

**ATTACHMENT C: SUMMARY OF CONSTRUCTION-PHASE EMISSIONS
– SITE 3**

Windsor Substation - Alternative Site 3
Summary of Construction Phase Emissions

Emissions	CO ₂ ¹	CO ₂ ¹ with APM ³	CH ₄ ²
Peak Daily (lb/day)			
Access Road and Substation Construction - September 2012 - October 2012	2544	2162	0.017
GC Tower - November 2012 - February 2013	5295	4501	0.076
GC Line - November 2012 - February 2013	1591	1352	0.019
Distribution Overhead - January 2013 - May 2013	3507	2981	0.075
Distribution Underground - January 2013 - May 2013	4373	3717	0.016
Max Daily	14767	12552	0.19
Average Daily 2012	2937	2496	0.03
Average Daily 2013	6596	5607	0.09
Tons per Phase			
Access Road and Substation Construction - September 2012 - October 2012	46.2	39.2	0.0003
GC Tower - November 2012 - February 2013	6.0	5.1	0.0001
GC Line - November 2012 - February 2013	4.4	3.7	0.0001
Distribution Overhead - January 2013 - May 2013	77.3	65.7	0.0014
Distribution Underground - January 2013 - May 2013	89.4	76.0	0.0005
Total tons per year 2012	51.4	43.7	0.000
Total tons per year 2013	171.9	146.1	0.002

1. Metric tons
2. Methane emissions from truck use only (metric tons).
3. Implementation of APM was assumed to reduce construction equipment, construction vehicles, and worker commutes by approximately 15 percent.

Windsor Substation - Alternative Site 3

Emissions calcs for Construction equipment

Emissions factors, approximate HP ratings, and load defaults are from URBEMIS 2007, Ver 9.2.4.

Equipment lists and construction schedule supplied by PG&E, February 2011.

Access Road and Substation Construction - September 2012 - October 2012

Equipment	Fuel	Number	Days Operating**	HP	Load	Hr/day	Emissions Factor, g/hp/hr CO2	Emissions, lb/day CO2*	Emissions, ton/phase** CO2*
Man Lift	Diesel	2	40	120	0.46	8	261.653	509.6	9.2
Forklift	Diesel	1	40	175	0.3	8	170.643	158.0	2.9
Crawler Backhoe	Diesel	1	40	175	0.55	8	312.846	531.2	9.6
D-3 Bulldozer	Diesel	1	40	50	0.55	8	312.846	151.8	2.8
Water Truck	Diesel	1	40	250	0.5	8	324.222	714.9	13.0
Total								2065.4	37.5

GC Tower - November 2012 - February 2013

Equipment	Fuel	Number	Days Operating**	HP	Load	Hr/day	Emissions Factor, g/hp/hr CO2	Emissions, lb/day CO2*	Emissions, ton/phase** CO2*
Excavator	Diesel	1	2	175	0.57	12	324.222	855.7	0.8
Crane	Diesel	1	1	250	0.43	4	244.589	231.9	0.1
Air Compressor	Diesel	1	2	250	0.48	2	273.029	144.5	0.1
Backhoe	Diesel	1	2	175	0.55	7	312.846	464.8	0.4
Water Truck	Diesel	1	5	250	0.5	12	324.222	1072.4	2.4
Total								2769.3	3.9

GC Line - November 2012 - February 2013

Equipment	Fuel	Number	Days Operating**	HP	Load	Hr/day	Emissions Factor, g/hp/hr CO2	Emissions, lb/day CO2*	Emissions, ton/phase** CO2*
Water Truck	Diesel	1	8	250	0.5	8	324.222	714.9	2.6
Puller	Diesel	1	2	25	0.51	2	290.093	16.3	0.0
Crane	Diesel	1	1	250	0.43	6	244.589	347.9	0.2
Total								1079.1	2.8

Distribution Overhead - January 2013 - May 2013

Equipment	Fuel	Number	Days Operating**	HP	Load	Hr/day	Emissions Factor, g/hp/hr CO2	Emissions, lb/day CO2*	Emissions, ton/phase** CO2*
Water Truck	Diesel	1	100	250	0.5	8	324.222	714.9	32.4
Puller	Diesel	1	10	25	0.51	8	290.093	65.2	0.3
Total								780.2	32.7

Distribution Underground - January 2013 - May 2013

Equipment	Fuel	Number	Days Operating**	HP	Load	Hr/day	Emissions Factor, g/hp/hr CO2	Emissions, lb/day CO2*	Emissions, ton/phase** CO2*
Water Truck	Diesel	1	64	250	0.5	8	324.222	714.9	20.8
Crawler Backhoe	Diesel	1	64	175	0.55	8	312.846	531.2	15.4
Excavator	Diesel	1	16	175	0.57	8	324.222	570.5	4.1
HDD Rig	Diesel	1	40	175	0.75	8	426.608	987.7	17.9
Bore Rig	Diesel	1	32	175	0.75	8	426.608	987.7	14.3
Total								3792.0	72.6

* metric tons.

** Calculated based on the PG&E estimates.

Windsor Substation - Alternative Site 3

Emissions calcs for on-site and commute truck miles

Equipment lists and usage percents supplied by PG&E, February 2011.

Truck	Fuel	Number	Days Operating	Average VMT Per day	Total VMT per day	Total VMT per phase	Emissions Factors (lb/mile) ²		Emissions, tons/phase		Emissions, lb/day	
							CO2	CH4	CO2 ⁴	CH4 ⁴	CO2 ⁴	CH4 ⁴
Access Road and Substation Construction - September 2012 - October 2012												
Pickup	Gasoline	3	40	30	90	3600	1.10153	0.00007	1.80	1.17E-04	99.1	6.45E-03
1 - ton Truck	Diesel	1	40	30	30	1200	4.21591	0.00012	2.29	6.34E-05	126.5	3.50E-03
Truck -mounted Digger	Diesel	1	40	30	30	1200	4.21591	0.00012	2.29	6.34E-05	126.5	3.50E-03
Concrete Truck	Diesel	1	40	30	30	1200	4.21591	0.00012	2.29	6.34E-05	126.5	3.50E-03
Total									8.68	3.07E-04	478.6	1.69E-02
GC Tower - November 2012 - February 2013												
Pickup	Gasoline	3	5	30	90	450	1.10153	0.00007	0.22	1.46E-05	99.1	6.45E-03
Crew-cab Pickup	Gasoline	2	5	30	60	300	1.10153	0.00007	0.15	9.76E-06	66.1	4.30E-03
Boom Truck	Diesel	1	1	30	30	30	4.21591	0.00012	0.06	1.59E-06	126.5	3.50E-03
Concrete Truck	Diesel	8	1	30	240	240	4.21591	0.00012	0.46	1.27E-05	1011.8	2.80E-02
Dump Truck	Diesel	5	2	40	200	400	4.21591	0.00012	0.76	2.11E-05	843.2	2.33E-02
2-ton Flat-bed Truck	Diesel	1	5	30	30	150	4.21591	0.00012	0.29	7.93E-06	126.5	3.50E-03
Potholer / Vac Truck	Diesel	2	2	30	60	120	4.21591	0.00012	0.23	6.34E-06	253.0	6.99E-03
Total									2.17	7.41E-05	2526.1	7.60E-02
GC Line - November 2012 - February 2013												
Pickup	Gasoline	3	8	30	90	720	1.10153	0.00007	0.36	2.34E-05	99.1	6.45E-03
Crew-cab Pickup	Gasoline	1	8	30	30	240	1.10153	0.00007	0.12	7.80E-06	33.0	2.15E-03
Bucket Truck	Diesel	2	8	30	60	480	4.21591	0.00012	0.92	2.54E-05	253.0	6.99E-03
Line Truck	Diesel	1	4	30	30	120	4.21591	0.00012	0.23	6.34E-06	126.5	3.50E-03
Total									1.63	6.29E-05	511.6	1.91E-02
Distribution Overhead - January 2013 - May 2013												
Pickup	Gasoline	3	100	30	90	9000	1.10087	0.00007	4.49	2.74E-04	99.1	6.04E-03
Crew-cab Pickup	Gasoline	3	100	30	90	9000	1.10087	0.00007	4.49	2.74E-04	99.1	6.04E-03
Line Truck	Diesel	4	50	30	120	6000	4.21519	0.00010	11.47	2.84E-04	505.8	1.25E-02
Bucket Truck	Diesel	5	10	30	150	1500	4.21519	0.00010	2.87	7.10E-05	632.3	1.57E-02
Splicing Van	Diesel	5	50	30	150	7500	4.21519	0.00010	14.34	3.55E-04	632.3	1.57E-02
Crane Truck	Diesel	6	20	30	180	3600	4.21519	0.00010	6.88	1.70E-04	758.7	1.88E-02
Total									44.55	1.43E-03	2727.3	7.47E-02
Distribution Underground - January 2013 - May 2013												
Pickup	Gasoline	1	64	30	30	1920	1.10087	0.00007	0.96	5.84E-05	33.0	2.01E-03
Crew Truck	Diesel	1	64	30	30	1920	4.21519	0.00010	3.67	9.09E-05	126.5	3.13E-03
Dump/Cement Truck	Diesel	1	64	100	100	6400	4.21519	0.00010	12.24	3.03E-04	421.5	1.04E-02
Total									16.87	4.52E-04	581.0	1.56E-02

1: Calculated based on information supplied by PG&E.

2: Most conservative emissions factors from EMFAC2007 v.2.3 for the SCAQMD.

4: Calculated in metric tons.

Windsor Substation - Alternative Site 3
Summary of Construction Phase Emissions of Criteria Pollutants

Pollutant	Average Daily lb/day emissions				
	Construction-Related Threshold	Original Project (Site A)		Site 3 Alternative	
	YEAR:	2011	2012	2012	2013
NOx	54	23.7	48.8	22.7	41.0
ROG	54	3.6	5.1	3.3	4.2
PM-10 (exhaust)	82	1.5	2.5	1.4	1.9
PM2.5 (exhaust)	54	1.4	2.1	1.2	1.7