UPPER GUADALUPE RIVER
FLOOD RISK MANAGEMENT PROJECT
San José, California

Air Quality and GHG Analysis

Appendix C6

DRAFT INTEGRATED
GENERAL REEVALUATION REPORT
& SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

November 2022

US Army Corps of Engineers®
San Francisco District

Valley Water

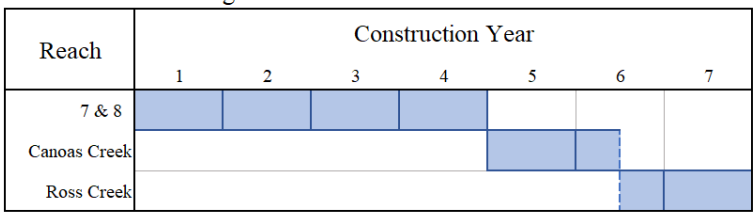
Appendix C6:
Air Quality and GHG Analysis

Construction Assumptions

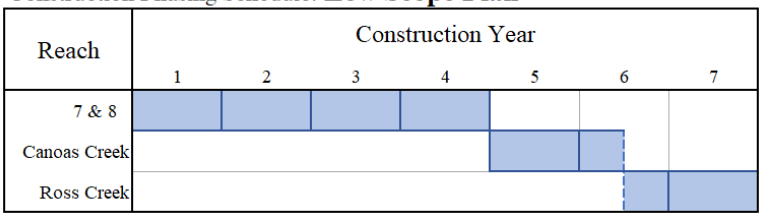
The following assumptions were used as the basis for the air quality and GHG analysis for the Upper Guadalupe Project:

- Years spent in construction:
  - Combination Plan: 7 years
  - Low Scope Plan: 7 years
  - Bypass Plan: 16 years
  - Valley View Plan: 16 years
- Schedule estimates depicting the sequencing assumptions for each of the four plans are included below and the quantities of equipment are presented in the excel tables of the emissions:

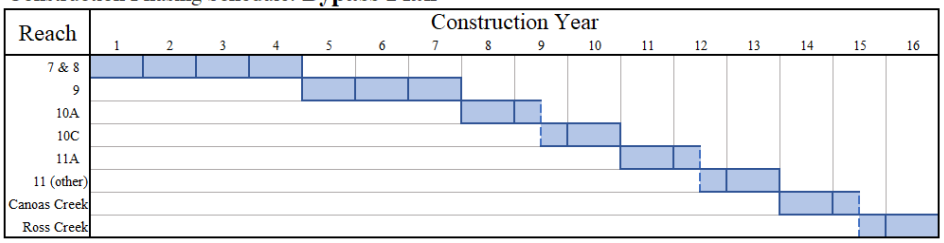
Construction Phasing Schedule: **Combination Plan**



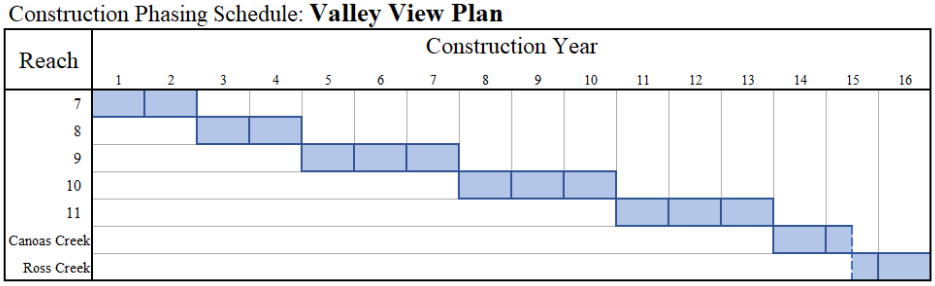
Construction Phasing Schedule: **Low Scope Plan**



Construction Phasing Schedule: **Bypass Plan**



Construction Phasing Schedule: **Valley View Plan**



- A construction season is estimated to be five months (May 1 to September 30), or 131 working days.
    - May 1 - September 30 = 153 days in the construction season (21 weeks and 6 days)
    - Assume 6 hauling days per week (conservative estimate)
    - 153 construction days – 22 off days = 131 hauling days per construction year

- Hauling Calculations:

Q = Quantity of material (tons)
L = Number of loads per day, per truck
N = Number of trucks
C = Load capacity per truck
D = Number of days

$$D = \frac{Q}{L \cdot N \cdot C}$$

Air Quality Analysis Methodology

An air quality emissions inventory and analysis was performed using the above construction assumptions and the steps below to ensure that project emissions would not exceed the Federal non-attainment thresholds for the San Francisco Bay Federal Air Basin. This process was repeated for all four of the proposed plans.

Step 1 (Emissions Inventory)

Calculate the total emissions across all of the construction equipment for each day for each criteria air pollutant, to calculate the daily emissions expected. For this step emissions factor data was used, including South Coast Air Quality Management District (SCAQMD 2021a, SCAQMD 2021b, SCAQMD 2021c) and composite off-road emission factors from the California Air Resources Board CARB's Off-Road Model.

Step 2 (Emissions Inventory)

Sum the results of step one for each criteria air pollutant and multiply by the number of working days over the total construction schedule for each calendar year and convert to tons to calculate the total emissions expected to be released for the project, to calculate the yearly emissions expected.

Step 3 (Air Quality Analysis)

Compare the results of step one and two with the applicable threshold from the EPA to ensure project emissions are below the thresholds for each individual criteria air pollutant.

The results of the air quality analysis and the full emissions inventory for all four plans are presented below. Based on this process for the emissions inventory and air quality analysis, it was determined that the emissions associated with all four plans are below the applicable Federal thresholds, and thus, the project impacts to air quality would be less than significant. Standard best management practices are proposed as detailed in the GRR/EA Section 2.2.7 to further reduce these levels.

Greenhouse Gases (GHG) Analysis Methodology

A GHG emissions inventory and analysis was performed using the above construction assumptions and the steps below to document project GHG emissions. This process was repeated for all four of the proposed plans.

Step 1 (Emissions Inventory)

Calculate the total emissions across all of the construction equipment for each day for each criteria air pollutant, to calculate the daily emissions expected. For this step EMFAC (Emissions Factor Computer Model) was used to directly calculate emissions by multiplying the emission factor for each pollutant by the number of hours each machine was used, then summed over all machines to find the total emissions for each pollutant, then converted all relevant greenhouse gases to CO2 equivalents by multiplying by the global warming potential.

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
*e = equivalent
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

Step 2 (Emissions Inventory)

Sum the results of step one for each criteria air pollutant and multiply by the number of working days over the total construction schedule for each calendar year and convert to tons to calculate the total emissions expected to be released for the project, to calculate the yearly emissions expected.

Since there is no Federal threshold available for GHGs and no applicable threshold that can be used as a point of comparison, there is no quantitative way to establish the level of significance for these emissions. A qualitative analysis documenting the results of this analysis is included in Section 4.16 of the GRR/EA.

Air Quality Analysis Results: Valley View Plan, Annual Emissions

Annual Emissions During Construction Years 1 - 2

	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	10.336	60.586	78.410	0.336	3.623	3.265
Total Project Emissions (tons)	0.677	3.968	5.136	0.022	0.237	0.214
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

Annual Emissions During Construction Years 3 - 4

	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	9.842	57.896	72.656	0.311	3.324	3.043
Total Project Emissions (tons)	0.645	3.792	4.759	0.020	0.218	0.199
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

Annual Emissions During Construction Years 5 - 7

	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	8.607	51.171	58.272	0.248	2.576	2.490
Total Project Emissions (tons)	0.564	3.352	3.817	0.016	0.169	0.163
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

Annual Emissions During Construction Years 8 - 10

	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	8.360	49.826	55.396	0.235	2.427	2.380
Total Project Emissions (tons)	0.548	3.264	3.628	0.015	0.159	0.156
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

Annual Emissions During Construction Years 11 - 13

	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	8.114	48.481	52.519	0.222	2.277	2.269
Total Project Emissions (tons)	0.531	3.176	3.440	0.015	0.149	0.149
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

Annual Emissions During Construction Years 14 - 16

	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	8.854	52.516	61.149	0.260	2.726	2.601
Total Project Emissions (tons)	0.580	3.440	4.005	0.017	0.179	0.170
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

Air Quality Emissions Inventory and Analysis: Valley View Plan, Annual Emissions During Construction Years 1 - 2 - All Equipment Combined

Emissions Inventory

Emission Source Data						Emission Factors for Construction Equipment (lbs/hr) or (lbs/mile)[1,2,3]						Daily Emissions from Construction Activities (lbs/day)					
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [1]	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Worker vehicles	N/A	NA	30	NA	40	0.00048658	0.00397866	0.00035150	0.00001072	0.00009661	0.00006389	0.584	4.774	0.422	0.013	0.116	0.077
Water Truck	N/A	NA	1	NA	5	0.00090210	0.00457902	0.01031407	0.00004009	0.00052122	0.00039592	0.005	0.023	0.052	0.000	0.003	0.002
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.0544	0.2316	0.2705	0.0013	0.0094	0.00839835	0.126	0.537	0.628	0.003	0.022	0.019
Portable Generator	15	0.74	4	44.4	8	0.0109	0.0627	0.0768	0.0002	0.0032	0.00286136	0.259	1.486	1.819	0.004	0.076	0.068
Grader	135	0.41	1	55.35	8	0.0652	0.7261	0.3117	0.0014	0.0157	0.01394558	0.214	2.382	1.022	0.005	0.051	0.046
Hydraulic Excavator	100	0.38	1	38	8	0.0448	0.4942	0.2638	0.0009	0.0092	0.00820993	0.359	3.954	2.110	0.007	0.074	0.066
Hydraulic Excavator	500	0.38	1	190	8	0.0946	0.4495	0.3091	0.0023	0.0107	0.00950760	0.757	3.596	2.472	0.018	0.085	0.076
Hydromulcher	4	0.65	1	2.6	8	0.0118	0.0617	0.0737	0.0002	0.0029	0.00256237	0.061	0.321	0.383	0.001	0.015	0.020
Backhoe	120	0.37	1	44.4	8	0.0281	0.3379	0.1761	0.0006	0.0055	0.00490796	0.083	1.000	0.521	0.002	0.016	0.039
Front-End Loader	500	0.37	1	185	8	0.1034	0.4654	0.4455	0.0023	0.0164	0.01457596	0.306	1.378	1.319	0.007	0.048	0.117
Aerial Lift	50	0.31	1	15.5	8	0.0168	0.1351	0.1218	0.0003	0.0035	0.00308736	0.134	1.081	0.975	0.002	0.028	0.025
Roller	500	0.38	2	380	8	0.0920	0.4189	0.4752	0.0022	0.0174	0.01547069	0.757	6.702	7.603	0.034	0.278	0.248
Dozer	300	0.65	2	390	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Dozer	440	0.65	2	572	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.093	0.504	1.079	0.005	0.056	0.041
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	14	N/A	320	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	3.458	18.829	40.275	0.177	2.093	1.548
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
Concrete Pump	50	0.74	1	37	8	0.0299	0.2394	0.2138	0.0004	0.0061	0.00544601	0.177	1.417	1.265	0.003	0.036	0.044

Air Quality Analysis Results

Peak Daily Emissions (lbs/day)	10.34	60.59	78.41	0.34	3.62	3.26
Total Project Emissions (tons)	0.677	3.968	5.136	0.022	0.237	0.214
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	**--**	**No**	**--**	**--**	**No**

$$Equip_{Emiss} = \frac{EF \cdot Time \cdot EngineHP \cdot LFwt}{(453.6 \cdot 2000)}$$

Where:
$Equip_{Emiss}$ = Construction Equipment emissions in tons per year
EF = Engine **emission factor** in grams per brake horsepower-hour
$Time$ = Annual **operating time** in hours
$EngineHP$ = **Engine brake horsepower** rating
$LFwt$ = Time weighted engine **load factor** (fraction of full load), based on different engine operating modes

References

1. SCAQMD 2021a
2. SCAQMD 2021b
3. SCAQMD 2021c.

Air Quality Emissions Inventory and Analysis: Valley View Plan, Annual Emissions During Construction Years 3 - 4 - All Equipment Combined

Emissions Inventory

Emission Source Data						Emission Factors for Construction Equipment (lbs/hr) or (lbs/mile)[1,2,3]						Daily Emissions from Construction Activities (lbs/day)					
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [(1)]	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Worker vehicles	N/A	NA	30	NA	40	0.00048658	0.00397866	0.00035150	0.00001072	0.00009661	0.00006389	0.584	4.774	0.422	0.013	0.116	0.077
Water Truck	N/A	NA	1	NA	5	0.00090210	0.00457902	0.01031407	0.00004009	0.00052122	0.00039592	0.005	0.023	0.052	0.000	0.003	0.002
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.0544	0.2316	0.2705	0.0013	0.0094	0.00839835	0.126	0.537	0.628	0.003	0.022	0.019
Portable Generator	15	0.74	4	44.4	8	0.0109	0.0627	0.0768	0.0002	0.0032	0.00286136	0.259	1.486	1.819	0.004	0.076	0.068
Grader	135	0.41	1	55.35	8	0.0652	0.7261	0.3117	0.0014	0.0157	0.01394558	0.214	2.382	1.022	0.005	0.051	0.046
Hydraulic Excavator	100	0.38	1	38	8	0.0448	0.4942	0.2638	0.0009	0.0092	0.00820993	0.359	3.954	2.110	0.007	0.074	0.066
Hydraulic Excavator	500	0.38	1	190	8	0.0946	0.4495	0.3091	0.0023	0.0107	0.00950760	0.757	3.596	2.472	0.018	0.085	0.076
Hydromulcher	4	0.65	1	2.6	8	0.0118	0.0617	0.0737	0.0002	0.0029	0.00256237	0.061	0.321	0.383	0.001	0.015	0.020
Backhoe	120	0.37	1	44.4	8	0.0281	0.3379	0.1761	0.0006	0.0055	0.00490796	0.083	1.000	0.521	0.002	0.016	0.039
Front-End Loader	500	0.37	1	185	8	0.1034	0.4654	0.4455	0.0023	0.0164	0.01457596	0.306	1.378	1.319	0.007	0.048	0.117
Aerial Lift	50	0.31	1	15.5	8	0.0168	0.1351	0.1218	0.0003	0.0035	0.00308736	0.134	1.081	0.975	0.002	0.028	0.025
Roller	500	0.38	2	380	8	0.0920	0.4189	0.4752	0.0022	0.0174	0.01547069	0.757	6.702	7.603	0.034	0.278	0.248
Dozer	300	0.65	2	390	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Dozer	440	0.65	2	572	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
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Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	12	N/A	320	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	2.964	16.139	34.521	0.152	1.794	1.327
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
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Air Quality Analysis Results

Peak Daily Emissions (lbs/day)	9.84	57.90	72.66	0.31	3.32	3.04
Total Project Emissions (tons)	0.645	3.792	4.759	0.020	0.218	0.199
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	**--**	**No**	**--**	**--**	**No**

$$Equip_{Emiss} = \frac{EF \cdot Time \cdot EngineHP \cdot LFwt}{(453.6 \cdot 2000)}$$

Where:
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Dozer	440	0.65	2	572	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.093	0.504	1.079	0.005	0.056	0.041
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	7	N/A	320	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	1.729	9.415	20.137	0.088	1.046	0.774
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
Concrete Pump	50	0.74	1	37	8	0.0299	0.2394	0.2138	0.0004	0.0061	0.00544601	0.177	1.417	1.265	0.003	0.036	0.044

Air Quality Analysis Results

Peak Daily Emissions (lbs/day)	8.61	51.17	58.27	0.25	2.58	2.49
Total Project Emissions (tons)	0.564	3.352	3.817	0.016	0.169	0.163
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

$$Equip_{Emiss} = \frac{EF \cdot Time \cdot EngineHP \cdot LFwt}{(453.6 \cdot 2000)}$$

Where:
$Equip_{Emiss}$ = Construction Equipment emissions in tons per year
EF = Engine **emission factor** in grams per brake horsepower-hour
$Time$ = Annual **operating time** in hours
$EngineHP$ = **Engine brake horsepower** rating
$LFwt$ = Time weighted engine **load factor** (fraction of full load), based on different engine operating modes

References

1. SCAQMD 2021a
2. SCAQMD 2021b
3. SCAQMD 2021c.

Air Quality Emissions Inventory and Analysis: Valley View Plan, Annual Emissions During Construction Years 8 - 10 - All Equipment Combined

Emissions Inventory

Emission Source Data						Emission Factors for Construction Equipment (lbs/hr) or (lbs/mile)[1,2,3]						Daily Emissions from Construction Activities (lbs/day)					
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [(1)]	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Worker vehicles	N/A	NA	30	NA	40	0.00048658	0.00397866	0.00035150	0.00001072	0.00009661	0.00006389	0.584	4.774	0.422	0.013	0.116	0.077
Water Truck	N/A	NA	1	NA	5	0.00090210	0.00457902	0.01031407	0.00004009	0.00052122	0.00039592	0.005	0.023	0.052	0.000	0.003	0.002
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.0544	0.2316	0.2705	0.0013	0.0094	0.00839835	0.126	0.537	0.628	0.003	0.022	0.019
Portable Generator	15	0.74	4	44.4	8	0.0109	0.0627	0.0768	0.0002	0.0032	0.00286136	0.259	1.486	1.819	0.004	0.076	0.068
Grader	135	0.41	1	55.35	8	0.0652	0.7261	0.3117	0.0014	0.0157	0.01394558	0.214	2.382	1.022	0.005	0.051	0.046
Hydraulic Excavator	100	0.38	1	38	8	0.0448	0.4942	0.2638	0.0009	0.0092	0.00820993	0.359	3.954	2.110	0.007	0.074	0.066
Hydraulic Excavator	500	0.38	1	190	8	0.0946	0.4495	0.3091	0.0023	0.0107	0.00950760	0.757	3.596	2.472	0.018	0.085	0.076
Hydromulcher	4	0.65	1	2.6	8	0.0118	0.0617	0.0737	0.0002	0.0029	0.00256237	0.061	0.321	0.383	0.001	0.015	0.020
Backhoe	120	0.37	1	44.4	8	0.0281	0.3379	0.1761	0.0006	0.0055	0.00490796	0.083	1.000	0.521	0.002	0.016	0.039
Front-End Loader	500	0.37	1	185	8	0.1034	0.4654	0.4455	0.0023	0.0164	0.01457596	0.306	1.378	1.319	0.007	0.048	0.117
Aerial Lift	50	0.31	1	15.5	8	0.0168	0.1351	0.1218	0.0003	0.0035	0.00308736	0.134	1.081	0.975	0.002	0.028	0.025
Roller	500	0.38	2	380	8	0.0920	0.4189	0.4752	0.0022	0.0174	0.01547069	0.757	6.702	7.603	0.034	0.278	0.248
Dozer	300	0.65	2	390	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Dozer	440	0.65	2	572	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.093	0.504	1.079	0.005	0.056	0.041
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	6	N/A	320	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	1.482	8.070	17.261	0.076	0.897	0.664
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
Concrete Pump	50	0.74	1	37	8	0.0299	0.2394	0.2138	0.0004	0.0061	0.00544601	0.177	1.417	1.265	0.003	0.036	0.044

Air Quality Analysis Results

Peak Daily Emissions (lbs/day)	8.36	49.83	55.40	0.24	2.43	2.38
Total Project Emissions (tons)	0.548	3.264	3.628	0.015	0.159	0.156
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	**--**	**No**	**--**	**--**	**No**

$$Equip_{Emiss} = \frac{EF \cdot Time \cdot EngineHP \cdot LFwt}{(453.6 \cdot 2000)}$$

Where:
$Equip_{Emiss}$ = Construction Equipment emissions in tons per year
EF = Engine **emission factor** in grams per brake horsepower-hour
Time = Annual **operating time** in hours
EngineHP = **Engine brake horsepower** rating
LFwt = Time weighted engine **load factor** (fraction of full load), based on different engine operating modes

References

1. SCAQMD 2021a
2. SCAQMD 2021b
3. SCAQMD 2021c.

Air Quality Emissions Inventory and Analysis: Valley View Plan, Annual Emissions During Construction Years 11 - 13 - All Equipment Combined

Emissions Inventory

Emission Source Data						Emission Factors for Construction Equipment (lbs/hr) or (lbs/mile)[1,2,3]						Daily Emissions from Construction Activities (lbs/day)					
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [(1)]	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Worker vehicles	N/A	NA	30	NA	40	0.00048658	0.00397866	0.00035150	0.00001072	0.00009661	0.00006389	0.584	4.774	0.422	0.013	0.116	0.077
Water Truck	N/A	NA	1	NA	5	0.00090210	0.00457902	0.01031407	0.00004009	0.00052122	0.00039592	0.005	0.023	0.052	0.000	0.003	0.002
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.0544	0.2316	0.2705	0.0013	0.0094	0.00839835	0.126	0.537	0.628	0.003	0.022	0.019
Portable Generator	15	0.74	4	44.4	8	0.0109	0.0627	0.0768	0.0002	0.0032	0.00286136	0.259	1.486	1.819	0.004	0.076	0.068
Grader	135	0.41	1	55.35	8	0.0652	0.7261	0.3117	0.0014	0.0157	0.01394558	0.214	2.382	1.022	0.005	0.051	0.046
Hydraulic Excavator	100	0.38	1	38	8	0.0448	0.4942	0.2638	0.0009	0.0092	0.00820993	0.359	3.954	2.110	0.007	0.074	0.066
Hydraulic Excavator	500	0.38	1	190	8	0.0946	0.4495	0.3091	0.0023	0.0107	0.00950760	0.757	3.596	2.472	0.018	0.085	0.076
Hydromulcher	4	0.65	1	2.6	8	0.0118	0.0617	0.0737	0.0002	0.0029	0.00256237	0.061	0.321	0.383	0.001	0.015	0.020
Backhoe	120	0.37	1	44.4	8	0.0281	0.3379	0.1761	0.0006	0.0055	0.00490796	0.083	1.000	0.521	0.002	0.016	0.039
Front-End Loader	500	0.37	1	185	8	0.1034	0.4654	0.4455	0.0023	0.0164	0.01457596	0.306	1.378	1.319	0.007	0.048	0.117
Aerial Lift	50	0.31	1	15.5	8	0.0168	0.1351	0.1218	0.0003	0.0035	0.00308736	0.134	1.081	0.975	0.002	0.028	0.025
Roller	500	0.38	2	380	8	0.0920	0.4189	0.4752	0.0022	0.0174	0.01547069	0.757	6.702	7.603	0.034	0.278	0.248
Dozer	300	0.65	2	390	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Dozer	440	0.65	2	572	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.093	0.504	1.079	0.005	0.056	0.041
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	5	N/A	320	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	1.235	6.725	14.384	0.063	0.747	0.553
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
Concrete Pump	50	0.74	1	37	8	0.0299	0.2394	0.2138	0.0004	0.0061	0.00544601	0.177	1.417	1.265	0.003	0.036	0.044

Air Quality Analysis Results

Peak Daily Emissions (lbs/day)	8.11	48.48	52.52	0.22	2.28	2.27
Total Project Emissions (tons)	0.531	3.176	3.440	0.015	0.149	0.149
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

$$Equip_{Emiss} = \frac{EF \cdot Time \cdot EngineHP \cdot LFwt}{(453.6 \cdot 2000)}$$

Where:
$Equip_{Emiss}$ = Construction Equipment emissions in tons per year
EF = Engine **emission factor** in grams per brake horsepower-hour
Time = Annual **operating time** in hours
EngineHP = **Engine brake horsepower** rating
LFwt = Time weighted engine **load factor** (fraction of full load), based on different engine operating modes

References

1. SCAQMD 2021a
2. SCAQMD 2021b
3. SCAQMD 2021c.

Air Quality Emissions Inventory and Analysis: Valley View Plan, Annual Emissions During Construction Years 14 - 16 - All Equipment Combined

Emissions Inventory

Emission Source Data						Emission Factors for Construction Equipment (lbs/hr) or (lbs/mile)[1,2,3]						Daily Emissions from Construction Activities (lbs/day)					
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [(1)]	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Worker vehicles	N/A	NA	30	NA	40	0.00048658	0.00397866	0.00035150	0.00001072	0.00009661	0.00006389	0.584	4.774	0.422	0.013	0.116	0.077
Water Truck	N/A	NA	1	NA	5	0.00090210	0.00457902	0.01031407	0.00004009	0.00052122	0.00039592	0.005	0.023	0.052	0.000	0.003	0.002
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.0544	0.2316	0.2705	0.0013	0.0094	0.00839835	0.126	0.537	0.628	0.003	0.022	0.019
Portable Generator	15	0.74	4	44.4	8	0.0109	0.0627	0.0768	0.0002	0.0032	0.00286136	0.259	1.486	1.819	0.004	0.076	0.068
Grader	135	0.41	1	55.35	8	0.0652	0.7261	0.3117	0.0014	0.0157	0.01394558	0.214	2.382	1.022	0.005	0.051	0.046
Hydraulic Excavator	100	0.38	1	38	8	0.0448	0.4942	0.2638	0.0009	0.0092	0.00820993	0.359	3.954	2.110	0.007	0.074	0.066
Hydraulic Excavator	500	0.38	1	190	8	0.0946	0.4495	0.3091	0.0023	0.0107	0.00950760	0.757	3.596	2.472	0.018	0.085	0.076
Hydromulcher	4	0.65	1	2.6	8	0.0118	0.0617	0.0737	0.0002	0.0029	0.00256237	0.061	0.321	0.383	0.001	0.015	0.020
Backhoe	120	0.37	1	44.4	8	0.0281	0.3379	0.1761	0.0006	0.0055	0.00490796	0.083	1.000	0.521	0.002	0.016	0.039
Front-End Loader	500	0.37	1	185	8	0.1034	0.4654	0.4455	0.0023	0.0164	0.01457596	0.306	1.378	1.319	0.007	0.048	0.117
Aerial Lift	50	0.31	1	15.5	8	0.0168	0.1351	0.1218	0.0003	0.0035	0.00308736	0.134	1.081	0.975	0.002	0.028	0.025
Roller	500	0.38	2	380	8	0.0920	0.4189	0.4752	0.0022	0.0174	0.01547069	0.757	6.702	7.603	0.034	0.278	0.248
Dozer	300	0.65	2	390	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Dozer	440	0.65	2	572	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.093	0.504	1.079	0.005	0.056	0.041
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	8	N/A	320	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	1.976	10.760	23.014	0.101	1.196	0.885
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
Concrete Pump	50	0.74	1	37	8	0.0299	0.2394	0.2138	0.0004	0.0061	0.00544601	0.177	1.417	1.265	0.003	0.036	0.044

Air Quality Analysis Results

Peak Daily Emissions (lbs/day)	8.85	52.52	61.15	0.26	2.73	2.60
Total Project Emissions (tons)	0.580	3.440	4.005	0.017	0.179	0.170
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	**--**	**No**	**--**	**--**	**No**

$$Equip_{Emiss} = \frac{EF \cdot Time \cdot EngineHP \cdot LFwt}{(453.6 \cdot 2000)}$$

Where:
$Equip_{Emiss}$ = Construction Equipment emissions in tons per year
EF = Engine **emission factor** in grams per brake horsepower-hour
$Time$ = Annual **operating time** in hours
$EngineHP$ = **Engine brake horsepower** rating
$LFwt$ = Time weighted engine **load factor** (fraction of full load), based on different engine operating modes

References

1. SCAQMD 2021a
2. SCAQMD 2021b
3. SCAQMD 2021c.

Green House Gas Analysis Results: Valley View Plan, Annual Emissions

Annual Emissions During Construction Years 1 - 2

Total CO_2e (lbs/day)	52285.48
Total Project CO_2e (Tons)	3424.699

Annual Emissions During Construction Years 3 - 4

Total CO_2e (lbs/day)	47883.82
Total Project CO_2e (Tons)	3136.39

Annual Emissions During Construction Years 5 - 7

Total CO_2e (lbs/day)	36879.66
Total Project CO_2e (Tons)	2415.618

Annual Emissions During Construction Years 8 - 10

Total CO_2e (lbs/day)	34678.83
Total Project CO_2e (Tons)	2271.464

Annual Emissions During Construction Years 11 - 13

Total CO_2e (lbs/day)	32478
Total Project CO_2e (Tons)	2127.309

Annual Emissions During Construction Years 14 - 16

Total CO_2e (lbs/day)	39080.5
Total Project CO_2e (Tons)	2559.772

Green House Gases Emissions Inventory and Analysis: Valley View Plan, Annual Emissions During Construction Years 1 - 2 - All Equipment Combined

GHG Emissions Inventory →

Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [1]	CO	CO_2	CH_4	NOx	CO	CO_2	CH_4	NO_X	CO_{2e}
Worker vehicles	N/A	NA	30	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	4.774	1332.239	0.049	0.422	1463.945
Water Truck	N/A	NA	1	NA	5	0.00457902	4.21483461	0.00004176	0.01031407	0.023	21.074	0.000	0.052	36.470
Hydraulic Self-Propelled Crane	250	0.65	1	162.5	8	0.2316	112	0.0049	0.2705	1.204	583.226	0.026	1.407	1004.267
Portable Generator	15	0.74	4	44.4	8	0.0627	10.2	0.0010	0.0768	1.486	241.718	0.023	1.819	785.781
Grader	135	0.41	1	55.35	8	0.7261	124	0.0059	0.3117	2.382	406.463	0.019	1.022	713.979
Hydraulic Excavator	100	0.38	1	38	8	0.4942	73.6	0.0040	0.2638	1.502	223.814	0.012	0.802	464.571
Hydraulic Excavator	500	0.38	1	190	8	0.4495	234	0.0085	0.3091	1.367	710.555	0.026	0.940	992.549
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Backhoe	120	0.37	1	44.4	8	0.3379	51.7	0.0025	0.1761	1.000	153.115	0.007	0.521	309.625
Front-End Loader	500	0.37	1	185	8	0.4654	237	0.0093	0.4455	1.378	701.545	0.028	1.319	1096.620
Aerial Lift	50	0.31	1	15.5	8	0.1351	19.6	0.0015	0.1218	0.335	48.640	0.004	0.302	139.114
Roller	500	0.38	2	380	8	0.4189	219	0.0083	0.4752	2.547	1332.135	0.050	2.889	2196.862
Dozer	300	0.65	2	390	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
Dozer	440	0.65	2	572	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
3/4 Ton Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	0.00420297	4.19349747	0.00003630	0.00898990	0.504	503.220	0.004	1.079	825.312
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	14	N/A	320	0.00420297	4.19349747	0.00003630	0.00898990	18.829	########	0.163	40.275	30811.638
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Concrete Pump	50	0.74	1	37	8	0.2394	34.3	0.0027	0.2138	1.417	203.262	0.016	1.265	582.185

Green House Gases Analysis Results

Total CO_2e (lbs/day)	52285.483
Total Project CO_2e (Tons)	3424.699

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
*e = equivalent
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

Green House Gases Emissions Inventory and Analysis: Valley View Plan, Annual Emissions During Construction Years 3 - 4 - All Equipment Combined

GHG Emissions Inventory →

Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day (1)	CO	CO_2	CH_4	NOx	CO	CO_2	CH_4	NO_X	CO_{2e}
Worker vehicles	N/A	NA	30	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	4.774	1332.239	0.049	0.422	1463.945
Water Truck	N/A	NA	1	NA	5	0.00457902	4.21483461	0.00004176	0.01031407	0.023	21.074	0.000	0.052	36.470
Hydraulic Self-Propelled Crane	250	0.65	1	162.5	8	0.2316	112	0.0049	0.2705	1.204	583.226	0.026	1.407	1004.267
Portable Generator	15	0.74	4	44.4	8	0.0627	10.2	0.0010	0.0768	1.486	241.718	0.023	1.819	785.781
Grader	135	0.41	1	55.35	8	0.7261	124	0.0059	0.3117	2.382	406.463	0.019	1.022	713.979
Hydraulic Excavator	100	0.38	1	38	8	0.4942	73.6	0.0040	0.2638	1.502	223.814	0.012	0.802	464.571
Hydraulic Excavator	500	0.38	1	190	8	0.4495	234	0.0085	0.3091	1.367	710.555	0.026	0.940	992.549
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Backhoe	120	0.37	1	44.4	8	0.3379	51.7	0.0025	0.1761	1.000	153.115	0.007	0.521	309.625
Front-End Loader	500	0.37	1	185	8	0.4654	237	0.0093	0.4455	1.378	701.545	0.028	1.319	1096.620
Aerial Lift	50	0.31	1	15.5	8	0.1351	19.6	0.0015	0.1218	0.335	48.640	0.004	0.302	139.114
Roller	500	0.38	2	380	8	0.4189	219	0.0083	0.4752	2.547	1332.135	0.050	2.889	2196.862
Dozer	300	0.65	2	390	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
Dozer	440	0.65	2	572	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
3/4 Ton Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	0.00420297	4.19349747	0.00003630	0.00898990	0.504	503.220	0.004	1.079	825.312
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	12	N/A	320	0.00420297	4.19349747	0.00003630	0.00898990	16.139	########	0.139	34.521	26409.976
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Concrete Pump	50	0.74	1	37	8	0.2394	34.3	0.0027	0.2138	1.417	203.262	0.016	1.265	582.185

Green House Gases Analysis Results

Total CO_2e (lbs/day)	47883.821
Total Project CO_2e (Tons)	3136.390

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
*e = equivalent
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

Green House Gases Emissions Inventory and Analysis: Valley View Plan, Annual Emissions During Construction Years 5 - 7 - All Equipment Combined

GHG Emissions Inventory →

Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [1]	CO	CO_2	CH_4	NOx	CO	CO_2	CH_4	NO_X	CO_{2e}
Worker vehicles	N/A	NA	30	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	4.774	1332.239	0.049	0.422	1463.945
Water Truck	N/A	NA	1	NA	5	0.00457902	4.21483461	0.00004176	0.01031407	0.023	21.074	0.000	0.052	36.470
Hydraulic Self-Propelled Crane	250	0.65	1	162.5	8	0.2316	112	0.0049	0.2705	1.204	583.226	0.026	1.407	1004.267
Portable Generator	15	0.74	4	44.4	8	0.0627	10.2	0.0010	0.0768	1.486	241.718	0.023	1.819	785.781
Grader	135	0.41	1	55.35	8	0.7261	124	0.0059	0.3117	2.382	406.463	0.019	1.022	713.979
Hydraulic Excavator	100	0.38	1	38	8	0.4942	73.6	0.0040	0.2638	1.502	223.814	0.012	0.802	464.571
Hydraulic Excavator	500	0.38	1	190	8	0.4495	234	0.0085	0.3091	1.367	710.555	0.026	0.940	992.549
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Backhoe	120	0.37	1	44.4	8	0.3379	51.7	0.0025	0.1761	1.000	153.115	0.007	0.521	309.625
Front-End Loader	500	0.37	1	185	8	0.4654	237	0.0093	0.4455	1.378	701.545	0.028	1.319	1096.620
Aerial Lift	50	0.31	1	15.5	8	0.1351	19.6	0.0015	0.1218	0.335	48.640	0.004	0.302	139.114
Roller	500	0.38	2	380	8	0.4189	219	0.0083	0.4752	2.547	1332.135	0.050	2.889	2196.862
Dozer	300	0.65	2	390	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
Dozer	440	0.65	2	572	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
3/4 Ton Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	0.00420297	4.19349747	0.00003630	0.00898990	0.504	503.220	0.004	1.079	825.312
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	7	N/A	320	0.00420297	4.19349747	0.00003630	0.00898990	9.415	9393.434	0.081	20.137	15405.819
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Concrete Pump	50	0.74	1	37	8	0.2394	34.3	0.0027	0.2138	1.417	203.262	0.016	1.265	582.185

Green House Gases Analysis Results

Total CO_2e (lbs/day)	36879.664
Total Project CO_2e (Tons)	2415.618

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
*e = equivalent
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

Green House Gases Emissions Inventory and Analysis: Valley View Plan, Annual Emissions During Construction Years 8 - 10 - All Equipment Combined

GHG Emissions Inventory →

Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [1]	CO	CO_2	CH_4	NOx	CO	CO_2	CH_4	NO_X	CO_{2e}
Worker vehicles	N/A	NA	30	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	4.774	1332.239	0.049	0.422	1463.945
Water Truck	N/A	NA	1	NA	5	0.00457902	4.21483461	0.00004176	0.01031407	0.023	21.074	0.000	0.052	36.470
Hydraulic Self-Propelled Crane	250	0.65	1	162.5	8	0.2316	112	0.0049	0.2705	1.204	583.226	0.026	1.407	1004.267
Portable Generator	15	0.74	4	44.4	8	0.0627	10.2	0.0010	0.0768	1.486	241.718	0.023	1.819	785.781
Grader	135	0.41	1	55.35	8	0.7261	124	0.0059	0.3117	2.382	406.463	0.019	1.022	713.979
Hydraulic Excavator	100	0.38	1	38	8	0.4942	73.6	0.0040	0.2638	1.502	223.814	0.012	0.802	464.571
Hydraulic Excavator	500	0.38	1	190	8	0.4495	234	0.0085	0.3091	1.367	710.555	0.026	0.940	992.549
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Backhoe	120	0.37	1	44.4	8	0.3379	51.7	0.0025	0.1761	1.000	153.115	0.007	0.521	309.625
Front-End Loader	500	0.37	1	185	8	0.4654	237	0.0093	0.4455	1.378	701.545	0.028	1.319	1096.620
Aerial Lift	50	0.31	1	15.5	8	0.1351	19.6	0.0015	0.1218	0.335	48.640	0.004	0.302	139.114
Roller	500	0.38	2	380	8	0.4189	219	0.0083	0.4752	2.547	1332.135	0.050	2.889	2196.862
Dozer	300	0.65	2	390	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
Dozer	440	0.65	2	572	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
3/4 Ton Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	0.00420297	4.19349747	0.00003630	0.00898990	0.504	503.220	0.004	1.079	825.312
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	6	N/A	320	0.00420297	4.19349747	0.00003630	0.00898990	8.070	8051.515	0.070	17.261	13204.988
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Concrete Pump	50	0.74	1	37	8	0.2394	34.3	0.0027	0.2138	1.417	203.262	0.016	1.265	582.185

Green House Gases Analysis Results

Total CO_2e (lbs/day)	34678.833
Total Project CO_2e (Tons)	2271.464

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
*e = equivalent
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

Green House Gases Emissions Inventory and Analysis: Valley View Plan, Annual Emissions During Construction Years 11 - 13 - All Equipment Combined

GHG Emissions Inventory →

Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [1]	CO	CO_2	CH_4	NOx	CO	CO_2	CH_4	NO_X	CO_{2e}
Worker vehicles	N/A	NA	30	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	4.774	1332.239	0.049	0.422	1463.945
Water Truck	N/A	NA	1	NA	5	0.00457902	4.21483461	0.00004176	0.01031407	0.023	21.074	0.000	0.052	36.470
Hydraulic Self-Propelled Crane	250	0.65	1	162.5	8	0.2316	112	0.0049	0.2705	1.204	583.226	0.026	1.407	1004.267
Portable Generator	15	0.74	4	44.4	8	0.0627	10.2	0.0010	0.0768	1.486	241.718	0.023	1.819	785.781
Grader	135	0.41	1	55.35	8	0.7261	124	0.0059	0.3117	2.382	406.463	0.019	1.022	713.979
Hydraulic Excavator	100	0.38	1	38	8	0.4942	73.6	0.0040	0.2638	1.502	223.814	0.012	0.802	464.571
Hydraulic Excavator	500	0.38	1	190	8	0.4495	234	0.0085	0.3091	1.367	710.555	0.026	0.940	992.549
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Backhoe	120	0.37	1	44.4	8	0.3379	51.7	0.0025	0.1761	1.000	153.115	0.007	0.521	309.625
Front-End Loader	500	0.37	1	185	8	0.4654	237	0.0093	0.4455	1.378	701.545	0.028	1.319	1096.620
Aerial Lift	50	0.31	1	15.5	8	0.1351	19.6	0.0015	0.1218	0.335	48.640	0.004	0.302	139.114
Roller	500	0.38	2	380	8	0.4189	219	0.0083	0.4752	2.547	1332.135	0.050	2.889	2196.862
Dozer	300	0.65	2	390	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
Dozer	440	0.65	2	572	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
3/4 Ton Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	0.00420297	4.19349747	0.00003630	0.00898990	0.504	503.220	0.004	1.079	825.312
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	5	N/A	320	0.00420297	4.19349747	0.00003630	0.00898990	6.725	6709.596	0.058	14.384	11004.157
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Concrete Pump	50	0.74	1	37	8	0.2394	34.3	0.0027	0.2138	1.417	203.262	0.016	1.265	582.185

Green House Gases Analysis Results

Total CO_2e (lbs/day)	32478.002
Total Project CO_2e (Tons)	2127.309

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
*e = equivalent
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

Green House Gases Emissions Inventory and Analysis: Valley View Plan, Annual Emissions During Construction Years 14 - 16 - All Equipment Combined

GHG Emissions Inventory →

Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [1]	CO	CO_2	CH_4	NOx	CO	CO_2	CH_4	NO_X	CO_{2e}
Worker vehicles	N/A	NA	30	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	4.774	1332.239	0.049	0.422	1463.945
Water Truck	N/A	NA	1	NA	5	0.00457902	4.21483461	0.00004176	0.01031407	0.023	21.074	0.000	0.052	36.470
Hydraulic Self-Propelled Crane	250	0.65	1	162.5	8	0.2316	112	0.0049	0.2705	1.204	583.226	0.026	1.407	1004.267
Portable Generator	15	0.74	4	44.4	8	0.0627	10.2	0.0010	0.0768	1.486	241.718	0.023	1.819	785.781
Grader	135	0.41	1	55.35	8	0.7261	124	0.0059	0.3117	2.382	406.463	0.019	1.022	713.979
Hydraulic Excavator	100	0.38	1	38	8	0.4942	73.6	0.0040	0.2638	1.502	223.814	0.012	0.802	464.571
Hydraulic Excavator	500	0.38	1	190	8	0.4495	234	0.0085	0.3091	1.367	710.555	0.026	0.940	992.549
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Backhoe	120	0.37	1	44.4	8	0.3379	51.7	0.0025	0.1761	1.000	153.115	0.007	0.521	309.625
Front-End Loader	500	0.37	1	185	8	0.4654	237	0.0093	0.4455	1.378	701.545	0.028	1.319	1096.620
Aerial Lift	50	0.31	1	15.5	8	0.1351	19.6	0.0015	0.1218	0.335	48.640	0.004	0.302	139.114
Roller	500	0.38	2	380	8	0.4189	219	0.0083	0.4752	2.547	1332.135	0.050	2.889	2196.862
Dozer	300	0.65	2	390	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
Dozer	440	0.65	2	572	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
3/4 Ton Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	0.00420297	4.19349747	0.00003630	0.00898990	0.504	503.220	0.004	1.079	825.312
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	8	N/A	320	0.00420297	4.19349747	0.00003630	0.00898990	10.760	########	0.093	23.014	17606.651
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Concrete Pump	50	0.74	1	37	8	0.2394	34.3	0.0027	0.2138	1.417	203.262	0.016	1.265	582.185

Green House Gases Analysis Results

Total CO_2e (lbs/day)	39080.496
Total Project CO_2e (Tons)	2559.772

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
*e = equivalent
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

Air Quality Analysis Results: Bypass Plan, Annual Emissions

Annual Emissions During Construction Years 1 - 4

	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	11.389	62.592	82.775	0.363	3.855	3.438
Total Project Emissions (tons)	0.746	4.100	5.422	0.024	0.252	0.225
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

Annual Emissions During Construction Years 5 - 7

	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	7.931	43.763	42.500	0.186	1.762	1.889
Total Project Emissions (Tons)	0.520	2.866	2.784	0.012	0.115	0.124
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

Annual Emissions During Construction Years 8 - 10

	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	8.672	47.798	51.130	0.224	2.210	2.221
Total Project Emissions (tons)	0.568	3.131	3.349	0.015	0.145	0.145
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

Annual Emissions During Construction Year 11 - 13

	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	9.907	54.523	65.514	0.287	2.958	2.774
Total Project Emissions (tons)	0.649	3.571	4.291	0.019	0.194	0.182
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

Annual Emissions During Construction Years 14 - 16

	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	7.931	43.763	42.500	0.186	1.762	1.889
Total Project Emissions (tons)	0.520	2.866	2.784	0.012	0.115	0.124
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

Air Quality Emissions Inventory and Analysis: Bypass Plan, Annual Emissions During Construction Years 1 - 4 - All Equipment Combined

Emissions Inventory →

Emission Source Data						Emission Factors for Construction Equipment (lbs/hr) or (lbs/mile)[1,2,3]						Daily Emissions from Construction Activities (lbs/day)					
Construction Activity/Equipment Type	**Power Rating (Hp)**	**Load Factor**	**# Active**	**Hourly Hp-Hrs**	**Hrs per Day Or Miles Per Day [1]**	**ROG**	**CO**	**NOx**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**ROG**	**CO**	**NOx**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Worker vehicles	N/A	NA	30	NA	40	0.00048658	0.00397866	0.00035150	0.00001072	0.00009661	0.00006389	0.584	4.774	0.422	0.013	0.116	0.077
Water Truck	N/A	NA	1	NA	5	0.00090210	0.00457902	0.01031407	0.00004009	0.00052122	0.00039592	0.005	0.023	0.052	0.000	0.003	0.002
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.0544	0.2316	0.2705	0.0013	0.0094	0.00839835	0.126	0.537	0.628	0.003	0.022	0.019
Portable Generator	15	0.74	2	22.2	8	0.0109	0.0627	0.0768	0.0002	0.0032	0.00286136	0.129	0.743	0.909	0.002	0.038	0.034
Grader	135	0.41	1	55.35	8	0.0652	0.7261	0.3117	0.0014	0.0157	0.01394558	0.214	2.382	1.022	0.005	0.051	0.046
Hydraulic Excavator	100	0.38	1	38	8	0.0448	0.4942	0.2638	0.0009	0.0092	0.00820993	0.359	3.954	2.110	0.007	0.074	0.066
Hydraulic Excavator	500	0.38	1	190	8	0.0946	0.4495	0.3091	0.0023	0.0107	0.00950760	0.757	3.596	2.472	0.018	0.085	0.076
Hydromulcher	4	0.65	1	2.6	8	0.0118	0.0617	0.0737	0.0002	0.0029	0.00256237	0.061	0.321	0.383	0.001	0.015	0.020
Backhoe	120	0.37	1	44.4	8	0.0281	0.3379	0.1761	0.0006	0.0055	0.00490796	0.083	1.000	0.521	0.002	0.016	0.039
Front-End Loader	500	0.37	1	185	8	0.1034	0.4654	0.4455	0.0023	0.0164	0.01457596	0.306	1.378	1.319	0.007	0.048	0.117
Aerial Lift	50	0.31	1	15.5	8	0.0168	0.1351	0.1218	0.0003	0.0035	0.00308736	0.134	1.081	0.975	0.002	0.028	0.025
Roller	500	0.38	1	190	8	0.0920	0.4189	0.4752	0.0022	0.0174	0.01547069	0.757	3.351	3.801	0.017	0.139	0.124
Dozer	300	0.65	2	390	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Dozer	440	0.65	2	572	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	5	N/A	30	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.116	0.630	1.348	0.006	0.070	0.052
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	16	N/A	320	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	3.952	21.519	46.028	0.202	2.392	1.770
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.039	0.210	0.449	0.002	0.023	0.017
Concrete Pump	50	0.74	1	37	8	0.0299	0.2394	0.2138	0.0004	0.0061	0.00544601	0.177	1.417	1.265	0.003	0.036	0.044
Asphault Pulverizer	250	0.85	1	212.5	8	0.0967	0.4768	0.4357	0.0028	0.0134	0.01194229	0.657	3.242	2.963	0.019	0.091	0.096

Air Quality Analysis Results

Peak Daily Emissions (lbs/day)	11.39	62.59	82.77	0.36	3.85	3.44
Total Project Emissions (tons)	0.746	4.100	5.422	0.024	0.252	0.225
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

$$Equip_{Emiss} = \frac{EF \cdot Time \cdot EngineHP \cdot LFwt}{(453.6 \cdot 2000)}$$

Where:
$Equip_{Emiss}$ = Construction Equipment emissions in tons per year
EF = Engine **emission factor** in grams per brake horsepower-hour
$Time$ = Annual **operating time** in hours
$EngineHP$ = **Engine brake horsepower** rating
$LFwt$ = Time weighted engine **load factor** (fraction of full load), based on different engine operating modes

References

1. SCAQMD 2021a
2. SCAQMD 2021b
3. SCAQMD 2021c.

Air Quality Emissions Inventory and Analysis: Bypass Plan, Annual Emissions During Construction Years 5 - 7 - All Equipment Combined

Emissions Inventory →

Emission Source Data						Emission Factors for Construction Equipment (lbs/hr) or (lbs/mile)[1,2,3]						Daily Emissions from Construction Activities (lbs/day)					
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [1]	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Worker vehicles	N/A	NA	30	NA	40	0.00048658	0.00397866	0.00035150	0.00001072	0.00009661	0.00006389	0.584	4.774	0.422	0.013	0.116	0.077
Water Truck	N/A	NA	1	NA	5	0.00090210	0.00457902	0.01031407	0.00004009	0.00052122	0.00039592	0.005	0.023	0.052	0.000	0.003	0.002
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.0544	0.2316	0.2705	0.0013	0.0094	0.00839835	0.126	0.537	0.628	0.003	0.022	0.019
Portable Generator	15	0.74	2	22.2	8	0.0109	0.0627	0.0768	0.0002	0.0032	0.00286136	0.129	0.743	0.909	0.002	0.038	0.034
Grader	135	0.41	1	55.35	8	0.0652	0.7261	0.3117	0.0014	0.0157	0.01394558	0.214	2.382	1.022	0.005	0.051	0.046
Hydraulic Excavator	100	0.38	1	38	8	0.0448	0.4942	0.2638	0.0009	0.0092	0.00820993	0.359	3.954	2.110	0.007	0.074	0.066
Hydraulic Excavator	500	0.38	1	190	8	0.0946	0.4495	0.3091	0.0023	0.0107	0.00950760	0.757	3.596	2.472	0.018	0.085	0.076
Hydromulcher	4	0.65	1	2.6	8	0.0118	0.0617	0.0737	0.0002	0.0029	0.00256237	0.061	0.321	0.383	0.001	0.015	0.020
Backhoe	120	0.37	1	44.4	8	0.0281	0.3379	0.1761	0.0006	0.0055	0.00490796	0.083	1.000	0.521	0.002	0.016	0.039
Front-End Loader	500	0.37	1	185	8	0.1034	0.4654	0.4455	0.0023	0.0164	0.01457596	0.306	1.378	1.319	0.007	0.048	0.117
Aerial Lift	50	0.31	1	15.5	8	0.0168	0.1351	0.1218	0.0003	0.0035	0.00308736	0.134	1.081	0.975	0.002	0.028	0.025
Roller	500	0.38	1	190	8	0.0920	0.4189	0.4752	0.0022	0.0174	0.01547069	0.757	3.351	3.801	0.017	0.139	0.124
Dozer	300	0.65	2	390	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Dozer	440	0.65	2	572	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	5	N/A	30	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.116	0.630	1.348	0.006	0.070	0.052
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	2	N/A	320	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.494	2.690	5.754	0.025	0.299	0.221
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.039	0.210	0.449	0.002	0.023	0.017
Concrete Pump	50	0.74	1	37	8	0.0299	0.2394	0.2138	0.0004	0.0061	0.00544601	0.177	1.417	1.265	0.003	0.036	0.044
Asphault Pulverizer	250	0.85	1	212.5	8	0.0967	0.4768	0.4357	0.0028	0.0134	0.01194229	0.657	3.242	2.963	0.019	0.091	0.096
Air Quality Analysis Results											Peak Daily Emissions (lbs/day)	7.93	43.76	42.50	0.19	1.76	1.89
											Total Project Emissions (tons)	0.520	2.866	2.784	0.012	0.115	0.124
											General Conformity Threshold (tons/year)	100	--	100	--	--	100
											Exceeds Threshold?	**No**	--	**No**	--	--	**No**

$$Equip_{Emiss} = \frac{EF \cdot Time \cdot EngineHP \cdot LFwt}{(453.6 \cdot 2000)}$$

Where:
$Equip_{Emiss}$ = Construction Equipment emissions in tons per year
EF = Engine **emission factor** in grams per brake horsepower-hour
Time = Annual **operating time** in hours
EngineHP = **Engine brake horsepower** rating
LFwt = Time weighted engine **load factor** (fraction of full load), based on different engine operating modes

References

1. SCAQMD 2021a
2. SCAQMD 2021b
3. SCAQMD 2021c.

Air Quality Emissions Inventory and Analysis: Bypass Plan, Annual Emissions During Construction Years 8 - 10 - All Equipment Combined

Emissions Inventory →

Emission Source Data						Emission Factors for Construction Equipment (lbs/hr) or (lbs/mile)[1,2,3]						Daily Emissions from Construction Activities (lbs/day)					
Construction Activity/Equipment Type	**Power Rating (Hp)**	**Load Factor**	**# Active**	**Hourly Hp-Hrs**	**Hrs per Day Or Miles Per Day [1]**	**ROG**	**CO**	**NOx**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**ROG**	**CO**	**NOx**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Worker vehicles	N/A	NA	30	NA	40	0.00048658	0.00397866	0.00035150	0.00001072	0.00009661	0.00006389	0.584	4.774	0.422	0.013	0.116	0.077
Water Truck	N/A	NA	1	NA	5	0.00090210	0.00457902	0.01031407	0.00004009	0.00052122	0.00039592	0.005	0.023	0.052	0.000	0.003	0.002
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.0544	0.2316	0.2705	0.0013	0.0094	0.00839835	0.126	0.537	0.628	0.003	0.022	0.019
Portable Generator	15	0.74	2	22.2	8	0.0109	0.0627	0.0768	0.0002	0.0032	0.00286136	0.129	0.743	0.909	0.002	0.038	0.034
Grader	135	0.41	1	55.35	8	0.0652	0.7261	0.3117	0.0014	0.0157	0.01394558	0.214	2.382	1.022	0.005	0.051	0.046
Hydraulic Excavator	100	0.38	1	38	8	0.0448	0.4942	0.2638	0.0009	0.0092	0.00820993	0.359	3.954	2.110	0.007	0.074	0.066
Hydraulic Excavator	500	0.38	1	190	8	0.0946	0.4495	0.3091	0.0023	0.0107	0.00950760	0.757	3.596	2.472	0.018	0.085	0.076
Hydromulcher	4	0.65	1	2.6	8	0.0118	0.0617	0.0737	0.0002	0.0029	0.00256237	0.061	0.321	0.383	0.001	0.015	0.020
Backhoe	120	0.37	1	44.4	8	0.0281	0.3379	0.1761	0.0006	0.0055	0.00490796	0.083	1.000	0.521	0.002	0.016	0.039
Front-End Loader	500	0.37	1	185	8	0.1034	0.4654	0.4455	0.0023	0.0164	0.01457596	0.306	1.378	1.319	0.007	0.048	0.117
Aerial Lift	50	0.31	1	15.5	8	0.0168	0.1351	0.1218	0.0003	0.0035	0.00308736	0.134	1.081	0.975	0.002	0.028	0.025
Roller	500	0.38	1	190	8	0.0920	0.4189	0.4752	0.0022	0.0174	0.01547069	0.757	3.351	3.801	0.017	0.139	0.124
Dozer	300	0.65	2	390	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Dozer	440	0.65	2	572	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	5	N/A	30	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.116	0.630	1.348	0.006	0.070	0.052
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	5	N/A	320	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	1.235	6.725	14.384	0.063	0.747	0.553
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.039	0.210	0.449	0.002	0.023	0.017
Concrete Pump	50	0.74	1	37	8	0.0299	0.2394	0.2138	0.0004	0.0061	0.00544601	0.177	1.417	1.265	0.003	0.036	0.044
Asphault Pulverizer	250	0.85	1	212.5	8	0.0967	0.4768	0.4357	0.0028	0.0134	0.01194229	0.657	3.242	2.963	0.019	0.091	0.096
Air Quality Analysis Results											Peak Daily Emissions (lbs/day)	8.67	47.80	51.13	0.22	2.21	2.22
											Total Project Emissions (tons)	0.568	3.131	3.349	0.015	0.145	0.145
											General Conformity Threshold (tons/year)	100	--	100	--	--	100
											Exceeds Threshold?	**No**	--	**No**	--	--	**No**

$$Equip_{Emiss} = \frac{EF \cdot Time \cdot EngineHP \cdot LFwt}{(453.6 \cdot 2000)}$$

Where:
$Equip_{Emiss}$ = Construction Equipment emissions in tons per year
EF = Engine **emission factor** in grams per brake horsepower-hour
$Time$ = Annual **operating time** in hours
$EngineHP$ = **Engine brake horsepower** rating
$LFwt$ = Time weighted engine **load factor** (fraction of full load), based on different engine

References

1. SCAQMD 2021a
2. SCAQMD 2021b
3. SCAQMD 2021c.

Air Quality Emissions Inventory and Analysis: Bypass Plan, Annual Emissions During Construction Years 11 - 13 - All Equipment Combined

Emissions Inventory →

Emission Source Data						Emission Factors for Construction Equipment (lbs/hr) or (lbs/mile)[1,2,3]						Daily Emissions from Construction Activities (lbs/day)					
Construction Activity/Equipment Type	**Power Rating (Hp)**	**Load Factor**	**# Active**	**Hourly Hp-Hrs**	**Hrs per Day Or Miles Per Day [1]**	**ROG**	**CO**	**NOx**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**ROG**	**CO**	**NOx**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Worker vehicles	N/A	NA	30	NA	40	0.00048658	0.00397866	0.00035150	0.00001072	0.00009661	0.00006389	0.584	4.774	0.422	0.013	0.116	0.077
Water Truck	N/A	NA	1	NA	5	0.00090210	0.00457902	0.01031407	0.00004009	0.00052122	0.00039592	0.005	0.023	0.052	0.000	0.003	0.002
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.0544	0.2316	0.2705	0.0013	0.0094	0.00839835	0.126	0.537	0.628	0.003	0.022	0.019
Portable Generator	15	0.74	2	22.2	8	0.0109	0.0627	0.0768	0.0002	0.0032	0.00286136	0.129	0.743	0.909	0.002	0.038	0.034
Grader	135	0.41	1	55.35	8	0.0652	0.7261	0.3117	0.0014	0.0157	0.01394558	0.214	2.382	1.022	0.005	0.051	0.046
Hydraulic Excavator	100	0.38	1	38	8	0.0448	0.4942	0.2638	0.0009	0.0092	0.00820993	0.359	3.954	2.110	0.007	0.074	0.066
Hydraulic Excavator	500	0.38	1	190	8	0.0946	0.4495	0.3091	0.0023	0.0107	0.00950760	0.757	3.596	2.472	0.018	0.085	0.076
Hydromulcher	4	0.65	1	2.6	8	0.0118	0.0617	0.0737	0.0002	0.0029	0.00256237	0.061	0.321	0.383	0.001	0.015	0.020
Backhoe	120	0.37	1	44.4	8	0.0281	0.3379	0.1761	0.0006	0.0055	0.00490796	0.083	1.000	0.521	0.002	0.016	0.039
Front-End Loader	500	0.37	1	185	8	0.1034	0.4654	0.4455	0.0023	0.0164	0.01457596	0.306	1.378	1.319	0.007	0.048	0.117
Aerial Lift	50	0.31	1	15.5	8	0.0168	0.1351	0.1218	0.0003	0.0035	0.00308736	0.134	1.081	0.975	0.002	0.028	0.025
Roller	500	0.38	1	190	8	0.0920	0.4189	0.4752	0.0022	0.0174	0.01547069	0.757	3.351	3.801	0.017	0.139	0.124
Dozer	300	0.65	2	390	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Dozer	440	0.65	2	572	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	5	N/A	30	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.116	0.630	1.348	0.006	0.070	0.052
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	10	N/A	320	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	2.470	13.449	28.768	0.126	1.495	1.106
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.039	0.210	0.449	0.002	0.023	0.017
Concrete Pump	50	0.74	1	37	8	0.0299	0.2394	0.2138	0.0004	0.0061	0.00544601	0.177	1.417	1.265	0.003	0.036	0.044
Asphault Pulverizer	250	0.85	1	212.5	8	0.0967	0.4768	0.4357	0.0028	0.0134	0.01194229	0.657	3.242	2.963	0.019	0.091	0.096

Air Quality Analysis Results

Peak Daily Emissions (lbs/day)	9.91	54.52	65.51	0.29	2.96	2.77
Total Project Emissions (tons)	0.649	3.571	4.291	0.019	0.194	0.182
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

$$Equip_{Emiss} = \frac{EF \cdot Time \cdot EngineHP \cdot LFwt}{(453.6 \cdot 2000)}$$

Where:
$Equip_{Emiss}$ = Construction Equipment emissions in tons per year
EF = Engine **emission factor** in grams per brake horsepower-hour
$Time$ = Annual **operating time** in hours
$EngineHP$ = **Engine brake horsepower** rating
$LFwt$ = Time weighted engine **load factor** (fraction of full load), based on different engine

References

1. SCAQMD 2021a
2. SCAQMD 2021b
3. SCAQMD 2021c.

Air Quality Emissions Inventory and Analysis: Bypass Plan, Annual Emissions During Construction Years 14 - 16 - All Equipment Combined

Emissions Inventory →

Emission Source Data						Emission Factors for Construction Equipment (lbs/hr) or (lbs/mile)[1,2,3]						Daily Emissions from Construction Activities (lbs/day)					
Construction Activity/Equipment Type	**Power Rating (Hp)**	**Load Factor**	**# Active**	**Hourly Hp-Hrs**	**Hrs per Day Or Miles Per Day [1]**	**ROG**	**CO**	**NOx**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**ROG**	**CO**	**NOx**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Worker vehicles	N/A	NA	30	NA	40	0.00048658	0.00397866	0.00035150	0.00001072	0.00009661	0.00006389	0.584	4.774	0.422	0.013	0.116	0.077
Water Truck	N/A	NA	1	NA	5	0.00090210	0.00457902	0.01031407	0.00004009	0.00052122	0.00039592	0.005	0.023	0.052	0.000	0.003	0.002
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.0544	0.2316	0.2705	0.0013	0.0094	0.00839835	0.126	0.537	0.628	0.003	0.022	0.019
Portable Generator	15	0.74	2	22.2	8	0.0109	0.0627	0.0768	0.0002	0.0032	0.00286136	0.129	0.743	0.909	0.002	0.038	0.034
Grader	135	0.41	1	55.35	8	0.0652	0.7261	0.3117	0.0014	0.0157	0.01394558	0.214	2.382	1.022	0.005	0.051	0.046
Hydraulic Excavator	100	0.38	1	38	8	0.0448	0.4942	0.2638	0.0009	0.0092	0.00820993	0.359	3.954	2.110	0.007	0.074	0.066
Hydraulic Excavator	500	0.38	1	190	8	0.0946	0.4495	0.3091	0.0023	0.0107	0.00950760	0.757	3.596	2.472	0.018	0.085	0.076
Hydromulcher	4	0.65	1	2.6	8	0.0118	0.0617	0.0737	0.0002	0.0029	0.00256237	0.061	0.321	0.383	0.001	0.015	0.020
Backhoe	120	0.37	1	44.4	8	0.0281	0.3379	0.1761	0.0006	0.0055	0.00490796	0.083	1.000	0.521	0.002	0.016	0.039
Front-End Loader	500	0.37	1	185	8	0.1034	0.4654	0.4455	0.0023	0.0164	0.01457596	0.306	1.378	1.319	0.007	0.048	0.117
Aerial Lift	50	0.31	1	15.5	8	0.0168	0.1351	0.1218	0.0003	0.0035	0.00308736	0.134	1.081	0.975	0.002	0.028	0.025
Roller	500	0.38	1	190	8	0.0920	0.4189	0.4752	0.0022	0.0174	0.01547069	0.757	3.351	3.801	0.017	0.139	0.124
Dozer	300	0.65	2	390	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Dozer	440	0.65	2	572	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.031	0.168	0.360	0.002	0.019	0.014
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	5	N/A	30	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.116	0.630	1.348	0.006	0.070	0.052
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	2	N/A	320	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.494	2.690	5.754	0.025	0.299	0.221
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.039	0.210	0.449	0.002	0.023	0.017
Concrete Pump	50	0.74	1	37	8	0.0299	0.2394	0.2138	0.0004	0.0061	0.00544601	0.177	1.417	1.265	0.003	0.036	0.044
Asphault Pulverizer	250	0.85	1	212.5	8	0.0967	0.4768	0.4357	0.0028	0.0134	0.01194229	0.657	3.242	2.963	0.019	0.091	0.096
											Peak Daily Emissions (lbs/day)	7.93	43.76	42.50	0.19	1.76	1.89
Air Quality Analysis Results											Total Project Emissions (tons)	0.520	2.866	2.784	0.012	0.115	0.124
											General Conformity Threshold (tons/year)	100	--	100	--	--	100
											Exceeds Threshold?	**No**	--	**No**	--	--	**No**

$$Equip_{Emiss} = \frac{EF \cdot Time \cdot EngineHP \cdot LFwt}{(453.6 \cdot 2000)}$$

Where:
$Equip_{Emiss}$ = Construction Equipment emissions in tons per year
EF = Engine **emission factor** in grams per brake horsepower-hour
$Time$ = Annual **operating time** in hours
$EngineHP$ = **Engine brake horsepower** rating
$LFwt$ = Time weighted engine **load factor** (fraction of full load), based on different engine

References

1. SCAQMD 2021a
2. SCAQMD 2021b
3. SCAQMD 2021c.

Green House Gas Analysis Results: Bypass Plan, Annual Emissions

Annual Emissions During Construction Years 1 - 4

Total CO_2e (lbs/day)	57465.15
Total Project CO_2e (Tons)	3763.967

Annual Emissions During Construction Years 5 - 7

Total CO_2e (lbs/day)	27209.72
Total Project CO_2e (Tons)	1782.237

Annual Emissions During Construction Years 8 - 10

Total CO_2e (lbs/day)	33812.21
Total Project CO_2e (Tons)	2214.7

Annual Emissions During Construction Years 11 - 13

Total CO_2e (lbs/day)	44816.37
Total Project CO_2e (Tons)	2935.472

Annual Emissions During Construction Years 14 - 16

Total CO_2e (lbs/day)	27209.72
Total Project CO_2e (Tons)	1782.237

Green House Gases Emissions Inventory and Analysis: Bypass Plan, Annual Emissions During Construction Years 1 - 4 - All Equipment Combined

GHG Emissions Inventory

Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [1]	CO	CO_2	CH_4	NOx	CO	CO_2	CH_4	NO_X	CO_{2e}
Worker vehicles	N/A	NA	30	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	4.774	1332.239	0.049	0.422	1463.945
Water Truck	N/A	NA	1	NA	5	0.00457902	4.21483461	0.00004176	0.01031407	0.023	21.074	0.000	0.052	36.470
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.2316	112	0.0049	0.2705	0.537	260.209	0.011	0.628	448.058
Portable Generator	15	0.74	2	22.2	8	0.0627	10.2	0.0010	0.0768	0.743	120.859	0.012	0.909	392.890
Grader	135	0.41	1	55.35	8	0.7261	124	0.0059	0.3117	2.382	406.463	0.019	1.022	713.979
Hydraulic Excavator	100	0.38	1	38	8	0.4942	73.6	0.0040	0.2638	1.502	223.814	0.012	0.802	464.571
Hydraulic Excavator	500	0.38	1	190	8	0.4495	234	0.0085	0.3091	1.367	710.555	0.026	0.940	992.549
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Backhoe	120	0.37	1	44.4	8	0.3379	51.7	0.0025	0.1761	1.000	153.115	0.007	0.521	309.625
Front-End Loader	500	0.37	1	185	8	0.4654	237	0.0093	0.4455	1.378	701.545	0.028	1.319	1096.620
Aerial Lift	50	0.31	1	15.5	8	0.1351	19.6	0.0015	0.1218	0.335	48.640	0.004	0.302	139.114
Roller	500	0.38	1	190	8	0.4189	219	0.0083	0.4752	1.273	666.067	0.025	1.444	1098.431
Dozer	300	0.65	2	390	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
Dozer	440	0.65	2	572	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
3/4 Ton Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	5	N/A	30	0.00420297	4.19349747	0.00003630	0.00898990	0.630	629.025	0.005	1.348	1031.640
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	16	N/A	320	0.00420297	4.19349747	0.00003630	0.00898990	21.519	21470.707	0.186	46.028	35213.301
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.210	209.675	0.002	0.449	343.880
Concrete Pump	50	0.74	1	37	8	0.2394	34.3	0.0027	0.2138	1.417	203.262	0.016	1.265	582.185
Asphault Pulverizer	250	0.85	1	212.5	8	0.4768	245	0.0087	0.4357	3.242	1662.820	0.059	2.963	2550.429

GHG Analysis Results

Total CO2e (lbs/day)	57465.148
Total Project CO2e (tons)	3763.967

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
*e = equivalent
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

Green House Gases Emissions Inventory and Analysis: Bypass Plan, Annual Emissions During Construction Years 5 - 7 - All Equipment Combined

GHG Emissions Inventory

Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [1]	CO	CO_2	CH_4	NOx	CO	CO_2	CH_4	NO_X	CO_{2e}
Worker vehicles	N/A	NA	30	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	4.774	1332.239	0.049	0.422	1463.945
Water Truck	N/A	NA	1	NA	5	0.00457902	4.21483461	0.00004176	0.01031407	0.023	21.074	0.000	0.052	36.470
Hydraulic Self-Propelled Crane	250	0.65	1	162.5	8	0.2316	112	0.0049	0.2705	1.204	583.226	0.026	1.407	1004.267
Portable Generator	15	0.74	2	22.2	8	0.0627	10.2	0.0010	0.0768	0.743	120.859	0.012	0.909	392.890
Grader	135	0.41	1	55.35	8	0.7261	124	0.0059	0.3117	2.382	406.463	0.019	1.022	713.979
Hydraulic Excavator	100	0.38	1	38	8	0.4942	73.6	0.0040	0.2638	1.502	223.814	0.012	0.802	464.571
Hydraulic Excavator	500	0.38	1	190	8	0.4495	234	0.0085	0.3091	1.367	710.555	0.026	0.940	992.549
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Backhoe	120	0.37	1	44.4	8	0.3379	51.7	0.0025	0.1761	1.000	153.115	0.007	0.521	309.625
Front-End Loader	500	0.37	1	185	8	0.4654	237	0.0093	0.4455	1.378	701.545	0.028	1.319	1096.620
Aerial Lift	50	0.31	1	15.5	8	0.1351	19.6	0.0015	0.1218	0.335	48.640	0.004	0.302	139.114
Roller	500	0.38	1	190	8	0.4189	219	0.0083	0.4752	1.273	666.067	0.025	1.444	1098.431
Dozer	300	0.65	2	390	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
Dozer	440	0.65	2	572	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
3/4 Ton Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	5	N/A	30	0.00420297	4.19349747	0.00003630	0.00898990	0.630	629.025	0.005	1.348	1031.640
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	2	N/A	320	0.00420297	4.19349747	0.00003630	0.00898990	2.690	2683.838	0.023	5.754	4401.663
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.210	209.675	0.002	0.449	343.880
Concrete Pump	50	0.74	1	37	8	0.2394	34.3	0.0027	0.2138	1.417	203.262	0.016	1.265	582.185
Asphault Pulverizer	250	0.85	1	212.5	8	0.4768	245	0.0087	0.4357	3.242	1662.820	0.059	2.963	2550.429

GHG Analysis Results

Total CO2e (lbs/day)	27209.719
Total Project CO2e (tons)	1782.237

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
*e = equivalent
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

Green House Gases Emissions Inventory and Analysis: Bypass Plan, Annual Emissions During Construction Years 8 - 10 - All Equipment Combined

GHG Emissions Inventory

Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [1]	CO	CO_2	CH_4	NOx	CO	CO_2	CH_4	NO_X	CO_{2e}
Worker vehicles	N/A	NA	30	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	4.774	1332.239	0.049	0.422	1463.945
Water Truck	N/A	NA	1	NA	5	0.00457902	4.21483461	0.00004176	0.01031407	0.023	21.074	0.000	0.052	36.470
Hydraulic Self-Propelled Crane	250	0.65	1	162.5	8	0.2316	112	0.0049	0.2705	1.204	583.226	0.026	1.407	1004.267
Portable Generator	15	0.74	2	22.2	8	0.0627	10.2	0.0010	0.0768	0.743	120.859	0.012	0.909	392.890
Grader	135	0.41	1	55.35	8	0.7261	124	0.0059	0.3117	2.382	406.463	0.019	1.022	713.979
Hydraulic Excavator	100	0.38	1	38	8	0.4942	73.6	0.0040	0.2638	1.502	223.814	0.012	0.802	464.571
Hydraulic Excavator	500	0.38	1	190	8	0.4495	234	0.0085	0.3091	1.367	710.555	0.026	0.940	992.549
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Backhoe	120	0.37	1	44.4	8	0.3379	51.7	0.0025	0.1761	1.000	153.115	0.007	0.521	309.625
Front-End Loader	500	0.37	1	185	8	0.4654	237	0.0093	0.4455	1.378	701.545	0.028	1.319	1096.620
Aerial Lift	50	0.31	1	15.5	8	0.1351	19.6	0.0015	0.1218	0.335	48.640	0.004	0.302	139.114
Roller	500	0.38	1	190	8	0.4189	219	0.0083	0.4752	1.273	666.067	0.025	1.444	1098.431
Dozer	300	0.65	2	390	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
Dozer	440	0.65	2	572	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
3/4 Ton Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	5	N/A	30	0.00420297	4.19349747	0.00003630	0.00898990	0.630	629.025	0.005	1.348	1031.640
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	5	N/A	320	0.00420297	4.19349747	0.00003630	0.00898990	6.725	6709.596	0.058	14.384	11004.157
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.210	209.675	0.002	0.449	343.880
Concrete Pump	50	0.74	1	37	8	0.2394	34.3	0.0027	0.2138	1.417	203.262	0.016	1.265	582.185
Asphault Pulverizer	250	0.85	1	212.5	8	0.4768	245	0.0087	0.4357	3.242	1662.820	0.059	2.963	2550.429

GHG Analysis Results

Total CO2e (lbs/day)	33812.213
Total Project CO2e (tons)	2214.700

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
*e = equivalent
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

Green House Gases Emissions Inventory and Analysis: Bypass Plan, Annual Emissions During Construction Years 11 - 13 - All Equipment Combined

GHG Emissions Inventory

Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [1]	CO	CO_2	CH_4	NOx	CO	CO_2	CH_4	NO_X	CO_{2e}
Worker vehicles	N/A	NA	30	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	4.774	1332.239	0.049	0.422	1463.945
Water Truck	N/A	NA	1	NA	5	0.00457902	4.21483461	0.00004176	0.01031407	0.023	21.074	0.000	0.052	36.470
Hydraulic Self-Propelled Crane	250	0.65	1	162.5	8	0.2316	112	0.0049	0.2705	1.204	583.226	0.026	1.407	1004.267
Portable Generator	15	0.74	2	22.2	8	0.0627	10.2	0.0010	0.0768	0.743	120.859	0.012	0.909	392.890
Grader	135	0.41	1	55.35	8	0.7261	124	0.0059	0.3117	2.382	406.463	0.019	1.022	713.979
Hydraulic Excavator	100	0.38	1	38	8	0.4942	73.6	0.0040	0.2638	1.502	223.814	0.012	0.802	464.571
Hydraulic Excavator	500	0.38	1	190	8	0.4495	234	0.0085	0.3091	1.367	710.555	0.026	0.940	992.549
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Backhoe	120	0.37	1	44.4	8	0.3379	51.7	0.0025	0.1761	1.000	153.115	0.007	0.521	309.625
Front-End Loader	500	0.37	1	185	8	0.4654	237	0.0093	0.4455	1.378	701.545	0.028	1.319	1096.620
Aerial Lift	50	0.31	1	15.5	8	0.1351	19.6	0.0015	0.1218	0.335	48.640	0.004	0.302	139.114
Roller	500	0.38	1	190	8	0.4189	219	0.0083	0.4752	1.273	666.067	0.025	1.444	1098.431
Dozer	300	0.65	2	390	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
Dozer	440	0.65	2	572	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
3/4 Ton Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	5	N/A	30	0.00420297	4.19349747	0.00003630	0.00898990	0.630	629.025	0.005	1.348	1031.640
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	10	N/A	320	0.00420297	4.19349747	0.00003630	0.00898990	13.449	13419.192	0.116	28.768	22008.313
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.210	209.675	0.002	0.449	343.880
Concrete Pump	50	0.74	1	37	8	0.2394	34.3	0.0027	0.2138	1.417	203.262	0.016	1.265	582.185
Asphault Pulverizer	250	0.85	1	212.5	8	0.4768	245	0.0087	0.4357	3.242	1662.820	0.059	2.963	2550.429

GHG Analysis Results

Total CO2e (lbs/day)	44816.370
Total Project CO2e (tons)	2935.472

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
*e = equivalent
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

Green House Gases Emissions Inventory and Analysis: Bypass Plan, Annual Emissions During Construction Years 14 - 16 - All Equipment Combined

GHG Emissions Inventory

Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [1]	CO	CO_2	CH_4	NOx	CO	CO_2	CH_4	NO_X	CO_{2e}
Worker vehicles	N/A	NA	30	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	4.774	1332.239	0.049	0.422	1463.945
Water Truck	N/A	NA	1	NA	5	0.00457902	4.21483461	0.00004176	0.01031407	0.023	21.074	0.000	0.052	36.470
Hydraulic Self-Propelled Crane	250	0.65	1	162.5	8	0.2316	112	0.0049	0.2705	1.204	583.226	0.026	1.407	1004.267
Portable Generator	15	0.74	2	22.2	8	0.0627	10.2	0.0010	0.0768	0.743	120.859	0.012	0.909	392.890
Grader	135	0.41	1	55.35	8	0.7261	124	0.0059	0.3117	2.382	406.463	0.019	1.022	713.979
Hydraulic Excavator	100	0.38	1	38	8	0.4942	73.6	0.0040	0.2638	1.502	223.814	0.012	0.802	464.571
Hydraulic Excavator	500	0.38	1	190	8	0.4495	234	0.0085	0.3091	1.367	710.555	0.026	0.940	992.549
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Backhoe	120	0.37	1	44.4	8	0.3379	51.7	0.0025	0.1761	1.000	153.115	0.007	0.521	309.625
Front-End Loader	500	0.37	1	185	8	0.4654	237	0.0093	0.4455	1.378	701.545	0.028	1.319	1096.620
Aerial Lift	50	0.31	1	15.5	8	0.1351	19.6	0.0015	0.1218	0.335	48.640	0.004	0.302	139.114
Roller	500	0.38	1	190	8	0.4189	219	0.0083	0.4752	1.273	666.067	0.025	1.444	1098.431
Dozer	300	0.65	2	390	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
Dozer	440	0.65	2	572	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
3/4 Ton Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	4	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.168	167.740	0.001	0.360	275.104
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	5	N/A	30	0.00420297	4.19349747	0.00003630	0.00898990	0.630	629.025	0.005	1.348	1031.640
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	2	N/A	320	0.00420297	4.19349747	0.00003630	0.00898990	2.690	2683.838	0.023	5.754	4401.663
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.210	209.675	0.002	0.449	343.880
Concrete Pump	50	0.74	1	37	8	0.2394	34.3	0.0027	0.2138	1.417	203.262	0.016	1.265	582.185
Asphault Pulverizer	250	0.85	1	212.5	8	0.4768	245	0.0087	0.4357	3.242	1662.820	0.059	2.963	2550.429

GHG Analysis Results

Total CO2e (lbs/day)	27209.719
Total Project CO2e (tons)	1782.237

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
*e = equivalent
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

Air Quality Analysis Results: Low Scope Plan, Annual Emissions

Annual Emissions During Construction Years 1 - 4

	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	10.619	59.284	78.321	0.347	3.681	3.217
Total Project Emissions (tons)	0.696	3.883	5.130	0.023	0.241	0.211
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

Annual Emissions During Construction Years 5 - 7

	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	7.161	40.455	38.047	0.170	1.588	1.669
Total Project Emissions (tons)	0.469	2.650	2.492	0.011	0.104	0.109
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

GHG Analysis Results: Low Scope Plan, Annual Emissions

Annual Emissions During Construction Years 1 - 4

Total CO_2e (lbs/day)	54947.17
Total Project CO_2e (Tons)	3599.04

Annual Emissions During Construction Years 5 - 7

Total CO_2e (lbs/day)	24135.53
Total Project CO_2e (Tons)	1580.877

Air Quality Emissions Inventory and Analysis: Low Scope Plan, Annual Emissions During Construction Years 1 - 4 - All Equipment Combined

Emissions Inventory →

Emission Source Data						Emission Factors for Construction Equipment (lbs/hr) or (lbs/mile)[1,2,3]						Daily Emissions from Construction Activities (lbs/day)					
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day (1)	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Worker vehicles	N/A	NA	30	NA	40	0.00048658	0.00397866	0.00035150	0.00001072	0.00009661	0.00006389	0.584	4.774	0.422	0.013	0.116	0.077
Water Truck	N/A	NA	1	NA	5	0.00090210	0.00457902	0.01031407	0.00004009	0.00052122	0.00039592	0.005	0.023	0.052	0.000	0.003	0.002
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.0544	0.2316	0.2705	0.0013	0.0094	0.00839835	0.126	0.537	0.628	0.003	0.022	0.019
Portable Generator	15	0.74	2	22.2	8	0.0109	0.0627	0.0768	0.0002	0.0032	0.00286136	0.129	0.743	0.909	0.002	0.038	0.034
Grader	135	0.41	1	55.35	8	0.0652	0.7261	0.3117	0.0014	0.0157	0.01394558	0.214	2.382	1.022	0.005	0.051	0.046
Hydraulic Excavator	100	0.38	1	38	8	0.0448	0.4942	0.2638	0.0009	0.0092	0.00820993	0.359	3.954	2.110	0.007	0.074	0.066
Hydraulic Excavator	500	0.38	1	190	8	0.0946	0.4495	0.3091	0.0023	0.0107	0.00950760	0.757	3.596	2.472	0.018	0.085	0.076
Hydromulcher	4	0.65	1	2.6	8	0.0118	0.0617	0.0737	0.0002	0.0029	0.00256237	0.061	0.321	0.383	0.001	0.015	0.020
Backhoe	120	0.37	1	44.4	8	0.0281	0.3379	0.1761	0.0006	0.0055	0.00490796	0.083	1.000	0.521	0.002	0.016	0.039
Front-End Loader	500	0.37	1	185	8	0.1034	0.4654	0.4455	0.0023	0.0164	0.01457596	0.306	1.378	1.319	0.007	0.048	0.117
Aerial Lift	50	0.31	1	15.5	8	0.0168	0.1351	0.1218	0.0003	0.0035	0.00308736	0.134	1.081	0.975	0.002	0.028	0.025
Roller	500	0.38	1	190	8	0.0920	0.4189	0.4752	0.0022	0.0174	0.01547069	0.757	3.351	3.801	0.017	0.139	0.124
Dozer (smaller)	300	0.65	2	390	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Dozer	440	0.65	1	286	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	0.724	3.056	3.914	0.013	0.146	0.199
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.093	0.504	1.079	0.005	0.056	0.041
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	16	N/A	320	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	3.952	21.519	46.028	0.202	2.392	1.770
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.039	0.210	0.449	0.002	0.023	0.017
Concrete Pump	50	0.74	1	37	8	0.0299	0.2394	0.2138	0.0004	0.0061	0.00544601	0.177	1.417	1.265	0.003	0.036	0.044
Asphault Pulverizer	250	0.85	1	212.5	8	0.0967	0.4768	0.4357	0.0028	0.0134	0.01194229	0.657	3.242	2.963	0.019	0.091	0.096

Air Quality Analysis Results							
Peak Daily Emissions (lbs/day)	10.62	59.28	78.32	0.35	3.68	3.22
Total Project Emissions (tons)	0.696	3.883	5.130	0.023	0.241	0.211
General Conformity Threshold (tons/year)	100	100	100	100	100	100
Exceeds Threshold?	**No**	**No**	**No**	**No**	**No**	**No**

$$Equip_{Emiss} = \frac{EF \cdot Time \cdot EngineHP \cdot LFwt}{(453.6 \cdot 2000)}$$

Where:
$Equip_{Emiss}$ = Construction Equipment emissions in tons per year
EF = Engine **emission factor** in grams per brake horsepower-hour
Time = Annual **operating time** in hours
EngineHP = **Engine brake horsepower** rating
LFwt = Time weighted engine **load factor** (fraction of full load), based on different engine operating modes

References

1. SCAQMD 2021a
2. SCAQMD 2021b
3. SCAQMD 2021c.

Air Quality Emissions Inventory and Analysis: Low Scope Plan, Annual Emissions During Construction Years 5 - 7 - All Equipment Combined

Emissions Inventory →

Emission Source Data						Emission Factors for Construction Equipment (lbs/hr) or (lbs/mile)[1,2,3]						Daily Emissions from Construction Activities (lbs/day)					
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day (1)	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Worker vehicles	N/A	NA	30	NA	40	0.00048658	0.00397866	0.00035150	0.00001072	0.00009661	0.00006389	0.584	4.774	0.422	0.013	0.116	0.077
Water Truck	N/A	NA	1	NA	5	0.00090210	0.00457902	0.01031407	0.00004009	0.00052122	0.00039592	0.005	0.023	0.052	0.000	0.003	0.002
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.0544	0.2316	0.2705	0.0013	0.0094	0.00839835	0.126	0.537	0.628	0.003	0.022	0.019
Portable Generator	15	0.74	2	22.2	8	0.0109	0.0627	0.0768	0.0002	0.0032	0.00286136	0.129	0.743	0.909	0.002	0.038	0.034
Grader	135	0.41	1	55.35	8	0.0652	0.7261	0.3117	0.0014	0.0157	0.01394558	0.214	2.382	1.022	0.005	0.051	0.046
Hydraulic Excavator	100	0.38	1	38	8	0.0448	0.4942	0.2638	0.0009	0.0092	0.00820993	0.359	3.954	2.110	0.007	0.074	0.066
Hydraulic Excavator	500	0.38	1	190	8	0.0946	0.4495	0.3091	0.0023	0.0107	0.00950760	0.757	3.596	2.472	0.018	0.085	0.076
Hydromulcher	4	0.65	1	2.6	8	0.0118	0.0617	0.0737	0.0002	0.0029	0.00256237	0.061	0.321	0.383	0.001	0.015	0.020
Backhoe	120	0.37	1	44.4	8	0.0281	0.3379	0.1761	0.0006	0.0055	0.00490796	0.083	1.000	0.521	0.002	0.016	0.039
Front-End Loader	500	0.37	1	185	8	0.1034	0.4654	0.4455	0.0023	0.0164	0.01457596	0.306	1.378	1.319	0.007	0.048	0.117
Aerial Lift	50	0.31	1	15.5	8	0.0168	0.1351	0.1218	0.0003	0.0035	0.00308736	0.134	1.081	0.975	0.002	0.028	0.025
Roller	500	0.38	1	190	8	0.0920	0.4189	0.4752	0.0022	0.0174	0.01547069	0.757	3.351	3.801	0.017	0.139	0.124
Dozer (smaller)	300	0.65	2	390	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Dozer	440	0.65	1	286	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	0.724	3.056	3.914	0.013	0.146	0.199
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00077178	0.00420297	0.00898990	0.00003946	0.00046717	0.00034564	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	1	N/A	10	0.00077178	0.00420297	0.00898990	0.00003946	0.00046717	0.00034564	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	0.00077178	0.00420297	0.00898990	0.00003946	0.00046717	0.00034564	0.093	0.504	1.079	0.005	0.056	0.041
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	2	N/A	320	0.00077178	0.00420297	0.00898990	0.00003946	0.00046717	0.00034564	0.494	2.690	5.754	0.025	0.299	0.221
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	0.00077178	0.00420297	0.00898990	0.00003946	0.00046717	0.00034564	0.039	0.210	0.449	0.002	0.023	0.017
Concrete Pump	50	0.74	1	37	8	0.0299	0.2394	0.2138	0.0004	0.0061	0.00544601	0.177	1.417	1.265	0.003	0.036	0.044
Asphault Pulverizer	250	0.85	1	212.5	8	0.0967	0.4768	0.4357	0.0028	0.0134	0.01194229	0.657	3.242	2.963	0.019	0.091	0.096
Air Quality Analysis Results																	
											Peak Daily Emissions (lbs/day)	7.16	40.45	38.05	0.17	1.59	1.67
											Total Project Emissions (tons)	0.469	2.650	2.492	0.011	0.104	0.109
											General Conformity Threshold (tons/year)	100	100	100	100	100	100
											Exceeds Threshold?	**No**	**No**	**No**	**No**	**No**	**No**

$$Equip_{Emiss} = \frac{EF \cdot Time \cdot EngineHP \cdot LFwt}{(453.6 \cdot 2000)}$$

Where:
$Equip_{Emiss}$ = Construction Equipment emissions in tons per year
EF = Engine **emission factor** in grams per brake horsepower-hour
$Time$ = Annual **operating time** in hours
$EngineHP$ = **Engine brake horsepower** rating
$LFwt$ = Time weighted engine **load factor** (fraction of full load), based on different engine operating modes

1. SCAQMD 2021a
2. SCAQMD 2021b
3. SCAQMD 2021c.

Green House Gases Emissions Inventory and Analysis: Low Scope Plan, Annual Emissions During Construction Years 1 - 4 - All Equipment Combined

GHG Emissions Inventory →

Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [(1)]	CO	CO_2	CH_4	NOx	CO	CO_2	CH_4	NO_X	CO_{2e}
Worker vehicles	N/A	NA	30	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	4.774	1332.239	0.049	0.422	1463.945
Water Truck	N/A	NA	1	NA	5	0.00457902	4.21483461	0.00004176	0.01031407	0.023	21.074	0.000	0.052	36.470
Hydraulic Self-Propelled Crane	250	0.65	1	162.5	8	0.2316	112	0.0049	0.2705	1.204	583.226	0.026	1.407	1004.267
Portable Generator	15	0.74	2	22.2	8	0.0627	10.2	0.0010	0.0768	0.743	120.859	0.012	0.909	392.890
Grader	135	0.41	1	55.35	8	0.7261	124	0.0059	0.3117	2.382	406.463	0.019	1.022	713.979
Hydraulic Excavator	100	0.38	1	38	8	0.4942	73.6	0.0040	0.2638	1.502	223.814	0.012	0.802	464.571
Hydraulic Excavator	500	0.38	1	190	8	0.4495	234	0.0085	0.3091	1.367	710.555	0.026	0.940	992.549
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Front-End Loader	500	0.37	1	185	8	0.4654	237	0.0093	0.4455	1.378	701.545	0.028	1.319	1096.620
Aerial Lift	50	0.31	1	15.5	8	0.1351	19.6	0.0015	0.1218	0.335	48.640	0.004	0.302	139.114
Roller	500	0.38	1	190	8	0.4189	219	0.0083	0.4752	1.273	666.067	0.025	1.444	1098.431
Dozer	300	0.65	2	390	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
Dozer	440	0.65	1	286	8	0.5877	259	0.0126	0.7527	3.056	1347.993	0.065	3.914	2519.097
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
TRUCK, 45,000 LB (20,412 KG) GVW, 6X4, 3 AXLE	N/A	N/A	4	N/A	30	0.00420297	4.19349747	0.00003630	0.00898990	0.504	503.220	0.004	1.079	825.312
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	16	N/A	320	0.00420297	4.19349747	0.00003630	0.00898990	21.519	21470.707	0.186	46.028	35213.301
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.210	209.675	0.002	0.449	343.880
Concrete Pump	50	0.74	1	37	8	0.2394	34.3	0.0027	0.2138	1.417	203.262	0.016	1.265	582.185
Asphault Pulverizer	250	0.85	1	212.5	8	0.4768	245	0.0087	0.4357	3.242	1662.820	0.059	2.963	2550.429

GHG Analysis Results

Total CO_2e (lbs/day)	54947.171
Total Project CO_2e (Tons)	3599.040

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$

Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1

Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298

Where Z = 100 Year Global Warming Potential for Methane = 25

*e = equivalent

CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

Green House Gases Emissions Inventory and Analysis: Low Scope Plan, Annual Emissions During Construction Years 5 - 7 - All Equipment Combined

GHG Emissions Inventory →

Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day (1)	CO	CO_2	CH_4	NOx	CO	CO_2	CH_4	NO_X	CO_{2e}
Worker vehicles	N/A	NA	30	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	4.774	1332.239	0.049	0.422	1463.945
Water Truck	N/A	NA	1	NA	5	0.00457902	4.21483461	0.00004176	0.01031407	0.023	21.074	0.000	0.052	36.470
Hydraulic Self-Propelled Crane	250	0.65	1	162.5	8	0.2316	112	0.0049	0.2705	1.204	583.226	0.026	1.407	1004.267
Portable Generator	15	0.74	2	22.2	8	0.0627	10.2	0.0010	0.0768	0.743	120.859	0.012	0.909	392.890
Grader	135	0.41	1	55.35	8	0.7261	124	0.0059	0.3117	2.382	406.463	0.019	1.022	713.979
Hydraulic Excavator	100	0.38	1	38	8	0.4942	73.6	0.0040	0.2638	1.502	223.814	0.012	0.802	464.571
Hydraulic Excavator	500	0.38	1	190	8	0.4495	234	0.0085	0.3091	1.367	710.555	0.026	0.940	992.549
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Front-End Loader	500	0.37	1	185	8	0.4654	237	0.0093	0.4455	1.378	701.545	0.028	1.319	1096.620
Aerial Lift	50	0.31	1	15.5	8	0.1351	19.6	0.0015	0.1218	0.335	48.640	0.004	0.302	139.114
Roller	500	0.38	1	190	8	0.4189	219	0.0083	0.4752	1.273	666.067	0.025	1.444	1098.431
Dozer	300	0.65	2	390	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
Dozer	440	0.65	1	286	8	0.5877	259	0.0126	0.7527	3.056	1347.993	0.065	3.914	2519.097
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
TRUCK, 45,000 LB (20,412 KG) GVW, 6X4, 3 AXLE	N/A	N/A	4	N/A	30	0.00420297	4.19349747	0.00003630	0.00898990	0.504	503.220	0.004	1.079	825.312
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	2	N/A	320	0.00420297	4.19349747	0.00003630	0.00898990	2.690	2683.838	0.023	5.754	4401.663
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.210	209.675	0.002	0.449	343.880
Concrete Pump	50	0.74	1	37	8	0.2394	34.3	0.0027	0.2138	1.417	203.262	0.016	1.265	582.185
Asphault Pulverizer	250	0.85	1	212.5	8	0.4768	245	0.0087	0.4357	3.242	1662.820	0.059	2.963	2550.429

GHG Analysis Results

Total CO_2e (lbs/day)	24135.533
Total Project CO_2e (Tons)	1580.877

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
*e = equivalent
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

Air Quality Analysis Results: Combination Plan, Annual Emissions

Annual Emissions During Construction Years 1 - 4

	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	10.619	59.284	78.321	0.347	3.681	3.217
Total Project Emissions (tons)	0.696	3.883	5.130	0.023	0.241	0.211
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

Annual Emissions During Construction Years 5 - 7

	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Peak Daily Emissions (lbs/day)	7.408	41.800	40.923	0.183	1.738	1.779
Total Project Emissions (tons)	0.485	2.738	2.680	0.012	0.114	0.117
General Conformity Threshold (tons/year)	100	--	100	--	--	100
Exceeds Threshold?	**No**	--	**No**	--	--	**No**

GHG Analysis Results: Combination Plan, Annual Emissions

Annual Emissions During Construction Years 1 - 4

Total CO_2e (lbs/day)	54533.4
Total Project CO_2e (Tons)	3571.937

Annual Emissions During Construction Years 5 - 7

Total CO_2e (lbs/day)	25922.59
Total Project CO_2e (Tons)	1697.93

Air Quality Emissions Inventory and Analysis: Combination Plan (Preferred Alternative), Annual Emissions During Construction Years 1 - 4 - All Equipment Combined

Emissions Inventory

Emission Source Data						Emission Factors for Construction Equipment (lbs/hr) or (lbs/mile)[1,2,3]						Daily Emissions from Construction Activities (lbs/day)					
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day (1)	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Worker vehicles	N/A	NA	30	NA	40	0.00048658	0.00397866	0.00035150	0.00001072	0.00009661	0.00006389	0.584	4.774	0.422	0.013	0.116	0.077
Water Truck	N/A	NA	1	NA	5	0.00090210	0.00457902	0.01031407	0.00004009	0.00052122	0.00039592	0.005	0.023	0.052	0.000	0.003	0.002
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.0544	0.2316	0.2705	0.0013	0.0094	0.00839835	0.126	0.537	0.628	0.003	0.022	0.019
Portable Generator	15	0.74	2	22.2	8	0.0109	0.0627	0.0768	0.0002	0.0032	0.00286136	0.129	0.743	0.909	0.002	0.038	0.034
Grader	135	0.41	1	55.35	8	0.0652	0.7261	0.3117	0.0014	0.0157	0.01394558	0.214	2.382	1.022	0.005	0.051	0.046
Hydraulic Excavator	100	0.38	1	38	8	0.0448	0.4942	0.2638	0.0009	0.0092	0.00820993	0.359	3.954	2.110	0.007	0.074	0.066
Hydraulic Excavator	500	0.38	1	190	8	0.0946	0.4495	0.3091	0.0023	0.0107	0.00950760	0.757	3.596	2.472	0.018	0.085	0.076
Hydromulcher	4	0.65	1	2.6	8	0.0118	0.0617	0.0737	0.0002	0.0029	0.00256237	0.061	0.321	0.383	0.001	0.015	0.020
Backhoe	120	0.37	1	44.4	8	0.0281	0.3379	0.1761	0.0006	0.0055	0.00490796	0.083	1.000	0.521	0.002	0.016	0.039
Front-End Loader	500	0.37	1	185	8	0.1034	0.4654	0.4455	0.0023	0.0164	0.01457596	0.306	1.378	1.319	0.007	0.048	0.117
Aerial Lift	50	0.31	1	15.5	8	0.0168	0.1351	0.1218	0.0003	0.0035	0.00308736	0.134	1.081	0.975	0.002	0.028	0.025
Roller	500	0.38	1	190	8	0.0920	0.4189	0.4752	0.0022	0.0174	0.01547069	0.757	3.351	3.801	0.017	0.139	0.124
Dozer	300	0.65	2	390	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Dozer	440	0.65	1	286	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	0.724	3.056	3.914	0.013	0.146	0.199
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.093	0.504	1.079	0.005	0.056	0.041
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	16	N/A	320	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	3.952	21.519	46.028	0.202	2.392	1.770
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.039	0.210	0.449	0.002	0.023	0.017
Concrete Pump	50	0.74	1	37	8	0.0299	0.2394	0.2138	0.0004	0.0061	0.00544601	0.177	1.417	1.265	0.003	0.036	0.044
Asphault Pulverizer	250	0.85	1	212.5	8	0.0967	0.4768	0.4357	0.0028	0.0134	0.01194229	0.657	3.242	2.963	0.019	0.091	0.096
											Peak Daily Emissions (lbs/day)	10.62	59.28	78.32	0.35	3.68	3.22
											Total Project Emissions (tons)	0.696	3.883	5.130	0.023	0.241	0.211
											General Conformity Thresholds (tons)	100	--	100	--	--	100
											Exceeds Threshold?	**No**	--	**No**	--	--	**No**

Air Quality Analysis Results

$$Equip_{Emiss} = \frac{EF \cdot Time \cdot EngineHP \cdot LFwt}{(453.6 \cdot 2000)}$$

Where:
$Equip_{Emiss}$ = Construction Equipment emissions in tons per year
EF = Engine **emission factor** in grams per brake horsepower-hour
Time = Annual **operating time** in hours
EngineHP = **Engine brake horsepower** rating
LFwt = Time weighted engine **load factor** (fraction of full load), based on different engine operating modes

References
1. SCAQMD 2021a
2. SCAQMD 2021b

Air Quality Emissions Inventory and Analysis: Combination Plan (Preferred Alternative), Annual Emissions During Construction Years 1 - 4 - All Equipment Combined

3. SCAQMD 2021c.

Air Quality Emissions Inventory and Analysis: Combination Plan (Preferred Alternative), Annual Emissions During Construction Years 5 - 7 - All Equipment Combined

Emissions Inventory

Emission Source Data						Emission Factors for Construction Equipment (lbs/hr) or (lbs/mile)[1,2,3]						Daily Emissions from Construction Activities (lbs/day)					
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [(1)]	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	ROG	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$
Worker vehicles	N/A	NA	30	NA	40	0.00048658	0.00397866	0.00035150	0.00001072	0.00009661	0.00006389	0.584	4.774	0.422	0.013	0.116	0.077
Water Truck	N/A	NA	1	NA	5	0.00090210	0.00457902	0.01031407	0.00004009	0.00052122	0.00039592	0.005	0.023	0.052	0.000	0.003	0.002
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.0544	0.2316	0.2705	0.0013	0.0094	0.00839835	0.126	0.537	0.628	0.003	0.022	0.019
Portable Generator	15	0.74	2	22.2	8	0.0109	0.0627	0.0768	0.0002	0.0032	0.00286136	0.129	0.743	0.909	0.002	0.038	0.034
Grader	135	0.41	1	55.35	8	0.0652	0.7261	0.3117	0.0014	0.0157	0.01394558	0.214	2.382	1.022	0.005	0.051	0.046
Hydraulic Excavator	100	0.38	1	38	8	0.0448	0.4942	0.2638	0.0009	0.0092	0.00820993	0.359	3.954	2.110	0.007	0.074	0.066
Hydraulic Excavator	500	0.38	1	190	8	0.0946	0.4495	0.3091	0.0023	0.0107	0.00950760	0.757	3.596	2.472	0.018	0.085	0.076
Hydromulcher	4	0.65	1	2.6	8	0.0118	0.0617	0.0737	0.0002	0.0029	0.00256237	0.061	0.321	0.383	0.001	0.015	0.020
Backhoe	120	0.37	1	44.4	8	0.0281	0.3379	0.1761	0.0006	0.0055	0.00490796	0.083	1.000	0.521	0.002	0.016	0.039
Front-End Loader	500	0.37	1	185	8	0.1034	0.4654	0.4455	0.0023	0.0164	0.01457596	0.306	1.378	1.319	0.007	0.048	0.117
Aerial Lift	50	0.31	1	15.5	8	0.0168	0.1351	0.1218	0.0003	0.0035	0.00308736	0.134	1.081	0.975	0.002	0.028	0.025
Roller	500	0.38	1	190	8	0.0920	0.4189	0.4752	0.0022	0.0174	0.01547069	0.757	3.351	3.801	0.017	0.139	0.124
Dozer	300	0.65	2	390	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	1.448	6.112	7.828	0.026	0.291	0.399
Dozer	440	0.65	1	286	8	0.1392	0.5877	0.7527	0.0025	0.0280	0.02493736	0.724	3.056	3.914	0.013	0.146	0.199
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	1	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.008	0.042	0.090	0.000	0.005	0.003
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.093	0.504	1.079	0.005	0.056	0.041
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	3	N/A	320	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.741	4.035	8.630	0.038	0.448	0.332
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	**0.00077178**	**0.00420297**	**0.00898990**	**0.00003946**	**0.00046717**	**0.00034564**	0.039	0.210	0.449	0.002	0.023	0.017
Concrete Pump	50	0.74	1	37	8	0.0299	0.2394	0.2138	0.0004	0.0061	0.00544601	0.177	1.417	1.265	0.003	0.036	0.044
Asphault Pulverizer	250	0.85	1	212.5	8	0.0967	0.4768	0.4357	0.0028	0.0134	0.01194229	0.657	3.242	2.963	0.019	0.091	0.096
											Peak Daily Emissions (lbs/day)	7.41	41.80	40.92	0.18	1.74	1.78
											Total Project Emissions (tons)	0.485	2.738	2.680	0.012	0.114	0.117
											General Conformity Thresholds (tons)	100	--	100	--	--	100
											Exceeds Threshold?	**No**	--	**No**	--	--	**No**

Air Quality Analysis Results

$$Equip_{Emiss} = \frac{EF \cdot Time \cdot EngineHP \cdot LFwt}{(453.6 \cdot 2000)}$$

Where:
Equip$_{Emiss}$ = Construction Equipment emissions in tons per year
EF = Engine **emission factor** in grams per brake horsepower-hour
Time = Annual **operating time** in hours
EngineHP = **Engine brake horsepower** rating
LFwt = Time weighted engine **load factor** (fraction of full load), based on different engine operating modes

References
1. SCAQMD 2021a
2. SCAQMD 2021b
3. SCAQMD 2021c.

Green House Gases Emissions Inventory and Analysis: Combination Plan (Preferred Alternative), Annual Emissions During Construction Years 1 - 4 - All Equipment Combined

GHG Emissions Inventory

Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [1]	CO	CO_2	CH_4	NOx	CO	CO_2	CH_4	NO_X	CO_{2e}
Worker vehicles	N/A	NA	30	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	4.774	1332.239	0.049	0.422	1463.945
Water Truck	N/A	NA	1	NA	5	0.00457902	4.21483461	0.00004176	0.01031407	0.023	21.074	0.000	0.052	36.470
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.2316	112	0.0049	0.2705	0.537	260.209	0.011	0.628	448.058
Portable Generator	15	0.74	2	22.2	8	0.0627	10.2	0.0010	0.0768	0.743	120.859	0.012	0.909	392.890
Grader	135	0.41	1	55.35	8	0.7261	124	0.0059	0.3117	2.382	406.463	0.019	1.022	713.979
Hydraulic Excavator (for Hammer)	100	0.38	1	38	8	0.4942	73.6	0.0040	0.2638	1.502	223.814	0.012	0.802	464.571
Hydraulic Excavator	500	0.38	1	190	8	0.4495	234	0.0085	0.3091	1.367	710.555	0.026	0.940	992.549
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Backhoe	120	0.37	1	44.4	8	0.3379	51.7	0.0025	0.1761	1.000	153.115	0.007	0.521	309.625
Front-End Loader	500	0.37	1	185	8	0.4654	237	0.0093	0.4455	1.378	701.545	0.028	1.319	1096.620
Aerial Lift	50	0.31	1	15.5	8	0.1351	19.6	0.0015	0.1218	0.335	48.640	0.004	0.302	139.114
Roller	500	0.38	1	190	8	0.4189	219	0.0083	0.4752	1.273	666.067	0.025	1.444	1098.431
Dozer (smaller)	300	0.65	2	390	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
Dozer	440	0.65	1	286	8	0.5877	259	0.0126	0.7527	3.056	1347.993	0.065	3.914	2519.097
3/4 Ton Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
TRUCK, 35,000 LB (15,876 KG) GVW, 4X2, 2 AXLE	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
TRUCK, 45,000 LB (20,412 KG) GVW, 6X4, 3 AXLE	N/A	N/A	4	N/A	30	0.00420297	4.19349747	0.00003630	0.00898990	0.504	503.220	0.004	1.079	825.312
TRUCK, 50,000 LB (22,680 KG) GVW, 6X4, 3 AXLE	N/A	N/A	16	N/A	320	0.00420297	4.19349747	0.00003630	0.00898990	21.519	#######	0.186	46.028	35213.301
PICKUP TRUCK, 8,800 LB (3,992 KG) GVW, 4X4, 2 AXLE, 3/4 TON (0.68 MT)	N/A	N/A	5	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.210	209.675	0.002	0.449	343.880
Concrete Pump	50	0.74	1	37	8	0.2394	34.3	0.0027	0.2138	1.417	203.262	0.016	1.265	582.185
Asphault Pulverizer	250	0.85	1	212.5	8	0.4768	245	0.0087	0.4357	3.242	1662.820	0.059	2.963	2550.429
											Total CO2e (lbs/day)			54533.395
											Total Project CO2e (tons)			3571.937

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
*e = equivalent
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

Green House Gases Emissions Inventory and Analysis: Combination Plan (Preferred Alternative), Annual Emissions During Construction Years 5 - 7 - All Equipment Combined

GHG Emissions Inventory

Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [(1)]	CO	CO_2	CH_4	NOx	CO	CO_2	CH_4	NO_X	CO_{2e}
Worker vehicles	N/A	NA	30	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	4.774	1332.239	0.049	0.422	1463.945
Water Truck	N/A	NA	1	NA	5	0.00457902	4.21483461	0.00004176	0.01031407	0.023	21.074	0.000	0.052	36.470
Hydraulic Self-Propelled Crane	250	0.29	1	72.5	8	0.2316	112	0.0049	0.2705	0.537	260.209	0.011	0.628	448.058
Portable Generator	15	0.74	2	22.2	8	0.0627	10.2	0.0010	0.0768	0.743	120.859	0.012	0.909	392.890
Grader	135	0.41	1	55.35	8	0.7261	124	0.0059	0.3117	2.382	406.463	0.019	1.022	713.979
Hydraulic Excavator	100	0.38	1	38	8	0.4942	73.6	0.0040	0.2638	1.502	223.814	0.012	0.802	464.571
Hydraulic Excavator	500	0.38	1	190	8	0.4495	234	0.0085	0.3091	1.367	710.555	0.026	0.940	992.549
Hydromulcher	4	0.65	1	2.6	8	0.0617	10.1	0.0011	0.0737	0.321	52.558	0.006	0.383	167.191
Backhoe	120	0.37	1	44.4	8	0.3379	51.7	0.0025	0.1761	1.000	153.115	0.007	0.521	309.625
Front-End Loader	500	0.37	1	185	8	0.4654	237	0.0093	0.4455	1.378	701.545	0.028	1.319	1096.620
Aerial Lift	50	0.31	1	15.5	8	0.1351	19.6	0.0015	0.1218	0.335	48.640	0.004	0.302	139.114
Roller	500	0.38	1	190	8	0.4189	219	0.0083	0.4752	1.273	666.067	0.025	1.444	1098.431
Dozer	300	0.65	2	390	8	0.5877	259	0.0126	0.7527	6.112	2695.986	0.131	7.828	5038.194
Dozer	440	0.65	1	286	8	0.5877	259	0.0126	0.7527	3.056	1347.993	0.065	3.914	2519.097
Pickup Truck, 8,800 GVW	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
Truck, 35,000 LB GVW, 4X2, 2 Axle	N/A	N/A	1	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.042	41.935	0.000	0.090	68.776
Truck, 45,000 LB GVW, 6X4, 3 Axle	N/A	N/A	4	N/A	30	0.00420297	4.19349747	0.00003630	0.00898990	0.504	503.220	0.004	1.079	825.312
Truck, 50,000 LB GVW, 6X4, 3 Axle	N/A	N/A	3	N/A	320	0.00420297	4.19349747	0.00003630	0.00898990	4.035	4025.758	0.035	8.630	6602.494
Pickup Truck, 8,800 LB GVW, 4X4, 2 Axle	N/A	N/A	5	N/A	10	0.00420297	4.19349747	0.00003630	0.00898990	0.210	209.675	0.002	0.449	343.880
Concrete Pump	50	0.74	1	37	8	0.2394	34.3	0.0027	0.2138	1.417	203.262	0.016	1.265	582.185
Asphault Pulverizer	250	0.85	1	212.5	8	0.4768	245	0.0087	0.4357	3.242	1662.820	0.059	2.963	2550.429
											Total CO2e (lbs/day)			25922.588
											Total Project CO2e (tons)			1697.930

$CO_2e = CO_2 + X \cdot CO + Y \cdot NOx + Z \cdot CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for Oxides of Nitrogen = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
*e = equivalent
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials