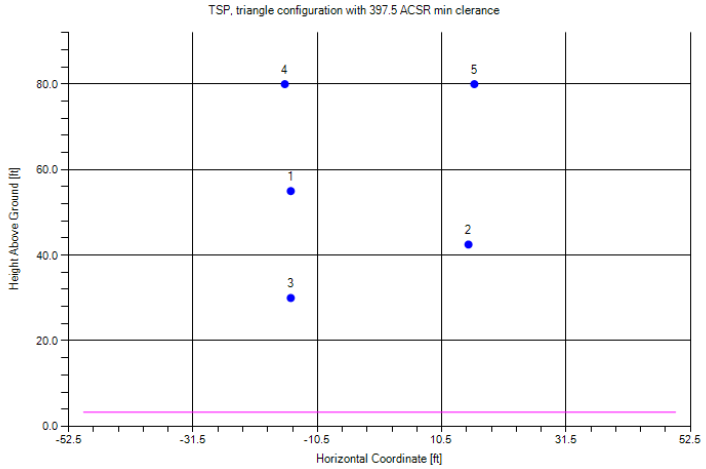

Figure 12 - Conductor Configuration for Minimum Clearance (Same Configuration as Alternative 2 and 3, but lower height)

The highest electric field point was found at 50' from the center line and was 3.06 kV/meter. The plot below shows the electric filed for alternative and is followed by the tabular output. The electric field is not symmetric due to the conductor configuration.

Table 4 - Minimum Clerance Electric Field Tabular Output

Electric Field ----------

Lateral Distance	Ey Magnitude (kV/m)	Max E-Field (kV/m)	Real(Ex)	Imag(Ex)	Real(Ey)	Imag(Ey)
-100.0	0.275	0.275	0.010	0.017	0.226	0.156
-90.0	0.337	0.338	0.010	0.025	0.256	0.219
-80.0	0.423	0.424	0.007	0.039	0.283	0.314
-70.0	0.546	0.548	-0.002	0.060	0.292	0.461
-60.0	0.739	0.744	-0.023	0.095	0.259	0.692
-50.0	1.065	1.075	-0.066	0.149	0.133	1.057
-40.0	1.618	1.634	-0.135	0.212	-0.165	1.610
-30.0	2.413	2.427	-0.197	0.219	-0.688	2.312
-20.0	3.059	3.060	-0.160	0.023	-1.285	2.776
-10.0	2.788	2.800	-0.024	-0.328	-1.572	2.302
0.0	1.787	1.812	0.043	-0.474	-1.503	0.966
10.0	1.411	1.412	0.046	-0.357	-1.363	-0.365
20.0	1.669	1.670	0.059	-0.157	-1.210	-1.150
30.0	1.695	1.696	0.076	-0.006	-1.000	-1.369
40.0	1.469	1.472	0.075	0.063	-0.764	-1.255
50.0	1.169	1.173	0.062	0.076	-0.552	-1.030
60.0	0.897	0.901	0.046	0.067	-0.389	-0.809
70.0	0.683	0.685	0.032	0.052	-0.270	-0.627
80.0	0.522	0.524	0.023	0.040	-0.188	-0.487
90.0	0.404	0.405	0.016	0.030	-0.131	-0.382
100.0	0.317	0.318	0.011	0.022	-0.091	-0.304

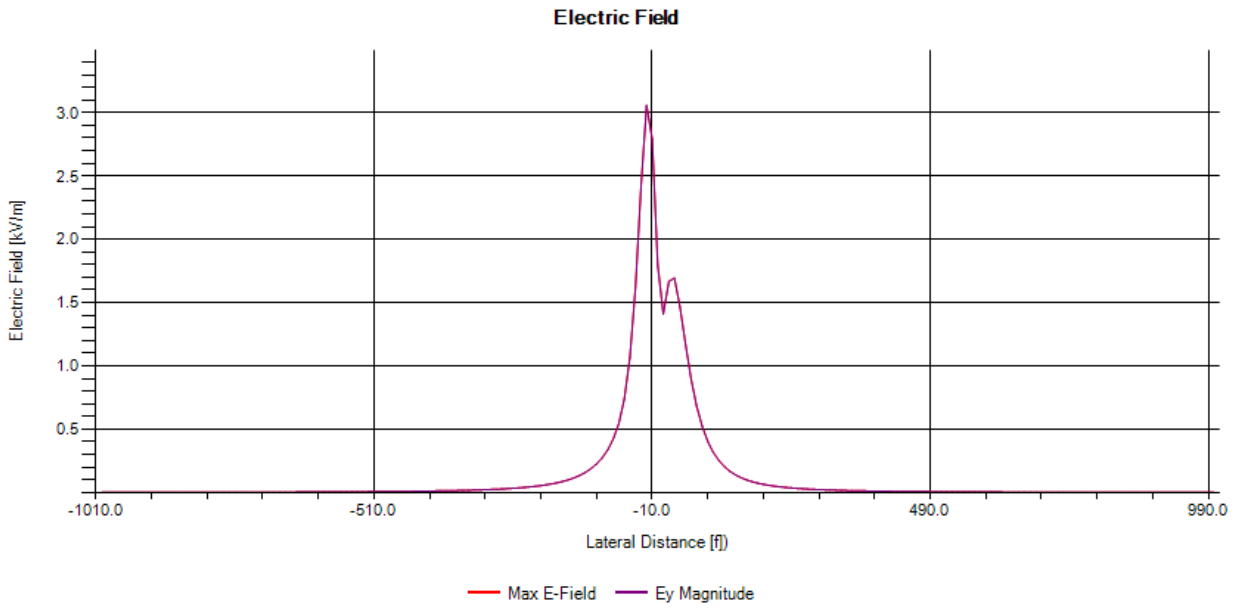

Figure 13 - Minimum Ground Clerance Electric Field Plot

4.1.1.5 Generation Tie Line Electric Filed Summary

For all alternatives, including the minimum ground clearance, the electric filed remains below the CEC understood limit of 5.5 kV/Meter and well below the international limit (ICNIRP) of 7.8 kV/Meter.

Table 5 - Electric Field Results Summary Table

Electric Field Summary Table	Max E-Field (kV/m)
Acceptable Level CEC	5.5
Acceptable Level ICNIRP	7.8
Alternative 1	0.943
Alternative 2	0.384
Alternative 3	0.385
Minimum Clearance	3.06

4.1.2 Tie Line Magnetic Field

The magnetic field associated with three alternatives and minimum clearance case are presented below.

4.1.2.1 Alternative 1: Conductor to Roughly Match existing Mead Adelanto Line

The highest magnetic field point was found directly below the center conductor and was 22.9 mg. The plot below shows the magnetic field for this alternative and is followed by the tabular output.

Table 6 - Alternative 1 Tabular Output for Magnetic Field

Magnetic Field

Lateral Distance	Max Magnetic Field(mG)	Resultant (mG)	Real(Ex)	Imag(Ex)	Real(Ey)	Imag(Ey)
-100.0	11.1	11.2	10.3	-3.8	0.8	-1.7
-90.0	12.4	12.5	11.6	-4.4	-0.6	-1.6
-80.0	13.9	14.1	12.8	-5.1	-2.5	-1.3
-70.0	15.4	15.7	13.6	-5.9	-5.1	-0.8
-60.0	17.0	17.3	13.7	-6.8	-8.1	-0.1
-50.0	18.4	18.9	12.9	-7.6	-11.4	0.9
-40.0	19.6	20.3	11.0	-8.3	-14.6	2.3
-30.0	20.6	21.4	8.1	-8.8	-17.3	4.1
-20.0	21.3	22.2	4.4	-8.7	-19.0	6.3
-10.0	21.7	22.8	0.4	-7.8	-19.5	8.7
0.0	21.8	22.9	-3.5	-6.1	-18.9	10.9
10.0	21.7	22.8	-7.0	-3.6	-17.3	12.6
20.0	21.3	22.2	-9.7	-0.5	-15.0	13.3
30.0	20.6	21.4	-11.6	2.6	-12.2	12.9
40.0	19.6	20.3	-12.7	5.4	-9.3	11.5
50.0	18.4	18.9	-13.0	7.4	-6.5	9.5
60.0	17.0	17.3	-12.7	8.5	-3.9	7.1
70.0	15.4	15.7	-11.9	8.8	-1.8	4.8
80.0	13.9	14.1	-10.8	8.5	-0.2	2.8
90.0	12.4	12.5	-9.6	7.9	1.0	1.3
100.0	11.1	11.2	-8.4	7.0	1.9	0.2

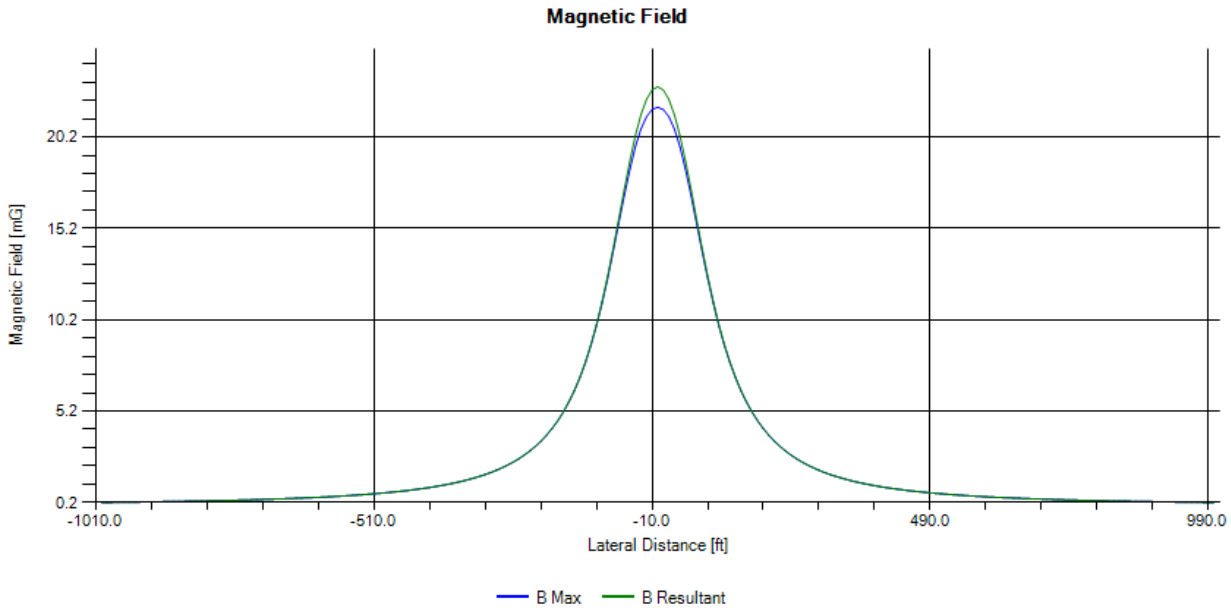

Figure 14 - Alternative 1 Magnetic Field Plot

4.1.2.2 Alternative 2: Tubular Steel Poles, Triangle Phase Configuration, 477 kcmil

The highest magnetic field point was found at the center line of the line (i.e. in line with the poles) and was 7.5 mG. The plot below shows the electric filed for alternative and is followed by the tabular output.

Table 7 - Alternative 2 Magnetic Field Tabular Output

Magnetic Field

Lateral Distance	Max Magnetic Field(mG)	Resultant (mG)	Real(Ex)	Imag(Ex)	Real(Ey)	Imag(Ey)
-100.0	3.4	4.3	1.0	3.2	-2.5	1.1
-90.0	3.7	4.7	0.8	3.6	-2.8	0.8
-80.0	4.1	5.1	0.5	4.1	-3.1	0.5
-70.0	4.5	5.6	0.1	4.5	-3.3	-0.1
-60.0	4.9	6.0	-0.4	4.8	-3.5	-0.8
-50.0	5.3	6.4	-0.9	5.0	-3.6	-1.6
-40.0	5.6	6.8	-1.5	5.0	-3.6	-2.5
-30.0	5.9	7.1	-2.1	4.7	-3.4	-3.5
-20.0	6.2	7.4	-2.7	4.2	-3.1	-4.5
-10.0	6.3	7.5	-3.2	3.4	-2.6	-5.3
0.0	6.4	7.5	-3.5	2.3	-2.0	-5.9
10.0	6.3	7.4	-3.7	1.2	-1.4	-6.1
20.0	6.1	7.2	-3.8	0.1	-0.8	-6.1
30.0	5.9	6.9	-3.7	-1.0	-0.2	-5.7
40.0	5.6	6.5	-3.5	-1.8	0.3	-5.2
50.0	5.3	6.1	-3.2	-2.4	0.7	-4.5
60.0	4.9	5.7	-2.9	-2.8	1.1	-3.8
70.0	4.5	5.3	-2.6	-3.1	1.3	-3.1
80.0	4.2	4.8	-2.3	-3.1	1.5	-2.5
90.0	3.8	4.4	-1.9	-3.1	1.6	-1.9
100.0	3.5	4.1	-1.6	-3.0	1.6	-1.5

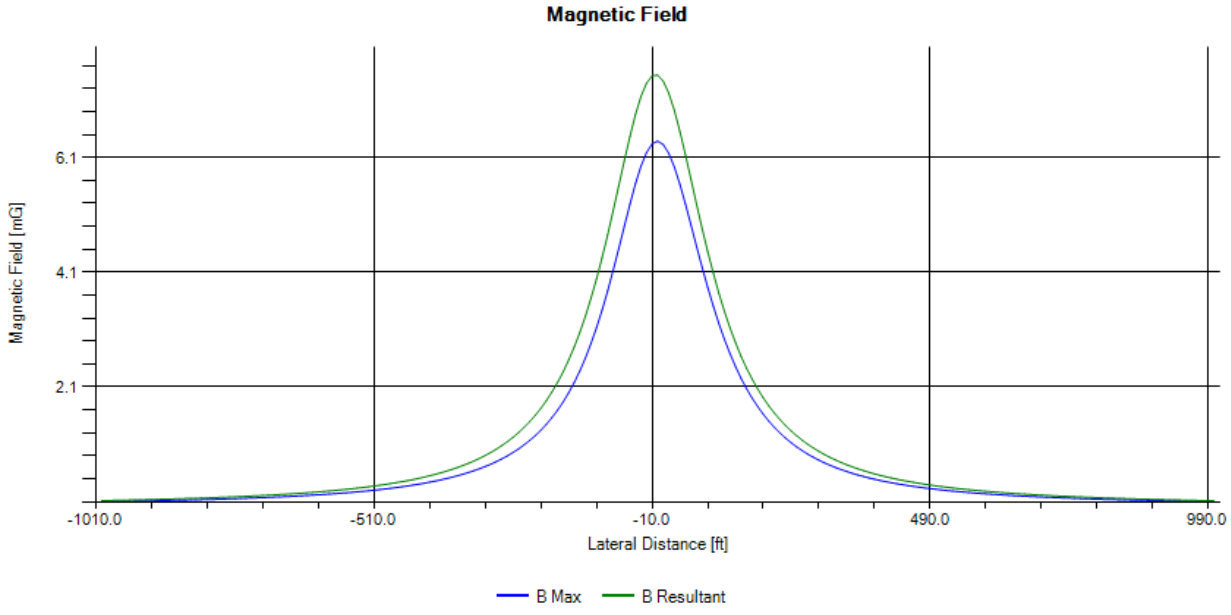

Figure 15 - Alternative 2 Magnetic Field Plot

4.1.2.3 *Alternative 3: Tubular Steel Poles, Triganle Phase Configuration 397.5 kcmil*

The highest magnetic field point was found at the center line of the line (i.e. in line with the poles) and was 7.8 mG. The plot below shows the electric filed for alternative and is followed by the tabular output.

Table 8 - Alternative 3 Magnetic Field Tabular Output

Magnetic Field

Lateral Distance	Max Magnetic Field(mG)	Resultant (mG)	Real(Ex)	Imag(Ex)	Real(Ey)	Imag(Ey)
-100.0	3.5	4.4	1.1	3.3	-2.5	1.2
-90.0	3.8	4.8	0.9	3.7	-2.8	0.9
-80.0	4.2	5.3	0.6	4.2	-3.1	0.6
-70.0	4.6	5.8	0.2	4.6	-3.4	0.0
-60.0	5.0	6.2	-0.3	5.0	-3.6	-0.7
-50.0	5.4	6.7	-0.9	5.2	-3.7	-1.6
-40.0	5.8	7.1	-1.6	5.2	-3.7	-2.6
-30.0	6.2	7.4	-2.2	5.0	-3.5	-3.6
-20.0	6.4	7.7	-2.8	4.4	-3.2	-4.7
-10.0	6.6	7.8	-3.3	3.5	-2.7	-5.5
0.0	6.6	7.8	-3.7	2.4	-2.1	-6.1
10.0	6.6	7.7	-3.9	1.2	-1.5	-6.4
20.0	6.4	7.5	-3.9	0.0	-0.8	-6.3
30.0	6.1	7.2	-3.8	-1.1	-0.2	-6.0
40.0	5.8	6.8	-3.6	-1.9	0.3	-5.4
50.0	5.4	6.3	-3.3	-2.6	0.8	-4.7
60.0	5.1	5.9	-3.0	-3.0	1.1	-3.9
70.0	4.7	5.4	-2.6	-3.2	1.4	-3.2
80.0	4.3	5.0	-2.3	-3.3	1.5	-2.5
90.0	3.9	4.5	-2.0	-3.2	1.6	-1.9
100.0	3.6	4.1	-1.6	-3.1	1.7	-1.4

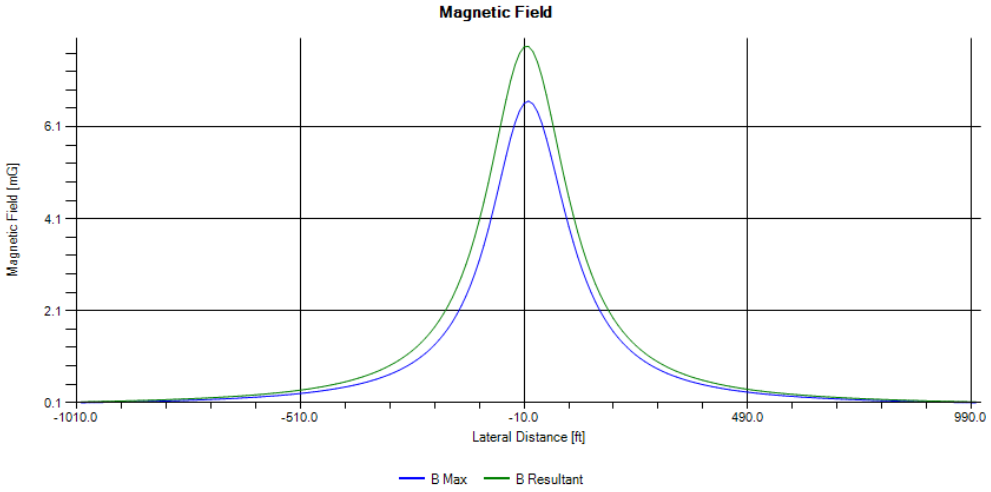

Figure 16 - Alternative 3 Magnetic Field Plot

4.1.2.4 *Minimum Ground Clearance*

The highest magnetic field point was found at 10’ from the center line (between the pole and the point directly below the side with two conductors and was 60.7 mG. The plot below shows the magnetic field for alternative and is followed by the tabular output

The minimum Gound Clerance results would only apply at the mid-span point and are well below the intended design height at mid-span. These results are presented as a worst-case scenario should the line experience excessive sag to the point of minimum clearance level.

Table 9 - Minimum Clerance Magnetic Field Tabular Output

Magnetic Field

Lateral Distance	Max Magnetic Field(mG)	Resultant (mG)	Real(Ex)	Imag(Ex)	Real(Ey)	Imag(Ey)
-100.0	6.6	8.8	5.6	1.6	-1.7	6.4
-90.0	8.1	10.6	6.5	2.4	-2.7	7.6
-80.0	10.0	13.0	7.4	3.7	-4.2	9.1
-70.0	12.8	16.2	8.2	5.8	-6.5	11.0
-60.0	16.7	20.7	8.6	9.4	-9.8	13.0
-50.0	22.2	26.7	7.5	15.3	-14.4	14.8
-40.0	30.1	35.0	3.5	24.9	-19.7	14.5
-30.0	40.3	45.5	-4.8	38.2	-23.1	7.3
-20.0	50.9	55.7	-15.2	48.1	-19.9	-12.9
-10.0	56.7	60.7	-20.2	39.4	-10.7	-40.1
0.0	55.3	58.5	-19.0	13.6	-3.6	-53.6
10.0	49.3	52.1	-17.3	-11.2	0.4	-47.8
20.0	41.4	43.9	-15.6	-24.7	4.2	-32.5
30.0	33.2	35.5	-12.6	-27.3	7.3	-17.3
40.0	25.9	28.0	-9.0	-24.0	8.8	-6.9
50.0	20.2	22.0	-5.8	-19.2	8.8	-1.1
60.0	15.8	17.4	-3.5	-14.9	8.1	1.7
70.0	12.5	13.9	-1.9	-11.4	7.1	2.9
80.0	10.1	11.3	-0.9	-8.9	6.1	3.3
90.0	8.3	9.3	-0.3	-7.0	5.2	3.3
100.0	6.9	7.8	0.1	-5.6	4.4	3.2

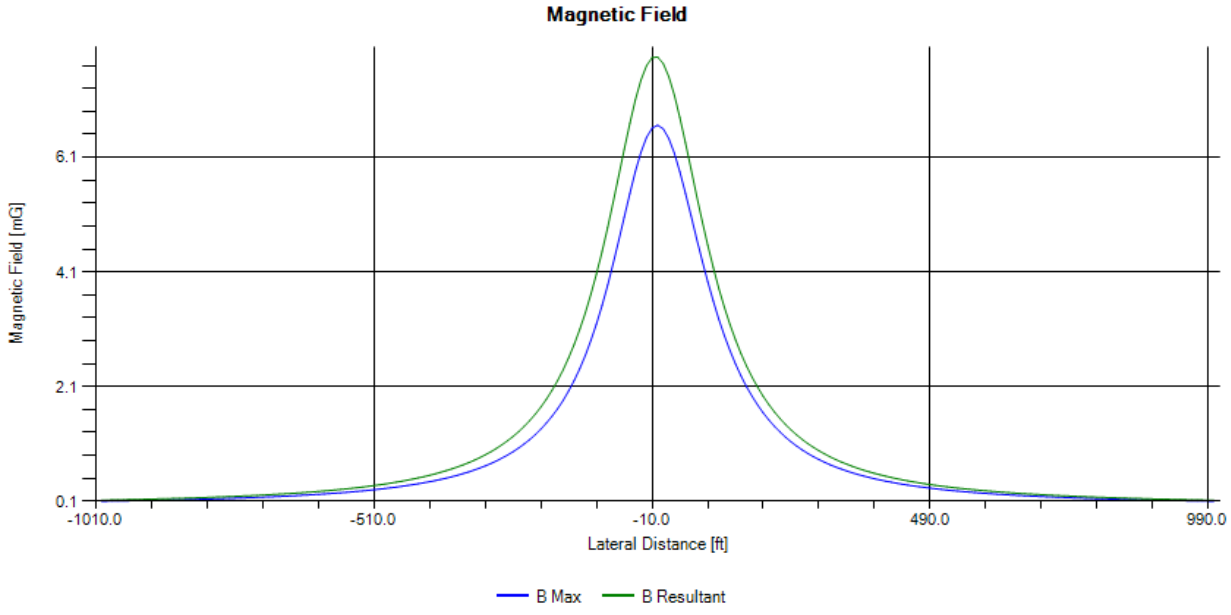

Figure 17 - Minimum Clerance Magnetic Field Plot

4.1.2.5 Generation Tie Line Magnetic Field Summary

For all alternatives, including the minimum ground clearance, the electric filed remains below the CEC understood limit of 5.5 kV/Meter and well below the international limit (ICNIRP) of 7.8 kV/Meter.

Table 10 - Magnetic Field Summary Table

Magnetic Field Summary Table	Resultant Magnetic Field (mG)
Acceptable Level CEC	250
Acceptable Level ICNIRP	2,000
Alternative 1	22.9
Alternative 2	7.5
Alternative 3	7.8
Minimum Clearance	60.7

4.2 Line Drop Electric and Magnetic Field

The line drop is assumed to be in a horizonal configuration to enable proper alignment with termination points within the switching station. The figure below shows the assumed configuration for the line drops.

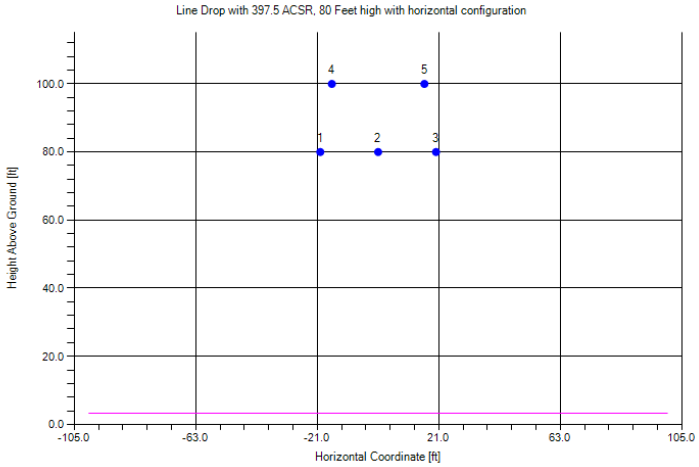

Figure 18 - Line Drop Conductor Configuration - Horizontal

Three data points are considered for the line drop analysis and are then averaged to provide the Electric and Magnetic Fields.

1. At 80', the electric field peaks at 0.511 kV/Meter and the magnetic field at 14.1 mG.
2. At 40', the electric field peaks at 1.869 kV/Meter and the magnetic field at 52.5 mG.
3. At 30', the electric field peaks at 2.967 kV/Meter and the magnetic field at 85.6 mG.

Averaging these points the electric field for the line drop yields an electric field of 1.78 kV/meter and magnetic field of 50.73 mG.

Table 11- Line Drop Results Summary

Line Drop Analysis			
Point	**Height (Feet)**	**Max E-Field (kV/m)**	**Resultant Magnetic Field (mG)**
1	80	0.511	14.1
2	40	1.869	52.5
3	30	2.967	85.6
Average	**50**	**1.78**	**50.73**

The plots below reflect point 3 above. The other points have the same plot contour, but peak at lower levels shown in the table above.

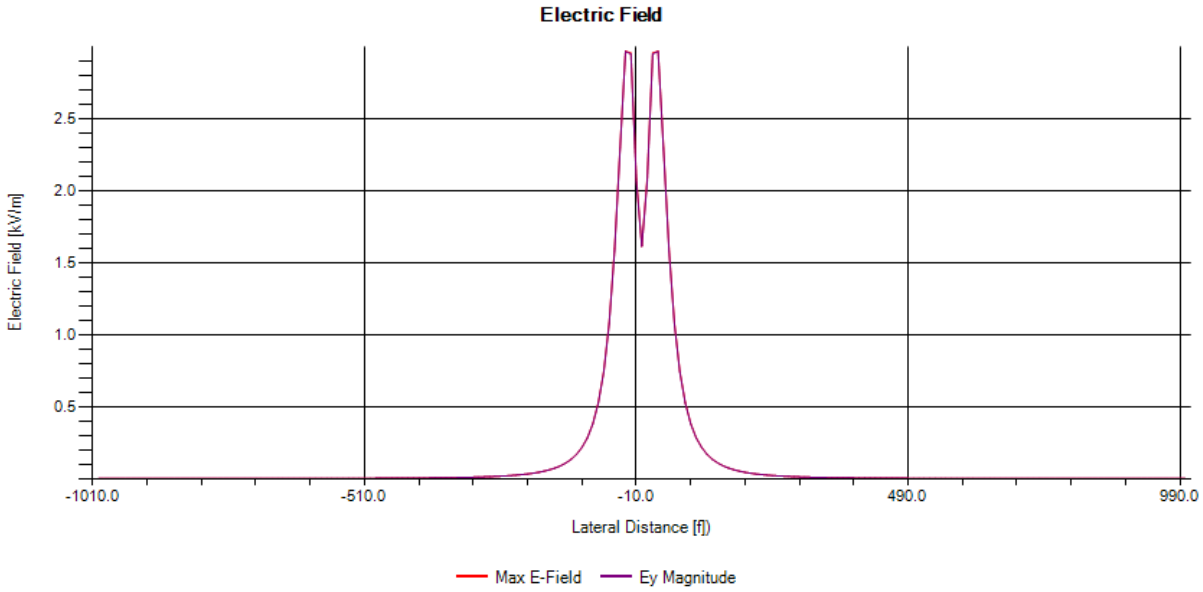

Figure 19 - Line Drop Electric Field at 30' Elevation

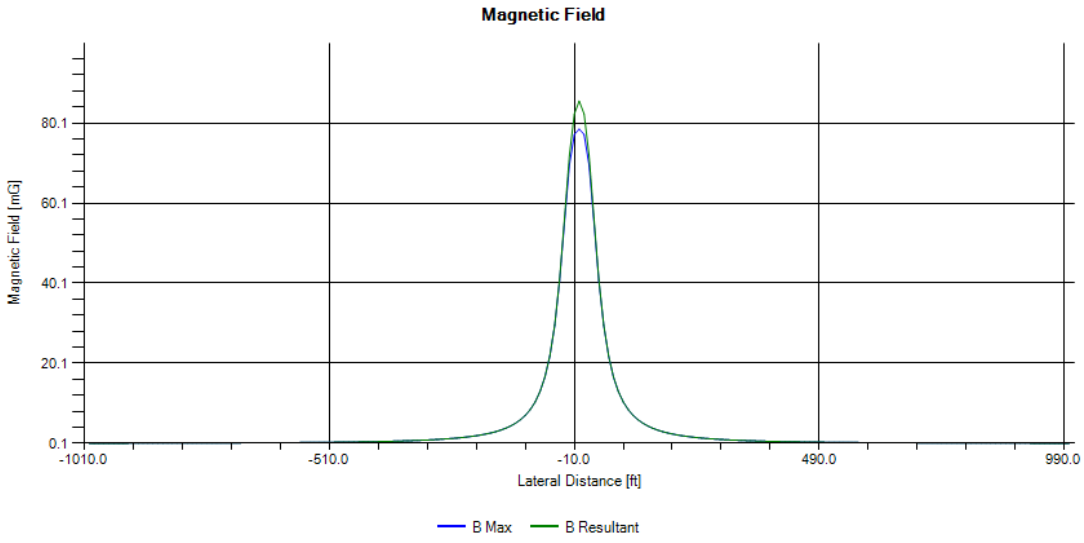

Figure 20 - Line Drop Magnetic Field at 30' Elevation

5. Design Considerations

The Generation tie line and line drops will be designed in accordance with CPUC GO 95. The small segment of the underground will be designed in accordance with CPUC GO 128. The underground segment, as noted above, is not included in this analysis. As observed in the results above, the EMF at ground level is reduced with a smaller diameter conductor and with a higher tower design. While the results indicate EMF levels are well within the acceptable levels, the design of the gen tie and line drops will consider this impact and design such that EMF is minimized. This will help to mitigate EMF, EF, radio and television interference form the proposed facilities.

6. Conclusion

In all scenarios, the Electric and Magnetic Fields (EMF) fall below the CEC and ICNIRP suggested limits. Alternative 3 represents the preliminary conductor and tower design. The tables below summarize the results for the Generation tie line and the Line Drop.

Table 12 - Summary Table for Generation Tie Line

Electric Field Summary Table	Max E-Field (kV/m)	% below CEC Limit	Delta Below CEC Limit	Resultant Magnetic Field (mG)	% below CECC Limit	Delta Below CEC Limit
Acceptable Level CEC	5.5			250		
Acceptable Level ICNIRP	7.8			2,000		
Alternative 1	0.943	83%	4.557	22.9	91%	227.1
Alternative 2	0.384	93%	5.116	7.5	97%	242.5
Alternative 3	0.385	93%	5.115	7.8	97%	242.2
Minimum Clearance	3.059	44%	2.441	60.7	76%	189.3

Table 13 - Summary Table for Line Drop

Line Drop Analysis			
Point	**Height (Feet)**	**Max E-Field (kV/m)**	**Resultant Magnetic Field (mG)**
1	80	0.511	14.1
2	40	1.869	52.5
3	30	2.967	85.6
Average	**50**	**1.78**	**50.73**
% below CEC Limit		68%	80%
Delta Below CEC Limit		3.72	199.27