Draft Environmental Impact Report

Appendix

Air Quality and Greenhouse Gas Emissions

Pacheco Reservoir Expansion Project

November 2021

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Summary

This section contains summary sheets of all emission sources calculated for the Proposed Project and each alternative. These include on-road exhaust emissions (on-road mobile worker vehicle trips and material hauling trips), off-road exhaust emissions (use of heavy duty equipment for construction and vegetative clearing), off-road dust emissions (grading, excavating, material movement, stockpiling), on-road dust emissions (worker and haul truck trips), helicopter, blasting, and operational emissions.

Emissions were estimated in accordance with Bay Area Air Quality Management District (BAAQMD) and SJVAPCD (San Joaquin Valley Air Pollution Control District) guidance. Quantification of air pollutant and GHG emissions was conducted using a combination of methods, including the use of emission factors from the U.S. Environmental Protection Agency's (EPA) published AP-42: Compilation of Air Emissions Factors (EPA 1995), exhaust emission factors from Sacramento Metropolitan Air Quality Management District's (SMAQMD's) Road Construction Emissions Model (RCEM, version 9.0) spreadsheet (SMAQMD 2018), California Air Resources Board's (CARB) EMFAC 2021 database (CARB 2017a) and OFFROAD ORION database (CARB 2017b), and the California Emissions Estimator Model (CalEEMod) Version 2016.3.2 computer program (CAPCOA 2017).

Construction-related emissions quantification and assessment were based on a detailed list of all pieces of construction equipment to be used during each construction phase to be completed under the Proposed Project and each alternative. In addition, proposed annual hours of operation; total quantities of material hauled and imported; and information on commuter trips for construction workers and material hauling quantities were also included in the assessment. Operational pump emissions were calculated based on pump energy usage and GHG emissions intensity factors. Greenhouse gas (GHG) emissions resulting from operations and maintenance worker commute trips were estimated using emission factors from CARB's EMFAC 2021 database.

Exhaust Emissions

Off-road Diesel Construction and Vegetative Clearing Equipment

This section contains calculations from construction and vegetative clearing exhaust sources. Construction equipment type and annual hours of use were provided for each construction phase, including vegetation clearing, road construction, dam building, and power transmission line installation. Horsepower ratings for equipment were obtained from online searches of manufacturer websites. Where equipment horsepower ratings were not available, they were obtained from similar equipment types or were based on CalEEMod defaults. Construction activity hours were split into annual totals for each equipment type for each calendar year of construction activity. Based on the annual hours of equipment use, annual emissions were then calculated for comparison to applicable thresholds of significance.

Exhaust emission rates for each piece of equipment were estimated using OFFROAD-ORION version 1.0.1 emission factors for 2021 and exhaust emission factors for heavy-duty diesel equipment from SMAQMD's Road Construction Emissions Model (RCEM, version 9.0) spreadsheet according to each equipment's horsepower rating and estimated annual operation hours. Default load factors from the California Emissions Estimator Model (CalEEMod) Version 2016.3.2 computer program were then applied based on equipment type (e.g., cranes, excavators, loaders). Although the RCEM model was developed by SMAQMD, emission rates

and engine usage factors for construction equipment are based on the same CARB-approved model used in CalEEMod, which has been accepted statewide as an acceptable platform for conducting emissions modeling and is therefore, appropriate for use in this analysis.

On-road Haul Truck Trips and On-road Worker Trips

On-road vehicle emissions associated with worker commute trips and truck hauling trips were estimated using CARB's EMFAC 2021 emission factors. Vehicle classifications for worker commute trips were assumed to be all Light-Duty gasoline and diesel (i.e., light duty automobile (LDA) and light duty truck (LDT1, LDT2)), while truck hauling trips were assumed to utilize Heavy-Heavy Duty Diesel California International Registration Plan (CAIRP) Construction Trucks (i.e., T7 CAIRP Construction). Worker commute trips exhaust emissions were calculated based on the estimated number of workers per day for each construction day and the total daily vehicle miles traveled (VMT) by each worker. An average worker trip mileage of 35 miles each way was used to calculate VMT. Haul truck VMT values were calculated based on the number trucks used for off-site import of materials, on-site hauling, and off-site water transport, with one-way mileages of 35 miles from the west and 33.5 miles from the east, two miles, and seven miles, respectively. Construction equipment was assumed to come from further away (i.e., 80 miles from the north [Pleasanton] and 100 miles from the southeast [Fresno]).

Fugitive Dust Emissions

Material Piles and Earthmoving, On-road Haul Truck Trips, and On-road Worker Trips

Off-road fugitive dust emissions would result from the loading/unloading of earth material that is imported and excavated at the project site as well as from the use of grading and earth-moving equipment (e.g., graders or bulldozers). AP-42, Chapter 13.2.4-3, Equation 1 methodology and emission factors were used to estimate PM_{10} emissions from stockpiling/loading activities. AP-42, Chapter 11.9, Equation 11.9-1 methodology and emission factors were used to estimate PM_{10} emissions from grading equipment during construction. $PM_{2.5}$ fugitive dust from off-road construction activity was calculated based on a 0.1 ratio of $PM_{2.5}/PM_{10}$ as indicated in EPA 2006 AP-42 Background Document for Revisions to Fine Fraction Ratios used for AP-42 Fugitive Dust Emission Factors.

Fugitive dust emissions from on-road worker and hauling trips and the handling of waste material were estimated using AP-42, Chapter 13.2.1, Equation 1 emissions factors. Emissions were estimated from on-road mobile sources traveling on paved and unpaved roads. AP-42 emissions factors for fugitive dust PM_{10} were applied to daily VMT, while fugitive dust $PM_{2.5}$. As with off-road emissions, $PM_{2.5}$ fugitive dust from off-road construction activity was calculated based on a ratio of $PM_{2.5}/PM_{10}$ of 0.1, as advised by AP-42.

Helicopter Emissions

Installation of power transmission lines would involve using helicopters with various lift capacities to carry materials to inaccessible areas; helicopters are not included in the RCEM and CalEEMod emissions models. Emissions factors for helicopters were available from the Federal Office of Civil Aviation (FOCA 2015) and were applied to the total hours of use, 348 per year, to estimate emissions for a Kaman K-1200 helicopter.

Blasting Emissions

Rock blasting activity and batch plant emissions were estimated using USEPA AP-42 emissions factors for default total prilled Ammonium Nitrate Fuel Oil (ANFO) blast material and specified number of blasts per year for each alternative, ranging from zero to 22.

Operational Emissions

Operation of the Project would include remote monitoring of the new facilities, the operation of new electric pump stations, and minimal maintenance activities, including weekly inspections initially then monthly inspections. Total changes in pumping, considering CVP system-wide and new pump station requirements for the Proposed Project compared to baseline conditions, include a minimal decrease (from 1,191.3 gWh to 1,190.7 gWh) under existing conditions and a minimal increase (from 1,231.6 gWh to 1,234.7 gWh) under future conditions. Increases in operational GHG emissions relative to baseline were calculated based on pump energy usage and GHG emissions intensity factors. GHG emissions resulting from operations and maintenance worker commute trips were estimated using emission factors from CARB's EMFAC 2021 database. VMT of worker commute trips was based on travel to and from Valley Water's San Jose office, 54.3 miles one-way, and the maximum number of trips per year for operations (52 per year) and maintenance (12 per year).

References

CAPCOA (California Air Pollution Control Officers Association). 2017. California Emissions Estimator Model (CalEEMod, version 2016.3.2). Prepared for CAPCOA. Prepared by BREEZE Software, South Coast Air Quality Management District and California Air Districts.

CARB (California Air Resources Board). EMFAC2017a. Web Database (version 1.0.2). Available: https://arb.ca.gov/emfac/2017/. Accessed April 8, 2021.

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EPA (U.S. Environmental Protection Agency). 1995. AP-42: Compilation of Air Emissions Factors (The Fifth Edition). U.S. Environmental Protection Agency. Office Of Air and Radiation. Research Triangle Park, NC.

FOCA (Federal Office of Civil Aviation). 2015. Guidance on Determination of Helicopter Emissions. Federal Office of Civil Aviation. Division Aviation Policy and Strategy

SMAQMD (Sacramento Metropolitan Air Quality Management District). 2018. Roadway Construction Emissions Model (version 9.0). prepare by RAMBOLL. Prepared for SMAQMD. Sacramento, CA.

Attachment A – Air Quality and GHG Emissions Data

Proposed Project – Upstream 140 TAF HFD

Emissions Summary Sheet

(Proposed) US 140TAF HFD - Summary of Total Combined Construction Emissions

	ROG		CO		NOX		PM10 (exhaust)		PM10 (dust) - Mitigated		PM2.5 (exhaust)		PM2.5 (dust) - Mitigated		CO2	CH4	N2O	Total GHG
Construction Year	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	MT/year	MT/year	MT-CO2e/year
2025 (year 1)	1.22	29.48	9.83	236.87	9.45	227.60	0.33	7.94	110.01	2650.89	0.31	7.40	11.06	266.58	4,632	0.819	0.023	4,659.1
2026 (year 2)	7.13	76.92	45.86	366.87	52.40	440.10	1.64	13.74	438.15	3505.17	1.53	12.25	43.98	351.80	16,287	6.683	0.099	16,483.3
2027 (year 3)	6.05	68.33	38.47	307.78	45.24	382.77	1.38	11.62	415.99	3327.90	1.29	10.28	41.74	333.96	13,617	6.005	0.080	13,791.3
2028 (year 4)	6.11	68.78	40.51	335.52	45.49	387.68	1.39	11.70	798.68	6752.67	1.30	10.36	97.56	829.55	14,144	5.989	0.080	14,317.9
2029 (year 5)	5.98	67.72	38.27	317.60	44.53	379.99	1.35	11.42	731.38	6214.29	1.26	10.10	90.82	775.62	13,368	5.868	0.077	13,537.7
2030 (year 6)	5.82	66.46	37.97	315.21	42.83	366.43	1.31	11.06	804.25	6797.22	1.22	9.76	100.67	854.41	13,361	5.776	0.073	13,527.4
2031 (year 7)	5.81	66.40	37.80	313.87	42.75	365.81	1.30	11.04	304.75	2437.99	1.22	9.75	33.19	265.48	13,306	5.772	0.073	13,472.4
2032 (year 8)	0.29	7.01	3.46	83.46	3.94	94.87	0.09	2.20	0.87	20.87	0.08	2.04	0.13	3.04	1,847	0.186	0.005	1,852.7

Summary of Off-Road Fugitive Dust Emissions (lbs/day)

		PM 10 Fugitive Dust (lbs/day)		PM 10 Fugitive Dust (tons/year)		PM2.5 Fugitive Dust (lbs/day)		PM2.5 Fugitive Dust (tons/year)	
Construction	Days/Year	Raw Total	With BMPs	Raw Total	With BMPs	Raw Total	With BMPs	Raw Total	With BMPs
Year 1	83	5,242	2,621	218	109	524	262	21.8	10.9
Year 2	250	6,959	3,479	870	435	696	348	87.0	43.5
Year 3	250	6,609	3,305	826	413	661	330	82.6	41.3
Year 4	250	4,736	2,368	592	296	474	237	59.2	29.6
Year 5	250	3,663	1,831	458	229	366	183	45.8	22.9
Year 6	250	3,662	1,831	458	229	366	183	45.8	22.9
Year 7	250	3,662	1,831	458	229	366	183	45.8	22.9
Year 8	83	3.43	1.72	0.142	0.071	0.34	0.17	0.014	0.007

*Includes materials movement, pile storage, and construction activity (grading and earthmoving)

2000 lb/ton

Summary of Batch Plant Emissions

	Proposed: US 140 TAF HFD											
Construction Year	months (A)	days/year (A)	months (B)	days/year (B)	days overlap A+B	PM10 (lbs/day)	PM10 Max (lbs/day)	PM10 tons/year	PM-10 Max tons/year	PM2.5 (lbs/day)	PM2.5 Max (lbs/day)	PM2.5 tons/yr	PM2.5 Max (tons/yr)
1													
2													
3													
4	Feb-Dec	229				1162.4	4359	133.2	499.5	157.0	588.9	18.0	67.5
5	Feb-Dec	229				1162.4	4359	133.2	499.5	157.0	588.9	18.0	67.5
6	Feb-Dec	229	Jan-Dec	250	229	1453	4940.2	169.5	572.1	196.3	667.4	22.9	77.3
7			Jan-Dec	250		290.6	581.2	36.3	72.7	39.3	78.5	4.9	9.8
8													

Summary of Off-road Construction Equipment Emissions

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG
Construction Year	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MTyear	lb/day	MTyear	lb/day	MTyear	lb/day	MT-CO2e/year
2025 (year 1)	1.19	28.73	8.36	201.55	7.71	185.71	0.29	7.03	0.27	6.53	2,614	62,982	0.82	19.73	0.02	0.56	2,641
2026 (year 2)	6.05	48.37	37.89	303.16	48.47	387.74	1.55	12.37	1.47	11.76	11,253	90,024	6.68	53.46	0.10	0.79	11,450
2027 (year 3)	4.94	39.53	30.40	243.16	41.48	331.80	1.28	10.23	1.22	9.77	9,007	72,057	5.98	47.87	0.08	0.63	9,180
2028 (year 4)	5.02	40.16	31.40	251.19	41.91	335.30	1.30	10.39	1.24	9.93	9,172	73,374	5.99	47.91	0.08	0.64	9,346
2029 (year 5)	4.90	39.19	30.11	240.85	41.01	328.11	1.27	10.13	1.21	9.68	8,735	69,876	5.87	46.95	0.08	0.61	8,904
2030 (year 6)	4.72	37.78	28.71	229.71	39.18	313.45	1.22	9.74	1.16	9.32	8,342	66,734	5.77	46.17	0.07	0.59	8,508
2031 (year 7)	4.72	37.78	28.71	229.71	39.18	313.45	1.22	9.74	1.16	9.32	8,342	66,734	5.77	46.17	0.07	0.59	8,508
2032 (year 8)	0.26	6.34	1.63	39.36	3.16	76.15	0.07	1.79	0.07	1.65	595	14,336	0.19	4.48	0.01	0.13	601

Summary of Off-road Vegetative Clearing Equipment Emissions

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG
Construction Year	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MTyear	lb/day	MTyear	lb/day	MTyear	lb/day	MT-CO2e/year
2027 (year 3)	0.03750	0.30004	0.31981	2.55846	0.30213	2.41704	0.01314	0.10512	0.01225	0.09798	71.1	568.7	0.02164	0.17315	0.00064	0.00510	71.8
2030 (year 6)	0.00640	0.05122	0.05251	0.42008	0.06922	0.55376	0.00187	0.01498	0.00173	0.01386	13.5	108.1	0.00428	0.03426	0.00012	0.00098	13.7

Summary of On-road Emissions (Exhaust and Dust)

Truck Hauling (Dust)

			Proposed: US 140 TAF HFD			
Construction Year	Days/year	Total Daily VMT	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)
1	83	12,176	21.68	0.90	3.25	0.13
2	250	5,926	10.55	1.32	1.58	0.20
3	250	4,789	8.53	1.07	1.28	0.16
4	250	4,789	8.53	1.07	1.28	0.16
5	250	4,789	8.53	1.07	1.28	0.16
6	250	4,789	8.53	1.07	1.28	0.16
7	250	4,789	8.53	1.07	1.28	0.16
8	83	4,874	8.68	0.36	1.30	0.05

Truck Hauling (Exhaust)

	Proposed: US 140 TAF HFD												
Construction Year	Total Daily VMT	ROG (lbs/day)	ROG (tons/yr)	NOX (lbs/day)	NOX (tons/yr)	PM10 (lbs/day)	PM10 (tons/yr)	PM2.5 (lbs/day)	PM2.5 (tons/yr)	CO (lbs/day)	CO (tons/yr)	CO2 (lbs/day)	CO2 (MT/yr)
1	12,176	0.33	0.014	39.69	1.647	0.85	0.035	0.81	0.034	1.66	0.069	40,360	1,519
2	5,926	0.16	0.020	19.32	2.414	0.41	0.052	0.40	0.049	0.81	0.101	19,642	2,227
3	4,789	0.13	0.016	15.61	1.951	0.33	0.042	0.32	0.040	0.65	0.081	15,872	1,800
4	4,789	0.13	0.016	15.61	1.951	0.33	0.042	0.32	0.040	0.65	0.081	15,872	1,800
5	4,789	0.13	0.016	15.61	1.951	0.33	0.042	0.32	0.040	0.65	0.081	15,872	1,800
6	4,789	0.13	0.016	15.61	1.951	0.33	0.042	0.32	0.040	0.65	0.081	15,872	1,800
7	4,789	0.13	0.016	15.61	1.951	0.33	0.042	0.32	0.040	0.65	0.081	15,872	1,800
8	4,874	0.13	0.006	15.89	0.659	0.34	0.014	0.33	0.013	0.66	0.028	16,156	608

Worker Commute Trips (Dust)

					Proposed: US 140 TAF HFD			
Construction Year	Days/year	# Avg Workers/day	Average Trip Length	Daily VMT (miles)	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)
1	83	318	35	22,235	8.1	0.34	1.2	0.05
2	250	594	35	41,563	15.2	1.90	2.3	0.28
3	250	580	35	40,571	14.8	1.85	2.2	0.28
4	250	671	35	46,988	17.2	2.14	2.6	0.32
5	250	600	35	41,971	15.3	1.92	2.3	0.29
6	250	678	35	47,483	17.3	2.17	2.6	0.33
7	250	670	35	46,871	17.1	2.14	2.6	0.32
8	83	410	35	28,700	10.5	0.43	1.6	0.07

Worker Commute Trips (Exhaust)

	Proposed: US 140 TAF HFD												
Construction Year	# Avg Workers/day	Daily VMT (miles)	ROG (lbs/day)	ROG (tons/year)	NOx (lbs/day)	NOx (tons/year)	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)	CO (lbs/day)	CO (tons/year)	CO2 (lbs/day)	CO2 (MT/year)
1	318	22,235	0.422	0.018	2.198	0.091	0.059	0.002	0.054	0.002	33.656	1.397	13,239	498
2	594	41,563	0.788	0.099	4.109	0.514	0.110	0.014	0.101	0.013	62.910	7.864	24,747	2,806
3	580	40,571	0.769	0.096	4.011	0.501	0.107	0.013	0.099	0.012	61.409	7.676	24,156	2,739
4	671	46,988	0.891	0.111	4.645	0.581	0.124	0.016	0.114	0.014	71.122	8.890	27,977	3,173
5	600	41,971	0.796	0.100	4.149	0.519	0.111	0.014	0.102	0.013	63.528	7.941	24,990	2,834
6	678	47,483	0.901	0.113	4.694	0.587	0.126	0.016	0.116	0.014	71.872	8.984	28,272	3,206
7	670	46,871	0.889	0.111	4.634	0.579	0.124	0.015	0.114	0.014	70.945	8.868	27,907	3,165
8	410	28,700	0.544	0.023	2.837	0.118	0.076	0.003	0.070	0.003	43.441	1.803	17,088	643

Haul Trucks plus 50% Worker Commute Trips (Exhaust)

	Proposed: US 140 TAF HFD												
Construction Year	Daily VMT (miles)	ROG (lbs/day)	ROG (tons/year)	NOx (lbs/day)	NOx (tons/year)	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)	CO (lbs/day)	CO (tons/year)	CO2 (lbs/day)	CO2 (MT/year)
1	23,294	0.544	0.086	40.789	6.478	0.878	0.139	0.839	0.133	18.484	2.936	46,979	6,769
2	26,707	0.556	0.165	21.370	6.344	0.468	0.139	0.446	0.132	32.261	9.578	32,015	8,622
3	25,074	0.516	0.149	17.614	5.104	0.387	0.112	0.369	0.107	31.356	9.087	27,950	7,348
4	28,282	0.577	0.194	17.931	6.018	0.396	0.133	0.376	0.126	36.212	12.154	29,860	9,092
5	25,774	0.529	0.159	17.683	5.301	0.389	0.117	0.370	0.111	32.415	9.718	28,367	7,715
6	28,530	0.581	0.197	17.956	6.090	0.397	0.134	0.377	0.128	36.587	12.409	30,008	9,233
7	28,224	0.575	0.193	17.925	6.001	0.396	0.132	0.376	0.126	36.124	12.094	29,825	9,059
8	19,224	0.406	0.083	17.306	3.548	0.378	0.077	0.360	0.074	22.384	4.589	24,700	4,594

2204.6 lb/MT

Haul Trucks plus 50% Worker Commute Trips (Dust)

		Proposed: US 140 TAF HFD			
Construction Year	Total Daily VMT	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)
1	23,294	25.74	1.07	3.86	0.16
2	26,707	18.14	2.27	2.72	0.34
3	25,074	15.93	1.99	2.39	0.30
4	28,282	17.10	2.14	2.57	0.32
5	25,774	16.19	2.02	2.43	0.30
6	28,530	17.19	2.15	2.58	0.32
7	28,224	17.08	2.14	2.56	0.32
8	19,224	13.92	0.58	2.09	0.087

Summary of Helicopter Emissions

Total Days Helicopter Used per Year	70	5 hrs/day
Total Hours Helicopter Used per Year	348	

Emissions

	HC	ROG (5)	NOX	(use as PM10) PM Non-Volatile		
Max Emissions (lbs/day)	21.8	27.6	28.9	0.849	lb/day	July 15-Dec 1 (years 2-7)
Annual Emissions (tons/yea	0.76	0.96	1.01	0.030	ton/year	July 15-Dec 1 (years 2-7)

* Assume AS 365 N3 Dauphin with Arriel 2C

Summary of Blasting Emissions

Blasting	Proposed: US 140 TAF HFD									
Year	Blasts/Day	Blasts/Year	tons/blast	lb-CO/day	lb-CO/yr	lb-NOx/day	lb-NOx/yr	lb-SO2/day	lb-SO2/yr	CH4
1	0	0	0	0	0	0	0	0	0	
2	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	
4	1	22	0.1875	12.5625	276.375	3.1875	70.125	0.375	8.25	NA
5	1	22	0.1875	12.5625	276.375	3.1875	70.125	0.375	8.25	NA
6	1	22	0.1875	12.5625	276.375	3.1875	70.125	0.375	8.25	NA
7	1	22	0.1875	12.5625	276.375	3.1875	70.125	0.375	8.25	NA
8	0	0	0	0	0	0	0	0	0	

Exhaust Emissions

Off-road Diesel Construction Equipment
On-road Haul Truck Trips
On-road Worker Trips
Vegetative Clearing Equipment

Off-Road Equipment Emissions - PREP Proposed Project (US 140 TAF HFO)

Unit Type		**Unit**	**Source**
Diesel Fuel	Mass Conversion Rates	453.59 g/lb	google.com
Heat Content		2000 lb/ton	google.com
Backfill Sand		2204.62 lb/MT	google.com

Summary of Equipment and Labor Hours

| Code | Equipment Classification & Description / Description | Equip Hours | reference | hp | load factor (CalEEMod Default) | Cumulative | | | | | | | | | | Year 1 (7 months) | | | | | | | | | | Year 2 (12 months) | | | | | | | | | | Year 3 (12 months) | | | | | | | | | | Year 4 (12 months) | | | | | | | | | | Year 5 (12 months) | | | | | | | | | | Year 6 (12 months) | | | | | | | | | | Year 7 (12 months) | | | | | | | | | | Year 8 (5 months) | | | | | | | | | |
|---|---|---|---

Proposed Project: Off-Road Equipment Annual & Daily Emissions Summary

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG		
	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT-CO2e/yr	Months/Year	Days/Year
2025 (year 1)	1.19	28.73	8.36	201.55	7.71	185.71	0.29	7.03	0.27	6.53	2,614	62,982	0.82	19.73	0.02	0.56	2,641.2	4	83
2026 (year 2)	6.05	48.37	37.89	303.16	48.47	387.74	1.55	12.37	1.47	11.76	11,253	90,024	6.68	53.46	0.10	0.79	11,449.7	12	250
2027 (year 3)	4.94	39.53	30.40	243.16	41.48	331.80	1.28	10.23	1.22	9.77	9,007	72,057	5.98	47.87	0.08	0.63	9,180.3	12	250
2028 (year 4)	5.02	40.16	31.40	251.19	41.91	335.30	1.30	10.39	1.24	9.93	9,172	73,374	5.99	47.91	0.08	0.64	9,345.5	12	250
2029 (year 5)	4.90	39.19	30.11	240.85	41.01	328.11	1.27	10.13	1.21	9.68	8,735	69,876	5.87	46.95	0.08	0.61	8,904.1	12	250
2030 (year 6)	4.72	37.78	28.71	229.71	39.18	313.45	1.22	9.74	1.16	9.32	8,342	66,734	5.77	46.17	0.07	0.59	8,507.9	12	250
2031 (year 7)	4.72	37.78	28.71	229.71	39.18	313.45	1.22	9.74	1.16	9.32	8,342	66,734	5.77	46.17	0.07	0.59	8,507.9	12	250
2032 (year 8)	0.26	6.34	1.63	39.36	3.16	76.15	0.07	1.79	0.07	1.65	595	14,336	0.19	4.48	0.01	0.13	601.2	4	83
																		6.7	

		Unit	Source	
Mass Conversion Rates	453.59	g/lb	google.com	80
	2000	lb/ton	google.com	
	25	ton-CO2e/	GWP CH4	
	298	ton-CO2e/	GWP N2O	

On-Road Emissions

Truck Hauling (Exhaust)

Exhaust emission rates shown on "Haul Truck Exhaust Em. Rts." worksheet

	Proposed: US 140 TAF HFD						
Construction Year	Total Daily VMT	ROG (lbs/day)	NOX (lbs/day	PM10 (lbs/day)	PM2.5 (lbs/day	CO (lbs/day)	CO2 (lbs/day)
1	12,176	0.33	39.69	0.85	0.81	1.66	40,360
2	5,926	0.16	19.32	0.41	0.40	0.81	19,642
3	4,789	0.13	15.61	0.33	0.32	0.65	15,872
4	4,789	0.13	15.61	0.33	0.32	0.65	15,872
5	4,789	0.13	15.61	0.33	0.32	0.65	15,872
6	4,789	0.13	15.61	0.33	0.32	0.65	15,872
7	4,789	0.13	15.61	0.33	0.32	0.65	15,872
8	4,874	0.13	15.89	0.34	0.33	0.66	16,156

On-Road Emissions

Worker Commute Trips (Exhaust)

Exhaust emission rates shown on "Worker Trip Exhaust Em. Rts." worksheet

Proposed: US 140 TAF HFD

Construction Year	# Avg Workers/ day	Daily VMT (miles)	ROG (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO (lbs/day)	CO2 (lbs/day)
1	318	22,235	0.422	2.198	0.059	0.054	33.656	13,239
2	594	41,563	0.788	4.109	0.110	0.101	62.910	24,747
3	580	40,571	0.769	4.011	0.107	0.099	61.409	24,156
4	671	46,988	0.891	4.645	0.124	0.114	71.122	27,977
5	600	41,971	0.796	4.149	0.111	0.102	63.528	24,990
6	678	47,483	0.901	4.694	0.126	0.116	71.872	28,272
7	670	46,871	0.889	4.634	0.124	0.114	70.945	27,907
8	410	28,700	0.544	2.837	0.076	0.070	43.441	17,088

Notes

1 Daily Truck Hauling trips based on total material import/export required

2 Average trip length obtained from Stantec

3 Daily VMT by workers = # workers * trips per worker * trip length

Off-Road Vegetative Clearing Equipment Emissions

		Unit	Source
Mass Conversion Rates	453.59	g/lb	google.com
	2000	lb/ton	google.com
	2204.62	lb/MT	google.com

				Emission Factors								Year 3	Proposed Proj US 140 TAF HFD							
Equipment Classification & Description		hp	load	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O	Equip	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O
Code	Description		factor	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	Hours	ton/year	ton/year	ton/year	ton/year	ton/year	MT/year	MT/year	MT/year
	6000 Gal Water Truck	260	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004274	200	0.0039	0.0258	0.0232	0.0008	0.0008	9.3854	0.0030	0.0001
	Chainsaws 25 Hsp	25	0.73	0.685	2.339	4.332	0.161	0.161	568.299	0.061	0.004751	600	0.0083	0.0282	0.0523	0.0019	0.0019	6.2229	0.0007	0.0001
	Medium Feller/Buncher 175 Hsp	175	0.4	0.2347	3.13647	2.16742	0.1121	0.1031	469.843	0.152	0.004274	100	0.0018	0.0242	0.0167	0.0009	0.0008	3.2889	0.0011	0.0000
	Large Feller/Buncher 300 Hsp	300	0.4	0.1684	1.3582	1.55241	0.0594	0.0547	476.2959	0.154	0.004274	100	0.0022	0.0180	0.0205	0.0008	0.0007	5.7156	0.0018	0.0001
	Medium Skidder 175 Hsp	175	0.37	0.1869	2.92602	1.9987	0.0942	0.0867	471.0403	0.1523	0.004274	100	0.0013	0.0209	0.0143	0.0007	0.0006	3.0500	0.0010	0.0000
	Large Skidder 175 Hsp	175	0.37	0.1869	2.92602	1.9987	0.0942	0.0867	471.0403	0.1523	0.004274	100	0.0013	0.0209	0.0143	0.0007	0.0006	3.0500	0.0010	0.0000
	Loader Rubber Tired 300 Hsp	300	0.36	0.1931	1.2763	1.43264	0.0525	0.0483	469.1434	0.1517	0.004274	200	0.0046	0.0304	0.0341	0.0013	0.0012	10.1335	0.0033	0.0001
	Masticator on Excavator 175 Hsp	175	0.38	0.1578	3.078	1.15367	0.0566	0.052	472.4964	0.1528	0.004274	200	0.0023	0.0451	0.0169	0.0008	0.0008	6.2842	0.0020	0.0001
	Whole Tree Chipper 300 Hsp	300	0.42	0.1684	1.3582	1.55241	0.0594	0.0547	476.2959	0.154	0.004274	300	0.0070	0.0566	0.0647	0.0025	0.0023	18.0040	0.0058	0.0002
	Large Diameter Chipper/Shredder 100 Hsp	100	0.42	0.3413	3.58397	3.25221	0.2029	0.1867	472.7482	0.1529	0.004274	300	0.0047	0.0498	0.0452	0.0028	0.0026	5.9566	0.0019	0.0001

These equipment types/ratings consistent with CalFire VTP PEIR, Appendix AQ-1 Treatment Activity Emissions Prepared by Ascent

				Emission Factors								Year 6	Proposed Proj US 140 TAF HFD							
Equipment Classification & Description		hp	load	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O	Equip	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O
Code	Description		factor	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	Hours	ton/year	ton/year	ton/year	ton/year	ton/year	MT/year	MT/year	MT/year
	67 Ton Off Hwy Truck 870 Hsp (Cat 777)	870	0.38	0.19	1.15	3.14	0.06	0.05	473.37	0.15	0.00	40	0.0027	0.0167	0.0457	0.0008	0.0008	6.2598	0.0020	0.0001
	6000 Gal Water Truck	260	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004274	40	0.0008	0.0052	0.0046	0.0002	0.0002	1.8771	0.0006	0.0000
	Chainsaws 25 Hsp	25	0.73	0.685	2.339	4.332	0.161	0.161	568.299	0.061	0.004751	40	0.0006	0.0019	0.0035	0.0001	0.0001	0.4149	0.0000	0.0000
	Rotary Mower 25 Hsp	25	0.42	0.7571	4.87388	4.30575	0.2678	0.2464	528.9535	0.1711	0.004751	40	0.0004	0.0023	0.0020	0.0001	0.0001	0.2222	0.0001	0.0000
	Small Diameter Chipper 25 Hsp	25	0.42	0.7571	4.87388	4.30575	0.2678	0.2464	528.9535	0.1711	0.004751	40	0.0004	0.0023	0.0020	0.0001	0.0001	0.2222	0.0001	0.0000
	Tractor/Loader/Backhoe 25 Hsp	25	0.37	0.55	4.55974	3.66186	0.145	0.1334	513.8025	0.1662	0.004751	40	0.0002	0.0019	0.0015	0.0001	0.0001	0.1901	0.0001	0.0000
	Tractor/Loader/Backhoe 175 Hsp	175	0.37	0.1619	3.08323	1.18039	0.0585	0.0538	469.3289	0.1518	0.004274	40	0.0005	0.0088	0.0034	0.0002	0.0002	1.2156	0.0004	0.0000
	Masticator on Excavator 175 Hsp	175	0.38	0.1578	3.078	1.15367	0.0566	0.052	472.4964	0.1528	0.004274	40	0.0005	0.0090	0.0034	0.0002	0.0002	1.2568	0.0004	0.0000
	Flail/Mulcher on Excavator 260 Hsp	260	0.38	0.1152	1.05072	0.72641	0.0257	0.0236	470.2915	0.1521	0.004274	40	0.0005	0.0046	0.0032	0.0001	0.0001	1.8586	0.0006	0.0000

Off-Road Vegetative Clearing Equipment Emissions

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG		
	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT-CO2e/yr	Months/Year	Days/Year
Proposed Proj US 140 TAF HFD																			
2027 (year 3)	0.03750	0.30004	0.320	2.56	0.302	2.42	0.01314	0.10512	0.01225	0.09798	71.091	568.73	0.022	0.17	0.00064	0.00510	71.8	12	250
2030 (year 6)	0.00640	0.05122	0.053	0.42	0.069	0.55	0.00187	0.01498	0.00173	0.01386	13.517	108.14	0.00428	0.03426	0.00012	0.00098	13.7	12	250
Alt A (US 140 TAF EFD)																			
2027 (year 3)	0.06436	0.51486	0.588	4.70	0.534	4.27	0.02332	0.18656	0.02169	0.17355	125.300	1002.40	0.039	0.31	0.00113	0.00900	126.6	12	250
2030 (year 6)	0.00160	0.01281	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250
Alt B (US 96 TAF EFD)																			
2027 (year 3)	0.04909	0.39273	0.448	3.59	0.409	3.28	0.01799	0.14394	0.01673	0.13382	95.790	766.32	0.030	0.24	0.00086	0.00688	96.8	12	250
2030 (year 6)	0.00160	0.01281	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250
Alt C (DS 140 TAF HFD)																			
2027 (year 3)	0.00544	0.04351	0.258	2.07	0.236	1.89	0.01036	0.08287	0.00963	0.07705	55.182	441.45	0.017	0.14	0.00050	0.00396	55.8	12	250
2030 (year 6)	0.05856	0.46852	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250
Alt D (DS 140 TAF EFD)																			
2027 (year 3)	0.00368	0.02941	0.390	3.12	0.365	2.92	0.01580	0.12641	0.01476	0.11810	83.135	665.08	0.025	0.20	0.00074	0.00596	84.0	12	250
2030 (year 6)	0.03004	0.24036	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250

		Unit	Source
Mass Conversion Rates	453.59	g/lb	google.com
	2000	lb/ton	google.com
	25	ton-CO2e/	GWP CH4
	298	ton-CO2e/	GWP N2O

Fugitive Dust Emissions

Material Piles and Earthmoving
On-road Haul Truck Trips
On-road Worker Trips

Off-Road Fugitive Dust Emissions

1. Earthwork

Off-Road Fugitive Dust Emissions

Off-Road Fugitive Dust Emissions

Construction Year	Proposed: US 140 TAF HFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	377,764	604,421.93	446,130	713,808.77	1,318,230.70	15,882.30	**5,228.73**
Year 2	1,511,055	2,417,687.71	1,784,522	2,855,235.09	5,272,922.81	21,091.69	**6,943.76**
Year 3	1,636,564	2,618,501.93	1,495,130	2,392,208.77	5,010,710.70	20,042.84	**6,598.46**
Year 4	834,894	1,335,830.00	1,407,790	2,252,463.61	3,588,293.61	14,353.17	**4,725.32**
Year 5	557,094	891,350.00	1,176,290	1,882,063.61	2,773,413.61	11,093.65	**3,652.23**
Year 6	557,094	891,350.00	1,176,290	1,882,063.61	2,773,413.61	11,093.65	**3,652.23**
Year 7	557,094	891,350.00	1,176,290	1,882,063.61	2,773,413.61	11,093.65	**3,652.23**
Year 8							

Construction Year	Alt A: US 140 TAF EFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	422,369	675,791.02	531,099	849,757.90	1,525,548.92	18,380.11	**6,051.06**
Year 2	3,386,987	5,419,178.63	5,072,077	8,115,322.51	13,534,501.14	54,138.00	**17,823.19**
Year 3	889,091	1,422,545.45	1,481,818	2,370,909.09	3,793,454.55	15,173.82	**4,995.49**
Year 4	3,781,935	6,051,095.44	2,623,751	4,198,002.05	10,249,097.49	40,996.39	**13,496.74**
Year 5	3,781,935	6,051,095.44	2,623,751	4,198,002.05	10,249,097.49	40,996.39	**13,496.74**
Year 6	3,781,935	6,051,095.44	2,623,751	4,198,002.05	10,249,097.49	40,996.39	**13,496.74**
Year 7	1,890,967	3,025,547.72	1,311,876	2,099,001.02	5,124,548.75	20,498.19	**6,748.37**
Year 8							

Construction Year	Alt B: US 96 TAF EFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	521,166	833,865.69	676,584	1,082,534.76	1,916,400.45	23,089.16	**7,601.36**
Year 2	3,238,088	5,180,957.08	4,939,253	7,902,804.28	13,083,761.36	52,335.05	**17,229.62**
Year 3	438,000	700,800.00	730,000	1,168,000.00	1,868,800.00	7,475.20	**2,460.97**
Year 4	3,554,122	5,686,595.81	2,270,263	3,632,420.13	9,319,015.94	37,276.06	**12,271.94**
Year 5	3,554,122	5,686,595.81	2,270,263	3,632,420.13	9,319,015.94	37,276.06	**12,271.94**
Year 6	3,554,122	5,686,595.81	2,270,263	3,632,420.13	9,319,015.94	37,276.06	**12,271.94**
Year 7							
Year 8							

Construction Year	Alt C: DS 140 TAF HFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)[1]	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	425,518	680,828.34	943,793	1,510,068.54	2,190,896.88	26,396.35	**8,690.14**
Year 2	1,276,553	2,042,485.02	2,831,379	4,530,205.62	6,572,690.64	26,290.76	**8,655.38**
Year 3	1,256,890	2,011,024.00	1,041,500	1,666,400.00	3,677,424.00	14,709.70	**4,842.69**
Year 4	1,511,931	2,419,090.29	1,823,784	2,918,053.77	5,337,144.06	21,348.58	**7,028.33**
Year 5	567,506	908,009.14	1,248,202	1,997,123.93	2,905,133.08	11,620.53	**3,825.68**
Year 6	567,506	908,009.14	1,248,202	1,997,123.93	2,905,133.08	11,620.53	**3,825.68**
Year 7	567,506	908,009.14	1,248,202	1,997,123.93	2,905,133.08	11,620.53	**3,825.68**
Year 8	412,731	660,370.29	907,784	1,452,453.77	2,112,824.06	8,451.30	**2,782.32**

Construction Year	Alt D: DS 140 TAF EFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)[1]	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	315,478	504,764.38	615,377	984,603.72	1,489,368.10	17,944.19	**5,907.55**
Year 2	2,727,494	4,363,990.86	4,941,870	7,906,992.65	12,270,983.51	49,083.93	**16,159.30**
Year 3	2,395,394	3,832,631.05	3,956,016	6,329,625.94	10,162,256.99	40,649.03	**13,382.38**
Year 4	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	39,180.01	**12,898.75**
Year 5	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	39,180.01	**12,898.75**
Year 6	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	39,180.01	**12,898.75**
Year 7	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	42,772.94	**14,081.61**
Year 8	1,420,206	2,272,329.60	875,498	1,400,796.21	3,673,125.81	25,158.40	**8,282.59**

Conversion Rates
2000 lbs/ton
1.6 ton/cy

Source
google.com
calculatorsoup.com

Notes
1. Calulation using emission factor for PM10 shown on "Fugitive Dust Emission Factors" worksheet.
2. Emission estimates for fugitive dust from material movement were based on the material totals for all material import and waste exported. These are the activities that would result in on-site fugitive dust emissions.
Values of 0.0 indicate that no material import/export would be required for that particular construction year.

2. Construction Activity (grading and earthmoving)

		Proposed: US 140 TAF HFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)	Alt A: US 140 TAF EFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)
Year 1	231 Hsp Dozer (Cat D-7H)	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00
	Motor Grader (CAT 140G)	1478	17.8	8.46	1332	16.0	7.62
	Dozer (CAT D8)	529	6.4	3.03	529	6.4	3.03
	Dozer (CAT D6)	344	4.1	1.97	344	4.1	1.97
	140 Hp Bulldozer	0	0.0	0.00	0	0.0	0.00
Total				**13.45**			**12.62**
Year 2	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	1478	5.9	2.81	1332	5.3	2.53
	Dozer (CAT D8)	529	2.1	1.01	529	2.1	1.01
	Dozer (CAT D6)	344	1.4	0.65	344	1.4	0.65
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**15.13**			**25.54**
Year 3	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.66**			**21.35**
Year 4	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.66**			**21.35**
Year 5	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.66**			**21.35**
Year 6	231 Hsp Dozer (Cat D-7H)	4161	16.6	7.91	791	3.2	1.50
	520 Hsp Dozer with Disc (Cat D-10N)	1113	4.5	2.11	7239	29.0	13.75
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2461	9.8	4.68
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.09**			**20.00**
Year 7	231 Hsp Dozer (Cat D-7H)	4161	16.6	7.91	791	3.2	1.50
	520 Hsp Dozer with Disc (Cat D-10N)	1113	4.5	2.11	7239	29.0	13.75
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2461	9.8	4.68
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.09**			**20.00**
Year 8	231 Hsp Dozer (Cat D-7H)	500	6.0	2.86	120	5.7	2.71
	520 Hsp Dozer with Disc (Cat D-10N)	100	1.2	0.57	1000	47.6	22.62
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	300	14.3	6.79
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	0	0.0	0.00	0	0.0	0.00
Total				**3.43**			**32.12**

		Alt B: US 96 TAF EFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)	Alt C: DS 140 TAF HFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)	Alt D: DS 140 TAF EFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)
Year 1	231 Hsp Dozer (Cat D-7H)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Motor Grader (CAT 140G)	1177	14.2	6.74	1176	14.2	6.73	1784	21.5	10.21
	Dozer (CAT D8)	562	6.8	3.22	585	7.0	3.35	794	9.6	4.55
	Dozer (CAT D6)	316	3.8	1.81	282	3.4	1.61	473	5.7	2.71
	140 Hp Bulldozer	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Total				**11.76**			**11.69**			**17.46**
Year 2	231 Hsp Dozer (Cat D-7H)	724	2.9	1.38	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	6286	25.1	11.94	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2013	8.1	3.82	1328	5.3	2.52	2815	11.3	5.35
	Motor Grader (CAT 140G)	1177	4.7	2.24	1176	4.7	2.23	1190	4.8	2.26
	Dozer (CAT D8)	562	2.2	1.07	585	2.3	1.11	530	2.1	1.01
	Dozer (CAT D6)	316	1.3	0.60	282	1.1	0.54	315	1.3	0.60
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**21.12**			**17.95**			**24.84**
Year 3	231 Hsp Dozer (Cat D-7H)	724	2.9	1.38	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1328	5.3	2.52	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**19.83**			**14.07**			**20.97**
Year 4	231 Hsp Dozer (Cat D-7H)	824	3.3	1.57	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1328	5.3	2.52	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**20.01**			**14.07**			**20.97**
Year 5	231 Hsp Dozer (Cat D-7H)	824	3.3	1.57	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1228	4.9	2.33	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**20.01**			**13.88**			**20.97**
Year 6	231 Hsp Dozer (Cat D-7H)	824	3.3	1.57	813	3.3	1.54	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1178	4.7	2.24	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**20.01**			**13.74**			**20.97**
Year 7	231 Hsp Dozer (Cat D-7H)	424	4.1	1.94	733	2.9	1.39	1333	5.8	2.77
	520 Hsp Dozer with Disc (Cat D-10N)	2286	22.0	10.44	3206	12.8	6.09	6855	29.9	14.22
	520 Hsp Dozer with Disc (Cat D-10N)	514	4.9	2.35	1178	4.7	2.24	2815	12.3	5.84
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.4	0.17	37	0.1	0.07	37	0.2	0.08
Total				**14.89**			**9.79**			**22.90**
Year 8	231 Hsp Dozer (Cat D-7H)				120	0.5	0.23	889	6.1	2.89
	520 Hsp Dozer with Disc (Cat D-10N)				2000	8.0	3.80	4570	31.3	14.87
	520 Hsp Dozer with Disc (Cat D-10N)				400	1.6	0.76	1877	12.9	6.10
	Motor Grader (CAT 140G)				0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)				0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)				0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer				0	0.0	0.00	0	0.0	0.00
Total							**4.79**			**23.86**

3. Summary of Off-Road Fugitive Dust Emissions (lbs/day)

Construction Year	PM 10 Fugitive Dust (lbs/day) Proposed: US 140 TAF HF	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD	PM2.5 Fugitive Dust (lbs/day) Proposed: US 140 TAF H	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD
Year 1	5,242	6,064	7,613	8,702	5,925	524	606	761	870	593
Year 2	6,959	17,849	17,251	8,673	16,184	696	1,785	1,725	867	1,618
Year 3	6,609	5,017	2,481	4,857	13,403	661	502	248	486	1,340
Year 4	4,736	13,518	12,292	7,042	12,920	474	1,352	1,229	704	1,292
Year 5	3,663	13,518	12,292	3,840	12,920	366	1,352	1,229	384	1,292
Year 6	3,662	13,517	12,292	3,839	12,920	366	1,352	1,229	384	1,292
Year 7	3,662	6,768	15	3,835	14,105	366	677	1.49	384	1,410
Year 8	3.43	32	-	2,787	8,306	0.34	3.21	-	279	831

Construction Year	PM 10 Fugitive Dust (lbs/day) - With BMPs Proposed: US 140 TAF HF	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD	PM2.5 Fugitive Dust (lbs/day) - With BMPs Proposed: US 140 TAF H	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD
Year 1	2,621	3,032	3,807	4,351	2,963	262	303	381	435	296
Year 2	3,479	8,924	8,625	4,337	8,092	348	892	863	434	809
Year 3	3,305	2,508	1,240	2,428	6,702	330	251	124	243	670
Year 4	2,368	6,759	6,146	3,521	6,460	237	676	615	352	646
Year 5	1,831	6,759	6,146	1,920	6,460	183	676	615	192	646
Year 6	1,831	6,758	6,146	1,920	6,460	183	676	615	192	646
Year 7	1,831	3,384	7.4	1,918	7,052	183	338	0.74	192	705
Year 8	1.72	16	-	1,394	4,153	0.17	1.61	-	139	415

Cut (CY)						
Alternative	Dam Foundation/ Spillway Excavation	Existing Dam Excavation	Shell Borrow Areas Excavation	Core Borrow Areas Excavation	Double Handle Stockpiled Material	Roadway
US 140 TAF HFD	926,000	354,500	4,705,159	0	0	2,676,783
US 140 TAF EFD	4,075,000	354,500	5,319,033	1,699,897	2,164,200	2,655,493
US 96 TAF EFD	3,285,000	354,500	3,711,984	1,297,004	1,801,800	2,706,337
DS 140 TAF HFD	1,603,000	354,500	5,560,175	0	0	3,775,171
DS 140 TAF EFD	5,466,500	354,500	5,971,934	2,041,645	2,200,560	3,692,264

Cut by Year (CY)								
Alternative	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
US 140 TAF HFD	446,130	1,784,522	1,495,130	1,407,790	1,176,290	1,176,290	1,176,290	
US 140 TAF EFD	531,099	5,072,077	1,481,818	2,623,751	2,623,751	2,623,751	1,311,876	
US 96 TAF EFD	676,584	4,939,253	730,000	2,270,263	2,270,263	2,270,263		
DS 140 TAF HFD	943,793	2,831,379	1,041,500	1,823,784	1,248,202	1,248,202	1,248,202	907,784
DS 140 TAF EFD	615,377	4,941,870	3,956,016	2,334,660	2,334,660	2,334,660	2,334,660	875,498

Fill (CY)						
Alternative	Disposal (Dam Foundation / Spillway Excavation)	Disposal (Existing Dam)	Embankment	Disposal (Borrow Areas)	Double Handle Stockpiled Material	Roadway
US 140 TAF HFD	1,111,200	425,400	0	2,228,375	0	2,266,582
US 140 TAF EFD	2,445,000	141,600	10,600,000	472,571	2,164,200	2,111,847
US 96 TAF EFD	1,971,000	141,600	8,500,000	360,567	1,801,800	2,084,664
DS 140 TAF HFD	1,923,600	432,490	0	2,527,980	0	1,702,071
DS 140 TAF EFD	3,403,500	142,000	13,800,000	568,510	2,200,560	1,892,866

Fill by Year (CY)								
Alternative	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
US 140 TAF HFD	377,764	1,511,055	1,636,564	834,894	557,094	557,094	557,094	
US 140 TAF EFD	422,369	3,386,987	889,091	3,781,935	3,781,935	3,781,935	1,890,967	
US 96 TAF EFD	521,166	3,238,098	438,000	3,554,122	3,554,122	3,554,122		
DS 140 TAF HFD	425,518	1,276,553	1,256,890	1,511,931	567,506	567,506	567,506	412,731
DS 140 TAF EFD	315,478	2,727,494	2,395,394	3,787,216	3,787,216	3,787,216	3,787,216	1,420,206

Assumptions

1. Evenly proportion earthwork during the months those activities are performed on the schedule.
2. Borrow areas and stockpiled material activities take place during dam construction.

On-Road Emissions

Truck Hauling (Dust)

Emission factor used is equation for travel on paved roads shown on worksheet "Fugitive Dust Emfacs"

	Proposed: US 140 TAF HFD														
		Annual Truck Hauling Trips (round trips)													
Construction Year	Days/year	Offsite Import	Onsite	Offsite Water	Total	Round Trips	West Imports	East Imports	Onsite VMT	West VMT	East VMT	Water Trucks VMT	Total Daily VMT	**PM10 (lbs/day)**	**PM2.5 (lbs/day)**
1	83	10612	8750	8000	27362	27362	13681	13681	17500	458,314	478,835	56,000	12,176	**21.68**	**3.25**
2	250	15231	26250	200	41681	41681	20841	20841	52500	698,157	729,418	1,400	5,926	**10.55**	**1.58**
3	250	6929	26250	200	33379	33379	16690	16690	52500	559,098	584,133	1,400	4,789	**8.53**	**1.28**
4	250	6929	26250	200	33379	33379	16690	16690	52500	559,098	584,133	1,400	4,789	**8.53**	**1.28**
5	250	6929	26250	200	33379	33379	16690	16690	52500	559,098	584,133	1,400	4,789	**8.53**	**1.28**
6	250	6929	26250	200	33379	33379	16690	16690	52500	559,098	584,133	1,400	4,789	**8.53**	**1.28**
7	250	6929	26250	200	33379	33379	16690	16690	52500	559,098	584,133	1,400	4,789	**8.53**	**1.28**
8	83	2310	8750	200	11260	11260	5630	5630	17500	188,605	197,050	1,400	4,874	**8.68**	**1.30**

Truck Hauling (Exhaust)

Exhaust emission rates shown on "Haul Truck Exhaust Em. Rts." worksheet

	Proposed: US 140 TAF HFD						
Construction Year	Total Daily VMT	ROG (lbs/day)	NOX (lbs/day	PM10 (lbs/day)	PM2.5 (lbs/day	CO (lbs/day)	CO2 (lbs/day)
1	12,176	0.33	39.69	0.85	0.81	1.66	40,360
2	5,926	0.16	19.32	0.41	0.40	0.81	19,642
3	4,789	0.13	15.61	0.33	0.32	0.65	15,872
4	4,789	0.13	15.61	0.33	0.32	0.65	15,872
5	4,789	0.13	15.61	0.33	0.32	0.65	15,872
6	4,789	0.13	15.61	0.33	0.32	0.65	15,872
7	4,789	0.13	15.61	0.33	0.32	0.65	15,872
8	4,874	0.13	15.89	0.34	0.33	0.66	16,156

On-Road Emissions

Worker Commute Trips (Dust)

Emission factor used is equation for travel on paved roads shown on worksheet "Fugitive Dust Emfac

Proposed: US 140 TAF HFD

Constructi on Year	# Avg Workers/d ay	Average Trip Length	Daily VMT (miles)	PM10 (lbs/day)	PM2.5 (lbs/day)
1	318	35	22,235	**8.1**	**1.2**
2	594	35	41,563	**15.2**	**2.3**
3	580	35	40,571	**14.8**	**2.2**
4	671	35	46,988	**17.2**	**2.6**
5	600	35	41,971	**15.3**	**2.3**
6	678	35	47,483	**17.3**	**2.6**
7	670	35	46,871	**17.1**	**2.6**
8	410	35	28,700	**10.5**	**1.6**

Worker Commute Trips (Exhaust)

Exhaust emission rates shown on "Worker Trip Exhaust Em. Rts." worksheet

Proposed: US 140 TAF HFD

ıstruction Y	Workers/d ay	Daily VMT (miles)	ROG (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO (lbs/day)	CO2 (lbs/day)
1	318	22,235	0.422	2.198	0.059	0.054	33.656	13,239
2	594	41,563	0.788	4.109	0.110	0.101	62.910	24,747
3	580	40,571	0.769	4.011	0.107	0.099	61.409	24,156
4	671	46,988	0.891	4.645	0.124	0.114	71.122	27,977
5	600	41,971	0.796	4.149	0.111	0.102	63.528	24,990
6	678	47,483	0.901	4.694	0.126	0.116	71.872	28,272
7	670	46,871	0.889	4.634	0.124	0.114	70.945	27,907
8	410	28,700	0.544	2.837	0.076	0.070	43.441	17,088

Notes

1 Daily Truck Hauling trips based on total material import/export required for each alternat

2 Average trip length obtained from Stantec

3 Daily VMT by workers = # workers * trips per worker * trip length

Helicopter Emissions

Helicopter Emissions

Helicopter operation	**Value**	Source	
Gallons of jet fuel used per hour	100	FOCA 2015 - used Kaman K-1200	
Gallons of fuel used per LTO	15	FOCA 2015 - used Kaman K-1200	
Average hours/use (assumes 2 LTO)	5	Applicant data	
Total Days Helicopter Used per Year	70	Applicant data	July 15 - December 1 (Years 2-7)
Total Hours Helicopter Used per Year	348	Applicant data	
Gallons used for LTO	1,084	calculated	
Gallons used for cruising	34,914	calculated	
Total gallons used per year	35,998	calculated	
Jet A Emissions Factor (kg CO2/gal)	9.7497	Climate Registry 2017 Emission Factors	
Jet A Emissions Factor (kg N2O/gal)	0.000308	Climate Registry 2017 Emission Factors	
GWP N2O	298		
LTO MTCO2E	10.67		
Cruising MTCO2E	343.61		
Total MTCO2E	354.28		
Note: No emission factor available for CH4 helicopter emissions.			

Helicopter Information	Value	Source
Aircraft Type	Helicopter	
Engine Type	T53 17A-1	FOCA 2015
Engine SHP	1500	FOCA 2015
Number of engines	1	FOCA 2015
Mean operating percent power per engine for large twin turboshaft helicopters	62%	FOCA 2015
Fuel flow per engine for engines up to 1000 SHP (kg/s)	0.2303889	FOCA 2015
Fuel flow per hour (kg/h)	514	FOCA 2015

Emissions Calculations							
	HC	ROG (5)	NOX	PM Non-Volatile	Source		
LTO EF (g/LTO)*	667	845	285	9	FOCA 2009		
Cruising EF (g/hour)*	1310	1659	2340	68	FOCA 2009		
Max Net Emissions per day (lbs/day)	21.793	27.598	28.936	0.849		lb/day	July 15-Dec 1 (years 2-7)
Annual Emissions (tons/year)	0.758	0.960	1.007	0.030		ton/year	July 15-Dec 1 (years 2-7)
** Assume Kaman K-1200*							

FOCA 2015 - Guidance on the Determination of Helicopter Emissions
https://www.bazl.admin.ch/dam/bazl/it/dokumente/Politik/Umwelt/helicopter_emissionstable.xls.download.xls/helicopter_emissionstable.xls

Blasting Emissions

Blasting Emissions

	Proposed: US 140 TAF HFD									
Year	Blasts/Day	Blasts/Year	tons/blast	lb-CO/day	lb-CO/yr	lb-NOx/day	lb-NOx/yr	lb-SO2/day	lb-SO2/yr	CH4
1	0	0								
2	0	0								
3	0	0								
4	1	22	0.1875	12.5625	276.375	3.1875	70.125	0.375	8.25	NA
5	1	22	0.1875	12.5625	276.375	3.1875	70.125	0.375	8.25	NA
6	1	22	0.1875	12.5625	276.375	3.1875	70.125	0.375	8.25	NA
7	1	22	0.1875	12.5625	276.375	3.1875	70.125	0.375	8.25	NA
8	0	0								

Emissions Factors for Detonation of Explosives

	lb	lb/day	lb/blast		tons/blast
Default total ANFO blast m	180,000	2,250	375	=	0.1875

	CO	NOx	SO2	CH4	
ANFO[1]	67	17	2	NA	lb/ton

	CO	NOx	SO2	CH4	
Total	12.5625	3.1875	0.375	NA	lb/blast

lbs/tons 2000

Sources

1

US EPA., 1980. AP 42: Compilation of Air Emissions Factors, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, Explosives Detonation.

Operational Emissions

Operational GHG Emissions Summary

Pumping Requirement	Future Conditions (2030)																									
	Future Baseline/ No Project Alt	Proposed Project					Alt A					Alt B					Alt C					Alt D				
		Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr
CVP System-Wide (gWh/year)	1,231.60	1,232.70	1.10	126,066	31.9	6.8	1,232.70	1.10	126,066	31.9	6.8	1,232.50	0.90	103,145	26.1	5.6	1,232.70	1.10	126,066	31.9	6.8	1,232.70	1.10	126,066	31.9	6.8
New Pumping Plant at Expanded Reservoir (gWh /year)	0	2	2.00	229,211	58.0	12.3	1.9	1.90	217,751	55.1	11.7	1.1	1.10	126,066	31.9	6.8	1.1	1.10	126,066	31.9	6.8	1	1.00	114,606	29.0	6.2
Total	1,231.60	1,234.70	3.10	355,277	89.9	19.1	1,234.60	3.00	343,817	87.0	18.5	1,233.60	2.00	229,211	58.0	12.3	1,233.80	2.20	252,132	63.8	13.6	1,233.70	2.10	240,672	60.9	13.0
MTCO2e/year				161.2	1.0	2.6			156.0	1.0	2.5			104.0	0.7	1.7			114.4	0.7	1.8			109.2	0.7	1.8
			MT-CO2e/year	164.8				MT-CO2e/year	159.4				MT-CO2e/year	106.3				MT-CO2e/year	116.9				MT-CO2e/year	111.6		
			O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88		
			TOTAL MT-CO2e/year	**166.6**				**TOTAL MT-CO2e/year**	**161.3**				**TOTAL MT-CO2e/year**	**108.2**				**TOTAL MT-CO2e/year**	**118.8**				**TOTAL MT-CO2e/year**	**113.49**		
			Compared to Proposed	100%					97%					65%					71%					68%		
			Difference	0%					3%					35%					29%					32%		

2030 CO2 Intensity Factor (PG&E)	114.61	lb-CO2/MWh	2204.62 lb/MT
2030 CH4 Intensity Factor (PG&E)	0.0290	lb-CH4/MWh	25 GWP CH4 (CO2e)
2030 N2O Intensity Factor (PG&E)	0.00617	lb-N2O/MWh	298 GWP N2O (CO2e)

PG&E Intensity Factors	2018	206.29	https://www.theclimateregistry.org/our-members/cris-public-reports/
	2030	114.61	linear interpolation
	2045	0	

Operations and Maintenance Worker Trip GHG Emissions

	Proposed: US 140 TAF HFD								
Year	Trips per Year	Annual VMT (roundtrip)	ROG (lbs/year)	NOx (lbs/year)	PM10 (lbs/year)	PM2.5 (lbs/year)	CO (lbs/year)	CO2 (lbs/year)	CO2 (MT/year)
1	64	6,950	0.132	0.687	0.018	0.017	10.520	4,138	1.88
2-5	38	4,127	0.078	0.408	0.011	0.010	6.246	2,457	1.11
6+	24	2,606	0.049	0.258	0.007	0.006	3.945	1,552	0.70

Project Description (Section 2.3.3.2):

Inspections

Year 1: One trip/worker per week (52 trips/year)

Years 2-5: One trip/worker every 2 weeks (26 trips/year)

Years 6+: One trip/worker per month (12 trips/year)

Maintenance

All Years: One trip/worker per month (12 trips per year)

2204.62 lb/MT

Distance fron Valley Water (San Jose) to project site: 54.3 miles 1-way

O & M Worker Trip Exhaust Emission Factors

Raw Emission Factors from EMFAC2021

Veh	Fuel	Pop	VMT	Trips	Running Exhaust Emission Rates (g/mile)						
		(Vehicles)	(Miles/day)	(Trips/day)	ROG_RUNEX	NOX_RUNEX	PM10_RUNEX	PM2_5_RUNEX	CO_RUNEX	SOX_RUNEX	CO2_RUNEX
LDA	Gasoline	598,860	22,133,915	2,780,384	0.008	0.038	0.001	0.001	0.695	0.003	273.208
LDA	Diesel	1,620	46,913	6,871	0.026	0.188	0.016	0.015	0.320	0.002	230.596
LDA	Electricity	61,443	2,670,452	299,853	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LDA	Plug-in Hybrid	19,038	825,568	78,721	0.001	0.003	0.001	0.001	0.209	0.001	135.439
LDT1	Gasoline	51,681	1,664,706	230,186	0.025	0.115	0.002	0.002	1.317	0.003	324.128
LDT1	Diesel	21	303	59	0.297	1.644	0.249	0.238	1.585	0.004	415.168
LDT1	Electricity	234	9,324	1,110	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LDT1	Plug-in Hybrid	98	4,519	406	0.001	0.003	0.000	0.000	0.187	0.001	121.010
LDT2	Gasoline	290,875	10,447,706	1,360,241	0.010	0.063	0.001	0.001	0.796	0.003	338.271
LDT2	Diesel	1,050	38,652	4,980	0.013	0.039	0.005	0.005	0.130	0.003	306.718
LDT2	Electricity	2,157	73,664	10,962	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LDT2	Plug-in Hybrid	2,562	112,327	10,593	0.001	0.003	0.000	0.000	0.196	0.001	127.261
Total			38,028,048								

Source: wksht: EMFAC2021output

Veh	Fuel	Ratio of Vehicle/Fuel Type to Total VMT	
LDA	Gasoline	58%	
LDA	Diesel	0.12%	
LDA	Electricity	7.0%	
LDA	Plug-in Hybrid	2.2%	
LDT1	Gasoline	4.4%	100%
LDT1	Diesel	0.001%	
LDT1	Electricity	0.025%	
LDT1	Plug-in Hybrid	0.012%	
LDT2	Gasoline	27.5%	
LDT2	Diesel	0.10%	
LDT2	Electricity	0.19%	
LDT2	Plug-in Hybrid	0.30%	

Exhaust Emission Rates for Composite Light Duty Vehicles

ROG_RUNEX (gms/mile)	NOX_RUNEX (gms/mile)	PM10_RUNEX (gms/mile)	PM2_5_RUNEX (gms/mile)	CO_RUNEX (gms/mile)	SOX_RUNEX (gms/mile)	CO2_RUNEX (gms/mile)
0.009	0.045	0.001	0.001	0.687	0.003	270.073

Source: EMFAC2021 emission factors (above) and weighted mix of passenger vehicle fleet (also above)

ROG	NOX	PM10	PM2.5	CO	SOX	CO2	Units
0.00002	0.00010	0.000003	0.000002	0.00151	0.00001	0.59541	lbs/mile

	value	unit	source
trips per worker	2	trips/worker	See Note 2
trip length	35	miles/trip	one-way value provided by Stantec
portion of trip on paved surfaces	100%	%	
portion of trip on unpaved surfaces	0%	%	
mass conversion rate	453.59	g/lb	onlineconversion.com/weight_common.htm

Exhaust Emissions per Worker Per Day

ROG	NOx	PM10	PM2.5	CO	SOx	CO2e	units
0.0013	0.0069	0.0002	0.0002	0.1060	0.0004	41.6786	lb/worker-day

Source: Exhaust emissions are based on trip length and the Exhaust Emission Rates for Composite Light Duty Vehicles (above).

Notes

1 It is conservatively assumed that all workers would drive alone and none would make trips during break periods due to the remoteness of the work sites.

2 Daily VMT by workers = # workers * trips per worker * trip length

Source: EMFAC2021 (v1.0.1) Emission Rates
Region Type: County
Region: Santa Clara
Calendar Year: 2025
Season: Annual
Vehicle Classification: EMFAC202x Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HOT

Region	Calendar Y	Vehicle Cat	Model Yea	Speed	Fuel	Population	Total VMT	CVMT	EVMT	Trips	Energy Consu
Santa Clara	2025	LDA	Aggregate	Aggregate	Gasoline	598860.3	22133914.69	22133914.69	0	2780384.029	0
Santa Clara	2025	LDA	Aggregate	Aggregate	Diesel	1620.04	46912.85411	46912.85411	0	6871.193241	0
Santa Clara	2025	LDA	Aggregate	Aggregate	Electricity	61443.19	2670451.983	0	2670451.983	299852.6978	1031014.87
Santa Clara	2025	LDA	Aggregate	Aggregate	Plug-in Hyl	19037.66	825567.7143	401012.9615	424554.7527	78720.73884	128228.189
Santa Clara	2025	LDT1	Aggregate	Aggregate	Gasoline	51680.86	1664705.874	1664705.874	0	230185.983	0
Santa Clara	2025	LDT1	Aggregate	Aggregate	Diesel	21.28272	302.825779	302.825779	0	59.13231308	0
Santa Clara	2025	LDT1	Aggregate	Aggregate	Electricity	234.4578	9323.703781	0	9323.703781	1109.79593	3599.71919
Santa Clara	2025	LDT1	Aggregate	Aggregate	Plug-in Hyl	98.13198	4519.182281	1961.286044	2557.896237	405.7757571	772.560901
Santa Clara	2025	LDT2	Aggregate	Aggregate	Gasoline	290874.7	10447705.78	10447705.78	0	1360240.873	0
Santa Clara	2025	LDT2	Aggregate	Aggregate	Diesel	1049.952	38652.33695	38652.33695	0	4980.340082	0
Santa Clara	2025	LDT2	Aggregate	Aggregate	Electricity	2157.059	73663.77305	0	73663.77305	10962.38395	28440.2962
Santa Clara	2025	LDT2	Aggregate	Aggregate	Plug-in Hyl	2561.885	112327.2154	51267.43918	61059.7762	10593.39505	18441.8723
Santa Clara	2025	T7 CAIRP C	Aggregate	Aggregate	Diesel	1034.487	207547.3052	207547.3052	0	23772.50231	0
Santa Clara	2025	T7 CAIRP C	Aggregate	Aggregate	Electricity	12.40346	2411.505747	0	2411.505747	285.0315405	4403.23123
Santa Clara	2025	T7 CAIRP C	Aggregate	Aggregate	Natural Ga	2.419779	485.0903505	485.0903505	0	55.60652865	0

SOAK and RUNLOSS, g/vehicle/day for IDLEX and DIURN

NOx_RUNE	NOx_IDLEX	NOx_STREX	PM2.5_RU	PM2.5_IDL	PM2.5_STF	PM2.5_PM	PM2.5_PM	PM10_RUN	PM10_IDLI	PM10_STR	PM10_PM	PM10_PM	CO2_RUNE	CO2_IDLEX	CO2_STREX
0.038209	0	0.245539	0.001142	0	0.00188	0.002	0.002655	0.001242	0	0.002044	0.008	0.007587	273.2075	0	69.04168
0.18842	0	0	0.015236	0	0	0.002	0.002712	0.015925	0	0	0.008	0.007748	230.5963	0	0
0	0	0	0	0	0	0.002	0.001534	0	0	0	0.008	0.004382	0	0	0
0.003187	0	0.11551	0.000578	0	0.001985	0.002	0.001382	0.000629	0	0.002159	0.008	0.003948	135.4391	0	65.04608
0.115355	0	0.35972	0.001639	0	0.002543	0.002	0.003241	0.001782	0	0.002766	0.008	0.00926	324.1276	0	84.93844
1.64381	0	0	0.238169	0	0	0.002	0.00372	0.248938	0	0	0.008	0.010628	415.1682	0	0
0	0	0	0	0	0	0.002	0.001537	0	0	0	0.008	0.004392	0	0	0
0.002848	0	0.11551	0.000353	0	0.001365	0.002	0.001394	0.000383	0	0.001485	0.008	0.003982	121.0095	0	70.34635
0.06257	0	0.314364	0.001192	0	0.001919	0.002	0.00313	0.001296	0	0.002087	0.008	0.008944	338.2713	0	86.2638
0.039332	0	0	0.004727	0	0	0.002	0.003123	0.004941	0	0	0.008	0.008921	306.7182	0	0
0	0	0	0	0	0	0.002	0.001527	0	0	0	0.008	0.004362	0	0	0
0.002995	0	0.11551	0.000438	0	0.00161	0.002	0.001388	0.000477	0	0.001751	0.008	0.003967	127.2609	0	77.17666
1.498671	123.4561	2.221126	0.030668	0.042485	0	0.009	0.025996	0.032054	0.044406	0	0.036	0.074273	1521.791	23804.97	0
0	0	0	0	0	0	0.009	0.013225	0	0	0	0.036	0.037786	0	0	0
0.206313	64.47231	0	0.001708	0.216514	0	0.009	0.025982	0.001858	0.235478	0	0.036	0.074235	1131.422	51379.69	0

CH4_RUNE	CH4_IDLEX	CH4_STRE	N2O_RUNI	N2O_IDLE	N2O_STRE	ROG_RUNI	ROG_IDLE	ROG_STRE	ROG_HOTS	ROG_RUNI
0.002117	0	0.067825	0.004408	0	0.032293	0.007947	0	0.306311	0.087189	0.224301
0.001193	0	0	0.036331	0	0	0.025693	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.000432	0	0.042249	0.000569	0	0.020584	0.001378	0	0.173285	0.041164	0.03735
0.005621	0	0.098552	0.008687	0	0.037511	0.02471	0	0.498818	0.156963	0.442299
0.013797	0	0	0.06541	0	0	0.297038	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.000383	0	0.041987	0.000501	0	0.020339	0.001231	0	0.173285	0.023895	0.020384
0.002642	0	0.078494	0.005588	0	0.036037	0.010244	0	0.360071	0.079452	0.214938
0.000603	0	0	0.048324	0	0	0.01298	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.000403	0	0.041992	0.000528	0	0.020344	0.001295	0	0.173285	0.026071	0.023359
0.000583	0.484627	0	0.239759	3.750482	0	0.012554	10.4339	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.929746	158.4146	0	0.230648	10.47409	0	0.013284	2.263432	0	0	0

ROG_DIUR	TOG_RUNI	TOG_IDLE	TOG_STRE	TOG_HOTS	TOG_RUNI	TOG_DIUR	NH3_RUNI	CO_RUNE	CO_IDLEX	CO_STREX	SOx_RUNE	SOx_IDLEX	SOx_STREX
1.384954	0.011596	0	0.335372	0.087189	0.224301	1.384954	0.035611	0.6952	0	3.049452	0.002701	0	0.000683
0	0.02925	0	0	0	0	0	0.0031	0.319914	0	0	0.002185	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.440525	0.002011	0	0.189725	0.041164	0.03735	0.440525	0.019241	0.209016	0	1.339893	0.001339	0	0.000643
2.52236	0.036056	0	0.546143	0.156963	0.442299	2.52236	0.036453	1.317416	0	4.886115	0.003204	0	0.00084
0	0.338158	0	0	0	0	0	0.0031	1.585068	0	0	0.003934	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.276746	0.001797	0	0.189725	0.023895	0.020384	0.276746	0.018228	0.186748	0	1.339893	0.001196	0	0.000695
1.349256	0.014949	0	0.394233	0.079452	0.214938	1.349256	0.03712	0.795621	0	3.47417	0.003344	0	0.000853
0	0.014777	0	0	0	0	0	0.0031	0.129797	0	0	0.002906	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.305362	0.00189	0	0.189725	0.026071	0.023359	0.305362	0.019143	0.196395	0	1.339893	0.001258	0	0.000763
0	0.014292	11.8782	0	0	0	0	0.22	0.053947	153.9743	0	0.01441	0.225419	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.948874	161.6737	0	0	0	0	1.06	3.681431	425.9711	0	0	0	0

Alternative A – Upstream 140 TAF EFD

Emissions Summary Sheet

(Alt A) US 140TAF EFD - Summary of Total Combined Construction Emissions

	ROG		CO		NOX		PM10 (exhaust)		PM10 (dust) - Mitigated		PM2.5 (exhaust)		PM2.5 (dust) - Mitigated		CO2	CH4	N2O	Total GHG
Construction Year	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	MT/year	MT/year	MT-CO2e/year
2025 (year 1)	1.04	25.14	9.19	221.46	8.74	210.60	0.29	7.07	127.49	3072.10	0.27	6.60	12.83	309.22	4,894	0.680	0.020	4,916.9
2026 (year 2)	8.78	90.18	64.50	515.97	83.50	688.84	2.24	18.54	1120.63	8965.04	2.05	16.39	112.32	898.54	25,849	5.338	0.159	26,030.0
2027 (year 3)	7.30	78.30	53.39	427.13	73.19	606.39	1.85	15.38	318.43	2547.41	1.68	13.46	32.09	256.69	22,170	4.285	0.129	22,315.6
2028 (year 4)	9.89	99.02	68.89	562.81	88.93	735.29	2.41	19.86	922.87	7382.96	2.25	18.03	95.10	760.83	25,815	4.183	0.151	25,965.1
2029 (year 5)	9.79	98.25	66.36	542.55	88.40	731.03	2.38	19.68	922.50	7379.98	2.23	17.85	95.05	760.38	25,101	4.176	0.150	25,250.0
2030 (year 6)	9.57	96.45	66.10	540.44	86.20	713.41	2.32	19.17	886.46	7382.29	2.17	17.38	90.19	760.76	25,074	4.025	0.145	25,217.5
2031 (year 7)	6.63	72.98	49.78	410.29	67.63	565.01	1.64	13.75	428.32	3426.58	1.50	11.96	43.10	344.78	21,205	3.787	0.115	21,333.6
2032 (year 8)	0.44	41.52	3.51	334.69	4.65	442.56	0.13	11.92	0.51	48.84	0.12	11.04	0.07	6.52	1,572	0.301	0.009	1,582.7

Summary of Off-Road Fugitive Dust Emissions (lbs/day)

		PM 10 Fugitive Dust (lbs/day)		PM 10 Fugitive Dust (tons/year)		PM2.5 Fugitive Dust (lbs/day)		PM2.5 Fugitive Dust (tons/year)	
Year	Days/Year	Raw Total	With BMPs	Raw Total	With BMPs	Raw Total	With BMPs	Raw Total	With BMPs
Year 1	83	6,064	1,032	252	126	606	303	25.2	12.6
Year 2	250	17,849	8,924	2,231	1,116	1,785	892	223.1	111.6
Year 3	250	5,017	2,508	627	314	502	251	62.7	31.4
Year 4	250	13,518	6,759	1,690	845	1,352	676	169.0	84.5
Year 5	250	13,518	6,759	1,690	845	1,352	676	169.0	84.5
Year 6	250	13,517	6,758	1,690	845	1,352	676	169.0	84.5
Year 7	250	6,768	3,384	846	423	677	338	84.6	42.3
Year 8	21	32.1	16.1	0.337	0.169	3.21	1.61	0.034	0.017

*Includes materials movement, pile storage, and construction activity (grading and earthmoving)

2000 lb/ton

Summary of Batch Plant Emissions

	Alt A- US 140 TAF EFD											
Construction Year	months (A)	days/year (A)	months (B)	days/year (B)	days overlap A+B	PM10 (lbs/day)	PM10-Max (lbs/day)	PM10 tons/year	PM-10 Max tons/year	PM2.5 (lbs/day)	PM2.5-Max (lbs/day)	PM2.5 tons/yr	PM2.5-Max (tons/yr)
1													
2													
3													
4			Jan-Dec	250		290.6	581.2	36.3	72.7	39.3	78.5	4.9	9.8
5			Jan-Dec	250		290.6	581.2	36.3	72.7	39.3	78.5	4.9	9.8
6			Jan-Jun	125		290.6	581.2	18.2	36.3	39.3	78.5	2.5	4.9
7													
8													

Summary of Off-road Construction Equipment Emissions

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG
Construction Year	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MTyear	lb/day	MTyear	lb/day	MTyear	lb/day	MT-CO2e/year
2025 (year 1)	1.00	24.06	6.95	167.36	6.49	156.45	0.24	5.89	0.23	5.48	2,181	52,561	0.68	16.38	0.02	0.47	2,204
2026 (year 2)	7.64	61.12	52.48	419.86	77.64	621.09	2.10	16.83	1.95	15.57	17,860	142,883	5.34	42.71	0.16	1.27	18,041
2027 (year 3)	6.10	48.76	40.95	327.58	67.13	537.02	1.69	13.54	1.57	12.53	14,404	115,230	4.25	33.97	0.13	1.02	14,548
2028 (year 4)	8.73	69.81	54.99	439.95	83.25	665.99	2.27	18.18	2.16	17.24	17,485	139,882	4.18	33.46	0.15	1.21	17,635
2029 (year 5)	8.65	69.19	54.01	432.05	82.82	662.53	2.25	18.02	2.14	17.08	17,322	138,578	4.18	33.41	0.15	1.20	17,471
2030 (year 6)	8.40	67.23	52.18	417.47	80.50	643.97	2.19	17.48	2.07	16.58	16,740	133,921	4.02	32.19	0.14	1.16	16,884
2031 (year 7)	5.47	43.78	36.09	288.76	61.97	495.79	1.51	12.08	1.40	11.17	12,934	103,469	3.79	30.29	0.11	0.92	13,063
2032 (year 8)	0.42	40.43	2.81	267.71	4.28	407.26	0.12	11.15	0.11	10.30	1,026	97,715	0.30	28.64	0.01	0.87	1,036

Summary of Off-road Vegetative Clearing Equipment Emissions

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG
Construction Year	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MTyear	lb/day	MTyear	lb/day	MTyear	lb/day	MT-CO2e/year
2027 (year 3)	0.06436	0.51486	0.58789	4.70309	0.53357	4.26857	0.02332	0.18656	0.02169	0.17355	125.3	1,002.4	0.03850	0.30801	0.00113	0.00900	126.6
2030 (year 6)	0.00160	0.01281	0.01313	0.10502	0.01730	0.13844	0.00047	0.00374	0.00043	0.00347	3.4	27.0	0.00107	0.00856	0.00003	0.00024	3.4

Summary of On-road Emissions (Exhaust and Dust)

Truck Hauling (Dust)

			Alt A: US 140 TAF EFD			
Construction Year	Days/year	Total Daily VMT	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)
1	83	15,570	27.72	1.15	4.16	0.17
2	250	10,011	17.82	2.23	2.67	0.33
3	250	9,221	16.42	2.05	2.46	0.31
4	250	9,221	16.42	2.05	2.46	0.31
5	250	9,221	16.42	2.05	2.46	0.31
6	250	9,221	16.42	2.05	2.46	0.31
7	250	9,221	16.42	2.05	2.46	0.31
8	21	9,512	16.94	0.18	2.54	0.03

Truck Hauling (Exhaust)

	Alt A: US 140 TAF EFD												
Construction Year	Total Daily VMT	ROG (lbs/day)	ROG (tons/yr)	NOX (lbs/day)	NOX (tons/yr)	PM10 (lbs/day)	PM10 (tons/yr)	PM2.5 (lbs/day)	PM2.5 (tons/yr)	CO (lbs/day)	CO (tons/yr)	CO2 (lbs/day)	CO2 (MT/yr)
1	15,570	0.43	0.018	50.75	2.106	1.09	0.045	1.04	0.043	2.12	0.088	51,609	1,943
2	10,011	0.27	0.034	32.63	4.079	0.70	0.087	0.67	0.083	1.36	0.170	33,181	3,763
3	9,221	0.25	0.032	30.06	3.757	0.64	0.080	0.61	0.077	1.25	0.157	30,564	3,466
4	9,221	0.25	0.032	30.06	3.757	0.64	0.080	0.61	0.077	1.25	0.157	30,564	3,466
5	9,221	0.25	0.032	30.06	3.757	0.64	0.080	0.61	0.077	1.25	0.157	30,564	3,466
6	9,221	0.25	0.032	30.06	3.757	0.64	0.080	0.61	0.077	1.25	0.157	30,564	3,466
7	9,221	0.25	0.032	30.06	3.757	0.64	0.080	0.61	0.077	1.25	0.157	30,564	3,466
8	9,512	0.26	0.003	31.01	0.326	0.66	0.007	0.63	0.007	1.29	0.014	31,529	300

Worker Commute Trips (Dust)

					Alt A: US 140 TAF EFD			
Construction Year	Days/year	# Avg Workers/day	Average Trip Length	Daily VMT (miles)	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)
1	83	491	35	34,341	12.5	0.52	1.9	0.08
2	250	894	35	62,592	22.8	2.86	3.4	0.43
3	250	883	35	61,833	22.6	2.82	3.4	0.42
4	250	1029	35	72,042	26.3	3.29	3.9	0.49
5	250	913	35	63,875	23.3	2.91	3.5	0.44
6	250	1029	35	72,042	26.3	3.29	3.9	0.49
7	250	1017	35	71,167	26.0	3.25	3.9	0.49
8	21	620	35	43,400	15.8	0.17	2.4	0.02

Worker Commute Trips (Exhaust)

					Alt A: US 140 TAF EFD								
Construction Year	# Avg Workers/day	Daily VMT (miles)	ROG (lbs/day)	ROG (tons/year)	NOx (lbs/day)	NOx (tons/year)	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)	CO (lbs/day)	CO (tons/year)	CO2 (lbs/day)	CO2 (MT/year)
1	491	34,341	0.651	0.027	3.395	0.141	0.091	0.004	0.084	0.003	51.980	2.157	20,447	770
2	894	62,592	1.187	0.148	6.188	0.773	0.165	0.021	0.152	0.019	94.741	11.843	37,268	4,226
3	883	61,833	1.173	0.147	6.113	0.764	0.163	0.020	0.150	0.019	93.593	11.699	36,816	4,175
4	1029	72,042	1.366	0.171	7.122	0.890	0.190	0.024	0.175	0.022	109.045	13.631	42,894	4,864
5	913	63,875	1.211	0.151	6.315	0.789	0.169	0.021	0.155	0.019	96.683	12.085	38,032	4,313
6	1029	72,042	1.366	0.171	7.122	0.890	0.190	0.024	0.175	0.022	109.045	13.631	42,894	4,864
7	1017	71,167	1.350	0.169	7.036	0.879	0.188	0.024	0.173	0.022	107.720	13.465	42,373	4,805
8	620	43,400	0.823	0.009	4.291	0.045	0.115	0.001	0.106	0.001	65.692	0.690	25,841	246

Haul Trucks plus 50% Worker Commute Trips (Exhaust)

					Alt A: US 140 TAF EFD								
Construction Year	Daily VMT (miles)	ROG (lbs/day)	ROG (tons/year)	NOx (lbs/day)	NOx (tons/year)	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)	CO (lbs/day)	CO (tons/year)	CO2 (lbs/day)	CO2 (MT/year)
1	32,741	0.752	0.184	52.451	12.866	1.131	0.277	1.080	0.265	28.108	6.895	61,833	13,760
2	41,306	0.867	0.388	35.724	15.972	0.781	0.349	0.744	0.333	48.732	21.787	51,814	21,016
3	40,138	0.839	0.370	33.114	14.625	0.724	0.320	0.690	0.305	48.051	21.222	48,972	19,622
4	45,242	0.935	0.481	33.618	17.299	0.738	0.380	0.703	0.362	55.776	28.702	52,011	24,280
5	41,159	0.858	0.391	33.215	15.154	0.727	0.332	0.693	0.316	49.596	22.628	49,580	20,522
6	45,242	0.935	0.481	33.618	17.299	0.738	0.380	0.703	0.362	55.776	28.702	52,011	24,280
7	44,805	0.927	0.471	33.575	17.067	0.737	0.375	0.702	0.357	55.114	28.016	51,751	23,865
8	31,212	0.672	0.208	33.151	10.277	0.720	0.223	0.687	0.213	34.140	10.583	44,449	12,500

2204.6 lb/MT

Haul Trucks plus 50% Worker Commute Trips (Dust)

		Alt A: US 140 TAF EFD			
Construction Year	Total Daily VMT	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)
1	32,741	33.99	1.41	5.10	0.21
2	41,306	29.25	3.66	4.39	0.55
3	40,138	27.70	3.46	4.16	0.52
4	45,242	29.57	3.70	4.44	0.55
5	41,159	28.08	3.51	4.21	0.53
6	45,242	29.57	3.70	4.44	0.55
7	44,805	29.41	3.68	4.41	0.55
8	31,212	24.86	0.26	3.73	0.039

Summary of Helicopter Emissions

Total Days Helicopter Used per Year	70	5 hrs/day
Total Hours Helicopter Used per Year	348	

Emissions	HC	ROG (5)	NOX	(use as PM10) PM Non-Volatile		
LTO EF (g/LTO)*	667	844.7	285	9.0		
Cruising EF (g/hour)*	1310	1659.0	2340	68		
Max Emissions (lbs/day)	21.8	27.6	28.9	0.849	lb/day	July 15-Dec 1 (years 2-7)
Annual Emissions (tons/yea	0.76	0.96	1.01	0.030	ton/year	July 15-Dec 1 (years 2-7)

* Assume AS 365 N3 Dauphin with Arriel 2C

Summary of Blasting Emissions

Blasting	Alt A: US 140 TAF EFD									
Year	Blasts/Day	Blasts/Year	tons/blast	lb-CO/day	lb-CO/yr	lb-NOx/day	lb-NOx/yr	lb-SO2/day	lb-SO2/yr	CH4
1	0	0	0	0	0	0	0	0	0	
2	1	14	0.1875	12.5625	175.875	3.1875	44.625	0.375	5.25	NA
3	1	20	0.1875	12.5625	251.25	3.1875	63.75	0.375	7.5	NA
4	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
5	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
6	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
7	1	10	0.1875	12.5625	125.625	3.1875	31.875	0.375	3.75	NA
8	0	0	0	0	0	0	0	0	0	

Exhaust Emissions

Off-road Diesel Construction Equipment
On-road Haul Truck Trips
On-road Worker Trips
Vegetative Clearing Equipment

Off-Road Equipment Emissions - PREP Alternative A (US 140 TAF EFD)

Upstream
Tailpipe
Earthfill Dam

Mass Conversion Rates LHV Source
1 kg/lb 2.2046 google.com
2000 lb/ton google.com
2204.62 lb/MT google.com

Summary of Equipment Hours

Code	Equipment Classification & Description / Description	Equip Hours	reference	hp	load factor	Cumulative ROG (g/gal)	CO (g/gal)	NOx (g/gal)	PM10 (g/gal)	PM2.5 (g/gal)	CO2 (g/gal)	CH4 (g/gal)	N2O (g/gal)	Year 1 (17 month) ROG (kg/year)	CO (kg/year)	NOx (kg/year)	PM10 (kg/year)	PM2.5 (kg/year)	CO2 (MT/year)	CH4 (MT/year)	N2O (MT/year)
CAAP																					
010000	**Earthmoving Equipment**																				
	140 Hp Dozer (CAT D-280)	5,139		140	0.40	0.461	3.612	4.129	0.231	0.212	474.103	0.153	0.0043	0	0	0	0	0	951	0.02	0.19	0.22
	140 Hp Dozer with Ripper (CAT D-280)	5,139		140	0.40	0.461	3.612	4.129	0.231	0.212	474.103	0.153	0.0043	0	0	0	0	0	951	0.02	0.19	0.22
	300 Hp Dozer with Ripper (CAT D-10N)	15,441		520	0.40	0.212	1.333	1.654	0.084	0.078	465.052	0.150	0.0043	0	0	0	0	0	2,611	0.13	0.80	0.99
	5 CY loader (CAT 980H)	15,335	http://t.TEE.tc/	349	0.37	0.193	1.276	1.433	0.053	0.048	469.143	0.152	0.0043	0	0	0	0	0	8,557	0.24	1.55	1.74
	231 Hoe Tracter with Ripper (Cat D-7H)	25,365		231	0.37	0.154	1.146	1.235	0.047	0.044	470.598	0.152	0.0043	0	0	0	0	0	4,997	0.07	0.54	0.58
	7 CY Excavator (Cat 375L)	12,598	https://vimeo/	428	0.38	0.115	1.051	0.736	0.026	0.024	479.292	0.152	0.0043	0	0	0	0	0	2,093	0.04	0.39	0.27
	20 CY Excavator (Terex 330)	46,082	https://vimeo/	1,400	0.38	0.115	1.051	0.736	0.026	0.024	479.292	0.152	0.0043	0	0	0	0	0	7,681	0.52	4.73	3.27
	30 Ton Compactor (CS Ingr (Cat B26))	32,898		815	0.43	0.221	1.061	0.937	0.030	0.030	568.299	0.020	0.0043	0	0	0	0	0	15,475	0.51	2.45	2.16
	30 Ton Compactor (CS Ingr (Cat 815))	32,898		815	0.43	0.221	1.061	0.937	0.030	0.030	568.299	0.020	0.0043	0	0	0	0	0	15,475	0.51	2.45	2.16
	4000 Gal. Water Truck	27,173	https://vimeo/	260	0.38	0.077	1.182	1.064	0.038	0.035	474.970	0.154	0.0043	0	0	0	0	0	46,253	0.89	5.96	5.36
	Sub-Total:	805,757																			
040000	**Concrete Equipment**																				
	Concrete Mixer	62,176	https://www.i	161	0.56	0.661	3.469	4.142	0.161	0.161	568.299	0.059	0.0048	0	0	0	0	0	-	-	-
	90 Yrds Tractor Mounted Concrete Pump	96,096	https://www.i	249	0.56	0.661	3.469	4.142	0.161	0.161	568.299	0.059	0.0048	0	0	0	0	0	-	-	-
	90 Yrds Vibrator Normal	96,096	https://www.i	241	0.56	0.661	3.469	4.142	0.161	0.161	568.299	0.059	0.0048	0	0	0	0	0	-	-	-
	6 Ton Wet Shotcrete Pump (Swing Pot)	14,014	https://www.i	100	0.74	0.157	0.992	0.977	0.029	0.029	568.300	0.014	0.0043	0	0	0	0	0	-	-	-
	Shotcrete Plant (CAT Dm)	14,014	https://www.i	100	0.74	0.157	0.992	0.977	0.029	0.029	568.300	0.014	0.0043	0	0	0	0	0	-	-	-
	Sub-Total:	356,457																			
050000	**Utility Equipment**																				
	360 CFM Diesel Compressor	5,639	https://vimeo	49	0.48	0.019	4.851	3.755	0.116	0.116	568.299	0.059	0.0048	0	0	0	0	0	271	0.00	0.03	0.03
	300 Gal Diesel Welder (Miller)	15,441	https://www.i	26	0.45	0.245	1.121	1.365	0.063	0.063	568.299	0.022	0.0043	0	0	0	0	0	6,976	0.12	1.48	0.64
	300 Amp Diesel Welder	15,441	https://www.i	26	0.45	0.245	1.121	1.365	0.063	0.063	568.299	0.022	0.0043	0	0	0	0	0	6,976	0.12	1.48	0.64
	Sub-Total:	36,521																			
060000	**Hoisting Equipment**																				
	50 Ton Truck Crane	7,305	https://www.i	165	0.29	0.334	3.335	3.160	0.166	0.153	474.748	0.154	0.0043	0	0	0	0	0	1,217	0.02	0.21	0.20
	50 Ton Hydraulic Crane	7,305	https://www.i	165	0.29	0.218	1.834	2.154	0.088	0.081	471.967	0.153	0.0043	0	0	0	0	0	1,217	0.02	0.21	0.20
	Manurod Manlift 80 ft	2,192	https://www.i	82	0.31	0.099	3.167	1.511	0.026	0.024	472.114	0.153	0.0043	0	0	0	0	0	778	0.00	0.07	0.03
	Sub-Total:	16,802																			
070000	**Foundation & Marine Equipment**																				
	Sub-Total:	0																			
080000	**Drilling & Tunneling Equipment**																				
	4" Air Track Drill	41,891	https://tradeki	260	0.50	0.102	0.997	0.823	0.028	0.026	467.289	0.151	0.0043	0	0	0	0	0	29,297	0.43	4.19	2.46
	Pre Grouting Hole Cased, 4in Rib, 90 Yr	1,118	https://www.i	260	0.50	0.102	0.997	0.823	0.028	0.026	467.289	0.151	0.0043	0	0	0	0	0	782	0.01	0.11	0.07
	Hydraulic Rotting Rig	18,653	https://www.i	315	0.50	0.391	4.273	3.978	0.169	0.178	532.821	0.172	0.0048	0	0	0	0	0	48,056	0.52	4.77	1.53
	Horizontal Auger	4,477		300	0.50	0.102	0.997	0.823	0.028	0.026	467.289	0.151	0.0043	0	0	0	0	0	307	0.01	0.05	0.04
	Sub-Total:	118,953																			
	Totals:	1,214,334																			
ROADS																					
Code	**Equipment Classification & Description / Description**	**Equip Hours**																			
010000	**Earthmoving Equipment**																				
	Excavator (CAT 330)	512	https://www.i	484	0.38	0.1152	1.05072	0.72641	0.0257	0.0236	470.2915	0.1521	0.004273924	256	0.00597	0.05453	0.037701	0.001334	0.001225	22.54582	0.007163	0.000001
	Excavator (CAT 374)	150		150	0.41	0.1152	1.05072	0.72641	0.0257	0.0236	470.2915	0.1521	0.004273924	52	0.00406	0.03704	0.025621	9.06E-05	8.32E-05	1.501995	0.000486	1.37E-05
	Double Steel Drum Roller (JMD)	1,000	https://www.i	150	0.41	0.1152	1.05072	0.72641	0.0257	0.0236	470.2915	0.1521	0.004273924	52	0.00406	0.03704	0.025621	9.06E-05	8.32E-05	1.501995	0.000486	1.37E-05
	Skip Loader (CAT 420F)	188		174	0.38	0.1398	1.25156	1.86756	0.0567	0.0521	470.6295	0.1529	0.004273924	81	0.00059	0.01898	0.016988	0.000031	0.000034	2.550026	0.000809	2.28E-05
	Single Drum Roller (CAT CS78B)	1400	https://t.TEE.tc/	97	0.37	0.1267	2.90859	1.10088	0.0494	0.0455	471.9696	0.1526	0.00427	700	0.00509	0.08549	0.030487	0.001368	0.00126	11.85752	0.003834	0.000107
	Backhoe (CAT 442)	56		276	0.37	0.2087	3.52142	2.16918	0.0748	0.0686	477.188	0.1543	0.00427	48	0.00	0.01	0.01919	0.011196	0.000642	0.030425	2.33906	0.000754
	Loader (CAT 966)	570		407	0.48	0.1444	1.23405	2.04575	0.0393	0.0362	470.9102	0.1523	0.00427	289	0.000907	0.07802	0.065083	0.002446	0.002253	26.58719	0.008599	0.000241
	Scraper (CAT 613)	570		290	0.48	0.0162	1.7018	2.03819	0.0607	0.0559	470.9102	0.1523	0.00427	294	0.000758	0.07819	0.101104	0.003137	0.002889	34.09331	0.011028	0.000309
	Scraper (CAT 627)	1000		267	0.48	0.0162	1.7018	2.03819	0.0607	0.0559	470.9102	0.1523	0.00427	554	0.002359	0.17909	0.213196	0.006614	0.006092	71.90184	0.023258	0.000652
	Wheel Loader (CAT 950)	1000		167	0.48	0.1444	1.23405	2.04575	0.0393	0.0362	470.9102	0.1523	0.00427	289	0.000907	0.07802	0.065083	0.002446	0.002253	26.58719	0.008599	0.000241
	Dozer (CAT D6)	480	CATEMod Del	402	0.38	0.3719	1.72032	1.80547	0.1665	0.1532	474.5714	0.1535	0.00427	344	0.023541	0.09651	0.220455	0.009645	0.008874	24.93662	0.00694	0.000125
	42 ton Off Highway Trucks (CAT 775)	740	https://www.i	249	0.43	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.00427	371	0.007753	0.05170	0.046518	0.001662	0.00153	18.84182	0.006093	0.00017
	4" Compactor	50	https://www.i	405	0.43	0.661	3.469	4.142	0.161	0.161	568.299	0.059	0.00475	81	0.010378	0.09344	0.064406	0.002505	0.002027	0.000822	6.7E-05	8.1E-05
	Compactor (CAT 825)	50		405	0.43	0.661	3.469	4.142	0.161	0.161	568.299	0.059	0.00475	460	0.06	0.30633	0.36576	0.014217	0.014217	45.52596	0.004735	0.000381
	Sub-Total:	11,126																			
020000	**Paving Equipment**																				
	Asphalt Paver (CAT D55)	175	https://www.i	225	0.42	0.107	1.00414	1.03493	0.0337	0.031	473.4832	0.1531	0.004273924	88	0.00	0.00505	0.009487	0.000309	0.000284	3.937494	0.001271	3.55E-05
	Double Steel Drum Roller (CAT CB15)	400	https://www.i	142	0.38	0.1267	2.90859	1.10088	0.0494	0.0455	471.9696	0.1526	0.004273924	232	0.00	0.04017	0.101332	0.000608	0.000561	5.908467	0.001906	5.93E-05
	Skip Loader (CAT 420F)	175	https://t.TEE.tc/	72	0.36	0.3519	3.79086	2.97026	0.1789	0.1646	468.8982	0.1531	0.004273924	88	0.00	0.09915	0.007468	0.00045	0.000414	1.064878	0.000344	9.75E-06
	Asphalt Grinder (WIRTGEN)	580	https://www.i	580	0.36	0.1332	1.11653	1.10952	0.0434	0.04	472.2341	0.1527	0.004273924	184	0.00	0.05103	0.038101	48.05	3.68E-05	0.284411	0.000128	1.57E-06
	AC Dike Machine	15		15	0.42	0.7571	4.87588	4.30575	0.2678	0.2464	528.9535	0.1711	0.004751392	8	0.00	0.00073	0.000239	1.49E-05	1.37E-05	0.003669	8.82E-06	2.39E-07
	Sub-Total:	845																			
040000	**Concrete Equipment**																				
	90 Yrds Tractor Mounted Concrete Pump	200	https://www.i	225	0.74	0.019	1.016	1.038	0.029	0.029	568.299	0.014	0.004273924	100	0.00	0.01864	0.019051	0.000532	0.000532	9.462197	0.000133	7.12E-05
	Concrete Vibrator Normal	200	https://www.i	241	0.56	0.661	3.469	4.142	0.161	0.161	568.299	0.059	0.004751392	135	0.01	0.06457	0.077325	0.002994	0.002904	5.587122	0.000995	8.02E-05
	Grout Pump	20	https://www.i	20	0.74	0.709	2.376	4.407	0.177	0.177	568.299	0.064	0.004751392	4	0.00	0.00015	0.000288	1.14E-05	1.16E-05	0.033643	1.79E-06	2.81E-07
	Concrete Truck	1070	CATEMod def	402	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	535	0.02	0.30614	0.695835	0.030423	0.031513	38.81774	0.012563	0.000164
	Sub-Total:	1625																			
050000	**Utility Equipment**																				
	10 Kw Generator Set (Gas)	2925	https://www.i	15.8	0.74	0.694	2.376	4.407	0.175	0.175	568.299	0.062	0.00475	1,416	0.01	0.04304	0.080427	0.003194	0.003194	9.408204	0.000206	7.87E-05
	Tower 4 Lights 12 Hp	52		12	0.42	0.7571	4.87588	4.30575	0.2678	0.2464	528.9535	0.1711	0.00475	16	0.00	0.00043	0.000383	2.38E-05	2.19E-05	0.042655	1.38E-05	3.83E-07
	185 CFM Diesel Compressor	2925	https://www.i	60	0.48	0.545	3.653	2.353	0.104	0.104	568.299	0.055	0.00427	1,416	0.02	0.16424	0.103977	0.004675	0.004675	23.17373	0.013364	0.000174
	Jackhamer Cutting Torch	416	CATEMod def	46	0.45	0.602	4.524	3.676	0.112	0.112	568.299	0.054	0.00475	228	0.00	0.02156	0.019124	0.000583	0.000549	2.682149	0.000231	2.24E-05
	4 Ton Hydraulic Jacks	1000	https://t.TEE.tc/	45	0.42	0.532	4.4147	3.561	0.088	0.088	568.299	0.047	0.00475	84	0.00	0.00736	0.006232	0.000172	0.000159	0.962213	7.44E-05	7.14E-06
	Portable Chargable Message Boards	10		45	0.42	0.532	4.117	3.561	0.088	0.088	568.299	0.047	0.00475	84	0.00	0.00736	0.006232	0.000172	0.000159	0.962213	7.44E-05	7.14E-06
	Arrow Boards	10		10	0.42	0.661	3.469	4.142	0.161	0.161	568.299	0.059	0.00475	84	0.00	0.00139	0.001611	6.26E-05	6.26E-05	0.200496	2.08E-05	1.68E-06
	Sub-Total:	6364																			
060000	**Hoisting Equipment**																				
	40 Ton Truck Crane (American 9260)	2280	https://www.i	308	0.29	0.2184	1.83363	2.15424	0.0879	0.0809	471.9671	0.1526	0.004273924	1,140	0.02	0.20582	0.241798	0.009866	0.00908	48.05085	0.015138	0.000435
	Manurod Manlift 80 Ft	53		53	0.31	0.0413	1.58587	1.19121	0.0329	0.1867	472.7482	0.1528	0.004273924	88	0.00	0.00712	0.005183	0.000298	0.000274	0.582122	0.000211	6.18E-06
	10k Forklift	2640	https://www.i	130	0.20	0.2087	3.17013	1.653	0.0843	0.0776	472.1062	0.1527	0.004273924	1,472	0.01	0.11974	0.069706	0.003556	0.003274	16.06848	0.005844	0.000164
	10k Forklift	144	https://www.i	138	0.20	0.2087	3.17013	1.653	0.0843	0.0776	472.1062	0.1527	0.004273924	72	0.00	0.00694	0.003621	0.000185	0.000017	0.938271	0.000303	8.49E-06
	Sub-Total:	5544																			
070000	**Foundation & Marine Equipment**																				
	Truck Mounted Post Hole Auger	375	https://t.co/d	60	0.50	0.1545	3.21758	1.96363	0.0674	0.062	469.8291	0.1487	0.004273924	188	0.00	0.020004	0.012208	0.000419	0.000385	2.593441	0.000835	2.41E-05
	Sub-Total:	375																			
080000	**Drilling & Tunneling Equipment**																				
	Pre Hammer and Lacal, 4in Rib, 90 Yr	144	https://www.i	700	0.50	0.0845	0.98349	0.59628	0.0226	0.0208	481.2495	0.1556	0.004273924	72	0.00	0.02732	0.016564	0.000628	0.000579	12.12751	0.003921	0.000108
	Sub-Total:	144																			
090000	**Service & Maintenance Equipment**																				
	1000 Gal Diesel Fuel Truck	1500	https://t.co/d	385	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	7,780	0.22	1.483431	1.334702	0.047677	0.043913	540.6187	0.17483	0.004865
	16 Ton Crane Cab Truck	370	https://www.i	385	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	88	0.00	0.02479	0.021969	0.000787	0.000407	6.114862	0.002079	5.5E-05
	1 Ton Utility Truck	370	https://www.i	430	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	96	0.00	0.02844	0.018394	0.000657	0.000605	7.450958	0.002405	6.7E-05
	5 Ton Flat Bed Truck	270	https://www.i	350	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	1,376	0.04	0.23814	0.21146	0.007666	0.007061	86.92341	0.02811	0.000782
	26 Ton Flat Bed Truck	527	https://www.i	450	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	636	0.02	0.14174	0.12753	0.004556	0.004196	51.65591	0.01705	0.000465
	14 Ton Double Bottom dump truck	1055	https://www.i	450	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	6,038	0.20	1.34554	1.210607	0.043246	0.039821	490.3656	0.158579	0.004412
	20 Ton Super Dump Truck	1072	https://www.i	450	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	5,355	0.18	1.193485	1.073927	0.038357	0.035329	434.933	0.140653	0.003914
	Water Truck High Side Dump Truck	1072	https://www.i	450	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	5,355	0.18	1.193485	1.073927	0.038357	0.035329	434.933	0.140653	0.003914
	Gove Truck	430		430	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	52	0.00	0.01109	0.009984	0.000356	0.000329	4.035721	0.001305	3.63E-05
	Vibracutter Truck	430		430	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	52	0.00	0.01109	0.009984	0.000356	0.000329	4.035721	0.001305	3.63E-05
	Tack Giant Oil Truck	402	CATEMod/UrR	402	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	42	0.00	0.00631	0.005732	0.000205	0.000189	2.321809	0.000751	2.09E-05
	Mechanical Sweeper	402	CATEMod Del	84	0.46	0.3031	3.66402	2.81732	0.1597	0.1469	474.1157	0.1533	0.004273924	176	0.00	0.02907	0.016091	0.000912	0.000839	2.456607	0.000794	2.21E-05
	Asphalt Distributor	402	CATEMod Del	172	0.42	0.1332	1.11653	1.10952	0.0434	0.04	472.2341	0.1527	0.004273924	72	0.00	0.00417	0.031101	0.000025	0.000023	0.232103	0.000104	1.28E-06
	4000 Gal Water Truck	402	CATEMod/UrR	402	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	1,187	0.04	0.31244	0.279521	0.009931	0.009125	100.7047	0.032564	0.000905
	Highboard Truck	402	CATEMod/UrR	402	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	108	0.00	0.02503	0.019346	0.000691	0.000637	7.836104	0.002534	7.05E-05
	561 Workmegan	402	CATEMod/UrR	402	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	384	0.01	0.07461	0.068766	0.002457	0.002261	27.8617	0.00901	0.000251
	20 Ton Boomtruck	450		450	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004273924	12	0.00	0.00269	0.002406	8.6E-05	7.92E-05	0.937664	0.000315	8.77E-06
	Sub-Total:	46955																			
	Totals:	73446																			
POWER TRANSMISSION																					
Code	**Equipment Classification & Description / Description**	**Equip Hours**																			
010000	**Earthmoving Equipment**																				
	140 Hp Dozer (CAT D-280)	860	https://www.i	350	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.00427	-	0	0	0	0	160	0.00	0.03	0.02
	140 Hp Dozer (CAT D-280)	160	CATEMod def	160	0.40	0.461	3.612	4.129	0.231	0.212	474.103	0.153	0.0043	-	0	0	0	0	37	0.00	0.01	0.01
	7 CY Excavator	240	https://vimeo/	428	0.38	0.115	1.051	0.736	0.026	0.024	479.292	0.152	0.0043	-	0	0	0	0	4	0.00	0.00	0.00
	30 Ton Compactor (CS Ingr	240		315	0.43	0.221	1.061	0.937	0.030	0.030	568.299	0.020	0.0043	-	0	0	0	0	4	0.00	0.00	0.00
	Excavator (JCB)	200	CATEMod Del	221	0.50	0.1074	1.04484	0.95717	0.0314	0.0289	470.6535	0.1522	0.00427	-	0	0	0	0	35	0.00	0.00	0.00
	4000 Gal Water Truck	260	CATEMod/UrR	260	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.00427	-	0	0	0	0	35	0.00	0.00	0.00
	Concrete Truck	120	CATEMod def	402	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.00427	-	0	0	0	0	53	0.00	0.01	0.01
	Mini Excavator (Mini Dozer)	20	https://www.i	53	0.38	0.2006	3.65876	2.08346	0.0803	0.0784	466.7376	0.1515	0.00427	-	0	0	0	0	53	0.00	0.01	0.01
	Hydraulic Jackhammer	53		53	0.38	0.2006	3.65876	2.08346	0.0803	0.0784	466.7376	0.1515	0.00427	-	0	0	0	0	53	0.00	0.01	0.01
	Sub-Total:	2344																			
	Totals:	2344																			

Code	Equipment Classification & Description / Description	Year 2 (12 month) ROG (kg/year)	CO (kg/year)	NOx (kg/year)	PM10 (kg/year)	PM2.5 (kg/year)	CO2 (MT/year)	CH4 (MT/year)	N2O (MT/year)	Year 3 (12 month) ROG (kg/year)	CO (kg/year)	NOx (kg/year)	PM10 (kg/year)	PM2.5 (kg/year)	CO2 (MT/year)	CH4 (MT/year)	N2O (MT/year)	Year 4 (12 month) ROG (kg/year)	CO (kg/year)	NOx (kg/year)	PM10 (kg/year)	PM2.5 (kg/year)	CO2 (MT/year)	CH4 (MT/year)	N2O (MT/year)	Year 5 (12 month) ROG (kg/year)	CO (kg/year)	NOx (kg/year)	PM10 (kg/year)	PM2.5 (kg/year)	CO2 (MT/year)	CH4 (MT/year)	N2O (MT/year)	Year 6 (12 month) ROG (kg/year)	CO (kg/year)	NOx (kg/year)	PM10 (kg/year)	PM2.5 (kg/year)	CO2 (MT/year)	CH4 (MT/year)	N2O (MT/year)	Year 7 (12 month) ROG (kg/year)	CO (kg/year)	NOx (kg/year)	PM10 (kg/year)	PM2.5 (kg/year)	CO2 (MT/year)	CH4 (MT/year)	N2O (MT/year)	Year 8 (17 month) ROG (kg/year)	CO (kg/year)	NOx (kg/year)	PM10 (kg/year)	PM2.5 (kg/year)	CO2 (MT/year)	CH4 (MT/year)	N2O (MT/year)
CAAP																																																															
010000	**Earthmoving Equipment**																																																														
	140 Hp Dozer (CAT D-280)	951	0.02	0.19	0.22	0.01	0.01	22.60	0.01	0.0002	951	0.02	0.19	0.22	0.01	0.01	22.60	0.01	0.0002	951	0.02	0.19	0.22	0.01	0.01	22.60	0.01	0.0002	951	0.02	0.19	0.22	0.01	0.01	22.60	0.01	0.0002	951	0.02	0.19	0.22	0.01	0.01	22.60	0.01	0.0002	791	0.02	0.18	0.21	0.01	0.01	21.01	0.01	0.0002	130	0.00	0.03	0.03	0.00	0.00	3.19	0.00	0.0000
	140 Hp Dozer with Ripper (CAT D-280)	951	0.02	0.19	0.22	0.01	0.01	22.60	0.01	0.0002	951	0.02	0.19	0.22	0.01	0.01	22.60	0.01	0.0002	951	0.02	0.19	0.22	0.01	0.01	22.60	0.01	0.0002	951	0.02	0.19	0.22	0.01	0.01	22.60	0.01	0.0002	951	0.02	0.19	0.22	0.01

Alternative A: Off-Road Equipment Annual & Daily Emissions Summary

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG		
	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT-CO2e/yr	Months/Year	Days/Year
2025 (year 1)	1.00	24.06	6.95	167.36	6.49	156.45	0.24	5.89	0.23	5.48	2181.28	52560.87	0.68	16.38	0.02	0.47	2,204.1	4	83
2026 (year 2)	7.64	61.12	52.48	419.86	77.64	621.09	2.10	16.83	1.95	15.57	17,860.34	142882.71	5.34	42.71	0.16	1.27	18,041.3	12	250
2027 (year 3)	6.10	48.76	40.95	327.58	67.13	537.02	1.69	13.54	1.57	12.53	14,403.77	115230.17	4.25	33.97	0.13	1.02	14,548.1	12	250
2028 (year 4)	8.73	69.81	54.99	439.95	83.25	665.99	2.27	18.18	2.16	17.24	17,485.30	139882.40	4.18	33.46	0.15	1.21	17,635.0	12	250
2029 (year 5)	8.65	69.19	54.01	432.05	82.82	662.53	2.25	18.02	2.14	17.08	17,322.19	138577.53	4.18	33.41	0.15	1.20	17,471.3	12	250
2030 (year 6)	8.40	67.23	52.18	417.47	80.50	643.97	2.19	17.48	2.07	16.58	16,740.15	133921.21	4.02	32.19	0.14	1.16	16,883.9	12	250
2031 (year 7)	5.47	43.78	36.09	288.76	61.97	495.79	1.51	12.08	1.40	11.17	12,933.68	103469.42	3.79	30.29	0.11	0.92	13,062.6	12	250
2032 (year 8)	0.42	40.43	2.81	267.71	4.28	407.26	0.12	11.15	0.11	10.30	1,026.00	97714.66	0.30	28.64	0.01	0.87	1,036.2	1	21
																		6.4	

		Unit	Source
Mass Conversion Rates	453.59	g/lb	google.com
	2000	lb/ton	google.com
	25	ton-CO2e/	GWP CH4
	298	ton-CO2e/	GWP N2O

On-Road Emissions

Truck Hauling (Exhaust)

Exhaust emission rates shown on "Haul Truck Exhaust Em. Rts." worksheet

	Alt A: US 140 TAF EFD						
Construction Year	Total Daily VMT	ROG (lbs/day)	NOX (lbs/day	PM10 (lbs/day)	PM2.5 (lbs/day	CO (lbs/day)	CO2 (lbs/day)
1	15,570	0.43	50.75	1.09	1.04	2.12	51,609
2	10,011	0.27	32.63	0.70	0.67	1.36	33,181
3	9,221	0.25	30.06	0.64	0.61	1.25	30,564
4	9,221	0.25	30.06	0.64	0.61	1.25	30,564
5	9,221	0.25	30.06	0.64	0.61	1.25	30,564
6	9,221	0.25	30.06	0.64	0.61	1.25	30,564
7	9,221	0.25	30.06	0.64	0.61	1.25	30,564
8	9,512	0.26	31.01	0.66	0.63	1.29	31,529

On-Road Emissions

Worker Commute Trips (Exhaust)

Exhaust emission rates shown on "Worker Trip Exhaust Em. Rts." worksheet

Alt A: US 140 TAF EFD

Construction Year	# Avg Workers/ day	Daily VMT (miles)	ROG (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO (lbs/day)	CO2 (lbs/day)
1	491	34,341	0.651	3.395	0.091	0.084	51.980	20,447
2	894	62,592	1.187	6.188	0.165	0.152	94.741	37,268
3	883	61,833	1.173	6.113	0.163	0.150	93.593	36,816
4	1029	72,042	1.366	7.122	0.190	0.175	109.045	42,894
5	913	63,875	1.211	6.315	0.169	0.155	96.683	38,032
6	1029	72,042	1.366	7.122	0.190	0.175	109.045	42,894
7	1017	71,167	1.350	7.036	0.188	0.173	107.720	42,373
8	620	43,400	0.823	4.291	0.115	0.106	65.692	25,841

Notes

1 Daily Truck Hauling trips based on total material import/export required

2 Average trip length obtained from Stantec

3 Daily VMT by workers = # workers * trips per worker * trip length

Off-Road Vegetative Clearing Equipment Emissions

		Unit	Source
Mass Conversion Rates	453.59	g/lb	google.com
	2000	lb/ton	google.com
	2204.62	lb/MT	google.com

												Year 3	Alternative A- US 140 TAF EFD							
Equipment Classification & Description		hp	load	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O	Equip	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O
Code	Description		factor	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	Hours	ton/year	ton/year	ton/year	ton/year	ton/year	MT/year	MT/year	MT/year
	6000 Gal Water Truck	260	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004274	300	0.0058	0.0386	0.0348	0.0012	0.0011	14.0781	0.0046	0.0001
	Chainsaws 25 Hsp	25	0.73	0.685	2.339	4.332	0.161	0.161	568.299	0.061	0.004751	900	0.0124	0.0423	0.0784	0.0029	0.0029	9.3343	0.0010	0.0001
	Medium Feller/Buncher 175 Hsp	175	0.4	0.2347	3.13647	2.16742	0.1121	0.1031	469.843	0.152	0.004274	300	0.0054	0.0726	0.0502	0.0026	0.0024	9.8667	0.0032	0.0001
	Large Feller/Buncher 300 Hsp	300	0.4	0.1684	1.3582	1.55241	0.0594	0.0547	476.2959	0.154	0.004274	300	0.0067	0.0539	0.0616	0.0024	0.0022	17.1467	0.0055	0.0002
	Medium Skidder 175 Hsp	175	0.37	0.1869	2.92602	1.9987	0.0942	0.0867	471.0403	0.1523	0.004274	300	0.0040	0.0627	0.0428	0.0020	0.0019	9.1500	0.0030	0.0001
	Large Skidder 175 Hsp	175	0.37	0.1869	2.92602	1.9987	0.0942	0.0867	471.0403	0.1523	0.004274	300	0.0040	0.0627	0.0428	0.0020	0.0019	9.1500	0.0030	0.0001
	Loader Rubber Tired 300 Hsp	300	0.36	0.1931	1.2763	1.43264	0.0525	0.0483	469.1434	0.1517	0.004274	300	0.0069	0.0456	0.0512	0.0019	0.0017	15.2003	0.0049	0.0001
	Masticator on Excavator 175 Hsp	175	0.38	0.1578	3.078	1.15367	0.0566	0.052	472.4964	0.1528	0.004274	300	0.0035	0.0677	0.0254	0.0012	0.0011	9.4263	0.0030	0.0001
	Whole Tree Chipper 300 Hsp	300	0.42	0.1684	1.3582	1.55241	0.0594	0.0547	476.2959	0.154	0.004274	400	0.0094	0.0755	0.0862	0.0033	0.0030	24.0054	0.0078	0.0002
	Large Diameter Chipper/Shredder 100 Hsp	100	0.42	0.3413	3.58397	3.25221	0.2029	0.1867	472.7482	0.1529	0.004274	400	0.0063	0.0664	0.0602	0.0038	0.0035	7.9422	0.0026	0.0001

These equipment types/ratings consistent with CalFire VTP PEIR, Appendix AQ-1 Treatment Activity Emissions Prepared by Ascent

				Emission Factors								Year 6	Alternative A- US 140 TAF EFD							
Equipment Classification & Description		hp	load	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O	Equip	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O
Code	Description		factor	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	Hours	ton/year	ton/year	ton/year	ton/year	ton/year	MT/year	MT/year	MT/year
	67 Ton Off Hwy Truck 870 Hsp (Cat 777)	870	0.38	0.19	1.15	3.14	0.06	0.05	473.37	0.15	0.00	10	0.0007	0.0042	0.0114	0.0002	0.0002	1.5650	0.0005	0.0000
	6000 Gal Water Truck	260	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004274	10	0.0002	0.0013	0.0012	0.0000	0.0000	0.4693	0.0002	0.0000
	Chainsaws 25 Hsp	25	0.73	0.685	2.339	4.332	0.161	0.161	568.299	0.061	0.004751	10	0.0001	0.0005	0.0009	0.0000	0.0000	0.1037	0.0000	0.0000
	Rotary Mower 25 Hsp	25	0.42	0.7571	4.87388	4.30575	0.2678	0.2464	528.9535	0.1711	0.004751	10	0.0001	0.0006	0.0005	0.0000	0.0000	0.0555	0.0000	0.0000
	Small Diameter Chipper 25 Hsp	25	0.42	0.7571	4.87388	4.30575	0.2678	0.2464	528.9535	0.1711	0.004751	10	0.0001	0.0006	0.0005	0.0000	0.0000	0.0555	0.0000	0.0000
	Tractor/Loader/Backhoe 25 Hsp	25	0.37	0.55	4.55974	3.66186	0.145	0.1334	513.8025	0.1662	0.004751	10	0.0001	0.0005	0.0004	0.0000	0.0000	0.0475	0.0000	0.0000
	Tractor/Loader/Backhoe 175 Hsp	175	0.37	0.1619	3.08323	1.18039	0.0585	0.0538	469.3289	0.1518	0.004274	10	0.0001	0.0022	0.0008	0.0000	0.0000	0.3039	0.0001	0.0000
	Masticator on Excavator 175 Hsp	175	0.38	0.1578	3.078	1.15367	0.0566	0.052	472.4964	0.1528	0.004274	10	0.0001	0.0023	0.0008	0.0000	0.0000	0.3142	0.0001	0.0000
	Flail/Mulcher on Excavator 260 Hsp	260	0.38	0.1152	1.05072	0.72641	0.0257	0.0236	470.2915	0.1521	0.004274	10	0.0001	0.0011	0.0008	0.0000	0.0000	0.4646	0.0002	0.0000

Off-Road Vegetative Clearing Equipment Emissions

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG		
	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT-CO2e/yr	Months/Year	Days/Year
Proposed Proj US 140 TAF HFD																			
2027 (year 3)	0.03750	0.30004	0.320	2.56	0.302	2.42	0.01314	0.10512	0.01225	0.09798	71.091	568.73	0.022	0.17	0.00064	0.00510	71.8	12	250
2030 (year 6)	0.00640	0.05122	0.053	0.42	0.069	0.55	0.00187	0.01498	0.00173	0.01386	13.517	108.14	0.00428	0.03426	0.00012	0.00098	13.7	12	250
Alt A (US 140 TAF EFD)																			
2027 (year 3)	0.06436	0.51486	0.588	4.70	0.534	4.27	0.02332	0.18656	0.02169	0.17355	125.300	1002.40	0.039	0.31	0.00113	0.00900	126.6	12	250
2030 (year 6)	0.00160	0.01281	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250
Alt B (US 96 TAF EFD)																			
2027 (year 3)	0.04909	0.39273	0.448	3.59	0.409	3.28	0.01799	0.14394	0.01673	0.13382	95.790	766.32	0.030	0.24	0.00086	0.00688	96.8	12	250
2030 (year 6)	0.00160	0.01281	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250
Alt C (DS 140 TAF HFD)																			
2027 (year 3)	0.00544	0.04351	0.258	2.07	0.236	1.89	0.01036	0.08287	0.00963	0.07705	55.182	441.45	0.017	0.14	0.00050	0.00396	55.8	12	250
2030 (year 6)	0.05856	0.46852	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250
Alt D (DS 140 TAF EFD)																			
2027 (year 3)	0.00368	0.02941	0.390	3.12	0.365	2.92	0.01580	0.12641	0.01476	0.11810	83.135	665.08	0.025	0.20	0.00074	0.00596	84.0	12	250
2030 (year 6)	0.03004	0.24036	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250

		Unit	Source
Mass Conversion Rates	453.59	g/lb	google.com
	2000	lb/ton	google.com
	25	ton-CO2e/	GWP CH4
	298	ton-CO2e/	GWP N2O

Fugitive Dust Emissions

Material Piles and Earthmoving
On-road Haul Truck Trips
On-road Worker Trips

Off-Road Fugitive Dust Emissions

1. Earthwork

Off-Road Fugitive Dust Emissions

Off-Road Fugitive Dust Emissions

Construction Year	Proposed: US 140 TAF HFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	377,764	604,421.93	446,130	713,808.77	1,318,230.70	15,882.30	**5,228.73**
Year 2	1,511,055	2,417,687.71	1,784,522	2,855,235.09	5,272,922.81	21,091.69	**6,943.76**
Year 3	1,636,564	2,618,501.93	1,495,130	2,392,208.77	5,010,710.70	20,042.84	**6,598.46**
Year 4	834,894	1,335,830.00	1,407,790	2,252,463.61	3,588,293.61	14,353.17	**4,725.32**
Year 5	557,094	891,350.00	1,176,290	1,882,063.61	2,773,413.61	11,093.65	**3,652.23**
Year 6	557,094	891,350.00	1,176,290	1,882,063.61	2,773,413.61	11,093.65	**3,652.23**
Year 7	557,094	891,350.00	1,176,290	1,882,063.61	2,773,413.61	11,093.65	**3,652.23**
Year 8							

Construction Year	Alt A: US 140 TAF EFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	422,369	675,791.02	531,099	849,757.90	1,525,548.92	18,380.11	**6,051.06**
Year 2	3,386,987	5,419,178.63	5,072,077	8,115,322.51	13,534,501.14	54,138.00	**17,823.19**
Year 3	889,091	1,422,545.45	1,481,818	2,370,909.09	3,793,454.55	15,173.82	**4,995.49**
Year 4	3,781,935	6,051,095.44	2,623,751	4,198,002.05	10,249,097.49	40,996.39	**13,496.74**
Year 5	3,781,935	6,051,095.44	2,623,751	4,198,002.05	10,249,097.49	40,996.39	**13,496.74**
Year 6	3,781,935	6,051,095.44	2,623,751	4,198,002.05	10,249,097.49	40,996.39	**13,496.74**
Year 7	1,890,967	3,025,547.72	1,311,876	2,099,001.02	5,124,548.75	20,498.19	**6,748.37**
Year 8							

Construction Year	Alt B: US 96 TAF EFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	521,166	833,865.69	676,584	1,082,534.76	1,916,400.45	23,089.16	**7,601.36**
Year 2	3,238,088	5,180,957.08	4,939,253	7,902,804.28	13,083,761.36	52,335.05	**17,229.62**
Year 3	438,000	700,800.00	730,000	1,168,000.00	1,868,800.00	7,475.20	**2,460.97**
Year 4	3,554,122	5,686,595.81	2,270,263	3,632,420.13	9,319,015.94	37,276.06	**12,271.94**
Year 5	3,554,122	5,686,595.81	2,270,263	3,632,420.13	9,319,015.94	37,276.06	**12,271.94**
Year 6	3,554,122	5,686,595.81	2,270,263	3,632,420.13	9,319,015.94	37,276.06	**12,271.94**
Year 7							
Year 8							

Construction Year	Alt C: DS 140 TAF HFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)[1]	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	425,518	680,828.34	943,793	1,510,068.54	2,190,896.88	26,396.35	**8,690.14**
Year 2	1,276,553	2,042,485.02	2,831,379	4,530,205.62	6,572,690.64	26,290.76	**8,655.38**
Year 3	1,256,890	2,011,024.00	1,041,500	1,666,400.00	3,677,424.00	14,709.70	**4,842.69**
Year 4	1,511,931	2,419,090.29	1,823,784	2,918,053.77	5,337,144.06	21,348.58	**7,028.33**
Year 5	567,506	908,009.14	1,248,202	1,997,123.93	2,905,133.08	11,620.53	**3,825.68**
Year 6	567,506	908,009.14	1,248,202	1,997,123.93	2,905,133.08	11,620.53	**3,825.68**
Year 7	567,506	908,009.14	1,248,202	1,997,123.93	2,905,133.08	11,620.53	**3,825.68**
Year 8	412,731	660,370.29	907,784	1,452,453.77	2,112,824.06	8,451.30	**2,782.32**

Construction Year	Alt D: DS 140 TAF EFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)[1]	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	315,478	504,764.38	615,377	984,603.72	1,489,368.10	17,944.19	**5,907.55**
Year 2	2,727,494	4,363,990.86	4,941,870	7,906,992.65	12,270,983.51	49,083.93	**16,159.30**
Year 3	2,395,394	3,832,631.05	3,956,016	6,329,625.94	10,162,256.99	40,649.03	**13,382.38**
Year 4	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	39,180.01	**12,898.75**
Year 5	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	39,180.01	**12,898.75**
Year 6	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	39,180.01	**12,898.75**
Year 7	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	42,772.94	**14,081.61**
Year 8	1,420,206	2,272,329.60	875,498	1,400,796.21	3,673,125.81	25,158.40	**8,282.59**

Conversion Rates
2000 lbs/ton
1.6 ton/cy

Source
google.com
calculatorsoup.com

Notes
1. Calulation using emission factor for PM10 shown on "Fugitive Dust Emission Factors" worksheet.
2. Emission estimates for fugitive dust from material movement were based on the material totals for all material import and waste exported. These are the activities that would result in on-site fugitive dust emissions.
Values of 0.0 indicate that no material import/export would be required for that particular construction year.

2. Construction Activity (grading and earthmoving)

		Proposed: US 140 TAF HFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)	Alt A: US 140 TAF EFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)
Year 1	231 Hsp Dozer (Cat D-7H)	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00
	Motor Grader (CAT 140G)	1478	17.8	8.46	1332	16.0	7.62
	Dozer (CAT D8)	529	6.4	3.03	529	6.4	3.03
	Dozer (CAT D6)	344	4.1	1.97	344	4.1	1.97
	140 Hp Bulldozer	0	0.0	0.00	0	0.0	0.00
Total				**13.45**			**12.62**
Year 2	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	1478	5.9	2.81	1332	5.3	2.53
	Dozer (CAT D8)	529	2.1	1.01	529	2.1	1.01
	Dozer (CAT D6)	344	1.4	0.65	344	1.4	0.65
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**15.13**			**25.54**
Year 3	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.66**			**21.35**
Year 4	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.66**			**21.35**
Year 5	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.66**			**21.35**
Year 6	231 Hsp Dozer (Cat D-7H)	4161	16.6	7.91	791	3.2	1.50
	520 Hsp Dozer with Disc (Cat D-10N)	1113	4.5	2.11	7239	29.0	13.75
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2461	9.8	4.68
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.09**			**20.00**
Year 7	231 Hsp Dozer (Cat D-7H)	4161	16.6	7.91	791	3.2	1.50
	520 Hsp Dozer with Disc (Cat D-10N)	1113	4.5	2.11	7239	29.0	13.75
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2461	9.8	4.68
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.09**			**20.00**
Year 8	231 Hsp Dozer (Cat D-7H)	500	6.0	2.86	120	5.7	2.71
	520 Hsp Dozer with Disc (Cat D-10N)	100	1.2	0.57	1000	47.6	22.62
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	300	14.3	6.79
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	0	0.0	0.00	0	0.0	0.00
Total				**3.43**			**32.12**

		Alt B: US 96 TAF EFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)	Alt C: DS 140 TAF HFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)	Alt D: DS 140 TAF EFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)
Year 1	231 Hsp Dozer (Cat D-7H)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Motor Grader (CAT 140G)	1177	14.2	6.74	1176	14.2	6.73	1784	21.5	10.21
	Dozer (CAT D8)	562	6.8	3.22	585	7.0	3.35	794	9.6	4.55
	Dozer (CAT D6)	316	3.8	1.81	282	3.4	1.61	473	5.7	2.71
	140 Hp Bulldozer	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Total				**11.76**			**11.69**			**17.46**
Year 2	231 Hsp Dozer (Cat D-7H)	724	2.9	1.38	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	6286	25.1	11.94	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2013	8.1	3.82	1328	5.3	2.52	2815	11.3	5.35
	Motor Grader (CAT 140G)	1177	4.7	2.24	1176	4.7	2.23	1190	4.8	2.26
	Dozer (CAT D8)	562	2.2	1.07	585	2.3	1.11	530	2.1	1.01
	Dozer (CAT D6)	316	1.3	0.60	282	1.1	0.54	315	1.3	0.60
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**21.12**			**17.95**			**24.84**
Year 3	231 Hsp Dozer (Cat D-7H)	724	2.9	1.38	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1328	5.3	2.52	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**19.83**			**14.07**			**20.97**
Year 4	231 Hsp Dozer (Cat D-7H)	824	3.3	1.57	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1328	5.3	2.52	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**20.01**			**14.07**			**20.97**
Year 5	231 Hsp Dozer (Cat D-7H)	824	3.3	1.57	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1228	4.9	2.33	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**20.01**			**13.88**			**20.97**
Year 6	231 Hsp Dozer (Cat D-7H)	824	3.3	1.57	813	3.3	1.54	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1178	4.7	2.24	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**20.01**			**13.74**			**20.97**
Year 7	231 Hsp Dozer (Cat D-7H)	424	4.1	1.94	733	2.9	1.39	1333	5.8	2.77
	520 Hsp Dozer with Disc (Cat D-10N)	2286	22.0	10.44	3206	12.8	6.09	6855	29.9	14.22
	520 Hsp Dozer with Disc (Cat D-10N)	514	4.9	2.35	1178	4.7	2.24	2815	12.3	5.84
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.4	0.17	37	0.1	0.07	37	0.2	0.08
Total				**14.89**			**9.79**			**22.90**
Year 8	231 Hsp Dozer (Cat D-7H)				120	0.5	0.23	889	6.1	2.89
	520 Hsp Dozer with Disc (Cat D-10N)				2000	8.0	3.80	4570	31.3	14.87
	520 Hsp Dozer with Disc (Cat D-10N)				400	1.6	0.76	1877	12.9	6.10
	Motor Grader (CAT 140G)				0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)				0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)				0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer				0	0.0	0.00	0	0.0	0.00
Total							**4.79**			**23.86**

3. Summary of Off-Road Fugitive Dust Emissions (lbs/day)

Construction Year	PM 10 Fugitive Dust (lbs/day) Proposed: US 140 TAF HF	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD	PM2.5 Fugitive Dust (lbs/day) Proposed: US 140 TAF H	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD
Year 1	5,242	6,064	7,613	8,702	5,925	524	606	761	870	593
Year 2	6,959	17,849	17,251	8,673	16,184	696	1,785	1,725	867	1,618
Year 3	6,609	5,017	2,481	4,857	13,403	661	502	248	486	1,340
Year 4	4,736	13,518	12,292	7,042	12,920	474	1,352	1,229	704	1,292
Year 5	3,663	13,518	12,292	3,840	12,920	366	1,352	1,229	384	1,292
Year 6	3,662	13,517	12,292	3,839	12,920	366	1,352	1,229	384	1,292
Year 7	3,662	6,768	15	3,835	14,105	366	677	1.49	384	1,410
Year 8	3.43	32	-	2,787	8,306	0.34	3.21	-	279	831

Construction Year	PM 10 Fugitive Dust (lbs/day) - With BMPs Proposed: US 140 TAF HF	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD	PM2.5 Fugitive Dust (lbs/day) - With BMPs Proposed: US 140 TAF H	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD
Year 1	2,621	3,032	3,807	4,351	2,963	262	303	381	435	296
Year 2	3,479	8,924	8,625	4,337	8,092	348	892	863	434	809
Year 3	3,305	2,508	1,240	2,428	6,702	330	251	124	243	670
Year 4	2,368	6,759	6,146	3,521	6,460	237	676	615	352	646
Year 5	1,831	6,759	6,146	1,920	6,460	183	676	615	192	646
Year 6	1,831	6,758	6,146	1,920	6,460	183	676	615	192	646
Year 7	1,831	3,384	7.4	1,918	7,052	183	338	0.74	192	705
Year 8	1.72	16	-	1,394	4,153	0.17	1.61	-	139	415

Cut (CY)						
Alternative	Dam Foundation/ Spillway Excavation	Existing Dam Excavation	Shell Borrow Areas Excavation	Core Borrow Areas Excavation	Double Handle Stockpiled Material	Roadway
US 140 TAF HFD	926,000	354,500	4,705,159	0	0	2,676,783
US 140 TAF EFD	4,075,000	354,500	5,319,033	1,699,897	2,164,200	2,655,493
US 96 TAF EFD	3,285,000	354,500	3,711,984	1,297,004	1,801,800	2,706,337
DS 140 TAF HFD	1,603,000	354,500	5,560,175	0	0	3,775,171
DS 140 TAF EFD	5,466,500	354,500	5,971,934	2,041,645	2,200,560	3,692,264

Cut by Year (CY)								
Alternative	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
US 140 TAF HFD	446,130	1,784,522	1,495,130	1,407,790	1,176,290	1,176,290	1,176,290	
US 140 TAF EFD	531,099	5,072,077	1,481,818	2,623,751	2,623,751	2,623,751	1,311,876	
US 96 TAF EFD	676,584	4,939,253	730,000	2,270,263	2,270,263	2,270,263		
DS 140 TAF HFD	943,793	2,831,379	1,041,500	1,823,784	1,248,202	1,248,202	1,248,202	907,784
DS 140 TAF EFD	615,377	4,941,870	3,956,016	2,334,660	2,334,660	2,334,660	2,334,660	875,498

Fill (CY)						
Alternative	Disposal (Dam Foundation / Spillway Excavation)	Disposal (Existing Dam)	Embankment	Disposal (Borrow Areas)	Double Handle Stockpiled Material	Roadway
US 140 TAF HFD	1,111,200	425,400	0	2,228,375	0	2,266,582
US 140 TAF EFD	2,445,000	141,600	10,600,000	472,571	2,164,200	2,111,847
US 96 TAF EFD	1,971,000	141,600	8,500,000	360,567	1,801,800	2,084,664
DS 140 TAF HFD	1,923,600	432,490	0	2,527,980	0	1,702,071
DS 140 TAF EFD	3,403,500	142,000	13,800,000	568,510	2,200,560	1,892,866

Fill by Year (CY)								
Alternative	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
US 140 TAF HFD	377,764	1,511,055	1,636,564	834,894	557,094	557,094	557,094	
US 140 TAF EFD	422,369	3,386,987	889,091	3,781,935	3,781,935	3,781,935	1,890,967	
US 96 TAF EFD	521,166	3,238,098	438,000	3,554,122	3,554,122	3,554,122		
DS 140 TAF HFD	425,518	1,276,553	1,256,890	1,511,931	567,506	567,506	567,506	412,731
DS 140 TAF EFD	315,478	2,727,494	2,395,394	3,787,216	3,787,216	3,787,216	3,787,216	1,420,206

Assumptions

1. Evenly proportion earthwork during the months those activities are performed on the schedule.
2. Borrow areas and stockpiled material activities take place during dam construction.

Alt A: US 140 TAF EFD

	Annual Truck Hauling Trips (round trips)													
Days/year	Offsite Import	Onsite	Offsite Water	Total	Round Trips	West Imports	East Imports	Onsite VMT	West VMT	East VMT	Water Trucks	Total Daily VMT	**PM10 (lbs/day)**	**PM2.5 (lbs/day)**
83	9624	17455	8000	35079	35079	17539	17539	34909	587,566	613,875	56,000	15,570	**27.72**	**4.16**
250	17408	52364	200	69972	69972	34986	34986	104727	1,172,025	1,224,504	1,400	10,011	**17.82**	**2.67**
250	11646	52364	200	64210	64210	32105	32105	104727	1,075,511	1,123,669	1,400	9,221	**16.42**	**2.46**
250	11646	52364	200	64210	64210	32105	32105	104727	1,075,511	1,123,669	1,400	9,221	**16.42**	**2.46**
250	11646	52364	200	64210	64210	32105	32105	104727	1,075,511	1,123,669	1,400	9,221	**16.42**	**2.46**
250	11646	52364	200	64210	64210	32105	32105	104727	1,075,511	1,123,669	1,400	9,221	**16.42**	**2.46**
250	11646	52364	200	64210	64210	32105	32105	104727	1,075,511	1,123,669	1,400	9,221	**16.42**	**2.46**
21	973	4364	200	5537	5537	2768	2768	8727	92,739	96,891	1,400	9,512	**16.94**	**2.54**

Alt A: US 140 TAF EFD

Total Daily VMT	ROG (lbs/day)	NOX (lbs/day	PM10 (lbs/day)	PM2.5 (lbs/day	CO (lbs/day)	CO2 (lbs/day)
15,570	0.43	50.75	1.09	1.04	2.12	51,609
10,011	0.27	32.63	0.70	0.67	1.36	33,181
9,221	0.25	30.06	0.64	0.61	1.25	30,564
9,221	0.25	30.06	0.64	0.61	1.25	30,564
9,221	0.25	30.06	0.64	0.61	1.25	30,564
9,221	0.25	30.06	0.64	0.61	1.25	30,564
9,221	0.25	30.06	0.64	0.61	1.25	30,564
9,512	0.26	31.01	0.66	0.63	1.29	31,529

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# Avg Workers/day	Average Trip Length	Daily VMT (miles)	Alt A: US 140 TAF EFD PM10 (lbs/day)	PM2.5 (lbs/day)
491	35	34,341	**12.5**	**1.9**
894	35	62,592	**22.8**	**3.4**
883	35	61,833	**22.6**	**3.4**
1029	35	72,042	**26.3**	**3.9**
913	35	63,875	**23.3**	**3.5**
1029	35	72,042	**26.3**	**3.9**
1017	35	71,167	**26.0**	**3.9**
620	35	43,400	**15.8**	**2.4**

Workers/day	Daily VMT (miles)	ROG (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO (lbs/day)	CO2 (lbs/day)
			Alt A: US 140 TAF EFD				
491	34,341	0.651	3.395	0.091	0.084	51.980	20,447
894	62,592	1.187	6.188	0.165	0.152	94.741	37,268
883	61,833	1.173	6.113	0.163	0.150	93.593	36,816
1029	72,042	1.366	7.122	0.190	0.175	109.045	42,894
913	63,875	1.211	6.315	0.169	0.155	96.683	38,032
1029	72,042	1.366	7.122	0.190	0.175	109.045	42,894
1017	71,167	1.350	7.036	0.188	0.173	107.720	42,373
620	43,400	0.823	4.291	0.115	0.106	65.692	25,841

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Helicopter Emissions

Helicopter Emissions

Helicopter operation	**Value**	Source	
Gallons of jet fuel used per hour	100	FOCA 2015 - used Kaman K-1200	
Gallons of fuel used per LTO	15	FOCA 2015 - used Kaman K-1200	
Average hours/use (assumes 2 LTO)	5	Applicant data	
Total Days Helicopter Used per Year	70	Applicant data	July 15 - December 1 (Years 2-7)
Total Hours Helicopter Used per Year	348	Applicant data	
Gallons used for LTO	1,084	calculated	
Gallons used for cruising	34,914	calculated	
Total gallons used per year	35,998	calculated	
Jet A Emissions Factor (kg CO2/gal)	9.7497	Climate Registry 2017 Emission Factors	
Jet A Emissions Factor (kg N2O/gal)	0.000308	Climate Registry 2017 Emission Factors	
GWP N2O	298		
LTO MTCO2E	10.67		
Cruising MTCO2E	343.61		
Total MTCO2E	354.28		
Note: No emission factor available for CH4 helicopter emissions.			

Helicopter Information	Value	Source
Aircraft Type	Helicopter	
Engine Type	T53 17A-1	FOCA 2015
Engine SHP	1500	FOCA 2015
Number of engines	1	FOCA 2015
Mean operating percent power per engine for large twin turboshaft helicopters	62%	FOCA 2015
Fuel flow per engine for engines up to 1000 SHP (kg/s)	0.2303889	FOCA 2015
Fuel flow per hour (kg/h)	514	FOCA 2015

Emissions Calculations							
	HC	ROG (5)	NOX	PM Non-Volatile	Source		
LTO EF (g/LTO)*	667	845	285	9	FOCA 2009		
Cruising EF (g/hour)*	1310	1659	2340	68	FOCA 2009		
Max Net Emissions per day (lbs/day)	21.793	27.598	28.936	0.849		lb/day	July 15-Dec 1 (years 2-7)
Annual Emissions (tons/year)	0.758	0.960	1.007	0.030		ton/year	July 15-Dec 1 (years 2-7)
** Assume Kaman K-1200*							

FOCA 2015 - Guidance on the Determination of Helicopter Emissions
https://www.bazl.admin.ch/dam/bazl/it/dokumente/Politik/Umwelt/helicopter_emissionstable.xls.download.xls/helicopter_emissionstable.xls

Blasting Emissions

Blasting Emissions

	Alt A: US 140 TAF EFD									
Year	Blasts/Day	Blasts/Yea	tons/blast	lb-CO/day	lb-CO/yr	lb-NOx/da	lb-NOx/yr	lb-SO2/da	lb-SO2/yr	CH4
1	0	0								
2	1	14	0.1875	12.5625	175.875	3.1875	44.625	0.375	5.25	NA
3	1	20	0.1875	12.5625	251.25	3.1875	63.75	0.375	7.5	NA
4	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
5	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
6	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
7	1	10	0.1875	12.5625	125.625	3.1875	31.875	0.375	3.75	NA
8	0	0								

Emissions Factors for Detonation of Explosives

	lb	lb/day	lb/blast		tons/blast
Default tot	180,000	2,250	375	=	0.1875

	CO	NOx	SO2	CH4	
ANFO[1]	67	17	2	NA	lb/ton

	CO	NOx	SO2	CH4	
Total	12.5625	3.1875	0.375	NA	lb/blast

lbs/tons 2000

Sources

1

US EPA., 1980. AP 42: Compilation of Air Emissions Factors, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, Explosives Detonation.

Operational Emissions

Operational GHG Emissions Summary

Pumping Requirement	Future Conditions (2030)																									
		Proposed Project					Alt A					Alt B					Alt C					Alt D				
	Future Baseline/ No Project Alt	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr
CVP System-Wide (gWh/year)	1,231.60	1,232.70	1.10	126,066	31.9	6.8	1,232.70	1.10	126,066	31.9	6.8	1,232.50	0.90	103,145	26.1	5.6	1,232.70	1.10	126,066	31.9	6.8	1,232.70	1.10	126,066	31.9	6.8
New Pumping Plant at Expanded Reservoir (gWh /year)	0	2	2.00	229,211	58.0	12.3	1.9	1.90	217,751	55.1	11.7	1.1	1.10	126,066	31.9	6.8	1.1	1.10	126,066	31.9	6.8	1	1.00	114,606	29.0	6.2
Total	1,231.60	1,234.70	3.10	355,277	89.9	19.1	1,232.60	1.00	114,606	29.0	6.2	1,233.60	2.00	229,211	58.0	12.3	1,233.80	2.20	252,132	63.8	13.6	1,233.70	2.10	240,672	60.9	13.0
MTCO2e/year				161.2	1.0	2.6			52.0	0.3	0.8			104.0	0.7	1.7			114.4	0.7	1.8			109.2	0.7	1.8
			MT-CO2e/year	164.8				MT-CO2e/year	53.1				MT-CO2e/year	106.3				MT-CO2e/year	116.9				MT-CO2e/year	111.6		
			O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88		
			TOTAL MT-CO2e/year	**166.6**				**TOTAL MT-CO2e/year**	**55.0**				**TOTAL MT-CO2e/year**	**108.2**				**TOTAL MT-CO2e/year**	**118.8**				**TOTAL MT-CO2e/year**	**113.49**		
			Compared to Proposed	100%					33%					65%					71%					68%		
			Difference	0%					67%					35%					29%					32%		

2030 CO2 Intensity Factor (PG&E)	114.61	lb-CO2/MWh	2204.62	lb/MT
2030 CH4 Intensity Factor (PG&E)	0.0290	lb-CH4/MWh	25	GWP CH4 (CO2e)
2030 N2O Intensity Factor (PG&E)	0.00617	lb-N2O/MWh	298	GWP N2O (CO2e)

PG&E Intensity Factors	2018	206.29	https://www.theclimateregistry.org/our-members/cris-public-reports/
	2030	114.61	linear interpolation
	2045	0	

Operations and Maintenance Worker Trip GHG Emissions

	Proposed: US 140 TAF HFD								
Year	Trips per Year	Annual VMT (roundtrip)	ROG (lbs/year)	NOx (lbs/year)	PM10 (lbs/year)	PM2.5 (lbs/year)	CO (lbs/year)	CO2 (lbs/year)	CO2 (MT/year)
1	64	6,950	0.132	0.687	0.018	0.017	10.520	4,138	1.88
2-5	38	4,127	0.078	0.408	0.011	0.010	6.246	2,457	1.11
6+	24	2,606	0.049	0.258	0.007	0.006	3.945	1,552	0.70

Project Description (Section 2.3.3.2):

Inspections

Year 1: One trip/worker per week (52 trips/year)

Years 2-5: One trip/worker every 2 weeks (26 trips/year)

Years 6+: One trip/worker per month (12 trips/year)

Maintenance

All Years: One trip/worker per month (12 trips per year)

2204.62 lb/MT

Distance fron Valley Water (San Jose) to project site: 54.3 miles 1-way

Alt A: US 140 TAF EFD								
Trips per Year	**Annual VMT (roundtrip)**	ROG (lbs/year)	NOx (lbs/year)	PM10 (lbs/year)	PM2.5 (lbs/year)	CO (lbs/year)	CO2 (lbs/year)	CO2 (MT/year)
64	6,950	0.132	0.687	0.018	0.017	10.520	4,138	1.88
38	4,127	0.078	0.408	0.011	0.010	6.246	2,457	1.11
24	2,606	0.049	0.258	0.007	0.006	3.945	1,552	0.70

O & M Worker Trip Exhaust Emission Factors

Raw Emission Factors from EMFAC2021

Veh	Fuel	Pop	VMT	Trips	Running Exhaust Emission Rates (g/mile)						
		(Vehicles)	(Miles/day)	(Trips/day)	ROG_RUNEX	NOX_RUNEX	PM10_RUNEX	PM2_5_RUNEX	CO_RUNEX	SOX_RUNEX	CO2_RUNEX
LDA	Gasoline	598,860	22,133,915	2,780,384	0.008	0.038	0.001	0.001	0.695	0.003	273.208
LDA	Diesel	1,620	46,913	6,871	0.026	0.188	0.016	0.015	0.320	0.002	230.596
LDA	Electricity	61,443	2,670,452	299,853	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LDA	Plug-in Hybrid	19,038	825,568	78,721	0.001	0.003	0.001	0.001	0.209	0.001	135.439
LDT1	Gasoline	51,681	1,664,706	230,186	0.025	0.115	0.002	0.002	1.317	0.003	324.128
LDT1	Diesel	21	303	59	0.297	1.644	0.249	0.238	1.585	0.004	415.168
LDT1	Electricity	234	9,324	1,110	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LDT1	Plug-in Hybrid	98	4,519	406	0.001	0.003	0.000	0.000	0.187	0.001	121.010
LDT2	Gasoline	290,875	10,447,706	1,360,241	0.010	0.063	0.001	0.001	0.796	0.003	338.271
LDT2	Diesel	1,050	38,652	4,980	0.013	0.039	0.005	0.005	0.130	0.003	306.718
LDT2	Electricity	2,157	73,664	10,962	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LDT2	Plug-in Hybrid	2,562	112,327	10,593	0.001	0.003	0.000	0.000	0.196	0.001	127.261
Total			38,028,048								

Source: wksht: EMFAC2021output

Veh	Fuel	Ratio of Vehicle/Fuel Type to Total VMT	
LDA	Gasoline	58%	
LDA	Diesel	0.12%	
LDA	Electricity	7.0%	
LDA	Plug-in Hybrid	2.2%	
LDT1	Gasoline	4.4%	100%
LDT1	Diesel	0.001%	
LDT1	Electricity	0.025%	
LDT1	Plug-in Hybrid	0.012%	
LDT2	Gasoline	27.5%	
LDT2	Diesel	0.10%	
LDT2	Electricity	0.19%	
LDT2	Plug-in Hybrid	0.30%	

Exhaust Emission Rates for Composite Light Duty Vehicles

ROG_RUNEX (gms/mile)	NOX_RUNEX (gms/mile)	PM10_RUNEX (gms/mile)	PM2_5_RUNEX (gms/mile)	CO_RUNEX (gms/mile)	SOX_RUNEX (gms/mile)	CO2_RUNEX (gms/mile)
0.009	0.045	0.001	0.001	0.687	0.003	270.073

Source: EMFAC2021 emission factors (above) and weighted mix of passenger vehicle fleet (also above)

ROG	NOX	PM10	PM2.5	CO	SOX	CO2	Units
0.00002	0.00010	0.000003	0.000002	0.00151	0.00001	0.59541	lbs/mile

	value	unit	source
trips per worker	2	trips/worker	See Note 2
trip length	35	miles/trip	one-way value provided by Stantec
portion of trip on paved surfaces	100%	%	
portion of trip on unpaved surfaces	0%	%	
mass conversion rate	453.59	g/lb	onlineconversion.com/weight_common.htm

Exhaust Emissions per Worker Per Day

ROG	NOx	PM10	PM2.5	CO	SOx	CO2e	units
0.0013	0.0069	0.0002	0.0002	0.1060	0.0004	41.6786	lb/worker-day

Source: Exhaust emissions are based on trip length and the Exhaust Emission Rates for Composite Light Duty Vehicles (above).

Notes

1 It is conservatively assumed that all workers would drive alone and none would make trips during break periods due to the remoteness of the work sites.

2 Daily VMT by workers = # workers * trips per worker * trip length

Source: EMFAC2021 (v1.0.1) Emission Rates
Region Type: County
Region: Santa Clara
Calendar Year: 2025
Season: Annual
Vehicle Classification: EMFAC202x Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HOT

Region	Calendar Y	Vehicle Cat	Model Yea	Speed	Fuel	Population	Total VMT	CVMT	EVMT	Trips	Energy Consu
Santa Clara	2025	LDA	Aggregate	Aggregate	Gasoline	598860.3	22133914.69	22133914.69	0	2780384.029	0
Santa Clara	2025	LDA	Aggregate	Aggregate	Diesel	1620.04	46912.85411	46912.85411	0	6871.193241	0
Santa Clara	2025	LDA	Aggregate	Aggregate	Electricity	61443.19	2670451.983	0	2670451.983	299852.6978	1031014.87
Santa Clara	2025	LDA	Aggregate	Aggregate	Plug-in Hyl	19037.66	825567.7143	401012.9615	424554.7527	78720.73884	128228.189
Santa Clara	2025	LDT1	Aggregate	Aggregate	Gasoline	51680.86	1664705.874	1664705.874	0	230185.983	0
Santa Clara	2025	LDT1	Aggregate	Aggregate	Diesel	21.28272	302.825779	302.825779	0	59.13231308	0
Santa Clara	2025	LDT1	Aggregate	Aggregate	Electricity	234.4578	9323.703781	0	9323.703781	1109.79593	3599.71919
Santa Clara	2025	LDT1	Aggregate	Aggregate	Plug-in Hyl	98.13198	4519.182281	1961.286044	2557.896237	405.7757571	772.560901
Santa Clara	2025	LDT2	Aggregate	Aggregate	Gasoline	290874.7	10447705.78	10447705.78	0	1360240.873	0
Santa Clara	2025	LDT2	Aggregate	Aggregate	Diesel	1049.952	38652.33695	38652.33695	0	4980.340082	0
Santa Clara	2025	LDT2	Aggregate	Aggregate	Electricity	2157.059	73663.77305	0	73663.77305	10962.38395	28440.2962
Santa Clara	2025	LDT2	Aggregate	Aggregate	Plug-in Hyl	2561.885	112327.2154	51267.43918	61059.7762	10593.39505	18441.8723
Santa Clara	2025	T7 CAIRP C	Aggregate	Aggregate	Diesel	1034.487	207547.3052	207547.3052	0	23772.50231	0
Santa Clara	2025	T7 CAIRP C	Aggregate	Aggregate	Electricity	12.40346	2411.505747	0	2411.505747	285.0315405	4403.23123
Santa Clara	2025	T7 CAIRP C	Aggregate	Aggregate	Natural Ga	2.419779	485.0903505	485.0903505	0	55.60652865	0

SOAK and RUNLOSS, g/vehicle/day for IDLEX and DIURN

NOx_RUNE	NOx_IDLEX	NOx_STREX	PM2.5_RU	PM2.5_IDL	PM2.5_STF	PM2.5_PM	PM2.5_PM	PM10_RUN	PM10_IDLI	PM10_STR	PM10_PM	PM10_PM	CO2_RUNE	CO2_IDLEX	CO2_STREX
0.038209	0	0.245539	0.001142	0	0.00188	0.002	0.002655	0.001242	0	0.002044	0.008	0.007587	273.2075	0	69.04168
0.18842	0	0	0.015236	0	0	0.002	0.002712	0.015925	0	0	0.008	0.007748	230.5963	0	0
0	0	0	0	0	0	0.002	0.001534	0	0	0	0.008	0.004382	0	0	0
0.003187	0	0.11551	0.000578	0	0.001985	0.002	0.001382	0.000629	0	0.002159	0.008	0.003948	135.4391	0	65.04608
0.115355	0	0.35972	0.001639	0	0.002543	0.002	0.003241	0.001782	0	0.002766	0.008	0.00926	324.1276	0	84.93844
1.64381	0	0	0.238169	0	0	0.002	0.00372	0.248938	0	0	0.008	0.010628	415.1682	0	0
0	0	0	0	0	0	0.002	0.001537	0	0	0	0.008	0.004392	0	0	0
0.002848	0	0.11551	0.000353	0	0.001365	0.002	0.001394	0.000383	0	0.001485	0.008	0.003982	121.0095	0	70.34635
0.06257	0	0.314364	0.001192	0	0.001919	0.002	0.00313	0.001296	0	0.002087	0.008	0.008944	338.2713	0	86.2638
0.039332	0	0	0.004727	0	0	0.002	0.003123	0.004941	0	0	0.008	0.008921	306.7182	0	0
0	0	0	0	0	0	0.002	0.001527	0	0	0	0.008	0.004362	0	0	0
0.002995	0	0.11551	0.000438	0	0.00161	0.002	0.001388	0.000477	0	0.001751	0.008	0.003967	127.2609	0	77.17666
1.498671	123.4561	2.221126	0.030668	0.042485	0	0.009	0.025996	0.032054	0.044406	0	0.036	0.074273	1521.791	23804.97	0
0	0	0	0	0	0	0.009	0.013225	0	0	0	0.036	0.037786	0	0	0
0.206313	64.47231	0	0.001708	0.216514	0	0.009	0.025982	0.001858	0.235478	0	0.036	0.074235	1131.422	51379.69	0

CH4_RUNE	CH4_IDLEX	CH4_STRE	N2O_RUNI	N2O_IDLE	N2O_STRE	ROG_RUNI	ROG_IDLE	ROG_STRE	ROG_HOTS	ROG_RUNI
0.002117	0	0.067825	0.004408	0	0.032293	0.007947	0	0.306311	0.087189	0.224301
0.001193	0	0	0.036331	0	0	0.025693	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.000432	0	0.042249	0.000569	0	0.020584	0.001378	0	0.173285	0.041164	0.03735
0.005621	0	0.098552	0.008687	0	0.037511	0.02471	0	0.498818	0.156963	0.442299
0.013797	0	0	0.06541	0	0	0.297038	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.000383	0	0.041987	0.000501	0	0.020339	0.001231	0	0.173285	0.023895	0.020384
0.002642	0	0.078494	0.005588	0	0.036037	0.010244	0	0.360071	0.079452	0.214938
0.000603	0	0	0.048324	0	0	0.01298	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.000403	0	0.041992	0.000528	0	0.020344	0.001295	0	0.173285	0.026071	0.023359
0.000583	0.484627	0	0.239759	3.750482	0	0.012554	10.4339	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.929746	158.4146	0	0.230648	10.47409	0	0.013284	2.263432	0	0	0

ROG_DIUR	TOG_RUNI	TOG_IDLE	TOG_STRE	TOG_HOTS	TOG_RUNI	TOG_DIUR	NH3_RUNI	CO_RUNE	CO_IDLEX	CO_STREX	SOx_RUNE	SOx_IDLEX	SOx_STREX
1.384954	0.011596	0	0.335372	0.087189	0.224301	1.384954	0.035611	0.6952	0	3.049452	0.002701	0	0.000683
0	0.02925	0	0	0	0	0	0.0031	0.319914	0	0	0.002185	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.440525	0.002011	0	0.189725	0.041164	0.03735	0.440525	0.019241	0.209016	0	1.339893	0.001339	0	0.000643
2.52236	0.036056	0	0.546143	0.156963	0.442299	2.52236	0.036453	1.317416	0	4.886115	0.003204	0	0.00084
0	0.338158	0	0	0	0	0	0.0031	1.585068	0	0	0.003934	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.276746	0.001797	0	0.189725	0.023895	0.020384	0.276746	0.018228	0.186748	0	1.339893	0.001196	0	0.000695
1.349256	0.014949	0	0.394233	0.079452	0.214938	1.349256	0.03712	0.795621	0	3.47417	0.003344	0	0.000853
0	0.014777	0	0	0	0	0	0.0031	0.129797	0	0	0.002906	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.305362	0.00189	0	0.189725	0.026071	0.023359	0.305362	0.019143	0.196395	0	1.339893	0.001258	0	0.000763
0	0.014292	11.8782	0	0	0	0	0.22	0.053947	153.9743	0	0.01441	0.225419	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.948874	161.6737	0	0	0	0	1.06	3.681431	425.9711	0	0	0	0

Alternative B – Upstream 96 TAF EFD

Emissions Summary Sheet

(Alt B) US 96TAF EFD - Summary of Total Combined Construction Emissions

	ROG		CO		NOX		PM10 (exhaust)		PM10 (dust) - Mitigated		PM2.5 (exhaust)		PM2.5 (dust) - Mitigated		CO2	CH4	N2O	Total GHG
Construction Year	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	MT/year	MT/year	MT-CO2e/year
2025 (year 1)	0.71	17.18	6.79	163.67	6.37	153.55	0.21	5.06	159.43	3841.74	0.20	4.73	16.02	385.93	4,074	0.460	0.013	4,089.8
2026 (year 2)	6.94	75.43	50.99	407.90	65.44	544.42	1.74	14.53	1082.71	8661.67	1.58	12.67	108.50	867.98	21,276	4.005	0.120	21,411.5
2027 (year 3)	8.06	84.40	56.77	454.16	75.83	627.56	2.01	16.71	159.45	1275.62	1.85	14.84	16.17	129.32	22,731	4.141	0.133	22,874.2
2028 (year 4)	8.65	89.08	60.53	495.90	78.79	654.15	2.09	17.37	845.72	6765.75	1.95	15.62	87.36	698.90	23,686	3.785	0.134	23,820.9
2029 (year 5)	8.58	88.58	58.56	480.10	78.44	651.38	2.08	17.26	845.38	6763.07	1.94	15.51	87.31	698.50	23,043	3.782	0.133	23,176.9
2030 (year 6)	7.27	78.07	52.25	429.69	70.16	585.13	1.78	14.83	809.39	6765.75	1.63	13.08	82.46	698.90	21,736	3.675	0.118	21,862.8
2031 (year 7)	2.77	62.47	16.14	310.39	22.15	435.60	0.58	11.44	2.01	38.67	0.51	9.82	0.28	5.43	6,841	1.194	0.036	6,881.8
2032 (year 8)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.000	0.000	0.0

Summary of Off-Road Fugitive Dust Emissions (lbs/day)

		PM 10 Fugitive Dust (lbs/day)		PM 10 Fugitive Dust (tons/year)		PM2.5 Fugitive Dust (lbs/day)		PM2.5 Fugitive Dust (tons/year)	
Year	Days/Year	Raw Total	With BMPs	Raw Total	With BMPs	Raw Total	With BMPs	Raw Total	With BMPs
Year 1	83	7,613	3,807	316	158	761	381	31.6	15.8
Year 2	250	17,251	8,625	2,156	1,078	1,725	863	215.6	107.8
Year 3	250	2,481	1,240	310	155	248	124	31.0	15.5
Year 4	250	12,292	6,146	1,536	768	1,229	615	153.6	76.8
Year 5	250	12,292	6,146	1,536	768	1,229	615	153.6	76.8
Year 6	250	12,292	6,146	1,536	768	1,229	615	153.6	76.8
Year 7	104	15	7	0.77	0.39	1	1	0.1	0.0
Year 8	0	-	-	-	-	-	-	-	-

*Includes materials movement, pile storage, and construction activity (grading and earthmoving)

2000 lb/ton

Summary of Batch Plant Emissions

	Alt B: US 96 TAF EFD												
Construction Year	months (A)	days/year (A)	months (B)	days/year (B)	days overlap A+B	PM10 (lbs/day)	PM10-Max (lbs/day)	PM10 tons/year	PM-10 Max tons/year	PM2.5 (lbs/day)	PM2.5-Max (lbs/day)	PM2.5 tons/yr	PM2.5-Max (tons/yr)
1													
2													
3													
4			Jan-Dec	250		290.6	581.2	36.3	72.7	39.3	78.5	4.9	9.8
5			Jan-Dec	250		290.6	581.2	36.3	72.7	39.3	78.5	4.9	9.8
6			Jan-Jun	125		290.6	581.2	18.2	36.3	39.3	78.5	2.5	4.9
7													
8													

Summary of Off-road Construction Equipment Emissions

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG
Construction Year	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT-CO2e/year
2025 (year 1)	0.67	16.22	4.73	113.93	4.45	107.18	0.17	4.06	0.16	3.77	1,467	35,352	0.46	11.08	0.01	0.32	1,483
2026 (year 2)	5.81	46.49	39.73	317.80	60.31	482.50	1.62	12.94	1.50	11.97	13,447	107,580	4.01	32.04	0.12	0.96	13,583
2027 (year 3)	6.89	55.09	45.19	361.52	70.50	563.97	1.88	15.02	1.75	14.04	15,051	120,412	4.11	32.89	0.13	1.06	15,194
2028 (year 4)	7.50	59.99	47.55	380.38	73.72	589.75	1.97	15.80	1.87	14.93	15,419	123,351	3.79	30.28	0.13	1.07	15,553
2029 (year 5)	7.45	59.63	46.96	375.70	73.46	587.70	1.96	15.70	1.85	14.84	15,322	122,578	3.78	30.25	0.13	1.06	15,456
2030 (year 6)	6.12	48.97	39.26	314.06	65.07	520.58	1.66	13.25	1.55	12.39	13,465	107,718	3.67	29.39	0.12	0.95	13,592
2031 (year 7)	1.76	33.76	12.39	238.32	19.56	376.21	0.52	9.91	0.48	9.18	4,024	77,383	1.19	22.97	0.04	0.69	4,064
2032 (year 8)																	

Summary of Off-road Vegetative Clearing Equipment Emissions

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG
Construction Year	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT-CO2e/year
2027 (year 3)	0.04909	0.39273	0.44824	3.58588	0.40946	3.27565	0.01799	0.14394	0.01673	0.13382	95.8	766.3	0.02951	0.23608	0.00086	0.00688	96.8
2030 (year 6)	0.00160	0.01281	0.01313	0.10502	0.01730	0.13844	0.00047	0.00374	0.00043	0.00347	3.4	27.0	0.00107	0.00856	0.00003	0.00024	3.4

Summary of On-road Emissions (Exhaust and Dust)

Truck Hauling (Dust)

			Alt B: US 96 TAF EFD			
Construction Year	Days/year	Total Daily VMT	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)
1	83	13,266	23.62	0.98	3.54	0.15
2	250	8,337	14.84	1.86	2.23	0.28
3	250	7,862	14.00	1.75	2.10	0.26
4	250	7,862	14.00	1.75	2.10	0.26
5	250	7,862	14.00	1.75	2.10	0.26
6	250	7,862	14.00	1.75	2.10	0.26
7	104	7,921	14.10	0.73	2.12	0.11
8						

Truck Hauling (Exhaust)

	Alt B: US 96 TAF EFD												
Construction Year	Total Daily VMT	ROG (lbs/day)	ROG (tons/yr)	NOX (lbs/day)	NOX (tons/yr)	PM10 (lbs/day)	PM10 (tons/yr)	PM2.5 (lbs/day)	PM2.5 (tons/yr)	CO (lbs/day)	CO (tons/yr)	CO2 (lbs/day)	CO2 (MT/yr)
1	13,266	0.36	0.015	43.24	1.795	0.92	0.038	0.88	0.037	1.80	0.075	43,972	1,825
2	8,337	0.23	0.029	27.17	3.397	0.58	0.073	0.56	0.069	1.13	0.142	27,633	3,454
3	7,862	0.22	0.027	25.63	3.203	0.55	0.069	0.52	0.066	1.07	0.134	26,059	3,257
4	7,862	0.22	0.027	25.63	3.203	0.55	0.069	0.52	0.066	1.07	0.134	26,059	3,257
5	7,862	0.22	0.027	25.63	3.203	0.55	0.069	0.52	0.066	1.07	0.134	26,059	3,257
6	7,862	0.22	0.027	25.63	3.203	0.55	0.069	0.52	0.066	1.07	0.134	26,059	3,257
7	7,921	0.22	0.011	25.82	1.343	0.55	0.029	0.53	0.027	1.08	0.056	26,255	1,365
8													

Worker Commute Trips (Dust)

					Alt B: US 96 TAF EFD			
Construction Year	Days/year	# Avg Workers/day	Average Trip Length	Daily VMT (miles)	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)
1	83	452	35	31,665	11.6	0.48	1.7	0.07
2	250	840	35	58,771	21.5	2.68	3.2	0.40
3	250	830	35	58,129	21.2	2.65	3.2	0.40
4	250	962	35	67,317	24.6	3.07	3.7	0.46
5	250	857	35	59,967	21.9	2.74	3.3	0.41
6	250	962	35	67,317	24.6	3.07	3.7	0.46
7	104	670	35	46,900	17.1	0.89	2.6	0.13
8								

Worker Commute Trips (Exhaust)

	Alt B: US 96 TAF EFD												
Construction Year	# Avg Workers/day	Daily VMT (miles)	ROG (lbs/day)	ROG (tons/year)	NOx (lbs/day)	NOx (tons/year)	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)	CO (lbs/day)	CO (tons/year)	CO2 (lbs/day)	CO2 (MT/year)
1	452	31,665	0.601	0.025	3.130	0.130	0.084	0.003	0.077	0.003	47.929	1.989	18,853	782
2	840	58,771	1.115	0.139	5.810	0.726	0.155	0.019	0.143	0.018	88.957	11.120	34,993	4,374
3	830	58,129	1.102	0.138	5.747	0.718	0.154	0.019	0.141	0.018	87.986	10.998	34,611	4,326
4	962	67,317	1.277	0.160	6.655	0.832	0.178	0.022	0.164	0.020	101.893	12.737	40,081	5,010
5	857	59,967	1.137	0.142	5.928	0.741	0.159	0.020	0.146	0.018	90.767	11.346	35,705	4,463
6	962	67,317	1.277	0.160	6.655	0.832	0.178	0.022	0.164	0.020	101.893	12.737	40,081	5,010
7	670	46,900	0.889	0.046	4.637	0.241	0.124	0.006	0.114	0.006	70.989	3.691	27,925	1,452
8														

Haul Trucks plus 50% Worker Commute Trips (Exhaust)

	Alt B: US 96 TAF EFD												
Construction Year	Daily VMT (miles)	ROG (lbs/day)	ROG (tons/year)	NOx (lbs/day)	NOx (tons/year)	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)	CO (lbs/day)	CO (tons/year)	CO2 (lbs/day)	CO2 (MT/year)
1	29,099	0.663	0.150	44.808	10.135	0.967	0.219	0.923	0.209	25.769	5.828	53,399	10,957
2	37,722	0.785	0.330	30.079	12.627	0.659	0.277	0.627	0.263	45.613	19.148	45,129	17,187
3	36,927	0.766	0.318	28.500	11.834	0.625	0.259	0.595	0.247	45.062	18.710	43,364	16,334
4	41,520	0.853	0.410	28.955	13.922	0.637	0.306	0.606	0.291	52.016	25.011	46,100	20,109
5	37,845	0.784	0.336	28.591	12.247	0.627	0.269	0.597	0.256	46.453	19.897	43,912	17,063
6	41,520	0.853	0.410	28.955	13.922	0.637	0.306	0.606	0.291	52.016	25.011	46,100	20,109
7	31,371	0.661	0.222	28.138	9.426	0.614	0.206	0.585	0.196	36.572	12.252	40,217	12,222
8	0	0.000	-	0.000	-	0.000	-	0.000	-	0.000	-	-	-

2204.6 lb/MT

Haul Trucks plus 50% Worker Commute Trips (Dust)

		Alt B: US 96 TAF EFD			
Construction Year	Total Daily VMT	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)
1	29,099	29.40	1.22	4.41	0.18
2	37,722	25.57	3.20	3.84	0.48
3	36,927	24.61	3.08	3.69	0.46
4	41,520	26.29	3.29	3.94	0.49
5	37,845	24.94	3.12	3.74	0.47
6	41,520	26.29	3.29	3.94	0.49
7	31,371	22.66	1.18	3.40	0.18
8	-	0.00	0.00	-	0.000

Summary of Helicopter Emissions

Total Days Helicopter Used per Year	70	5 hrs/day
Total Hours Helicopter Used per Year	348	

Emissions	HC	ROG (5)	NOX	(use as PM10) PM Non-Volatile		
LTO EF (g/LTO)*	667	844.7	285	9.0		
Cruising EF (g/hour)*	1310	1659.0	2340	68		
Max Emissions (lbs/day)	21.8	27.6	28.5	0.849	lb/day	July 15-Dec 1 (years 2-7)
Annual Emissions (tons/year	0.76	0.96	1.01	0.030	ton/year	July 15-Dec 1 (years 2-7)

* Assume AS 365 N3 Dauphin with Arriel 2C

Summary of Blasting Emissions

Blasting	Alt B: US 96 TAF EFD									
Year	Blasts/Day	Blasts/Year	tons/blast	lb-CO/day	lb-CO/yr	lb-NOx/day	lb-NOx/yr	lb-SO2/day	lb-SO2/yr	CH4
1	0	0	0	0	0	0	0	0	0	
2	1	14	0.1875	12.5625	175.875	3.1875	44.625	0.375	5.25	NA
3	1	20	0.1875	12.5625	251.25	3.1875	63.75	0.375	7.5	NA
4	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
5	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
6	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
7	0	0	0	0	0	0	0	0	0	
8	0	0	0	0	0	0	0	0	0	

Exhaust Emissions

Off-road Diesel Construction Equipment
On-road Haul Truck Trips
On-road Worker Trips
Vegetative Clearing Equipment

Off-Road Equipment Emissions - PREP Alternative B (US 96 TAF EFD)
Upstream
Tier 4 Fuel
Earthfill Dam

Mass Conversion Rates LHV Source
2000 lb/ton google.com
2000 lb/ton google.com
2204.62 lb/MT google.com

Summary of Equipment Hours

| Code | Equipment Classification & Description / Description | Equip Hours | reference | hp | load factor | Cumulative HCSU | Cumulative CO | Cumulative NOX | Cumulative PMSU | Cumulative PMES | Cumulative COZ | Cumulative CH4 | Cumulative N2O | Year 1 (17 months) HCSU | CO | NOX | PMSU | PMES | COZ | CH4 | N2O | Year 2 (12 months) HCSU | CO | NOX | PMSU | PMES | COZ | CH4 | N2O | Year 3 (12 months) HCSU | CO | NOX | PMSU | PMES | COZ | CH4 | N2O | Year 4 (12 months) HCSU | CO | NOX | PMSU | PMES | COZ | CH4 | N2O | Year 5 (12 months) HCSU | CO | NOX | PMSU | PMES | COZ | CH4 | N2O | Year 6 (12 months) HCSU | CO | NOX | PMSU | PMES | COZ | CH4 | N2O | Year 7 (6 months) HCSU | CO | NOX | PMSU | PMES | COZ | CH4 | N2O |
|---|---|---

Alternative B: Off-Road Equipment Annual & Daily Emissions Summary

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG		
	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT-CO2e/yr	Months/Year	Days/Year
2025 (year 1)	0.67	16.22	4.73	113.93	4.45	107.18	0.17	4.06	0.16	3.77	1467.12	35352.30	0.46	11.08	0.013	0.32	1,482.5	4	83
2026 (year 2)	5.81	46.49	39.73	317.80	60.31	482.50	1.62	12.94	1.50	11.97	13,447.48	107579.82	4.01	32.04	0.12	0.96	13,583.3	12	250
2027 (year 3)	6.89	55.09	45.19	361.52	70.50	563.97	1.88	15.02	1.75	14.04	15,051.45	120411.58	4.11	32.89	0.13	1.06	15,193.7	12	250
2028 (year 4)	7.50	59.99	47.55	380.38	73.72	589.75	1.97	15.80	1.87	14.93	15,418.87	123350.96	3.79	30.28	0.13	1.07	15,553.4	12	250
2029 (year 5)	7.45	59.63	46.96	375.70	73.46	587.70	1.96	15.70	1.85	14.84	15,322.25	122578.01	3.78	30.25	0.13	1.06	15,456.4	12	250
2030 (year 6)	6.12	48.97	39.26	314.06	65.07	520.58	1.66	13.25	1.55	12.39	13,464.74	107717.91	3.67	29.39	0.12	0.95	13,591.9	12	250
2031 (year 7)	1.76	33.76	12.39	238.32	19.56	376.21	0.52	9.91	0.48	9.18	4,023.90	77382.68	1.19	22.97	0.04	0.69	4,064.4	5	104
2032 (year 8)	-		-		-		-		-		-		-		-		0.0	5.8	

		Unit	Source
Mass Conversion Rates	453.59	g/lb	google.com
	2000	lb/ton	google.com
	25	ton-CO2e/	GWP CH4
	298	ton-CO2e/	GWP N2O

On-Road Emissions

Truck Hauling (Exhaust)

Exhaust emission rates shown on "Haul Truck Exhaust Em. Rts." worksheet

	Alt B: US 96 TAF EFD						
Construction Year	Total Daily VMT	ROG (lbs/day)	NOX (lbs/day	PM10 (lbs/day)	PM2.5 (lbs/day	CO (lbs/day)	CO2 (lbs/day)
1	13,266	0.36	43.24	0.92	0.88	1.80	43,972
2	8,337	0.23	27.17	0.58	0.56	1.13	27,633
3	7,862	0.22	25.63	0.55	0.52	1.07	26,059
4	7,862	0.22	25.63	0.55	0.52	1.07	26,059
5	7,862	0.22	25.63	0.55	0.52	1.07	26,059
6	7,862	0.22	25.63	0.55	0.52	1.07	26,059
7	7,921	0.22	25.82	0.55	0.53	1.08	26,255
8							

On-Road Emissions

Worker Commute Trips (Exhaust)

Exhaust emission rates shown on "Worker Trip Exhaust Em. Rts." worksheet

Alt B: US 96 TAF EFD

Construction Year	# Avg Workers/ day	Daily VMT (miles)	ROG (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO (lbs/day)	CO2 (lbs/day)
1	452	31,665	0.601	3.130	0.084	0.077	47.929	18,853
2	840	58,771	1.115	5.810	0.155	0.143	88.957	34,993
3	830	58,129	1.102	5.747	0.154	0.141	87.986	34,611
4	962	67,317	1.277	6.655	0.178	0.164	101.893	40,081
5	857	59,967	1.137	5.928	0.159	0.146	90.767	35,705
6	962	67,317	1.277	6.655	0.178	0.164	101.893	40,081
7	670	46,900	0.889	4.637	0.124	0.114	70.989	27,925
8								

Notes

1 Daily Truck Hauling trips based on total material import/export required

2 Average trip length obtained from Stantec

3 Daily VMT by workers = # workers * trips per worker * trip length

Off-Road Vegetative Clearing Equipment Emissions

		Unit	Source
Mass Conversion Rates	453.59	g/lb	google.com
	2000	lb/ton	google.com
	2204.62	lb/MT	google.com

												Year 3	Alternative B- US 96 TAF EFD							
Equipment Classification & Description		hp	load	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O	Equip	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O
Code	Description		factor	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	Hours	ton/year	ton/year	ton/year	ton/year	ton/year	MT/year	MT/year	MT/year
	6000 Gal Water Truck	260	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004274	218	0.0042	0.0281	0.0253	0.0009	0.0008	10.2301	0.0033	0.0001
	Chainsaws 25 Hsp	25	0.73	0.685	2.339	4.332	0.161	0.161	568.299	0.061	0.004751	654	0.0090	0.0308	0.0570	0.0021	0.0021	6.7829	0.0007	0.0001
	Medium Feller/Buncher 175 Hsp	175	0.4	0.2347	3.13647	2.16742	0.1121	0.1031	469.843	0.152	0.004274	218	0.0039	0.0528	0.0365	0.0019	0.0017	7.1698	0.0023	0.0001
	Large Feller/Buncher 300 Hsp	300	0.4	0.1684	1.3582	1.55241	0.0594	0.0547	476.2959	0.154	0.004274	218	0.0049	0.0392	0.0448	0.0017	0.0016	12.4599	0.0040	0.0001
	Medium Skidder 175 Hsp	175	0.37	0.1869	2.92602	1.9987	0.0942	0.0867	471.0403	0.1523	0.004274	218	0.0029	0.0455	0.0311	0.0015	0.0013	6.6490	0.0021	0.0001
	Large Skidder 175 Hsp	175	0.37	0.1869	2.92602	1.9987	0.0942	0.0867	471.0403	0.1523	0.004274	218	0.0029	0.0455	0.0311	0.0015	0.0013	6.6490	0.0021	0.0001
	Loader Rubber Tired 300 Hsp	300	0.36	0.1931	1.2763	1.43264	0.0525	0.0483	469.1434	0.1517	0.004274	218	0.0050	0.0331	0.0372	0.0014	0.0013	11.0455	0.0036	0.0001
	Masticator on Excavator 175 Hsp	175	0.38	0.1578	3.078	1.15367	0.0566	0.052	472.4964	0.1528	0.004274	218	0.0025	0.0492	0.0184	0.0009	0.0008	6.8498	0.0022	0.0001
	Whole Tree Chipper 300 Hsp	300	0.42	0.1684	1.3582	1.55241	0.0594	0.0547	476.2959	0.154	0.004274	350	0.0082	0.0660	0.0755	0.0029	0.0027	21.0047	0.0068	0.0002
	Large Diameter Chipper/Shredder 100 Hsp	100	0.42	0.3413	3.58397	3.25221	0.2029	0.1867	472.7482	0.1529	0.004274	350	0.0055	0.0581	0.0527	0.0033	0.0030	6.9494	0.0022	0.0001

These equipment types/ratings consistent with CalFire VTP PEIR, Appendix AQ-1 Treatment Activity Emissions Prepared by Ascent

				Emission Factors								Year 6	Alternative B- US 96 TAF EFD							
Equipment Classification & Description		hp	load	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O	Equip	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O
Code	Description		factor	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	Hours	ton/year	ton/year	ton/year	ton/year	ton/year	MT/year	MT/year	MT/year
	67 Ton Off Hwy Truck 870 Hsp (Cat 777)	870	0.38	0.19	1.15	3.14	0.06	0.05	473.37	0.15	0.00	10	0.0007	0.0042	0.0114	0.0002	0.0002	1.5650	0.0005	0.0000
	6000 Gal Water Truck	260	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004274	10	0.0002	0.0013	0.0012	0.0000	0.0000	0.4693	0.0002	0.0000
	Chainsaws 25 Hsp	25	0.73	0.685	2.339	4.332	0.161	0.161	568.299	0.061	0.004751	10	0.0001	0.0005	0.0009	0.0000	0.0000	0.1037	0.0000	0.0000
	Rotary Mower 25 Hsp	25	0.42	0.7571	4.87388	4.30575	0.2678	0.2464	528.9535	0.1711	0.004751	10	0.0001	0.0006	0.0005	0.0000	0.0000	0.0555	0.0000	0.0000
	Small Diameter Chipper 25 Hsp	25	0.42	0.7571	4.87388	4.30575	0.2678	0.2464	528.9535	0.1711	0.004751	10	0.0001	0.0006	0.0005	0.0000	0.0000	0.0555	0.0000	0.0000
	Tractor/Loader/Backhoe 25 Hsp	25	0.37	0.55	4.55974	3.66186	0.145	0.1334	513.8025	0.1662	0.004751	10	0.0001	0.0005	0.0004	0.0000	0.0000	0.0475	0.0000	0.0000
	Tractor/Loader/Backhoe 175 Hsp	175	0.37	0.1619	3.08323	1.18039	0.0585	0.0538	469.3289	0.1518	0.004274	10	0.0001	0.0022	0.0008	0.0000	0.0000	0.3039	0.0001	0.0000
	Masticator on Excavator 175 Hsp	175	0.38	0.1578	3.078	1.15367	0.0566	0.052	472.4964	0.1528	0.004274	10	0.0001	0.0023	0.0008	0.0000	0.0000	0.3142	0.0001	0.0000
	Flail/Mulcher on Excavator 260 Hsp	260	0.38	0.1152	1.05072	0.72641	0.0257	0.0236	470.2915	0.1521	0.004274	10	0.0001	0.0011	0.0008	0.0000	0.0000	0.4646	0.0002	0.0000

Off-Road Vegetative Clearing Equipment Emissions

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG		
	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT-CO2e/yr	Months/Year	Days/Year
Proposed Proj US 140 TAF HFD																			
2027 (year 3)	0.03750	0.30004	0.320	2.56	0.302	2.42	0.01314	0.10512	0.01225	0.09798	71.091	568.73	0.022	0.17	0.00064	0.00510	71.8	12	250
2030 (year 6)	0.00640	0.05122	0.053	0.42	0.069	0.55	0.00187	0.01498	0.00173	0.01386	13.517	108.14	0.00428	0.03426	0.00012	0.00098	13.7	12	250
Alt A (US 140 TAF EFD)																			
2027 (year 3)	0.06436	0.51486	0.588	4.70	0.534	4.27	0.02332	0.18656	0.02169	0.17355	125.300	1002.40	0.039	0.31	0.00113	0.00900	126.6	12	250
2030 (year 6)	0.00160	0.01281	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250
Alt B (US 96 TAF EFD)																			
2027 (year 3)	0.04909	0.39273	0.448	3.59	0.409	3.28	0.01799	0.14394	0.01673	0.13382	95.790	766.32	0.030	0.24	0.00086	0.00688	96.8	12	250
2030 (year 6)	0.00160	0.01281	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250
Alt C (DS 140 TAF HFD)																			
2027 (year 3)	0.00544	0.04351	0.258	2.07	0.236	1.89	0.01036	0.08287	0.00963	0.07705	55.182	441.45	0.017	0.14	0.00050	0.00396	55.8	12	250
2030 (year 6)	0.05856	0.46852	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250
Alt D (DS 140 TAF EFD)																			
2027 (year 3)	0.00368	0.02941	0.390	3.12	0.365	2.92	0.01580	0.12641	0.01476	0.11810	83.135	665.08	0.025	0.20	0.00074	0.00596	84.0	12	250
2030 (year 6)	0.03004	0.24036	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250

		Unit	Source
Mass Conversion Rates	453.59	g/lb	google.com
	2000	lb/ton	google.com
	25	ton-CO2e/	GWP CH4
	298	ton-CO2e/	GWP N2O

Fugitive Dust Emissions

Material Piles and Earthmoving
On-road Haul Truck Trips
On-road Worker Trips

Off-Road Fugitive Dust Emissions

1. Earthwork

Off-Road Fugitive Dust Emissions

Off-Road Fugitive Dust Emissions

Construction Year	Proposed: US 140 TAF HFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	377,764	604,421.93	446,130	713,808.77	1,318,230.70	15,882.30	**5,228.73**
Year 2	1,511,055	2,417,687.71	1,784,522	2,855,235.09	5,272,922.81	21,091.69	**6,943.76**
Year 3	1,636,564	2,618,501.93	1,495,130	2,392,208.77	5,010,710.70	20,042.84	**6,598.46**
Year 4	834,894	1,335,830.00	1,407,790	2,252,463.61	3,588,293.61	14,353.17	**4,725.32**
Year 5	557,094	891,350.00	1,176,290	1,882,063.61	2,773,413.61	11,093.65	**3,652.23**
Year 6	557,094	891,350.00	1,176,290	1,882,063.61	2,773,413.61	11,093.65	**3,652.23**
Year 7	557,094	891,350.00	1,176,290	1,882,063.61	2,773,413.61	11,093.65	**3,652.23**
Year 8							

Construction Year	Alt A: US 140 TAF EFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	422,369	675,791.02	531,099	849,757.90	1,525,548.92	18,380.11	**6,051.06**
Year 2	3,386,987	5,419,178.63	5,072,077	8,115,322.51	13,534,501.14	54,138.00	**17,823.19**
Year 3	889,091	1,422,545.45	1,481,818	2,370,909.09	3,793,454.55	15,173.82	**4,995.49**
Year 4	3,781,935	6,051,095.44	2,623,751	4,198,002.05	10,249,097.49	40,996.39	**13,496.74**
Year 5	3,781,935	6,051,095.44	2,623,751	4,198,002.05	10,249,097.49	40,996.39	**13,496.74**
Year 6	3,781,935	6,051,095.44	2,623,751	4,198,002.05	10,249,097.49	40,996.39	**13,496.74**
Year 7	1,890,967	3,025,547.72	1,311,876	2,099,001.02	5,124,548.75	20,498.19	**6,748.37**
Year 8							

Construction Year	Alt B: US 96 TAF EFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	521,166	833,865.69	676,584	1,082,534.76	1,916,400.45	23,089.16	**7,601.36**
Year 2	3,238,088	5,180,957.08	4,939,253	7,902,804.28	13,083,761.36	52,335.05	**17,229.62**
Year 3	438,000	700,800.00	730,000	1,168,000.00	1,868,800.00	7,475.20	**2,460.97**
Year 4	3,554,122	5,686,595.81	2,270,263	3,632,420.13	9,319,015.94	37,276.06	**12,271.94**
Year 5	3,554,122	5,686,595.81	2,270,263	3,632,420.13	9,319,015.94	37,276.06	**12,271.94**
Year 6	3,554,122	5,686,595.81	2,270,263	3,632,420.13	9,319,015.94	37,276.06	**12,271.94**
Year 7							
Year 8							

Construction Year	Alt C: DS 140 TAF HFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)[1]	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	425,518	680,828.34	943,793	1,510,068.54	2,190,896.88	26,396.35	**8,690.14**
Year 2	1,276,553	2,042,485.02	2,831,379	4,530,205.62	6,572,690.64	26,290.76	**8,655.38**
Year 3	1,256,890	2,011,024.00	1,041,500	1,666,400.00	3,677,424.00	14,709.70	**4,842.69**
Year 4	1,511,931	2,419,090.29	1,823,784	2,918,053.77	5,337,144.06	21,348.58	**7,028.33**
Year 5	567,506	908,009.14	1,248,202	1,997,123.93	2,905,133.08	11,620.53	**3,825.68**
Year 6	567,506	908,009.14	1,248,202	1,997,123.93	2,905,133.08	11,620.53	**3,825.68**
Year 7	567,506	908,009.14	1,248,202	1,997,123.93	2,905,133.08	11,620.53	**3,825.68**
Year 8	412,731	660,370.29	907,784	1,452,453.77	2,112,824.06	8,451.30	**2,782.32**

Construction Year	Alt D: DS 140 TAF EFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)[1]	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	315,478	504,764.38	615,377	984,603.72	1,489,368.10	17,944.19	**5,907.55**
Year 2	2,727,494	4,363,990.86	4,941,870	7,906,992.65	12,270,983.51	49,083.93	**16,159.30**
Year 3	2,395,394	3,832,631.05	3,956,016	6,329,625.94	10,162,256.99	40,649.03	**13,382.38**
Year 4	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	39,180.01	**12,898.75**
Year 5	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	39,180.01	**12,898.75**
Year 6	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	39,180.01	**12,898.75**
Year 7	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	42,772.94	**14,081.61**
Year 8	1,420,206	2,272,329.60	875,498	1,400,796.21	3,673,125.81	25,158.40	**8,282.59**

Conversion Rates
2000 lbs/ton
1.6 ton/cy

Source
google.com
calculatorsoup.com

Notes
1. Calulation using emission factor for PM10 shown on "Fugitive Dust Emission Factors" worksheet.
2. Emission estimates for fugitive dust from material movement were based on the material totals for all material import and waste exported. These are the activities that would result in on-site fugitive dust emissions.
Values of 0.0 indicate that no material import/export would be required for that particular construction year.

2. Construction Activity (grading and earthmoving)

		Proposed: US 140 TAF HFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)	Alt A: US 140 TAF EFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)
Year 1	231 Hsp Dozer (Cat D-7H)	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00
	Motor Grader (CAT 140G)	1478	17.8	8.46	1332	16.0	7.62
	Dozer (CAT D8)	529	6.4	3.03	529	6.4	3.03
	Dozer (CAT D6)	344	4.1	1.97	344	4.1	1.97
	140 Hp Bulldozer	0	0.0	0.00	0	0.0	0.00
Total				**13.45**			**12.62**
Year 2	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	1478	5.9	2.81	1332	5.3	2.53
	Dozer (CAT D8)	529	2.1	1.01	529	2.1	1.01
	Dozer (CAT D6)	344	1.4	0.65	344	1.4	0.65
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**15.13**			**25.54**
Year 3	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.66**			**21.35**
Year 4	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.66**			**21.35**
Year 5	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.66**			**21.35**
Year 6	231 Hsp Dozer (Cat D-7H)	4161	16.6	7.91	791	3.2	1.50
	520 Hsp Dozer with Disc (Cat D-10N)	1113	4.5	2.11	7239	29.0	13.75
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2461	9.8	4.68
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.09**			**20.00**
Year 7	231 Hsp Dozer (Cat D-7H)	4161	16.6	7.91	791	3.2	1.50
	520 Hsp Dozer with Disc (Cat D-10N)	1113	4.5	2.11	7239	29.0	13.75
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2461	9.8	4.68
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.09**			**20.00**
Year 8	231 Hsp Dozer (Cat D-7H)	500	6.0	2.86	120	5.7	2.71
	520 Hsp Dozer with Disc (Cat D-10N)	100	1.2	0.57	1000	47.6	22.62
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	300	14.3	6.79
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	0	0.0	0.00	0	0.0	0.00
Total				**3.43**			**32.12**

		Alt B: US 96 TAF EFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)	Alt C: DS 140 TAF HFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)	Alt D: DS 140 TAF EFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)
Year 1	231 Hsp Dozer (Cat D-7H)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Motor Grader (CAT 140G)	1177	14.2	6.74	1176	14.2	6.73	1784	21.5	10.21
	Dozer (CAT D8)	562	6.8	3.22	585	7.0	3.35	794	9.6	4.55
	Dozer (CAT D6)	316	3.8	1.81	282	3.4	1.61	473	5.7	2.71
	140 Hp Bulldozer	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Total				**11.76**			**11.69**			**17.46**
Year 2	231 Hsp Dozer (Cat D-7H)	724	2.9	1.38	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	6286	25.1	11.94	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2013	8.1	3.82	1328	5.3	2.52	2815	11.3	5.35
	Motor Grader (CAT 140G)	1177	4.7	2.24	1176	4.7	2.23	1190	4.8	2.26
	Dozer (CAT D8)	562	2.2	1.07	585	2.3	1.11	530	2.1	1.01
	Dozer (CAT D6)	316	1.3	0.60	282	1.1	0.54	315	1.3	0.60
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**21.12**			**17.95**			**24.84**
Year 3	231 Hsp Dozer (Cat D-7H)	724	2.9	1.38	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1328	5.3	2.52	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**19.83**			**14.07**			**20.97**
Year 4	231 Hsp Dozer (Cat D-7H)	824	3.3	1.57	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1328	5.3	2.52	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**20.01**			**14.07**			**20.97**
Year 5	231 Hsp Dozer (Cat D-7H)	824	3.3	1.57	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1228	4.9	2.33	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**20.01**			**13.88**			**20.97**
Year 6	231 Hsp Dozer (Cat D-7H)	824	3.3	1.57	813	3.3	1.54	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1178	4.7	2.24	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**20.01**			**13.74**			**20.97**
Year 7	231 Hsp Dozer (Cat D-7H)	424	4.1	1.94	733	2.9	1.39	1333	5.8	2.77
	520 Hsp Dozer with Disc (Cat D-10N)	2286	22.0	10.44	3206	12.8	6.09	6855	29.9	14.22
	520 Hsp Dozer with Disc (Cat D-10N)	514	4.9	2.35	1178	4.7	2.24	2815	12.3	5.84
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.4	0.17	37	0.1	0.07	37	0.2	0.08
Total				**14.89**			**9.79**			**22.90**
Year 8	231 Hsp Dozer (Cat D-7H)				120	0.5	0.23	889	6.1	2.89
	520 Hsp Dozer with Disc (Cat D-10N)				2000	8.0	3.80	4570	31.3	14.87
	520 Hsp Dozer with Disc (Cat D-10N)				400	1.6	0.76	1877	12.9	6.10
	Motor Grader (CAT 140G)				0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)				0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)				0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer				0	0.0	0.00	0	0.0	0.00
Total							**4.79**			**23.86**

3. Summary of Off-Road Fugitive Dust Emissions (lbs/day)

Construction Year	PM 10 Fugitive Dust (lbs/day) Proposed: US 140 TAF HF	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD	PM2.5 Fugitive Dust (lbs/day) Proposed: US 140 TAF H	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD
Year 1	5,242	6,064	7,613	8,702	5,925	524	606	761	870	593
Year 2	6,959	17,849	17,251	8,673	16,184	696	1,785	1,725	867	1,618
Year 3	6,609	5,017	2,481	4,857	13,403	661	502	248	486	1,340
Year 4	4,736	13,518	12,292	7,042	12,920	474	1,352	1,229	704	1,292
Year 5	3,663	13,518	12,292	3,840	12,920	366	1,352	1,229	384	1,292
Year 6	3,662	13,517	12,292	3,839	12,920	366	1,352	1,229	384	1,292
Year 7	3,662	6,768	15	3,835	14,105	366	677	1.49	384	1,410
Year 8	3.43	32	-	2,787	8,306	0.34	3.21	-	279	831

Construction Year	PM 10 Fugitive Dust (lbs/day) - With BMPs Proposed: US 140 TAF HF	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD	PM2.5 Fugitive Dust (lbs/day) - With BMPs Proposed: US 140 TAF H	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD
Year 1	2,621	3,032	3,807	4,351	2,963	262	303	381	435	296
Year 2	3,479	8,924	8,625	4,337	8,092	348	892	863	434	809
Year 3	3,305	2,508	1,240	2,428	6,702	330	251	124	243	670
Year 4	2,368	6,759	6,146	3,521	6,460	237	676	615	352	646
Year 5	1,831	6,759	6,146	1,920	6,460	183	676	615	192	646
Year 6	1,831	6,758	6,146	1,920	6,460	183	676	615	192	646
Year 7	1,831	3,384	7.4	1,918	7,052	183	338	0.74	192	705
Year 8	1.72	16	-	1,394	4,153	0.17	1.61	-	139	415

Cut (CY)						
Alternative	Dam Foundation/ Spillway Excavation	Existing Dam Excavation	Shell Borrow Areas Excavation	Core Borrow Areas Excavation	Double Handle Stockpiled Material	Roadway
US 140 TAF HFD	926,000	354,500	4,705,159	0	0	2,676,783
US 140 TAF EFD	4,075,000	354,500	5,319,033	1,699,897	2,164,200	2,655,493
US 96 TAF EFD	3,285,000	354,500	3,711,984	1,297,004	1,801,800	2,706,337
DS 140 TAF HFD	1,603,000	354,500	5,560,175	0	0	3,775,171
DS 140 TAF EFD	5,466,500	354,500	5,971,934	2,041,645	2,200,560	3,692,264

Cut by Year (CY)								
Alternative	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
US 140 TAF HFD	446,130	1,784,522	1,495,130	1,407,790	1,176,290	1,176,290	1,176,290	
US 140 TAF EFD	531,099	5,072,077	1,481,818	2,623,751	2,623,751	2,623,751	1,311,876	
US 96 TAF EFD	676,584	4,939,253	730,000	2,270,263	2,270,263	2,270,263		
DS 140 TAF HFD	943,793	2,831,379	1,041,500	1,823,784	1,248,202	1,248,202	1,248,202	907,784
DS 140 TAF EFD	615,377	4,941,870	3,956,016	2,334,660	2,334,660	2,334,660	2,334,660	875,498

Fill (CY)						
Alternative	Disposal (Dam Foundation / Spillway Excavation)	Disposal (Existing Dam)	Embankment	Disposal (Borrow Areas)	Double Handle Stockpiled Material	Roadway
US 140 TAF HFD	1,111,200	425,400	0	2,228,375	0	2,266,582
US 140 TAF EFD	2,445,000	141,600	10,600,000	472,571	2,164,200	2,111,847
US 96 TAF EFD	1,971,000	141,600	8,500,000	360,567	1,801,800	2,084,664
DS 140 TAF HFD	1,923,600	432,490	0	2,527,980	0	1,702,071
DS 140 TAF EFD	3,403,500	142,000	13,800,000	568,510	2,200,560	1,892,866

Fill by Year (CY)								
Alternative	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
US 140 TAF HFD	377,764	1,511,055	1,636,564	834,894	557,094	557,094	557,094	
US 140 TAF EFD	422,369	3,386,987	889,091	3,781,935	3,781,935	3,781,935	1,890,967	
US 96 TAF EFD	521,166	3,238,098	438,000	3,554,122	3,554,122	3,554,122		
DS 140 TAF HFD	425,518	1,276,553	1,256,890	1,511,931	567,506	567,506	567,506	412,731
DS 140 TAF EFD	315,478	2,727,494	2,395,394	3,787,216	3,787,216	3,787,216	3,787,216	1,420,206

Assumptions

1. Evenly proportion earthwork during the months those activities are performed on the schedule.
2. Borrow areas and stockpiled material activities take place during dam construction.

Alt B: US 96 TAF EFD

	Annual Truck Hauling Trips (round trips)													
Days/year	Offsite Import	Onsite	Offsite Water	Total	Round Trips	West Imports	East Imports	Onsite VMT	West VMT	East VMT	Water Trucks	Total Daily VMT	**PM10 (lbs/day)**	**PM2.5 (lbs/day)**
83	6537	15096	8000	29633	29633	14816	14816	30191	496,347	518,571	56,000	13,266	**23.62**	**3.54**
250	12680	45287	200	58167	58167	29083	29083	90574	974,297	1,017,922	1,400	8,337	**14.84**	**2.23**
250	9215	45287	200	54702	54702	27351	27351	90574	916,258	957,284	1,400	7,862	**14.00**	**2.10**
250	9215	45287	200	54702	54702	27351	27351	90574	916,258	957,284	1,400	7,862	**14.00**	**2.10**
250	9215	45287	200	54702	54702	27351	27351	90574	916,258	957,284	1,400	7,862	**14.00**	**2.10**
250	9215	45287	200	54702	54702	27351	27351	90574	916,258	957,284	1,400	7,862	**14.00**	**2.10**
104	3840	18870	200	22910	22910	11455	11455	37739	383,735	400,917	1,400	7,921	**14.10**	**2.12**

Alt B: US 96 TAF EFD

Total Daily VMT	ROG (lbs/day)	NOX (lbs/day	PM10 (lbs/day)	PM2.5 (lbs/day	CO (lbs/day)	CO2 (lbs/day)
13,266	0.36	43.24	0.92	0.88	1.80	43,972
8,337	0.23	27.17	0.58	0.56	1.13	27,633
7,862	0.22	25.63	0.55	0.52	1.07	26,059
7,862	0.22	25.63	0.55	0.52	1.07	26,059
7,862	0.22	25.63	0.55	0.52	1.07	26,059
7,862	0.22	25.63	0.55	0.52	1.07	26,059
7,921	0.22	25.82	0.55	0.53	1.08	26,255

# Avg Workers/day	Average Trip Length	Daily VMT (miles)	Alt B: US 96 TAF EFD PM10 (lbs/day)	Alt B: US 96 TAF EFD PM2.5 (lbs/day)
452	35	31,665	**11.6**	**1.7**
840	35	58,771	**21.5**	**3.2**
830	35	58,129	**21.2**	**3.2**
962	35	67,317	**24.6**	**3.7**
857	35	59,967	**21.9**	**3.3**
962	35	67,317	**24.6**	**3.7**
670	35	46,900	**17.1**	**2.6**

Alt B: US 96 TAF EFD

Workers/day	Daily VMT (miles)	ROG (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO (lbs/day)	CO2 (lbs/day)
452	31,665	0.601	3.130	0.084	0.077	47.929	18,853
840	58,771	1.115	5.810	0.155	0.143	88.957	34,993
830	58,129	1.102	5.747	0.154	0.141	87.986	34,611
962	67,317	1.277	6.655	0.178	0.164	101.893	40,081
857	59,967	1.137	5.928	0.159	0.146	90.767	35,705
962	67,317	1.277	6.655	0.178	0.164	101.893	40,081
670	46,900	0.889	4.637	0.124	0.114	70.989	27,925

Helicopter Emissions

Helicopter Emissions

Helicopter operation	**Value**	Source	
Gallons of jet fuel used per hour	100	FOCA 2015 - used Kaman K-1200	
Gallons of fuel used per LTO	15	FOCA 2015 - used Kaman K-1200	
Average hours/use (assumes 2 LTO)	5	Applicant data	
Total Days Helicopter Used per Year	70	Applicant data	July 15 - December 1 (Years 2-7)
Total Hours Helicopter Used per Year	348	Applicant data	
Gallons used for LTO	1,084	calculated	
Gallons used for cruising	34,914	calculated	
Total gallons used per year	35,998	calculated	
Jet A Emissions Factor (kg CO2/gal)	9.7497	Climate Registry 2017 Emission Factors	
Jet A Emissions Factor (kg N2O/gal)	0.000308	Climate Registry 2017 Emission Factors	
GWP N2O	298		
LTO MTCO2E	10.67		
Cruising MTCO2E	343.61		
Total MTCO2E	354.28		
Note: No emission factor available for CH4 helicopter emissions.			

Helicopter Information	Value	Source
Aircraft Type	Helicopter	
Engine Type	T53 17A-1	FOCA 2015
Engine SHP	1500	FOCA 2015
Number of engines	1	FOCA 2015
Mean operating percent power per engine for large twin turboshaft helicopters	62%	FOCA 2015
Fuel flow per engine for engines up to 1000 SHP (kg/s)	0.2303889	FOCA 2015
Fuel flow per hour (kg/h)	514	FOCA 2015

Emissions Calculations							
	HC	ROG (5)	NOX	PM Non-Volatile	Source		
LTO EF (g/LTO)*	667	845	285	9	FOCA 2009		
Cruising EF (g/hour)*	1310	1659	2340	68	FOCA 2009		
Max Net Emissions per day (lbs/day)	21.793	27.598	28.936	0.849		lb/day	July 15-Dec 1 (years 2-7)
Annual Emissions (tons/year)	0.758	0.960	1.007	0.030		ton/year	July 15-Dec 1 (years 2-7)
** Assume Kaman K-1200*							

FOCA 2015 - Guidance on the Determination of Helicopter Emissions
https://www.bazl.admin.ch/dam/bazl/it/dokumente/Politik/Umwelt/helicopter_emissionstable.xls.download.xls/helicopter_emissionstable.xls

Blasting Emissions

Blasting Emissions

	Alt B: US 96 TAF EFD									
Year	Blasts/Day	Blasts/Year	tons/blast	lb-CO/day	lb-CO/yr	lb-NOx/day	lb-NOx/yr	lb-SO2/day	lb-SO2/yr	CH4
1	0	0								
2	1	14	0.1875	12.5625	175.875	3.1875	44.625	0.375	5.25	NA
3	1	20	0.1875	12.5625	251.25	3.1875	63.75	0.375	7.5	NA
4	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
5	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
6	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
7	0	0								
8	0	0								

Emissions Factors for Detonation of Explosives

	lb	lb/day	lb/blast		tons/blast
Default tot	180,000	2,250	375	=	0.1875

	CO	NOx	SO2	CH4	
ANFO[1]	67	17	2	NA	lb/ton

	CO	NOx	SO2	CH4	
Total	12.5625	3.1875	0.375	NA	lb/blast

lbs/tons 2000

Sources

1

US EPA., 1980. AP 42: Compilation of Air Emissions Factors, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, Explosives Detonation.

Operational Emissions

Operational GHG Emissions Summary

Pumping Requirement	Future Conditions (2030)																									
		Proposed Project					Alt A					Alt B					Alt C					Alt D				
	Future Baseline/ No Project Alt	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr
CVP System-Wide (gWh/year)	1,231.60	1,232.70	1.10	126,066	31.9	6.8	1,232.70	1.10	126,066	31.9	6.8	1,232.50	0.90	103,145	26.1	5.6	1,232.70	1.10	126,066	31.9	6.8	1,232.70	1.10	126,066	31.9	6.8
New Pumping Plant at Expanded Reservoir (gWh /year)	0	2	2.00	229,211	58.0	12.3	1.9	1.90	217,751	55.1	11.7	1.1	1.10	126,066	31.9	6.8	1.1	1.10	126,066	31.9	6.8	1	1.00	114,606	29.0	6.2
Total	1,231.60	1,234.70	3.10	355,277	89.9	19.1	1,232.60	1.00	114,606	29.0	6.2	1,233.60	2.00	229,211	58.0	12.3	1,233.80	2.20	252,132	63.8	13.6	1,233.70	2.10	240,672	60.9	13.0
MTCO2e/year				161.2	1.0	2.6			52.0	0.3	0.8			104.0	0.7	1.7			114.4	0.7	1.8			109.2	0.7	1.8
			MT-CO2e/year	164.8				MT-CO2e/year	53.1				MT-CO2e/year	106.3				MT-CO2e/year	116.9				MT-CO2e/year	111.6		
			O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88		
			TOTAL MT-CO2e/year	**166.6**				**TOTAL MT-CO2e/year**	**55.0**				**TOTAL MT-CO2e/year**	**108.2**				**TOTAL MT-CO2e/year**	**118.8**				**TOTAL MT-CO2e/year**	**113.49**		
			Compared to Proposed	100%					33%					65%					71%					68%		
			Difference	0%					67%					35%					29%					32%		

2030 CO2 Intensity Factor (PG&E)	114.61	lb-CO2/MWh	2204.62	lb/MT
2030 CH4 Intensity Factor (PG&E)	0.0290	lb-CH4/MWh	25	GWP CH4 (CO2e)
2030 N2O Intensity Factor (PG&E)	0.00617	lb-N2O/MWh	298	GWP N2O (CO2e)

PG&E Intensity Factors	2018	206.29	https://www.theclimateregistry.org/our-members/cris-public-reports/
	2030	114.61	linear interpolation
	2045	0	

Operations and Maintenance Worker Trip GHG Emissions

	Proposed: US 140 TAF HFD								
Year	Trips per Year	Annual VMT (roundtrip)	ROG (lbs/year)	NOx (lbs/year)	PM10 (lbs/year)	PM2.5 (lbs/year)	CO (lbs/year)	CO2 (lbs/year)	CO2 (MT/year)
1	64	6,950	0.132	0.687	0.018	0.017	10.520	4,138	1.88
2-5	38	4,127	0.078	0.408	0.011	0.010	6.246	2,457	1.11
6+	24	2,606	0.049	0.258	0.007	0.006	3.945	1,552	0.70

Project Description (Section 2.3.3.2):

Inspections

Year 1: One trip/worker per week (52 trips/year)

Years 2-5: One trip/worker every 2 weeks (26 trips/year)

Years 6+: One trip/worker per month (12 trips/year)

Maintenance

All Years: One trip/worker per month (12 trips per year)

2204.62 lb/MT

Distance fron Valley Water (San Jose) to project site: 54.3 miles 1-way

Alt B: US 96 TAF EFD								
Trips per Year	**Annual VMT (roundtrip)**	ROG (lbs/year)	NOx (lbs/year)	PM10 (lbs/year)	PM2.5 (lbs/year)	CO (lbs/year)	CO2 (lbs/year)	CO2 (MT/year)
64	6,950	0.132	0.687	0.018	0.017	10.520	4,138	1.88
38	4,127	0.078	0.408	0.011	0.010	6.246	2,457	1.11
24	2,606	0.049	0.258	0.007	0.006	3.945	1,552	0.70

O & M Worker Trip Exhaust Emission Factors

Raw Emission Factors from EMFAC2021

Veh	Fuel	Pop	VMT	Trips	Running Exhaust Emission Rates (g/mile)						
		(Vehicles)	(Miles/day)	(Trips/day)	ROG_RUNEX	NOX_RUNEX	PM10_RUNEX	PM2_5_RUNEX	CO_RUNEX	SOX_RUNEX	CO2_RUNEX
LDA	Gasoline	598,860	22,133,915	2,780,384	0.008	0.038	0.001	0.001	0.695	0.003	273.208
LDA	Diesel	1,620	46,913	6,871	0.026	0.188	0.016	0.015	0.320	0.002	230.596
LDA	Electricity	61,443	2,670,452	299,853	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LDA	Plug-in Hybrid	19,038	825,568	78,721	0.001	0.003	0.001	0.001	0.209	0.001	135.439
LDT1	Gasoline	51,681	1,664,706	230,186	0.025	0.115	0.002	0.002	1.317	0.003	324.128
LDT1	Diesel	21	303	59	0.297	1.644	0.249	0.238	1.585	0.004	415.168
LDT1	Electricity	234	9,324	1,110	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LDT1	Plug-in Hybrid	98	4,519	406	0.001	0.003	0.000	0.000	0.187	0.001	121.010
LDT2	Gasoline	290,875	10,447,706	1,360,241	0.010	0.063	0.001	0.001	0.796	0.003	338.271
LDT2	Diesel	1,050	38,652	4,980	0.013	0.039	0.005	0.005	0.130	0.003	306.718
LDT2	Electricity	2,157	73,664	10,962	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LDT2	Plug-in Hybrid	2,562	112,327	10,593	0.001	0.003	0.000	0.000	0.196	0.001	127.261
Total			38,028,048								

Source: wksht: EMFAC2021output

Veh	Fuel	Ratio of Vehicle/Fuel Type to Total VMT	
LDA	Gasoline	58%	
LDA	Diesel	0.12%	
LDA	Electricity	7.0%	
LDA	Plug-in Hybrid	2.2%	
LDT1	Gasoline	4.4%	100%
LDT1	Diesel	0.001%	
LDT1	Electricity	0.025%	
LDT1	Plug-in Hybrid	0.012%	
LDT2	Gasoline	27.5%	
LDT2	Diesel	0.10%	
LDT2	Electricity	0.19%	
LDT2	Plug-in Hybrid	0.30%	

Exhaust Emission Rates for Composite Light Duty Vehicles

ROG_RUNEX (gms/mile)	NOX_RUNEX (gms/mile)	PM10_RUNEX (gms/mile)	PM2_5_RUNEX (gms/mile)	CO_RUNEX (gms/mile)	SOX_RUNEX (gms/mile)	CO2_RUNEX (gms/mile)
0.009	0.045	0.001	0.001	0.687	0.003	270.073

Source: EMFAC2021 emission factors (above) and weighted mix of passenger vehicle fleet (also above)

ROG	NOX	PM10	PM2.5	CO	SOX	CO2	Units
0.00002	0.00010	0.000003	0.000002	0.00151	0.00001	0.59541	lbs/mile

	value	unit	source
trips per worker	2	trips/worker	See Note 2
trip length	35	miles/trip	one-way value provided by Stantec
portion of trip on paved surfaces	100%	%	
portion of trip on unpaved surfaces	0%	%	
mass conversion rate	453.59	g/lb	onlineconversion.com/weight_common.htm

Exhaust Emissions per Worker Per Day

ROG	NOx	PM10	PM2.5	CO	SOx	CO2e	units
0.0013	0.0069	0.0002	0.0002	0.1060	0.0004	41.6786	lb/worker-day

Source: Exhaust emissions are based on trip length and the Exhaust Emission Rates for Composite Light Duty Vehicles (above).

Notes

1 It is conservatively assumed that all workers would drive alone and none would make trips during break periods due to the remoteness of the work sites.

2 Daily VMT by workers = # workers * trips per worker * trip length

Source: EMFAC2021 (v1.0.1) Emission Rates
Region Type: County
Region: Santa Clara
Calendar Year: 2025
Season: Annual
Vehicle Classification: EMFAC202x Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HOT

Region	Calendar Y	Vehicle Cat	Model Yea	Speed	Fuel	Population	Total VMT	CVMT	EVMT	Trips	Energy Consu
Santa Clara	2025	LDA	Aggregate	Aggregate	Gasoline	598860.3	22133914.69	22133914.69	0	2780384.029	0
Santa Clara	2025	LDA	Aggregate	Aggregate	Diesel	1620.04	46912.85411	46912.85411	0	6871.193241	0
Santa Clara	2025	LDA	Aggregate	Aggregate	Electricity	61443.19	2670451.983	0	2670451.983	299852.6978	1031014.87
Santa Clara	2025	LDA	Aggregate	Aggregate	Plug-in Hyl	19037.66	825567.7143	401012.9615	424554.7527	78720.73884	128228.189
Santa Clara	2025	LDT1	Aggregate	Aggregate	Gasoline	51680.86	1664705.874	1664705.874	0	230185.983	0
Santa Clara	2025	LDT1	Aggregate	Aggregate	Diesel	21.28272	302.825779	302.825779	0	59.13231308	0
Santa Clara	2025	LDT1	Aggregate	Aggregate	Electricity	234.4578	9323.703781	0	9323.703781	1109.79593	3599.71919
Santa Clara	2025	LDT1	Aggregate	Aggregate	Plug-in Hyl	98.13198	4519.182281	1961.286044	2557.896237	405.7757571	772.560901
Santa Clara	2025	LDT2	Aggregate	Aggregate	Gasoline	290874.7	10447705.78	10447705.78	0	1360240.873	0
Santa Clara	2025	LDT2	Aggregate	Aggregate	Diesel	1049.952	38652.33695	38652.33695	0	4980.340082	0
Santa Clara	2025	LDT2	Aggregate	Aggregate	Electricity	2157.059	73663.77305	0	73663.77305	10962.38395	28440.2962
Santa Clara	2025	LDT2	Aggregate	Aggregate	Plug-in Hyl	2561.885	112327.2154	51267.43918	61059.7762	10593.39505	18441.8723
Santa Clara	2025	T7 CAIRP C	Aggregate	Aggregate	Diesel	1034.487	207547.3052	207547.3052	0	23772.50231	0
Santa Clara	2025	T7 CAIRP C	Aggregate	Aggregate	Electricity	12.40346	2411.505747	0	2411.505747	285.0315405	4403.23123
Santa Clara	2025	T7 CAIRP C	Aggregate	Aggregate	Natural Ga	2.419779	485.0903505	485.0903505	0	55.60652865	0

SOAK and RUNLOSS, g/vehicle/day for IDLEX and DIURN

NOx_RUNE	NOx_IDLEX	NOx_STREX	PM2.5_RU	PM2.5_IDL	PM2.5_STF	PM2.5_PM	PM2.5_PM	PM10_RUN	PM10_IDLI	PM10_STR	PM10_PM	PM10_PM	CO2_RUNE	CO2_IDLEX	CO2_STREX
0.038209	0	0.245539	0.001142	0	0.00188	0.002	0.002655	0.001242	0	0.002044	0.008	0.007587	273.2075	0	69.04168
0.18842	0	0	0.015236	0	0	0.002	0.002712	0.015925	0	0	0.008	0.007748	230.5963	0	0
0	0	0	0	0	0	0.002	0.001534	0	0	0	0.008	0.004382	0	0	0
0.003187	0	0.11551	0.000578	0	0.001985	0.002	0.001382	0.000629	0	0.002159	0.008	0.003948	135.4391	0	65.04608
0.115355	0	0.35972	0.001639	0	0.002543	0.002	0.003241	0.001782	0	0.002766	0.008	0.00926	324.1276	0	84.93844
1.64381	0	0	0.238169	0	0	0.002	0.00372	0.248938	0	0	0.008	0.010628	415.1682	0	0
0	0	0	0	0	0	0.002	0.001537	0	0	0	0.008	0.004392	0	0	0
0.002848	0	0.11551	0.000353	0	0.001365	0.002	0.001394	0.000383	0	0.001485	0.008	0.003982	121.0095	0	70.34635
0.06257	0	0.314364	0.001192	0	0.001919	0.002	0.00313	0.001296	0	0.002087	0.008	0.008944	338.2713	0	86.2638
0.039332	0	0	0.004727	0	0	0.002	0.003123	0.004941	0	0	0.008	0.008921	306.7182	0	0
0	0	0	0	0	0	0.002	0.001527	0	0	0	0.008	0.004362	0	0	0
0.002995	0	0.11551	0.000438	0	0.00161	0.002	0.001388	0.000477	0	0.001751	0.008	0.003967	127.2609	0	77.17666
1.498671	123.4561	2.221126	0.030668	0.042485	0	0.009	0.025996	0.032054	0.044406	0	0.036	0.074273	1521.791	23804.97	0
0	0	0	0	0	0	0.009	0.013225	0	0	0	0.036	0.037786	0	0	0
0.206313	64.47231	0	0.001708	0.216514	0	0.009	0.025982	0.001858	0.235478	0	0.036	0.074235	1131.422	51379.69	0

CH4_RUNE	CH4_IDLEX	CH4_STRE	N2O_RUNI	N2O_IDLE	N2O_STRE	ROG_RUNI	ROG_IDLE	ROG_STRE	ROG_HOTS	ROG_RUNI
0.002117	0	0.067825	0.004408	0	0.032293	0.007947	0	0.306311	0.087189	0.224301
0.001193	0	0	0.036331	0	0	0.025693	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.000432	0	0.042249	0.000569	0	0.020584	0.001378	0	0.173285	0.041164	0.03735
0.005621	0	0.098552	0.008687	0	0.037511	0.02471	0	0.498818	0.156963	0.442299
0.013797	0	0	0.06541	0	0	0.297038	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.000383	0	0.041987	0.000501	0	0.020339	0.001231	0	0.173285	0.023895	0.020384
0.002642	0	0.078494	0.005588	0	0.036037	0.010244	0	0.360071	0.079452	0.214938
0.000603	0	0	0.048324	0	0	0.01298	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.000403	0	0.041992	0.000528	0	0.020344	0.001295	0	0.173285	0.026071	0.023359
0.000583	0.484627	0	0.239759	3.750482	0	0.012554	10.4339	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.929746	158.4146	0	0.230648	10.47409	0	0.013284	2.263432	0	0	0

ROG_DIUR	TOG_RUNI	TOG_IDLE	TOG_STRE	TOG_HOTS	TOG_RUNI	TOG_DIUR	NH3_RUNI	CO_RUNE	CO_IDLEX	CO_STREX	SOx_RUNE	SOx_IDLEX	SOx_STREX
1.384954	0.011596	0	0.335372	0.087189	0.224301	1.384954	0.035611	0.6952	0	3.049452	0.002701	0	0.000683
0	0.02925	0	0	0	0	0	0.0031	0.319914	0	0	0.002185	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.440525	0.002011	0	0.189725	0.041164	0.03735	0.440525	0.019241	0.209016	0	1.339893	0.001339	0	0.000643
2.52236	0.036056	0	0.546143	0.156963	0.442299	2.52236	0.036453	1.317416	0	4.886115	0.003204	0	0.00084
0	0.338158	0	0	0	0	0	0.0031	1.585068	0	0	0.003934	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.276746	0.001797	0	0.189725	0.023895	0.020384	0.276746	0.018228	0.186748	0	1.339893	0.001196	0	0.000695
1.349256	0.014949	0	0.394233	0.079452	0.214938	1.349256	0.03712	0.795621	0	3.47417	0.003344	0	0.000853
0	0.014777	0	0	0	0	0	0.0031	0.129797	0	0	0.002906	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.305362	0.00189	0	0.189725	0.026071	0.023359	0.305362	0.019143	0.196395	0	1.339893	0.001258	0	0.000763
0	0.014292	11.8782	0	0	0	0	0.22	0.053947	153.9743	0	0.01441	0.225419	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.948874	161.6737	0	0	0	0	1.06	3.681431	425.9711	0	0	0	0

Alternative C – Downstream 140 TAF HFD

Emissions Summary Sheet

(Alt C) DS 140TAF HFD - Summary of Total Combined Construction Emissions

	ROG		CO		NOX		PM10 (exhaust)		PM10 (dust) - Mitigated		PM2.5 (exhaust)		PM2.5 (dust) - Mitigated		CO2	CH4	N2O	Total GHG
Construction Year	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	MT/year	MT/year	MT-CO2e/year
2025 (year 1)	0.65	15.65	5.80	139.87	5.65	136.06	0.19	4.55	181.70	4378.28	0.18	4.25	18.23	439.20	3,207	0.427	0.012	3,221.0
2026 (year 2)	4.73	57.73	32.71	261.66	39.75	338.86	1.09	9.36	545.30	4362.40	0.98	7.87	54.69	437.53	13,577	2.694	0.077	13,666.8
2027 (year 3)	4.17	53.26	29.26	234.08	36.01	308.94	0.96	8.29	306.63	2453.05	0.86	6.89	30.82	246.54	12,184	2.286	0.066	12,260.5
2028 (year 4)	7.57	80.46	49.49	407.61	57.57	484.40	1.75	14.57	852.20	7907.32	1.64	13.15	99.73	945.09	17,227	2.733	0.103	17,325.6
2029 (year 5)	7.31	78.37	46.68	384.92	55.25	465.79	1.68	14.06	742.59	6303.97	1.58	12.67	91.95	784.66	16,265	2.557	0.098	16,358.1
2030 (year 6)	7.19	77.41	45.75	377.49	53.88	454.85	1.63	13.66	767.04	6887.04	1.54	12.29	95.25	863.46	15,917	2.348	0.092	16,002.7
2031 (year 7)	7.03	76.17	45.10	372.29	52.96	447.44	1.59	13.34	815.20	6884.84	1.50	12.00	101.77	863.23	15,720	2.298	0.090	15,804.1
2032 (year 8)	4.28	34.26	32.90	263.23	31.78	254.28	1.07	8.59	177.52	1420.12	1.05	8.41	17.92	143.34	11,292	0.910	0.051	11,329.8

Summary of Off-Road Fugitive Dust Emissions (lbs/day)

		PM 10 Fugitive Dust (lbs/day)		PM 10 Fugitive Dust (tons/year)		PM2.5 Fugitive Dust (lbs/day)		PM2.5 Fugitive Dust (tons/year)	
Construction	Days/Year	Raw Total	With BMPs	Raw Total	With BMPs	Raw Total	With BMPs	Raw Total	With BMPs
Year 1	83	8,702	4,351	361	181	870	435	36.1	18.1
Year 2	250	8,673	4,337	1,084	542	867	434	108.4	54.2
Year 3	250	4,857	2,428	607	304	486	243	60.7	30.4
Year 4	250	7,042	3,521	880	440	704	352	88.0	44.0
Year 5	250	3,840	1,920	480	240	384	192	48.0	24.0
Year 6	250	3,839	1,920	480	240	384	192	48.0	24.0
Year 7	250	3,835	1,918	479	240	384	192	47.9	24.0
Year 8	250	2,787	1,394	348	174	279	139	34.8	17.4

*Includes materials movement, pile storage, and construction activity (grading and earthmoving)

2000 lb/ton

Summary of Batch Plant Emissions

	Alt C: DS 140 TAF HFD											
Construction Year	months (A)	days/year (A)	months (B)	days/year (B)	days overlap A+B	PM10 (lbs/day)	PM10-Max (lbs/day)	PM10 tons/year	PM-10 Max tons/year	PM2.5 (lbs/day)	PM2.5-Max (lbs/day)	PM2.5 tons/yr	PM2.5-Max (tons/yr)
1													
2													
3													
4	Apr-Dec	188				1162.4	4359.0	109.0	408.7	157.0	588.9	14.7	55.2
5	Feb-Dec	229				1162.4	4359.0	133.2	499.5	157.0	588.9	18.0	67.5
6	Feb-Dec	229	Sep-Dec	83	83	1453	4940.2	145.3	523.7	196.3	667.4	19.6	70.7
7	Feb-Dec	229	Jan-Dec	250	229	1453	4940.2	169.5	572.1	196.3	667.4	22.9	77.3
8	Feb-Oct	188	Jan-Oct	208	188	1453	4940.2	139.2	469.2	196.3	667.4	18.8	63.4

Summary of Off-road Construction Equipment Emissions

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG
Construction Year	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MTyear	lb/day	MTyear	lb/day	MTyear	lb/day	MT-CO2e/year
2025 (year 1)	0.62	14.94	4.35	104.74	4.09	98.62	0.16	3.74	0.14	3.47	1,359	32,755	0.43	10.29	0.01	0.29	1,374
2026 (year 2)	3.65	29.18	24.74	197.95	35.81	286.49	1.00	7.99	0.92	7.38	8,541	68,332	2.69	21.55	0.08	0.61	8,632
2027 (year 3)	3.09	24.69	21.20	169.60	32.02	256.17	0.86	6.87	0.79	6.34	7,310	58,481	2.27	18.16	0.07	0.52	7,386
2028 (year 4)	6.48	51.81	40.30	322.42	53.71	429.66	1.65	13.22	1.58	12.66	11,953	95,626	2.73	21.87	0.10	0.83	12,052
2029 (year 5)	6.23	49.82	38.47	307.78	51.45	411.57	1.59	12.72	1.52	12.20	11,350	90,801	2.56	20.46	0.10	0.78	11,443
2030 (year 6)	6.04	48.29	36.52	292.20	50.00	399.97	1.54	12.30	1.48	11.81	10,640	85,121	2.35	18.77	0.09	0.73	10,726
2031 (year 7)	5.94	47.53	36.00	288.03	49.09	392.76	1.50	11.99	1.44	11.52	10,488	83,904	2.30	18.38	0.09	0.72	10,572
2032 (year 8)	4.15	33.23	24.11	192.91	28.98	231.81	1.01	8.09	0.99	7.93	6,121	48,968	0.91	7.28	0.05	0.41	6,159

Summary of Off-road Vegetative Clearing Equipment Emissions

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG
Construction Year	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MTyear	lb/day	MTyear	lb/day	MTyear	lb/day	MT-CO2e/year
2027 (year 3)	0.00544	0.04351	0.25826	2.06607	0.23582	1.88654	0.01036	0.08287	0.00963	0.07705	55.2	441.5	0.01700	0.13598	0.00050	0.00396	55.8
2030 (year 6)	0.05856	0.46852	0.01313	0.10502	0.01730	0.13844	0.00047	0.00374	0.00043	0.00347	3.4	27.0	0.00107	0.00856	0.00003	0.00024	3.4

Summary of On-road Emissions (Exhaust and Dust)

Truck Hauling (Dust)

			Alt C: DS 140 TAF HFD			
Construction Year	Days/year	Total Daily VMT	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)
1	83	10,810	19.25	0.80	2.89	0.12
2	250	5,930	10.56	1.32	1.58	0.20
3	250	5,500	9.79	1.22	1.47	0.18
4	250	5,500	9.79	1.22	1.47	0.18
5	250	5,500	9.79	1.22	1.47	0.18
6	250	5,500	9.79	1.22	1.47	0.18
7	250	5,500	9.79	1.22	1.47	0.18
8	250	5,500	9.79	1.22	1.47	0.18

Truck Hauling (Exhaust)

	Alt C: DS 140 TAF HFD														
Construction Year	Total Daily VMT	ROG (lbs/day)	ROG (tons/yr)	NOX (lbs/day)	NOX (tons/yr)	PM10 (lbs/day)	PM10 (tons/yr)	PM2.5 (lbs/day)	PM2.5 (tons/yr)	CO (lbs/day)	CO (tons/yr)	CO2 (lbs/day)	CO2 (MT/yr)
1	10,810	0.30	0.012	35.24	1.462	0.75	0.031	0.72	0.030	1.47	0.061	35,830	1,349
2	5,930	0.16	0.020	19.33	2.416	0.41	0.052	0.40	0.049	0.81	0.101	19,655	2,229
3	5,500	0.15	0.019	17.93	2.241	0.38	0.048	0.37	0.046	0.75	0.093	18,229	2,067
4	5,500	0.15	0.019	17.93	2.241	0.38	0.048	0.37	0.046	0.75	0.093	18,229	2,067
5	5,500	0.15	0.019	17.93	2.241	0.38	0.048	0.37	0.046	0.75	0.093	18,229	2,067
6	5,500	0.15	0.019	17.93	2.241	0.38	0.048	0.37	0.046	0.75	0.093	18,229	2,067
7	5,500	0.15	0.019	17.93	2.241	0.38	0.048	0.37	0.046	0.75	0.093	18,229	2,067
8	5,500	0.15	0.019	17.93	2.241	0.38	0.048	0.37	0.046	0.75	0.093	18,229	2,067

Worker Commute Trips (Dust)

					Alt C: DS 140 TAF HFD			
Construction Year	Days/year	# Avg Workers/day	Average Trip Length	Daily VMT (miles)	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)
1	83	318	35	22,235	8.1	0.34	1.2	0.05
2	250	594	35	41,563	15.2	1.90	2.3	0.28
3	250	582	35	40,746	14.9	1.86	2.2	0.28
4	250	678	35	47,483	17.3	2.17	2.6	0.33
5	250	603	35	42,175	15.4	1.92	2.3	0.29
6	250	678	35	47,483	17.3	2.17	2.6	0.33
7	250	670	35	46,871	17.1	2.14	2.6	0.32
8	250	657	35	45,967	16.8	2.10	2.5	0.31

Worker Commute Trips (Exhaust)

	Alt C: DS 140 TAF HFD													
Construction Year	# Avg Workers/day	Daily VMT (miles)	ROG (lbs/day)	ROG (tons/year)	NOx (lbs/day)	NOx (tons/year)	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)	CO (lbs/day)	CO (tons/year)	CO2 (lbs/day)	CO2 (MT/year)
1	318	22,235	0.422	0.018	2.198	0.091	0.059	0.002	0.054	0.002	33.656	1.397	13,239	498
2	594	41,563	0.788	0.099	4.109	0.514	0.110	0.014	0.101	0.013	62.910	7.864	24,747	2,806
3	582	40,746	0.773	0.097	4.028	0.504	0.108	0.013	0.099	0.012	61.674	7.709	24,260	2,751
4	678	47,483	0.901	0.113	4.694	0.587	0.126	0.016	0.116	0.014	71.872	8.984	28,272	3,206
5	603	42,175	0.800	0.100	4.170	0.521	0.111	0.014	0.103	0.013	63.837	7.980	25,111	2,848
6	678	47,483	0.901	0.113	4.694	0.587	0.126	0.016	0.116	0.014	71.872	8.984	28,272	3,206
7	670	46,871	0.889	0.111	4.634	0.579	0.124	0.015	0.114	0.014	70.945	8.868	27,907	3,165
8	657	45,967	0.872	0.109	4.544	0.568	0.121	0.015	0.112	0.014	69.577	8.697	27,369	3,104

Haul Trucks plus 50% Worker Commute Trips (Exhaust)

	Alt C: DS 140 TAF HFD													
Construction Year	Daily VMT (miles)	ROG (lbs/day)	ROG (tons/year)	NOx (lbs/day)	NOx (tons/year)	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)	CO (lbs/day)	CO (tons/year)	CO2 (lbs/day)	CO2 (MT/year)
1	21,928	0.507	0.080	36.335	5.771	0.783	0.124	0.748	0.119	18.298	2.906	42,450	6,116
2	26,711	0.556	0.165	21.383	6.348	0.468	0.139	0.446	0.132	32.262	9.578	32,028	8,626
3	25,873	0.537	0.156	19.941	5.804	0.437	0.127	0.416	0.121	31.585	9.193	30,360	8,016
4	29,241	0.601	0.204	20.274	6.876	0.446	0.151	0.425	0.144	36.684	12.442	32,365	9,959
5	26,587	0.550	0.166	20.012	6.029	0.439	0.132	0.418	0.126	32.667	9.841	30,785	8,413
6	29,241	0.601	0.204	20.274	6.876	0.446	0.151	0.425	0.144	36.684	12.442	32,365	9,959
7	28,935	0.595	0.199	20.244	6.778	0.445	0.149	0.424	0.142	36.221	12.126	32,183	9,775
8	28,483	0.586	0.193	20.199	6.632	0.444	0.146	0.423	0.139	35.536	11.668	31,914	9,506

2204.6 lb/MT

Haul Trucks plus 50% Worker Commute Trips (Dust)

		Alt C: DS 140 TAF HFD			
Construction Year	Total Daily VMT	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)
1	21,928	23.31	0.97	3.50	0.15
2	26,711	18.14	2.27	2.72	0.34
3	25,873	17.23	2.15	2.58	0.32
4	29,241	18.46	2.31	2.77	0.35
5	26,587	17.49	2.19	2.62	0.33
6	29,241	18.46	2.31	2.77	0.35
7	28,935	18.35	2.29	2.75	0.34
8	28,483	18.18	2.27	2.73	0.341

Summary of Helicopter Emissions

Total Days Helicopter Used per Year	70	5 hrs/day
Total Hours Helicopter Used per Year	348	

Emissions	HC	ROG (5)	NOX	(use as PM10) PM Non-Volatile		
LTO EF (g/LTO)*	667	844.7	285	9.0		
Cruising EF (g/hour)*	1310	1659.0	2340	68		
Max Emissions (lbs/day)	21.8	27.6	28.9	0.849	lb/day	July 15-Dec 1 (years 2-7)
Annual Emissions (tons/yea	0.76	0.96	1.01	0.030	ton/year	July 15-Dec 1 (years 2-7)

* Assume AS 365 N3 Dauphin with Arriel 2C

Summary of Blasting Emissions

Blasting	Alt C: DS 140 TAF HFD									
Year	Blasts/Day	Blasts/Year	tons/blast	lb-CO/day	lb-CO/yr	lb-NOx/day	lb-NOx/yr	lb-SO2/day	lb-SO2/yr	CH4
1	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0
4	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
5	1	22	0.1875	12.5625	276.375	3.1875	70.125	0.375	8.25	NA
6	1	22	0.1875	12.5625	276.375	3.1875	70.125	0.375	8.25	NA
7	1	22	0.1875	12.5625	276.375	3.1875	70.125	0.375	8.25	NA
8	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA

Exhaust Emissions

Off-road Diesel Construction Equipment
On-road Haul Truck Trips
On-road Worker Trips
Vegetative Clearing Equipment

Off-Road Equipment Emissions - PREP Alternative C (DS 140 TAF HFD)
Diesel Fuel
Year 1
Handfill Dam

Mass Conversion Rates LHV Source
453.7 kg/lb 18,300 Btu/lb google.com
2000 lb/ton 19,000 lb/ton google.com
2204.62 lb/MT 22042.62 lb/MT google.com

Summary of Equipment Hours

Code	Equipment Classification & Description / Description	Equip Hours	reference	hp	load factor	Cumulative ROG (g/bhp-hr)	Cumulative CO (g/bhp-hr)	Cumulative NOx (g/bhp-hr)	Cumulative PM10 (g/bhp-hr)	Cumulative PM2.5 (g/bhp-hr)	Cumulative CO2 (g/bhp-hr)	Cumulative CH4 (g/bhp-hr)	Cumulative N2O (g/bhp-hr)	Emission Factors ROG (lb/hr/unit)	CO (lb/hr/unit)	NOx (lb/hr/unit)	PM10 (lb/hr/unit)	PM2.5 (lb/hr/unit)	CO2 (MT/hr/unit)	CH4 (MT/hr/unit)	N2O (MT/hr/unit)
CAM																					
010000	**Earthmoving Equipment**																				
	140 Hoe Dozer (CAT D-280C)	5,000		140	0.40	0.4610	3.6124	4.2399	0.2305	0.2120	474.1029	0.1533	0.0043	0	0	0	0	0	0	0	0
	140 Hoe Dozer with Ripper (CAT D-280C)	1,000		140	0.40	0.4610	3.6124	4.2399	0.2305	0.2120	474.1029	0.1533	0.0043	0	0	0	0	0	0	0	0
	140 Hoe Dozer with Rock Saw (CAT D-280C)	1,000		140	0.40	0.4610	3.6124	4.2399	0.2305	0.2120	474.1029	0.1533	0.0043	0	0	0	0	0	0	0	0
	525 Hoe Dozer with Ripper (CAT D-10N)	1,000		525	0.40	0.2122	1.3326	1.8541	0.0840	0.0584	465.0523	0.1504	0.0041	0	0	0	0	0	0	0	0
	5 LCD loader (Cat 980H)	48,770	http://t.ht/1c	349	0.37	0.1931	1.2763	1.4326	0.0525	0.0483	469.1414	0.1517	0.0041	0	0	0	0	0	0	0	0
	231 Hoe Tractor with Rake (Cat D-7H)	14,112		231	0.37	0.1541	1.1455	1.2346	0.0473	0.0435	470.5976	0.1522	0.0041	0	0	0	0	0	0	0	0
	17 CY Excavator (Cat 375L)	6,768	https://t.co/mzd	428	0.38	0.1152	1.0507	0.7264	0.0257	0.0236	470.2915	0.1521	0.0043	0	0	0	0	0	0	0	0
	35 CY Excavator (Terex 335)	28,800	https://t.co/ln	1,400	0.38	0.1152	1.0507	0.7264	0.0257	0.0236	470.2915	0.1521	0.0043	0	0	0	0	0	0	0	0
	30 Ton Compactor (CS-533 (Cat B25D)	4,872		315	0.43	0.2210	1.0610	0.9370	0.0500	0.0300	568.2990	0.0200	0.0041	0	0	0	0	0	0	0	0
	30 Ton Compactor (Ingersoll-Rand SD-77B)	2,436		315	0.43	0.2210	1.0610	0.9370	0.0500	0.0300	568.2990	0.0200	0.0041	0	0	0	0	0	0	0	0
	5000 Gal. Water Truck	156,000	https://www.r	260	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	0	0	0	0	0	0	0	0
	Sub-Total	**503,906**																			
030000	**Concrete Equipment**																				
	Concrete Mixer	104,800	https://www.r	161	0.56	0.6610	3.4690	4.1420	0.1610	0.1610	568.2990	0.0590	0.0048	0	0	0	0	0	0	0	0
	90 Yds Tractor Mounted Concrete Pump	52,400	https://www.r	241	0.56	0.6610	3.4690	4.1420	0.1610	0.1610	568.2990	0.0590	0.0048	0	0	0	0	0	0	0	0
	Concrete Vibrator Normal	104,800	https://www.r	241	0.56	0.6610	3.4690	4.1420	0.1610	0.1610	568.2990	0.0590	0.0048	0	0	0	0	0	0	0	0
	Concrete Truck	52,400	https://www.r	402	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	0	0	0	0	0	0	0	0
	Sub-Total	**314,400**																			
050000	**Utility Equipment**																				
	185 CFM Diesel Compressor	20,000	https://t.co/qq	125	0.48	0.2690	1.2050	1.3830	0.0650	0.0650	568.2990	0.0240	0.0043	0	0	0	0	0	0	0	0
	300 Amp Diesel Welder	20,870		26	0.45	0.2450	3.1210	1.3830	0.0630	0.0630	568.2990	0.0220	0.0043	0	0	0	0	0	0	0	0
	Sub-Total	**40,870**																			
060000	**Hoisting Equipment**																				
	50 Ton Truck Crane	7,300	https://www.r	165	0.29	0.3342	3.3354	3.1664	0.1663	0.1530	474.7477	0.1535	0.0043	0	0	0	0	0	0	0	0
	75 Ton Crawler Crane	15,600	https://www.r	445	0.29	0.2184	1.8336	2.1542	0.0879	0.0809	471.9671	0.1526	0.0043	0	0	0	0	0	0	0	0
	Motorized Manlift 66 Ft	4,680	https://www.r	82	0.31	0.0988	3.1674	1.5108	0.0259	0.0238	472.1142	0.1527	0.0043	0	0	0	0	0	0	0	0
	Sub-Total	**27,580**																			
080000	**Drilling & Tunneling Equipment**																				
	4" Air Track Drill	20,040	https://rockdri	260	0.50	0.1016	0.9974	0.8230	0.0281	0.0259	467.2892	0.1511	0.0043	0	0	0	0	0	0	0	0
	Horizontal Auger	480	https://www.r	300	0.50	0.1016	0.9974	0.8230	0.0281	0.0259	467.2892	0.1511	0.0043	0	0	0	0	0	0	0	0
	Sub-Total	**20,478**																			
	Totals	**906,737**																			
ROADS																					
	Equipment Classification & Description																				
Code	Description																				
010000	**Earthmoving Equipment**																				
	Excavator (CAT 330)	472	https://www.r	484	0.38	0.1152	1.0507	0.7264	0.0257	0.0236	470.2915	0.1521	0.0043	236	0.0055	0.06027	0.034756	0.00319	0.001129	20.4131	0.006602
	Grader (CAT 140H)	160	https://www.r	150	0.41	0.1108	1.0126	0.7264	0.0257	0.0236	470.2915	0.1521	0.0043	128	0.0055	0.06027	0.034756	0.00319	0.001129	20.4131	0.006602
	Double Drum Roller (CAT 140G)	160	https://www.r	150	0.38	0.1108	1.0126	0.7264	0.0257	0.0236	470.2915	0.1521	0.0043	128	0.00845	0.08855	0.050127	0.00468	0.001658	17.7556	0.009416
	Skip Loader (CAT 432F)	56	https://www.r	174	0.38	0.1398	0.2116	1.3874	0.0267	0.0221	472.6295	0.1529	0.0043	48	0.00449	0.01375	0.006313	0.00038	0.000182	1.50016	0.000485
	Single Drum Roller (CAT CS-78B)	136	https://t.co/1c	97	0.37	0.1267	1.9086	1.1009	0.0494	0.0465	471.9696	0.1526	0.0043	48	0.00259	0.07878	0.02979	0.00137	0.001231	11.5862	0.003745
	Backhoe (CAT 442)	112	https://www.r	276	0.37	0.2087	3.5224	2.1050	0.0865	0.0796	477.1880	0.1543	0.0043	56	0.00116	0.02205	0.01296	0.00039	0.000495	2.72891	0.00882
	Loader (CAT 966)	400	https://www.r	407	0.48	0.1444	1.2341	1.6458	0.0393	0.0362	469.5922	0.1519	0.0043	200	0.00618	0.05131	0.04604	0.00169	0.001559	18.39944	0.005951
	Scraper (CAT 623)	480	https://www.r	290	0.48	0.2162	1.7318	2.0505	0.0867	0.0743	472.5394	0.1528	0.0043	244	0.08804	0.84838	0.676771	0.00321	0.002782	16.94974	0.00519
	Scraper (CAT 631D)	480	https://www.r	290	0.48	0.2162	1.7318	2.0505	0.0867	0.0743	472.5394	0.1528	0.0043	244	0.08804	0.84838	0.676771	0.00321	0.002782	16.94974	0.00519
	Dozer (CAT D6)	1,120	https://www.r	215	0.40	0.3468	2.9590	3.3096	0.1380	0.1384	470.0933	0.1549	0.0043	585	0.02042	0.18409	0.18487	0.00842	0.007608	24.10214	0.007759
	Dozer (CAT D8)	562	CATEMod def	402	0.38	0.1719	1.7202	1.8051	0.1665	0.1532	474.5734	0.1535	0.0043	282	0.01766	0.08589	0.18076	0.00706	0.007276	20.44387	0.006613
	42 ton Off Highway Trucks (CAT 775)	560	https://www.r	249	0.43	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	830	0.01768	0.11842	0.10429	0.00372	0.003429	42.2004	0.01365
	Compactor (CAT 825)	672	https://www.r	405	0.43	0.6610	3.4690	4.1420	0.1610	0.1610	568.2990	0.0590	0.0048	336	0.04265	0.22376	0.26756	0.01085	0.010351	33.25174	0.003452
	Sub-Total	**10,736**																			
020000	**Aggregate Processing**																				
	Portable Screen (CAT 1055)	194	https://www.r	225	0.42	0.1070	1.0041	1.0349	0.0337	0.0310	473.4832	0.1531	0.0043	84	0.00549	0.06402	0.004744	0.00014	0.000142	1.968747	0.000637
	Double Steel Drum Roller (CAT CB15)	376	https://www.r	143	0.38	0.1267	1.9086	1.1009	0.0494	0.0465	471.9696	0.1526	0.0043	188	0.00147	0.02252	0.01251	0.00052	0.000488	4.787896	0.001548
	Skip Loader (CAT 432F)	140	https://www.r	72	0.36	0.3519	3.7909	2.9703	0.1789	0.1646	466.8982	0.1510	0.0043	72	0.00714	0.07798	0.06611	0.00368	0.000339	0.871346	0.000282
	Asphalt Grinder (W1000)	16	https://www.r	580	0.36	0.1332	1.1165	1.1095	0.0434	0.0400	472.2341	0.1527	0.0043	16	0.00845	0.06411	0.06908	0.00239	0.002195	1.577643	0.00051
	AC Drive Machine	8	https://www.r	15	0.42	0.7571	4.8739	4.3058	0.2678	0.2464	528.9535	0.1711	0.0048	8	4.231-05	0.00037	0.000239	1.49E-05	1.37E-05	0.010659	8.62E-06
	Sub-Total	**734**																			
040000	**Concrete Equipment**																				
	90 Yds Tractor Mounted Concrete Pump	42	https://www.r	225	0.74	0.1590	1.0160	1.0380	0.0290	0.0290	568.2990	0.0140	0.0043	0	0	0	0	0	0	0	0
	Concrete Vibrator Normal	200	https://www.r	241	0.56	0.6610	3.4690	4.1420	0.1610	0.1610	568.2990	0.0590	0.0048	100	0.00804	0.05168	0.06162	0.00195	0.001869	7.669779	0.000796
	Concrete Truck	500	CATEMod def	402	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	200						14.5113	0.004693
	Sub-Total	**742**																			
050000	**Utility Equipment**																				
	185 CFM Diesel Compressor Set (Ditch)	1,000	https://www.r	15.8	0.74	0.6940	2.3760	4.4070	0.1750	0.1750	568.2990	0.0620	0.0048	500	0.004472	0.015311	0.028399	0.001128	0.001138	3.322283	0.000362
	Sewer Knights 12 Hog	50		12	0.42	0.7571	4.8739	4.3058	0.2678	0.2464	528.9535	0.1711	0.0048	12	0.00015	0.00966	0.009755	4.76E-05	4.38E-05	0.038011	2.76E-05
	185 CFM Diesel Compressor	500		60	0.48	0.3400	3.6530	2.3130	0.1040	0.1040	568.2990	0.0310	0.0043	500	0.00547	0.05798	0.036715	0.001651	0.001651	8.188522	0.000446
	Aerojetter Cutting Torch	170	CATEMod def	46	0.45	0.6020	4.1240	3.9750	0.1510	0.1510	568.2990	0.0340	0.0048	38	0.00259	0.00969	0.007381	0.00025	0.000225	1.035216	0.384E-05
	7 yd Sand Blasting Pot	170	https://t.co/ur	10	0.48	0.7571	4.8739	4.3058	0.2678	0.2464	528.9535	0.1711	0.0048	88	0.00353	0.00269	0.00205	0.00011	0.000101	0.22343	7.23E-05
	Portable Changeable Message Boards	1,000		45	0.42	0.2020	2.1170	1.5610	0.0860	0.0860	568.2990	0.0470	0.0048	116	0.00152	0.01016	0.008066	0.00027	0.000247	1.240956	0.000405
	Arrow Boards	50		10	0.42	0.6610	3.4690	4.1420	0.1610	0.1610	568.2990	0.0590	0.0048	116	0.00355	0.05180	0.061824	0.00195	0.001869	7.676979	0.000796
	Sub-Total	**3,910**																			
060000	**Hoisting Equipment**																				
	50 Ton Truck Crane	10	https://www.r	195	0.29	0.2648	1.4697	2.6813	0.1140	0.1049	472.9798	0.1530	0.0043	16	0.00204	0.01484	0.00574	0.00014	0.000105	0.427953	0.000138
	100 Ton Crawler Crane (American S260)	110	https://t.co/qq	368	0.29	0.2184	1.8336	2.1542	0.0879	0.0809	471.9671	0.1526	0.0043	550	0.01827	0.09539	0.11667	0.00476	0.004381	23.1858	0.007487
	15t Forklift	110	https://www.r	130	0.20	0.2087	3.1701	1.8530	0.0843	0.0776	472.1062	0.1527	0.0043	550	0.00329	0.04973	0.02656	0.00132	0.001215	6.751132	0.002184
	15t Forklift	110	https://www.r	130	0.20	0.2087	3.1701	1.8530	0.0843	0.0776	472.1062	0.1527	0.0043	550	0.00329	0.04973	0.02656	0.00132	0.001215	6.751132	0.002184
	Truck Mounted Boom Lift	24	https://www.r	74.2	0.31	0.0988	1.1674	1.5108	0.0259	0.0238	472.1142	0.1527	0.0043	24	0.01455	0.50507	0.009019	1.59E-05	1.46E-05	0.26063	8.44E-05
	Sub-Total	**2,376**																			
070000	**Foundation & Marine Equipment**																				
	Truck Mounted Pect Hole Auger	384	https://www.r	60	0.50	0.1545	3.2176	1.9636	0.0674	0.0620	459.8291	0.1487	0.0041	192	0.00981	0.02429	0.012468	0.00043	0.000394	2.648621	0.000857
	Sub-Total	**384**																			
080000	**Drilling & Tunneling Equipment**																				
	Pick Hammer and Lead, 4pk N-Ha, 90 "H	50	https://www.r	790	0.50	0.0845	0.9835	0.5963	0.0226	0.0208	481.2495	0.1556	0.0043	48	0.00156	0.01813	0.011042	0.00043	0.000385	0.806008	0.000144
	Horizontal Bore Machine	480	https://www.r	300	0.50	0.1016	0.9974	0.8230	0.0281	0.0259	467.2892	0.1511	0.0043	12	0.00202	0.02019	0.016433	0.56E-05	5.14E-05	0.044122	0.000772
	Sub-Total	**530**																			
090000	**Service & Maintenance Equipment**																				
	3/4 Ton Pickup Truck 2x2	9212	https://www.r	385	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	4,606	0.01699	0.87837	0.700245	0.02826	0.025998	103.6527	0.033585
	1 Ton Utility Truck	9212	https://www.r	385	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	4,606	0.01699	0.87837	0.700245	0.02826	0.025998	103.6527	0.033585
	1 Ton Utility Truck	300	https://www.r	430	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	152	0.00404	0.02107	0.012312	0.00049	0.000454	11.79675	0.003816
	1 Ton Flat Bed Truck	1652	https://www.r	350	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	826	0.02471	0.14119	0.123823	0.00482	0.004238	52.17933	0.016874
	2d Ton Flat Bed Truck	862	https://www.r	350	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	431	0.01404	0.09604	0.086424	0.00387	0.003561	35.39267	0.01132
	2d Ton Double Bottom dump truck	2972	https://www.r	450	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	1,486	0.04962	0.33176	0.297972	0.01044	0.009614	120.6029	0.039021
	2d Ton Dump Truck 2x2	2972	https://www.r	450	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	1,486	0.04962	0.33176	0.297972	0.01044	0.009614	120.6029	0.039021
	20 Ton Super Dump Truck	3500	https://www.r	450	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	4,375	0.15273	1.01840	0.916374	0.03194	0.029414	371.1751	0.120034
	20 Ton Semi High Side Dump Truck	1000	https://www.r	450	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	80	0.00267	0.01782	0.016042	0.00055	0.000506	6.497599	0.000231
	Dump Truck	1200	https://www.r	450	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	60	0.00237	0.01440	0.013329	0.00045	0.000419	5.277944	0.000197
	Attenuator Truck	50	CaterpillarEnf	402	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	48	0.00143	0.00956	0.008548	0.00030	0.000287	3.482713	0.000128
	Tack Coat 20-Truck	400	CaterpillarEnf	402	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	34	0.00135	0.00674	0.00609	0.00018	0.000162	2.466601	0.000798
	Mechanical Sweeper	120	CaterpillarEnf	64	0.46	0.3031	3.6640	2.8173	0.1597	0.1469	474.1117	0.1533	0.0043	60	0.00859	0.07134	0.065486	0.00231	0.002196	0.83748	0.000271
	Water Truck 20-Truck	1600	CaterpillarEnf	402	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	64	0.00190	0.01276	0.011711	0.00041	0.000374	4.622279	0.000175
	4000 Gallon Watertruck	1800	CaterpillarEnf	260	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	954	0.02811	0.15840	0.110526	0.00346	0.003426	44.76845	0.014478
	Highlocked Truck	172	CaterpillarEnf	402	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	86	0.00267	0.01752	0.015764	0.00056	0.000519	6.384971	0.002065
	931 Wheelhogger	440	CaterpillarEnf	402	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	440	0.01136	0.0874	0.078818	0.00283	0.002593	31.51687	0.010214
	Sub-Total	**28,170**																			
	Totals	**44,615**																			
POWER TRANSMISSION																					
	Equipment Classification & Description																				
Code	Description	Equip Hours																			
010000	**Earthmoving Equipment**																				
	14 yard Hay Haul Truck	900	https://www.r	350	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	0	0	0	0	0	0	0	0
	Hay Baler	900	https://www.r	160	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	160	0.00	0.03	0.02	0.00	0.00	10.11	0.00
	1 CY Excavator	428	https://www.r	428	0.38	0.1152	1.0507	0.7264	0.0257	0.0236	470.2915	0.1521	0.0043	4	0.00	0.00	0.00	0.00	0.00	0.31	0.00
	30 Ton Compactor 533 hp	243		315	0.43	0.2210	1.0610	0.9370	0.0500	0.0300	568.2990	0.0200	0.0041	0	0.00	0.01	0.00	0.00	0.00	1.08	0.00
	Excavator drill	221	CATEMod Def	221	0.50	0.1016	0.9974	0.8230	0.0281	0.0259	470.0155	0.1511	0.0043	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5000 Gal. Water Truck	750	https://www.r	260	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	0	0.00	0.02	0.01	0.00	0.00	1.51	0.00
	Mobile Tower	42	CATEMod def	402	0.38	0.1773	1.1823	1.0638	0.0380	0.0350	474.9697	0.1536	0.0043	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Mini Excavator with Decoy	2,000	https://www.r	53	0.38	0.2006	1.4388	2.0825	0.0853	0.0784	466.7376	0.1510	0.0043	0	0.00	0.00	0.00	0.00	0.00	4.04	0.00
	Excavator - Grapple (20%)	1,000																			
	Sub-Total	**7344**																			
	Totals	**7344**																			

Code	Equipment Classification & Description / Description	Year 1 (17 months) ROG (lb/year)	CO (lb/year)	NOx (lb/year)	PM10 (lb/year)	PM2.5 (lb/year)	CO2 (MT/year)	CH4 (MT/year)	N2O (MT/year)	Year 2 (12 months) ROG (lb/year)	CO (lb/year)	NOx (lb/year)	PM10 (lb/year)	PM2.5 (lb/year)	CO2 (MT/year)	CH4 (MT/year)	N2O (MT/year)	Year 3 (12 months) ROG (lb/year)	CO (lb/year)	NOx (lb/year)	PM10 (lb/year)	PM2.5 (lb/year)	CO2 (MT/year)	CH4 (MT/year)	N2O (MT/year)
CAM																									
010000	**Earthmoving Equipment**																								
	140 Hoe Dozer (CAT D-280C)	0	0	0	0	0	0	0	0	833	0.02	0.19	0.22	0.01	0.01	22.12	0.01	0.00	833	0.02	0.19	0.22	0.01	0.01	22.12
	140 Hoe Dozer with Ripper (CAT D-280C)	0	0	0	0	0	0	0	0	833	0.02	0.19	0.22	0.01	0.01	22.12	0.01	0.00	833	0.02	0.19	0.22	0.01	0.01	22.12
	140 Hoe Dozer with Rock Saw (CAT D-280C)	0	0	0	0	0	0	0	0	833	0.02	0.19	0.22	0.01	0.01	22.12	0.01	0.00	833	0.02	0.19	0.22	0.01	0.01	22.12
	525 Hoe Dozer with Ripper (CAT D-10N)	0	0	0	0	0	0	0	0	1,328	0.06	0.41	0.50	0.02	0.02	128.41	0.04	0.00	1,328	0.06	0.41	0.50	0.02	0.02	128.41
	5 LCD loader (Cat 980H)	0	0	0	0	0	0	0	0	11,630	0.32	2.11	2.37	0.09	0.08	704.54	0.23	0.01	11,630	0.32	2.11	2.37	0.09	0.08	704.54
	231 Hoe Tractor with Rake (Cat D-7H)	0	0	0	0	0	0	0	0	2,356	0.03	0.25	0.27	0.01	0.01	94.74	0.03	0.00	2,356	0.03	0.25	0.27	0.01	0.01	94.74
	17 CY Excavator (Cat 375L)	0	0	0	0	0	0	0	0	1,128	0.02	0.21	0.15	0.01	0.00	86.28	0.03	0.00	1,128	0.02	0.21	0.15	0.01	0.00	86.28
	35 CY Excavator (Terex 335)	0	0	0	0	0	0	0	0	4,728	0.32	2.91	2.01	0.07	0.07	1,582.84	0.38	0.01	4,728	0.32	2.91	2.01	0.07	0.07	1,582.84
	30 Ton Compactor (CS-533 (Cat B25D)	0	0	0	0	0	0	0	0	1,479	0.05	0.23	0.21	0.01	0.01	113.84	0.00	0.00	1,479	0.05	0.23	0.21	0.01	0.01	113.84
	30 Ton Compactor (Ingersoll-Rand SD-77B)	0	0	0	0	0	0	0	0	1,479	0.05	0.23	0.21	0.01	0.01	113.84	0.00	0.00	1,479	0.05	0.23	0.21	0.01	0.01	113.84
	5000 Gal. Water Truck	0	0	0	0	0	0	0	0	39,410	0.76	5.07	4.57	0.16	0.15	1,849.40	0.60	0.02	39,410	0.76	5.07	4.57	0.16	0.15	1,849.40
	Sub-Total																								
030000	**Concrete Equipment**																								
	Concrete Mixer	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	90 Yds Tractor Mounted Concrete Pump	0	0	0	0	0	0	0	0	-	-	-	-	-

Alternative C: Off-Road Equipment Annual & Daily Emissions Summary

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG		
	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT-CO2e/yr	Months/Year	Days/Year
2025 (year 1)	0.62	14.94	4.35	104.74	4.09	98.62	0.16	3.74	0.14	3.47	1359.31	32754.53	0.43	10.29	0.01	0.29	1,373.6	4	83
2026 (year 2)	3.65	29.18	24.74	197.95	35.81	286.49	1.00	7.99	0.92	7.38	8,541.49	68331.95	2.69	21.55	0.08	0.61	8,631.7	12	250
2027 (year 3)	3.09	24.69	21.20	169.60	32.02	256.17	0.86	6.87	0.79	6.34	7,310.18	58481.42	2.27	18.16	0.07	0.52	7,386.5	12	250
2028 (year 4)	6.48	51.81	40.30	322.42	53.71	429.66	1.65	13.22	1.58	12.66	11,953.29	95626.34	2.73	21.87	0.10	0.83	12,052.4	12	250
2029 (year 5)	6.23	49.82	38.47	307.78	51.45	411.57	1.59	12.72	1.52	12.20	11,350.17	90801.37	2.56	20.46	0.10	0.78	11,443.3	12	250
2030 (year 6)	6.04	48.29	36.52	292.20	50.00	399.97	1.54	12.30	1.48	11.81	10,640.12	85120.95	2.35	18.77	0.09	0.73	10,726.1	12	250
2031 (year 7)	5.94	47.53	36.00	288.03	49.09	392.76	1.50	11.99	1.44	11.52	10,487.96	83903.68	2.30	18.38	0.09	0.72	10,572.3	12	250
2032 (year 8)	4.15	33.23	24.11	192.91	28.98	231.81	1.01	8.09	0.99	7.93	6,121.06	48968.46	0.91	7.28	0.05	0.41	6,158.9	12	250
																		7.3	

		Unit	Source
Mass Conversion Rates	453.59	g/lb	google.com
	2000	lb/ton	google.com
	25	ton-CO2e/	GWP CH4
	298	ton-CO2e/	GWP N2O

On-Road Emissions

Truck Hauling (Exhaust)

Exhaust emission rates shown on "Haul Truck Exhaust Em. Rts." worksheet

	Alt C: DS 140 TAF HFD						
Construction Year	Total Daily VMT	ROG (lbs/day)	NOX (lbs/day	PM10 (lbs/day)	PM2.5 (lbs/day	CO (lbs/day)	CO2 (lbs/day)
1	10,810	0.30	35.24	0.75	0.72	1.47	35,830
2	5,930	0.16	19.33	0.41	0.40	0.81	19,655
3	5,500	0.15	17.93	0.38	0.37	0.75	18,229
4	5,500	0.15	17.93	0.38	0.37	0.75	18,229
5	5,500	0.15	17.93	0.38	0.37	0.75	18,229
6	5,500	0.15	17.93	0.38	0.37	0.75	18,229
7	5,500	0.15	17.93	0.38	0.37	0.75	18,229
8	5,500	0.15	17.93	0.38	0.37	0.75	18,229

On-Road Emissions

Worker Commute Trips (Exhaust)

Exhaust emission rates shown on "Worker Trip Exhaust Em. Rts." worksheet

Alt C: DS 140 TAF HFD

Construction Year	# Avg Workers/ day	Daily VMT (miles)	ROG (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO (lbs/day)	CO2 (lbs/day)
1	318	22,235	0.422	2.198	0.059	0.054	33.656	13,239
2	594	41,563	0.788	4.109	0.110	0.101	62.910	24,747
3	582	40,746	0.773	4.028	0.108	0.099	61.674	24,260
4	678	47,483	0.901	4.694	0.126	0.116	71.872	28,272
5	603	42,175	0.800	4.170	0.111	0.103	63.837	25,111
6	678	47,483	0.901	4.694	0.126	0.116	71.872	28,272
7	670	46,871	0.889	4.634	0.124	0.114	70.945	27,907
8	657	45,967	0.872	4.544	0.121	0.112	69.577	27,369

Notes

1 Daily Truck Hauling trips based on total material import/export required

2 Average trip length obtained from Stantec

3 Daily VMT by workers = # workers * trips per worker * trip length

Off-Road Vegetative Clearing Equipment Emissions

		Unit	Source
Mass Conversion Rates	453.59	g/lb	google.com
	2000	lb/ton	google.com
	2204.62	lb/MT	google.com

												Year 3	Alternative C- DS 140 TAF							
Equipment Classification & Description		hp	load	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O	Equip	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O
Code	Description		factor	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	Hours	ton/year	ton/year	ton/year	ton/year	ton/year	MT/year	MT/year	MT/year
	6000 Gal Water Truck	260	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004274	126	0.0024	0.0162	0.0146	0.0005	0.0005	5.9128	0.0019	0.0001
	Chainsaws 25 Hsp	25	0.73	0.685	2.339	4.332	0.161	0.161	568.299	0.061	0.004751	378	0.0052	0.0178	0.0329	0.0012	0.0012	3.9204	0.0004	0.0000
	Medium Feller/Buncher 175 Hsp	175	0.4	0.2347	3.13647	2.16742	0.1121	0.1031	469.843	0.152	0.004274	126	0.0023	0.0305	0.0211	0.0011	0.0010	4.1440	0.0013	0.0000
	Large Feller/Buncher 300 Hsp	300	0.4	0.1684	1.3582	1.55241	0.0594	0.0547	476.2959	0.154	0.004274	126	0.0028	0.0226	0.0259	0.0010	0.0009	7.2016	0.0023	0.0001
	Medium Skidder 175 Hsp	175	0.37	0.1869	2.92602	1.9987	0.0942	0.0867	471.0403	0.1523	0.004274	126	0.0017	0.0263	0.0180	0.0008	0.0008	3.8430	0.0012	0.0000
	Large Skidder 175 Hsp	175	0.37	0.1869	2.92602	1.9987	0.0942	0.0867	471.0403	0.1523	0.004274	126	0.0017	0.0263	0.0180	0.0008	0.0008	3.8430	0.0012	0.0000
	Loader Rubber Tired 300 Hsp	300	0.36	0.1931	1.2763	1.43264	0.0525	0.0483	469.1434	0.1517	0.004274	126	0.0029	0.0191	0.0215	0.0008	0.0007	6.3841	0.0021	0.0001
	Masticator on Excavator 175 Hsp	175	0.38	0.1578	3.078	1.15367	0.0566	0.052	472.4964	0.1528	0.004274	126	0.0015	0.0284	0.0107	0.0005	0.0005	3.9591	0.0013	0.0000
	Whole Tree Chipper 300 Hsp	300	0.42	0.1684	1.3582	1.55241	0.0594	0.0547	476.2959	0.154	0.004274	200	0.0047	0.0377	0.0431	0.0017	0.0015	12.0027	0.0039	0.0001
	Large Diameter Chipper/Shredder 100 Hsp	100	0.42	0.3413	3.58397	3.25221	0.2029	0.1867	472.7482	0.1529	0.004274	200	0.0032	0.0332	0.0301	0.0019	0.0017	3.9711	0.0013	0.0000

These equipment types/ratings consistent with CalFire VTP PEIR, Appendix AQ-1 Treatment Activity Emissions Prepared by Ascent

				Emission Factors								Year 6	Alternative C- DS 140 TAF							
Equipment Classification & Description		hp	load	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O	Equip	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O
Code	Description		factor	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	Hours	ton/year	ton/year	ton/year	ton/year	ton/year	MT/year	MT/year	MT/year
	67 Ton Off Hwy Truck 870 Hsp (Cat 777)	870	0.38	0.19	1.15	3.14	0.06	0.05	473.37	0.15	0.00	10	0.0007	0.0042	0.0114	0.0002	0.0002	1.5650	0.0005	0.0000
	6000 Gal Water Truck	260	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004274	10	0.0002	0.0013	0.0012	0.0000	0.0000	0.4693	0.0002	0.0000
	Chainsaws 25 Hsp	25	0.73	0.685	2.339	4.332	0.161	0.161	568.299	0.061	0.004751	10	0.0001	0.0005	0.0009	0.0000	0.0000	0.1037	0.0000	0.0000
	Rotary Mower 25 Hsp	25	0.42	0.7571	4.87388	4.30575	0.2678	0.2464	528.9535	0.1711	0.004751	10	0.0001	0.0006	0.0005	0.0000	0.0000	0.0555	0.0000	0.0000
	Small Diameter Chipper 25 Hsp	25	0.42	0.7571	4.87388	4.30575	0.2678	0.2464	528.9535	0.1711	0.004751	10	0.0001	0.0006	0.0005	0.0000	0.0000	0.0555	0.0000	0.0000
	Tractor/Loader/Backhoe 25 Hsp	25	0.37	0.55	4.55974	3.66186	0.145	0.1334	513.8025	0.1662	0.004751	10	0.0001	0.0005	0.0004	0.0000	0.0000	0.0475	0.0000	0.0000
	Tractor/Loader/Backhoe 175 Hsp	175	0.37	0.1619	3.08323	1.18039	0.0585	0.0538	469.3289	0.1518	0.004274	10	0.0001	0.0022	0.0008	0.0000	0.0000	0.3039	0.0001	0.0000
	Masticator on Excavator 175 Hsp	175	0.38	0.1578	3.078	1.15367	0.0566	0.052	472.4964	0.1528	0.004274	10	0.0001	0.0023	0.0008	0.0000	0.0000	0.3142	0.0001	0.0000
	Flail/Mulcher on Excavator 260 Hsp	260	0.38	0.1152	1.05072	0.72641	0.0257	0.0236	470.2915	0.1521	0.004274	10	0.0001	0.0011	0.0008	0.0000	0.0000	0.4646	0.0002	0.0000

Off-Road Vegetative Clearing Equipment Emissions

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG		
	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT-CO2e/yr	Months/Year	Days/Year
Proposed Proj US 140 TAF HFD																			
2027 (year 3)	0.03750	0.30004	0.320	2.56	0.302	2.42	0.01314	0.10512	0.01225	0.09798	71.091	568.73	0.022	0.17	0.00064	0.00510	71.8	12	250
2030 (year 6)	0.00640	0.05122	0.053	0.42	0.069	0.55	0.00187	0.01498	0.00173	0.01386	13.517	108.14	0.00428	0.03426	0.00012	0.00098	13.7	12	250
Alt A (US 140 TAF EFD)																			
2027 (year 3)	0.06436	0.51486	0.588	4.70	0.534	4.27	0.02332	0.18656	0.02169	0.17355	125.300	1002.40	0.039	0.31	0.00113	0.00900	126.6	12	250
2030 (year 6)	0.00160	0.01281	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250
Alt B (US 96 TAF EFD)																			
2027 (year 3)	0.04909	0.39273	0.448	3.59	0.409	3.28	0.01799	0.14394	0.01673	0.13382	95.790	766.32	0.030	0.24	0.00086	0.00688	96.8	12	250
2030 (year 6)	0.00160	0.01281	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250
Alt C (DS 140 TAF HFD)																			
2027 (year 3)	0.00544	0.04351	0.258	2.07	0.236	1.89	0.01036	0.08287	0.00963	0.07705	55.182	441.45	0.017	0.14	0.00050	0.00396	55.8	12	250
2030 (year 6)	0.05856	0.46852	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250
Alt D (DS 140 TAF EFD)																			
2027 (year 3)	0.00368	0.02941	0.390	3.12	0.365	2.92	0.01580	0.12641	0.01476	0.11810	83.135	665.08	0.025	0.20	0.00074	0.00596	84.0	12	250
2030 (year 6)	0.03004	0.24036	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250

		Unit	Source
Mass Conversion Rates	453.59	g/lb	google.com
	2000	lb/ton	google.com
	25	ton-CO2e/	GWP CH4
	298	ton-CO2e/	GWP N2O

Fugitive Dust Emissions

Material Piles and Earthmoving
On-road Haul Truck Trips
On-road Worker Trips

Off-Road Fugitive Dust Emissions

1. Earthwork

Off-Road Fugitive Dust Emissions

Off-Road Fugitive Dust Emissions

Construction Year	Proposed: US 140 TAF HFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	377,764	604,421.93	446,130	713,808.77	1,318,230.70	15,882.30	**5,228.73**
Year 2	1,511,055	2,417,687.71	1,784,522	2,855,235.09	5,272,922.81	21,091.69	**6,943.76**
Year 3	1,636,564	2,618,501.93	1,495,130	2,392,208.77	5,010,710.70	20,042.84	**6,598.46**
Year 4	834,894	1,335,830.00	1,407,790	2,252,463.61	3,588,293.61	14,353.17	**4,725.32**
Year 5	557,094	891,350.00	1,176,290	1,882,063.61	2,773,413.61	11,093.65	**3,652.23**
Year 6	557,094	891,350.00	1,176,290	1,882,063.61	2,773,413.61	11,093.65	**3,652.23**
Year 7	557,094	891,350.00	1,176,290	1,882,063.61	2,773,413.61	11,093.65	**3,652.23**
Year 8							

Construction Year	Alt A: US 140 TAF EFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	422,369	675,791.02	531,099	849,757.90	1,525,548.92	18,380.11	**6,051.06**
Year 2	3,386,987	5,419,178.63	5,072,077	8,115,322.51	13,534,501.14	54,138.00	**17,823.19**
Year 3	889,091	1,422,545.45	1,481,818	2,370,909.09	3,793,454.55	15,173.82	**4,995.49**
Year 4	3,781,935	6,051,095.44	2,623,751	4,198,002.05	10,249,097.49	40,996.39	**13,496.74**
Year 5	3,781,935	6,051,095.44	2,623,751	4,198,002.05	10,249,097.49	40,996.39	**13,496.74**
Year 6	3,781,935	6,051,095.44	2,623,751	4,198,002.05	10,249,097.49	40,996.39	**13,496.74**
Year 7	1,890,967	3,025,547.72	1,311,876	2,099,001.02	5,124,548.75	20,498.19	**6,748.37**
Year 8							

Construction Year	Alt B: US 96 TAF EFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	521,166	833,865.69	676,584	1,082,534.76	1,916,400.45	23,089.16	**7,601.36**
Year 2	3,238,088	5,180,957.08	4,939,253	7,902,804.28	13,083,761.36	52,335.05	**17,229.62**
Year 3	438,000	700,800.00	730,000	1,168,000.00	1,868,800.00	7,475.20	**2,460.97**
Year 4	3,554,122	5,686,595.81	2,270,263	3,632,420.13	9,319,015.94	37,276.06	**12,271.94**
Year 5	3,554,122	5,686,595.81	2,270,263	3,632,420.13	9,319,015.94	37,276.06	**12,271.94**
Year 6	3,554,122	5,686,595.81	2,270,263	3,632,420.13	9,319,015.94	37,276.06	**12,271.94**
Year 7							
Year 8							

Construction Year	Alt C: DS 140 TAF HFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)[1]	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	425,518	680,828.34	943,793	1,510,068.54	2,190,896.88	26,396.35	**8,690.14**
Year 2	1,276,553	2,042,485.02	2,831,379	4,530,205.62	6,572,690.64	26,290.76	**8,655.38**
Year 3	1,256,890	2,011,024.00	1,041,500	1,666,400.00	3,677,424.00	14,709.70	**4,842.69**
Year 4	1,511,931	2,419,090.29	1,823,784	2,918,053.77	5,337,144.06	21,348.58	**7,028.33**
Year 5	567,506	908,009.14	1,248,202	1,997,123.93	2,905,133.08	11,620.53	**3,825.68**
Year 6	567,506	908,009.14	1,248,202	1,997,123.93	2,905,133.08	11,620.53	**3,825.68**
Year 7	567,506	908,009.14	1,248,202	1,997,123.93	2,905,133.08	11,620.53	**3,825.68**
Year 8	412,731	660,370.29	907,784	1,452,453.77	2,112,824.06	8,451.30	**2,782.32**

Construction Year	Alt D: DS 140 TAF EFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)[1]	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	315,478	504,764.38	615,377	984,603.72	1,489,368.10	17,944.19	**5,907.55**
Year 2	2,727,494	4,363,990.86	4,941,870	7,906,992.65	12,270,983.51	49,083.93	**16,159.30**
Year 3	2,395,394	3,832,631.05	3,956,016	6,329,625.94	10,162,256.99	40,649.03	**13,382.38**
Year 4	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	39,180.01	**12,898.75**
Year 5	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	39,180.01	**12,898.75**
Year 6	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	39,180.01	**12,898.75**
Year 7	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	42,772.94	**14,081.61**
Year 8	1,420,206	2,272,329.60	875,498	1,400,796.21	3,673,125.81	25,158.40	**8,282.59**

Conversion Rates
2000 lbs/ton
1.6 ton/cy

Source
google.com
calculatorsoup.com

Notes
1. Calulation using emission factor for PM10 shown on "Fugitive Dust Emission Factors" worksheet.
2. Emission estimates for fugitive dust from material movement were based on the material totals for all material import and waste exported. These are the activities that would result in on-site fugitive dust emissions.
Values of 0.0 indicate that no material import/export would be required for that particular construction year.

2. Construction Activity (grading and earthmoving)

		Proposed: US 140 TAF HFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)	Alt A: US 140 TAF EFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)
Year 1	231 Hsp Dozer (Cat D-7H)	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00
	Motor Grader (CAT 140G)	1478	17.8	8.46	1332	16.0	7.62
	Dozer (CAT D8)	529	6.4	3.03	529	6.4	3.03
	Dozer (CAT D6)	344	4.1	1.97	344	4.1	1.97
	140 Hp Bulldozer	0	0.0	0.00	0	0.0	0.00
Total				**13.45**			**12.62**
Year 2	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	1478	5.9	2.81	1332	5.3	2.53
	Dozer (CAT D8)	529	2.1	1.01	529	2.1	1.01
	Dozer (CAT D6)	344	1.4	0.65	344	1.4	0.65
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**15.13**			**25.54**
Year 3	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.66**			**21.35**
Year 4	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.66**			**21.35**
Year 5	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.66**			**21.35**
Year 6	231 Hsp Dozer (Cat D-7H)	4161	16.6	7.91	791	3.2	1.50
	520 Hsp Dozer with Disc (Cat D-10N)	1113	4.5	2.11	7239	29.0	13.75
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2461	9.8	4.68
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.09**			**20.00**
Year 7	231 Hsp Dozer (Cat D-7H)	4161	16.6	7.91	791	3.2	1.50
	520 Hsp Dozer with Disc (Cat D-10N)	1113	4.5	2.11	7239	29.0	13.75
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2461	9.8	4.68
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.09**			**20.00**
Year 8	231 Hsp Dozer (Cat D-7H)	500	6.0	2.86	120	5.7	2.71
	520 Hsp Dozer with Disc (Cat D-10N)	100	1.2	0.57	1000	47.6	22.62
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	300	14.3	6.79
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	0	0.0	0.00	0	0.0	0.00
Total				**3.43**			**32.12**

		Alt B: US 96 TAF EFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)	Alt C: DS 140 TAF HFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)	Alt D: DS 140 TAF EFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)
Year 1	231 Hsp Dozer (Cat D-7H)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Motor Grader (CAT 140G)	1177	14.2	6.74	1176	14.2	6.73	1784	21.5	10.21
	Dozer (CAT D8)	562	6.8	3.22	585	7.0	3.35	794	9.6	4.55
	Dozer (CAT D6)	316	3.8	1.81	282	3.4	1.61	473	5.7	2.71
	140 Hp Bulldozer	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Total				**11.76**			**11.69**			**17.46**
Year 2	231 Hsp Dozer (Cat D-7H)	724	2.9	1.38	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	6286	25.1	11.94	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2013	8.1	3.82	1328	5.3	2.52	2815	11.3	5.35
	Motor Grader (CAT 140G)	1177	4.7	2.24	1176	4.7	2.23	1190	4.8	2.26
	Dozer (CAT D8)	562	2.2	1.07	585	2.3	1.11	530	2.1	1.01
	Dozer (CAT D6)	316	1.3	0.60	282	1.1	0.54	315	1.3	0.60
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**21.12**			**17.95**			**24.84**
Year 3	231 Hsp Dozer (Cat D-7H)	724	2.9	1.38	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1328	5.3	2.52	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**19.83**			**14.07**			**20.97**
Year 4	231 Hsp Dozer (Cat D-7H)	824	3.3	1.57	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1328	5.3	2.52	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**20.01**			**14.07**			**20.97**
Year 5	231 Hsp Dozer (Cat D-7H)	824	3.3	1.57	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1228	4.9	2.33	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**20.01**			**13.88**			**20.97**
Year 6	231 Hsp Dozer (Cat D-7H)	824	3.3	1.57	813	3.3	1.54	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1178	4.7	2.24	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**20.01**			**13.74**			**20.97**
Year 7	231 Hsp Dozer (Cat D-7H)	424	4.1	1.94	733	2.9	1.39	1333	5.8	2.77
	520 Hsp Dozer with Disc (Cat D-10N)	2286	22.0	10.44	3206	12.8	6.09	6855	29.9	14.22
	520 Hsp Dozer with Disc (Cat D-10N)	514	4.9	2.35	1178	4.7	2.24	2815	12.3	5.84
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.4	0.17	37	0.1	0.07	37	0.2	0.08
Total				**14.89**			**9.79**			**22.90**
Year 8	231 Hsp Dozer (Cat D-7H)				120	0.5	0.23	889	6.1	2.89
	520 Hsp Dozer with Disc (Cat D-10N)				2000	8.0	3.80	4570	31.3	14.87
	520 Hsp Dozer with Disc (Cat D-10N)				400	1.6	0.76	1877	12.9	6.10
	Motor Grader (CAT 140G)				0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)				0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)				0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer				0	0.0	0.00	0	0.0	0.00
Total							**4.79**			**23.86**

3. Summary of Off-Road Fugitive Dust Emissions (lbs/day)

Construction Year	PM 10 Fugitive Dust (lbs/day) Proposed: US 140 TAF HF	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD	PM2.5 Fugitive Dust (lbs/day) Proposed: US 140 TAF H	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD
Year 1	5,242	6,064	7,613	8,702	5,925	524	606	761	870	593
Year 2	6,959	17,849	17,251	8,673	16,184	696	1,785	1,725	867	1,618
Year 3	6,609	5,017	2,481	4,857	13,403	661	502	248	486	1,340
Year 4	4,736	13,518	12,292	7,042	12,920	474	1,352	1,229	704	1,292
Year 5	3,663	13,518	12,292	3,840	12,920	366	1,352	1,229	384	1,292
Year 6	3,662	13,517	12,292	3,839	12,920	366	1,352	1,229	384	1,292
Year 7	3,662	6,768	15	3,835	14,105	366	677	1.49	384	1,410
Year 8	3.43	32	-	2,787	8,306	0.34	3.21	-	279	831

Construction Year	PM 10 Fugitive Dust (lbs/day) - With BMPs Proposed: US 140 TAF HF	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD	PM2.5 Fugitive Dust (lbs/day) - With BMPs Proposed: US 140 TAF H	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD
Year 1	2,621	3,032	3,807	4,351	2,963	262	303	381	435	296
Year 2	3,479	8,924	8,625	4,337	8,092	348	892	863	434	809
Year 3	3,305	2,508	1,240	2,428	6,702	330	251	124	243	670
Year 4	2,368	6,759	6,146	3,521	6,460	237	676	615	352	646
Year 5	1,831	6,759	6,146	1,920	6,460	183	676	615	192	646
Year 6	1,831	6,758	6,146	1,920	6,460	183	676	615	192	646
Year 7	1,831	3,384	7.4	1,918	7,052	183	338	0.74	192	705
Year 8	1.72	16	-	1,394	4,153	0.17	1.61	-	139	415

Cut (CY)						
Alternative	Dam Foundation/ Spillway Excavation	Existing Dam Excavation	Shell Borrow Areas Excavation	Core Borrow Areas Excavation	Double Handle Stockpiled Material	Roadway
US 140 TAF HFD	926,000	354,500	4,705,159	0	0	2,676,783
US 140 TAF EFD	4,075,000	354,500	5,319,033	1,699,897	2,164,200	2,655,493
US 96 TAF EFD	3,285,000	354,500	3,711,984	1,297,004	1,801,800	2,706,337
DS 140 TAF HFD	1,603,000	354,500	5,560,175	0	0	3,775,171
DS 140 TAF EFD	5,466,500	354,500	5,971,934	2,041,645	2,200,560	3,692,264

Cut by Year (CY)								
Alternative	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
US 140 TAF HFD	446,130	1,784,522	1,495,130	1,407,790	1,176,290	1,176,290	1,176,290	
US 140 TAF EFD	531,099	5,072,077	1,481,818	2,623,751	2,623,751	2,623,751	1,311,876	
US 96 TAF EFD	676,584	4,939,253	730,000	2,270,263	2,270,263	2,270,263		
DS 140 TAF HFD	943,793	2,831,379	1,041,500	1,823,784	1,248,202	1,248,202	1,248,202	907,784
DS 140 TAF EFD	615,377	4,941,870	3,956,016	2,334,660	2,334,660	2,334,660	2,334,660	875,498

Fill (CY)						
Alternative	Disposal (Dam Foundation / Spillway Excavation)	Disposal (Existing Dam)	Embankment	Disposal (Borrow Areas)	Double Handle Stockpiled Material	Roadway
US 140 TAF HFD	1,111,200	425,400	0	2,228,375	0	2,266,582
US 140 TAF EFD	2,445,000	141,600	10,600,000	472,571	2,164,200	2,111,847
US 96 TAF EFD	1,971,000	141,600	8,500,000	360,567	1,801,800	2,084,664
DS 140 TAF HFD	1,923,600	432,490	0	2,527,980	0	1,702,071
DS 140 TAF EFD	3,403,500	142,000	13,800,000	568,510	2,200,560	1,892,866

Fill by Year (CY)								
Alternative	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
US 140 TAF HFD	377,764	1,511,055	1,636,564	834,894	557,094	557,094	557,094	
US 140 TAF EFD	422,369	3,386,987	889,091	3,781,935	3,781,935	3,781,935	1,890,967	
US 96 TAF EFD	521,166	3,238,098	438,000	3,554,122	3,554,122	3,554,122		
DS 140 TAF HFD	425,518	1,276,553	1,256,890	1,511,931	567,506	567,506	567,506	412,731
DS 140 TAF EFD	315,478	2,727,494	2,395,394	3,787,216	3,787,216	3,787,216	3,787,216	1,420,206

Assumptions

1. Evenly proportion earthwork during the months those activities are performed on the schedule.
2. Borrow areas and stockpiled material activities take place during dam construction.

Alt C: DS 140 TAF HFD

		Annual Truck Hauling Trips (round trips)												
Days/year	Offsite Import	Onsite	Offsite Water	Total	Round Trips	West Imports	East Imports	Onsite VMT	West VMT	East VMT	Water Trucks	Total Daily VMT	**PM10 (lbs/day)**	**PM2.5 (lbs/day)**
83	5857	10000	8100	23957	23957	11979	11979	20000	401,280	419,248	56,700	10,810	**19.25**	**2.89**
250	11291	30000	200	41491	41491	20746	20746	60000	694,974	726,093	1,400	5,930	**10.56**	**1.58**
250	8152	30000	200	38352	38352	19176	19176	60000	642,396	671,160	1,400	5,500	**9.79**	**1.47**
250	8152	30000	200	38352	38352	19176	19176	60000	642,396	671,160	1,400	5,500	**9.79**	**1.47**
250	8152	30000	200	38352	38352	19176	19176	60000	642,396	671,160	1,400	5,500	**9.79**	**1.47**
250	8152	30000	200	38352	38352	19176	19176	60000	642,396	671,160	1,400	5,500	**9.79**	**1.47**
250	8152	30000	200	38352	38352	19176	19176	60000	642,396	671,160	1,400	5,500	**9.79**	**1.47**
250	8152	30000	200	38352	38352	19176	19176	60000	642,396	671,160	1,400	5,500	**9.79**	**1.47**

Alt C: DS 140 TAF HFD

Total Daily VMT	ROG (lbs/day)	NOX (lbs/day	PM10 (lbs/day)	PM2.5 (lbs/day	CO (lbs/day)	CO2 (lbs/day)
10,810	0.30	35.24	0.75	0.72	1.47	35,830
5,930	0.16	19.33	0.41	0.40	0.81	19,655
5,500	0.15	17.93	0.38	0.37	0.75	18,229
5,500	0.15	17.93	0.38	0.37	0.75	18,229
5,500	0.15	17.93	0.38	0.37	0.75	18,229
5,500	0.15	17.93	0.38	0.37	0.75	18,229
5,500	0.15	17.93	0.38	0.37	0.75	18,229
5,500	0.15	17.93	0.38	0.37	0.75	18,229

Alt C: DS 140 TAF HFD

# Avg Workers/day	Average Trip Length	Daily VMT (miles)	PM10 (lbs/day)	PM2.5 (lbs/day)
318	35	22,235	**8.1**	**1.2**
594	35	41,563	**15.2**	**2.3**
582	35	40,746	**14.9**	**2.2**
678	35	47,483	**17.3**	**2.6**
603	35	42,175	**15.4**	**2.3**
678	35	47,483	**17.3**	**2.6**
670	35	46,871	**17.1**	**2.6**
657	35	45,967	**16.8**	**2.5**

Alt C: DS 140 TAF HFD

Workers/day	Daily VMT (miles)	ROG (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO (lbs/day)	CO2 (lbs/day)
318	22,235	0.422	2.198	0.059	0.054	33.656	13,239
594	41,563	0.788	4.109	0.110	0.101	62.910	24,747
582	40,746	0.773	4.028	0.108	0.099	61.674	24,260
678	47,483	0.901	4.694	0.126	0.116	71.872	28,272
603	42,175	0.800	4.170	0.111	0.103	63.837	25,111
678	47,483	0.901	4.694	0.126	0.116	71.872	28,272
670	46,871	0.889	4.634	0.124	0.114	70.945	27,907
657	45,967	0.872	4.544	0.121	0.112	69.577	27,369

Helicopter Emissions

Helicopter Emissions

Helicopter operation	**Value**	Source	
Gallons of jet fuel used per hour	100	FOCA 2015 - used Kaman K-1200	
Gallons of fuel used per LTO	15	FOCA 2015 - used Kaman K-1200	
Average hours/use (assumes 2 LTO)	5	Applicant data	
Total Days Helicopter Used per Year	70	Applicant data	July 15 - December 1 (Years 2-7)
Total Hours Helicopter Used per Year	348	Applicant data	
Gallons used for LTO	1,084	calculated	
Gallons used for cruising	34,914	calculated	
Total gallons used per year	35,998	calculated	
Jet A Emissions Factor (kg CO2/gal)	9.7497	Climate Registry 2017 Emission Factors	
Jet A Emissions Factor (kg N2O/gal)	0.000308	Climate Registry 2017 Emission Factors	
GWP N2O	298		
LTO MTCO2E	10.67		
Cruising MTCO2E	343.61		
Total MTCO2E	354.28		
Note: No emission factor available for CH4 helicopter emissions.			

Helicopter Information	Value	Source
Aircraft Type	Helicopter	
Engine Type	T53 17A-1	FOCA 2015
Engine SHP	1500	FOCA 2015
Number of engines	1	FOCA 2015
Mean operating percent power per engine for large twin turboshaft helicopters	62%	FOCA 2015
Fuel flow per engine for engines up to 1000 SHP (kg/s)	0.2303889	FOCA 2015
Fuel flow per hour (kg/h)	514	FOCA 2015

Emissions Calculations							
	HC	ROG (5)	NOX	PM Non-Volatile	Source		
LTO EF (g/LTO)*	667	845	285	9	FOCA 2009		
Cruising EF (g/hour)*	1310	1659	2340	68	FOCA 2009		
Max Net Emissions per day (lbs/day)	21.793	27.598	28.936	0.849		lb/day	July 15-Dec 1 (years 2-7)
Annual Emissions (tons/year)	0.758	0.960	1.007	0.030		ton/year	July 15-Dec 1 (years 2-7)
** Assume Kaman K-1200*							

FOCA 2015 - Guidance on the Determination of Helicopter Emissions
https://www.bazl.admin.ch/dam/bazl/it/dokumente/Politik/Umwelt/helicopter_emissionstable.xls.download.xls/helicopter_emissionstable.xls

Blasting Emissions

Blasting Emissions

	Alt C: DS 140 TAF HFD									
Year	Blasts/Day	Blasts/Yea	tons/blast	lb-CO/day	lb-CO/yr	lb-NOx/da	lb-NOx/yr	lb-SO2/da	lb-SO2/yr	CH4
1	0	0								
2	0	0								
3	0	0								
4	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
5	1	22	0.1875	12.5625	276.375	3.1875	70.125	0.375	8.25	NA
6	1	22	0.1875	12.5625	276.375	3.1875	70.125	0.375	8.25	NA
7	1	22	0.1875	12.5625	276.375	3.1875	70.125	0.375	8.25	NA
8	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA

Emissions Factors for Detonation of Explosives

	lb	lb/day	lb/blast		tons/blast
Default tot	180,000	2,250	375	=	0.1875

	CO	NOx	SO2	CH4	
ANFO[1]	67	17	2	NA	lb/ton

	CO	NOx	SO2	CH4	
Total	12.5625	3.1875	0.375	NA	lb/blast

lbs/tons 2000

Sources

1

US EPA., 1980. AP 42: Compilation of Air Emissions Factors, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, Explosives Detonation.

Operational Emissions

Operational GHG Emissions Summary

Pumping Requirement	Future Conditions (2030)																									
		Proposed Project					Alt A					Alt B					Alt C					Alt D				
	Future Baseline/ No Project Alt	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr
CVP System-Wide (gWh/year)	1,231.60	1,232.70	1.10	126,066	31.9	6.8	1,232.70	1.10	126,066	31.9	6.8	1,232.50	0.90	103,145	26.1	5.6	1,232.70	1.10	126,066	31.9	6.8	1,232.70	1.10	126,066	31.9	6.8
New Pumping Plant at Expanded Reservoir (gWh /year)	0	2	2.00	229,211	58.0	12.3	1.9	1.90	217,751	55.1	11.7	1.1	1.10	126,066	31.9	6.8	1.1	1.10	126,066	31.9	6.8	1	1.00	114,606	29.0	6.2
Total	1,231.60	1,234.70	3.10	355,277	89.9	19.1	1,232.60	1.00	114,606	29.0	6.2	1,233.60	2.00	229,211	58.0	12.3	1,233.80	2.20	252,132	63.8	13.6	1,233.70	2.10	240,672	60.9	13.0
MTCO2e/year				161.2	1.0	2.6			52.0	0.3	0.8			104.0	0.7	1.7			114.4	0.7	1.8			109.2	0.7	1.8
			MT-CO2e/year	164.8				MT-CO2e/year	53.1				MT-CO2e/year	106.3				MT-CO2e/year	116.9				MT-CO2e/year	111.6		
			O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88		
			TOTAL MT-CO2e/year	**166.6**				**TOTAL MT-CO2e/year**	**55.0**				**TOTAL MT-CO2e/year**	**108.2**				**TOTAL MT-CO2e/year**	**118.8**				**TOTAL MT-CO2e/year**	**113.49**		
			Compared to Proposed	100%					33%					65%					71%					68%		
			Difference	0%					67%					35%					29%					32%		

2030 CO2 Intensity Factor (PG&E)	114.61	lb-CO2/MWh	2204.62	lb/MT
2030 CH4 Intensity Factor (PG&E)	0.0290	lb-CH4/MWh	25	GWP CH4 (CO2e)
2030 N2O Intensity Factor (PG&E)	0.00617	lb-N2O/MWh	298	GWP N2O (CO2e)

PG&E Intensity Factors	2018	206.29	https://www.theclimateregistry.org/our-members/cris-public-reports/
	2030	114.61	linear interpolation
	2045	0	

Operations and Maintenance Worker Trip GHG Emissions

	Proposed: US 140 TAF HFD								
Year	Trips per Year	Annual VMT (roundtrip)	ROG (lbs/year)	NOx (lbs/year)	PM10 (lbs/year)	PM2.5 (lbs/year)	CO (lbs/year)	CO2 (lbs/year)	CO2 (MT/year)
1	64	6,950	0.132	0.687	0.018	0.017	10.520	4,138	1.88
2-5	38	4,127	0.078	0.408	0.011	0.010	6.246	2,457	1.11
6+	24	2,606	0.049	0.258	0.007	0.006	3.945	1,552	0.70

Project Description (Section 2.3.3.2):

Inspections

Year 1: One trip/worker per week (52 trips/year)

Years 2-5: One trip/worker every 2 weeks (26 trips/year)

Years 6+: One trip/worker per month (12 trips/year)

Maintenance

All Years: One trip/worker per month (12 trips per year)

2204.62 lb/MT

Distance fron Valley Water (San Jose) to project site: 54.3 miles 1-way

Alt C: DS 140 TAF HFD								
Trips per Year	**Annual VMT (roundtrip)**	ROG (lbs/year)	NOx (lbs/year)	PM10 (lbs/year)	PM2.5 (lbs/year)	CO (lbs/year)	CO2 (lbs/year)	CO2 (MT/year)
64	6,950	0.132	0.687	0.018	0.017	10.520	4,138	1.88
38	4,127	0.078	0.408	0.011	0.010	6.246	2,457	1.11
24	2,606	0.049	0.258	0.007	0.006	3.945	1,552	0.70

O & M Worker Trip Exhaust Emission Factors

Raw Emission Factors from EMFAC2021

Veh	Fuel	Pop	VMT	Trips	Running Exhaust Emission Rates (g/mile)						
		(Vehicles)	(Miles/day)	(Trips/day)	ROG_RUNEX	NOX_RUNEX	PM10_RUNEX	PM2_5_RUNEX	CO_RUNEX	SOX_RUNEX	CO2_RUNEX
LDA	Gasoline	598,860	22,133,915	2,780,384	0.008	0.038	0.001	0.001	0.695	0.003	273.208
LDA	Diesel	1,620	46,913	6,871	0.026	0.188	0.016	0.015	0.320	0.002	230.596
LDA	Electricity	61,443	2,670,452	299,853	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LDA	Plug-in Hybrid	19,038	825,568	78,721	0.001	0.003	0.001	0.001	0.209	0.001	135.439
LDT1	Gasoline	51,681	1,664,706	230,186	0.025	0.115	0.002	0.002	1.317	0.003	324.128
LDT1	Diesel	21	303	59	0.297	1.644	0.249	0.238	1.585	0.004	415.168
LDT1	Electricity	234	9,324	1,110	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LDT1	Plug-in Hybrid	98	4,519	406	0.001	0.003	0.000	0.000	0.187	0.001	121.010
LDT2	Gasoline	290,875	10,447,706	1,360,241	0.010	0.063	0.001	0.001	0.796	0.003	338.271
LDT2	Diesel	1,050	38,652	4,980	0.013	0.039	0.005	0.005	0.130	0.003	306.718
LDT2	Electricity	2,157	73,664	10,962	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LDT2	Plug-in Hybrid	2,562	112,327	10,593	0.001	0.003	0.000	0.000	0.196	0.001	127.261
Total			38,028,048								

Source: wksht: EMFAC2021output

Veh	Fuel	Ratio of Vehicle/Fuel Type to Total VMT	
LDA	Gasoline	58%	
LDA	Diesel	0.12%	
LDA	Electricity	7.0%	
LDA	Plug-in Hybrid	2.2%	
LDT1	Gasoline	4.4%	100%
LDT1	Diesel	0.001%	
LDT1	Electricity	0.025%	
LDT1	Plug-in Hybrid	0.012%	
LDT2	Gasoline	27.5%	
LDT2	Diesel	0.10%	
LDT2	Electricity	0.19%	
LDT2	Plug-in Hybrid	0.30%	

Exhaust Emission Rates for Composite Light Duty Vehicles

ROG_RUNEX (gms/mile)	NOX_RUNEX (gms/mile)	PM10_RUNEX (gms/mile)	PM2_5_RUNEX (gms/mile)	CO_RUNEX (gms/mile)	SOX_RUNEX (gms/mile)	CO2_RUNEX (gms/mile)
0.009	0.045	0.001	0.001	0.687	0.003	270.073

Source: EMFAC2021 emission factors (above) and weighted mix of passenger vehicle fleet (also above)

ROG	NOX	PM10	PM2.5	CO	SOX	CO2	Units
0.00002	0.00010	0.000003	0.000002	0.00151	0.00001	0.59541	lbs/mile

	value	unit	source
trips per worker	2	trips/worker	See Note 2
trip length	35	miles/trip	one-way value provided by Stantec
portion of trip on paved surfaces	100%	%	
portion of trip on unpaved surfaces	0%	%	
mass conversion rate	453.59	g/lb	onlineconversion.com/weight_common.htm

Exhaust Emissions per Worker Per Day

ROG	NOx	PM10	PM2.5	CO	SOx	CO2e	units
0.0013	0.0069	0.0002	0.0002	0.1060	0.0004	41.6786	lb/worker-day

Source: Exhaust emissions are based on trip length and the Exhaust Emission Rates for Composite Light Duty Vehicles (above).

Notes

1 It is conservatively assumed that all workers would drive alone and none would make trips during break periods due to the remoteness of the work sites.

2 Daily VMT by workers = # workers * trips per worker * trip length

Source: EMFAC2021 (v1.0.1) Emission Rates
Region Type: County
Region: Santa Clara
Calendar Year: 2025
Season: Annual
Vehicle Classification: EMFAC202x Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HOT

Region	Calendar Y	Vehicle Cat	Model Yea	Speed	Fuel	Population	Total VMT	CVMT	EVMT	Trips	Energy Consu
Santa Clara	2025	LDA	Aggregate	Aggregate	Gasoline	598860.3	22133914.69	22133914.69	0	2780384.029	0
Santa Clara	2025	LDA	Aggregate	Aggregate	Diesel	1620.04	46912.85411	46912.85411	0	6871.193241	0
Santa Clara	2025	LDA	Aggregate	Aggregate	Electricity	61443.19	2670451.983	0	2670451.983	299852.6978	1031014.87
Santa Clara	2025	LDA	Aggregate	Aggregate	Plug-in Hyl	19037.66	825567.7143	401012.9615	424554.7527	78720.73884	128228.189
Santa Clara	2025	LDT1	Aggregate	Aggregate	Gasoline	51680.86	1664705.874	1664705.874	0	230185.983	0
Santa Clara	2025	LDT1	Aggregate	Aggregate	Diesel	21.28272	302.825779	302.825779	0	59.13231308	0
Santa Clara	2025	LDT1	Aggregate	Aggregate	Electricity	234.4578	9323.703781	0	9323.703781	1109.79593	3599.71919
Santa Clara	2025	LDT1	Aggregate	Aggregate	Plug-in Hyl	98.13198	4519.182281	1961.286044	2557.896237	405.7757571	772.560901
Santa Clara	2025	LDT2	Aggregate	Aggregate	Gasoline	290874.7	10447705.78	10447705.78	0	1360240.873	0
Santa Clara	2025	LDT2	Aggregate	Aggregate	Diesel	1049.952	38652.33695	38652.33695	0	4980.340082	0
Santa Clara	2025	LDT2	Aggregate	Aggregate	Electricity	2157.059	73663.77305	0	73663.77305	10962.38395	28440.2962
Santa Clara	2025	LDT2	Aggregate	Aggregate	Plug-in Hyl	2561.885	112327.2154	51267.43918	61059.7762	10593.39505	18441.8723
Santa Clara	2025	T7 CAIRP C	Aggregate	Aggregate	Diesel	1034.487	207547.3052	207547.3052	0	23772.50231	0
Santa Clara	2025	T7 CAIRP C	Aggregate	Aggregate	Electricity	12.40346	2411.505747	0	2411.505747	285.0315405	4403.23123
Santa Clara	2025	T7 CAIRP C	Aggregate	Aggregate	Natural Ga	2.419779	485.0903505	485.0903505	0	55.60652865	0

SOAK and RUNLOSS, g/vehicle/day for IDLEX and DIURN

NOx_RUNE	NOx_IDLEX	NOx_STREX	PM2.5_RU	PM2.5_IDL	PM2.5_STF	PM2.5_PM	PM2.5_PM	PM10_RUN	PM10_IDLI	PM10_STR	PM10_PM	PM10_PM	CO2_RUNE	CO2_IDLEX	CO2_STREX
0.038209	0	0.245539	0.001142	0	0.00188	0.002	0.002655	0.001242	0	0.002044	0.008	0.007587	273.2075	0	69.04168
0.18842	0	0	0.015236	0	0	0.002	0.002712	0.015925	0	0	0.008	0.007748	230.5963	0	0
0	0	0	0	0	0	0.002	0.001534	0	0	0	0.008	0.004382	0	0	0
0.003187	0	0.11551	0.000578	0	0.001985	0.002	0.001382	0.000629	0	0.002159	0.008	0.003948	135.4391	0	65.04608
0.115355	0	0.35972	0.001639	0	0.002543	0.002	0.003241	0.001782	0	0.002766	0.008	0.00926	324.1276	0	84.93844
1.64381	0	0	0.238169	0	0	0.002	0.00372	0.248938	0	0	0.008	0.010628	415.1682	0	0
0	0	0	0	0	0	0.002	0.001537	0	0	0	0.008	0.004392	0	0	0
0.002848	0	0.11551	0.000353	0	0.001365	0.002	0.001394	0.000383	0	0.001485	0.008	0.003982	121.0095	0	70.34635
0.06257	0	0.314364	0.001192	0	0.001919	0.002	0.00313	0.001296	0	0.002087	0.008	0.008944	338.2713	0	86.2638
0.039332	0	0	0.004727	0	0	0.002	0.003123	0.004941	0	0	0.008	0.008921	306.7182	0	0
0	0	0	0	0	0	0.002	0.001527	0	0	0	0.008	0.004362	0	0	0
0.002995	0	0.11551	0.000438	0	0.00161	0.002	0.001388	0.000477	0	0.001751	0.008	0.003967	127.2609	0	77.17666
1.498671	123.4561	2.221126	0.030668	0.042485	0	0.009	0.025996	0.032054	0.044406	0	0.036	0.074273	1521.791	23804.97	0
0	0	0	0	0	0	0.009	0.013225	0	0	0	0.036	0.037786	0	0	0
0.206313	64.47231	0	0.001708	0.216514	0	0.009	0.025982	0.001858	0.235478	0	0.036	0.074235	1131.422	51379.69	0

CH4_RUNE	CH4_IDLEX	CH4_STRE	N2O_RUNI	N2O_IDLE	N2O_STRE	ROG_RUNI	ROG_IDLE	ROG_STRE	ROG_HOTS	ROG_RUNI
0.002117	0	0.067825	0.004408	0	0.032293	0.007947	0	0.306311	0.087189	0.224301
0.001193	0	0	0.036331	0	0	0.025693	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.000432	0	0.042249	0.000569	0	0.020584	0.001378	0	0.173285	0.041164	0.03735
0.005621	0	0.098552	0.008687	0	0.037511	0.02471	0	0.498818	0.156963	0.442299
0.013797	0	0	0.06541	0	0	0.297038	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.000383	0	0.041987	0.000501	0	0.020339	0.001231	0	0.173285	0.023895	0.020384
0.002642	0	0.078494	0.005588	0	0.036037	0.010244	0	0.360071	0.079452	0.214938
0.000603	0	0	0.048324	0	0	0.01298	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.000403	0	0.041992	0.000528	0	0.020344	0.001295	0	0.173285	0.026071	0.023359
0.000583	0.484627	0	0.239759	3.750482	0	0.012554	10.4339	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.929746	158.4146	0	0.230648	10.47409	0	0.013284	2.263432	0	0	0

ROG_DIUR	TOG_RUNI	TOG_IDLE	TOG_STRE	TOG_HOTS	TOG_RUNI	TOG_DIUR	NH3_RUNI	CO_RUNE	CO_IDLEX	CO_STREX	SOx_RUNE	SOx_IDLEX	SOx_STREX
1.384954	0.011596	0	0.335372	0.087189	0.224301	1.384954	0.035611	0.6952	0	3.049452	0.002701	0	0.000683
0	0.02925	0	0	0	0	0	0.0031	0.319914	0	0	0.002185	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.440525	0.002011	0	0.189725	0.041164	0.03735	0.440525	0.019241	0.209016	0	1.339893	0.001339	0	0.000643
2.52236	0.036056	0	0.546143	0.156963	0.442299	2.52236	0.036453	1.317416	0	4.886115	0.003204	0	0.00084
0	0.338158	0	0	0	0	0	0.0031	1.585068	0	0	0.003934	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.276746	0.001797	0	0.189725	0.023895	0.020384	0.276746	0.018228	0.186748	0	1.339893	0.001196	0	0.000695
1.349256	0.014949	0	0.394233	0.079452	0.214938	1.349256	0.03712	0.795621	0	3.47417	0.003344	0	0.000853
0	0.014777	0	0	0	0	0	0.0031	0.129797	0	0	0.002906	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.305362	0.00189	0	0.189725	0.026071	0.023359	0.305362	0.019143	0.196395	0	1.339893	0.001258	0	0.000763
0	0.014292	11.8782	0	0	0	0	0.22	0.053947	153.9743	0	0.01441	0.225419	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.948874	161.6737	0	0	0	0	1.06	3.681431	425.9711	0	0	0	0

Alternative D – Downstream 140 TAF EFD

Emissions Summary Sheet

(Alt D) DS 140TAF EFD - Summary of Total Combined Construction Emissions

	ROG		CO		NOX		PM10 (exhaust)		PM10 (dust) - Mitigated		PM2.5 (exhaust)		PM2.5 (dust) - Mitigated		CO2	CH4	N2O	Total GHG
Construction Year	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	MT/year	MT/year	MT-CO2e/year
2025 (year 1)	1.27	30.64	10.98	264.60	10.40	250.54	0.35	8.50	124.77	3006.49	0.33	7.93	12.57	302.85	5,644	0.839	0.024	5,672.5
2026 (year 2)	9.46	95.59	69.90	559.20	91.31	751.38	2.46	20.26	1017.16	8137.30	2.25	17.98	102.00	815.99	27,668	5.581	0.167	27,857.7
2027 (year 3)	7.58	80.52	55.87	446.97	78.40	648.12	1.93	16.04	843.10	6744.84	1.76	14.08	84.58	676.64	23,609	4.421	0.134	23,759.9
2028 (year 4)	8.79	90.26	64.76	529.77	85.54	708.19	2.18	18.03	886.03	7088.25	2.02	16.14	91.45	731.58	25,814	4.346	0.145	25,965.6
2029 (year 5)	12.71	121.59	83.45	679.27	110.44	907.39	3.08	25.25	885.62	7084.97	2.92	23.36	91.39	731.09	30,131	4.663	0.184	30,302.5
2030 (year 6)	12.75	121.92	84.91	690.94	110.43	907.28	3.08	25.25	886.03	7088.25	2.92	23.35	91.45	731.58	30,707	4.653	0.184	30,877.9
2031 (year 7)	8.08	89.79	58.00	518.13	80.65	727.48	2.00	18.04	849.18	7680.34	1.84	16.07	86.46	790.78	23,843	4.259	0.136	23,989.8
2032 (year 8)	4.08	55.82	34.15	467.83	49.60	679.44	1.17	15.98	307.16	4207.74	1.08	14.81	30.92	423.50	15,732	2.754	0.084	15,826.2

Summary of Off-Road Fugitive Dust Emissions (lbs/day)

		PM 10 Fugitive Dust (lbs/day)		PM 10 Fugitive Dust (tons/year)		PM2.5 Fugitive Dust (lbs/day)		PM2.5 Fugitive Dust (tons/year)	
Year	Days/Year	Raw Total	With BMPs	Raw Total	With BMPs	Raw Total	With BMPs	Raw Total	With BMPs
Year 1	83	5,925	2,963	246	123	593	296	24.6	12.3
Year 2	250	16,184	8,092	2,023	1,012	1,618	809	202.3	101.2
Year 3	250	13,403	6,702	1,675	838	1,340	670	167.5	83.8
Year 4	250	12,920	6,460	1,615	807	1,292	646	161.5	80.7
Year 5	250	12,920	6,460	1,615	807	1,292	646	161.5	80.7
Year 6	250	12,920	6,460	1,615	807	1,292	646	161.5	80.7
Year 7	229	14,105	7,052	1,615	807	1,410	705	161.5	80.7
Year 8	146	8,306	4,153	606	303	831	415	60.6	30.3

*Includes materials movement, pile storage, and construction activity (grading and earthmoving)

2000 lb/ton

Summary of Batch Plant Emissions

	Alt D: DS 140 TAF EFD											
Construction Year	months (A)	days/year (A)	months (B)	days/year (B)	days overlap A+B	PM10 (lbs/day)	PM10-Max (lbs/day)	PM10 tons/year	PM-10 Max tons/year	PM2.5 (lbs/day)	PM2.5-Max (lbs/day)	PM2.5 tons/yr	PM2.5-Max (tons/yr)
1													
2													
3													
4			Jan-Dec	250		290.6	581.2	36.3	72.7	39.3	78.5	4.9	9.8
5			Jan-Dec	250		290.6	581.2	36.3	72.7	39.3	78.5	4.9	9.8
6			Jan-Dec	250		290.6	581.2	36.3	72.7	39.3	78.5	4.9	9.8
7			Jan-Jun	125		290.6	581.2	18.2	36.3	39.3	78.5	2.5	4.9
8													

Summary of Off-road Construction Equipment Emissions

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG
Construction Year	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT-CO2e/year
2025 (year 1)	1.22	29.46	8.52	205.20	7.95	191.49	0.30	7.22	0.28	6.71	2,681	64,607	0.84	20.22	0.02	0.58	2,709
2026 (year 2)	8.30	66.38	56.68	453.47	84.85	678.83	2.31	18.44	2.13	17.06	18,776	150,209	5.58	44.65	0.17	1.34	18,965
2027 (year 3)	6.42	51.33	42.58	340.63	71.94	575.54	1.77	14.16	1.64	13.10	15,057	120,452	4.40	35.17	0.13	1.07	15,206
2028 (year 4)	7.61	60.89	49.66	397.30	79.28	634.26	2.03	16.25	1.91	15.25	16,600	132,798	4.35	34.77	0.15	1.16	16,752
2029 (year 5)	11.55	92.39	70.05	560.39	104.29	834.34	2.94	23.49	2.81	22.49	21,523	172,188	4.66	37.30	0.18	1.47	21,695
2030 (year 6)	11.54	92.31	69.79	558.36	104.15	833.21	2.93	23.46	2.81	22.46	21,489	171,915	4.65	37.21	0.18	1.47	21,660
2031 (year 7)	6.92	60.44	44.31	386.98	74.84	653.60	1.86	16.26	1.74	15.18	15,453	134,962	4.26	37.20	0.14	1.19	15,600
2032 (year 8)	3.94	53.96	25.55	349.96	45.50	623.23	1.08	14.73	0.99	13.63	9,439	129,299	2.75	37.73	0.08	1.15	9,533

Summary of Off-road Vegetative Clearing Equipment Emissions

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG
Construction Year	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT-CO2e/year
2027 (year 3)	0.00368	0.02941	0.38980	3.11839	0.36540	2.92319	0.01580	0.12641	0.01476	0.11810	83.1	665.1	0.02497	0.19979	0.00074	0.00596	84.0
2030 (year 6)	0.03004	0.24036	0.01313	0.10502	0.01730	0.13844	0.00047	0.00374	0.00043	0.00347	3.4	27.0	0.00107	0.00856	0.00003	0.00024	3.4

Summary of On-road Emissions (Exhaust and Dust)

Truck Hauling (Dust)

			Alt D: DS 140 TAF EFD			
Construction Year	Days/year	Total Daily VMT	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)
1	83	16,970	30.22	1.25	4.53	0.19
2	250	11,293	20.11	2.51	3.02	0.38
3	250	10,452	18.61	2.33	2.79	0.35
4	250	10,452	18.61	2.33	2.79	0.35
5	250	10,452	18.61	2.33	2.79	0.35
6	250	10,452	18.61	2.33	2.79	0.35
7	229	10,462	18.63	2.13	2.79	0.32
8	146	14,923	26.57	1.94	3.99	0.29

Truck Hauling (Exhaust)

	Alt D: DS 140 TAF EFD													
Construction Year	Total Daily VMT	ROG (lbs/day)	ROG (tons/yr)	NOX (lbs/day)	NOX (tons/yr)	PM10 (lbs/day)	PM10 (tons/yr)	PM2.5 (lbs/day)	PM2.5 (tons/yr)	CO (lbs/day)	CO (tons/yr)	CO2 (lbs/day)	CO2 (MT/yr)
1	16,970	0.46	0.019	55.32	2.296	1.18	0.049	1.13	0.047	2.31	0.096	56,249	2,118
2	11,293	0.31	0.039	36.81	4.601	0.79	0.098	0.75	0.094	1.54	0.192	37,431	4,245
3	10,452	0.29	0.036	34.07	4.258	0.73	0.091	0.70	0.087	1.42	0.178	34,642	3,928
4	10,452	0.29	0.036	34.07	4.258	0.73	0.091	0.70	0.087	1.42	0.178	34,642	3,928
5	10,452	0.29	0.036	34.07	4.258	0.73	0.091	0.70	0.087	1.42	0.178	34,642	3,928
6	10,452	0.29	0.036	34.07	4.258	0.73	0.091	0.70	0.087	1.42	0.178	34,642	3,928
7	10,462	0.29	0.033	34.10	3.905	0.73	0.084	0.70	0.080	1.42	0.163	34,677	3,602
8	14,923	0.41	0.030	48.64	3.551	1.04	0.076	1.00	0.073	2.03	0.148	49,463	3,276

Worker Commute Trips (Dust)

					Alt D: DS 140 TAF EFD			
Construction Year	Days/year	# Avg Workers/day	Average Trip Length	Daily VMT (miles)	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)
1	83	539	35	37,718	13.8	0.57	2.1	0.09
2	250	983	35	68,833	25.1	3.14	3.8	0.47
3	250	961	35	67,258	24.6	3.07	3.7	0.46
4	250	1118	35	78,283	28.6	3.57	4.3	0.54
5	250	990	35	69,300	25.3	3.16	3.8	0.47
6	250	1118	35	78,283	28.6	3.57	4.3	0.54
7	229	1106	35	77,408	28.3	3.24	4.2	0.49
8	146	1093	35	76,533	27.9	2.04	4.2	0.31

Worker Commute Trips (Exhaust)

Construction Year	# Avg Workers/day	Daily VMT (miles)	ROG (lbs/day)	ROG (tons/year)	NOx (lbs/day)	NOx (tons/year)	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)	CO (lbs/day)	CO (tons/year)	CO2 (lbs/day)	CO2 (MT/yr)
1	539	37,718	0.715	0.030	3.729	0.155	0.100	0.004	0.092	0.004	57.091	2.369	22,457	845
2	983	68,833	1.305	0.163	6.805	0.851	0.182	0.023	0.167	0.021	104.188	13.024	40,984	4,648
3	961	67,258	1.276	0.159	6.649	0.831	0.178	0.022	0.164	0.020	101.804	12.726	40,046	4,541
4	1118	78,283	1.485	0.186	7.739	0.967	0.207	0.026	0.190	0.024	118.492	14.812	46,611	5,286
5	990	69,300	1.314	0.164	6.851	0.856	0.183	0.023	0.169	0.021	104.895	13.112	41,262	4,679
6	1118	78,283	1.485	0.186	7.739	0.967	0.207	0.026	0.190	0.024	118.492	14.812	46,611	5,286
7	1106	77,408	1.468	0.168	7.653	0.876	0.205	0.023	0.188	0.022	117.168	13.416	46,090	4,787
8	1093	76,533	1.452	0.106	7.566	0.552	0.202	0.015	0.186	0.014	115.843	8.457	45,569	3,018

Haul Trucks plus 50% Worker Commute Trips (Exhaust)

Construction Year	Daily VMT (miles)	ROG (lbs/day)	ROG (tons/year)	NOx (lbs/day)	NOx (tons/year)	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)	CO (lbs/day)	CO (tons/year)	CO2 (lbs/day)	CO2 (MT/year)
1	35,829	0.822	0.221	57.180	15.405	1.233	0.332	1.178	0.317	30.853	8.312	67,477	16,492
2	45,710	0.962	0.473	40.213	19.771	0.878	0.432	0.837	0.411	53.630	26.368	57,923	25,836
3	44,081	0.924	0.444	37.393	17.964	0.817	0.393	0.779	0.374	52.324	25.137	54,666	23,825
4	49,593	1.028	0.575	37.938	21.213	0.832	0.465	0.792	0.443	60.668	33.923	57,948	29,395
5	45,102	0.943	0.467	37.494	18.559	0.820	0.406	0.781	0.387	53.869	26.665	55,273	24,821
6	49,593	1.028	0.575	37.938	21.213	0.832	0.465	0.792	0.443	60.668	33.923	57,948	29,395
7	49,166	1.020	0.564	37.929	20.971	0.832	0.460	0.792	0.438	60.007	33.179	57,722	28,954
8	53,190	1.134	0.620	52.426	28.660	1.141	0.624	1.088	0.595	59.951	32.773	72,248	35,830

2204.6 lb/MT

Haul Trucks plus 50% Worker Commute Trips (Dust)

		Alt D: DS 140 TAF EFD			
Construction Year	Total Daily VMT	PM10 (lbs/day)	PM10 (tons/year)	PM2.5 (lbs/day)	PM2.5 (tons/year)
1	35,829	37.10	1.54	5.56	0.23
2	45,710	32.67	4.08	4.90	0.61
3	44,081	30.89	3.86	4.63	0.58
4	49,593	32.90	4.11	4.93	0.62
5	45,102	31.26	3.91	4.69	0.59
6	49,593	32.90	4.11	4.93	0.62
7	49,166	32.76	3.75	4.91	0.56
8	53,190	40.54	2.96	6.08	0.444

Summary of Helicopter Emissions

Total Days Helicopter Used per Year	70	5 hrs/day
Total Hours Helicopter Used per Year	348	

Emissions	HC	ROG (5)	NOX	(use as PM10) PM Non-Volatile		
LTO EF (g/LTO)*	667	844.7	285	9.0		
Cruising EF (g/hour)*	1310	1659.0	2340	68		
Max Emissions (lbs/day)	21.8	27.6	28.9	0.849	lb/day	July 15-Dec 1 (years 2-7)
Annual Emissions (tons/yea	0.76	0.96	1.01	0.030	ton/year	July 15-Dec 1 (years 2-7)

* Assume AS 365 N3 Dauphin with Arriel 2C

Summary of Blasting Emissions

Blasting	Alt D: DS 140 TAF EFD									
Year	Blasts/Day	Blasts/Year	tons/blast	lb-CO/day	lb-CO/yr	lb-NOx/day	lb-NOx/yr	lb-SO2/day	lb-SO2/yr	CH4
1	0	0	0	0	0	0	0	0	0	
2	1	14	0.1875	12.5625	175.875	3.1875	44.625	0.375	5.25	NA
3	1	20	0.1875	12.5625	251.25	3.1875	63.75	0.375	7.5	NA
4	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
5	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
6	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
7	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
8	1	6	0.1875	12.5625	75.375	3.1875	19.125	0.375	2.25	NA

Exhaust Emissions

Off-road Diesel Construction Equipment
On-road Haul Truck Trips
On-road Worker Trips
Vegetative Clearing Equipment

Off-Road Equipment Emissions - PREP Alternative D (DS 140 TAF EFD)
Dixon Landing
Alt 3 PREP
Earthfill Dam

Mass Conversion Rates LHV Source
1 kWh 3.6 MJ google.com
1 hp-hr 2545 Btu/hr google.com
2204.62 lb/MT google.com

Summary of Equipment Hours Projections

| Code | Equipment Classification & Description / Description | Equip Hours | reference | hp | load factor | Cumulative ROG g/hp-hr | Cumulative CO g/hp-hr | Cumulative NOx g/hp-hr | Cumulative PM10 g/hp-hr | Cumulative PM2.5 g/hp-hr | Cumulative CO2 g/hp-hr | Cumulative CH4 g/hp-hr | Cumulative N2O g/hp-hr | Year 1 (17 months) ROG tons/year | CO tons/year | NOx tons/year | PM10 tons/year | PM2.5 tons/year | CO2 MTons/year | CH4 MTons/year | N2O MTons/year | Year 2 (12 months) ROG tons/year | CO tons/year | NOx tons/year | PM10 tons/year | PM2.5 tons/year | CO2 MTons/year | CH4 MTons/year | N2O MTons/year | 3 (12 months) ROG tons/year | CO tons/year | NOx tons/year | PM10 tons/year | PM2.5 tons/year | CO2 MTons/year | CH4 MTons/year | N2O MTons/year | 4 (12 months) ROG tons/year | CO tons/year | NOx tons/year | PM10 tons/year | PM2.5 tons/year | CO2 MTons/year | CH4 MTons/year | N2O MTons/year | 5 (12 months) ROG tons/year | CO tons/year | NOx tons/year | PM10 tons/year | PM2.5 tons/year | CO2 MTons/year | CH4 MTons/year | N2O MTons/year | 6 (12 months) ROG tons/year | CO tons/year | NOx tons/year | PM10 tons/year | PM2.5 tons/year | CO2 MTons/year | CH4 MTons/year | N2O MTons/year | 7 (12 months) ROG tons/year | CO tons/year | NOx tons/year | PM10 tons/year | PM2.5 tons/year | CO2 MTons/year | CH4 MTons/year | N2O MTons/year | 8 (8 months) ROG tons/year | CO tons/year | NOx tons/year | PM10 tons/year | PM2.5 tons/year | CO2 MTons/year | CH4 MTons/year | N2O MTons/year |
|---|---|---

Alternative D: Off-Road Equipment Annual & Daily Emissions Summary

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG		
	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT-CO2e/yr	Months/Year	Days/Year
2025 (year 1)	1.22	29.46	8.52	205.20	7.95	191.49	0.30	7.22	0.28	6.71	2681.18	64606.65	0.84	20.22	0.02	0.58	2,709.3	4	83
2026 (year 2)	8.30	66.38	56.68	453.47	84.85	678.83	2.31	18.44	2.13	17.06	18,776.13	150209.07	5.58	44.65	0.17	1.34	18,965.5	12	250
2027 (year 3)	6.42	51.33	42.58	340.63	71.94	575.54	1.77	14.16	1.64	13.10	15,056.53	120452.28	4.40	35.17	0.13	1.07	15,206.3	12	250
2028 (year 4)	7.61	60.89	49.66	397.30	79.28	634.26	2.03	16.25	1.91	15.25	16,599.70	132797.57	4.35	34.77	0.15	1.16	16,751.6	12	250
2029 (year 5)	11.55	92.39	70.05	560.39	104.29	834.34	2.94	23.49	2.81	22.49	21,523.46	172187.71	4.66	37.30	0.18	1.47	21,695.0	12	250
2030 (year 6)	11.54	92.31	69.79	558.36	104.15	833.21	2.93	23.46	2.81	22.46	21,489.35	171914.79	4.65	37.21	0.18	1.47	21,660.5	12	250
2031 (year 7)	6.92	60.44	44.31	386.98	74.84	653.60	1.86	16.26	1.74	15.18	15,453.20	134962.43	4.26	37.20	0.14	1.19	15,600.3	11	229
2032 (year 8)	3.94	53.96	25.55	349.96	45.50	623.23	1.08	14.73	0.99	13.63	9,438.81	129298.80	2.75	37.73	0.08	1.15	9,532.6	7	146
																		6.8	

		Unit	Source
Mass Conversion Rates	453.59	g/lb	google.com
	2000	lb/ton	google.com
	25	ton-CO2e/	GWP CH4
	298	ton-CO2e/	GWP N2O

On-Road Emissions

Truck Hauling (Exhaust)

Exhaust emission rates shown on "Haul Truck Exhaust Em. Rts." worksheet

	Alt D: DS 140 TAF EFD						
Construction Year	Total Daily VMT	ROG (lbs/day)	NOX (lbs/day	PM10 (lbs/day)	PM2.5 (lbs/day	CO (lbs/day)	CO2 (lbs/day)
1	16,970	0.46	55.32	1.18	1.13	2.31	56,249
2	11,293	0.31	36.81	0.79	0.75	1.54	37,431
3	10,452	0.29	34.07	0.73	0.70	1.42	34,642
4	10,452	0.29	34.07	0.73	0.70	1.42	34,642
5	10,452	0.29	34.07	0.73	0.70	1.42	34,642
6	10,452	0.29	34.07	0.73	0.70	1.42	34,642
7	10,462	0.29	34.10	0.73	0.70	1.42	34,677
8	14,923	0.41	48.64	1.04	1.00	2.03	49,463

On-Road Emissions

Worker Commute Trips (Exhaust)

Exhaust emission rates shown on "Worker Trip Exhaust Em. Rts." worksheet

Alt D: DS 140 TAF EFD

Construction Year	# Avg Workers/ day	Daily VMT (miles)	ROG (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO (lbs/day)	CO2 (lbs/day)
1	539	37,718	0.715	3.729	0.100	0.092	57.091	22,457
2	983	68,833	1.305	6.805	0.182	0.167	104.188	40,984
3	961	67,258	1.276	6.649	0.178	0.164	101.804	40,046
4	1118	78,283	1.485	7.739	0.207	0.190	118.492	46,611
5	990	69,300	1.314	6.851	0.183	0.169	104.895	41,262
6	1118	78,283	1.485	7.739	0.207	0.190	118.492	46,611
7	1106	77,408	1.468	7.653	0.205	0.188	117.168	46,090
8	1093	76,533	1.452	7.566	0.202	0.186	115.843	45,569

Notes

1 Daily Truck Hauling trips based on total material import/export required

2 Average trip length obtained from Stantec

3 Daily VMT by workers = # workers * trips per worker * trip length

Off-Road Vegetative Clearing Equipment Emissions

		Unit	Source
Mass Conversion Rates	453.59	g/lb	google.com
	2000	lb/ton	google.com
	2204.62	lb/MT	google.com

												Year 3	Alternative D- DS 140 TAF EFD							
Equipment Classification & Description		hp	load	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O	Equip	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O
Code	Description		factor	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	Hours	ton/year	ton/year	ton/year	ton/year	ton/year	MT/year	MT/year	MT/year
	6000 Gal Water Truck	260	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004274	194	0.0037	0.0250	0.0225	0.0008	0.0007	9.1039	0.0029	0.0001
	Chainsaws 25 Hsp	25	0.73	0.685	2.339	4.332	0.161	0.161	568.299	0.061	0.004751	852	0.0117	0.0401	0.0742	0.0028	0.0028	8.8365	0.0009	0.0001
	Medium Feller/Buncher 175 Hsp	175	0.4	0.2347	3.13647	2.16742	0.1121	0.1031	469.843	0.152	0.004274	194	0.0035	0.0470	0.0324	0.0017	0.0015	6.3805	0.0021	0.0001
	Large Feller/Buncher 300 Hsp	300	0.4	0.1684	1.3582	1.55241	0.0594	0.0547	476.2959	0.154	0.004274	194	0.0043	0.0349	0.0398	0.0015	0.0014	11.0882	0.0036	0.0001
	Medium Skidder 175 Hsp	175	0.37	0.1869	2.92602	1.9987	0.0942	0.0867	471.0403	0.1523	0.004274	194	0.0026	0.0405	0.0277	0.0013	0.0012	5.9170	0.0019	0.0001
	Large Skidder 175 Hsp	175	0.37	0.1869	2.92602	1.9987	0.0942	0.0867	471.0403	0.1523	0.004274	194	0.0026	0.0405	0.0277	0.0013	0.0012	5.9170	0.0019	0.0001
	Loader Rubber Tired 300 Hsp	300	0.36	0.1931	1.2763	1.43264	0.0525	0.0483	469.1434	0.1517	0.004274	194	0.0045	0.0295	0.0331	0.0012	0.0011	9.8295	0.0032	0.0001
	Masticator on Excavator 175 Hsp	175	0.38	0.1578	3.078	1.15367	0.0566	0.052	472.4964	0.1528	0.004274	194	0.0022	0.0438	0.0164	0.0008	0.0007	6.0957	0.0020	0.0001
	Whole Tree Chipper 300 Hsp	300	0.42	0.1684	1.3582	1.55241	0.0594	0.0547	476.2959	0.154	0.004274	250	0.0058	0.0472	0.0539	0.0021	0.0019	15.0034	0.0049	0.0001
	Large Diameter Chipper/Shredder 100 Hsp	100	0.42	0.3413	3.58397	3.25221	0.2029	0.1867	472.7482	0.1529	0.004274	250	0.0040	0.0415	0.0376	0.0023	0.0022	4.9639	0.0016	0.0000

These equipment types/ratings consistent with CalFire VTP PEIR, Appendix AQ-1 Treatment Activity Emissions Prepared by Ascent

				Emission Factors								Year 6	Alternative D- DS 140 TAF EFD							
Equipment Classification & Description		hp	load	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O	Equip	ROG	CO	NOX	PM10	PM2.5	CO2	CH4	N2O
Code	Description		factor	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	g/hp/hr	Hours	ton/year	ton/year	ton/year	ton/year	ton/year	MT/year	MT/year	MT/year
	67 Ton Off Hwy Truck 870 Hsp (Cat 777)	870	0.38	0.19	1.15	3.14	0.06	0.05	473.37	0.15	0.00	10	0.0007	0.0042	0.0114	0.0002	0.0002	1.5650	0.0005	0.0000
	6000 Gal Water Truck	260	0.38	0.1773	1.18233	1.06379	0.038	0.035	474.9697	0.1536	0.004274	10	0.0002	0.0013	0.0012	0.0000	0.0000	0.4693	0.0002	0.0000
	Chainsaws 25 Hsp	25	0.73	0.685	2.339	4.332	0.161	0.161	568.299	0.061	0.004751	10	0.0001	0.0005	0.0009	0.0000	0.0000	0.1037	0.0000	0.0000
	Rotary Mower 25 Hsp	25	0.42	0.7571	4.87388	4.30575	0.2678	0.2464	528.9535	0.1711	0.004751	10	0.0001	0.0006	0.0005	0.0000	0.0000	0.0555	0.0000	0.0000
	Small Diameter Chipper 25 Hsp	25	0.42	0.7571	4.87388	4.30575	0.2678	0.2464	528.9535	0.1711	0.004751	10	0.0001	0.0006	0.0005	0.0000	0.0000	0.0555	0.0000	0.0000
	Tractor/Loader/Backhoe 25 Hsp	25	0.37	0.55	4.55974	3.66186	0.145	0.1334	513.8025	0.1662	0.004751	10	0.0001	0.0005	0.0004	0.0000	0.0000	0.0475	0.0000	0.0000
	Tractor/Loader/Backhoe 175 Hsp	175	0.37	0.1619	3.08323	1.18039	0.0585	0.0538	469.3289	0.1518	0.004274	10	0.0001	0.0022	0.0008	0.0000	0.0000	0.3039	0.0001	0.0000
	Masticator on Excavator 175 Hsp	175	0.38	0.1578	3.078	1.15367	0.0566	0.052	472.4964	0.1528	0.004274	10	0.0001	0.0023	0.0008	0.0000	0.0000	0.3142	0.0001	0.0000
	Flail/Mulcher on Excavator 260 Hsp	260	0.38	0.1152	1.05072	0.72641	0.0257	0.0236	470.2915	0.1521	0.004274	10	0.0001	0.0011	0.0008	0.0000	0.0000	0.4646	0.0002	0.0000

Off-Road Vegetative Clearing Equipment Emissions

	ROG		CO		NOX		PM10		PM2.5		CO2		CH4		N2O		Total GHG		
	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	tons/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT/year	lb/day	MT-CO2e/yr	Months/Year	Days/Year
Proposed Proj US 140 TAF HFD																			
2027 (year 3)	0.03750	0.30004	0.320	2.56	0.302	2.42	0.01314	0.10512	0.01225	0.09798	71.091	568.73	0.022	0.17	0.00064	0.00510	71.8	12	250
2030 (year 6)	0.00640	0.05122	0.053	0.42	0.069	0.55	0.00187	0.01498	0.00173	0.01386	13.517	108.14	0.00428	0.03426	0.00012	0.00098	13.7	12	250
Alt A (US 140 TAF EFD)																			
2027 (year 3)	0.06436	0.51486	0.588	4.70	0.534	4.27	0.02332	0.18656	0.02169	0.17355	125.300	1002.40	0.039	0.31	0.00113	0.00900	126.6	12	250
2030 (year 6)	0.00160	0.01281	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250
Alt B (US 96 TAF EFD)																			
2027 (year 3)	0.04909	0.39273	0.448	3.59	0.409	3.28	0.01799	0.14394	0.01673	0.13382	95.790	766.32	0.030	0.24	0.00086	0.00688	96.8	12	250
2030 (year 6)	0.00160	0.01281	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250
Alt C (DS 140 TAF HFD)																			
2027 (year 3)	0.00544	0.04351	0.258	2.07	0.236	1.89	0.01036	0.08287	0.00963	0.07705	55.182	441.45	0.017	0.14	0.00050	0.00396	55.8	12	250
2030 (year 6)	0.05856	0.46852	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250
Alt D (DS 140 TAF EFD)																			
2027 (year 3)	0.00368	0.02941	0.390	3.12	0.365	2.92	0.01580	0.12641	0.01476	0.11810	83.135	665.08	0.025	0.20	0.00074	0.00596	84.0	12	250
2030 (year 6)	0.03004	0.24036	0.013	0.11	0.017	0.14	0.00047	0.00374	0.00043	0.00347	3.379	27.03	0.00107	0.00856	0.00003	0.00024	3.4	12	250

		Unit	Source
Mass Conversion Rates	453.59	g/lb	google.com
	2000	lb/ton	google.com
	25	ton-CO2e/	GWP CH4
	298	ton-CO2e/	GWP N2O

Fugitive Dust Emissions

Material Piles and Earthmoving
On-road Haul Truck Trips
On-road Worker Trips

Off-Road Fugitive Dust Emissions

1. Earthwork

Off-Road Fugitive Dust Emissions

Off-Road Fugitive Dust Emissions

Construction Year	Proposed: US 140 TAF HFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	377,764	604,421.93	446,130	713,808.77	1,318,230.70	15,882.30	**5,228.73**
Year 2	1,511,055	2,417,687.71	1,784,522	2,855,235.09	5,272,922.81	21,091.69	**6,943.76**
Year 3	1,636,564	2,618,501.93	1,495,130	2,392,208.77	5,010,710.70	20,042.84	**6,598.46**
Year 4	834,894	1,335,830.00	1,407,790	2,252,463.61	3,588,293.61	14,353.17	**4,725.32**
Year 5	557,094	891,350.00	1,176,290	1,882,063.61	2,773,413.61	11,093.65	**3,652.23**
Year 6	557,094	891,350.00	1,176,290	1,882,063.61	2,773,413.61	11,093.65	**3,652.23**
Year 7	557,094	891,350.00	1,176,290	1,882,063.61	2,773,413.61	11,093.65	**3,652.23**
Year 8							

Construction Year	Alt A: US 140 TAF EFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	422,369	675,791.02	531,099	849,757.90	1,525,548.92	18,380.11	**6,051.06**
Year 2	3,386,987	5,419,178.63	5,072,077	8,115,322.51	13,534,501.14	54,138.00	**17,823.19**
Year 3	889,091	1,422,545.45	1,481,818	2,370,909.09	3,793,454.55	15,173.82	**4,995.49**
Year 4	3,781,935	6,051,095.44	2,623,751	4,198,002.05	10,249,097.49	40,996.39	**13,496.74**
Year 5	3,781,935	6,051,095.44	2,623,751	4,198,002.05	10,249,097.49	40,996.39	**13,496.74**
Year 6	3,781,935	6,051,095.44	2,623,751	4,198,002.05	10,249,097.49	40,996.39	**13,496.74**
Year 7	1,890,967	3,025,547.72	1,311,876	2,099,001.02	5,124,548.75	20,498.19	**6,748.37**
Year 8							

Construction Year	Alt B: US 96 TAF EFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	521,166	833,865.69	676,584	1,082,534.76	1,916,400.45	23,089.16	**7,601.36**
Year 2	3,238,088	5,180,957.08	4,939,253	7,902,804.28	13,083,761.36	52,335.05	**17,229.62**
Year 3	438,000	700,800.00	730,000	1,168,000.00	1,868,800.00	7,475.20	**2,460.97**
Year 4	3,554,122	5,686,595.81	2,270,263	3,632,420.13	9,319,015.94	37,276.06	**12,271.94**
Year 5	3,554,122	5,686,595.81	2,270,263	3,632,420.13	9,319,015.94	37,276.06	**12,271.94**
Year 6	3,554,122	5,686,595.81	2,270,263	3,632,420.13	9,319,015.94	37,276.06	**12,271.94**
Year 7							
Year 8							

Construction Year	Alt C: DS 140 TAF HFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)[1]	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	425,518	680,828.34	943,793	1,510,068.54	2,190,896.88	26,396.35	**8,690.14**
Year 2	1,276,553	2,042,485.02	2,831,379	4,530,205.62	6,572,690.64	26,290.76	**8,655.38**
Year 3	1,256,890	2,011,024.00	1,041,500	1,666,400.00	3,677,424.00	14,709.70	**4,842.69**
Year 4	1,511,931	2,419,090.29	1,823,784	2,918,053.77	5,337,144.06	21,348.58	**7,028.33**
Year 5	567,506	908,009.14	1,248,202	1,997,123.93	2,905,133.08	11,620.53	**3,825.68**
Year 6	567,506	908,009.14	1,248,202	1,997,123.93	2,905,133.08	11,620.53	**3,825.68**
Year 7	567,506	908,009.14	1,248,202	1,997,123.93	2,905,133.08	11,620.53	**3,825.68**
Year 8	412,731	660,370.29	907,784	1,452,453.77	2,112,824.06	8,451.30	**2,782.32**

Construction Year	Alt D: DS 140 TAF EFD Imported Fill (CY)	Imported Fill (tons)	Cut Excavation (CY)	Excavation (tons)	Activity Total (tons)[1]	Material (tons/day)	PM10 (lbs/day)[1]
Year 1	315,478	504,764.38	615,377	984,603.72	1,489,368.10	17,944.19	**5,907.55**
Year 2	2,727,494	4,363,990.86	4,941,870	7,906,992.65	12,270,983.51	49,083.93	**16,159.30**
Year 3	2,395,394	3,832,631.05	3,956,016	6,329,625.94	10,162,256.99	40,649.03	**13,382.38**
Year 4	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	39,180.01	**12,898.75**
Year 5	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	39,180.01	**12,898.75**
Year 6	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	39,180.01	**12,898.75**
Year 7	3,787,216	6,059,545.60	2,334,660	3,735,456.57	9,795,002.17	42,772.94	**14,081.61**
Year 8	1,420,206	2,272,329.60	875,498	1,400,796.21	3,673,125.81	25,158.40	**8,282.59**

Conversion Rates
2000 lbs/ton
1.6 ton/cy

Source
google.com
calculatorsoup.com

Notes
1. Calulation using emission factor for PM10 shown on "Fugitive Dust Emission Factors" worksheet.
2. Emission estimates for fugitive dust from material movement were based on the material totals for all material import and waste exported. These are the activities that would result in on-site fugitive dust emissions.
Values of 0.0 indicate that no material import/export would be required for that particular construction year.

2. Construction Activity (grading and earthmoving)

		Proposed: US 140 TAF HFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)	Alt A: US 140 TAF EFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)
Year 1	231 Hsp Dozer (Cat D-7H)	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00
	Motor Grader (CAT 140G)	1478	17.8	8.46	1332	16.0	7.62
	Dozer (CAT D8)	529	6.4	3.03	529	6.4	3.03
	Dozer (CAT D6)	344	4.1	1.97	344	4.1	1.97
	140 Hp Bulldozer	0	0.0	0.00	0	0.0	0.00
Total				**13.45**			**12.62**
Year 2	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	1478	5.9	2.81	1332	5.3	2.53
	Dozer (CAT D8)	529	2.1	1.01	529	2.1	1.01
	Dozer (CAT D6)	344	1.4	0.65	344	1.4	0.65
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**15.13**			**25.54**
Year 3	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.66**			**21.35**
Year 4	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.66**			**21.35**
Year 5	231 Hsp Dozer (Cat D-7H)	4411	17.6	8.38	851	3.4	1.62
	520 Hsp Dozer with Disc (Cat D-10N)	1163	4.7	2.21	7739	31.0	14.70
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2611	10.4	4.96
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.66**			**21.35**
Year 6	231 Hsp Dozer (Cat D-7H)	4161	16.6	7.91	791	3.2	1.50
	520 Hsp Dozer with Disc (Cat D-10N)	1113	4.5	2.11	7239	29.0	13.75
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2461	9.8	4.68
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.09**			**20.00**
Year 7	231 Hsp Dozer (Cat D-7H)	4161	16.6	7.91	791	3.2	1.50
	520 Hsp Dozer with Disc (Cat D-10N)	1113	4.5	2.11	7239	29.0	13.75
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	2461	9.8	4.68
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07
Total				**10.09**			**20.00**
Year 8	231 Hsp Dozer (Cat D-7H)	500	6.0	2.86	120	5.7	2.71
	520 Hsp Dozer with Disc (Cat D-10N)	100	1.2	0.57	1000	47.6	22.62
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	300	14.3	6.79
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	0	0.0	0.00	0	0.0	0.00
Total				**3.43**			**32.12**

		Alt B: US 96 TAF EFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)	Alt C: DS 140 TAF HFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)	Alt D: DS 140 TAF EFD Equipment Hours Total Hours	Daily Hours (avg)	Dust Emissions PM10 (lbs/day)
Year 1	231 Hsp Dozer (Cat D-7H)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	520 Hsp Dozer with Disc (Cat D-10N)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Motor Grader (CAT 140G)	1177	14.2	6.74	1176	14.2	6.73	1784	21.5	10.21
	Dozer (CAT D8)	562	6.8	3.22	585	7.0	3.35	794	9.6	4.55
	Dozer (CAT D6)	316	3.8	1.81	282	3.4	1.61	473	5.7	2.71
	140 Hp Bulldozer	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Total				**11.76**			**11.69**			**17.46**
Year 2	231 Hsp Dozer (Cat D-7H)	724	2.9	1.38	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	6286	25.1	11.94	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2013	8.1	3.82	1328	5.3	2.52	2815	11.3	5.35
	Motor Grader (CAT 140G)	1177	4.7	2.24	1176	4.7	2.23	1190	4.8	2.26
	Dozer (CAT D8)	562	2.2	1.07	585	2.3	1.11	530	2.1	1.01
	Dozer (CAT D6)	316	1.3	0.60	282	1.1	0.54	315	1.3	0.60
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**21.12**			**17.95**			**24.84**
Year 3	231 Hsp Dozer (Cat D-7H)	724	2.9	1.38	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1328	5.3	2.52	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**19.83**			**14.07**			**20.97**
Year 4	231 Hsp Dozer (Cat D-7H)	824	3.3	1.57	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1328	5.3	2.52	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**20.01**			**14.07**			**20.97**
Year 5	231 Hsp Dozer (Cat D-7H)	824	3.3	1.57	833	3.3	1.58	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1228	4.9	2.33	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**20.01**			**13.88**			**20.97**
Year 6	231 Hsp Dozer (Cat D-7H)	824	3.3	1.57	813	3.3	1.54	1333	5.3	2.53
	520 Hsp Dozer with Disc (Cat D-10N)	7286	29.1	13.84	5206	20.8	9.89	6855	27.4	13.02
	520 Hsp Dozer with Disc (Cat D-10N)	2388	9.6	4.54	1178	4.7	2.24	2815	11.3	5.35
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.1	0.07	37	0.1	0.07	37	0.1	0.07
Total				**20.01**			**13.74**			**20.97**
Year 7	231 Hsp Dozer (Cat D-7H)	424	4.1	1.94	733	2.9	1.39	1333	5.8	2.77
	520 Hsp Dozer with Disc (Cat D-10N)	2286	22.0	10.44	3206	12.8	6.09	6855	29.9	14.22
	520 Hsp Dozer with Disc (Cat D-10N)	514	4.9	2.35	1178	4.7	2.24	2815	12.3	5.84
	Motor Grader (CAT 140G)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer	37	0.4	0.17	37	0.1	0.07	37	0.2	0.08
Total				**14.89**			**9.79**			**22.90**
Year 8	231 Hsp Dozer (Cat D-7H)				120	0.5	0.23	889	6.1	2.89
	520 Hsp Dozer with Disc (Cat D-10N)				2000	8.0	3.80	4570	31.3	14.87
	520 Hsp Dozer with Disc (Cat D-10N)				400	1.6	0.76	1877	12.9	6.10
	Motor Grader (CAT 140G)				0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D8)				0	0.0	0.00	0	0.0	0.00
	Dozer (CAT D6)				0	0.0	0.00	0	0.0	0.00
	140 Hp Bulldozer				0	0.0	0.00	0	0.0	0.00
Total							**4.79**			**23.86**

3. Summary of Off-Road Fugitive Dust Emissions (lbs/day)

Construction Year	PM 10 Fugitive Dust (lbs/day) Proposed: US 140 TAF HF	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD	PM2.5 Fugitive Dust (lbs/day) Proposed: US 140 TAF H	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD
Year 1	5,242	6,064	7,613	8,702	5,925	524	606	761	870	593
Year 2	6,959	17,849	17,251	8,673	16,184	696	1,785	1,725	867	1,618
Year 3	6,609	5,017	2,481	4,857	13,403	661	502	248	486	1,340
Year 4	4,736	13,518	12,292	7,042	12,920	474	1,352	1,229	704	1,292
Year 5	3,663	13,518	12,292	3,840	12,920	366	1,352	1,229	384	1,292
Year 6	3,662	13,517	12,292	3,839	12,920	366	1,352	1,229	384	1,292
Year 7	3,662	6,768	15	3,835	14,105	366	677	1.49	384	1,410
Year 8	3.43	32	-	2,787	8,306	0.34	3.21	-	279	831

Construction Year	PM 10 Fugitive Dust (lbs/day) - With BMPs Proposed: US 140 TAF HF	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD	PM2.5 Fugitive Dust (lbs/day) - With BMPs Proposed: US 140 TAF H	Alt A: US 140 TAF EFD	Alt B: US 96 TAF EFD	Alt C: DS 140 TAF HFD	Alt D: DS 140 TAF EFD
Year 1	2,621	3,032	3,807	4,351	2,963	262	303	381	435	296
Year 2	3,479	8,924	8,625	4,337	8,092	348	892	863	434	809
Year 3	3,305	2,508	1,240	2,428	6,702	330	251	124	243	670
Year 4	2,368	6,759	6,146	3,521	6,460	237	676	615	352	646
Year 5	1,831	6,759	6,146	1,920	6,460	183	676	615	192	646
Year 6	1,831	6,758	6,146	1,920	6,460	183	676	615	192	646
Year 7	1,831	3,384	7.4	1,918	7,052	183	338	0.74	192	705
Year 8	1.72	16	-	1,394	4,153	0.17	1.61	-	139	415

Cut (CY)						
Alternative	Dam Foundation/ Spillway Excavation	Existing Dam Excavation	Shell Borrow Areas Excavation	Core Borrow Areas Excavation	Double Handle Stockpiled Material	Roadway
US 140 TAF HFD	926,000	354,500	4,705,159	0	0	2,676,783
US 140 TAF EFD	4,075,000	354,500	5,319,033	1,699,897	2,164,200	2,655,493
US 96 TAF EFD	3,285,000	354,500	3,711,984	1,297,004	1,801,800	2,706,337
DS 140 TAF HFD	1,603,000	354,500	5,560,175	0	0	3,775,171
DS 140 TAF EFD	5,466,500	354,500	5,971,934	2,041,645	2,200,560	3,692,264

Cut by Year (CY)								
Alternative	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
US 140 TAF HFD	446,130	1,784,522	1,495,130	1,407,790	1,176,290	1,176,290	1,176,290	
US 140 TAF EFD	531,099	5,072,077	1,481,818	2,623,751	2,623,751	2,623,751	1,311,876	
US 96 TAF EFD	676,584	4,939,253	730,000	2,270,263	2,270,263	2,270,263		
DS 140 TAF HFD	943,793	2,831,379	1,041,500	1,823,784	1,248,202	1,248,202	1,248,202	907,784
DS 140 TAF EFD	615,377	4,941,870	3,956,016	2,334,660	2,334,660	2,334,660	2,334,660	875,498

Fill (CY)						
Alternative	Disposal (Dam Foundation / Spillway Excavation)	Disposal (Existing Dam)	Embankment	Disposal (Borrow Areas)	Double Handle Stockpiled Material	Roadway
US 140 TAF HFD	1,111,200	425,400	0	2,228,375	0	2,266,582
US 140 TAF EFD	2,445,000	141,600	10,600,000	472,571	2,164,200	2,111,847
US 96 TAF EFD	1,971,000	141,600	8,500,000	360,567	1,801,800	2,084,664
DS 140 TAF HFD	1,923,600	432,490	0	2,527,980	0	1,702,071
DS 140 TAF EFD	3,403,500	142,000	13,800,000	568,510	2,200,560	1,892,866

Fill by Year (CY)								
Alternative	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
US 140 TAF HFD	377,764	1,511,055	1,636,564	834,894	557,094	557,094	557,094	
US 140 TAF EFD	422,369	3,386,987	889,091	3,781,935	3,781,935	3,781,935	1,890,967	
US 96 TAF EFD	521,166	3,238,098	438,000	3,554,122	3,554,122	3,554,122		
DS 140 TAF HFD	425,518	1,276,553	1,256,890	1,511,931	567,506	567,506	567,506	412,731
DS 140 TAF EFD	315,478	2,727,494	2,395,394	3,787,216	3,787,216	3,787,216	3,787,216	1,420,206

Assumptions

1. Evenly proportion earthwork during the months those activities are performed on the schedule.
2. Borrow areas and stockpiled material activities take place during dam construction.

Alt D: DS 140 TAF EFD

	Annual Truck Hauling Trips (round trips)													
Days/year	Offsite Import	Onsite	Offsite Water	Total	Round Trips	West Imports	East Imports	Onsite VMT	West VMT	East VMT	Water Trucks	Total Daily VMT	**PM10 (lbs/day)**	**PM2.5 (lbs/day)**
83	10571	19765	8000	38336	38336	19168	19168	39529	642,123	670,875	56,000	16,970	**30.22**	**4.53**
250	19433	59294	200	78927	78927	39464	39464	118588	1,322,029	1,381,225	1,400	11,293	**20.11**	**3.02**
250	13292	59294	200	72786	72786	36393	36393	118588	1,219,167	1,273,757	1,400	10,452	**18.61**	**2.79**
250	13292	59294	200	72786	72786	36393	36393	118588	1,219,167	1,273,757	1,400	10,452	**18.61**	**2.79**
250	13292	59294	200	72786	72786	36393	36393	118588	1,219,167	1,273,757	1,400	10,452	**18.61**	**2.79**
250	13292	59294	200	72786	72786	36393	36393	118588	1,219,167	1,273,757	1,400	10,452	**18.61**	**2.79**
229	12184	54353	200	66737	66737	33368	33368	108706	1,117,844	1,167,896	1,400	10,462	**18.63**	**2.79**
146	11076	49412	200	60688	60688	30344	30344	98824	1,016,520	1,062,036	1,400	14,923	**26.57**	**3.99**

Alt D: DS 140 TAF EFD

Total Daily VMT	ROG (lbs/day)	NOX (lbs/day	PM10 (lbs/day)	PM2.5 (lbs/day	CO (lbs/day)	CO2 (lbs/day)
16,970	0.46	55.32	1.18	1.13	2.31	56,249
11,293	0.31	36.81	0.79	0.75	1.54	37,431
10,452	0.29	34.07	0.73	0.70	1.42	34,642
10,452	0.29	34.07	0.73	0.70	1.42	34,642
10,452	0.29	34.07	0.73	0.70	1.42	34,642
10,452	0.29	34.07	0.73	0.70	1.42	34,642
10,462	0.29	34.10	0.73	0.70	1.42	34,677
14,923	0.41	48.64	1.04	1.00	2.03	49,463

# Avg Workers/day	Average Trip Length	Daily VMT (miles)	Alt D: DS 140 TAF EFD PM10 (lbs/day)	PM2.5 (lbs/day)
539	35	37,718	**13.8**	**2.1**
983	35	68,833	**25.1**	**3.8**
961	35	67,258	**24.6**	**3.7**
1118	35	78,283	**28.6**	**4.3**
990	35	69,300	**25.3**	**3.8**
1118	35	78,283	**28.6**	**4.3**
1106	35	77,408	**28.3**	**4.2**
1093	35	76,533	**27.9**	**4.2**

Workers/day	Daily VMT (miles)	ROG (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO (lbs/day)	CO2 (lbs/day)
			Alt D: DS 140 TAF EFD				
539	37,718	0.715	3.729	0.100	0.092	57.091	22,457
983	68,833	1.305	6.805	0.182	0.167	104.188	40,984
961	67,258	1.276	6.649	0.178	0.164	101.804	40,046
1118	78,283	1.485	7.739	0.207	0.190	118.492	46,611
990	69,300	1.314	6.851	0.183	0.169	104.895	41,262
1118	78,283	1.485	7.739	0.207	0.190	118.492	46,611
1106	77,408	1.468	7.653	0.205	0.188	117.168	46,090
1093	76,533	1.452	7.566	0.202	0.186	115.843	45,569

Helicopter Emissions

Helicopter Emissions

Helicopter operation	**Value**	Source	
Gallons of jet fuel used per hour	100	FOCA 2015 - used Kaman K-1200	
Gallons of fuel used per LTO	15	FOCA 2015 - used Kaman K-1200	
Average hours/use (assumes 2 LTO)	5	Applicant data	
Total Days Helicopter Used per Year	70	Applicant data	July 15 - December 1 (Years 2-7)
Total Hours Helicopter Used per Year	348	Applicant data	
Gallons used for LTO	1,084	calculated	
Gallons used for cruising	34,914	calculated	
Total gallons used per year	35,998	calculated	
Jet A Emissions Factor (kg CO2/gal)	9.7497	Climate Registry 2017 Emission Factors	
Jet A Emissions Factor (kg N2O/gal)	0.000308	Climate Registry 2017 Emission Factors	
GWP N2O	298		
LTO MTCO2E	10.67		
Cruising MTCO2E	343.61		
Total MTCO2E	354.28		
Note: No emission factor available for CH4 helicopter emissions.			

Helicopter Information	Value	Source
Aircraft Type	Helicopter	
Engine Type	T53 17A-1	FOCA 2015
Engine SHP	1500	FOCA 2015
Number of engines	1	FOCA 2015
Mean operating percent power per engine for large twin turboshaft helicopters	62%	FOCA 2015
Fuel flow per engine for engines up to 1000 SHP (kg/s)	0.2303889	FOCA 2015
Fuel flow per hour (kg/h)	514	FOCA 2015

Emissions Calculations							
	HC	ROG (5)	NOX	PM Non-Volatile	Source		
LTO EF (g/LTO)*	667	845	285	9	FOCA 2009		
Cruising EF (g/hour)*	1310	1659	2340	68	FOCA 2009		
Max Net Emissions per day (lbs/day)	21.793	27.598	28.936	0.849		lb/day	July 15-Dec 1 (years 2-7)
Annual Emissions (tons/year)	0.758	0.960	1.007	0.030		ton/year	July 15-Dec 1 (years 2-7)
** Assume Kaman K-1200*							

FOCA 2015 - Guidance on the Determination of Helicopter Emissions
https://www.bazl.admin.ch/dam/bazl/it/dokumente/Politik/Umwelt/helicopter_emissionstable.xls.download.xls/helicopter_emissionstable.xls

Blasting Emissions

Blasting Emissions

	Alt D: DS 140 TAF EFD									
Year	Blasts/Day	Blasts/Yea	tons/blast	lb-CO/day	lb-CO/yr	lb-NOx/da	lb-NOx/yr	lb-SO2/da	lb-SO2/yr	CH4
1	0	0								
2	1	14	0.1875	12.5625	175.875	3.1875	44.625	0.375	5.25	NA
3	1	20	0.1875	12.5625	251.25	3.1875	63.75	0.375	7.5	NA
4	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
5	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
6	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
7	1	18	0.1875	12.5625	226.125	3.1875	57.375	0.375	6.75	NA
8	1	6	0.1875	12.5625	75.375	3.1875	19.125	0.375	2.25	NA

Emissions Factors for Detonation of Explosives

	lb	lb/day	lb/blast		tons/blast
Default tot	180,000	2,250	375	=	0.1875

	CO	NOx	SO2	CH4	
ANFO[1]	67	17	2	NA	lb/ton

	CO	NOx	SO2	CH4	
Total	12.5625	3.1875	0.375	NA	lb/blast

lbs/tons 2000

Sources

1

US EPA., 1980. AP 42: Compilation of Air Emissions Factors, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, Explosives Detonation.

Operational Emissions

Operational GHG Emissions Summary

Pumping Requirement	Future Conditions (2030)																									
		Proposed Project					Alt A					Alt B					Alt C					Alt D				
	Future Baseline/ No Project Alt	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr	Electricty Demand GWh/yr	Net Increase GWh/yr	GHGs lb-CO2/yr	GHGs lb-CH4/yr	GHGs lb-N2O/yr
CVP System-Wide (gWh/year)	1,231.60	1,232.70	1.10	126,066	31.9	6.8	1,232.70	1.10	126,066	31.9	6.8	1,232.50	0.90	103,145	26.1	5.6	1,232.70	1.10	126,066	31.9	6.8	1,232.70	1.10	126,066	31.9	6.8
New Pumping Plant at Expanded Reservoir (gWh /year)	0	2	2.00	229,211	58.0	12.3	1.9	1.90	217,751	55.1	11.7	1.1	1.10	126,066	31.9	6.8	1.1	1.10	126,066	31.9	6.8	1	1.00	114,606	29.0	6.2
Total	1,231.60	1,234.70	3.10	355,277	89.9	19.1	1,232.60	1.00	114,606	29.0	6.2	1,233.60	2.00	229,211	58.0	12.3	1,233.80	2.20	252,132	63.8	13.6	1,233.70	2.10	240,672	60.9	13.0
MTCO2e/year				161.2	1.0	2.6			52.0	0.3	0.8			104.0	0.7	1.7			114.4	0.7	1.8			109.2	0.7	1.8
			MT-CO2e/year	164.8				MT-CO2e/year	53.1				MT-CO2e/year	106.3				MT-CO2e/year	116.9				MT-CO2e/year	111.6		
			O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88				O&M Trips MT-CO2/year	1.88		
			TOTAL MT-CO2e/year	**166.6**				**TOTAL MT-CO2e/year**	**55.0**				**TOTAL MT-CO2e/year**	**108.2**				**TOTAL MT-CO2e/year**	**118.8**				**TOTAL MT-CO2e/year**	**113.49**		
			Compared to Proposed	100%					33%					65%					71%					68%		
			Difference	0%					67%					35%					29%					32%		

2030 CO2 Intensity Factor (PG&E)	114.61	lb-CO2/MWh	2204.62	lb/MT
2030 CH4 Intensity Factor (PG&E)	0.0290	lb-CH4/MWh	25	GWP CH4 (CO2e)
2030 N2O Intensity Factor (PG&E)	0.00617	lb-N2O/MWh	298	GWP N2O (CO2e)

PG&E Intensity Factors	2018	206.29	https://www.theclimateregistry.org/our-members/cris-public-reports/
	2030	114.61	linear interpolation
	2045	0	

Operations and Maintenance Worker Trip GHG Emissions

	Proposed: US 140 TAF HFD								
Year	Trips per Year	Annual VMT (roundtrip)	ROG (lbs/year)	NOx (lbs/year)	PM10 (lbs/year)	PM2.5 (lbs/year)	CO (lbs/year)	CO2 (lbs/year)	CO2 (MT/year)
1	64	6,950	0.132	0.687	0.018	0.017	10.520	4,138	1.88
2-5	38	4,127	0.078	0.408	0.011	0.010	6.246	2,457	1.11
6+	24	2,606	0.049	0.258	0.007	0.006	3.945	1,552	0.70

Project Description (Section 2.3.3.2):

Inspections

Year 1: One trip/worker per week (52 trips/year)

Years 2-5: One trip/worker every 2 weeks (26 trips/year)

Years 6+: One trip/worker per month (12 trips/year)

Maintenance

All Years: One trip/worker per month (12 trips per year)

2204.62 lb/MT

Distance fron Valley Water (San Jose) to project site: 54.3 miles 1-way

Alt D: DS 140 TAF EFD								
Trips per Year	**Annual VMT (roundtrip)**	ROG (lbs/year)	NOx (lbs/year)	PM10 (lbs/year)	PM2.5 (lbs/year)	CO (lbs/year)	CO2 (lbs/year)	CO2 (MT/year)
64	6,950	0.132	0.687	0.018	0.017	10.520	4,138	1.88
38	4,127	0.078	0.408	0.011	0.010	6.246	2,457	1.11
24	2,606	0.049	0.258	0.007	0.006	3.945	1,552	0.70

O & M Worker Trip Exhaust Emission Factors

Raw Emission Factors from EMFAC2021

Veh	Fuel	Pop	VMT	Trips	Running Exhaust Emission Rates (g/mile)						
		(Vehicles)	(Miles/day)	(Trips/day)	ROG_RUNEX	NOX_RUNEX	PM10_RUNEX	PM2_5_RUNEX	CO_RUNEX	SOX_RUNEX	CO2_RUNEX
LDA	Gasoline	598,860	22,133,915	2,780,384	0.008	0.038	0.001	0.001	0.695	0.003	273.208
LDA	Diesel	1,620	46,913	6,871	0.026	0.188	0.016	0.015	0.320	0.002	230.596
LDA	Electricity	61,443	2,670,452	299,853	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LDA	Plug-in Hybrid	19,038	825,568	78,721	0.001	0.003	0.001	0.001	0.209	0.001	135.439
LDT1	Gasoline	51,681	1,664,706	230,186	0.025	0.115	0.002	0.002	1.317	0.003	324.128
LDT1	Diesel	21	303	59	0.297	1.644	0.249	0.238	1.585	0.004	415.168
LDT1	Electricity	234	9,324	1,110	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LDT1	Plug-in Hybrid	98	4,519	406	0.001	0.003	0.000	0.000	0.187	0.001	121.010
LDT2	Gasoline	290,875	10,447,706	1,360,241	0.010	0.063	0.001	0.001	0.796	0.003	338.271
LDT2	Diesel	1,050	38,652	4,980	0.013	0.039	0.005	0.005	0.130	0.003	306.718
LDT2	Electricity	2,157	73,664	10,962	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LDT2	Plug-in Hybrid	2,562	112,327	10,593	0.001	0.003	0.000	0.000	0.196	0.001	127.261
Total			38,028,048								

Source: wksht: EMFAC2021output

Veh	Fuel	Ratio of Vehicle/Fuel Type to Total VMT	
LDA	Gasoline	58%	
LDA	Diesel	0.12%	
LDA	Electricity	7.0%	
LDA	Plug-in Hybrid	2.2%	
LDT1	Gasoline	4.4%	100%
LDT1	Diesel	0.001%	
LDT1	Electricity	0.025%	
LDT1	Plug-in Hybrid	0.012%	
LDT2	Gasoline	27.5%	
LDT2	Diesel	0.10%	
LDT2	Electricity	0.19%	
LDT2	Plug-in Hybrid	0.30%	

Exhaust Emission Rates for Composite Light Duty Vehicles

ROG_RUNEX (gms/mile)	NOX_RUNEX (gms/mile)	PM10_RUNEX (gms/mile)	PM2_5_RUNEX (gms/mile)	CO_RUNEX (gms/mile)	SOX_RUNEX (gms/mile)	CO2_RUNEX (gms/mile)
0.009	0.045	0.001	0.001	0.687	0.003	270.073

Source: EMFAC2021 emission factors (above) and weighted mix of passenger vehicle fleet (also above)

ROG	NOX	PM10	PM2.5	CO	SOX	CO2	Units
0.00002	0.00010	0.000003	0.000002	0.00151	0.00001	0.59541	lbs/mile

	value	unit	source
trips per worker	2	trips/worker	See Note 2
trip length	35	miles/trip	one-way value provided by Stantec
portion of trip on paved surfaces	100%	%	
portion of trip on unpaved surfaces	0%	%	
mass conversion rate	453.59	g/lb	onlineconversion.com/weight_common.htm

Exhaust Emissions per Worker Per Day

ROG	NOx	PM10	PM2.5	CO	SOx	CO2e	units
0.0013	0.0069	0.0002	0.0002	0.1060	0.0004	41.6786	lb/worker-day

Source: Exhaust emissions are based on trip length and the Exhaust Emission Rates for Composite Light Duty Vehicles (above).

Notes

1 It is conservatively assumed that all workers would drive alone and none would make trips during break periods due to the remoteness of the work sites.

2 Daily VMT by workers = # workers * trips per worker * trip length

Source: EMFAC2021 (v1.0.1) Emission Rates
Region Type: County
Region: Santa Clara
Calendar Year: 2025
Season: Annual
Vehicle Classification: EMFAC202x Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HOT

Region	Calendar Y	Vehicle Cat	Model Yea	Speed	Fuel	Population	Total VMT	CVMT	EVMT	Trips	Energy Consu
Santa Clara	2025	LDA	Aggregate	Aggregate	Gasoline	598860.3	22133914.69	22133914.69	0	2780384.029	0
Santa Clara	2025	LDA	Aggregate	Aggregate	Diesel	1620.04	46912.85411	46912.85411	0	6871.193241	0
Santa Clara	2025	LDA	Aggregate	Aggregate	Electricity	61443.19	2670451.983	0	2670451.983	299852.6978	1031014.87
Santa Clara	2025	LDA	Aggregate	Aggregate	Plug-in Hyl	19037.66	825567.7143	401012.9615	424554.7527	78720.73884	128228.189
Santa Clara	2025	LDT1	Aggregate	Aggregate	Gasoline	51680.86	1664705.874	1664705.874	0	230185.983	0
Santa Clara	2025	LDT1	Aggregate	Aggregate	Diesel	21.28272	302.825779	302.825779	0	59.13231308	0
Santa Clara	2025	LDT1	Aggregate	Aggregate	Electricity	234.4578	9323.703781	0	9323.703781	1109.79593	3599.71919
Santa Clara	2025	LDT1	Aggregate	Aggregate	Plug-in Hyl	98.13198	4519.182281	1961.286044	2557.896237	405.7757571	772.560901
Santa Clara	2025	LDT2	Aggregate	Aggregate	Gasoline	290874.7	10447705.78	10447705.78	0	1360240.873	0
Santa Clara	2025	LDT2	Aggregate	Aggregate	Diesel	1049.952	38652.33695	38652.33695	0	4980.340082	0
Santa Clara	2025	LDT2	Aggregate	Aggregate	Electricity	2157.059	73663.77305	0	73663.77305	10962.38395	28440.2962
Santa Clara	2025	LDT2	Aggregate	Aggregate	Plug-in Hyl	2561.885	112327.2154	51267.43918	61059.7762	10593.39505	18441.8723
Santa Clara	2025	T7 CAIRP C	Aggregate	Aggregate	Diesel	1034.487	207547.3052	207547.3052	0	23772.50231	0
Santa Clara	2025	T7 CAIRP C	Aggregate	Aggregate	Electricity	12.40346	2411.505747	0	2411.505747	285.0315405	4403.23123
Santa Clara	2025	T7 CAIRP C	Aggregate	Aggregate	Natural Ga	2.419779	485.0903505	485.0903505	0	55.60652865	0

SOAK and RUNLOSS, g/vehicle/day for IDLEX and DIURN

NOx_RUNE	NOx_IDLEX	NOx_STREX	PM2.5_RU	PM2.5_IDL	PM2.5_STF	PM2.5_PM	PM2.5_PM	PM10_RUN	PM10_IDLI	PM10_STR	PM10_PM	PM10_PM	CO2_RUNE	CO2_IDLEX	CO2_STREX
0.038209	0	0.245539	0.001142	0	0.00188	0.002	0.002655	0.001242	0	0.002044	0.008	0.007587	273.2075	0	69.04168
0.18842	0	0	0.015236	0	0	0.002	0.002712	0.015925	0	0	0.008	0.007748	230.5963	0	0
0	0	0	0	0	0	0.002	0.001534	0	0	0	0.008	0.004382	0	0	0
0.003187	0	0.11551	0.000578	0	0.001985	0.002	0.001382	0.000629	0	0.002159	0.008	0.003948	135.4391	0	65.04608
0.115355	0	0.35972	0.001639	0	0.002543	0.002	0.003241	0.001782	0	0.002766	0.008	0.00926	324.1276	0	84.93844
1.64381	0	0	0.238169	0	0	0.002	0.00372	0.248938	0	0	0.008	0.010628	415.1682	0	0
0	0	0	0	0	0	0.002	0.001537	0	0	0	0.008	0.004392	0	0	0
0.002848	0	0.11551	0.000353	0	0.001365	0.002	0.001394	0.000383	0	0.001485	0.008	0.003982	121.0095	0	70.34635
0.06257	0	0.314364	0.001192	0	0.001919	0.002	0.00313	0.001296	0	0.002087	0.008	0.008944	338.2713	0	86.2638
0.039332	0	0	0.004727	0	0	0.002	0.003123	0.004941	0	0	0.008	0.008921	306.7182	0	0
0	0	0	0	0	0	0.002	0.001527	0	0	0	0.008	0.004362	0	0	0
0.002995	0	0.11551	0.000438	0	0.00161	0.002	0.001388	0.000477	0	0.001751	0.008	0.003967	127.2609	0	77.17666
1.498671	123.4561	2.221126	0.030668	0.042485	0	0.009	0.025996	0.032054	0.044406	0	0.036	0.074273	1521.791	23804.97	0
0	0	0	0	0	0	0.009	0.013225	0	0	0	0.036	0.037786	0	0	0
0.206313	64.47231	0	0.001708	0.216514	0	0.009	0.025982	0.001858	0.235478	0	0.036	0.074235	1131.422	51379.69	0

CH4_RUNE	CH4_IDLEX	CH4_STRE	N2O_RUNI	N2O_IDLE	N2O_STRE	ROG_RUNI	ROG_IDLE	ROG_STRE	ROG_HOTS	ROG_RUNI
0.002117	0	0.067825	0.004408	0	0.032293	0.007947	0	0.306311	0.087189	0.224301
0.001193	0	0	0.036331	0	0	0.025693	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.000432	0	0.042249	0.000569	0	0.020584	0.001378	0	0.173285	0.041164	0.03735
0.005621	0	0.098552	0.008687	0	0.037511	0.02471	0	0.498818	0.156963	0.442299
0.013797	0	0	0.06541	0	0	0.297038	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.000383	0	0.041987	0.000501	0	0.020339	0.001231	0	0.173285	0.023895	0.020384
0.002642	0	0.078494	0.005588	0	0.036037	0.010244	0	0.360071	0.079452	0.214938
0.000603	0	0	0.048324	0	0	0.01298	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.000403	0	0.041992	0.000528	0	0.020344	0.001295	0	0.173285	0.026071	0.023359
0.000583	0.484627	0	0.239759	3.750482	0	0.012554	10.4339	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0.929746	158.4146	0	0.230648	10.47409	0	0.013284	2.263432	0	0	0

ROG_DIUR	TOG_RUNI	TOG_IDLE	TOG_STRE	TOG_HOTS	TOG_RUNI	TOG_DIUR	NH3_RUNI	CO_RUNE	CO_IDLEX	CO_STREX	SOx_RUNE	SOx_IDLEX	SOx_STREX
1.384954	0.011596	0	0.335372	0.087189	0.224301	1.384954	0.035611	0.6952	0	3.049452	0.002701	0	0.000683
0	0.02925	0	0	0	0	0	0.0031	0.319914	0	0	0.002185	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.440525	0.002011	0	0.189725	0.041164	0.03735	0.440525	0.019241	0.209016	0	1.339893	0.001339	0	0.000643
2.52236	0.036056	0	0.546143	0.156963	0.442299	2.52236	0.036453	1.317416	0	4.886115	0.003204	0	0.00084
0	0.338158	0	0	0	0	0	0.0031	1.585068	0	0	0.003934	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.276746	0.001797	0	0.189725	0.023895	0.020384	0.276746	0.018228	0.186748	0	1.339893	0.001196	0	0.000695
1.349256	0.014949	0	0.394233	0.079452	0.214938	1.349256	0.03712	0.795621	0	3.47417	0.003344	0	0.000853
0	0.014777	0	0	0	0	0	0.0031	0.129797	0	0	0.002906	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.305362	0.00189	0	0.189725	0.026071	0.023359	0.305362	0.019143	0.196395	0	1.339893	0.001258	0	0.000763
0	0.014292	11.8782	0	0	0	0	0.22	0.053947	153.9743	0	0.01441	0.225419	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.948874	161.6737	0	0	0	0	1.06	3.681431	425.9711	0	0	0	0