PG&E Vierra Reinforcement Project – Application No. 18-06-004
Data Request Set No. 1 – Additional Responses
November 5, 2018

Below are additional responses to Data Request No. 1. Responses to AQ-9 and PD-6 are forthcoming.

Air Quality

AQ-1 The data deficiency response CD included emissions tables as pdf files. Staff needs the original spreadsheet files with live, embedded calculations to complete the analysis of the project. Please provide the original Excel spreadsheet files for air quality and greenhouse gas (GHG) emission estimates with live, embedded calculations. Please provide the CalEEMod output files as Excel spreadsheets.

PG&E Response: *The requested data is included with this submission. Please note that the data has been updated to reflect the change in the proposed dump truck capacity from 10 cubic yards to 25 cubic yards. Construction equipment input data into the CalEEMod and resultant revisions to tables 3.3-5, 3.7-2, and 3.7-3 are also included in this submission.*

Greenhouse Gas Emissions

GHG-1 A note under **Table 3.7-2** on page 3.7-8 of the PEA states that GHG emissions would be reduced by 5 percent with the implementation of **APM GHG-1** as a result of minimizing idling and maintaining equipment in proper operating condition. Please provide a reference for this assumption.

PG&E Response: *The reference for the 5 percent reduction in GHG emissions due to implementation of mitigation measures is the Revised Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance (BAAQMD, October 2009). This report states that it is relatively easy to achieve 5 percent reduction in operational GHG emissions through implementation of relatively few performance measures. Since GHG emissions from both construction and operational phases include fuel combustion sources, it is reasonable to assume that the same percent reduction would be achieved by implementing APM-1 for this project. It should also be noted that the GHG emissions without implementation of APM-1 are 14.8 metric tons/year, which is well below the significance threshold of 10,000 metric tons/year.*

GHG-3 Please make sure that the most updated global warming potentials (GWPs) from the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) are used to calculate the CO_2e emissions. Otherwise, please justify the use of GWPs from previous versions of the IPCC reports.

PG&E Response: *Calculations were revised to use GWPs from the AR5 report. All the revised calculations are included in the response to AQ-1.*

Biological Resources

BIO-1 The CPUC August 10, 2012, working draft of the PEA Checklist 3.7.1.5 Vegetation Clearance, states "Identify the preliminary location and provide an approximate area of disturbance in the GIS database for each type of vegetation removal." According to PEA Section 2.7.5, construction of the project "…will require ground-disturbing activities (approximately 2.8 acres at Vierra substation and 0.4 acre at each pole location), including minor vegetation trimming, tree removal, and pole installation and removal." Elsewhere, the project PEA states that "…the total amount of area disturbed during project construction is estimated to be 9.2 acres. This includes approximately 6.4 acres for tubular steel pole (TSP) sites, pull sites, and temporary access roads and staging areas, and approximately 2.8 acres associated with expanding the substation" (from PEA Air Quality Section 3.3, page 3.3-4). In order to complete a sufficient CEQA analysis of the project, please provide the acres of temporary and permanent impacts by vegetation type, along with supporting GIS data.

***PG&E Response**: Acres of temporary and permanent impact by vegetation type are approximated below. The GIS data is included with this submission.*

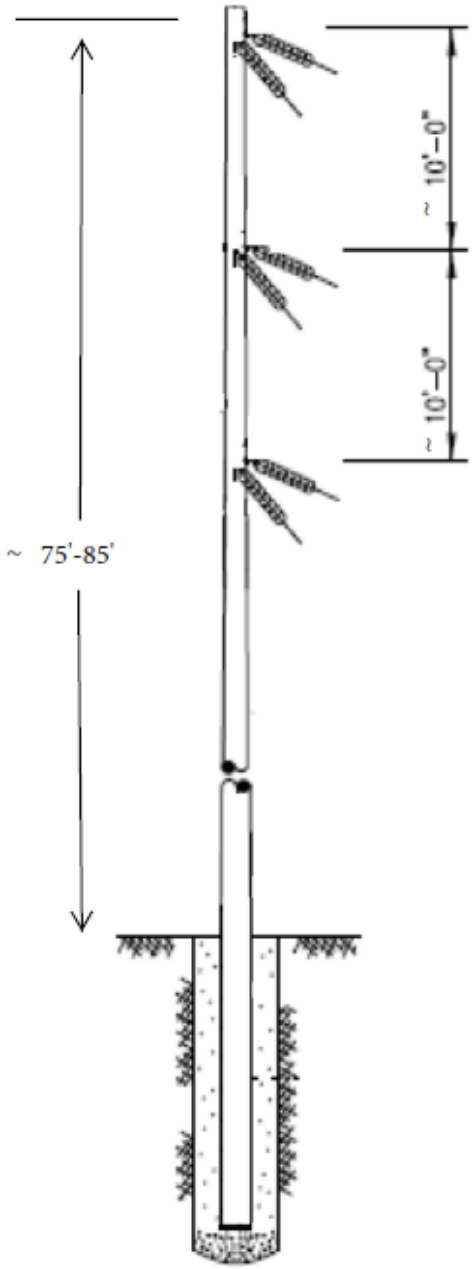
Work Area	***Vegetation Type***	***Approximate Acres***
Temporary Impacts		
Temporary Impacts (Access Road, Guard Structure Work Area, Pole Work Areas, Pull Sites, Staging Areas)	*Agriculture*	*8.01*
	Bare Ground	*0.10*
	Developed	*1.88*
	Ornamental Landscaping	*0.40*
	Ruderal Herbaceous	*2.00*
Permanent Impacts		
Substation	*Agriculture*	*2.63*
	Developed	*0.04*
	Ruderal Herbaceous	*0.12*
Poles	*Agriculture*	*0.00432*
	Bare Ground	*0.00144*
	Developed	*0.00108*
	Ornamental Landscaping	*0.00036*
	Ruderal Herbaceous	*0.00072*

Assumptions and Notes:

1. *TSPs average 5 feet in diameter (15.7 square feet, or 0.00036 acre).*
2. *Poles located within the substation footprint were not calculated separately.*
3. *Only SA-1 is included as only one staging area will be required. This is the preferred staging area and larger than the two alternative staging areas.*

PD-7 PEA Section 2.1 states that four temporary shoo-fly structures would be installed to support the transmission line relocation. Please provide shoo-fly structure configuration and dimensions in a viewable figure.

PG&E Response: *The requested figure is provided below.*



Typical Temporary Wood Shoofly Pole

(Preliminary, Approximate, and Subject to Change)

Activity	Total Number of On-Site Workers	Estimated Quantity of Equipment		CalEEMod Equipment Type	Horsepower	CalEEMod Default HP (y/n)	Estimated Days per Week of Operation	Estimated Hours per Day of Operation	Estimated Duration of Use (weeks)
Vegetation Trimming	2	1	Leaf blower	Other Construction Equipment	9	n	2	10	1
		1	Weed mower	Other Construction Equipment	20	n	2	10	1
		1	Pickup truck	On-road vehicle - Add as vendor trip	NA	NA	2	10	1
Traffic Control	4	2	Work site protection type vehicles	On-road vehicle - Add as vendor trip	NA	NA	6	2	12
		2	Flasher board	Assume battery powered - no emissions	NA	NA	6	8	12
TSP Installation (includes foundation and augur TSP holes)	6	1	40-ton cranes	Cranes	231	y	4	1	8
		1	Tractor trailer	Off-Highway Trucks	402	y	4	2	8
		1	Construction digger	Trenchers	78	y	2	6	8
		1	Crane with 120 boom	Cranes	231	y	2	4	8
		1	Backhoe	Tractors/Loaders/Backhoes	97	y	4	2	8
		1	Dump truck	Off-Highway Trucks	250	n	2	6	8
		1	Foreman pickup truck	On-road vehicle - Add as vendor trip	NA	NA	6	1	8
		1	Crew-cab truck	On-road vehicle - Add as vendor trip	NA	NA	6	1	8
		2	Cement truck	Off-Highway Trucks	402	y	2	6	6
Conductor Installation	15	1	V-Groove puller attached to line truck	Other General Industrial Equipment	88	y	3	6	5
		1	Helicopter (small)	Will be calculated outside CalEEMod	NA	NA	1	3	2
		1	Tensioner attached to line truck	Other General Industrial Equipment	88	y	3	6	5
		1	40-ton cranes	Cranes	231	y	6	6	5
		2	Bucket trucks	On-road vehicle - Add as vendor trip	NA	NA	6	6	5
		2	Boom trucks	On-road vehicle - Add as vendor trip	NA	NA	6	6	5
		3	Crew-cab truck	On-road vehicle - Add as vendor trip	NA	NA	6	2	5
		3	Foreman pickup truck	On-road vehicle - Add as vendor trip	NA	NA	6	3	5
		1	Forklift	Forklifts	89	y	6	2	5
		1	Hardline puller	Other General Industrial Equipment	88	y	3	6	5
		2	Crane with 120 boom	Cranes	231	y	6	6	5

Substation Expansion A	19	2	Concrete Truck	Off-Highway Trucks	402	y	3	3	8
		1	D-3 Bulldozer	Rubber Tired Dozers	247	y	5	6	2
		1	Bucket truck	On-road vehicle - Add as vendor trip	NA	NA	5	6	2
		1	Line Truck	On-road vehicle - Add as vendor trip	NA	NA	5	6	2
		1	50-ton crane	Cranes	231	y	5	6	1
		2	Water Truck	Add as vendor trip	NA	NA	5	6	8
		2	Compactor	Plate Compactors	8	y	5	6	6
		1	Road grader, six wheel	Graders	187	y	5	6	2
		1	Elevating scraper	Scrapers	367	y	5	6	2
		2	Mini excavator	Excavators	50	y	5	8	8
		1	Large excavator drill	Excavators	158	y	5	6	4
Substation Expansion B	18	3	Aerial man Lift	Aerial Lifts	63	y	5	5	20
		1	2-ton flatbed trucks	Add as vendor trip	NA	NA	5	4	20
		2	Fork Lift	Forklifts	89	y	5	5	20
		2	Backhoe	Tractors/Loaders/Backhoes	97	y	5	6	20
		2	Skid-steer bobcat	Skid Steer Loaders	65	y	5	4	30
		1	Boom truck	On-road vehicle - Add as vendor trip	NA	NA	5	6	20
		2	Air compressor	Air Compressors	78	y	5	2	30
		1	Portable generators	Generator Sets	84	y	5	4	30
		~~3.5~~	~~Dump truck (10 cu. Yards)~~	~~On-road vehicle - Add as haul trip~~	~~NA~~	~~NA~~	~~5~~	~~NA~~	~~30~~
Substation Expansion C	0	2	Dump truck	On-road vehicle - Add as haul trip	NA	NA	5	NA	4
Substation Expansion D~~C~~	7	5	Pickup truck	On-road vehicle - Add as vendor trip	NA	NA	5	4	52

Helicopter Emission Factors

Type	Mode	Operation			Power (hp)	Fuel Consumption		Emission F
		Daily	Days per Week	Weeks				CO_2
Hughes 500	LTO	1 LTO/day	1	2	317	16.4 kg	5.35 gallons	9.57
	Operation	3 Hours/day	1	2	317	98.8 kg/hr	32.25 gallons/hr	9.57

Helicopter Greenhouse Gas Emissions

Type	Mode	Total Emissions (metric tons)			
		CO_2	N_2O	CH_4	CO2e
Hughes 500	LTO	0.10	3.3E-06	2.9E-06	0.10
	Operation	1.85	6.0E-05	5.2E-05	1.87
	Total Emissions	1.95	6.3E-05	5.5E-05	1.97

Notes:

Fuel usage data obtained from the *FOCA Guidance on Determination of Helicopter Emissions, Edition 2, December 2015* .

Greenhouse gas emission factors obtained from *California Climate Action Registry General Reporting Protocol, Version 3.1, January 2009* .

Global Warming Potentials (GWPs) obtained from the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC). GWPs used here do not include climate-carbon feedbacks.

Density of fuel from *ExxonMobil Aviation World Jet Fuel Specifications, 2005 Edition.*

775-840 kg/m^3 = 6.47 - 7.01 lb/gallon

Average Density = 6.74 lb/gallon

LTO = Landing and take-off cycle

1 LTO per day of operations is assumed.

actors (kg GHG/gallon)	
N_2O	CH_4
3.1E-04	2.7E-04
3.1E-04	2.7E-04

SF_6-Insulated Breaker Emissions - Greenhouse Gas

Emission Scenario	Qty.	Equipment	SF6 Capacity (lbs/breaker)	Leak Rate	**Emissions** (metric tons/year)	
					SF6	CO2e
Without APM GHG-2	11	Circuit Breaker	80	1.0%	0.0040	94.0
With APM GHG-2	11	Circuit Breaker	80	0.5%	0.0020	47.0

Notes:
Circuit breakers were conservatively assumed to each contain approximately 80 pounds of SF6 consistent with the PG&E: Missouri Flat-Gold Hill 115 KV Power Line Reconductoring Project
Implementation of APM GHG-2 includes the requirement that new breakers at Vierra Substation have a manufacturer's guaranteed maximum leakage rate of 0.5 percent per year
The Global Warming Potential for SF6 (23,500) obtained from the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC).

Helicopter Criteria Pollutant Emission Factors

Type	Mode	Operation: Daily	Days per Week	Weeks	Power (hp)	Fuel Consumption		CombustionEmission Factors (LTO:kg, Operation:kg/hour) NO_x	HC	CO	SO_x	PM
Hughes 500	LTO	1 LTO/ day	1	2	317	16.4 kg	5.35 gallons	0.0595	0.4382	0.5712	0.0195	0.0023
Operation		3 Hours /day	1	2	317	98.8 kg/hr	32.25 gallons/ hr	0.48	0.96	1.2	0.1174	0.016

Helicopter Criteria Pollutant Emissions (Combustion)

Type	Mode	Daily Emissions (pounds/day) NO_x	HC	CO	SO_x	PM	Total Emissions (pounds) NO_x	HC	CO	SO_x	PM
Hughes 500	LTO	0.13	0.96	1.26	0.04	0.01	0.26	1.93	2.51	0.09	0.01
Operation		3.17	6.34	7.92	0.77	0.11	6.34	12.67	15.84	1.55	0.21
Total Emissions		3.30	7.30	9.18	0.82	0.11	6.60	14.60	18.35	1.64	0.22

Notes:

Fuel usage data and criteria pollutant emission factors obtained from the *FOCA Guidance on Determination of Helicopter Emissions, Edition 2, December 2015* .

Jet Fuel assumed to contain an average 0.054% wt. sulfur per the FAA's Aviation Emissions, Impacts & Mitigation: a Primer, dated January 2015.

Density of fuel from *ExxonMobil Aviation World Jet Fuel Specifications, 2005 Edition.*

775-840 kg/m^3 = 6.47 - 7.01 lb/gallon

Average Density = 6.74 lb/gallon

LTO = Landing and take-off cycle

1 LTO per day of operations is assumed.

Table 3.3-1: Estimated Unmitigated Criteria Pollutant Emissions during Construction

Criteria Emissions	Daily Maximum lbs/day	Total		
		Project Total Tons[1]	Applicable Construction Threshold[2] Tons/Year	Threshold Exceeded?
Volatile Organic Compounds (VOCs)	13.74	0.2	10	No
Carbon Monoxide (CO)	58.34	2.0	100	No
NO_X	61.12.2	2.2	10	No
Sulfur Dioxide	0.91	<0.1	27	No
Particulates (PM_{10})	9.08.4	0.3	15	No
Particulates ($PM_{2.5}$)	5.35.2	0.2	15	No

Source: SJVAPCD 2015

Notes:

Emissions are for the entire proposed project construction

Key:

lbs	pounds
NOx	oxides of nitrogen
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
SO_2	sulfur dioxide

Table 3.7-2: Estimated Construction-Related Greenhouse Gas Emissions

Construction Phase	CO_2e metric tons/year (w/o APMs)	CO_2e metric tons/year (w/ APMs)
Vegetation Trimming	< 0.1	< 0.1
Traffic Control	0.2	0.2
TSP Installation	2.87	2.6
Conductor Installation	1.2	1.12
Substation Expansion	10.47	9.810.1
Helicopter Operations	0.1	0.1
Total	**14.68**	**13.914.1**

Notes:

GHG emissions listed above are annual emissions derived from the amortization of total construction emissions over a 30-year period.

Reduction in GHG emissions assumes that implementation of APM GHG-1 will achieve a 5 percent reduction in emissions as a result of minimizing idling and maintaining equipment in proper operating condition.

Table 3.7-3: O&M-Related Greenhouse Gas Emissions

O&M Phase	CO_2e metric tons/year (w/o APMs)	CO_2e metric tons/year (w/ APMs)
Circuit Breaker SF_6 Leakage	~~91.2~~94.0	47.0~~45.6~~

Notes:
Per APM GHG-2, PG&E will require that the new breakers at Vierra Substation have a manufacturer's guaranteed maximum leakage rate of 0.5 percent per year or less for SF_6.

Maximum Daily Construction Emissions, lbs/day						
2022	**ROG**	**NOx**	**CO**	**SOx**	**PM_{10}**	**$PM_{2.5}$**
Construction Equipment	5.9	55.3	46.0	0.1	2.4	2.2
Construction Truck Trips	0.1	2.3	0.5	0.0	0.5	0.1
Worker Trips	0.4	0.3	2.6	0.0	1.5	0.4
Fugitive Dust	0.0	0.0	0.0	0.0	4.6	2.5
Helicopter	7.3	3.3	9.2	0.8	0.1	0.1
Maximum Daily Emissions	**13.7**	**61.1**	**58.3**	**0.9**	**9.0**	**5.3**
Threshold [1]	**100**	**100**	**100**	**100**	**100**	**100**
Significant?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Annual Construction Emissions, tons/yr						
2022	**ROG**	**NOx**	**CO**	**SOx**	**PM_{10}**	**$PM_{2.5}$**
Construction Equipment	0.2	2.0	1.9	0.0	0.1	0.1
Construction Truck Trips	0.0	0.2	0.0	0.0	0.0	0.0
Worker Trips	0.0	0.0	0.2	0.0	0.1	0.0
Fugitive Dust	0.0	0.0	0.0	0.0	0.1	0.1
Helicopter	0.0	0.0	0.0	0.0	0.0	0.0
Annual Emissions	**0.2**	**2.2**	**2.0**	**0.0**	**0.3**	**0.2**
Threshold	**10**	**10**	**100**	**27**	**15**	**15**
Significant?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

1 Daily thresholds are cited from screening levels described on page 93 of San Joaquin Valley Unified Air Pollution Control District Guidance for Assessing and Mitigating Air Quality Impacts, March 19, 2015.

Construction Phase	Total CO2e Emissions (MT)	Amortized CO2e Emissions w/o APMs (MT/yr)	Amortized CO2e Emissions w/APMs (MT/yr)
Vegetation Trimming	0.2	0.0	0.0
Traffic Control	5.7	0.2	0.2
TSP Installation	82.8	2.8	2.6
Conductor Installation	36.3	1.2	1.1
Substation Expansion	310.7	10.4	9.8
Helicopter Operations	2.0	0.1	0.1
Total	437.7	14.6	13.9

Project: TL633 Underground Conversion
Emissions Summary - Daily

Construction Phase	Pollutants (tons/yr)						GHG Emissi	
	ROG	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4
Phase 1: Site Preparation								
Construction Equipment	0.00025	0.00127	0.00139	0.000	0.00009	0.00009	0.1289	0.00004
Haul Truck Trips	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vendor Trips	0.00001	0.0002	0.00004	0.000	0.00001	0.000	0.0527	0.000
Worker Trips	0.00001	0.00001	0.00009	0.000	0.00003	0.00001	0.0262	0.000
Fugitive Dust	0	0	0	0	0.000	0.000	0	0
Phase 2: Traffic Control								
Construction Equipment	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Haul Truck Trips	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vendor Trips	0.00044	0.0146	0.00293	0.00004	0.00099	0.00031	3.7961	0.00021
Worker Trips	0.00098	0.00066	0.00676	0.00002	0.00231	0.00062	1.8881	0.00004
Fugitive Dust	0	0	0	0	0.000	0.000	0	0
Phase 3: TSP Installation								
Construction Equipment	0.0429	0.3636	0.2739	0.00088	0.016	0.0148	77.6841	0.0251
Haul Truck Trips	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vendor Trips	0.0003	0.00974	0.00196	0.00003	0.00066	0.00021	2.5307	0.00014
Worker Trips	0.00098	0.00066	0.00676	0.00002	0.00231	0.00062	1.8881	0.00004
Fugitive Dust	0	0	0	0	0.000	0.000	0	0
Phase 4: Conductor Installation								
Construction Equipment	0.0191	0.2022	0.1335	0.00029	0.00967	0.0089	25.2073	0.00815
Haul Truck Trips	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vendor Trips	0.00092	0.0304	0.00611	0.00008	0.00486	0.00133	7.9085	0.00045
Worker Trips	0.00154	0.00103	0.0106	0.00003	0.00981	0.0025	2.9502	0.00007
Fugitive Dust	0	0	0	0	0.000	0.000	0	0
Phase 5a: Substation Expansion								
Construction Equipment	0.0738	0.7449	0.5199	0.00121	0.0315	0.029	106.382	0.0344
Haul Truck Trips	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vendor Trips	0.00073	0.0213	0.00445	0.00007	0.00209	0.00065	7.1012	0.00025
Worker Trips	0.00325	0.00217	0.0223	0.00007	0.00762	0.00206	6.2281	0.00015
Fugitive Dust	0	0	0	0	0.114	0.062	0	0
Phase 5b: Substation Expansion								
Construction Equipment	0.0683	0.6789	0.9303	0.0014	0.0337	0.0318	121.9235	0.0303
Haul Truck Trips	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vendor Trips	0.00092	0.0304	0.00611	0.00008	0.00206	0.00065	7.9085	0.00045
Worker Trips	0.00923	0.00616	0.0634	0.0002	0.0216	0.00584	17.7009	0.00042
Fugitive Dust	0	0	0	0	0.000	0.000	0	0
Phase 5c: Substation Expansion								
Construction Equipment	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Haul Truck Trips	0.003	0.094	0.016	0.000	0.007	0.002	29.6606	0.00124
Vendor Trips	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Worker Trips	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fugitive Dust	0	0	0	0	0.001	0.0001	0	0
Phase 5d: Substation Expansion								
Construction Equipment	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Haul Truck Trips	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vendor Trips	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Worker Trips	0.00622	0.00415	0.0427	0.00013	0.0146	0.00394	11.9317	0.00028
Fugitive Dust	0	0	0	0	0.000	0.000	0	0

Total

Construction Equipment	0.204	1.991	1.859	0.004	0.091	0.085	331.326	0.098
Haul Truck Trips	0.003	0.094	0.016	0.000	0.007	0.002	29.661	0.001
Vendor Trips	0.003	0.107	0.022	0.000	0.011	0.003	29.298	0.002
Worker Trips	0.022	0.015	0.153	0.000	0.058	0.016	42.613	0.001
Fugitive Dust	0.000	0.000	0.000	0.000	0.115	0.062	0.000	0.000
Total	0.23271	2.20595	2.049	0.00486	0.28215	0.16778	432.8974	0.10173

General Assumptions:

25 cy per load for haul trips
Total haul trips include both import and export, unphased
Use CalEEMod default trip lengths:
- one-way worker trip length = 10.8 mi
- one-way vendor trip length = 7.3 mi
- one-way haul trip length = 20 mi

Pickup/crw cab/boom/bucket/line trucks counted as vendor trips, 2 one way trips per day
Water trucks counted as vendor trips, traveling 5 mph for 6 hrs per day (30 VMT)

Project: TL633 Underground Conversion
Emissions Summary - Daily

Construction Phase	Pollutants (tons/yr)						GHG Emissi	
	ROG	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2	CH_4

Global Warming Potentials (GWPs) obtained from the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC). GWPs used here do not include climate-carbon feedbacks.

Project: TL633 Underground Conversion
Emissions Summary - Daily

ons (MT/yr)	
N_2O	CO_2e
0.000	0.13002
0.000	0.000
0.000	0.0527
0.000	0.0262
0	0
0.000	0.000
0.000	0.000
0.000	3.80198
0.000	1.88922
0	0
0.000	78.3869
0.000	0.000
0.000	2.53462
0.000	1.88922
0	0
0.000	25.4355
0.000	0.000
0.000	7.9211
0.000	2.95216
0	0
0.000	107.3452
0.000	0.000
0.000	7.1082
0.000	6.2323
0	0
0.000	122.7719
0.000	0.000
0.000	7.9211
0.000	17.71266
0	0
0.000	0.000
0.000	29.69532
0.000	0.000
0.000	0.000
0	0
0.000	0.000
0.000	0.000
0.000	0.000
0.000	11.93954
0	0

0.000	334.070
0.000	29.695
0.000	29.340
0.000	42.641
0.000	0.000
0	435.7458

Project: TL633 Underground Conversion
Emissions Summary - Daily

ons (MT/yr)	
N_2O	CO_2e

Project: TL633 Underground Conversion
Emissions Summary - Annual

Construction Phase	Pollutants (lbs/day)					
	ROG	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$
Phase 1: Site Preparation						
Construction Equipment	0.247	1.2731	1.3875	0.00146	0.0934	0.0859
Haul Truck Trips	0.000	0.000	0.000	0.000	0.000	0.000
Vendor Trips	0.00638	0.2023	0.0446	0.00055	0.0141	0.00442
Worker Trips	0.0148	0.01	0.0938	0.00028	0.0331	0.0089
Fugitive Dust	0	0	0	0	0.000	0.000
Phase 2: Traffic Control						
Construction Equipment	0.000	0.000	0.000	0.000	0.000	0.000
Haul Truck Trips	0.000	0.000	0.000	0.000	0.000	0.000
Vendor Trips	0.0128	0.4047	0.0892	0.00109	0.0282	0.00884
Worker Trips	0.0295	0.0201	0.1875	0.00056	0.0661	0.0178
Fugitive Dust	0	0	0	0	0.000	0.000
Phase 3: TSP Installation						
Construction Equipment	1.7881	15.149	11.4124	0.0369	0.6679	0.6145
Haul Truck Trips	0.000	0.000	0.000	0.000	0.000	0.000
Vendor Trips	0.0128	0.4047	0.0892	0.00109	0.0282	0.00884
Worker Trips	0.0443	0.0301	0.2812	0.00085	0.0992	0.0267
Fugitive Dust	0	0	0	0	0.000	0.000
Phase 4: Conductor Installation						
Construction Equipment	1.2698	13.4774	8.9016	0.0191	0.6447	0.5932
Haul Truck Trips	0.000	0.000	0.000	0.000	0.000	0.000
Vendor Trips	0.0638	2.0232	0.4458	0.00545	0.3339	0.0916
Worker Trips	0.1107	0.0753	0.7031	0.00212	0.6763	0.1719
Fugitive Dust	0	0	0	0	0.000	0.000
Phase 5a: Substation Expansion						
Construction Equipment	2.9511	29.7961	20.7939	0.0484	1.2607	1.1598
Haul Truck Trips	0.000	0.000	0.000	0.000	0.000	0.000
Vendor Trips	0.03	0.8539	0.1892	0.00296	0.0857	0.0267
Worker Trips	0.1403	0.0953	0.8906	0.00268	0.3141	0.0846
Fugitive Dust	0	0	0	0	4.576	2.489
Phase 5b: Substation Expansion						
Construction Equipment	0.91	9.0521	12.4035	0.0186	0.4495	0.4238
Haul Truck Trips	0.000	0.000	0.000	0.000	0.000	0.000
Vendor Trips	0.0128	0.4047	0.0892	0.00109	0.0282	0.00884
Worker Trips	0.1329	0.0903	0.8437	0.00254	0.2976	0.0801
Fugitive Dust	0	0	0	0	0.000	0.000
Phase 5c: Substation Expansion						
Construction Equipment	0.000	0.000	0.000	0.000	0.000	0.000
Haul Truck Trips	0.288	9.375	1.676	0.031	0.729	0.219
Vendor Trips	0.000	0.000	0.000	0.000	0.000	0.000
Worker Trips	0.000	0.000	0.000	0.000	0.000	0.000
Fugitive Dust	0	0	0	0	0.074	0.011
Phase 5d: Substation Expansion						
Construction Equipment	0.000	0.000	0.000	0.000	0.000	0.000
Haul Truck Trips	0.000	0.000	0.000	0.000	0.000	0.000
Vendor Trips	0.000	0.000	0.000	0.000	0.000	0.000
Worker Trips	0.0517	0.0351	0.3281	0.00099	0.1157	0.0312
Fugitive Dust	0	0	0	0	0.000	0.000

Total (Maximum Overlapping Phases)

Construction Equipment	5.896	55.270	45.997	0.105	2.355	2.177
Haul Truck Trips	0.000	0.000	0.000	0.000	0.000	0.000
Vendor Trips	0.075	2.270	0.501	0.007	0.476	0.136
Worker Trips	0.4135	0.2809	2.6249	0.0079	1.4698	0.3856
Fugitive Dust	0	0	0	0	4.576	2.4891
Total	6.384	57.822	49.124	0.120	8.877	5.187

General Assumptions:

Values above are for Winter CalEEMod run, which was highest for NOx and PM emissions.
25 cy per load for haul trips
Total haul trips include both import and export, unphased
Use CalEEMod default trip lengths:
- one-way worker trip length = 10.8 mi
- one-way vendor trip length = 7.3 mi
- one-way haul trip length = 20 mi

Pickup/crw cab/boom/bucket/line trucks counted as vendor trips, 2 one way trips per day

Project: TL633 Underground Conversion
Emissions Summary - Annual

Construction Phase	Pollutants (lbs/day)					
	ROG	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$

Water trucks counted as vendor trips, traveling 5 mph for 6 hrs per day (30 VMT)