

APPENDIX D

AIR EMISSIONS ESTIMATION METHODS

D.1 Construction Emissions

To estimate emissions from construction of the LTE sites, a construction scenario for a generic site with maximum activity levels was defined. This scenario consisted of the following construction activities that may generate air emissions:

- Demolition of existing pavement and structures.
- Preparation (through cuts and fills) of the area where the monopole, equipment shelters, and emergency generator will be installed.
- Excavation for the monopole's foundation.
- Concrete pad construction.
- Monopole erection and antenna equipment installation.
- Installation of cabinets, emergency generator and other ground-based equipment.

Because not all of these activities will take place at every site, this scenario represents a maximum emissions case. Table D.1-1 lists the types of equipment, and the number of pieces of each type, that were assumed to be used for each construction activity at the generic site.¹ This information, as well as hours per day and total days of use, were obtained from Table 2.1-2 in Section 2 and from guidance provided for the California Emissions Estimator Model (CalEEMod[®]), a widely used emissions estimation model that was developed for the California Air Pollution Control Officers Association (CAPCOA), and applicable statewide (EIC, 2013a, 2013b).

The information in Table D.1-1 was used to formulate inputs to CalEEMod, which takes into account changes in federal and state off-road equipment emission limits over future years. Results were compared with the SCAQMD and AVAQMD significance thresholds for regional impacts, which were presented in Section 3.2.2. Fifteen of the proposed LTE sites are located in the jurisdiction of the AVAQMD, and the remaining 216 are in the jurisdiction of the SCAQMD.

The CalEEMod runs indicated that daily and annual construction emissions for any single site would be below the significance thresholds of both agencies. The criteria pollutant whose emissions came closest to its respective significance threshold was NO_x. To determine whether projected unmitigated daily NO_x emissions would be below the SCAQMD or AVAQMD daily thresholds when multiple sites are constructed simultaneously, aggregate daily emissions were calculated by assuming various numbers of sites per day and a uniform schedule for each site. The same analysis was repeated, using the assumption that all onsite construction equipment to which USEPA Tier 4 emission limits would apply met those limits. The results for the unmitigated and mitigated cases are shown in Tables D.1-2 and D.1-3, respectively.

¹ Pieces of equipment are the maximum that would be on site on a given day.

Table D.1-1
Assignment of Construction Equipment to Construction Activities

Equipment Type	Spec ^a	No./ Site	Hours/ Day	Days On Site	Usage
Demolition					
Concrete Saw	27 hp	1	7	1	Break up existing concrete
Mini Excavator	73 hp	1	5	1	Debris handling
Dump truck	400 hp	1	3	1	Haul demolition material
500-gallon water trailer	5 hp	1	7	1	Dust control
Site Preparation					
Mini Excavator	73 hp	1	5	1	Cut and fill work
Excavation					
Drill rig with augers	206 hp	1	3	2	Install fences, excavate foundation holes and bores
Mini Excavator/loader/backhoe	73 hp	1	5	2	Move excavated soil on site
500-gallon water trailer	5 HP	1	7	2	Dust control
Pad Construction					
Concrete truck	400 hp	1	4	2	Pour concrete
Monopole and Equipment Installation					
3-ton flatbed truck	400 hp	1	3	2	Haul materials
25-ton crane	226 hp	1	6	1	Set monopole
Aerial man-lift	226 hp	1	6	6	Access structures, string conductor, modify structure arms, tree trimming/removal, etc.
Portable generator	7 hp	1	6	10	Operate power tools

Source: Equipment assumptions provided by LA-RICS Authority

^aHorsepower ratings for equipment derived from defaults developed for California Emissions Estimator Model®, except for mini excavator, water trailer, and portable generator, which were provided by Motorola.

Table D.1-2
Construction Schedule - Unmitigated Nitrogen Oxides Emissions (South Coast Air Basin Only)

Calendar Day	Sites Starting	Active Sites	Total Sites Completed
1	13	13	0
2	0	13	0
3	0	13	0
4	10	23	0
5	0	23	0
6	0	23	0
7	0	23	0
8	0	23	0
9	0	23	0
10	4	27	0
11	5	19	0
12	2	21	0
13	9	30	0
14	5	25	0
15	1	26	0
16	8	34	0
17	1	35	0
18	0	35	0
19	0	35	0
20	0	31	0
21	0	26	0
22	0	24	0
23	5	20	0
24	1	16	0
25	0	15	0
26	0	20	0
27	0	19	0
28	0	19	0
29	0	29	0
30	0	29	0
31	0	29	0
32	0	29	0
33	1	25	0
34	0	24	13
35	0	15	13
36	0	20	13
37	0	22	23
38	0	21	23
39	0	26	23
40	0	27	23

Table D.1-2 (continued)
Construction Schedule - Unmitigated Nitrogen Oxides Emissions (South Coast Air Basin Only)

Calendar Day	Sites Starting	Active Sites	Total Sites Completed
41	3	38	23
42	5	44	23
43	1	44	27
44	7	47	32
45	0	42	34
46	0	40	43
47	0	31	48
48	0	31	49
49	0	31	57
50	0	23	58
51	8	27	58
52	1	23	58
53	7	29	58
54	8	30	58
55	1	31	58
56	5	36	63
57	0	31	64
58	0	31	64
59	0	31	64
60	0	31	64
61	0	23	64
62	0	22	64
63	8	23	64
64	2	17	64
65	0	16	64
66	0	14	65
67	0	18	65
68	0	19	65
69	0	26	65
70	0	26	65
71	0	26	65
72	0	26	65
73	0	18	65
74	0	16	68
75	0	13	73
76	0	16	74
77	0	16	81
78	0	16	81
79	0	24	81
80	0	25	81
81	6	36	81

Table D.1-2 (continued)
Construction Schedule - Unmitigated Nitrogen Oxides Emissions (South Coast Air Basin Only)

Calendar Day	Sites Starting	Active Sites	Total Sites Completed
82	0	36	81
83	0	36	81
84	0	36	89
85	0	28	90
86	0	27	97
87	0	20	105
88	0	20	106
89	0	21	111
90	0	16	111
91	15	25	111
92	0	25	111
93	0	25	111
94	4	29	111
95	0	29	111
96	0	29	119
97	0	21	121
98	0	19	121
99	0	19	121
100	3	22	121
101	11	18	121
102	2	20	121
103	2	22	121
104	4	22	121
105	0	22	121
106	0	28	121
107	0	28	121
108	0	28	121
109	0	28	121
110	0	25	121
111	0	14	121
112	0	12	121
113	0	10	121
114	0	6	127
115	0	0	127
116	0	15	127
117	0	15	127
118	0	15	127
119	0	19	127
120	0	19	127
121	2	21	127
122	0	21	127

Table D.1-2 (continued)
Construction Schedule - Unmitigated Nitrogen Oxides Emissions (South Coast Air Basin Only)

Calendar Day	Sites Starting	Active Sites	Total Sites Completed
123	0	21	127
124	0	21	142
125	0	9	142
126	0	20	142
127	0	22	146
128	0	20	146
129	8	32	146
130	0	32	146
131	8	38	146
132	7	45	146
133	0	45	149
134	6	48	160
135	0	37	162
136	0	35	164
137	1	34	168
138	0	30	168
139	0	22	168
140	0	22	168
141	10	24	168
142	0	17	168
143	5	22	168
144	1	17	168
145	0	17	168
146	0	19	168
147	0	18	168
148	0	18	168
149	0	18	168
150	0	18	168
151	0	8	168
152	0	8	168
153	0	3	168
154	0	10	170
155	0	8	170
156	0	16	170
157	0	23	170
158	0	23	170
159	0	29	170
160	0	29	170
161	0	29	170
162	0	30	178
163	0	22	178

Table D.1-2 (continued)
Construction Schedule - Unmitigated Nitrogen Oxides Emissions (South Coast Air Basin Only)

Calendar Day	Sites Starting	Active Sites	Total Sites Completed
164	0	22	186
165	0	14	193
166	0	17	193
167	0	17	199
168	0	16	199
169	0	17	199
170	0	17	200
171	0	16	200
172	0	16	200
173	0	16	200
174	0	16	210
175	0	6	210
176	0	6	215
177	0	1	216
	Max Starting	Max Active	
	15	48	

Table D.1-3
Construction Schedule - Mitigated Nitrogen Oxides Emissions (South Coast Air Basin Only)

Calendar Day	Sites Starting	Active Sites	Total Sites Completed
1	15	15	0
2	0	15	0
3	11	26	0
4	0	26	0
5	9	35	0
6	0	35	0
7	0	35	0
8	0	35	0
9	0	35	0
10	0	35	0
11	4	24	0
12	3	27	0
13	7	23	0
14	2	25	0
15	14	30	0
16	2	32	0
17	2	34	0
18	0	34	0
19	2	36	0
20	0	36	0
21	0	32	0
22	0	29	0
23	0	22	0
24	0	20	0
25	0	6	0
26	0	19	0
27	1	18	0
28	6	35	0
29	0	33	0
30	6	48	0
31	0	48	0
32	0	48	0
33	0	48	0
34	5	53	15
35	0	38	15
36	2	44	26
37	0	35	26
38	0	36	35
39	0	29	35
40	0	37	35

Table D.1-3 (continued)
Construction Schedule - Mitigated Nitrogen Oxides Emissions (South Coast Air Basin Only)

Calendar Day	Sites Starting	Active Sites	Total Sites Completed
41	0	39	35
42	9	50	35
43	1	51	35
44	9	57	39
45	0	53	42
46	7	55	49
47	0	48	51
48	1	47	65
49	0	33	67
50	0	31	69
51	0	29	69
52	0	21	71
53	0	24	71
54	3	18	71
55	3	27	71
56	13	33	71
57	3	36	71
58	1	36	71
59	3	44	71
60	0	44	72
61	0	45	78
62	0	39	78
63	0	39	84
64	0	30	84
65	0	27	84
66	4	18	84
67	1	25	89
68	6	26	89
69	2	34	91
70	8	40	91
71	3	50	91
72	1	51	91
73	0	52	91
74	1	53	91
75	0	53	100
76	0	40	101
77	0	38	110
78	0	23	110
79	0	24	117
80	0	12	117
81	0	22	118

Table D.1-3 (continued)
Construction Schedule - Mitigated Nitrogen Oxides Emissions (South Coast Air Basin Only)

Calendar Day	Sites Starting	Active Sites	Total Sites Completed
82	0	23	118
83	11	35	118
84	0	37	118
85	6	43	118
86	0	43	118
87	0	43	121
88	0	40	124
89	0	37	137
90	0	24	140
91	0	25	141
92	0	25	144
93	0	17	144
94	7	26	144
95	1	29	144
96	12	44	144
97	0	45	144
98	9	54	144
99	0	55	148
100	0	51	149
101	0	50	155
102	0	44	157
103	0	42	165
104	0	27	168
105	0	23	169
106	0	10	169
107	0	10	170
108	0	11	170
109	0	11	170
110	0	17	170
111	0	17	170
112	0	17	170
113	0	17	170
114	0	17	170
115	0	17	170
116	0	17	181
117	0	6	181
118	0	6	187
119	0	7	187
120	0	8	187
121	0	20	187
122	0	20	187

Table D.1-3 (continued)
Construction Schedule - Mitigated Nitrogen Oxides Emissions (South Coast Air Basin Only)

Calendar Day	Sites Starting	Active Sites	Total Sites Completed
123	0	29	187
124	0	29	187
125	0	29	187
126	0	29	187
127	0	29	194
128	0	22	195
129	0	21	207
130	0	9	207
131	0	9	216
	Max Starting	Max Active	
	15	57	

D.2 Localized Significance Analysis

Finally, the issue of exposure of sensitive receptors in the SCAQMD to construction emissions was addressed, using a screening method developed by the District (Chico et al., 2003).² The analysis was not performed for sites in the AVAQMD because that district does not recommend or require it, and the methodology is based upon meteorology in the SCAQMD only. The nearest sensitive receptors to all the LTE sites are identified in the site data sheets in Appendix B. The localized significance analysis evaluated all 15 source-receptor areas (SRAs) within which LA-RICS LTE sites would be located. These SRAs are 1 (Central Los Angeles), 2 (Northwest Coastal), 3 (Southwest Coastal), 4 (South Coastal), 5 (Southeast), 6 (West San Fernando Valley), 7 (East San Fernando Valley), 8 (West San Gabriel Valley), 9 (East San Gabriel Valley), 10 (Pomona – Walnut Valley), 11 (South San Gabriel Valley), 12 (South Central Los Angeles), 13 (Upper Santa Clara River Valley), 15 (Angeles National Forest), and 16 (Northern Orange County).

D.3 Operational Emissions

D.3.1 Maintenance Activities

One source of operational criteria pollutant emissions from the Proposed Action would be vehicles used for transporting personnel for routine maintenance of the LTE equipment. EMFAC2011-LDV (Light Duty Vehicles), a CARB-developed motor vehicle emission model, was used to estimate emissions from motor vehicle traffic for site maintenance. It was conservatively assumed that maintenance would be required twice a year such that maintenance for all 231 sites would be divided evenly among 12 months of a given year.

D.3.2 Diesel Generator Emissions

In addition, it was assumed that the emergency generator would be tested for one hour each month at each site. It was also assumed that test days would be distributed evenly during the month, so that about eight sites would be tested on any given day. Diesel emergency generator emission factors for 2015 were obtained from a compilation maintained by the SCAQMD (2008). For the present analysis it was assumed that the biannual maintenance day coincided with an emergency generator test day.

D.4 Greenhouse Gas Emissions

CalEEMod was used to determine construction carbon dioxide equivalent (CO₂e) emissions from off-road construction equipment and on-road vehicles used to transport construction workers. Construction emissions were amortized throughout the life of the project (assumed to be 30 years).³ EMFAC2011-LDV was used to develop emission factors for both startup and running carbon dioxide (CO₂) emissions from motor vehicle traffic for site maintenance.

² For its review of proposed projects, the South Coast Air Quality Management District requests (but does not require) a localized significance analysis of construction emissions.

³ Amortization over 30 years is suggested by the South Coast Air Quality Management District in its draft guidance for CEQA analysis of GHG emissions (Smith and Krause, 2008).

Indirect greenhouse gas emissions such as those from electricity consumption were included in the analysis as well. To determine the electricity consumption at each site, the equipment power output was assumed to be 12,500 watts at each site. An emission factor was developed based on the assumption that all electricity is supplied by the Los Angeles Department of Water and Power (LADWP) and that GHG emissions from electricity generation result only from combustion of fossil fuels.^{4,5} Finally, GHG emissions from monthly generator testing were calculated with emission factors from the SCAQMD (2008).

⁴ The emission factor accounts for the percentage of LADWP electricity supply associated with fossil fuel combustion.

⁵ Several other utilities would provide electricity to LTE sites; data for the LADWP were used for this analysis because (1) 61 (27%) of the sites would be served by that utility and (2) use of other utilities' data for the remaining sites would not materially affect the conclusions of the analysis.