Appendix A

Air Quality, Greenhouse Gases Emissions, and Energy Modeling Data

Net Change in Operational Emissions of Criteria Air Pollutants and Precursors

Daily Emissions

Source	ROG	NO_x	PM_{10}	$PM_{2.5}$	CO2e	units	source
New Combined Heat and Power Generators[1]	97.9	123.8	77.5	77.5	296,641	lb/day	Source 1
Worker Commute Trips	0.03	0.1	0.1	0.03	113	lb/day	worksheet: CalEEMod Output Summaries
Reduced Flaring by Waste Gas Burners	-1.4	-3.7	-0.6	-0.6	-5,426	lb/day	Source 1
Reduced Flaring by Ground Flares	-1.4	-2.8	-0.6	-0.6	-5,426	lb/day	Source 1
Shutdown of Steam-Generating Boilers	-0.1	-1.2	-0.4	-0.4	-3,672	lb/day	Source 1
Displaced Generation of Natural Gas–Based Electricity	-28.6	-42.8	-26.7	-26.7	-527,188	lb/day	Source 1
Displaced Steam Generation[2]	-5.9	-8.9	-5.5	-5.5	-109,218	lb/day	Source 1
Total Net Daily Emissions	**60.5**	**64.6**	**43.7**	**43.7**	-354,289	lb/day	Summation
SMAQMD Daily Mass Emission Thresholds	**65**	**65**	**80**	**80**	—	lb/day	Source 2 (SMAQMD 2020)

Annual Emissions

Source	ROG	NO_x	PM_{10}	$PM_{2.5}$	CO2e	source
units:	tons/year	tons/year	tons/year	tons/year	MTCO2e/yr	
New Combined Heat and Power Generators[1]	17.9	22.6	14.1	14.1	61,736	Source 1
Worker Commute Trips	0.004	0.02	0.10	0.03	55	worksheet: CalEEMod Output Summaries
Reduced Flaring by Waste Gas Burners	-0.3	-0.7	-0.1	-0.1	-899	Source 1
Reduced Flaring by Ground Flares	-0.3	-0.5	-0.1	-0.1	-990	Source 1
Shutdown of Steam-Generating Boilers	- <0.1	-0.2	-0.1	-0.1	-670	Source 1
Displaced Generation of Natural Gas–Based Electricity	-5.2	-7.8	-4.9	-4.9	-87,307	Source 1
Displaced Steam Generation[2]	-1.1	-1.6	-1	-1	-18,087	Source 1
Total Net Annual Emissions	11.0	11.8	8.00	7.9	-46,162	Summation
SMAQMD Annual Mass Emission Thresholds	—	—	14.6	15	10,000	Source 2 (SMAQMD 2020)

Notes

1 The new CHP generators would produce between 10 and 15 MW of electricity. These emission estimates reflect a number and type of engines that would generate 15 MW of electricity.

2 The size of these emission reductions is conservatively low because it is assumed that the heat recovery steam generator at the CCGT that currently supplies steam to the SRWTP would cease to operate rather than the more emissions intensive auxiliary boiler.

Sources

1 Trinity Consultants. 2021 (March 5). Air Quality Emission Calculations and Technical Discussion. Prepared by Allan Daly of Trinity Consultants and e-mailed to Stephanie Rasmussen and Austin Kerr of Ascent Environmental, as well as staff at the Sacramento Regional Sanitation District.

2 Sacramento Metropolitan Air Quality Management District. 2020. Guide to Air Quality Assessment in Sacramento County. Available: http://www.airquality.org/businesses/ceqa-land-use-planning/ceqa-guidance-tools. Accessed October 26, 2020.

Construction-Related Emissions of Criteria Air Pollutants and Precursors

	ROG	NOx	PM10 Fugitive Dust	PM10 Exhaust	PM10 Total	PM2.5 Fugitive Dust	PM2.5 Exhaust	PM2.5 Total	units	source
2022 - Summer	3.2375	33.1167	18.2032	1.6135	19.8167	9.967	1.4844	11.4514	lb/day	CalEEMod run
2022 - Winter	3.2323	33.1245	18.2032	1.6135	19.8167	9.967	1.4844	11.4514	lb/day	CalEEMod run
2023 - Summer	7.9202	14.5569	0.1521	0.7003	0.8524	0.0404	0.6589	0.6993	lb/day	CalEEMod run
2023 - Winter	7.9199	14.5608	0.1521	0.7003	0.7579	0.0404	0.6589	0.6993	lb/day	CalEEMod run
Maximum Daily Emissio	7.9	33.1	18.2	1.6	19.8	10.0	1.5	11.5	lb/day	Max calc

Construction-Related Emissions of GHGs

Year	GHG	units	source
2022	246.58	MTCO2e	CalEEMod run
2023	73.75	MTCO2e	CalEEMod run
Total	320.33	MTCO2e	sum

Operational Emissions of Criteria Air Pollutants and Precursors

	ROG	NOx	PM10 Fugitive Dust	PM10 Exhaust	PM10 Total	PM2.5 Fugitive Dust	PM2.5 Exhaust	PM2.5 Total	CO2e	units	source
Vehicle Travel (mobile sources)											
Summer	0.0269	0.0902	0.1004	0.00079	0.1012	0.0268	0.00073	0.0275	112.7061	lb/day	CalEEMod run
Winter	0.0204	0.097	0.1004	0.00079	0.1012	0.0268	0.00074	0.0275	101.9409	lb/day	CalEEMod run
Maximum Daily Emiss	0.0269	0.097	0.1004	0.00079	0.1012	0.0268	0.00074	0.0275	112.7061	lb/day	Max calc
Annual	0.00392	0.0171	0.0177	0.00014	0.0178	0.000473	0.00013	0.0006	see below	tons/year	CalEEMod run

Operational Emissions of GHGs

	GHG	units	source
Vehicle Travel (mobile sources)			
Annual	55.4333	MTCO2e	CalEEMod run

Regional San Biogas

Sacramento Metropolitan AQMD Air District, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	15.00	1000sqft	3.40	15,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	3.5	**Precipitation Freq (Days)**	58
Climate Zone	6			**Operational Year**	2024
Utility Company	User Defined				
CO2 Intensity (lb/MWhr)	0	**CH4 Intensity (lb/MWhr)**	0	**N2O Intensity (lb/MWhr)**	0

1.3 User Entered Comments & Non-Default Data

Regional San Biogas - Sacramento Metropolitan AQMD Air District, Summer

Project Characteristics - This model run is for estimating emiss from proj construction, and area- and mobile-source emiss assoc w/ operation. Stationary-source and indirect emis associated with electricity consumption are estimated separately from CalEEMod.

Land Use - Approximately 3.4 acres for the project area and 2.2 acres for Contractor laydown (5.6 acres total).

Construction Phase - Assumption: Trenching phase will take similar time as grading phase.

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - The equipment types selected reflect the need for trenching and installation of underground pipes and/or utilities.

Trips and VMT -

Demolition - The project would not involve the demolition of existing buildings or facilities.

Grading -

Vehicle Trips - Operation of the project would require up to 10 additional full-time employees to operate and maintain the new facilities. It is assumed that 7 employees would work on a single day and every employee would make 2 one-way trips per day.

Landscape Equipment - It’s not anticipated that the project would result in additional landscape maintenance activity.

Energy Use -

Water And Wastewater - The project would result in a nominal increase in the consumption of water and generation of wastewater associated with the 10 additional employees. Therefore, these emissions are not estimated.

Solid Waste - The project would result in a nominal increase in the generation of solid waste and, therefore, associated emissions are not estimated.

Land Use Change - The project would result in no changes to vegetation.

Construction Off-road Equipment Mitigation - Consistent with SMAQMD’s modeling guidance, unpaved areas would be watered 2x/day.

Stationary Sources - Emergency Generators and Fire Pumps - Stationary-source emissions are estimated “off model” (separately from this CalEEMod run).

Regional San Biogas - Sacramento Metropolitan AQMD Air District, Summer

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	9
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblLandscapeEquipment	NumberSummerDays	250	1
tblLandUse	LotAcreage	0.34	3.40
tblVehicleTrips	CC_TL	5.00	0.00
tblVehicleTrips	CC_TTP	28.00	0.00
tblVehicleTrips	CNW_TL	6.50	0.00
tblVehicleTrips	CNW_TTP	13.00	0.00
tblVehicleTrips	CW_TTP	59.00	100.00
tblVehicleTrips	ST_TR	1.32	0.93
tblVehicleTrips	SU_TR	0.68	0.93
tblVehicleTrips	WD_TR	6.97	0.93
tblWater	IndoorWaterUseRate	3,468,750.00	52,000.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	3.2375	33.1167	20.1937		18.2032	1.6135	19.8167	9.9670	1.4844	11.4514						3,848.9665
2023	7.9202	14.5569	16.4381		0.1521	0.7003	0.7579	0.0404	0.6589	0.6745						2,664.0453
Maximum	**7.9202**	**33.1167**	**20.1937**		**18.2032**	**1.6135**	**19.8167**	**9.9670**	**1.4844**	**11.4514**						**3,848.9665**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	3.2375	33.1167	20.1937		8.2560	1.6135	9.8695	4.5025	1.4844	5.9869						3,848.9665
2023	7.9202	14.5569	16.4381		0.1402	0.7003	0.7536	0.0374	0.6589	0.6734						2,664.0453
Maximum	**7.9202**	**33.1167**	**20.1937**		**8.2560**	**1.6135**	**9.8695**	**4.5025**	**1.4844**	**5.9869**						**3,848.9665**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**54.26**	**0.00**	**48.37**	**54.63**	**0.00**	**45.07**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3592	1.0000e-005	1.5300e-003			1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.5000e-003
Energy	0.0159	0.1443	0.1212			0.0110	0.0110		0.0110	0.0110						174.1634
Mobile	0.0269	0.0902	0.3252		0.1004	7.8000e-004	0.1012	0.0268	7.3000e-004	0.0276						112.7061
Total	**0.4020**	**0.2345**	**0.4479**		**0.1004**	**0.0118**	**0.1122**	**0.0268**	**0.0117**	**0.0385**						**286.8730**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3592	1.0000e-005	1.5300e-003			1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.5000e-003
Energy	0.0159	0.1443	0.1212			0.0110	0.0110		0.0110	0.0110						174.1634
Mobile	0.0269	0.0902	0.3252		0.1004	7.8000e-004	0.1012	0.0268	7.3000e-004	0.0276						112.7061
Total	**0.4020**	**0.2345**	**0.4479**		**0.1004**	**0.0118**	**0.1122**	**0.0268**	**0.0117**	**0.0385**						**286.8730**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**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**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	3/20/2022	3/25/2022	5	5	
2	Grading	Grading	3/26/2022	4/6/2022	5	8	
3	Trenching	Trenching	4/7/2022	4/18/2022	5	8	
4	Building Construction	Building Construction	4/19/2022	3/6/2023	5	230	
5	Paving	Paving	3/7/2023	3/30/2023	5	18	
6	Archetectural Coating	Architectural Coating	3/31/2023	4/25/2023	5	18	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 22,500; Non-Residential Outdoor: 7,500; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Regional San Biogas - Sacramento Metropolitan AQMD Air District, Summer

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Trenching	Excavators	1	8.00	158	0.38
Trenching	Forklifts	1	8.00	89	0.20
Trenching	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Trenching	Trenchers	1	8.00	78	0.50
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	2	6.00	132	0.36
Paving	Rollers	2	6.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Archetectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	7	18.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Trenching	4	10.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	6.00	2.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Archetectural Coating	1	1.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307						0.0000
Off-Road	3.1701	33.0835	19.6978			1.6126	1.6126		1.4836	1.4836						3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**		**18.0663**	**1.6126**	**19.6788**	**9.9307**	**1.4836**	**11.4143**						**3,715.8655**

3.2 Site Preparation - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0673	0.0332	0.4959		0.1369	9.0000e-004	0.1378	0.0363	8.3000e-004	0.0372						133.1009
Total	**0.0673**	**0.0332**	**0.4959**		**0.1369**	**9.0000e-004**	**0.1378**	**0.0363**	**8.3000e-004**	**0.0372**						**133.1009**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.1298	0.0000	8.1298	4.4688	0.0000	4.4688						0.0000
Off-Road	3.1701	33.0835	19.6978			1.6126	1.6126		1.4836	1.4836						3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**		**8.1298**	**1.6126**	**9.7424**	**4.4688**	**1.4836**	**5.9524**						**3,715.8655**

3.2 Site Preparation - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0673	0.0332	0.4959		0.1262	9.0000e-004	0.1271	0.0337	8.3000e-004	0.0345						133.1009
Total	**0.0673**	**0.0332**	**0.4959**		**0.1262**	**9.0000e-004**	**0.1271**	**0.0337**	**8.3000e-004**	**0.0345**						**133.1009**

3.3 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675						0.0000
Off-Road	1.9486	20.8551	15.2727			0.9409	0.9409		0.8656	0.8656						2,895.2684
Total	**1.9486**	**20.8551**	**15.2727**		**6.5523**	**0.9409**	**7.4932**	**3.3675**	**0.8656**	**4.2331**						**2,895.2684**

3.3 Grading - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0561	0.0277	0.4133		0.1141	7.5000e-004	0.1149	0.0303	6.9000e-004	0.0310						110.9174
Total	**0.0561**	**0.0277**	**0.4133**		**0.1141**	**7.5000e-004**	**0.1149**	**0.0303**	**6.9000e-004**	**0.0310**						**110.9174**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.9486	0.0000	2.9486	1.5154	0.0000	1.5154						0.0000
Off-Road	1.9486	20.8551	15.2727			0.9409	0.9409		0.8656	0.8656						2,895.2684
Total	**1.9486**	**20.8551**	**15.2727**		**2.9486**	**0.9409**	**3.8894**	**1.5154**	**0.8656**	**2.3810**						**2,895.2684**

3.3 Grading - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0561	0.0277	0.4133		0.1052	7.5000e-004	0.1059	0.0281	6.9000e-004	0.0288						110.9174
Total	**0.0561**	**0.0277**	**0.4133**		**0.1052**	**7.5000e-004**	**0.1059**	**0.0281**	**6.9000e-004**	**0.0288**						**110.9174**

3.4 Trenching - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8446	7.8872	9.2458			0.4854	0.4854		0.4466	0.4466						1,286.5535
Total	**0.8446**	**7.8872**	**9.2458**			**0.4854**	**0.4854**		**0.4466**	**0.4466**						**1,286.5535**

3.4 Trenching - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0374	0.0185	0.2755		0.0761	5.0000e-004	0.0766	0.0202	4.6000e-004	0.0206						73.9450
Total	**0.0374**	**0.0185**	**0.2755**		**0.0761**	**5.0000e-004**	**0.0766**	**0.0202**	**4.6000e-004**	**0.0206**						**73.9450**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8446	7.8872	9.2458			0.4854	0.4854		0.4466	0.4466						1,286.5535
Total	**0.8446**	**7.8872**	**9.2458**			**0.4854**	**0.4854**		**0.4466**	**0.4466**						**1,286.5535**

3.4 Trenching - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0374	0.0185	0.2755		0.0701	5.0000e-004	0.0706	0.0187	4.6000e-004	0.0192						73.9450
Total	**0.0374**	**0.0185**	**0.2755**		**0.0701**	**5.0000e-004**	**0.0706**	**0.0187**	**4.6000e-004**	**0.0192**						**73.9450**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634			0.8090	0.8090		0.7612	0.7612						2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**			**0.8090**	**0.8090**		**0.7612**	**0.7612**						**2,569.6322**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	5.7300e-003	0.1910	0.0473		0.0120	4.8000e-004	0.0125	3.4600e-003	4.6000e-004	3.9200e-003						51.9088
Worker	0.0225	0.0111	0.1653		0.0456	3.0000e-004	0.0459	0.0121	2.8000e-004	0.0124						44.3670
Total	**0.0282**	**0.2021**	**0.2126**		**0.0577**	**7.8000e-004**	**0.0585**	**0.0156**	**7.4000e-004**	**0.0163**						**96.2758**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634			0.8090	0.8090		0.7612	0.7612						2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**			**0.8090**	**0.8090**		**0.7612**	**0.7612**						**2,569.6322**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	5.7300e-003	0.1910	0.0473		0.0113	4.8000e-004	0.0117	3.2700e-003	4.6000e-004	3.7300e-003						51.9088
Worker	0.0225	0.0111	0.1653		0.0421	3.0000e-004	0.0424	0.0112	2.8000e-004	0.0115						44.3670
Total	**0.0282**	**0.2021**	**0.2126**		**0.0533**	**7.8000e-004**	**0.0541**	**0.0145**	**7.4000e-004**	**0.0152**						**96.2758**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5728	14.3849	16.2440			0.6997	0.6997		0.6584	0.6584						2,570.4061
Total	**1.5728**	**14.3849**	**16.2440**			**0.6997**	**0.6997**		**0.6584**	**0.6584**						**2,570.4061**

3.5 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	4.5300e-003	0.1620	0.0419		0.0120	2.3000e-004	0.0123	3.4600e-003	2.2000e-004	3.6800e-003						50.9421
Worker	0.0210	9.9700e-003	0.1522		0.0456	2.9000e-004	0.0459	0.0121	2.7000e-004	0.0124						42.6971
Total	**0.0255**	**0.1720**	**0.1941**		**0.0577**	**5.2000e-004**	**0.0582**	**0.0156**	**4.9000e-004**	**0.0161**						**93.6392**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5728	14.3849	16.2440			0.6997	0.6997		0.6584	0.6584						2,570.4061
Total	**1.5728**	**14.3849**	**16.2440**			**0.6997**	**0.6997**		**0.6584**	**0.6584**						**2,570.4061**

3.5 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	4.5300e-003	0.1620	0.0419		0.0113	2.3000e-004	0.0115	3.2700e-003	2.2000e-004	3.4900e-003						50.9421
Worker	0.0210	9.9700e-003	0.1522		0.0421	2.9000e-004	0.0424	0.0112	2.7000e-004	0.0115						42.6971
Total	**0.0255**	**0.1720**	**0.1941**		**0.0533**	**5.2000e-004**	**0.0539**	**0.0145**	**4.9000e-004**	**0.0150**						**93.6392**

3.6 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.9181	8.7903	12.1905			0.4357	0.4357		0.4025	0.4025						1,819.6122
Paving	0.0000					0.0000	0.0000		0.0000	0.0000						0.0000
Total	**0.9181**	**8.7903**	**12.1905**			**0.4357**	**0.4357**		**0.4025**	**0.4025**						**1,819.6122**

3.6 Paving - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0699	0.0332	0.5072		0.1521	9.8000e-004	0.1531	0.0404	9.0000e-004	0.0413						142.3238
Total	**0.0699**	**0.0332**	**0.5072**		**0.1521**	**9.8000e-004**	**0.1531**	**0.0404**	**9.0000e-004**	**0.0413**						**142.3238**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.9181	8.7903	12.1905			0.4357	0.4357		0.4025	0.4025						1,819.6122
Paving	0.0000					0.0000	0.0000		0.0000	0.0000						0.0000
Total	**0.9181**	**8.7903**	**12.1905**			**0.4357**	**0.4357**		**0.4025**	**0.4025**						**1,819.6122**

3.6 Paving - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0699	0.0332	0.5072		0.1402	9.8000e-004	0.1412	0.0374	9.0000e-004	0.0383						142.3238
Total	**0.0699**	**0.0332**	**0.5072**		**0.1402**	**9.8000e-004**	**0.1412**	**0.0374**	**9.0000e-004**	**0.0383**						**142.3238**

3.7 Archetectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	7.7250					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	0.1917	1.3030	1.8111			0.0708	0.0708		0.0708	0.0708						281.8690
Total	**7.9167**	**1.3030**	**1.8111**			**0.0708**	**0.0708**		**0.0708**	**0.0708**						**281.8690**

3.7 Archetectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	3.5000e-003	1.6600e-003	0.0254		7.6100e-003	5.0000e-005	7.6600e-003	2.0200e-003	4.0000e-005	2.0600e-003						7.1162
Total	**3.5000e-003**	**1.6600e-003**	**0.0254**		**7.6100e-003**	**5.0000e-005**	**7.6600e-003**	**2.0200e-003**	**4.0000e-005**	**2.0600e-003**						**7.1162**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	7.7250					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	0.1917	1.3030	1.8111			0.0708	0.0708		0.0708	0.0708						281.8690
Total	**7.9167**	**1.3030**	**1.8111**			**0.0708**	**0.0708**		**0.0708**	**0.0708**						**281.8690**

3.7 Archetectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	3.5000e-003	1.6600e-003	0.0254		7.0100e-003	5.0000e-005	7.0600e-003	1.8700e-003	4.0000e-005	1.9200e-003						7.1162
Total	**3.5000e-003**	**1.6600e-003**	**0.0254**		**7.0100e-003**	**5.0000e-005**	**7.0600e-003**	**1.8700e-003**	**4.0000e-005**	**1.9200e-003**						**7.1162**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0269	0.0902	0.3252		0.1004	7.8000e-004	0.1012	0.0268	7.3000e-004	0.0276						112.7061
Unmitigated	0.0269	0.0902	0.3252		0.1004	7.8000e-004	0.1012	0.0268	7.3000e-004	0.0276						112.7061

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	13.95	13.95	13.95	47,366	47,366
Total	13.95	13.95	13.95	47,366	47,366

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	10.00	0.00	0.00	100.00	0.00	0.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.566033	0.037143	0.208217	0.113428	0.016713	0.004955	0.018463	0.024036	0.001978	0.001883	0.005758	0.000618	0.000776

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0159	0.1443	0.1212			0.0110	0.0110		0.0110	0.0110						174.1634
NaturalGas Unmitigated	0.0159	0.1443	0.1212			0.0110	0.0110		0.0110	0.0110						174.1634

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	1471.64	0.0159	0.1443	0.1212			0.0110	0.0110		0.0110	0.0110						174.1634
Total		**0.0159**	**0.1443**	**0.1212**			**0.0110**	**0.0110**		**0.0110**	**0.0110**						**174.1634**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	1.47164	0.0159	0.1443	0.1212			0.0110	0.0110		0.0110	0.0110						174.1634
Total		**0.0159**	**0.1443**	**0.1212**			**0.0110**	**0.0110**		**0.0110**	**0.0110**						**174.1634**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.3592	1.0000e-005	1.5300e-003			1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.5000e-003
Unmitigated	0.3592	1.0000e-005	1.5300e-003			1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.5000e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0381					0.0000	0.0000		0.0000	0.0000						0.0000
Consumer Products	0.3210					0.0000	0.0000		0.0000	0.0000						0.0000
Landscaping	1.4000e-004	1.0000e-005	1.5300e-003			1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.5000e-003
Total	**0.3592**	**1.0000e-005**	**1.5300e-003**			**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**						**3.5000e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0381					0.0000	0.0000		0.0000	0.0000						0.0000
Consumer Products	0.3210					0.0000	0.0000		0.0000	0.0000						0.0000
Landscaping	1.4000e-004	1.0000e-005	1.5300e-003			1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.5000e-003
Total	**0.3592**	**1.0000e-005**	**1.5300e-003**			**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**						**3.5000e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Regional San Biogas

Sacramento Metropolitan AQMD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	15.00	1000sqft	3.40	15,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	3.5	**Precipitation Freq (Days)**	58
Climate Zone	6			**Operational Year**	2024
Utility Company	User Defined				
CO2 Intensity (lb/MWhr)	0	**CH4 Intensity (lb/MWhr)**	0	**N2O Intensity (lb/MWhr)**	0

1.3 User Entered Comments & Non-Default Data

Regional San Biogas - Sacramento Metropolitan AQMD Air District, Winter

Project Characteristics - This model run is for estimating emiss from proj construction, and area- and mobile-source emiss assoc w/ operation. Stationary-source and indirect emis associated with electricity consumption are estimated separately from CalEEMod.

Land Use - Approximately 3.4 acres for the project area and 2.2 acres for Contractor laydown (5.6 acres total).

Construction Phase - Assumption: Trenching phase will take similar time as grading phase.

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - The equipment types selected reflect the need for trenching and installation of underground pipes and/or utilities.

Trips and VMT -

Demolition - The project would not involve the demolition of existing buildings or facilities.

Grading -

Vehicle Trips - Operation of the project would require up to 10 additional full-time employees to operate and maintain the new facilities. It is assumed that 7 employees would work on a single day and every employee would make 2 one-way trips per day.

Landscape Equipment - It’s not anticipated that the project would result in additional landscape maintenance activity.

Energy Use -

Water And Wastewater - The project would result in a nominal increase in the consumption of water and generation of wastewater associated with the 10 additional employees. Therefore, these emissions are not estimated.

Solid Waste - The project would result in a nominal increase in the generation of solid waste and, therefore, associated emissions are not estimated.

Land Use Change - The project would result in no changes to vegetation.

Construction Off-road Equipment Mitigation - Consistent with SMAQMD’s modeling guidance, unpaved areas would be watered 2x/day.

Stationary Sources - Emergency Generators and Fire Pumps - Stationary-source emissions are estimated “off model” (separately from this CalEEMod run).

Regional San Biogas - Sacramento Metropolitan AQMD Air District, Winter

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	9
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblLandscapeEquipment	NumberSummerDays	250	1
tblLandUse	LotAcreage	0.34	3.40
tblVehicleTrips	CC_TL	5.00	0.00
tblVehicleTrips	CC_TTP	28.00	0.00
tblVehicleTrips	CNW_TL	6.50	0.00
tblVehicleTrips	CNW_TTP	13.00	0.00
tblVehicleTrips	CW_TTP	59.00	100.00
tblVehicleTrips	ST_TR	1.32	0.93
tblVehicleTrips	SU_TR	0.68	0.93
tblVehicleTrips	WD_TR	6.97	0.93
tblWater	IndoorWaterUseRate	3,468,750.00	52,000.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	3.2323	33.1245	20.1189		18.2032	1.6135	19.8167	9.9670	1.4844	11.4514						3,832.7690
2023	7.9199	14.5608	16.4210		0.1521	0.7003	0.7579	0.0404	0.6589	0.6745						2,657.5431
Maximum	**7.9199**	**33.1245**	**20.1189**		**18.2032**	**1.6135**	**19.8167**	**9.9670**	**1.4844**	**11.4514**						**3,832.7690**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	3.2323	33.1245	20.1189		8.2560	1.6135	9.8695	4.5025	1.4844	5.9869						3,832.7690
2023	7.9199	14.5608	16.4210		0.1402	0.7003	0.7536	0.0374	0.6589	0.6734						2,657.5431
Maximum	**7.9199**	**33.1245**	**20.1189**		**8.2560**	**1.6135**	**9.8695**	**4.5025**	**1.4844**	**5.9869**						**3,832.7690**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**54.26**	**0.00**	**48.37**	**54.63**	**0.00**	**45.07**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3592	1.0000e-005	1.5300e-003			1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.5000e-003
Energy	0.0159	0.1443	0.1212			0.0110	0.0110		0.0110	0.0110						174.1634
Mobile	0.0204	0.0970	0.2894		0.1004	7.9000e-004	0.1012	0.0268	7.4000e-004	0.0276						101.9409
Total	**0.3955**	**0.2413**	**0.4121**		**0.1004**	**0.0118**	**0.1122**	**0.0268**	**0.0117**	**0.0386**						**276.1078**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3592	1.0000e-005	1.5300e-003			1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.5000e-003
Energy	0.0159	0.1443	0.1212			0.0110	0.0110		0.0110	0.0110						174.1634
Mobile	0.0204	0.0970	0.2894		0.1004	7.9000e-004	0.1012	0.0268	7.4000e-004	0.0276						101.9409
Total	**0.3955**	**0.2413**	**0.4121**		**0.1004**	**0.0118**	**0.1122**	**0.0268**	**0.0117**	**0.0386**						**276.1078**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**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**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	3/20/2022	3/25/2022	5	5	
2	Grading	Grading	3/26/2022	4/6/2022	5	8	
3	Trenching	Trenching	4/7/2022	4/18/2022	5	8	
4	Building Construction	Building Construction	4/19/2022	3/6/2023	5	230	
5	Paving	Paving	3/7/2023	3/30/2023	5	18	
6	Archetectural Coating	Architectural Coating	3/31/2023	4/25/2023	5	18	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 22,500; Non-Residential Outdoor: 7,500; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Regional San Biogas - Sacramento Metropolitan AQMD Air District, Winter

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Trenching	Excavators	1	8.00	158	0.38
Trenching	Forklifts	1	8.00	89	0.20
Trenching	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Trenching	Trenchers	1	8.00	78	0.50
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	2	6.00	132	0.36
Paving	Rollers	2	6.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Archetectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	7	18.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Trenching	4	10.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	6.00	2.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Archetectural Coating	1	1.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307						0.0000
Off-Road	3.1701	33.0835	19.6978			1.6126	1.6126		1.4836	1.4836						3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**		**18.0663**	**1.6126**	**19.6788**	**9.9307**	**1.4836**	**11.4143**						**3,715.8655**

3.2 Site Preparation - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0621	0.0410	0.4212		0.1369	9.0000e-004	0.1378	0.0363	8.3000e-004	0.0372						116.9035
Total	**0.0621**	**0.0410**	**0.4212**		**0.1369**	**9.0000e-004**	**0.1378**	**0.0363**	**8.3000e-004**	**0.0372**						**116.9035**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.1298	0.0000	8.1298	4.4688	0.0000	4.4688						0.0000
Off-Road	3.1701	33.0835	19.6978			1.6126	1.6126		1.4836	1.4836						3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**		**8.1298**	**1.6126**	**9.7424**	**4.4688**	**1.4836**	**5.9524**						**3,715.8655**

3.2 Site Preparation - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0621	0.0410	0.4212		0.1262	9.0000e-004	0.1271	0.0337	8.3000e-004	0.0345						116.9035
Total	**0.0621**	**0.0410**	**0.4212**		**0.1262**	**9.0000e-004**	**0.1271**	**0.0337**	**8.3000e-004**	**0.0345**						**116.9035**

3.3 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675						0.0000
Off-Road	1.9486	20.8551	15.2727			0.9409	0.9409		0.8656	0.8656						2,895.2684
Total	**1.9486**	**20.8551**	**15.2727**		**6.5523**	**0.9409**	**7.4932**	**3.3675**	**0.8656**	**4.2331**						**2,895.2684**

3.3 Grading - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0518	0.0342	0.3510		0.1141	7.5000e-004	0.1149	0.0303	6.9000e-004	0.0310						97.4196
Total	**0.0518**	**0.0342**	**0.3510**		**0.1141**	**7.5000e-004**	**0.1149**	**0.0303**	**6.9000e-004**	**0.0310**						**97.4196**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.9486	0.0000	2.9486	1.5154	0.0000	1.5154						0.0000
Off-Road	1.9486	20.8551	15.2727			0.9409	0.9409		0.8656	0.8656						2,895.2684
Total	**1.9486**	**20.8551**	**15.2727**		**2.9486**	**0.9409**	**3.8894**	**1.5154**	**0.8656**	**2.3810**						**2,895.2684**

3.3 Grading - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0518	0.0342	0.3510		0.1052	7.5000e-004	0.1059	0.0281	6.9000e-004	0.0288						97.4196
Total	**0.0518**	**0.0342**	**0.3510**		**0.1052**	**7.5000e-004**	**0.1059**	**0.0281**	**6.9000e-004**	**0.0288**						**97.4196**

3.4 Trenching - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8446	7.8872	9.2458			0.4854	0.4854		0.4466	0.4466						1,286.5535
Total	**0.8446**	**7.8872**	**9.2458**			**0.4854**	**0.4854**		**0.4466**	**0.4466**						**1,286.5535**

3.4 Trenching - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0345	0.0228	0.2340		0.0761	5.0000e-004	0.0766	0.0202	4.6000e-004	0.0206						64.9464
Total	**0.0345**	**0.0228**	**0.2340**		**0.0761**	**5.0000e-004**	**0.0766**	**0.0202**	**4.6000e-004**	**0.0206**						**64.9464**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8446	7.8872	9.2458			0.4854	0.4854		0.4466	0.4466						1,286.5535
Total	**0.8446**	**7.8872**	**9.2458**			**0.4854**	**0.4854**		**0.4466**	**0.4466**						**1,286.5535**

3.4 Trenching - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0345	0.0228	0.2340		0.0701	5.0000e-004	0.0706	0.0187	4.6000e-004	0.0192						64.9464
Total	**0.0345**	**0.0228**	**0.2340**		**0.0701**	**5.0000e-004**	**0.0706**	**0.0187**	**4.6000e-004**	**0.0192**						**64.9464**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634			0.8090	0.8090		0.7612	0.7612						2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**			**0.8090**	**0.8090**		**0.7612**	**0.7612**						**2,569.6322**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	6.0800e-003	0.1938	0.0549		0.0120	5.1000e-004	0.0126	3.4600e-003	4.9000e-004	3.9500e-003						50.5729
Worker	0.0207	0.0137	0.1404		0.0456	3.0000e-004	0.0459	0.0121	2.8000e-004	0.0124						38.9678
Total	**0.0268**	**0.2075**	**0.1953**		**0.0577**	**8.1000e-004**	**0.0585**	**0.0156**	**7.7000e-004**	**0.0163**						**89.5407**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634			0.8090	0.8090		0.7612	0.7612						2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**			**0.8090**	**0.8090**		**0.7612**	**0.7612**						**2,569.6322**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	6.0800e-003	0.1938	0.0549		0.0113	5.1000e-004	0.0118	3.2700e-003	4.9000e-004	3.7600e-003						50.5729
Worker	0.0207	0.0137	0.1404		0.0421	3.0000e-004	0.0424	0.0112	2.8000e-004	0.0115						38.9678
Total	**0.0268**	**0.2075**	**0.1953**		**0.0533**	**8.1000e-004**	**0.0541**	**0.0145**	**7.7000e-004**	**0.0153**						**89.5407**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5728	14.3849	16.2440			0.6997	0.6997		0.6584	0.6584						2,570.4061
Total	**1.5728**	**14.3849**	**16.2440**			**0.6997**	**0.6997**		**0.6584**	**0.6584**						**2,570.4061**

3.5 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	4.8200e-003	0.1636	0.0484		0.0120	2.5000e-004	0.0123	3.4600e-003	2.4000e-004	3.7000e-003						49.6337
Worker	0.0194	0.0123	0.1286		0.0456	2.9000e-004	0.0459	0.0121	2.7000e-004	0.0124						37.5034
Total	**0.0242**	**0.1759**	**0.1770**		**0.0577**	**5.4000e-004**	**0.0582**	**0.0156**	**5.1000e-004**	**0.0161**						**87.1371**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5728	14.3849	16.2440			0.6997	0.6997		0.6584	0.6584						2,570.4061
Total	**1.5728**	**14.3849**	**16.2440**			**0.6997**	**0.6997**		**0.6584**	**0.6584**						**2,570.4061**

3.5 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	4.8200e-003	0.1636	0.0484		0.0113	2.5000e-004	0.0115	3.2700e-003	2.4000e-004	3.5100e-003						49.6337
Worker	0.0194	0.0123	0.1286		0.0421	2.9000e-004	0.0424	0.0112	2.7000e-004	0.0115						37.5034
Total	**0.0242**	**0.1759**	**0.1770**		**0.0533**	**5.4000e-004**	**0.0539**	**0.0145**	**5.1000e-004**	**0.0150**						**87.1371**

3.6 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.9181	8.7903	12.1905			0.4357	0.4357		0.4025	0.4025						1,819.6122
Paving	0.0000					0.0000	0.0000		0.0000	0.0000						0.0000
Total	**0.9181**	**8.7903**	**12.1905**			**0.4357**	**0.4357**		**0.4025**	**0.4025**						**1,819.6122**

3.6 Paving - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0647	0.0410	0.4288		0.1521	9.8000e-004	0.1531	0.0404	9.0000e-004	0.0413						125.0114
Total	**0.0647**	**0.0410**	**0.4288**		**0.1521**	**9.8000e-004**	**0.1531**	**0.0404**	**9.0000e-004**	**0.0413**						**125.0114**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.9181	8.7903	12.1905			0.4357	0.4357		0.4025	0.4025						1,819.6122
Paving	0.0000					0.0000	0.0000		0.0000	0.0000						0.0000
Total	**0.9181**	**8.7903**	**12.1905**			**0.4357**	**0.4357**		**0.4025**	**0.4025**						**1,819.6122**

3.6 Paving - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	0.0647	0.0410	0.4288		0.1402	9.8000e-004	0.1412	0.0374	9.0000e-004	0.0383						125.0114
Total	**0.0647**	**0.0410**	**0.4288**		**0.1402**	**9.8000e-004**	**0.1412**	**0.0374**	**9.0000e-004**	**0.0383**						**125.0114**

3.7 Archetectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	7.7250					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	0.1917	1.3030	1.8111			0.0708	0.0708		0.0708	0.0708						281.8690
Total	**7.9167**	**1.3030**	**1.8111**			**0.0708**	**0.0708**		**0.0708**	**0.0708**						**281.8690**

3.7 Archetectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	3.2300e-003	2.0500e-003	0.0214		7.6100e-003	5.0000e-005	7.6600e-003	2.0200e-003	4.0000e-005	2.0600e-003						6.2506
Total	**3.2300e-003**	**2.0500e-003**	**0.0214**		**7.6100e-003**	**5.0000e-005**	**7.6600e-003**	**2.0200e-003**	**4.0000e-005**	**2.0600e-003**						**6.2506**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	7.7250					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	0.1917	1.3030	1.8111			0.0708	0.0708		0.0708	0.0708						281.8690
Total	**7.9167**	**1.3030**	**1.8111**			**0.0708**	**0.0708**		**0.0708**	**0.0708**						**281.8690**

3.7 Archetectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	3.2300e-003	2.0500e-003	0.0214		7.0100e-003	5.0000e-005	7.0600e-003	1.8700e-003	4.0000e-005	1.9200e-003						6.2506
Total	**3.2300e-003**	**2.0500e-003**	**0.0214**		**7.0100e-003**	**5.0000e-005**	**7.0600e-003**	**1.8700e-003**	**4.0000e-005**	**1.9200e-003**						**6.2506**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0204	0.0970	0.2894		0.1004	7.9000e-004	0.1012	0.0268	7.4000e-004	0.0276						101.9409
Unmitigated	0.0204	0.0970	0.2894		0.1004	7.9000e-004	0.1012	0.0268	7.4000e-004	0.0276						101.9409

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	13.95	13.95	13.95	47,366	47,366
Total	13.95	13.95	13.95	47,366	47,366

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	10.00	0.00	0.00	100.00	0.00	0.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.566033	0.037143	0.208217	0.113428	0.016713	0.004955	0.018463	0.024036	0.001978	0.001883	0.005758	0.000618	0.000776

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0159	0.1443	0.1212			0.0110	0.0110		0.0110	0.0110						174.1634
NaturalGas Unmitigated	0.0159	0.1443	0.1212			0.0110	0.0110		0.0110	0.0110						174.1634

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	1471.64	0.0159	0.1443	0.1212			0.0110	0.0110		0.0110	0.0110						174.1634
Total		**0.0159**	**0.1443**	**0.1212**			**0.0110**	**0.0110**		**0.0110**	**0.0110**						**174.1634**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Light Industry	1.47164	0.0159	0.1443	0.1212			0.0110	0.0110		0.0110	0.0110						174.1634
Total		**0.0159**	**0.1443**	**0.1212**			**0.0110**	**0.0110**		**0.0110**	**0.0110**						**174.1634**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.3592	1.0000e-005	1.5300e-003			1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.5000e-003
Unmitigated	0.3592	1.0000e-005	1.5300e-003			1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.5000e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0381					0.0000	0.0000		0.0000	0.0000						0.0000
Consumer Products	0.3210					0.0000	0.0000		0.0000	0.0000						0.0000
Landscaping	1.4000e-004	1.0000e-005	1.5300e-003			1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.5000e-003
Total	**0.3592**	**1.0000e-005**	**1.5300e-003**			**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**						**3.5000e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0381					0.0000	0.0000		0.0000	0.0000						0.0000
Consumer Products	0.3210					0.0000	0.0000		0.0000	0.0000						0.0000
Landscaping	1.4000e-004	1.0000e-005	1.5300e-003			1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005						3.5000e-003
Total	**0.3592**	**1.0000e-005**	**1.5300e-003**			**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**						**3.5000e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Regional San Biogas

Sacramento Metropolitan AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	15.00	1000sqft	3.40	15,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	3.5	**Precipitation Freq (Days)**	58
Climate Zone	6			**Operational Year**	2024
Utility Company	User Defined				
CO2 Intensity (lb/MWhr)	0	**CH4 Intensity (lb/MWhr)**	0	**N2O Intensity (lb/MWhr)**	0

1.3 User Entered Comments & Non-Default Data

Regional San Biogas - Sacramento Metropolitan AQMD Air District, Annual

Project Characteristics - This model run is for estimating emiss from proj construction, and area- and mobile-source emiss assoc w/ operation. Stationary-source and indirect emis associated with electricity consumption are estimated separately from CalEEMod.

Land Use - Approximately 3.4 acres for the project area and 2.2 acres for Contractor laydown (5.6 acres total).

Construction Phase - Assumption: Trenching phase will take similar time as grading phase.

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - The equipment types selected reflect the need for trenching and installation of underground pipes and/or utilities.

Trips and VMT -

Demolition - The project would not involve the demolition of existing buildings or facilities.

Grading -

Vehicle Trips - Operation of the project would require up to 10 additional full-time employees to operate and maintain the new facilities. It is assumed that 7 employees would work on a single day and every employee would make 2 one-way trips per day.

Landscape Equipment - It’s not anticipated that the project would result in additional landscape maintenance activity.

Energy Use -

Water And Wastewater - The project would result in a nominal increase in the consumption of water and generation of wastewater associated with the 10 additional employees. Therefore, these emissions are not estimated.

Solid Waste - The project would result in a nominal increase in the generation of solid waste and, therefore, associated emissions are not estimated.

Land Use Change - The project would result in no changes to vegetation.

Construction Off-road Equipment Mitigation - Consistent with SMAQMD’s modeling guidance, unpaved areas would be watered 2x/day.

Stationary Sources - Emergency Generators and Fire Pumps - Stationary-source emissions are estimated “off model” (separately from this CalEEMod run).

Regional San Biogas - Sacramento Metropolitan AQMD Air District, Annual

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	9
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblLandscapeEquipment	NumberSummerDays	250	1
tblLandUse	LotAcreage	0.34	3.40
tblVehicleTrips	CC_TL	5.00	0.00
tblVehicleTrips	CC_TTP	28.00	0.00
tblVehicleTrips	CNW_TL	6.50	0.00
tblVehicleTrips	CNW_TTP	13.00	0.00
tblVehicleTrips	CW_TTP	59.00	100.00
tblVehicleTrips	ST_TR	1.32	0.93
tblVehicleTrips	SU_TR	0.68	0.93
tblVehicleTrips	WD_TR	6.97	0.93
tblWater	IndoorWaterUseRate	3,468,750.00	52,000.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.1789	1.6536	1.6736		0.0776	0.0843	0.1618	0.0400	0.0791	0.1190						246.5786
2023	0.1168	0.4261	0.5076		2.6700e-003	0.0207	0.0233	7.2000e-004	0.0194	0.0201						73.7500
Maximum	**0.1789**	**1.6536**	**1.6736**		**0.0776**	**0.0843**	**0.1618**	**0.0400**	**0.0791**	**0.1190**						**246.5786**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.1789	1.6536	1.6736		0.0379	0.0843	0.1221	0.0188	0.0791	0.0979						246.5783
2023	0.1168	0.4261	0.5076		2.4700e-003	0.0207	0.0231	6.7000e-004	0.0194	0.0201						73.7499
Maximum	**0.1789**	**1.6536**	**1.6736**		**0.0379**	**0.0843**	**0.1221**	**0.0188**	**0.0791**	**0.0979**						**246.5783**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**49.75**	**0.00**	**21.57**	**52.17**	**0.00**	**15.25**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	3-20-2022	6-19-2022	0.6023	0.6023
2	6-20-2022	9-19-2022	0.5767	0.5767
3	9-20-2022	12-19-2022	0.5706	0.5706
4	12-20-2022	3-19-2023	0.4959	0.4959
5	3-20-2023	6-19-2023	0.1242	0.1242
		Highest	0.6023	0.6023

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0655	0.0000	0.0000			0.0000	0.0000		0.0000	0.0000						0.0000
Energy	2.9000e-003	0.0263	0.0221			2.0000e-003	2.0000e-003		2.0000e-003	2.0000e-003						28.8347
Mobile	3.9200e-003	0.0171	0.0516		0.0177	1.4000e-004	0.0178	4.7300e-003	1.3000e-004	4.8600e-003						17.2127
Waste						0.0000	0.0000		0.0000	0.0000						9.3540
Water						0.0000	0.0000		0.0000	0.0000						0.0319
Total	**0.0724**	**0.0435**	**0.0737**		**0.0177**	**2.1400e-003**	**0.0198**	**4.7300e-003**	**2.1300e-003**	**6.8600e-003**						**55.4333**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0655	0.0000	0.0000			0.0000	0.0000		0.0000	0.0000						0.0000
Energy	2.9000e-003	0.0263	0.0221			2.0000e-003	2.0000e-003		2.0000e-003	2.0000e-003						28.8347
Mobile	3.9200e-003	0.0171	0.0516		0.0177	1.4000e-004	0.0178	4.7300e-003	1.3000e-004	4.8600e-003						17.2127
Waste						0.0000	0.0000		0.0000	0.0000						9.3540
Water						0.0000	0.0000		0.0000	0.0000						0.0319
Total	**0.0724**	**0.0435**	**0.0737**		**0.0177**	**2.1400e-003**	**0.0198**	**4.7300e-003**	**2.1300e-003**	**6.8600e-003**						**55.4333**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**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**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Regional San Biogas - Sacramento Metropolitan AQMD Air District, Annual

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	3/20/2022	3/25/2022	5	5	
2	Grading	Grading	3/26/2022	4/6/2022	5	8	
3	Trenching	Trenching	4/7/2022	4/18/2022	5	8	
4	Building Construction	Building Construction	4/19/2022	3/6/2023	5	230	
5	Paving	Paving	3/7/2023	3/30/2023	5	18	
6	Archetectural Coating	Architectural Coating	3/31/2023	4/25/2023	5	18	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 22,500; Non-Residential Outdoor: 7,500; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Regional San Biogas - Sacramento Metropolitan AQMD Air District, Annual

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Trenching	Excavators	1	8.00	158	0.38
Trenching	Forklifts	1	8.00	89	0.20
Trenching	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Trenching	Trenchers	1	8.00	78	0.50
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	2	6.00	132	0.36
Paving	Rollers	2	6.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Archetectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	7	18.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Trenching	4	10.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	6.00	2.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT
Archetectural Coating	1	1.00	0.00	0.00	10.00	6.50	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0452	0.0000	0.0452	0.0248	0.0000	0.0248						0.0000
Off-Road	7.9300e-003	0.0827	0.0492			4.0300e-003	4.0300e-003		3.7100e-003	3.7100e-003						8.4274
Total	**7.9300e-003**	**0.0827**	**0.0492**		**0.0452**	**4.0300e-003**	**0.0492**	**0.0248**	**3.7100e-003**	**0.0285**						**8.4274**

3.2 Site Preparation - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	1.5000e-004	9.0000e-005	1.0500e-003		3.3000e-004	0.0000	3.3000e-004	9.0000e-005	0.0000	9.0000e-005						0.2729
Total	**1.5000e-004**	**9.0000e-005**	**1.0500e-003**		**3.3000e-004**	**0.0000**	**3.3000e-004**	**9.0000e-005**	**0.0000**	**9.0000e-005**						**0.2729**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0203	0.0000	0.0203	0.0112	0.0000	0.0112						0.0000
Off-Road	7.9300e-003	0.0827	0.0492			4.0300e-003	4.0300e-003		3.7100e-003	3.7100e-003						8.4274
Total	**7.9300e-003**	**0.0827**	**0.0492**		**0.0203**	**4.0300e-003**	**0.0244**	**0.0112**	**3.7100e-003**	**0.0149**						**8.4274**

3.2 Site Preparation - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	1.5000e-004	9.0000e-005	1.0500e-003		3.0000e-004	0.0000	3.1000e-004	8.0000e-005	0.0000	8.0000e-005						0.2729
Total	**1.5000e-004**	**9.0000e-005**	**1.0500e-003**		**3.0000e-004**	**0.0000**	**3.1000e-004**	**8.0000e-005**	**0.0000**	**8.0000e-005**						**0.2729**

3.3 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0262	0.0000	0.0262	0.0135	0.0000	0.0135						0.0000
Off-Road	7.7900e-003	0.0834	0.0611			3.7600e-003	3.7600e-003		3.4600e-003	3.4600e-003						10.5062
Total	**7.7900e-003**	**0.0834**	**0.0611**		**0.0262**	**3.7600e-003**	**0.0300**	**0.0135**	**3.4600e-003**	**0.0169**						**10.5062**

3.3 Grading - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	1.9000e-004	1.2000e-004	1.4000e-003		4.4000e-004	0.0000	4.4000e-004	1.2000e-004	0.0000	1.2000e-004						0.3639
Total	**1.9000e-004**	**1.2000e-004**	**1.4000e-003**		**4.4000e-004**	**0.0000**	**4.4000e-004**	**1.2000e-004**	**0.0000**	**1.2000e-004**						**0.3639**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0118	0.0000	0.0118	6.0600e-003	0.0000	6.0600e-003						0.0000
Off-Road	7.7900e-003	0.0834	0.0611			3.7600e-003	3.7600e-003		3.4600e-003	3.4600e-003						10.5062
Total	**7.7900e-003**	**0.0834**	**0.0611**		**0.0118**	**3.7600e-003**	**0.0156**	**6.0600e-003**	**3.4600e-003**	**9.5200e-003**						**10.5062**

3.3 Grading - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	1.9000e-004	1.2000e-004	1.4000e-003		4.1000e-004	0.0000	4.1000e-004	1.1000e-004	0.0000	1.1000e-004						0.3639
Total	**1.9000e-004**	**1.2000e-004**	**1.4000e-003**		**4.1000e-004**	**0.0000**	**4.1000e-004**	**1.1000e-004**	**0.0000**	**1.1000e-004**						**0.3639**

3.4 Trenching - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.3800e-003	0.0316	0.0370			1.9400e-003	1.9400e-003		1.7900e-003	1.7900e-003						4.6686
Total	**3.3800e-003**	**0.0316**	**0.0370**			**1.9400e-003**	**1.9400e-003**		**1.7900e-003**	**1.7900e-003**						**4.6686**

3.4 Trenching - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	1.3000e-004	8.0000e-005	9.3000e-004		2.9000e-004	0.0000	3.0000e-004	8.0000e-005	0.0000	8.0000e-005						0.2426
Total	**1.3000e-004**	**8.0000e-005**	**9.3000e-004**		**2.9000e-004**	**0.0000**	**3.0000e-004**	**8.0000e-005**	**0.0000**	**8.0000e-005**						**0.2426**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.3800e-003	0.0316	0.0370			1.9400e-003	1.9400e-003		1.7900e-003	1.7900e-003						4.6686
Total	**3.3800e-003**	**0.0316**	**0.0370**			**1.9400e-003**	**1.9400e-003**		**1.7900e-003**	**1.7900e-003**						**4.6686**

3.4 Trenching - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	1.3000e-004	8.0000e-005	9.3000e-004		2.7000e-004	0.0000	2.7000e-004	7.0000e-005	0.0000	7.0000e-005						0.2426
Total	**1.3000e-004**	**8.0000e-005**	**9.3000e-004**		**2.7000e-004**	**0.0000**	**2.7000e-004**	**7.0000e-005**	**0.0000**	**7.0000e-005**						**0.2426**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1570	1.4366	1.5054			0.0744	0.0744		0.0700	0.0700						214.4641
Total	**0.1570**	**1.4366**	**1.5054**			**0.0744**	**0.0744**		**0.0700**	**0.0700**						**214.4641**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	5.4000e-004	0.0179	4.6400e-003		1.0800e-003	5.0000e-005	1.1200e-003	3.1000e-004	4.0000e-005	3.5000e-004						4.2855
Worker	1.7900e-003	1.1200e-003	0.0128		4.0500e-003	3.0000e-005	4.0800e-003	1.0800e-003	3.0000e-005	1.1000e-003						3.3475
Total	**2.3300e-003**	**0.0190**	**0.0175**		**5.1300e-003**	**8.0000e-005**	**5.2000e-003**	**1.3900e-003**	**7.0000e-005**	**1.4500e-003**						**7.6330**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1570	1.4366	1.5054			0.0744	0.0744		0.0700	0.0700						214.4638
Total	**0.1570**	**1.4366**	**1.5054**			**0.0744**	**0.0744**		**0.0700**	**0.0700**						**214.4638**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	5.4000e-004	0.0179	4.6400e-003		1.0100e-003	5.0000e-005	1.0500e-003	2.9000e-004	4.0000e-005	3.4000e-004						4.2855
Worker	1.7900e-003	1.1200e-003	0.0128		3.7400e-003	3.0000e-005	3.7700e-003	1.0000e-003	3.0000e-005	1.0300e-003						3.3475
Total	**2.3300e-003**	**0.0190**	**0.0175**		**4.7500e-003**	**8.0000e-005**	**4.8200e-003**	**1.2900e-003**	**7.0000e-005**	**1.3700e-003**						**7.6330**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0362	0.3309	0.3736			0.0161	0.0161		0.0151	0.0151						53.6322
Total	**0.0362**	**0.3309**	**0.3736**			**0.0161**	**0.0161**		**0.0151**	**0.0151**						**53.6322**

3.5 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	1.1000e-004	3.7800e-003	1.0300e-003		2.7000e-004	1.0000e-005	2.7000e-004	8.0000e-005	1.0000e-005	8.0000e-005						1.0515
Worker	4.2000e-004	2.5000e-004	2.9500e-003		1.0100e-003	1.0000e-005	1.0200e-003	2.7000e-004	1.0000e-005	2.8000e-004						0.8054
Total	**5.3000e-004**	**4.0300e-003**	**3.9800e-003**		**1.2800e-003**	**2.0000e-005**	**1.2900e-003**	**3.5000e-004**	**2.0000e-005**	**3.6000e-004**						**1.8569**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0362	0.3309	0.3736			0.0161	0.0161		0.0151	0.0151						53.6321
Total	**0.0362**	**0.3309**	**0.3736**			**0.0161**	**0.0161**		**0.0151**	**0.0151**						**53.6321**

3.5 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	1.1000e-004	3.7800e-003	1.0300e-003		2.5000e-004	1.0000e-005	2.6000e-004	7.0000e-005	1.0000e-005	8.0000e-005						1.0515
Worker	4.2000e-004	2.5000e-004	2.9500e-003		9.3000e-004	1.0000e-005	9.4000e-004	2.5000e-004	1.0000e-005	2.6000e-004						0.8054
Total	**5.3000e-004**	**4.0300e-003**	**3.9800e-003**		**1.1800e-003**	**2.0000e-005**	**1.2000e-003**	**3.2000e-004**	**2.0000e-005**	**3.4000e-004**						**1.8569**

3.6 Paving - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.2600e-003	0.0791	0.1097			3.9200e-003	3.9200e-003		3.6200e-003	3.6200e-003						14.8565
Paving	0.0000					0.0000	0.0000		0.0000	0.0000						0.0000
Total	**8.2600e-003**	**0.0791**	**0.1097**			**3.9200e-003**	**3.9200e-003**		**3.6200e-003**	**3.6200e-003**						**14.8565**

3.6 Paving - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	5.5000e-004	3.3000e-004	3.8400e-003		1.3200e-003	1.0000e-005	1.3300e-003	3.5000e-004	1.0000e-005	3.6000e-004						1.0506
Total	**5.5000e-004**	**3.3000e-004**	**3.8400e-003**		**1.3200e-003**	**1.0000e-005**	**1.3300e-003**	**3.5000e-004**	**1.0000e-005**	**3.6000e-004**						**1.0506**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.2600e-003	0.0791	0.1097			3.9200e-003	3.9200e-003		3.6200e-003	3.6200e-003						14.8565
Paving	0.0000					0.0000	0.0000		0.0000	0.0000						0.0000
Total	**8.2600e-003**	**0.0791**	**0.1097**			**3.9200e-003**	**3.9200e-003**		**3.6200e-003**	**3.6200e-003**						**14.8565**

3.6 Paving - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	5.5000e-004	3.3000e-004	3.8400e-003		1.2200e-003	1.0000e-005	1.2300e-003	3.3000e-004	1.0000e-005	3.3000e-004						1.0506
Total	**5.5000e-004**	**3.3000e-004**	**3.8400e-003**		**1.2200e-003**	**1.0000e-005**	**1.2300e-003**	**3.3000e-004**	**1.0000e-005**	**3.3000e-004**						**1.0506**

3.7 Archetectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0695					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	1.7200e-003	0.0117	0.0163			6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004						2.3014
Total	**0.0713**	**0.0117**	**0.0163**			**6.4000e-004**	**6.4000e-004**		**6.4000e-004**	**6.4000e-004**						**2.3014**

3.7 Archetectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	3.0000e-005	2.0000e-005	1.9000e-004		7.0000e-005	0.0000	7.0000e-005	2.0000e-005	0.0000	2.0000e-005						0.0525
Total	**3.0000e-005**	**2.0000e-005**	**1.9000e-004**		**7.0000e-005**	**0.0000**	**7.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**						**0.0525**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0695					0.0000	0.0000		0.0000	0.0000						0.0000
Off-Road	1.7200e-003	0.0117	0.0163			6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004						2.3014
Total	**0.0713**	**0.0117**	**0.0163**			**6.4000e-004**	**6.4000e-004**		**6.4000e-004**	**6.4000e-004**						**2.3014**

3.7 Archetectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Vendor	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						0.0000
Worker	3.0000e-005	2.0000e-005	1.9000e-004		6.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005						0.0525
Total	**3.0000e-005**	**2.0000e-005**	**1.9000e-004**		**6.0000e-005**	**0.0000**	**6.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**						**0.0525**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	3.9200e-003	0.0171	0.0516		0.0177	1.4000e-004	0.0178	4.7300e-003	1.3000e-004	4.8600e-003						17.2127
Unmitigated	3.9200e-003	0.0171	0.0516		0.0177	1.4000e-004	0.0178	4.7300e-003	1.3000e-004	4.8600e-003						17.2127

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	13.95	13.95	13.95	47,366	47,366
Total	13.95	13.95	13.95	47,366	47,366

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	10.00	0.00	0.00	100.00	0.00	0.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.566033	0.037143	0.208217	0.113428	0.016713	0.004955	0.018463	0.024036	0.001978	0.001883	0.005758	0.000618	0.000776

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000						0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000						0.0000
NaturalGas Mitigated	2.9000e-003	0.0263	0.0221			2.0000e-003	2.0000e-003		2.0000e-003	2.0000e-003						28.8347
NaturalGas Unmitigated	2.9000e-003	0.0263	0.0221			2.0000e-003	2.0000e-003		2.0000e-003	2.0000e-003						28.8347

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	537150	2.9000e-003	0.0263	0.0221			2.0000e-003	2.0000e-003		2.0000e-003	2.0000e-003						28.8347
Total		**2.9000e-003**	**0.0263**	**0.0221**			**2.0000e-003**	**2.0000e-003**		**2.0000e-003**	**2.0000e-003**						**28.8347**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	537150	2.9000e-003	0.0263	0.0221			2.0000e-003	2.0000e-003		2.0000e-003	2.0000e-003						28.8347
Total		**2.9000e-003**	**0.0263**	**0.0221**			**2.0000e-003**	**2.0000e-003**		**2.0000e-003**	**2.0000e-003**						**28.8347**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	227700				0.0000
Total					**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	227700				0.0000
Total					**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0655	0.0000	0.0000			0.0000	0.0000		0.0000	0.0000						0.0000
Unmitigated	0.0655	0.0000	0.0000			0.0000	0.0000		0.0000	0.0000						0.0000

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	6.9500e-003					0.0000	0.0000		0.0000	0.0000						0.0000
Consumer Products	0.0586					0.0000	0.0000		0.0000	0.0000						0.0000
Landscaping	0.0000	0.0000	0.0000			0.0000	0.0000		0.0000	0.0000						0.0000
Total	**0.0655**	**0.0000**	**0.0000**			**0.0000**	**0.0000**		**0.0000**	**0.0000**						**0.0000**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	6.9500e-003					0.0000	0.0000		0.0000	0.0000						0.0000
Consumer Products	0.0586					0.0000	0.0000		0.0000	0.0000						0.0000
Landscaping	0.0000	0.0000	0.0000			0.0000	0.0000		0.0000	0.0000						0.0000
Total	**0.0655**	**0.0000**	**0.0000**			**0.0000**	**0.0000**		**0.0000**	**0.0000**						**0.0000**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated				0.0319
Unmitigated				0.0319

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	0.052 / 0				0.0319
Total					**0.0319**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	0.052 / 0				0.0319
Total					**0.0319**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated				9.3540
Unmitigated				9.3540

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	18.6				9.3540
Total					**9.3540**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	18.6				9.3540
Total					**9.3540**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Sacramento Regional Wastewater Treatment Plant (SRWTP) Renewable Combined Heat and Power (CHP) Project

METHODOLOGY

Emissions of criteria pollutants and greenhouse gasses were estimated using the methods and tools described in the Sacramento Metropolitan Air Quality Management District's (SMAQMD's) *Guide to Air Quality Assessment in Sacramento County*, October 2020 update (SMAQMD CEQA Guide).

Additional guidance was derived from SMAQMD's *Recommended Guidance for Land Use Emission Reductions, Version 4.2 (for Operational Emissions)*, July 16, 2020 (SMAQMD Mitigation Guide) and the California Air Pollution Control Officers Associations' (CAPCOA's) *Quantifying Greenhouse Gas Mitigation Measures*, August 2010 (CAPCOA Guide) as noted.

Construction and operation emissions were compared to SMAQMD's adopted thresholds of significance contained in Chapter 2 of the SMAQMD CEQA Guide.

Construction

Short-term construction-related emissions of criteria air pollutants, precursors, and GHG emissions were calculated using project-specific information (e.g., size, area to be graded, area to be paved) where available; reasonable assumptions based on typical construction activities; and default values in CAPCOA's California Emissions Estimator Model (CalEEMod), Version 2016.3.2 for the project's location and land use subtype.

CalEEMod Project Setup

Within CalEEMod, the project was established as belonging to the General Heavy Industry land use subtype, with a building area of ##### sq. ft., and a lot acreage of #.# acres. This reflects the building size of the new engine hall and the area that will be cleared, graded, and used for construction (including staging areas). Default CalEEMod values were used for construction phases, with the exception that a custom phasing schedule was input based on the anticipated project build schedule.

Additionally, the Basic Construction Emission Control Practices (Best Management Practices) listed in the Appendix to Chapter 3 of SMAQMD CEQA Guide were selected as CalEEMod inputs to the degree possible. These measures include:

- Water all exposed surfaces two times daily. Exposed surfaces include, but are not limited to soil piles, graded areas, unpaved parking areas, staging areas, and access roads.
- Cover or maintain at least two feet of free board space on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks that would be traveling along freeways or major roadways should be covered.
- Use wet power vacuum street sweepers to remove any visible trackout mud or dirt onto adjacent public roads at least once a day. Use of dry power sweeping is prohibited.
- Limit vehicle speeds on unpaved roads to 15 miles per hour (mph).
- All roadways, driveways, sidewalks, parking lots to be paved should be completed as soon as possible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders are used.
- Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes [California Code of Regulations, Title 13, sections 2449(d)(3) and 2485]. Provide clear signage that posts this requirement for workers at the entrances to the site.

- Provide current certificate(s) of compliance for CARB's In-Use Off-Road Diesel-Fueled Fleets Regulation [California Code of Regulations, Title 13, sections 2449 and 2449.1]. For more information contact CARB at 877-593-6677, doors@arb.ca.gov, or www.arb.ca.gov/doors/compliance_cert1.html.
- Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determine to be running in proper condition before it is operated.

The CalEEMod project setup inputs are summarized in Table 3.2-1. Daily and annual emissions are compared to SMAQMD's Thresholds in Table 3.2-2. Additional CalEEMod model assumptions, such as equipment numbers, ratings (horsepower), and operating schedules, are shown on the CalEEMod output reports contained in Appendix C.

Table 3.1-1 CalEEMod Inputs

CalEEMod Screen	Parameter	Value
Project Characteristics	Project Location	Sacramento Metropolitan AQMD
Project Characteristics	CEC Forecasting Climate Zone	6
Project Characteristics	Start of Construction	January 1, 2024
Project Characteristics	Operational Year	2025
Project Characteristics	Utility Company	Sacramento Municipal Utilities District
Land Use	Type/Subtype	Industrial/General Heavy Industry
Land Use	Unit Amount/Size Metric	##,### Sq. Ft.
Land Use	Lot Acreage	#.# Acres
Mitigation - Construction	Replace Ground Cover of Area Disturbed	15% Reduction $PM_{10}/PM_{2.5}$[a]
Mitigation - Construction	Lot Water Exposed Area	2 Times Per Day
Mitigation - Construction	Unpaved Road Mitigation	15 mph Vehicle Speed Limit
Mitigation - Construction	Clean Paved Road	9% PM Reduction[b]

a From SCAQMD Table XI-E

b From SCAQMD Table XI-C

Table 3.1-2 Construction Emissions (lbs/day, metric tons/year for CO_2e)

	ROG	NOx	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
Construction Emissions							
SMAQMD CEQA Thresholds	-	85	-	-	80[a]	82[a]	1,100
Significant Impact?	No	No	No	No	No	No	No

a Project will apply all feasible Basic Construction Emission Control Practices (Best Management Practices) listed above.

As shown in Table 3.2-2, the project's construction emissions are below SMAQMD's thresholds of significance for all pollutants. However, the project will be required to implement the Basic Construction Emission Control Practices (Best Management Practices) listed in the Appendix to Chapter 3 of SMAQMD CEQA Guide.

Operations

The project's operational emissions of criteria air pollutants and precursors, as well as GHGs, involve stationary sources subject to SMAQMD's stationary source permitting program. These sources operate under Permits to Operate issued pursuant to SMAQMD Rule 201—*General Permit Requirements and Rule 207—Title V Federal Operating Permit Program* as described below. Additionally, project operational emissions will include small number of new vehicle trips generated by additional employees, vendors, and visitors to the SRWTP.

CalEEMod includes a degree of functionality for calculating stationary source emissions, such as emergency generators, and users may also manually input user-defined daily and annual stationary source emissions on the "Operational – Stationary Sources" screen.

Additionally, CalEEMod includes some functionality for calculating emission reductions of producing on-site renewable energy, on the "Mitigation – Energy Screen." CalEEMod's ability to evaluate on-site renewable energy production is intended to account for Measures [A-1] General Onsite Renewable Energy, [A-2] Onsite Solar Power, and [A-3] Onsite Wind Power as described in the CAPCOA Guide.

CalEEMod does not include functionality for quantifying Measure [A-4] Utilize a Combined Heat and Power System contained in the CAPCOA Guide. However, the SMAQMD Mitigation Guide allows for "Non-CalEEMod CAPCOA Measures" to be applied to be quantified and applied to project emissions as an off-model measure.[1] Hence, project operational emissions were not calculated using CalEEMod with the exception of vehicle emissions from new employees and vendors.

Project emissions are therefore calculated as direct emissions emitted by the new CHP project minus the direct emissions from the curtailment of flaring and shutting down the plant's existing boilers. There are also indirect emission benefits occurring at the neighboring Central Valley Financing Authority (CVFA) cogeneration plant due to displaced electricity and steam production. Each is discussed below.

Direct Emissions

Criteria and GHG emissions from the proposed CHP project were estimated using the expected emission rates of the CHP engines, along with the proposed maximum gross power output of 15.0 MW. With the exception of GHG emissions, engine emission rates will be dictated by the requirement to apply Best Available Control Technology (BACT) found in SMAQMD Rule 202—New Source Review, Section 302.

BACT will be determined on the date that the application is deemed complete pursuant to a top-down BACT determination. However, in order to estimate project emissions, recent BACT determinations for similar digester gas fueled engine were utilized. The actual BACT determination arrived at by SMAQMD may be lower than the emission factors shown below; hence, the emissions estimate is conservative. Additionally, the applicant may request lower emission factors and/or facility emission limits during the permitting process. The estimated BACT limits and emission factors used for this analysis are shown in Table 3.2-1.

Table 3.2-1 Operation BACT Limits and Emission Factors

Pollutant	Estimated BACT	Equivalent Emission Factor	Reference
VOC	25 ppmvd @ 15% O_2	0.90 g/bhp-hr	Applicant Request. SCAQMD BACT Determination A/N 546360 is 30 ppmvd @ 15% O_2
NOx	11 ppmvd @ 15% O_2	0.11 g/bhp-hr	SCAQMD BACT Determination A/N 546360
SO_2	100 ppmv of total sulfur in biogas	0.07 g/bhp-hr	BAAQMD BACT Determination, IC Engine – Biogas Fired ≥50 bhp Output, Document #: 96.2.4, 5/30/2013
PM_{10}	0.07 g/bhp-hr	0.07 g/bhp-hr	BAAQMD BACT Determination, IC Engine – Biogas Fired ≥50 bhp Output, Document #: 96.2.4, 5/30/2013
$PM_{2.5}$	0.07 g/bhp-hr	0.07 g/bhp-hr	Assumed to be the same as PM_{10}
CO	75 ppmvd @ 15% O_2	0.46 g/bhp-hr	Applicant Request. BAAQMD BACT Determination, IC Engine – Biogas Fired ≥50 bhp Output, Document #: 96.2.4, 5/30/2013 is 0.89 g/bhp-hr
CO_2	N/A	52.07 kg CO_2/mmBtu	Based on Table C-1 to 40 CFR 98, Subpart C Emission Factor for "Other Biomass Gasses"

[1] Page 38 states, "CalEEMod does not contain all measures listed in the CAPCOA guidance document, and the proponent may, with the consent of the SMAQMD, utilize a quantified measure listed in the CAPCOA guidance document."

Pollutant	Estimated BACT	Equivalent Emission Factor	Reference
CH_4	N/A	3.2 x 10^{-3} kg CH_4/mmBtu	Based on Table C-2 to 40 CFR 98, Subpart C Emission Factor for "Biomass Fuels—Gaseous (All fuel Types in Table C-1)"
N_2O	N/A	6.3 x 10^{-4} kg N_2O/mmBtu	Based on Table C-2 to 40 CFR 98, Subpart C Emission Factor for "Biomass Fuels—Gaseous (All fuel Types in Table C-1)"

Direct project emissions were calculated based on continuous operation at maximum rated load (15 MW of net power production. Direct project emissions from the CHP engines are shown in Table 3.2-2.

Table 3.2-2 Direct Operation –CHP Engine Emissions

Emissions	VOC	NOx	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
lbs/day	97.9	123.8	514	76.0	77.5	77.5	66,587
tons/year, metric tons/year for CO_2e	17.9	22.6	93.8	13.9	14.1	14.1	61,736

An additional direct effect of the project will be the curtailment of digester gas flaring in SRWTP's enclosed flares (ground flares) and waste gas burners. Flaring of treated and untreated digester gas occurs under a variety of planned and unplanned scenarios. The most likely cause of unplanned flaring is when CVFA does not accept SRWTP's digester gas for reasons outside the control of SRCSD. These reasons include planned and unplanned maintenance or a breakdown affecting SMUD's Cosumnes Power Plant (CPP) or the gas conditioning system and/or the combined cycle gas turbine at CVFA (discussed below in further under the hearing of Indirect Emission Changes).

Additionally, various planned and unplanned projects, as well as routine maintenance, may prohibit SRWTP from exporting its digester gas to CVFA for extended periods. These include maintenance of SRWTP's digesters, gas management system, H_2S scrubber system, and source testing of the enclosed flares. Furthermore, SRWTP has recently implemented new standard operating procedures to prevent the release of unburned biogas from the gas management system during unforeseeable overpressure events, resulting in the need for additional temporary preventative flaring. And finally, due to regional growth and the implementation of the EchoWater project, digester gas production rates are expected to increase beyond the physical constraints of the delivery system to CVFA.

Considering the above factors, SRWTP operating personnel estimate that 10% of the plant's current modelled maximum digester gas production (2,600 scfm) is flared for 40% of the hours of the year, primarily due to the above conditions and constraints. The effect of the CHP project will be to eliminate surplus flaring in this amount due to greater control and flexibility of the digester gas. SRWTP will operate its own digester gas conditioning system and will be able to schedule and stagger maintenance of the CHP engines such that downtime will be minimized. For the purposes of this analysis, it is assumed that the emission reductions will occur equally between the ground flares and waste gas burners, which approximates the current pattern of usage.

Reduced flaring emissions resulting from the project are shown in Table 3.2-3.

Table 3.2-3 Direct Operation – Reduced Flaring Emissions

Source	Fuel Consumption	VOC	NOx	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
	MMBtu/year[a]	lbs/MMBtu[b]						
Waste Gas Burners	16,945	0.03	0.08	0.05	0.0449	0.0137	0.0137	116.88
Ground Flares	16,945	0.03	0.06	0.37	0.0126	0.0137	0.0137	116.88
		lbs/day						
Waste Gas Burners	-	1.4	3.7	2.3	2.1	0.6	0.6	5,426
Ground Flares	-	1.4	2.8	17.2	0.6	0.6	0.6	5,426
		tons/year (metric tons/year for CO_2e)						

Source	Fuel Consumption	VOC	NOx	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
Waste Gas Burners	-	0.3	0.7	0.4	0.4	0.1	0.1	899
Ground Flares	-	0.3	0.5	3.1	0.1	0.1	0.1	990

a Based on 10% of 2,600 scfm, 620 Btu/scf, for 40% of the time (2,504 h/year), burned in equal quantities between the waste gas burners and ground flares.

b Emission factors from SMAQMD P/Os 12526 & 25901.

Additionally, once the project is operational, SRWTP's three boilers permitted under SMAQMD P/Os 19868-70 will no longer be required and will be decommissioned. Reduced emissions resulting from the shutdown of the boilers are shown in Table 3.2-4 and are based on the actual emissions and fuel usage reported to SMAQMD per Attachments 'A' and 'C' of the plant's permits for the 2020 calendar year.

Table 3.2-4 Direct Operation – Reduced Emissions from Shutdown of SRWTP's Boilers

Source	VOC	NOx	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
(3) Boilers (P/Os 19868 – 70)	lbs/day						
	0.1	1.2	0.6	0.2	0.4	0.4	3,672
	tons/year (metric tons/year for CO_2e)						
	0.0	0.2	0.1	0.0	0.1	0.1	670

Indirect Emission Changes

In addition to direct emissions occurring at the project site, CEQA requires an evaluation of reasonably foreseeable indirect physical impacts. Section 15064(d)(2) of the State CEQA guidance describes an indirect physical change as follows:

> *An indirect physical change in the environment is a physical change in the environment which is not immediately related to the project, but which is caused indirectly by the project. If a direct physical change in the environment in turn causes another change in the environment, then the other change is an indirect physical change in the environment.*

Regarding the proposed project, the following two reasonably foreseeable physical changes related to emissions will occur:

- A reduction in fuel burning will occur at the neighboring CVFA Cogeneration Plant due to the onsite production of steam in SRWTP's new CHP plant, resulting in emissions reductions.
- An incremental reduction in power demand will at SMUD's regional power plants due to the onsite generation of power in SRWTP's new CHP plant, resulting in emission reductions.

The steam supplied to SRWTP by CVFA can be produced by two methods—either by the heat recovery steam generator (HRSG) of CVFA's combined cycle gas turbine (CCGT) or by an auxiliary boiler. Both units are fired by natural gas; however, the CCGT can also burn SRWTP's digester gas in its duct burner when it is infeasible to inject it into a dedicated pipeline serving the Cosumnes Power Plant (CPP).[2] As a conservative assumption, the lower-emitting unit (CCGT) will be assumed to supply steam to SRWTP for the purposes of this analysis.

The quantity of displaced fuel burning at CVFA is a factor of the quantity of steam demanded by SRWTP and the thermal efficiency of the HRSG. The heating value of steam demanded by SRWTP varies from year-to-year and is tracked according to terms of the commodity agreement. For the purposes of this analysis, the following five-year average steam demand (shown in Table 3.1.3) will be used for emission calculations.

[2] Section 6 of the *SMUD Renewable Energy Resources Procurement Plan* (April 2019) states, "SMUD also has 3 "grandfathered" common carrier biomethane contracts that are certified to provide renewable biomethane to the Cosumnes Power Plant (CPP), along with a biogas cleanup facility near the Sacramento Regional County Sanitation District's (SRCSD) wastewater treatment plant that began injecting the cleaned biogas into SMUD's dedicated pipeline for combustion at CPP in 2011. This SRCSD biogas was previously combusted at SMUD's Carson power plant, and may still be combusted there when combustion at CPP is infeasible (due to planned or unplanned outages)." Available at: https://www.smud.org/-/media/Documents/Corporate/About-Us/Board-Meetings-and-Agendas/2019/Apr/Policy-Info-Packet---Apr-3-2019.ashx.

The electricity supplied to SRWTP by is generated SMUD's portfolio of thermal and renewable generating units. The foreseeable effect of SRWTP generating 15 MW of onsite power is that demand will decrease the same amount, plus a further small decrease due to line losses. Because generating units are dispatched according to "merit order," the demand reduction will occur at SMUD's least economic generating unit (typically the oldest and least efficient thermal generating unit). As a conservative assumption, the assumption was made that the displaced power will also occur at CVFA, and specifically the CCGT that will experience curtailed steam production.

The CAPCOA Guide identifies U.S.EPA's CHP Energy and Emissions Savings Calculator (CHP Calculator) as the appropriate tool for calculating indirect emission changes associated with an onsite CHP project. The calculator estimates the emissions benefits of NOx, SO_2 and GHGs from displaced emission from separate heat and power systems (SHP) that are replaced by a CHP system. The CHP Calculator was used to estimate the indirect emissions of these pollutants. For the remaining pollutants of VOC, CO, PM_{10}, and $PM_{2.5}$, emission reductions were calculated based on the displaced electricity production and displaced thermal production fuel use reported by the CHP calculator, along with the emission factors on the associated permits. VOC, CO, PM_{10} and $PM_{2.5}$ emission reductions are shown in Table 3.1-4 below.

Table 3.1-5 Indirect Operation, Utility Displacement Emissions

Source	Fuel Consumption	VOC	NOx	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
	MMBtu/year[a]	lbs/MMBtu[b]						
Electricity	1,668,171	0.006251	0.009368	0.066678	0.004684	0.005834	0.005834	115.35
Thermal (Steam)	228,093							
		lbs/day						
Electricity	-	28.6	42.8	304.7	21.4	26.7	26.7	527,188
Thermal (Steam)	-	3.9	5.9	41.7	2.9	3.6	3.6	72,084
		tons/year (metric tons/year for CO_2e)						
Electricity	-	5.2	7.8	55.6	3.9	4.9	4.9	87,306
Thermal (Steam)	-	0.7	1.1	7.6	0.5	0.7	0.7	11,938

a From U.S.EPA CHP Energy and Emissions Savings Calculator. Displaced thermal production is greater than the heating value of the steam provided to SRTWTP shown in Table 3.1-3 due to inefficiency losses.

b From SMAQMD P/Os 22021, 22022, 22066, 11015 (CVFA Combined Cycle Gas Turbine).

Total daily net project emissions are shown in Table 3.1-6 and are compared to SMAQMD CEQA threshold of significance. Total annual net project emissions are shown in Table 3.1-7 and are compared to SMAQMD CEQA threshold of significance. Both indicate that the project will not result in a significant impact with regard to the environmental factors of air quality or greenhouse gasses.

Table 3.1-6 Total Daily Net (Direct and Indirect) Project Emissions

Source	VOC	NOx	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
	lbs/day						
CHP Engines	97.9	123.8	989	76	77.5	77.5	296,641
Waste Gas Burners – Reduced Flaring	-1.4	-3.7	-2.3	-2.1	-0.6	-0.6	-5,426
Ground Flares – Reduced Flaring	-1.4	-2.8	-17.2	-0.6	-0.6	-0.6	-5,426
Boilers – Shutdown	-0.1	-1.2	-0.6	-0.2	-0.4	-0.4	-3,672
Displaced Electricity Usage	-28.6	-42.8	-304.7	-21.4	-26.7	-26.7	-527,188
Displaced Steam Usage	-5.9	-8.9	-63.1	-4.4	-5.5	-5.5	-109,218
Total Net Daily Emissions	**60.5**	**64.5**	**601.0**	**47.3**	**43.6**	**43.6**	**-354,289**

Source	VOC	NOx	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
SMAQMD Thresholds of Significance	65	65	-	-	80	80	-
Significant Impact?	No	No	-	-	No	No	-

Table 3.1-7 Total Annual Net (Direct and Indirect) Project Emissions

Source	VOC	NOx	CO	SO_2	PM_{10}	$PM_{2.5}$	CO2e
	tons/year (metric tons/year for CO_2e)						
CHP Engines	17.86	22.6	93.79	13.9	14.1	14.1	61736
Waste Gas Burners – Reduced Flaring	-0.3	-0.7	-0.4	-0.4	-0.1	-0.1	-898.6
Ground Flares – Reduced Flaring	-0.3	-0.5	-3.1	-0.1	-0.1	-0.1	-990.3
Boilers – Shutdown	0.0	-0.2	-0.1	0.0	-0.1	-0.1	-670.2
Displaced Electricity Usage	-5.2	-7.8	-55.6	-3.9	-4.9	-4.9	-87306.5
Displaced Steam Usage	-1.1	-1.6	-11.5	-0.8	-1.0	-1.0	-18087.3
Total Net Annual Emissions	11.0	11.8	23.0	8.7	7.9	7.9	-46,217
SMAQMD Thresholds of Significance	-	-	-	-	14.6	15	10,000
Significant Impact?	-	-	-	-	No	No	No

Health Risk Assessment

Regional San CHP - 15 MW

Air Quality Emission Calculations

EQUIPMENT DESCRIPTION: 5 x GE Model JMS 620 GS-B.L with SCR and OxCat

PROCESS DATA:

Engine Data		Units	Formula Symbol	Reference
Per Engine Rating =	3,119	kWm	kW	kW = BHP / 1.341
Per Engine Rating =	4,183	BHP	BHP	GE Model JMS 620 GS-B.L Data Sheet
Per Engine Heat Input =	24.052	MMBTU/hour	HI	GE Model JMS 620 GS-B.L Data Sheet
Per Engine Heat Rate =	7,711	BTU/kW-hour	HR	HR = HI * 10^6 BTU/1 MMBTU / kW

Facility Data		Units	Formula Symbol	Reference
Number of Engines =	5		Units	Project Design Value
Total Facility Rating =	15.6	MW	MW	kW * (1 MW/1000 kW) * Units

Fuel Data		Units	Formula Symbol	Reference
Biogas Gas F-Factor =	9,222	DSCF/MMBTU @ 68 °F	Fd	Value used for MRR
Biogas Gas Higher Heat =	620	BTU/SCF	HH	Project Design Value

Misc. Data		Units	Formula Symbol	Reference
Fraction of PM2.5 =	100	% PM10	FP	AP-42, Table 3.2, Footnote (i) (07/2000)
Molar Volume =	385.3	DSCF/lb-mole @ 68 °F	MV	Constant
Molar Weight, VOC (as CH4) =	16	lb/lb-mole	MWvoc	Constant
Molar Weight, NOx (as NO2) =	46	lb/lb-mole	MWnox	Constant
Molar Weight, Sulfur (S) =	32	lb/lb-mole	MWs	Constant
Molar Weight, Sulfur (SO2) =	64	lb/lb-mole	MWsox	Constant
Molar Weight, CO =	28	lb/lb-mole	MWco	Constant
Molar Weight, NH3 =	17	lb/lb-mole	MWnh3	Constant
Global Warming Potential of CH4 =	25	(CO-equivalent)	ERch4	40 CFR 98, Subpart A - Table A-1
Global Warming Potential of N2O =	298	(CO-equivalent)	ERn20	40 CFR 98, Subpart A - Table A-1

Calendar Hours		Units	Formula Symbol	Reference
Daily =	24	hours	HD	-
1st Quarter =	2,160	hours	HQ1	(24 hours/day) * (90 days/quarter)
2nd Quarter =	2,184	hours	HQ2	(24 hours/day) * (91 days/quarter)
3rd Quarter =	2,208	hours	HQ3	(24 hours/day) * (92 days/quarter)
4th Quarter =	2,208	hours	HQ4	(24 hours/day) * (92 days/quarter)
Yearly =	8,760	hours	HY	(24 hours/day) * (365 days/year)

Indv. Engine Op. Capacity Factor		Units	Formula Symbol	Reference
Daily Capacity Factor =	100.0	%	CFd	Project Design Value
Quarterly Capacity Factor =	100.0	%	CFiq	Project Design Value
Yearly Capacity Factor =	100.0	%	CFiy	Project Design Value

Facility Operating Capacity		Units	Formula Symbol	Reference
Daily Capacity Factor =	100.0	%	-	Project Design Value
Quarterly Capacity Factor =	100.0	%	CFfq	Project Design Value
Yearly Capacity Factor =	100.0	%	CFfy	Project Design Value

Cold Start Parameters		Units	Formula Symbol	Reference
Max. Cold Start Duration =	0.5	hours/start	SC	Project Design Value
Avg. Cold Starts per Day =	0	starts/engine	SDcold	Set to Zero for this Scenario
Avg. Cold Starts per Quarter =	0	starts/engine	SQcold	Project Design Value
Avg. Cold Starts per Year =	0	starts/engine	SYcold	Project Design Value

Warm Start Parameters		Units	Formula Symbol	Reference
Max. Warm Start Duration =	0.25	hours/start	SW	Project Design Value
Avg. Warm Starts per Day =	0	starts/engine	SDwrm	Set to Zero for this Scenario
Avg. Warm Starts per Quarter =	0	starts/engine	SQwrm	Project Design Value
Avg. Warm Starts per Year =	0	starts/engine	SYwrm	Project Design Value

Indv. Daily Operating Schedule		Units	Formula Symbol	Reference
Daily Cold Start-Operation =	0.0	hour (at 30-min/start)	DOcold	SC * SDcold
Daily Warm Start-Operation =	0.0	hour (at 30-min/start)	DOwrm	SW * SDwrm
Daily Normal Operation =	24.0	hours	DOnorm	(HD * CFd) - (DOcold + DOwrm)

Inv. Quarterly Operating Schedule	Units	Formula Symbol	Reference
Max. Quarterly Cold Start-Op =	0.0 hours	QOcold	SC * SQcold
Max. Quarterly Warm Start-Op =	0.0 hours	QOwrm	SW * SQwrm
1st Quarter Normal Operation =	2,160.0 hours	Q_1	(HQ_1 * CFiq) - (QOcold + QOwrm)
2nd Quarter Normal Operation =	2,184.0 hours	Q_2	(HQ_2 * CFiq) - (QOcold + QOwrm)
3rd Quarter Normal Operation =	2,208.0 hours	Q_3	(HQ_3 * CFiq) - (QOcold + QOwrm)
4th Quarter Normal Operation =	2,208.0 hours	Q_4	(HQ_4 * CFiq) - (QOcold + QOwrm)

* Note: A total of 0 starts (0 hours) per quarter.

Inv. Yearly Operating Schedule	Units	Formula Symbol	Reference
Max. Yearly Cold Start-Op =	0.0 hours	YOcold	SC * SYcold
Max. Yearly Warm Start-Op =	0.0 hours	YOwrm	SW * SYwrm
Max. Yearly Operation =	8,760.0 hours	YO	(HY * CFiy) - (YOcold + YOwrm)

Facility Qtrly. Operating Schedule	Units	Formula Symbol	Reference
Max. Quarterly Cold Start-Op =	0.0 hours	QOf_cold	QOcold * Units
Max. Quarterly Warm Start-Op =	0.0 hours	QOf_wrm	QOwrm * Units
1st Quarter Normal Operation =	10,800.0 hours	Qf_1	(HQ_1*CFfq*Units)-(QOf_cold+QOf_wrm)
2nd Quarter Normal Operation =	10,920.0 hours	Qf_2	(HQ_2*CFfq*Units)-(QOf_cold+QOf_wrm)
3rd Quarter Normal Operation =	11,040.0 hours	Qf_3	(HQ_3*CFfq*Units)-(QOf_cold+QOf_wrm)
4th Quarter Normal Operation =	11,040.0 hours	Qf_4	(HQ_4*CFfq*Units)-(QOf_cold+QOf_wrm)

Facility Yearly Operating Schedule	Units	Formula Symbol	Reference
Max. Yearly Cold Start-Op =	0.0 hours	YOf_cold	YOcold * Units
Max. Yearly Warm Start-Op =	0.0 hours	YOf_wrm	YOwrm * Units
Max. Yearly Operation =	43,800.0 hours	YOf	(HQ_4*CFfq*Units)-(QOf_cold+QOf_wrm)

EMISSION FACTORS:

Cold Start Performance		Units	Formula Symbol	Reference
VOC =	0.00	per start	PCvoc	Project Design Value
NOx =	0.00	per start	PCnox	Project Design Value
SOx =	0.00	per start	PCsox	EFsox * HI * SC
PM10/PM2.5 =	0.00	per start	PCpm	Project Design Value
CO =	0.00	per start	PCco	Project Design Value

Warm Start Performance		Units	Formula Symbol	Reference
VOC =	0.00	per start	PWvoc	Project Design Value
NOx =	0.00	per start	PWnox	Project Design Value
SOx =	0.00	per start	PWsox	EFsox * HI * SW

PM10/PM2.5 =	0.00	per start	PWpm	Project Design Value
CO =	0.00	per start	PWco	Project Design Value

Normal Performance		Units	Formula Symbol	Reference
VOC =	25	ppmvd @15% O2	VOC_ppm	SCAQMD BACT Determination A/N 546360
NOx (Daily) =	11	ppmvd @15% O2	NOx_ppm_day	SCAQMD BACT Determination A/N 546360
NOx (Quarterly & Yearly) =	11	ppmvd @15% O2	NOx_ppm_qtr	SCAQMD BACT Determination A/N 546360
SOx (as SO2) from Fuel =	5.7	gr S/100 SCF (fuel)	SO2_ice	Value Equates to 100 ppmv S in biogas, BAAQMD BACT Determination
SOx (as SO2) from Lube Oil =	0.0	lb/hr	SO2_oil	Set to Zero for this Scenario
PM10 =	0.65	lb/hr	PM10_lb	Value Equates to 0.07 g/hp-hr, BAAQMD BACT Determination
PM2.5 =	0.65	lb/hr	PM2.5_lb	PM10_lb * FP
CO =	75.00	ppmvd @15% O2	CO_ppm	Value Equates to 0.89 g/hp-hr, BAAQMD BACT Determination

Ammonia		Units	Formula Symbol	Reference
Ammonia (NH3) Slip =	10	ppmvd @15% O2	NH3_ppm	Project Design Value

Greenhouse Gas (GHG) Pollutants		Units	Formula Symbol	Reference
Carbon Dioxide, CO2 =	114.8	lb/MMBTU	EFco2	40 CFR 98, Subpart C - Table C-1
Methane, CH4 =	0.0070528	lb/MMBTU	CH_4	40 CFR 98, Subpart C - Table C-2
Nitrous Oxide, N2O =	0.00138852	lb/MMBTU	N2O	40 CFR 98, Subpart C - Table C-2

* Note: Emission factors for natural gas combustion, where the conversion formula is: [lb/MMBTU] = (x kg/MMBTU) * (2.204 lb/1 kg).

CALCULATIONS:

			Formula Symbol
1. Emission Factors for "Cold Start" Operation in units of "lb/MMBTU":			
VOC Emission Factor = PCvoc * (1/SC) * (1/HI) =	0.000	lb/MMBTU	EFcv
NOx Emission Factor = PCnox * (1/SC) * (1/HI) =	0.000	lb/MMBTU	EFcn
SOx Emission Factor = PCsox * (1/SC) * (1/HI) =	0.00000	lb/MMBTU	EFcs
PM10 Emission Factor = PCpm * (1/SC) * (1/HI) =	0.0000	lb/MMBTU	EFcp1
PM2.5 Emission Factor = PCpm * (1/SC) * (1/HI) =	0.0000	lb/MMBTU	EFcp2
CO Emission Factor = PCco * (1/SC) * (1/HI) =	0.000	lb/MMBTU	EFcc
2. Emission Factors for "Warm Start" Operation in units of "lb/MMBTU":			**Symbol**
VOC Emission Factor = PWvoc * (1/SW) * (1/HI) =	0.0000	lb/MMBTU	EFwv
NOx Emission Factor = PWnox * (1/SW) * (1/HI) =	0.000	lb/MMBTU	EFwn
SOx Emission Factor = PWsox * (1/SW) * (1/HI) =	0.00000	lb/MMBTU	EFws
PM10 Emission Factor = PWpm * (1/SW) * (1/HI) =	0.0000	lb/MMBTU	EFwp1
PM2.5 Emission Factor = PWpm * (1/SW) * (1/HI) =	0.0000	lb/MMBTU	EFwp2
CO Emission Factor = PWco * (1/SW) * (1/HI) =	0.000	lb/MMBTU	EFwc
3(a). Emission Factors for "Normal" Operation in units of "lb/MMBTU":			**Symbol**
VOC Emission Factor = VOC_ppm * (20.9% / (20.9% - 15%)) * (1/MV) * MWvoc * Fd =	0.03391	lb/MMBTU	EFvoc
Daily NOx Emission Factor = NOx_ppm_day * (20.9% / (20.9% - 15%)) * (1/MV) * MWnox * Fd =	0.04290	lb/MMBTU	EFnox_day
Qtrly. & Yearly NOx Ems. Factor = NOx_ppm_qtr * (20.9% / (20.9% - 15%)) * (1/MV) * MWnox * Fd =	0.04290	lb/MMBTU	EFnox_qtr
SOx-fuel Ems. Factor = SO2_fuel * (1 lb/7,000 gr) * (1/HH) * (10^6 BTU/1 MMBTU) * (MWsox/MWs) =	0.02634	lb/MMBTU	EFs_1
SOx-oil Ems. Factor = SO2_oil * (1/HI) =	0.00000	lb/MMBTU	EFs_2
Total SOx Ems. Factor = EFs1 + EFs2 =	0.02634	lb/MMBTU	EFsox
PM10 Ems. Factor = PM10_lb * (1/HI) =	0.0268	lb/MMBTU	EFpm10
PM2.5 Ems. Factor = PM2.5_lb * (1/HI) =	0.0268	lb/MMBTU	EFpm2.5
CO Emission Factor = CO_ppm * (20.9% / (20.9% - 15%)) * (1/MV) * MWco * Fd =	0.17805	lb/MMBTU	EFco
3(b). Emission Factors for "Normal" Operation in units of "g/BHP-hr":			**Symbol**
VOC Emission Factor = EFvoc * (453.6 g/1 lb) * HI * (1/BHP) =	0.0885	g/BHP-hr	-
Daily NOx Emission Factor = EFnox_day * (453.6 g/1 lb) * HI * (1/BHP) =	0.1119	g/BHP-hr	-
Qtrly. & Yearly NOx Ems. Factor = EFnox_qtr * (453.6 g/1 lb) * HI * (1/BHP) =	0.1119	g/BHP-hr	-
Total SOx Ems. Factor = EFsox * (453.6 g/1 lb) * HI * (1/BHP) =	0.0687	g/BHP-hr	-
PM10 Ems. Factor = EFpm10 * (453.6 g/1 lb) * HI * (1/BHP) =	0.0700	g/BHP-hr	-
PM2.5 Ems. Factor = EFpm2.5 * (453.6 g/1 lb) * HI * (1/BHP) =	0.0700	g/BHP-hr	-
CO Emission Factor = EFco * (453.6 g/1 lb) * HI * (1/BHP) =	0.4644	g/BHP-hr	-
4. Emission Factor for Ammonia in units of "lb/MMBTU":			**Symbol**
NH3 Emission Factor = NH3-ppm * (20.9% / (20.9% - 15%)) * (1/MV) * MWnh3 * Fd =	0.01441	lb/MMBTU	EFnh3
5. Emission Factors for Greenhouse Gases in units of "lb of CO2e/MMBTU":			**Symbol**
CO2 Equiv. for CH4 Emission Factor = CH_4 * ERch4 =	0.1763	lb/MMBTU	EFg_1
CO2 Equiv. for N2O Emission Factor = N2O * ERn2o =	0.4138	lb/MMBTU	EFg_2
Total CO2-Equivalent Emission Factor = EFco2+ EFg_1 + EFg_2 =	115.3524	lb/MMBTU	EFghg

EMISSION CALCULATIONS:

1. Determine the total emissions for a single engine:

Maximum VOC Emissions

Max. Hourly VOC Ems. = HI * MAX(EFcv, EFwv, EFvoc) =	0.8	lb/hour
Max. Daily VOC Ems. = HI * (DOcold*EFcv + DOwrm*EFwv + DOnorm*EFvoc) =	19.6	lb/day
1st Quarter VOC Ems. = HI * (QOcold*EFcv + QOwrm*EFwv + Q_1*EFvoc) =	1,762	lb/quarter
2nd Quarter VOC Ems. = HI * (QOcold*EFcv + QOwrm*EFwv + Q_2*EFvoc) =	1,781	lb/quarter
3rd Quarter VOC Ems. = HI * (QOcold*EFcv + QOwrm*EFwv + Q_3*EFvoc) =	1,801	lb/quarter
4th Quarter VOC Ems. = HI * (QOcold*EFcv + QOwrm*EFwv + Q_4*EFvoc) =	1,801	lb/quarter
Max. Yearly VOC Ems. = HI * (YOcold*EFcv + YOwrm*EFwv + YO*EFvoc) =	7,146	lb/year
Max. Yearly VOC Ems. = HI * (YOcold*EFcv + YOwrm*EFwv + YO*EFvoc) * (1 ton/2,000 lb) =	3.57	tons/year

Maximum NOx Emissions

Max. Hourly NOx Ems. = HI * MAX(EFcn, EFwn, EFnox_day) =	1.0	lb/hour
Max. Daily NOx Ems. = HI * (DOcold*EFcn + DOwrm*EFwn + DOnorm*EFnox_day) =	24.8	lb/day
1st Quarter NOx Ems. = HI * (QOcold*EFcn + QOwrm*EFwn + Q_1*EFnox_qtr) =	2,229	lb/quarter
2nd Quarter NOx Ems. = HI * (QOcold*EFcn + QOwrm*EFwn + Q_2*EFnox_qtr) =	2,254	lb/quarter
3rd Quarter NOx Ems. = HI * (QOcold*EFcn + QOwrm*EFwn + Q_3*EFnox_qtr) =	2,278	lb/quarter
4th Quarter NOx Ems. = HI * (QOcold*EFcn + QOwrm*EFwn + Q_4*EFnox_qtr) =	2,278	lb/quarter
Max. Yearly NOx Ems. = HI * (YOcold*EFcn + YOwrm*EFwn + YO*EFnox_qtr) =	9,039	lb/year
Max. Yearly NOx Ems. = HI * (YOcold*EFcn + YOwrm*EFwn + YO*EFnox_qtr) * (1 ton/2,000 lb) =	4.52	tons/year

Maximum SOx Emissions

Max. Hourly SOx Ems. = HI * MAX(EFcs, EFws, EFsox) =	0.6	lb/hour
Max. Daily SOx Ems. = HI * (DOcold*EFcs + DOwrm*EFws + DOnorm*EFsox) =	15.2	lb/day
1st Quarter SOx Ems. = HI * (QOcold*EFcs + QOwrm*EFws + Q_1*EFsox) =	1,368	lb/quarter
2nd Quarter SOx Ems. = HI * (QOcold*EFcs + QOwrm*EFws + Q_2*EFsox) =	1,384	lb/quarter
3rd Quarter SOx Ems. = HI * (QOcold*EFcs + QOwrm*EFws + Q_3*EFsox) =	1,399	lb/quarter
4th Quarter SOx Ems. = HI * (QOcold*EFcs + QOwrm*EFws + Q_4*EFsox) =	1,399	lb/quarter
Max. Yearly SOx Ems. = HI * (YOcold*EFcs + YOwrm*EFws + YO*EFsox) =	5,550	lb/year
Max. Yearly SOx Ems. = HI * (YOcold*EFcs + YOwrm*EFws + YO*EFsox) * (1 ton/2,000 lb) =	2.77	tons/year

Maximum PM10 Emissions

Max. Hourly PM10 Ems. = HI * MAX(EFcp1, EFwp1, EFpm10) =	0.6	lb/hour
Max. Daily PM10 Ems. = HI * (DOcold*EFcp1 + DOwrm*EFwp1 + DOnorm*EFpm10) =	15.5	lb/day
1st Quarter PM10 Ems. = HI * (QOcold*EFcp1 + QOwrm*EFwp1 + Q_1*EFpm10) =	1,394	lb/quarter
2nd Quarter PM10 Ems. = HI * (QOcold*EFcp1 + QOwrm*EFwp1 + Q_2*EFpm10) =	1,410	lb/quarter
3rd Quarter PM10 Ems. = HI * (QOcold*EFcp1 + QOwrm*EFwp1 + Q_3*EFpm10) =	1,425	lb/quarter
4th Quarter PM10 Ems. = HI * (QOcold*EFcp1 + QOwrm*EFwp1 + Q_4*EFpm10) =	1,425	lb/quarter
Max. Yearly PM10 Ems. = HI * (YOcold*EFcp1 + YOwrm*EFwp1 + YO*EFpm10) =	5,655	lb/year
Max. Yearly PM10 Ems. = HI * (YOcold*EFcp1 + YOwrm*EFwp1 + YO*EFpm10) * (1 ton/2,000 lb) =	2.83	tons/year

Maximum PM2.5 Emissions

Max. Hourly PM2.5 Ems. = HI * MAX(EFcp2, EFwp2, EFpm2.5) =	0.6	lb/hour
Max. Daily PM2.5 Ems. = HI * (DOcold*EFcp2 + DOwrm*EFwp2 + DOnorm*EFpm2.5) =	15.5	lb/day
1st Quarter PM2.5 Ems. = HI * (QOcold*EFcp2 + QOwrm*EFwp2 + Q_1*EFpm2.5) =	1,394	lb/quarter
2nd Quarter PM2.5 Ems. = HI * (QOcold*EFcp2 + QOwrm*EFwp2 + Q_2*EFpm2.5) =	1,410	lb/quarter
3rd Quarter PM2.5 Ems. = HI * (QOcold*EFcp2 + QOwrm*EFwp2 + Q_3*EFpm2.5) =	1,425	lb/quarter
4th Quarter PM2.5 Ems. = HI * (QOcold*EFcp2 + QOwrm*EFwp2 + Q_4*EFpm2.5) =	1,425	lb/quarter
Max. Yearly PM2.5 Ems. = HI * (YOcold*EFcp2 + YOwrm*EFwp2 + YO*EFpm2.5) =	5,655	lb/year
Max. Yearly PM2.5 Ems. = HI * (YOcold*EFcp2 + YOwrm*EFwp2 + YO*EFpm2.5) * (1 ton/2,000 lb) =	2.83	tons/year

Maximum CO Emissions

Max. Hourly CO Ems. = HI * MAX(EFcc, EFwc, EFco) =	4.3	lb/hour
Max. Daily CO Ems. = HI * (DOcold*EFcc + DOwrm*EFwc + DOnorm*EFco) =	102.8	lb/day
1st Quarter CO Ems. = HI * (QOcold*EFcc + QOwrm*EFwc + Q_1*EFco) =	9,250	lb/quarter
2nd Quarter CO Ems. = HI * (QOcold*EFcc + QOwrm*EFwc + Q_2*EFco) =	9,353	lb/quarter
3rd Quarter CO Ems. = HI * (QOcold*EFcc + QOwrm*EFwc + Q_3*EFco) =	9,456	lb/quarter
4th Quarter CO Ems. = HI * (QOcold*EFcc + QOwrm*EFwc + Q_4*EFco) =	9,456	lb/quarter
Max. Yearly CO Ems. = HI * (YOcold*EFcc + YOwrm*EFwc + YO*EFco) =	37,514	lb/year
Max. Yearly CO Ems. = HI * (YOcold*EFcc + YOwrm*EFwc + YO*EFco) * (1 ton/2,000 lb) =	18.76	tons/year

Maximum NH3 Emissions

Max. Hourly NH3 Ems. = HI * EFnh3 =	0.3	lb/hour
Max. Daily NH3 Ems. = HI * (DOcold + DOwrm + DOnorm) * EFnh3 =	8.3	lb/day
1st Quarter NH3 Ems. = HI * (QOcold + QOwrm + Q_1) * EFnh3 =	749	lb/quarter
2nd Quarter NH3 Ems. = HI * (QOcold + QOwrm + Q_2) * EFnh3 =	757	lb/quarter
3rd Quarter NH3 Ems. = HI * (QOcold + QOwrm + Q_3) * EFnh3 =	765	lb/quarter
4th Quarter NH3 Ems. = HI * (QOcold + QOwrm + Q_4) * EFnh3 =	765	lb/quarter
Max. Yearly NH3 Ems. = HI * (YOcold + YOwrm + YO) * EFnh3 =	3,037	lb/year
Max. Yearly NH3 Ems. = HI * (YOcold + YOwrm + YO) * EFnh3 * (1 ton/2,000 lb) =	1.52	tons/year

Maximum Greenhouse Gas Emissions

Max. Hourly CO2-Equiv. Ems. = HI * EFghg =	2,774	lb/hour
Max. Daily CO2-Equiv. Ems. = HI * (DOcold + DOwrm + DOnorm) * EFghg =	66,587	lb/day
1st Quarter CO2-Equiv. Ems. = HI * (QOcold + QOwrm + Q_1) * EFghg * (1 ton/2,000 lb) =	2,996	tons/quarter
2nd Quarter CO2-Equiv. Ems. = HI * (QOcold + QOwrm + Q_2) * EFghg * (1 ton/2,000 lb) =	3,030	tons/quarter
3rd Quarter CO2-Equiv. Ems. = HI * (QOcold + QOwrm + Q_3) * EFghg * (1 ton/2,000 lb) =	3,063	tons/quarter
4th Quarter CO2-Equiv. Ems. = HI * (QOcold + QOwrm + Q_4) * EFghg * (1 ton/2,000 lb) =	3,063	tons/quarter
Max. Yearly CO2-Equiv. Ems. = HI * (YOcold + YOwrm + YO) * EFghg * (1 ton/2,000 lb) =	12,152	tons/year

2. Determine the total emissions for all five engines:

Maximum VOC Emissions

Max. Hourly VOC Ems. = HI * MAX(EFcv, EFwv, EFvoc) * Units =	4.1	lb/hour
Max. Daily VOC Ems. = HI * (DOcold*EFcv + DOwrm*EFwv + DOnorm*EFvoc) * Units =	97.9	lb/day
1st Quarter VOC Ems. = HI * (QOf_cold*EFcv + QOf_wrm*EFwv + Qf_1*EFvoc) =	8,810	lb/quarter
2nd Quarter VOC Ems. = HI * (QOf_cold*EFcv + QOf_wrm*EFwv + Qf_2*EFvoc) =	8,907	lb/quarter
3rd Quarter VOC Ems. = HI * (QOf_cold*EFcv + QOf_wrm*EFwv + Qf_3*EFvoc) =	9,005	lb/quarter
4th Quarter VOC Ems. = HI * (QOf_cold*EFcv + QOf_wrm*EFwv + Qf_4*EFvoc) =	9,005	lb/quarter
Max. Yearly VOC Ems. = HI * (YOcold*EFcv + YOwrm*EFwv + YOf*EFvoc) =	35,728	lb/year
Max. Yearly VOC Ems. = HI * (YOcold*EFcv + YOwrm*EFwv + YOf*EFvoc) * (1 ton/2,000 lb) =	17.86	tons/year

Maximum NOx Emissions

Max. Hourly NOx Ems. = HI * MAX(EFcn, EFwn, EFnox) * Units =	5.2	lb/hour
Max. Daily NOx Ems. = HI * (DOcold*EFcn + DOwrm*EFwn + DOnorm*EFnox) * Units =	123.8	lb/day
1st Quarter NOx Ems. = HI * (QOf_cold*EFcn + QOf_wrm*EFwn + Qf_1*EFnox) =	11,144	lb/quarter
2nd Quarter NOx Ems. = HI * (QOf_cold*EFcn + QOf_wrm*EFwn + Qf_2*EFnox) =	11,268	lb/quarter
3rd Quarter NOx Ems. = HI * (QOf_cold*EFcn + QOf_wrm*EFwn + Qf_3*EFnox) =	11,392	lb/quarter
4th Quarter NOx Ems. = HI * (QOf_cold*EFcn + QOf_wrm*EFwn + Qf_4*EFnox) =	11,392	lb/quarter
Max. Yearly NOx Ems. = HI * (YOcold*EFcn + YOwrm*EFwn + YOf*EFnox) =	45,196	lb/year
Max. Yearly NOx Ems. = HI * (YOcold*EFcn + YOwrm*EFwn + YOf*EFnox) * (1 ton/2,000 lb) =	22.60	tons/year

Maximum SOx Emissions

Max. Hourly SOx Ems. = HI * MAX(EFcs, EFws, EFsox) * Units =	3.2	lb/hour
Max. Daily SOx Ems. = HI * (DOcold*EFcs + DOwrm*EFws + DOnorm*EFsox) * Units =	76.0	lb/day
1st Quarter SOx Ems. = HI * (QOf_cold*EFcs + QOf_wrm*EFws + Qf_1*EFsox) =	6,842	lb/quarter
2nd Quarter SOx Ems. = HI * (QOf_cold*EFcs + QOf_wrm*EFws + Qf_2*EFsox) =	6,918	lb/quarter
3rd Quarter SOx Ems. = HI * (QOf_cold*EFcs + QOf_wrm*EFws + Qf_3*EFsox) =	6,994	lb/quarter
4th Quarter SOx Ems. = HI * (QOf_cold*EFcs + QOf_wrm*EFws + Qf_4*EFsox) =	6,994	lb/quarter
Max. Yearly SOx Ems. = HI * (YOcold*EFcs + YOwrm*EFws + YOf*EFsox) =	27,750	lb/year
Max. Yearly SOx Ems. = HI * (YOcold*EFcs + YOwrm*EFws + YOf*EFsox) * (1 ton/2,000 lb) =	13.87	tons/year

Maximum PM10 Emissions

Max. Hourly PM10 Ems. = HI * MAX(EFcp1, EFwp1, EFpm10) * Units =	3.2	lb/hour
Max. Daily PM10 Ems. = HI * (DOcold*EFcp1 + DOwrm*EFwp1 + DOnorm*EFpm10) * Units =	77.5	lb/day
1st Quarter PM10 Ems. = HI * (QOf_cold*EFcp1 + QOf_wrm*EFwp1 + Qf_1*EFpm10) =	6,972	lb/quarter
2nd Quarter PM10 Ems. = HI * (QOf_cold*EFcp1 + QOf_wrm*EFwp1 + Qf_2*EFpm10) =	7,049	lb/quarter
3rd Quarter PM10 Ems. = HI * (QOf_cold*EFcp1 + QOf_wrm*EFwp1 + Qf_3*EFpm10) =	7,127	lb/quarter
4th Quarter PM10 Ems. = HI * (QOf_cold*EFcp1 + QOf_wrm*EFwp1 + Qf_4*EFpm10) =	7,127	lb/quarter
Max. Yearly PM10 Ems. = HI * (YOcold*EFcp1 + YOwrm*EFwp1 + YOf*EFpm10) =	28,274	lb/year
Max. Yearly PM10 Ems. = HI * (YOcold*EFcp1 + YOwrm*EFwp1 + YOf*EFpm10) * (1 ton/2,000 lb) =	14.14	tons/year

Maximum PM2.5 Emissions

Max. Hourly PM2.5 Ems. = HI * MAX(EFcp2, EFwp2, EFpm2.5) * Units =	3.2	lb/hour
Max. Daily PM2.5 Ems. = HI * (DOcold*EFcp2 + DOwrm*EFwp2 + DOnorm*EFpm2.5) * Units =	77.5	lb/day
1st Quarter PM2.5 Ems. = HI * (QOf_cold*EFcp2 + QOf_wrm*EFwp2 + Qf_1*EFpm2.5) =	6,972	lb/quarter
2nd Quarter PM2.5 Ems. = HI * (QOf_cold*EFcp2 + QOf_wrm*EFwp2 + Qf_2*EFpm2.5) =	7,049	lb/quarter
3rd Quarter PM2.5 Ems. = HI * (QOf_cold*EFcp2 + QOf_wrm*EFwp2 + Qf_3*EFpm2.5) =	7,127	lb/quarter
4th Quarter PM2.5 Ems. = HI * (QOf_cold*EFcp2 + QOf_wrm*EFwp2 + Qf_4*EFpm2.5) =	7,127	lb/quarter
Max. Yearly PM2.5 Ems. = HI * (YOcold*EFcp2 + YOwrm*EFwp2 + YOf*EFpm2.5) =	28,274	lb/year
Max. Yearly PM2.5 Ems. = HI * (YOcold*EFcp2 + YOwrm*EFwp2 + YOf*EFpm2.5) * (1 ton/2,000 lb) =	14.14	tons/year

Maximum CO Emissions

Max. Hourly CO Ems. = HI * MAX(EFcc, EFwc, EFco) * Units =	21.4	lb/hour
Max. Daily CO Ems. = HI * (DOcold*EFcc + DOwrm*EFwc + DOnorm*EFco) * Units =	513.9	lb/day
1st Quarter CO Ems. = HI * (QOf_cold*EFcc + QOf_wrm*EFwc + Qf_1*EFco) =	46,250	lb/quarter
2nd Quarter CO Ems. = HI * (QOf_cold*EFcc + QOf_wrm*EFwc + Qf_2*EFco) =	46,764	lb/quarter
3rd Quarter CO Ems. = HI * (QOf_cold*EFcc + QOf_wrm*EFwc + Qf_3*EFco) =	47,278	lb/quarter
4th Quarter CO Ems. = HI * (QOf_cold*EFcc + QOf_wrm*EFwc + Qf_4*EFco) =	47,278	lb/quarter
Max. Yearly CO Ems. = HI * (YOcold*EFcc + YOwrm*EFwc + YOf*EFco) =	187,571	lb/year
Max. Yearly CO Ems. = HI * (YOcold*EFcc + YOwrm*EFwc + YOf*EFco) * (1 ton/2,000 lb) =	93.79	tons/year

Maximum NH3 Emissions

Max. Hourly NH3 Ems. = HI * EFnh3 =	0.3	lb/hour
Max. Daily NH3 Ems. = HI * (DOcold + DOwrm + DOnorm) * EFnh3 =	8.3	lb/day
1st Quarter NH3 Ems. = HI * (QOf_cold + QOf_wrm + Qf_1) * EFnh3 =	3,744	lb/quarter
2nd Quarter NH3 Ems. = HI * (QOf_cold + QOf_wrm + Qf_2) * EFnh3 =	3,786	lb/quarter
3rd Quarter NH3 Ems. = HI * (QOf_cold + QOf_wrm + Qf_3) * EFnh3 =	3,786	lb/quarter
4th Quarter NH3 Ems. = HI * (QOf_cold + QOf_wrm + Qf_4) * EFnh3 =	3,786	lb/quarter
Max. Yearly NH3 Ems. = HI * (YOf_cold + YOf_wrm + YOf) * EFnh3 =	15,184	lb/year
Max. Yearly NH3 Ems. = HI * (YOf_cold + YOf_wrm + YOf) * EFnh3 * (1 ton/2,000 lb) =	7.59	tons/year

Maximum Greenhouse Gas Emissions

Max. Hourly CO2-Equiv. Ems. = HI * EFghg =	2,774	lb/hour
Max. Daily CO2-Equiv. Ems. = HI * (DOcold + DOwrm + DOnorm) * EFghg =	66,587	lb/day
1st Quarter CO2-Equiv. Ems. = HI * (QOf_cold + QOf_wrm + Qf_1) * EFghg * (1 ton/2,000 lb) =	14,982	tons/quarter
2nd Quarter CO2-Equiv. Ems. = HI * (QOf_cold + QOf_wrm + Qf_2) * EFghg * (1 ton/2,000 lb) =	15,149	tons/quarter
3rd Quarter CO2-Equiv. Ems. = HI * (QOf_cold + QOf_wrm + Qf_3) * EFghg * (1 ton/2,000 lb) =	15,315	tons/quarter
4th Quarter CO2-Equiv. Ems. = HI * (QOf_cold + QOf_wrm + Qf_4) * EFghg * (1 ton/2,000 lb) =	15,315	tons/quarter
Max. Yearly CO2-Equiv. Ems. = HI * (YOf_cold + YOf_wrm + YOf) * EFghg * (1 ton/2,000 lb) =	60,761	tons/year

3. Emission Limit Summary for Project:

Maximum Potential to Emit (PTE) for a Single Engine at 100% Yearly Capacity Facotor.

	Daily	Yearly
VOC =	19.6 lb/day	3.57 tons/year
NOx =	24.8 lb/day	4.52 tons/year
SOx =	15.2 lb/day	2.77 tons/year
PM10 =	15.5 lb/day	2.83 tons/year
PM2.5 =	15.5 lb/day	2.83 tons/year
CO =	102.8 lb/day	18.76 tons/year
CO2-Equiv. =	66,587 lb/day	12,152 tons/year

	Quarter #1	Quarter #2	Quarter #3	Quarter #4
VOC (lb)	1,762	1,781	1,801	1,801
NOx (lb)	2,229	2,254	2,278	2,278
SOx (lb)	1,368	1,384	1,399	1,399
PM10 (lb)	1,394	1,410	1,425	1,425
PM2.5 (lb)	1,394	1,410	1,425	1,425
CO (lb)	9,250	9,353	9,456	9,456

CO2-Equiv. (tons)	2,996	3,030	3,063	3,063

Maximum Potential to Emit (PTE) for *All Five Engines*

	Daily		Yearly	
VOC	97.9	lb/day	17.86	tons/year
NOx	123.8	lb/day	22.60	tons/year
SOx	76.0	lb/day	13.87	tons/year
PM10	77.5	lb/day	14.14	tons/year
PM2.5	77.5	lb/day	14.14	tons/year
CO	513.9	lb/day	93.79	tons/year
CO2-Equiv.	66,587	lb/day	60,761	tons/year

	Quarter #1	Quarter #2	Quarter #3	Quarter #4
VOC (lb)	8,810	8,907	9,005	9,005
NOx (lb)	11,144	11,268	11,392	11,392
SOx (lb)	6,842	6,918	6,994	6,994
PM10 (lb)	6,972	7,049	7,127	7,127
PM2.5 (lb)	6,972	7,049	7,127	7,127
CO (lb)	46,250	46,764	47,278	47,278
CO2-Equiv. (tons)	14,982	15,149	15,315	15,315

RULE & REGULATORY COMPLIANCE EVALUATION:

SMAQMD Rule 202 (New Source Review)

1. **Determine if Best Available Control Technology is Triggered for each engine (§301)**:

	Previous Historical Daily Emissions (§224)	Increase in Proposed Daily Emissions (§411.1)	BACT Trigger Levels (§301.1)	BACT Triggered?
VOC (lb/day)	0	20	0	Yes
NOx (lb/day)	0	25	0	Yes
SOx (lb/day)	0	15	0	Yes
PM10 (lb/day)	0	15	0	Yes
PM2.5 (lb/day)	0	15	0	Yes
CO (lb/day)	0	103	550	No

2. **Determine if emission offset are triggered under the general thresholds for the entire facility (§302.1):**

Offset Trigger Levels for All Types of Facilities

	Quarter #1	Quarter #2	Quarter #3	Quarter #4	Yearly
VOC (lb)	5,000	5,000	5,000	5,000	-
NOx (lb)	5,000	5,000	5,000	5,000	-
SOx (lb)	13,650	13,650	13,650	13,650	-
PM10 (lb)	7,300	7,300	7,300	7,300	-
PM2.5 (tons)	-	-	-	-	15
CO (lb)	49,500	49,500	49,500	49,500	-

Offsets Triggered in the Following Quarters (Facility Total)

	Quarter #1	Quarter #2	Quarter #3	Quarter #4	Yearly
VOC (lb)	Yes	Yes	Yes	Yes	-
NOx (lb)	Yes	Yes	Yes	Yes	-
SOx (lb)	No	No	No	No	-
PM10 (lb)	No	No	No	No	-
PM2.5 (tons)	-	-	-	-	No
CO (lb)	No	No	No	No	-

3. Determine if the facility will be a Major Source (§228):

Major Source Trigger Levels (Project Only Totals - Other Facilty PTE Must Be Added)

	Proposed Yearly Emissions	Trigger Levels (§228)	Major Source Triggered?
VOC (tons/year)	17.86	25	No
NOx (tons/year)	22.60	25	No
SOx (tons/year)	13.87	100	No
PM10 (tons/year)	14.14	100	No
PM2.5 (tons/year)	14.14	100	No
CO (tons/year)	93.79	100	No

Version 3.2, June 22, 2020

INTRODUCTION AND PURPOSE

The calculator is a Microsoft Excel-based tool that estimates the energy and emissions savings of a CHP syste by comparing the estimated energy use and air pollutant emissions (CO_2e, SO_2 and NO_X) of a CHP system an the estimated energy use and emissions associated with the same quantity of grid-supplied power and outp from an on-site boiler system.

The calculator is designed for users with at least a moderate understanding of CHP technology and its terminology; therefore this User Manual does not include a glossary of the terms that appear in the calculat For more information about CHP technologies, benefits, emissions calculation methodology, and why EPA supports CHP, please visit www.epa.gov/chp.

Please note that the results generated by the calculator are intended for educational and outreach purposes only and are not intended for use in developing emissions inventories or preparing air permit applications. T accuracy of the results is a function of the accuracy and completeness of the user inputs.

BASIC DIRECTIONS FOR USE

The primary components of the calculator are the Inputs and Results Worksheets:

Inputs Worksheet

The Inputs Worksheet consists of 32 input fields that are used to characterize the CHP system being evaluat and comparable displaced electricity and thermal production. Note that some inputs are not applicable to every CHP or displaced electricity and thermal production system and therefore do not need to be complete

Enter Inputs 1 through 6 at a minimum. Default values can be optionally selected for inputs 7 through 25. Please note that the accuracy of the calculator's results is improved by completing as many inputs as possibl with system-specific information. Values (other than default values) must be entered for inputs 1 through 2 for the most accurate estimates of energy savings. In addition, inputs 26 through 32 must be entered to estimate emissions savings.

Each Input field has three components: a question, at least one input cell, and a 'Submit' button. To complet an input, choose one of these three options:

1) Manually enter or select (from a pull-down menu) system-specific information.

2) Use default system information provided (in certain cases) in the available Microsoft Excel note.

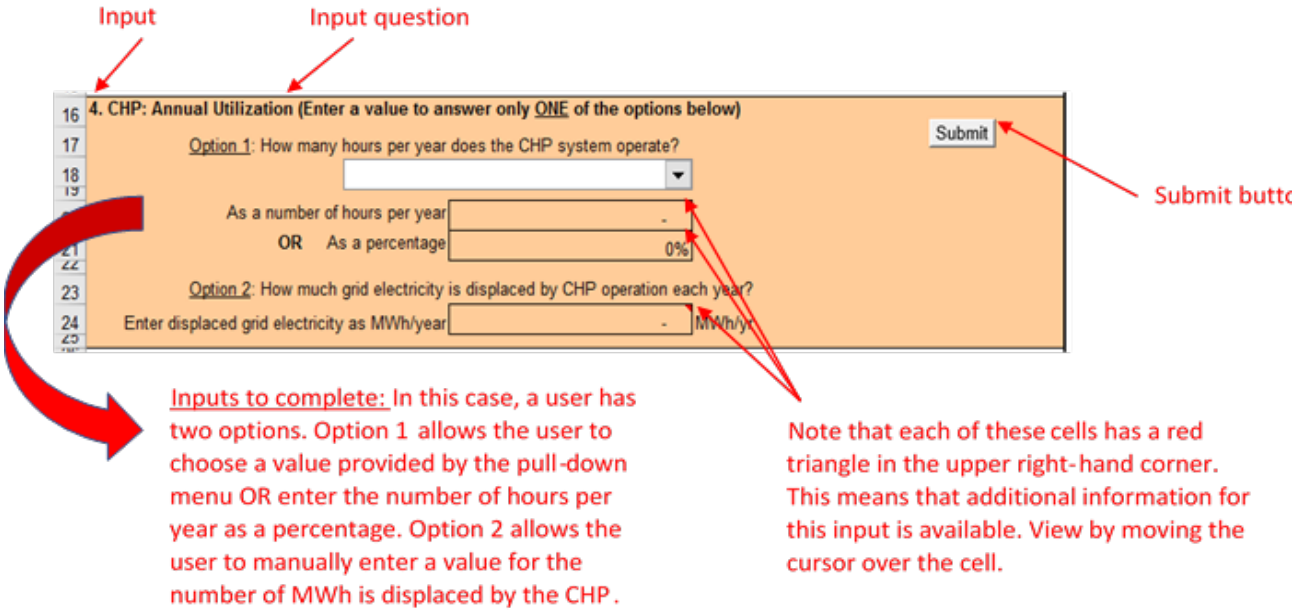
   The calculator information for certain inputs in the form of Excel notes. To view the notes, move the cursor over red triangle in the upper right-hand corner of the cell.

3) Skip the input.

After completing an input, click on the 'Submit' button, which moves the cursor to the next appropriate inpu field.

Once all inputs are completed, click on one of the 'Check All Inputs and Go to Results' buttons on the Inputs Worksheet. This action will either open the Results Worksheet or display an error message numbers of the Inputs numbers that need attention.

Example:



Results Worksheet

The Results Worksheet includes several tables:

- Table 1: Annual Energy Savings—presents the energy consumption of the CHP and the displaced electricity and thermal production, the total energy savings from using CHP, and CHP energy savings expressed in term of the annual energy use of passenger cars and annual electricity use in homes.

- Table 2: Annual Emissions Savings—presents the emissions associated with CHP and displaced electricity a thermal production systems and the emissions savings by using CHP. It also presents the CHP GHG savings ir terms of the emissions associated with passenger vehicles and the generation of electricity used by the average U.S. home.

- Table 3: CHP Technology and Generation Profile—presents a summary of CHP information.

- Table 4: Displaced Thermal Energy—presents information about displaced thermal production (i.e., the amount of energy required to produce thermal energy in the displaced electricity and thermal production system).

- Table 5: Displaced Electricity—presents information about the displaced electric production (i.e., the amou of energy required to produce electricity in the displaced electricity and thermal production).

Note: If only energy savings associated with CHP are estimated (i.e., only inputs 1 through 25 on the Inputs Worksheet are completed), Tables 1 through 5 only will appear on the Results Worksheet (however, in this ca Table 2 will not display data). If all inputs (1 through 32) are estimated, Tables 1 through 10 will appear with displayed data.

- Table 6: Annual Analysis for CHP—presents the annual energy use and emissions from the CHP system.

- Table 7: Annual Analysis for Displaced Thermal Production (non-cooling)—presents the annual energy use and emissions associated with displaced thermal production.

- Table 8: Annual Analysis for Displaced Electricity Production—presents the annual energy use and emissior associated with displaced electricity production.

- Table 9: Emission Rates for Displaced Electricity—presents the emissions rates by pollutant for CHP and displaced electricity.

- Table 10: Emission Rates for Displaced Thermal—presents the emission rates by pollutant associated with displaced thermal production.

In addition to the tables, two schematic flow diagrams appear on the Results Worksheet. If users estimate o energy savings, the diagrams show the energy input and output flows associated with displaced electricity a thermal production and CHP. If the user also estimates emissions savings, the diagrams show the emissions associated with displaced electricity and thermal production and CHP, in addition to the energy use.

CONTACT US

We welcome your input on the calculator's usability and functionality. Should you encounter any bugs wher using the calculator, or if you have questions about how to use the calculator, please contact the EPA CHP Partnership at chp@epa.gov or 703-373-8108.

EPA COMBINED HEAT AND POWER PARTNERSHIP

Energy Savings Inputs

CHP System Characteristics

1. CHP: Type of System — Recip Engine - Lean Burn — Submit

2. CHP: Electricity Generating Capacity (per unit) — Submit

Normal size range for this technology is 500 to 5,000 kW

3,022 kW

3. CHP: How Many Identical Units (i.e., engines) Does This System Have? — Submit

5

4. CHP: Annual Utilization (Enter a value to answer only ONE of the options below) — Submit

Option 1: How many hours per year does the CHP system operate?

7 days per week, 24 hours per day, 8,760 hours

As a number of hours per year: 8,760

OR As a percentage: 0%

Option 2: How much grid electricity is displaced by CHP operation each year?

Enter displaced grid electricity as MWh/year: MWh/yr

5. CHP: Does the System Provide Heating or Cooling or Both? — Submit

Heating Only

If Heating and Cooling: How many of the 8,760 hours are in cooling mode?

As a number of hours per year: -

as a percentage of the 8,760 hours? 0%

If Heating and Cooling: Does the System Provide Simultaneous Heating and Cooling?

No

6. CHP: Fuel — Submit

Fuel Type: Other Fuel (including renewables)

Click on 'View Biomass and Coal Fuel Characteristics' to select the appropriate CO2 emissions rate and heat content for your fuel.

7. CHP: What is the Heat Content of this Fuel? (Enter a value in only ONE of the boxes) — Submit

620 Btu/cubic foot (HHV)

OR - Btu/gallon (HHV)

OR - Btu/lb (HHV)

8. CHP: Boiler Steam To Process (Steam Turbine CHP Only)

Boiler Steam to Process as lb Steam/hr: -

Boiler Steam to Process as MMBtu Steam/hr: -

9. CHP: Steam Turbine System Boiler Efficiency (Steam Turbine CHP Only)

Enter Boiler Efficiency as %:

10. CHP: Electric Efficiency — I will enter an efficiency in **one** of the following blocks — Use default for this technology — Submit

Enter Generating Efficiency as %: 42% (HHV)

OR Enter Generating Efficiency as Btu/kWh HHV: - Btu/kWh (HHV)

OR Enter Generating Efficiency as Btu/kWh LHV: - Btu/kWh (LHV)

EPA COMBINED HEAT AND POWER PARTNERSHIP

11. CHP Equipment: Base Power to Heat Ratio

The Power to Heat Ratio should reflect ONLY the thermal production of the generating unit (i.e., combustion turbine).
Thermal Output of the duct burners (if equipped) should not be included.

I will enter a Power to Heat ratio | Use default for this technology

Submit

See the SubThermalCalculator for help on calculating a Power to Heat Ratio

Power to Heat Ratio (Generating Unit Capacity)	1.98
If WHP: Useful Thermal Output (MMBtu/hr)	

12. Duct Burners: Does the System Incorporate Duct Burners? (Duct Burners only allowed on Combustion Turbines)

Submit

13. Duct Burners: What is the Total Fuel Input Capacity of the Burners for Each CHP Unit?

For reference, the Recip Engine - Lean Burn has a heat input of 24.4 MMBtu/hr

Submit

- MMBtu/hr

14. Duct Burners: The CHP system operates 8,760 hours per year. How much do the duct burners operate?

Submit

As a number of hours per year	-
As a percentage of the 8,760 hours?	0%

CHP Cooling Characteristics

15. Cooling: Does the CHP Provide Cooling? **No**

You indicated No Cooling in Item 5

Submit

16. Cooling: What is the Coefficient of Performance (COP) of the Absorption Chiller Used?

Submit

Coefficient of Performance (COP) -

17. Cooling: What is the Cooling Capacity of the System?

Based on your other entries, the maximum cooling capacity is . tons or . MMBtu/hr of cooling

Submit

(Enter a value in only ONE of the boxes)

- Cooling Tons
- **OR** MMBtu per Hour of Cooling

18. Displaced Cooling: What is the Efficiency of the Cooling System that is Being Displaced?

Submit

(Enter a value in only ONE of the boxes)

Electricity Demand (kW per ton)	-
OR Coefficient of Performance (COP)	-

Thermal Characteristics

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19. Displaced Thermal: Type of System:

Existing Gas Boiler | Submit

20. Displaced Thermal: What is the Heat Content of the displaced Fuel? (Enter a value in only ONE of the boxes)

	1,028	Btu/cubic foot (HHV)
OR	-	Btu/gallon (HHV)
OR	-	Btu/lb (HHV)

Submit

21. Displaced Thermal: Efficiency (usually a boiler)

I will enter an efficiency | Use default for this thermal technology | Submit

Enter Generating Efficiency as % 66%

22. Thermal Utilization (Enter a value to answer only ONE of the options below)

Option 1: CHP Thermal Utilization - What is the percent of available CHP thermal output utilized throughout the year?

I will enter a thermal utilization | Use the default thermal utilization | Submit

Enter thermal utilization as a % (also applies to cooling) 100%

Option 2: Displaced boiler fuel - What is the quantity of boiler fuel displaced throughout the year?

Enter displaced boiler fuel as MMBtu/year MMBtu/yr

Electricity Profile

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23. Displaced Electricity: Electricity Generation Profile

User Source 1

Modify one of the User-Defined Profiles

Submit

See the instructions for Input 23 in Section 2 of the User Manual

24. Displaced Electricity: Select U.S. Average, eGRID Subregion, or NERC region

CAMX - WECC California

Submit

Link to eGRID Subregion Map and NERC Interconnections Map

25. Displaced Electricity: Select Electric Grid Region for Transmission and Distribution (T&D) Losses

Western Interconnect

4.80%

Submit

Link to NERC Interconnections Map

EPA COMBINED HEAT AND POWER PARTNERSHIP

CHP Results

The results generated by the CHP Energy and Emissions Savings Calculator are intended for educational and outreach purposes only; it is not designed for use in developing emission inventories or preparing air permit applications.

The results of this analysis have not been reviewed or endorsed by the EPA CHP Partnership.

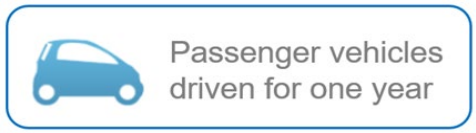
Table 1: Annual Energy Savings

	CHP System	Displaced Electricity Production	Displaced Thermal Production	Fuel Savings	Percent Savings
Fuel Consumption (MMBtu/year)	1,070,408	1,668,171	345,596	943,359	47%
Equal to the annual energy consumption of this many passenger vehicles:				14,916	
Equal to the annual energy consumption from the generation of electricity for this many homes:				-	

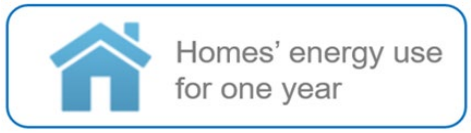
Table 2: Annual Emissions Savings

	CHP System	Displaced Electricity Production	Displaced Thermal Production	Emissions Savings	Percent Savings
NO_x (tons/year)	22.60	7.81	1.62	(13.16)	-139%
SO_2 (tons/year)	-	6.78	0.10	6.88	-
CO_2 (tons/year)	61,736	56,866.29	20,200	15,330.61	20%
CH_4 (tons/year)	-	-	0.38	0.38	-
N_2O (tons/year)	-	-	0.04	0.04	-
Total GHGs (CO_2e tons/year)	61,736	56,866.29	20,220	15,350.41	20%
Equal to the annual GHG emissions from this many passenger vehicles:				3,008	
Equal to the annual GHG emissions from the generation of electricity for this many homes:				1,606	

Equal to the annual greenhouse gas emissions from 3,008 passenger vehicles.



Equal to the annual greenhouse gas emissions from the generation of electricity used by 1,606 homes.



CHP Results

The results of this analysis have not been reviewed or endorsed by the EPA CHP Partnership.

Table 3: CHP Technology and Generation Profile

CHP Technology:	Recip Engine - Lean Burn	
Fuel:	Other Fuel (including renewables)	
Unit Capacity:	3,022	kW
Number of Units:	5	
Total CHP Capacity:	15,110	kW
Operation:	8,760	hours per year
Heat Rate:	8,087	Btu/kWh HHV
CHP Fuel Consumption:	1,070,408	MMBtu/year
Duct Burner Fuel Consumption:	-	MMBtu/year
Total Fuel Consumption:	**1,070,408**	**MMBtu/year**
Total CHP Generation:	**132,364**	**MWh/year**
Useful CHP Thermal Output:	228,093	MMBtu/year for thermal applications (non-cooling)
	-	MMBtu/year for electric applications (cooling and electric heating)
	228,093	**MMBtu/year Total**

Table 4: Displaced Thermal Energy

Displaced On-Site Production for Thermal (non-cooling) Applications:		Existing Gas Boiler
	0.01	lb/MMBtu NOx
	0.00%	sulfur content
Displaced Electric Service (cooling and electric heating):	There is no displaced cooling service	

Table 5: Displaced Electricity

Displaced Electricity Profile:	User Source 1	
eGRID State:	N/A	
Distribution Losses:	4.8%	
Displaced Electricity Production:	132,364	MWh/year CHP generation
	-	MWh/year Displaced Electric Demand (cooling)
	-	MWh/year Displaced Electric Demand (electric heating)
	6,674	MWh/year Transmission Losses
	139,037	**MWh/year Total**

CHP Results

The results of this analysis have not been reviewed or endorsed by the EPA CHP Partnership.

Table 6: Annual Analysis for CHP

	CHP System: Recip Engine - Lean Burn	Duct Burners (if applicable)	Total Emissions from CHP System
NO_x (tons/year)	22.60	-	22.60
SO_2 (tons/year)	-	-	-
CO_2 (tons/year)	61,736	-	61,736
CH_4 (tons/year)	-	-	-
N_2O (tons/year)	-	-	-
Total GHGs (CO_2e tons/year)	61,736	-	61,736
Carbon (metric tons/year)	15,265	-	15,265
Fuel Consumption (MMBtu/year)	1,070,408	-	1,070,408

Table 7: Annual Analysis for Displaced Thermal Production (non-cooling)

	Total Displaced Emissions from Thermal Production
NO_x (tons/year)	1.62
SO_2 (tons/year)	0.10
CO_2 (tons/year)	20,200
CH_4 (tons/year)	0.38
N_2O (tons/year)	0.04
Total GHGs (CO_2e tons/year)	20,220
Carbon (metric tons/year)	4,995
Fuel Consumption (MMBtu/year)	345,596

Table 8: Annual Analysis for Displaced Electricity Production

	Displaced CHP Electricity Generation	Displaced Electricity for Cooling	Displaced Electricity for Heating	Transmission Losses	Total Displaced Emissions from Electricity Generation
NO_x (tons/year)	7.44	-	-	0.38	7.81
SO_2 (tons/year)	6.45	-	-	0.33	6.78
CO_2 (tons/year)	54,137	-	-	2,729.58	56,866
CH_4 (tons/year)	-	-	-	-	0.000
N_2O (tons/year)	-	-	-	-	0.000
Total GHGs (CO_2e tons/year)	54,137	-	-	2,730	56,866
Carbon (metric tons/year)	13,386	-	-	675	14,061
Fuel Consumption (MMBtu/year)	1,588,098	-	-	80,072	1,668,171

Table 9: Emission Rates for Displaced Electricity

CHP Results

	CHP System including Duct Burners	Recip Engine - Lean Burn Alone	Displaced Electricity Production
NOx (lb/MWh)	0.34	0.34	0.11
SO2 (lb/MWh)	-	-	0.10
CO2 (lb/MWh)	933	933	818

Table 10: Emission Rates for Displaced Thermal

	Displaced Thermal Production
NOx (lb/MMBtu)	0.01
SO2 (lb/MMBtu)	0.00059
CO2 (lb/MMBtu)	116.90

CHP Results

The results of this analysis have not been reviewed or endorsed by the EPA CHP Partnership.

Figure 1. Conventional Production Energy Flow Schematic

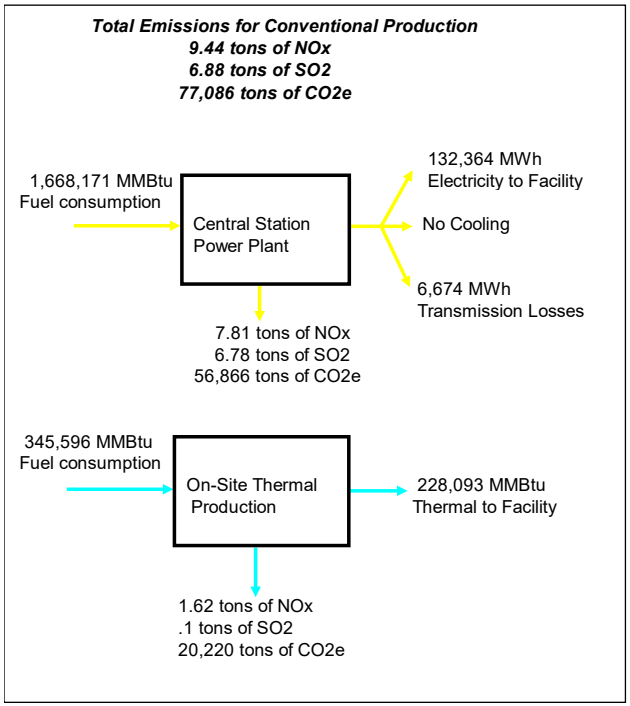
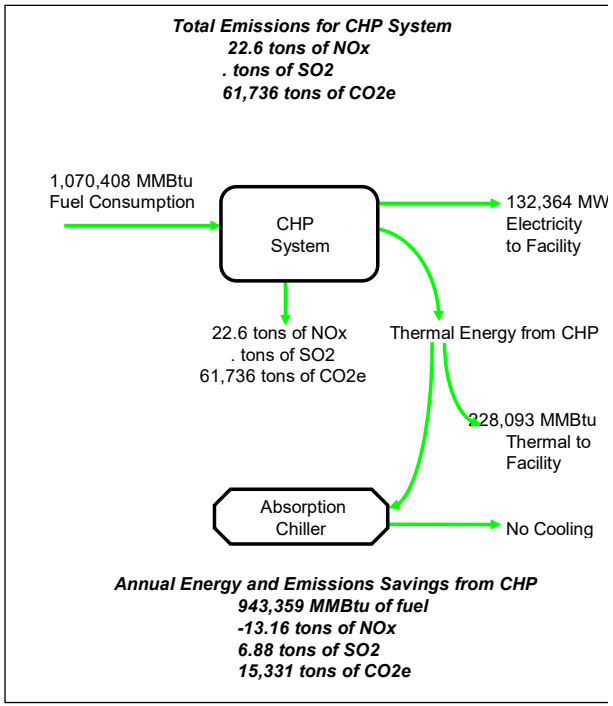


Figure 2. CHP System Energy Flow Schematic



Thermal Calculator

Value	Units	Description

Calculate the Power to Heat Ratio by completing the entries in one of the following boxes:

-	MMBtu/hr	Thermal output from a single unit

OR

-	lb/hr	Steam consumed in process
1,000	Btu/lb	Enthalpy (a common value is 1,000 Btu/lb)
-	*MMBtu/hr*	*calculated*

OR

-	MMBtu/hr	Fuel consumed in thermal process (often a boiler)
0%		Efficiency of thermal converter
-	*MMBtu/hr*	*calculated*

Results

-	MMBtu/hr	thermal output
-	kW	thermal output
3,022	kW	kW capacity of CHP system
		Power to Heat ratio of CHP system

Copy this Power to Heat Ratio to the Input Screen

Reset Thermal Calculator

Generation Sources

Existing Generation Sources				Heat Rate	
Name	NOx lb/MWh	SO2 lb/MWh	CO2 lb/MWh	Btu/kWh	
EGrid Annual Average	0.46	0.05	497	4,160	EPA eGRID2018 (released March 202020), http://www.epa.gov/energy/egrid
EGrid Annual Fossil	0.76	0.06	954	7,479	EPA eGRID2018 (released March 202020), http://www.epa.gov/energy/egrid
EGrid Annual Coal	2.282	0.57	1,974	9,617	EPA eGRID2018 (released March 202020), http://www.epa.gov/energy/egrid
EGrid Annual Oil	8.403	0.59	1,935	9,837	EPA eGRID2018 (released March 202020), http://www.epa.gov/energy/egrid
EGrid Annual Natural Gas	0.618	0.008	857	7,291	EPA eGRID2018 (released March 202020), http://www.epa.gov/energy/egrid
Coal Boiler 3.8 lb/MWh NOx	3.800	5.000	1,967	9,500	AP 42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors
Coal Boiler 1.5 lb/MWh NOx	1.500	2.500	1,967	9,500	AP 42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors
Coal Boiler with SCR 0.8 lb/MWh NOx	0.800	1.000	1,967	9,500	AP 42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors
Gas Boiler 0.77 lb/MWh NOx	0.770	0.006	1,286	11,000	AP 42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors
Gas Turbine Peaker 25 ppm	1.103	0.007	1,403	12,000	AP 42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors
Gas combined-cycle 9 ppm	0.265	0.005	935	8,000	AP 42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors
Gas combined-cycle 3 ppm	0.077	0.004	818	7,000	AP 42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors

Please enter emission rates for the new generation sources:

User Defined Generation Sources				Heat Rate
Name	NOx lb/MWh	SO2 lb/MWh	CO2 lb/MWh	Btu/kWh
User Source 1	0.112	0.098	1,403	11,998
User Source 2	-	-	-	-
User Source 3	-	-	-	-

Reset this Generation Sources Screen

Click here to use the rates that have been entered here to define a user source in Input 23, and Return to Input Screen

Biomass and Coal Data

Note: The data in these tables are not used in any calculations within the tool, but are only provided as a reference for users entering biomass or coal data.

Biomass

Heat Content & Emission Rates for Biomass Fuels

Biomass Fuel Source	Heat Content (HHV)		CO_2 Emission Rate*		NOx Emission Rate**	Sulfur Content**
Wood and Wood Residuals	8,740	Btu/lb	206.7	lb/MMBtu	0.49 lb/MMBtu	0.025 lb/MMBtu
Agricultural Byproducts	4,125	Btu/lb	260.4	lb/MMBtu		
Solid Byproducts	5,195	Btu/lb	232.5	lb/MMBtu		
Biogas	655	Btu/scf	114.7	lb/MMBtu		
Landfill Gas	485	Btu/scf	114.7	lb/MMBtu		
Biodiesel	128,000	Btu/gal	162.7	lb/MMBtu		
Ethanol	84,000	Btu/gal	150.8	lb/MMBtu		

*CO_2 Emissions data from EPA Mandatory GHG Reporting Rule, 40 CFR 98, Subpart C, Table C-1

**NO_X and Sulfur emissions data for dry wood fuels from AP-42. Rates for Agricultural Byproducts and Solid Byproducts depend on the composition of the fuels, and for NOx, the combustion temperature. Gaseous and liquid biomass fuels contain trace amounts of Sulfur, and their NOx content is variable, depending on prime mover, combustion temperature, and post-combustion emission controls.

Coal

Coal Type	Heat Content (HHV)		CO_2 Emission Rate	
Anthracite	12,545	Btu/lb	228.3	lb/MMBtu
Bituminous	12,465	Btu/lb	205.9	lb/MMBtu
Sub-bituminous	8,625	Btu/lb	213.9	lb/MMBtu
Lignite	7,105	Btu/lb	212.5	lb/MMBtu
Industrial Mixed Use	11,175	Btu/lb	207.1	lb/MMBtu
Commercial Mixed Use	10,695	Btu/lb	210.0	lb/MMBtu

*Emissions Data from EPA Mandatory GHG Reporting Rule, Part 98, Subpart C, Table C-1

For an expanded list of emissions factors and heat content values, please see Table C-1 in 40 CFR 98:
http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr98_main_02.tpl

Selecting an Appropriate Displaced Electricity Generation Profile

When calculating fuel and CO_2 emissions savings associated with CHP, the Partnership recommends the following factors for the displaced electricity generation profile:

The **eGRID Fossil Fuel** emissions factor and heat rate for the eGRID subregion where the CHP system is located should be used for **baseload CHP** applications with **high annual capacity factors** (i.e., greater than 6,500 annual operating hours), and

The **eGRID non-baseload** emissions factor and heat rate for the eGRID subregion where the CHP system is located should be used for CHP systems with relatively **low annual capacity factors** (i.e., less than 6,500 annual operating hours) and with most generation occurring during periods of high system demand.

There are three types of generation rates provided in eGRID that represent a utility generation mix:

All Sources
The rates for "All Sources" are based on data for all power generation regardless of energy source (i.e., fossil, nuclear, hydro, and renewables) within a defined region or subregion. One CO_2 emissions factor (lb/MWh) and one heat rate (Btu/kWh) value are associated with the category for each NERC region and eGRID subregion.

Fossil Fuel
The Fossil Fuel output rates are based on data for power generation from fossil fuel-fired plants within a defined region or subregion. One CO_2 emission factor (lb/MWh) and one heat rate (Btu/kWh) value are associated with the category for each NERC region and eGRID subregion. EPA characterizes this emissions factor as "a rough estimate to determine how much emissions could be avoided if energy efficiency and/or renewable energy displaces fossil fuel generation." The EPA CHP Partnership recommends the emissions factor and heat rate from this category to determine emissions and fuel use from displaced grid electricity when evaluating CHP systems. The rationale for this recommendation is presented in section B.3 below.

Non-Baseload
The Non-baseload output rates are based on data for power generation from combustion generating units within a defined region or subregion that do not serve as baseload units. One CO_2 emissions factor (lb/MWh) and one heat rate (Btu/kWh) value are associated with the category for each NERC region and eGRID subregion. The term "baseload" refers to those plants that supply electricity to the grid even when demand for electricity is relatively low. Baseload plants are usually brought online to provide electricity to the grid regardless of the level of demand, and they generally operate continuously except when undergoing routine or unscheduled maintenance. EPA developed the non-baseload output emissions factors to estimate emissions reductions from energy efficiency projects and certain types of clean energy projects based on the emissions from generating units that are dispatched to respond to marginal increases in electricity demand.

When selecting the eGRID emissions and heat rate category, it is important to select the category that contains central station generators representative of those that are displaced by CHP systems. At first glance, each of the eGRID categories mentioned above (All Sources, Fossil Fuel, and Non-Baseload) may seem like reasonable choices.

Estimating the energy and emissions displaced by CHP requires an estimate of the nature of generation displaced by the use of power produced by the CHP system. Accurate estimates can be made using a power system dispatch model to determine how emissions for generation in a specific eGRID subregion are impacted by the shift in the system demand curve and generation mix resulting from the addition of CHP systems. However, these models are complex and costly to run.

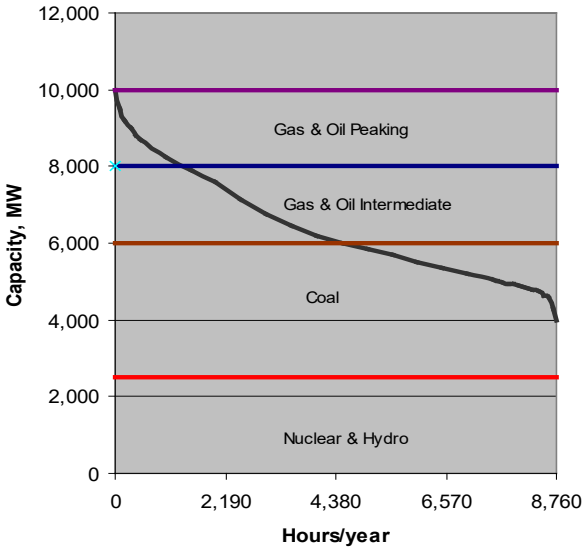
As stated previously, eGRID provides two rates that can be used to estimate the mix of generation that is displaced by the use of clean energy technologies like CHP: the **fossil fuel** output rates and the **non-baseload** output rates.

Use of the "all sources" rates is not appropriate since it includes a substantial amount of baseload generation that is not offset by CHP projects. Specifically, nuclear and hydroelectric power sources, which do not produce significant emissions, tend to be the lowest-cost generation option for utilities. As a result, nuclear and hydroelectric power sources operate continuously throughout the year, even during periods of low system demand. Coal generation is typically the next-lowest operating cost source of power for utilities. While coal plants largely serve as baseload plants, there are periods in which coal power must be scaled back or turned off during periods of low demand.

Natural gas and oil-fired systems have the highest operating costs, so when system demand is reduced, these are the first plants to be scaled back or turned off. Many of these generators are only used to meet peak loads. Therefore, baseload distributed generation resources like CHP will displace a mix of fossil fuel power from utilities, while generators with low capacity factors are more likely to displace a utility's non-baseload power resources.

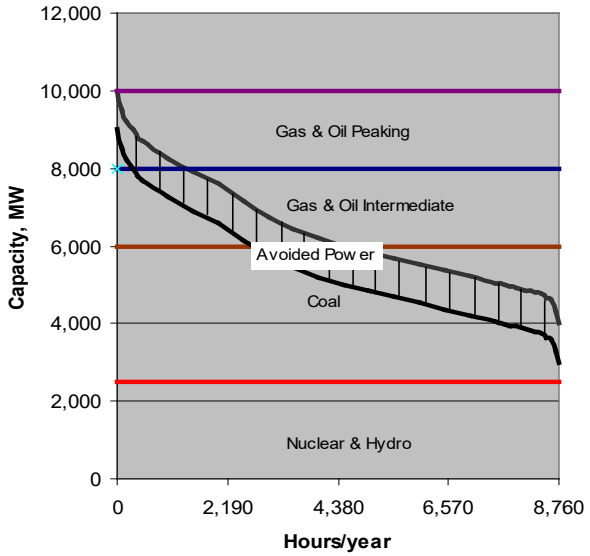
A hypothetical power system load duration curve that illustrates this concept is shown below.

Hypothetical Power System Load Duration Curve and Dispatch Order



The effect of marginal displaced generation from a 1 MW CHP unit on this hypothetical power system is shown below. Note that for systems with low operating hours, only the intermediate and peaking resources are displaced, while systems with high operating hours displace a mix of gas, oil, and coal resources. Low-cost nuclear and hydro resources are not impacted by the addition of CHP.

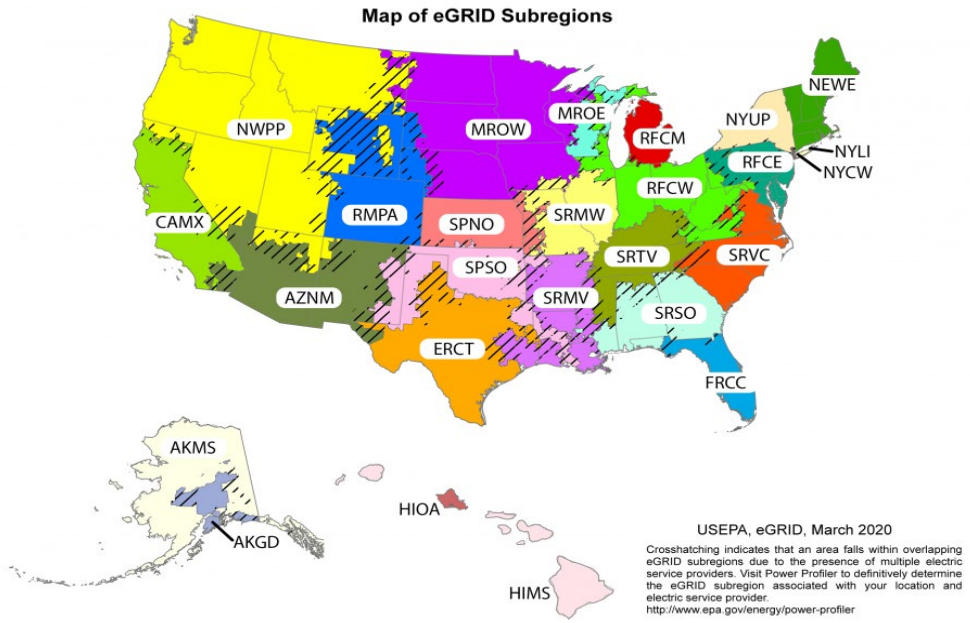
Marginal Displaced Generation due to 1,000 MW of CHP



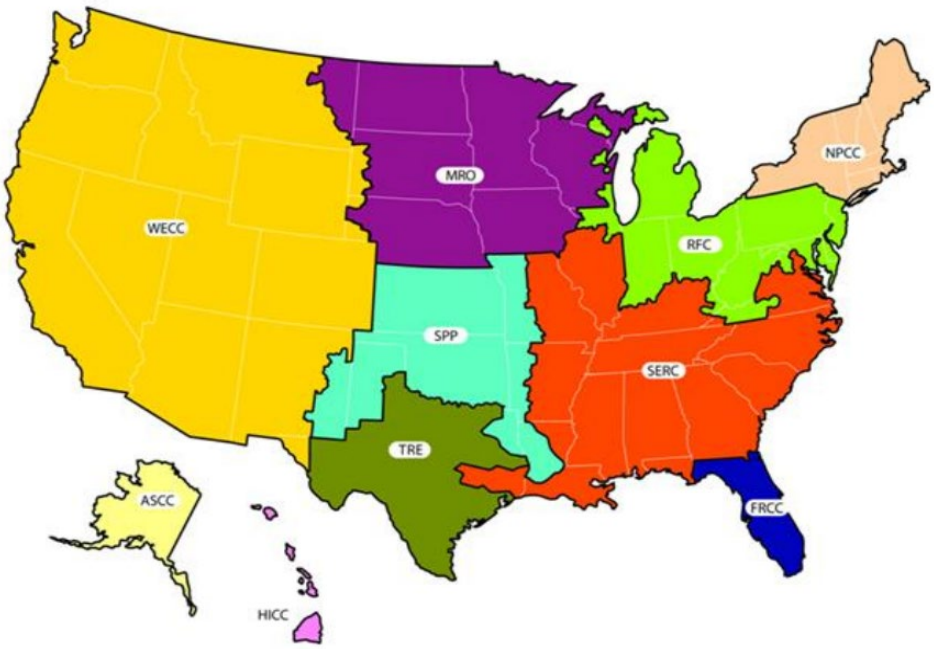
More details on eGRID generation sources and displaced grid electricity can be found in Appendix B of EPA's Fuel and CO2 Emissions Savings Calculation Methodology for CHP

eGRID2018 Subregions Map

User Manual
Double Click to Launch



NERC Interconnections Map



Phase 1 Construction Offroad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor	Number of days	Diesel Fuel Usage
Site Preparation	Rubber Tired Dozers	3	8	247	0.4	5	593
Site Preparation	Tractors/Loaders/Backhoes	4	8	97	0.37	5	287
Grading	Graders	1	8	187	0.41	8	245
Grading	Excavators	1	8	158	0.38	8	192
Grading	Rubber Tired Dozers	1	8	247	0.40	8	316
Grading	Tractors/Loaders/Backhoes	3	8	97	0.37	8	345
Trenching	Excavators	1	8	158	0.38	8	192
Trenching	Forklifts	1	8	89	0.20	8	57
Trenching	Tractors/Loaders/Backhoes	1	8	97	0.37	8	115
Trenching	Trenchers	1	8	78	1	8	125
Paving	Cement and Mortar Mixers	2	6	9	0.56	18	54
Paving	Pavers	1	8	130	0.42	18	393
Paving	Paving Equipment	2	6	132	0.36	18	513
Paving	Rollers	2	6	80	0.38	18	328
Paving	Tractors/Loaders/Backhoes	1	8	97	0.37	18	258
Building Construction	Forklifts	3	8	89	0.20	230	4,913
Building Construction	Generator Sets	1	8	84	0.74	230	5,719
Building Construction	Tractors/Loaders/Backhoes	3	7	97	0.37	230	8,667
Building Construction	Cranes	1	7	231	0.29	230	5,393
Building Construction	Welders	1	8	46	0.45	230	1,904
Architectural Coating	Air Compressors	1	6	78	0.48	18	202
						TOTAL	30,813

Notes: Equipment assumptions are consistent with CalEEMod. Fuel usage average of 0.05 gallons of diesel fuel per horsepower-hour is from the SCAQMD CEQA Air Quality Handbook, Table A9-3E.

Trips and VMT

Phase Name	Daily Worker Trip	Daily Vendor Trip	Daily Hauling Trip	Days per Year	Total Worker Trips	Total Vendor Trips	Total Haul Trips	Worker Trip Length (miles)	Vendor Trip Length (miles)	Haul Trip Length (miles)	Total Worker Trip Length (miles)	Total Vendor Trip Length (miles)	Total Haul Trip Length (miles)	Total gallons of gasoline	Total gallons of diesel
Site Preparation	18	0	0	4	72	0	0	10.00	6.50	20.00	720	0	-	27	0
Grading	15	0	0	20	300	0	0	10.00	6.50	20.00	3,000	0	-	112	0
Trenching	10	0	0	7	70	0	0	10.00	6.50	20.00	700	0	-	26	0
Building Construction	6	2	0	68	408	136	0	10.00	6.50	20.00	4,080	884	-	152	145
Paving	20	0	0	5	100	0	0	10.00	6.50	20.00	1,000	0	-	37	0
Archetectural Coating	1	0	0	10	10	0	0	10.00	6.50	20.00	100	0	-	4	0
													TOTAL	359	145

Trips and VMT Associated with Project Operations

Employees	Trips/ employee/ day	Total Worker Trips/day	Worker Trip Length (miles)	Total Worker Trip Length (miles)	Fuel Efficiency (miles/gallon)	gallons of gasoline/day	Days/year	gallons of gasoline/year
10	4	40	10.00	400	26.75	15	365	5,457

Source: EMFAC2021 (v1.0.0) Emissions Inventory
Region Type: County
Region: Sacramento
Calendar Year: 2024
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	CalYr	VehClass	MdlYr	Speed miles/hr	Fuel	Population vehicles	VMT miles/day	Trips trips/day	Fuel gas 1,000 gallons/day	Diesel gas 1,000 gallons/day	Portion of Pass Veh VMT (%)	Miles per gallon	Gasoline miles per gallon	Diesel miles per gallon
Sacramento	2018	LDA	Aggregated	Aggregated	GAS	494,865	18,120,208	2,276,170	631	—	64%	28.71	26.75	6.10
Sacramento	2018	LDT1	Aggregated	Aggregated	GAS	50,247	1,596,182	219,401	66	—	6%	24.09		
Sacramento	2018	LDT2	Aggregated	Aggregated	GAS	233,491	8,743,519	1,082,945	377	—	31%	23.19		
Sacramento	2018	T7 tractor construction	Aggregated	Aggregated	DSL	960	75,299	13,945	—	12	—	6.10		

Source: EMFAC2021 (v1.0.0) Emissions Inventory
Region Type: County
Region: Sacramento
Calendar Year: 2024
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	Population	Total VMT	CVMT	EVMT	Trips	Fuel Consumption
Sacramento	2024	LDA	1980	Aggregate	Gasoline	317	377	377	0	846.8539	0.044
Sacramento	2024	LDA	1980	Aggregate	Diesel	27	32	32	0	71.663	0.001
Sacramento	2024	LDA	1981	Aggregate	Gasoline	355	625	625	0	968.0743	0.047
Sacramento	2024	LDA	1981	Aggregate	Diesel	41	72	72	0	111.1572	0.003
Sacramento	2024	LDA	1982	Aggregate	Gasoline	356	839	839	0	991.1842	0.057
Sacramento	2024	LDA	1982	Aggregate	Diesel	50	117	117	0	138.406	0.004
Sacramento	2024	LDA	1983	Aggregate	Gasoline	322	961	961	0	915.5103	0.062
Sacramento	2024	LDA	1983	Aggregate	Diesel	59	175	175	0	166.6801	0.006
Sacramento	2024	LDA	1984	Aggregate	Gasoline	358	1,302	1,302	0	1037.746	0.079
Sacramento	2024	LDA	1984	Aggregate	Diesel	58	210	210	0	167.1591	0.007
Sacramento	2024	LDA	1985	Aggregate	Gasoline	580	2,503	2,503	0	1713.79	0.146
Sacramento	2024	LDA	1985	Aggregate	Diesel	69	296	296	0	202.7924	0.010
Sacramento	2024	LDA	1986	Aggregate	Gasoline	458	2,299	2,299	0	1378.896	0.124
Sacramento	2024	LDA	1986	Aggregate	Diesel	7	33	33	0	19.89763	0.001
Sacramento	2024	LDA	1987	Aggregate	Gasoline	718	4,138	4,138	0	2205.982	0.219
Sacramento	2024	LDA	1987	Aggregate	Diesel	28	160	160	0	85.15608	0.005
Sacramento	2024	LDA	1988	Aggregate	Gasoline	585	3,813	3,813	0	1828.078	0.198
Sacramento	2024	LDA	1989	Aggregate	Gasoline	849	6,211	6,211	0	2704.604	0.318
Sacramento	2024	LDA	1989	Aggregate	Diesel	1	6	6	0	2.756437	0.000
Sacramento	2024	LDA	1990	Aggregate	Gasoline	868	7,061	7,061	0	2815.083	0.358
Sacramento	2024	LDA	1991	Aggregate	Gasoline	1,236	11,093	11,093	0	4076.609	0.557
Sacramento	2024	LDA	1991	Aggregate	Diesel	6	51	51	0	18.6749	0.002
Sacramento	2024	LDA	1992	Aggregate	Gasoline	1,092	10,759	10,759	0	3666.019	0.536
Sacramento	2024	LDA	1992	Aggregate	Diesel	2	18	18	0	6.301355	0.001
Sacramento	2024	LDA	1993	Aggregate	Gasoline	1,067	11,475	11,475	0	3643.511	0.533
Sacramento	2024	LDA	1993	Aggregate	Diesel	4	46	46	0	14.54206	0.001
Sacramento	2024	LDA	1994	Aggregate	Gasoline	1,203	14,049	14,049	0	4175.097	0.647
Sacramento	2024	LDA	1994	Aggregate	Diesel	0	5	5	0	1.62676	0.000
Sacramento	2024	LDA	1995	Aggregate	Gasoline	1,558	19,687	19,687	0	5497.295	0.900
Sacramento	2024	LDA	1995	Aggregate	Diesel	5	61	61	0	16.98264	0.002
Sacramento	2024	LDA	1996	Aggregate	Gasoline	1,730	23,557	23,557	0	6201.963	1.077
Sacramento	2024	LDA	1996	Aggregate	Diesel	9	118	118	0	31.07021	0.003
Sacramento	2024	LDA	1997	Aggregate	Gasoline	2,356	34,472	34,472	0	8583.122	1.539
Sacramento	2024	LDA	1997	Aggregate	Diesel	7	98	98	0	24.45666	0.003
Sacramento	2024	LDA	1998	Aggregate	Gasoline	2,993	46,901	46,901	0	11075.17	2.036
Sacramento	2024	LDA	1998	Aggregate	Diesel	6	91	91	0	21.48143	0.003
Sacramento	2024	LDA	1999	Aggregate	Gasoline	3,597	60,202	60,202	0	13516.58	2.544
Sacramento	2024	LDA	1999	Aggregate	Diesel	12	197	197	0	44.19672	0.005
Sacramento	2024	LDA	2000	Aggregate	Gasoline	4,948	88,225	88,225	0	18876.42	3.739
Sacramento	2024	LDA	2000	Aggregate	Diesel	7	128	128	0	27.44891	0.004
Sacramento	2024	LDA	2001	Aggregate	Gasoline	5,917	112,135	112,135	0	22911.54	4.738
Sacramento	2024	LDA	2001	Aggregate	Diesel	15	283	283	0	57.74868	0.008
Sacramento	2024	LDA	2002	Aggregate	Gasoline	6,671	134,101	134,101	0	26215.55	5.652
Sacramento	2024	LDA	2002	Aggregate	Diesel	29	582	582	0	113.8102	0.016
Sacramento	2024	LDA	2003	Aggregate	Gasoline	7,965	169,479	169,479	0	31755.9	7.153
Sacramento	2024	LDA	2003	Aggregate	Diesel	48	1,016	1,016	0	190.3913	0.028
Sacramento	2024	LDA	2004	Aggregate	Gasoline	8,579	192,876	192,876	0	34695.77	8.458
Sacramento	2024	LDA	2004	Aggregate	Diesel	14	305	305	0	54.83165	0.008
Sacramento	2024	LDA	2005	Aggregate	Gasoline	11,421	270,842	270,842	0	46844.5	11.684
Sacramento	2024	LDA	2005	Aggregate	Diesel	32	764	764	0	132.1221	0.021
Sacramento	2024	LDA	2006	Aggregate	Gasoline	12,994	324,506	324,506	0	54040.38	14.033
Sacramento	2024	LDA	2006	Aggregate	Diesel	33	827	827	0	137.7838	0.023
Sacramento	2024	LDA	2007	Aggregate	Gasoline	15,603	409,738	409,738	0	65784.26	17.279
Sacramento	2024	LDA	2007	Aggregate	Diesel	12	311	311	0	49.9534	0.008
Sacramento	2024	LDA	2008	Aggregate	Gasoline	13,375	368,794	368,794	0	57154.51	15.634
Sacramento	2024	LDA	2008	Aggregate	Diesel	14	380	380	0	58.96569	0.010
Sacramento	2024	LDA	2009	Aggregate	Gasoline	11,557	334,172	334,172	0	50047.5	13.426
Sacramento	2024	LDA	2009	Aggregate	Diesel	32	912	912	0	136.5241	0.023
Sacramento	2024	LDA	2010	Aggregate	Gasoline	14,405	436,273	436,273	0	63209.37	15.939
Sacramento	2024	LDA	2010	Aggregate	Diesel	35	1,060	1,060	0	153.5896	0.025
Sacramento	2024	LDA	2011	Aggregate	Gasoline	14,604	462,700	462,700	0	64918.85	17.617
Sacramento	2024	LDA	2011	Aggregate	Diesel	86	2,717	2,717	0	381.174	0.066
Sacramento	2024	LDA	2012	Aggregate	Gasoline	22,186	736,428	736,428	0	99892.61	26.722
Sacramento	2024	LDA	2012	Aggregate	Diesel	87	2,896	2,896	0	392.7731	0.067
Sacramento	2024	LDA	2013	Aggregate	Gasoline	27,923	966,897	966,897	0	127323.2	34.066
Sacramento	2024	LDA	2013	Aggregate	Diesel	153	5,292	5,292	0	696.8619	0.119
Sacramento	2024	LDA	2014	Aggregate	Gasoline	27,437	992,713	992,713	0	126681.4	35.067
Sacramento	2024	LDA	2014	Aggregate	Diesel	232	8,388	8,388	0	1070.444	0.190
Sacramento	2024	LDA	2015	Aggregate	Gasoline	31,831	1,202,107	1,202,107	0	148790.1	41.616
Sacramento	2024	LDA	2015	Aggregate	Diesel	287	10,857	10,857	0	1343.758	0.241
Sacramento	2024	LDA	2016	Aggregate	Gasoline	32,135	1,265,119	1,265,119	0	152050.6	42.849
Sacramento	2024	LDA	2016	Aggregate	Diesel	45	1,768	1,768	0	212.5318	0.038
Sacramento	2024	LDA	2017	Aggregate	Gasoline	32,401	1,328,397	1,328,397	0	155168.7	45.440
Sacramento	2024	LDA	2017	Aggregate	Diesel	16	648	648	0	75.72133	0.014
Sacramento	2024	LDA	2018	Aggregate	Gasoline	28,020	1,194,391	1,194,391	0	135792.1	40.789
Sacramento	2024	LDA	2018	Aggregate	Diesel	33	1,413	1,413	0	160.6885	0.031
Sacramento	2024	LDA	2019	Aggregate	Gasoline	25,144	1,113,638	1,113,638	0	123296	37.547
Sacramento	2024	LDA	2019	Aggregate	Diesel	3	128	128	0	14.14411	0.003
Sacramento	2024	LDA	2020	Aggregate	Gasoline	20,865	959,253	959,253	0	103506.4	31.460
Sacramento	2024	LDA	2020	Aggregate	Diesel	12	530	530	0	57.15439	0.011
Sacramento	2024	LDA	2021	Aggregate	Gasoline	24,290	1,158,841	1,158,841	0	121891.7	37.070

Sacramento	2024	LDA	2021	Aggregate	Diesel	14	648	648	0	68.18134	0.013
Sacramento	2024	LDA	2022	Aggregate	Gasoline	26,834	1,327,225	1,327,225	0	136191.6	41.521
Sacramento	2024	LDA	2022	Aggregate	Diesel	15	750	750	0	76.94609	0.015
Sacramento	2024	LDA	2023	Aggregate	Gasoline	24,392	1,249,847	1,249,847	0	125198	38.241
Sacramento	2024	LDA	2023	Aggregate	Diesel	14	710	710	0	71.14755	0.014
Sacramento	2024	LDA	2024	Aggregate	Gasoline	19,105	1,013,507	1,013,507	0	99155.38	30.328
Sacramento	2024	LDA	2024	Aggregate	Diesel	11	579	579	0	56.68	0.011
Sacramento	2024	LDT1	1980	Aggregate	Gasoline	20	160	160	0	54.27504	0.012
Sacramento	2024	LDT1	1981	Aggregate	Gasoline	39	319	319	0	105.5942	0.018
Sacramento	2024	LDT1	1981	Aggregate	Diesel	1	5	5	0	1.617666	0.000
Sacramento	2024	LDT1	1982	Aggregate	Gasoline	60	518	518	0	167.4862	0.029
Sacramento	2024	LDT1	1982	Aggregate	Diesel	11	96	96	0	31.17364	0.004
Sacramento	2024	LDT1	1983	Aggregate	Gasoline	54	490	490	0	154.3769	0.027
Sacramento	2024	LDT1	1983	Aggregate	Diesel	3	25	25	0	7.923969	0.001
Sacramento	2024	LDT1	1984	Aggregate	Gasoline	112	1,059	1,059	0	325.611	0.060
Sacramento	2024	LDT1	1984	Aggregate	Diesel	2	15	15	0	4.699074	0.001
Sacramento	2024	LDT1	1985	Aggregate	Gasoline	173	1,709	1,709	0	512.2777	0.095
Sacramento	2024	LDT1	1985	Aggregate	Diesel	1	11	11	0	3.259518	0.000
Sacramento	2024	LDT1	1986	Aggregate	Gasoline	247	2,552	2,552	0	745.3681	0.141
Sacramento	2024	LDT1	1986	Aggregate	Diesel	2	17	17	0	4.992516	0.001
Sacramento	2024	LDT1	1987	Aggregate	Gasoline	265	2,856	2,856	0	812.7475	0.157
Sacramento	2024	LDT1	1987	Aggregate	Diesel	1	6	6	0	1.782634	0.000
Sacramento	2024	LDT1	1988	Aggregate	Gasoline	212	2,394	2,394	0	663.5425	0.131
Sacramento	2024	LDT1	1989	Aggregate	Gasoline	373	4,398	4,398	0	1186.486	0.240
Sacramento	2024	LDT1	1990	Aggregate	Gasoline	324	4,003	4,003	0	1050.907	0.218
Sacramento	2024	LDT1	1991	Aggregate	Gasoline	491	6,349	6,349	0	1621.627	0.344
Sacramento	2024	LDT1	1992	Aggregate	Gasoline	390	5,267	5,267	0	1308.538	0.285
Sacramento	2024	LDT1	1993	Aggregate	Gasoline	520	7,344	7,344	0	1773.88	0.365
Sacramento	2024	LDT1	1994	Aggregate	Gasoline	680	10,049	10,049	0	2359.472	0.495
Sacramento	2024	LDT1	1995	Aggregate	Gasoline	617	9,541	9,541	0	2176.96	0.466
Sacramento	2024	LDT1	1996	Aggregate	Gasoline	898	14,569	14,569	0	3221.002	0.712
Sacramento	2024	LDT1	1997	Aggregate	Gasoline	1,068	18,160	18,160	0	3889.686	0.873
Sacramento	2024	LDT1	1998	Aggregate	Gasoline	1,312	23,403	23,403	0	4856.357	1.113
Sacramento	2024	LDT1	1999	Aggregate	Gasoline	1,266	23,665	23,665	0	4757.56	1.112
Sacramento	2024	LDT1	2000	Aggregate	Gasoline	1,345	26,334	26,334	0	5129.628	1.326
Sacramento	2024	LDT1	2001	Aggregate	Gasoline	1,385	28,416	28,416	0	5364.002	1.428
Sacramento	2024	LDT1	2001	Aggregate	Diesel	1	12	12	0	2.260412	0.001
Sacramento	2024	LDT1	2002	Aggregate	Gasoline	1,649	35,424	35,424	0	6481.49	1.777
Sacramento	2024	LDT1	2003	Aggregate	Gasoline	1,029	23,135	23,135	0	4104.061	1.159
Sacramento	2024	LDT1	2004	Aggregate	Gasoline	887	20,851	20,851	0	3587.171	1.043
Sacramento	2024	LDT1	2005	Aggregate	Gasoline	692	16,996	16,996	0	2836.604	0.837
Sacramento	2024	LDT1	2006	Aggregate	Gasoline	1,125	28,886	28,886	0	4678.646	1.411
Sacramento	2024	LDT1	2007	Aggregate	Gasoline	1,287	34,507	34,507	0	5425.786	1.663
Sacramento	2024	LDT1	2008	Aggregate	Gasoline	2,027	56,734	56,734	0	8663.512	2.749
Sacramento	2024	LDT1	2009	Aggregate	Gasoline	1,702	49,681	49,681	0	7370.415	2.282
Sacramento	2024	LDT1	2010	Aggregate	Gasoline	381	11,590	11,590	0	1671.111	0.484
Sacramento	2024	LDT1	2011	Aggregate	Gasoline	366	11,604	11,604	0	1626.865	0.505
Sacramento	2024	LDT1	2012	Aggregate	Gasoline	1,423	47,094	47,094	0	6405.688	1.954
Sacramento	2024	LDT1	2013	Aggregate	Gasoline	2,113	72,835	72,835	0	9635.577	2.935
Sacramento	2024	LDT1	2014	Aggregate	Gasoline	1,610	57,807	57,807	0	7432.398	2.336
Sacramento	2024	LDT1	2015	Aggregate	Gasoline	5,170	193,319	193,319	0	24168	7.656
Sacramento	2024	LDT1	2016	Aggregate	Gasoline	4,436	172,539	172,539	0	20990.13	6.685
Sacramento	2024	LDT1	2017	Aggregate	Gasoline	1,410	57,017	57,017	0	6752.936	2.231
Sacramento	2024	LDT1	2018	Aggregate	Gasoline	2,954	124,033	124,033	0	14314.26	4.846
Sacramento	2024	LDT1	2019	Aggregate	Gasoline	1,356	59,097	59,097	0	6647.11	2.279
Sacramento	2024	LDT1	2020	Aggregate	Gasoline	1,161	52,501	52,501	0	5758.754	1.970
Sacramento	2024	LDT1	2020	Aggregate	Diesel	0	1	1	0	0.066834	0.000
Sacramento	2024	LDT1	2021	Aggregate	Gasoline	1,361	63,831	63,831	0	6827.659	2.336
Sacramento	2024	LDT1	2021	Aggregate	Diesel	0	1	1	0	0.079535	0.000
Sacramento	2024	LDT1	2022	Aggregate	Gasoline	1,532	74,498	74,498	0	7775.368	2.666
Sacramento	2024	LDT1	2022	Aggregate	Diesel	0	1	1	0	0.091144	0.000
Sacramento	2024	LDT1	2023	Aggregate	Gasoline	1,471	74,085	74,085	0	7547.819	2.593
Sacramento	2024	LDT1	2023	Aggregate	Diesel	0	1	1	0	0.08895	0.000
Sacramento	2024	LDT1	2024	Aggregate	Gasoline	1,234	64,373	64,373	0	6404.157	2.203
Sacramento	2024	LDT1	2024	Aggregate	Diesel	0	1	1	0	0.075877	0.000
Sacramento	2024	LDT2	1980	Aggregate	Gasoline	9	68	68	0	22.88915	0.005
Sacramento	2024	LDT2	1980	Aggregate	Diesel	3	24	24	0	8.263152	0.001
Sacramento	2024	LDT2	1981	Aggregate	Gasoline	17	143	143	0	47.31354	0.011
Sacramento	2024	LDT2	1981	Aggregate	Diesel	1	7	7	0	2.236737	0.000
Sacramento	2024	LDT2	1982	Aggregate	Gasoline	10	87	87	0	28.07369	0.007
Sacramento	2024	LDT2	1982	Aggregate	Diesel	3	27	27	0	8.575609	0.001
Sacramento	2024	LDT2	1983	Aggregate	Gasoline	33	300	300	0	94.66651	0.023
Sacramento	2024	LDT2	1983	Aggregate	Diesel	1	7	7	0	2.18563	0.000
Sacramento	2024	LDT2	1984	Aggregate	Gasoline	49	465	465	0	142.8315	0.037
Sacramento	2024	LDT2	1985	Aggregate	Gasoline	26	260	260	0	78.02594	0.020
Sacramento	2024	LDT2	1986	Aggregate	Gasoline	60	617	617	0	180.3534	0.043
Sacramento	2024	LDT2	1987	Aggregate	Gasoline	94	1,016	1,016	0	288.9855	0.070
Sacramento	2024	LDT2	1988	Aggregate	Gasoline	150	1,694	1,694	0	469.4342	0.117
Sacramento	2024	LDT2	1989	Aggregate	Gasoline	191	2,250	2,250	0	607.0382	0.155
Sacramento	2024	LDT2	1990	Aggregate	Gasoline	232	2,859	2,859	0	750.7039	0.196
Sacramento	2024	LDT2	1991	Aggregate	Gasoline	233	3,012	3,012	0	769.2756	0.206
Sacramento	2024	LDT2	1992	Aggregate	Gasoline	264	3,564	3,564	0	885.5386	0.244
Sacramento	2024	LDT2	1993	Aggregate	Gasoline	301	4,251	4,251	0	1026.732	0.264
Sacramento	2024	LDT2	1993	Aggregate	Diesel	1	7	7	0	1.716008	0.000
Sacramento	2024	LDT2	1994	Aggregate	Gasoline	335	4,952	4,952	0	1162.78	0.306
Sacramento	2024	LDT2	1995	Aggregate	Gasoline	494	7,646	7,646	0	1744.681	0.468
Sacramento	2024	LDT2	1996	Aggregate	Gasoline	523	8,490	8,490	0	1876.991	0.520
Sacramento	2024	LDT2	1997	Aggregate	Gasoline	1,197	20,357	20,357	0	4360.375	1.227
Sacramento	2024	LDT2	1998	Aggregate	Gasoline	1,445	25,770	25,770	0	5347.404	1.534
Sacramento	2024	LDT2	1999	Aggregate	Gasoline	1,872	34,987	34,987	0	7033.743	2.059

Sacramento	2024	LDT2	2000	Aggregate	Gasoline	2,797	54,780	54,780	0	10670.49	3.228
Sacramento	2024	LDT2	2001	Aggregate	Gasoline	3,067	62,914	62,914	0	11876	3.700
Sacramento	2024	LDT2	2002	Aggregate	Gasoline	3,835	82,370	82,370	0	15071.18	4.836
Sacramento	2024	LDT2	2003	Aggregate	Gasoline	4,402	98,936	98,936	0	17550.59	5.802
Sacramento	2024	LDT2	2004	Aggregate	Gasoline	5,900	138,683	138,683	0	23859.02	7.635
Sacramento	2024	LDT2	2005	Aggregate	Gasoline	7,180	176,458	176,458	0	29450.63	9.568
Sacramento	2024	LDT2	2005	Aggregate	Diesel	3	72	72	0	12.08469	0.003
Sacramento	2024	LDT2	2006	Aggregate	Gasoline	7,449	191,259	191,259	0	30977.73	10.191
Sacramento	2024	LDT2	2006	Aggregate	Diesel	1	31	31	0	5.084948	0.001
Sacramento	2024	LDT2	2007	Aggregate	Gasoline	7,010	187,955	187,955	0	29553.6	10.005
Sacramento	2024	LDT2	2007	Aggregate	Diesel	8	204	204	0	32.12989	0.008
Sacramento	2024	LDT2	2008	Aggregate	Gasoline	5,060	141,598	141,598	0	21622.33	7.525
Sacramento	2024	LDT2	2008	Aggregate	Diesel	5	129	129	0	19.64467	0.005
Sacramento	2024	LDT2	2009	Aggregate	Gasoline	2,710	79,115	79,115	0	11737.15	3.974
Sacramento	2024	LDT2	2009	Aggregate	Diesel	13	385	385	0	57.10436	0.014
Sacramento	2024	LDT2	2010	Aggregate	Gasoline	5,220	158,842	158,842	0	22903.28	7.517
Sacramento	2024	LDT2	2010	Aggregate	Diesel	13	398	398	0	57.43453	0.014
Sacramento	2024	LDT2	2011	Aggregate	Gasoline	7,189	227,944	227,944	0	31956.61	10.583
Sacramento	2024	LDT2	2011	Aggregate	Diesel	22	713	713	0	99.91764	0.025
Sacramento	2024	LDT2	2012	Aggregate	Gasoline	6,303	208,635	208,635	0	28378.34	9.633
Sacramento	2024	LDT2	2012	Aggregate	Diesel	25	828	828	0	112.5765	0.029
Sacramento	2024	LDT2	2013	Aggregate	Gasoline	9,403	324,103	324,103	0	42876.75	14.603
Sacramento	2024	LDT2	2013	Aggregate	Diesel	36	1,237	1,237	0	163.5985	0.042
Sacramento	2024	LDT2	2014	Aggregate	Gasoline	10,430	374,554	374,554	0	48157.57	16.627
Sacramento	2024	LDT2	2014	Aggregate	Diesel	91	3,274	3,274	0	420.9374	0.109
Sacramento	2024	LDT2	2015	Aggregate	Gasoline	10,819	404,519	404,519	0	50571.43	17.657
Sacramento	2024	LDT2	2015	Aggregate	Diesel	106	3,981	3,981	0	497.6665	0.130
Sacramento	2024	LDT2	2016	Aggregate	Gasoline	12,898	501,645	501,645	0	61027.32	21.319
Sacramento	2024	LDT2	2016	Aggregate	Diesel	53	2,051	2,051	0	249.5201	0.065
Sacramento	2024	LDT2	2017	Aggregate	Gasoline	18,375	742,965	742,965	0	87995.52	31.027
Sacramento	2024	LDT2	2017	Aggregate	Diesel	27	1,086	1,086	0	128.6224	0.034
Sacramento	2024	LDT2	2018	Aggregate	Gasoline	18,008	756,221	756,221	0	87273.22	31.616
Sacramento	2024	LDT2	2018	Aggregate	Diesel	57	2,396	2,396	0	276.5093	0.075
Sacramento	2024	LDT2	2019	Aggregate	Gasoline	15,669	683,102	683,102	0	76834.01	27.412
Sacramento	2024	LDT2	2019	Aggregate	Diesel	15	634	634	0	71.32229	0.019
Sacramento	2024	LDT2	2020	Aggregate	Gasoline	10,895	492,760	492,760	0	54050.13	19.757
Sacramento	2024	LDT2	2020	Aggregate	Diesel	40	1,794	1,794	0	196.7373	0.054
Sacramento	2024	LDT2	2021	Aggregate	Gasoline	12,502	586,541	586,541	0	62734.65	22.836
Sacramento	2024	LDT2	2021	Aggregate	Diesel	46	2,172	2,172	0	232.3076	0.063
Sacramento	2024	LDT2	2022	Aggregate	Gasoline	13,867	674,437	674,437	0	70382.94	25.706
Sacramento	2024	LDT2	2022	Aggregate	Diesel	52	2,522	2,522	0	263.2395	0.072
Sacramento	2024	LDT2	2023	Aggregate	Gasoline	13,340	672,161	672,161	0	68469.97	25.080
Sacramento	2024	LDT2	2023	Aggregate	Diesel	50	2,525	2,525	0	257.2268	0.071
Sacramento	2024	LDT2	2024	Aggregate	Gasoline	10,916	569,587	569,587	0	56656.61	20.802
Sacramento	2024	LDT2	2024	Aggregate	Diesel	41	2,143	2,143	0	213.2139	0.059
Sacramento	2024	T7 Tractor	1980	Aggregate	Diesel	0	0	0	0	0.347458	0.000
Sacramento	2024	T7 Tractor	1981	Aggregate	Diesel	0	0	0	0	0.398596	0.000
Sacramento	2024	T7 Tractor	1982	Aggregate	Diesel	0	0	0	0	0.249281	0.000
Sacramento	2024	T7 Tractor	1983	Aggregate	Diesel	0	0	0	0	0.214022	0.000
Sacramento	2024	T7 Tractor	1984	Aggregate	Diesel	0	0	0	0	0.613202	0.000
Sacramento	2024	T7 Tractor	1985	Aggregate	Diesel	0	0	0	0	0.822365	0.000
Sacramento	2024	T7 Tractor	1986	Aggregate	Diesel	0	0	0	0	0.782134	0.000
Sacramento	2024	T7 Tractor	1987	Aggregate	Diesel	0	0	0	0	0.945639	0.000
Sacramento	2024	T7 Tractor	1988	Aggregate	Diesel	0	0	0	0	1.350043	0.000
Sacramento	2024	T7 Tractor	1989	Aggregate	Diesel	0	0	0	0	1.477964	0.000
Sacramento	2024	T7 Tractor	1990	Aggregate	Diesel	0	0	0	0	2.117391	0.000
Sacramento	2024	T7 Tractor	1991	Aggregate	Diesel	0	0	0	0	1.331643	0.000
Sacramento	2024	T7 Tractor	1992	Aggregate	Diesel	0	0	0	0	1.364025	0.000
Sacramento	2024	T7 Tractor	1993	Aggregate	Diesel	0	0	0	0	1.836071	0.000
Sacramento	2024	T7 Tractor	1994	Aggregate	Diesel	0	0	0	0	2.723286	0.000
Sacramento	2024	T7 Tractor	1995	Aggregate	Diesel	0	1	1	0	3.9072	0.000
Sacramento	2024	T7 Tractor	1996	Aggregate	Diesel	0	0	0	0	3.45609	0.000
Sacramento	2024	T7 Tractor	1997	Aggregate	Diesel	0	0	0	0	3.436842	0.000
Sacramento	2024	T7 Tractor	1998	Aggregate	Diesel	0	0	0	0	3.182067	0.000
Sacramento	2024	T7 Tractor	1999	Aggregate	Diesel	0	1	1	0	4.072201	0.000
Sacramento	2024	T7 Tractor	2000	Aggregate	Diesel	0	1	1	0	5.592733	0.000
Sacramento	2024	T7 Tractor	2001	Aggregate	Diesel	0	0	0	0	3.532888	0.000
Sacramento	2024	T7 Tractor	2002	Aggregate	Diesel	0	0	0	0	1.936803	0.000
Sacramento	2024	T7 Tractor	2003	Aggregate	Diesel	0	0	0	0	2.311443	0.000
Sacramento	2024	T7 Tractor	2004	Aggregate	Diesel	0	0	0	0	1.702874	0.000
Sacramento	2024	T7 Tractor	2005	Aggregate	Diesel	0	0	0	0	2.452391	0.000
Sacramento	2024	T7 Tractor	2006	Aggregate	Diesel	0	0	0	0	2.173448	0.000
Sacramento	2024	T7 Tractor	2007	Aggregate	Diesel	0	0	0	0	2.093892	0.000
Sacramento	2024	T7 Tractor	2008	Aggregate	Diesel	0	0	0	0	3.517419	0.000
Sacramento	2024	T7 Tractor	2009	Aggregate	Diesel	0	0	0	0	3.202201	0.000
Sacramento	2024	T7 Tractor	2010	Aggregate	Diesel	0	0	0	0	1.136805	0.000
Sacramento	2024	T7 Tractor	2011	Aggregate	Diesel	47	3,009	3,009	0	681.907	0.500
Sacramento	2024	T7 Tractor	2012	Aggregate	Diesel	74	4,907	4,907	0	1076.836	0.813
Sacramento	2024	T7 Tractor	2013	Aggregate	Diesel	74	5,049	5,049	0	1072.816	0.787
Sacramento	2024	T7 Tractor	2014	Aggregate	Diesel	82	5,775	5,775	0	1187.381	0.989
Sacramento	2024	T7 Tractor	2015	Aggregate	Diesel	87	6,350	6,350	0	1263.025	1.085
Sacramento	2024	T7 Tractor	2016	Aggregate	Diesel	108	8,183	8,183	0	1573.892	1.395
Sacramento	2024	T7 Tractor	2017	Aggregate	Diesel	72	5,607	5,607	0	1042.436	0.987
Sacramento	2024	T7 Tractor	2018	Aggregate	Diesel	63	5,133	5,133	0	922.4715	0.883
Sacramento	2024	T7 Tractor	2019	Aggregate	Diesel	83	6,969	6,969	0	1210.188	1.196
Sacramento	2024	T7 Tractor	2020	Aggregate	Diesel	74	6,389	6,389	0	1072.041	1.094
Sacramento	2024	T7 Tractor	2021	Aggregate	Diesel	59	5,252	5,252	0	851.5357	0.772
Sacramento	2024	T7 Tractor	2022	Aggregate	Diesel	52	4,819	4,819	0	754.8637	0.707
Sacramento	2024	T7 Tractor	2023	Aggregate	Diesel	49	4,664	4,664	0	705.8933	0.683
Sacramento	2024	T7 Tractor	2024	Aggregate	Diesel	32	3,182	3,182	0	465.3713	0.444

Appendix B

Special-Status Species

Special-Status Plants Known to Occur in the Project Region and their Potential to Occur on the Project Site

Name	Federal Status[1]	State Status[1]	CRPR	SSHCP	Habitat	Potential to Occur in the Project Site
Ferris' milk-vetch *Astragalus tener* var. *ferrisiae*	None	None	1B.1	No	Wetland. Meadows and seeps, valley, and foothill grassland. Subalkaline flats on overflow land in the Central Valley; usually seen in dry, adobe soil. 16–246 feet in elevation. Blooms April–May.	**Not expected to occur:** The project site does not provide habitat (i.e., subalkaline flats or dry adobe soils) suitable for this species.
Watershield *Brasenia schreberi*	None	None	2B.3	No	Wetland. Freshwater marshes and swamps. Aquatic from water bodies both natural and artificial in California. 98–7,218 feet in elevation. Blooms June–September.	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Bristly sedge *Carex comosa*	None	None	2B.1	No	Wetland. Marshes and swamps, coastal prairie, valley, and foothill grassland. Lake margins, wet places; site below sea level is on a Delta island. -16–5,315 feet in elevation. Blooms May–September.	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Pappose tarplant *Centromadia parryi* ssp. *parryi*	None	None	1B.2	No	Chaparral, coastal prairie, meadows and seeps, coastal salt marsh, valley, and foothill grassland. Vernally mesic, often alkaline sites. 7–1,378 feet in elevation. Blooms May–November.	**Not expected to occur:** The project site does not provide vernally mesic habitat suitable for this species.
Bolander's water-hemlock *Cicuta maculata* var. *bolanderi*	None	None	2B.1	No	Salt marsh, Wetland. Marshes and swamps, fresh or brackish water. 0–656 feet in elevation. Blooms July–September.	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Peruvian dodder *Cuscuta obtusiflora* var. *glandulosa*	None	None	2B.2	No	Wetland. Marshes and swamps (freshwater). Freshwater marsh. 49–919 feet in elevation. Blooms July–October.	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Dwarf downingia *Downingia pusilla*	None	None	2B.2	Covered	Wetland. Valley and foothill grassland (mesic sites), vernal pools. Vernal lake and pool margins with a variety of associates. In several types of vernal pools. 3–1,608 feet in elevation. Blooms March–May.	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Boggs Lake hedge-hyssop *Gratiola heterosepala*	None	None	1B.2	Covered	Wetland. Marshes and swamps (freshwater), vernal pools. Clay soils; usually in vernal pools, sometimes on lake margins. 33–7,792 feet in elevation. Blooms April–August.	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Woolly rose-mallow *Hibiscus lasiocarpos* var. *occidentalis*	None	None	1B.2	No	Wetland. Marshes and swamps (freshwater). Moist, freshwater-soaked riverbanks and low peat islands in sloughs; can also occur on riprap and levees. In California, known from the delta watershed. 0–509 feet in elevation. Blooms June–September.	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Ahart's dwarf rush *Juncus leiospermus* var. *ahartii*	None	None	1B.2	Covered	Valley and foothill grassland. Restricted to the edges of vernal pools in grassland. 98–328 feet in elevation. Blooms March–May.	**Not expected to occur:** The project site does not provide vernal pool edge habitat suitable for this species.

Name	Federal Status[1]	State Status[1]	CRPR	SSHCP	Habitat	Potential to Occur in the Project Site
Alkali-sink goldfields *Lasthenia chrysantha*	None	None	1B.1	No	Vernal pool Vernal pools. Alkaline. 0–656 feet in elevation. Blooms February–June.	**Not expected to occur:** The project site does not provide vernal pool habitat suitable for this species.
Delta tule pea *Lathyrus jepsonii* var. *jepsonii*	None	None	1B.2	No	Wetland. Freshwater and brackish marshes. Often found with *Typha, Aster lentus, Rosa californica, Juncus spp., Scirpus*. Usually on marsh and slough edges. 0–16 feet in elevation. Blooms May–July (September).	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Legenere *Legenere limosa*	None	None	1B.1	Covered	Vernal pools, wetland. In beds of vernal pools. 3–2,887 feet in elevation. Blooms April–June.	**Not expected to occur:** The project site does not provide vernal pool or wetland habitat suitable for this species.
Heckard's pepper-grass *Lepidium latipes* var. *heckardii*	None	None	1B.2	No	Valley and foothill grassland, vernal pools. Grassland, and sometimes vernal pool edges. Alkaline soils. 3–98 feet in elevation. Blooms March–May.	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Mason's lilaeopsis *Lilaeopsis masonii*	None	SR	1B.1	No	Wetland. Freshwater and brackish marshes, riparian scrub. Tidal zones, in muddy or silty soil formed through river deposition or riverbank erosion. 0–33 feet in elevation. Blooms April–November.	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Delta mudwort *Limosella australis*	None	None	2B.1	No	Wetland. Riparian scrub, marshes, and swamps. Usually on mud banks of the Delta in marshy or scrubby riparian associations; often with *Lilaeopsis masonii*. 0–16 feet in elevation. Blooms May–August.	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Slender Orcutt grass *Orcuttia tenuis*	FT	SE	1B.1	Covered	Vernal pools, wetland. Often in gravelly substrate. 82–5,758 feet in elevation. Blooms May–September (October).	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Sacramento Orcutt grass *Orcuttia viscida*	FE	SE	1B.1	Covered	Vernal pools, wetland. 49–279 feet in elevation. Blooms April–July (September).	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Sanford's arrowhead *Sagittaria sanfordii*	None	None	1B.2	Covered	Wetland. Marshes and swamps. In standing or slow-moving freshwater ponds, marshes, and ditches. 0–2,133 feet in elevation. Blooms May–October (November).	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Marsh skullcap *Scutellaria galericulata*	None	None	2B.2	No	Wetland. Marshes and swamps, lower montane coniferous forest, meadows, and seeps. Swamps and wet places. 0–6,398 feet in elevation. Blooms June–September.	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Side-flowering skullcap *Scutellaria lateriflora*	None	None	2B.2	No	Wetland. Meadows and seeps, marshes, and swamps. Wet meadows and marshes. In the Delta, often found on logs. 0–1,640 feet in elevation. Blooms July–September.	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.

Name	Federal Status[1]	State Status[1]	CRPR	SSHCP	Habitat	Potential to Occur in the Project Site
Suisun Marsh aster *Symphyotrichum lentum*	None	None	1B.2	No	Wetland. Marshes and swamps (brackish and freshwater). Most often seen along sloughs with *Phragmites, Scirpus, blackberry, Typha*. 0–98 feet in elevation. Blooms (April), May–November.	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Saline clover *Trifolium hydrophilum*	None	None	1B.2	No	Wetland. Marshes and swamps, valley and foothill grassland, vernal pools. Mesic, alkaline sites. 0–984 feet in elevation. Blooms April–June.	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.
Ferris' milk-vetch *Astragalus tener* var. *ferrisiae*	None	None	1B.1	No	Wetland. Meadows and seeps, valley, and foothill grassland. Subalkaline flats on overflow land in the Central Valley; usually seen in dry, adobe soil. 16–246 feet in elevation. Blooms April–May.	**Not expected to occur:** The project site does not provide wetland habitat suitable for this species.

Notes: CRPR = California Rare Plant Rank; CNDDB = California Natural Diversity Database

[1] Legal Status Definitions

Federal:
FE Endangered (legally protected by ESA)
FT Threatened (legally protected by ESA)

State:
SE Endangered (legally protected by CESA)
SR Rare (legally protected by CNPPA)

California Rare Plant Ranks:
1B Plant species considered rare or endangered in California and elsewhere (protected under CEQA, but not legally protected under ESA or CESA)
2B Plant species considered rare or endangered in California but more common elsewhere (protected under CEQA, but not legally protected under ESA or CESA)

Threat Ranks:
0.1 Seriously threatened in California (over 80% of occurrences threatened; high degree and immediacy of threat)
0.2 Moderately threatened in California (20-80% occurrences threatened; moderate degree and immediacy of threat)
0.3 Not very threatened in California (less than 20% of occurrences threatened; low degree and immediacy of threat or not current threats known)

SSHCP:

Covered Species is covered under the SSHCP
No Species is not covered under the SSHCP

[2] Potential for Occurrence Definitions

Not expected to occur: Species is unlikely to be present within the project area due to poor habitat quality, lack of suitable habitat features, or restricted current distribution of the species.

May occur: Suitable habitat is available within the project area; however, there are little to no other indicators that the species might be present.

Likely to occur: All of the species life history requirements can be met by habitat present on the site, and populations/occurrences are known to occur in the immediate vicinity.

Sources: CNDDB 2021; CNPS 2021; SSHCP 2018; Baldwin et al. 2012.

Special-Status Wildlife Known to Occur in the Project Region and their Potential to Occur on the Project Site

Name	Federal Status[1]	State Status[1]	SSHCP	Habitat	Potential to Occur in the Project Site
Invertebrates					
Crotch bumble bee *Bombus crotchii*	None	SSC	No	Coastal California east to the Sierra-Cascade crest and south into Mexico. Food plant genera include *Antirrhinum, Phacelia, Clarkia, Dendromecon, Eschscholzia*, and *Eriogonum*.	**Not expected to Occur:** The project site does not support plants associated for this bumble bee.
Ricksecker's water scavanger beetle *Hydrochara rickseckeri*	None	None	Covered	Aquatic, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters.	**Not expected to Occur:** The project site does not support aquatic habitat.
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	FT	None	Covered	Riparian scrub. Occurs only in the Central Valley of California, in association with blue elderberry (*Sambucus nigra* ssp. *caerulea*). Prefers to lay eggs in elderberries 2-8 inches in diameter; some preference shown for "stressed" elderberries.	**Not expected to Occur:** Elderberry shrubs are known to occur in the Bufferlands, nearest is approximately 260 feet southwest of the project site.
Vernal pool fairy shrimp Branchinecta lynchi	FT	None	Covered	Valley and foothill grassland, vernal pool, wetland. Endemic to the grasslands of the Central Valley, Central Coast mountains, and South Coast mountains, in astatic rain-filled pools. Inhabit small, clear-water sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	**Not expected to Occur:** The project site does not support vernal pool or wetland habitat suitable for this species.
Mid-walley fairy shrimp *Branchinecta mesovallensis*	None	None	Covered	Vernal pool, wetland. Vernal pools in the Central Valley.	**Not expected to Occur:** The project site does not support vernal pool or wetland habitat suitable for this species.
Vernal pool tadpole shrimp *Lepidurus packardi*	FE	None	Covered	Valley and foothill grassland, vernal pool, wetland. Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water. Pools commonly found in grass bottomed swales of unplowed grasslands. Some pools are mud-bottomed and highly turbid.	**Not expected to Occur:** The project site does not support vernal pool or wetland habitat suitable for this species.
Fish					
Longfin smelt *Spirinchus thaleichthys*	FC	ST	No	Aquatic, estuary. Euryhaline, nektonic, and anadromous. Found in open waters of estuaries, mostly in middle or bottom of water column. Prefer salinities of 15-30 ppt but can be found in completely freshwater to almost pure seawater.	**Not expected to Occur:** The project site does not support aquatic habitat suitable for this species.
Sacramento perch *Archoplites interruptus*	None	SSC	No	Aquatic, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters. Historically found in the sloughs, slow-moving rivers, and lakes of the Central Valley. Prefers warm water. Aquatic vegetation is essential for young. Tolerates wide range of physio-chemical water conditions.	**Not expected to Occur:** The project site does not support aquatic habitat suitable for this species.

Name	Federal Status[1]	State Status[1]	SSHCP	Habitat	Potential to Occur in the Project Site
Sacramento splittail *Pogonichthys macrolepidotus*	None	SSC	No	Aquatic, estuary, freshwater marsh, Sacramento/San Joaquin flowing waters. Endemic to the lakes and rivers of the Central Valley, but now confined to the Delta, Suisun Bay, and associated marshes. Slow moving river sections, dead end sloughs. Requires flooded vegetation for spawning and foraging for young.	**Not expected to Occur:** The project site does not support aquatic habitat suitable for this species.
Steelhead - Central Valley DPS pop. 11 *Oncorhynchus mykiss irideus*	FT	None	No	Aquatic. Sacramento/San Joaquin flowing waters. Populations in the Sacramento and San Joaquin rivers and their tributaries.	**Not expected to Occur:** The project site does not support aquatic habitat suitable for this species.
Chinook salmon - Central Valley spring-run ESU pop. 6 *Oncorhynchus tshawytscha*	FT	ST	No	Aquatic. Sacramento/San Joaquin flowing waters. Adult numbers depend on pool depth and volume, amount of cover, and proximity to gravel. Water temps >27 C are lethal to adults. Federal listing refers to populations spawning in Sacramento River and tributaries.	**Not expected to Occur:** The project site does not support aquatic habitat suitable for this species.
Chinook salmon - Sacramento River winter-run ESU pop. 7 *Oncorhynchus tshawytscha*	FE	SE	No	Aquatic. Sacramento/San Joaquin flowing waters. Sacramento River below Keswick Dam. Spawns in the Sacramento River, but not in tributary streams. Requires clean, cold water over gravel beds with water temperatures between 6 and 14 C for spawning.	**Not expected to Occur:** The project site does not support aquatic habitat suitable for this species.
Amphibians					
California tiger salamander *Ambystoma californiense*	FT	ST	Covered	Cismontane woodland, meadow and seep, riparian woodland, valley and foothill grassland, vernal pool, and wetlands. Central Valley DPS federally listed as threatened. Santa Barbara and Sonoma counties DPS federally listed as endangered. Need underground refuges, especially ground squirrel burrows, and vernal pools or other seasonal water sources for breeding.	**Not expected to Occur:** The project site does not support aquatic habitat suitable for this species.
Western spadefoot *Spea hammondii*	None	SSC	Covered	Cismontane woodland, coastal scrub, valley and foothill grassland, vernal pool, and wetlands. Occurs primarily in grassland habitats but can be found in valley-foothill hardwood woodlands. Vernal pools are essential for breeding and egg-laying.	**Not expected to Occur:** The project site does not support aquatic habitat suitable for this species.

Name	Federal Status[1]	State Status[1]	SSHCP	Habitat	Potential to Occur in the Project Site
Reptiles					
Giant garter snake *Thamnophis gigas*	FT	ST	Covered	Marsh and swamp, riparian scrub, wetland. Prefers freshwater marsh and low gradient streams. Has adapted to drainage canals and irrigation ditches. This is the most aquatic of the garter snakes in California.	**Not expected to Occur:** Although the nearest CNDDB recorded observation is from Laguna Creek, 370 feet north of project site. Laguna Creek is separated from the project site by a levee and flood wall; and the project site does not support aquatic nor upland habitat suitable for this species. The detention basin north of project site (Emergency Storage Basin E) does not inundate on a regular basis and thus does not provide suitable habitat for this species.
Western pond turtle *Actinemys marmorata*	None	SSC	Covered	Aquatic, artificial flowing waters, Klamath/north coast flowing waters, Klamath/north coast standing waters, marsh and swamp, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters, South coast flowing and standing waters. A thoroughly aquatic turtle of ponds, marshes, rivers, streams, and irrigation ditches, usually with aquatic vegetation, below 6,000 feet elevation. Need basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	**Not expected to Occur:** The project site does not support aquatic habitat suitable for this species and it is separated from habitat suitable in the Bufferlands, by a levee, concrete wall, and chain link fence.
Birds					
Cooper's hawk *Accipiter cooperi*	None	None	Covered	Woodland, chiefly of open, interrupted, or marginal type. Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river floodplains; also, live oaks.	**May occur:** Species is known to frequent the Bufferlands, riparian habitat along Laguna Creek north of the project site may provide suitable nesting habitat.
Tricolored blackbird *Agelaius tricolor*	None	ST/SSC	Covered	Freshwater marsh, marsh and swamp, swamp, wetland. Highly colonial species, most numerous in Central Valley and vicinity. Largely endemic to California. Requires open water, protected nesting substrate, and foraging area with insect prey within a few kilometers of the colony.	**May occur:** Species is known to frequent the Bufferlands, riparian habitat along Laguna Creek north of the project site may provide suitable nesting habitat.
Golden eagle *Aquila chrysaetos*	None	FP	No	Broadleaved upland forest, cismontane woodland, coastal prairie, Great Basin grassland, Great Basin scrub, lower montane coniferous forest, pinyon and juniper woodlands, upper montane coniferous forest, and valley and foothill grassland. Rolling foothills, mountain areas, sage-juniper flats, and desert. Cliff-walled canyons	**Not expected to Occur:** Although the Bufferlands may provide suitable foraging habitat, there is no suitable nesting habitat. The project site does not support habitat suitable for this species.

Name	Federal Status[1]	State Status[1]	SSHCP	Habitat	Potential to Occur in the Project Site
				provide nesting habitat in most parts of range; also, large trees in open areas.	
Burrowing owl *Athene cunicularia*	None	SSC	Covered	Coastal prairie, coastal scrub, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Sonoran desert scrub, and valley and foothill grassland. Open, dry annual or perennial grasslands, deserts and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	**May occur:** Species known to nest in the Bufferlands. Vegetation height at project site may discourage usage by owls as its too tall. Limited California ground squirrel burrows as site has been graded historically for staging and construction storage.
Swainson's hawk *Buteo swainsoni*	None	ST	Covered	Great Basin grassland, riparian forest, riparian woodland, valley, and foothill grassland. Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, and agricultural or ranch lands with groves or lines of trees. Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	**May occur:** The trees within the project site do not provide suitable nesting habitat, mature trees, and annual grassland in the Bufferlands provide suitable nesting and foraging habitat. Nearest known nest location is 100 feet west of project site.
Ferruginous hawk *Buteo regalis*	None	None	Covered	Great Basin grassland, Great Basin scrub, pinyon and juniper woodlands, valley, and foothill grassland. Open grasslands, sagebrush flats, desert scrub, low foothills and fringes of pinyon and juniper habitats. Eats mostly lagomorphs, ground squirrels, and mice. Population trends may follow lagomorph population cycles.	**Not expected to Occur:** Although the Bufferlands may provide suitable wintering habitat, the project site does not provide habitat suitable for this species.
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	FT	SE	No	Riparian forest. Riparian forest nester, along the broad, lower flood-bottoms of larger river systems. Nests in riparian jungles of willow, often mixed with cottonwoods, with lower story of blackberry, nettles, or wild grape.	**Not expected to Occur:** The project site does not support nesting habitat suitable for this species. The adjacent riparian area does not provide dense riparian habitat preferred by this species.
White-tailed kite *Elanus leucurus*	None	FP	Covered	Cismontane woodland, marsh and swamp, riparian woodland, valley and foothill grassland, and wetlands. Rolling foothills and valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	**May occur:** The trees within the project site do not provide suitable nesting habitat, mature trees and annual grassland in the surrounding area provide suitable nesting and foraging habitat.
Greater sandhill crane *Grus canadensis tabida*	None	ST/FP	Covered	Annual and perennial grassland habitats, moist croplands with rice or corn stubble, and open, emergent wetlands. Typically nests in mounds of wetland plants or hummocks in remote portions of extensive wetlands. Sometimes nests in grass-lined depressions on dry sites.	**May occur:** Regular, often daily, visitor to the Bufferlands from September through March. Known to breed only in Siskiyou, Modoc, and Lassen counties and in Sierra Valley, Plumas, and

Name	Federal Status[1]	State Status[1]	SSHCP	Habitat	Potential to Occur in the Project Site
					Sierra counties. Does not breed in the project area.
Loggerhead shrike *Lanius ludovicianus*	None	SSC	Covered	A common resident and winter visitor in lowlands and foothills throughout California. Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. Occurs only rarely in heavily urbanized areas, but often found in open cropland. Sometimes uses edges of denser habitats	**May occur:** May forage within the annual grassland for insects and small mice. The project site lacks suitable nesting habitat but riparian area north and west of project site provides suitable nesting and foraging habitat.
California black rail *Laterallus jamaicensis coturniculus*	None	ST/FP	No	Brackish marsh, freshwater marsh, marsh and swamp, salt marsh, wetland. Inhabits freshwater marshes, wet meadows and shallow margins of saltwater marshes bordering larger bays. Needs water depths of about 1 inch that do not fluctuate during the year and dense vegetation for nesting habitat.	**Not expected to Occur:** The project site does not support nesting habitat suitable for this species.
Song sparrow ("Modesto" population) *Melospiza melodia*	None	SSC	No	Marsh and swamp, wetlands. Emergent freshwater marshes, riparian willow thickets, riparian forests of valley oak (*Quercus lobata*), and vegetated irrigation canals and levees.	**Not expected to Occur:** The project site does not support marsh, swamp, or wetland habitat suitable for this species.
Purple martin *Progne subis*	None	SSC	No	Broadleaved upland forest, lower montane coniferous forest. Inhabits woodlands, low elevation coniferous forest of Douglas-fir, ponderosa pine, and Monterey pine. Nests in old woodpecker cavities mostly, also in human-made structures. Nest often located in tall, isolated tree/snag.	**Not expected to Occur:** The project site does not support nesting habitat suitable for this species.
Bank swallow *Riparia riparia*	None	ST	No	Riparian scrub, riparian woodland. Colonial nester; nests primarily in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	**Not expected to Occur:** The project site does not support nesting habitat suitable for this species.
Least Bell's vireo *Vireo bellii pusillus*	FE	SE	No	Riparian forest, riparian scrub, riparian woodland. Summer resident of Southern California in low riparian in vicinity of water or in dry river bottoms; below 2,000 feet. Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, Baccharis, mesquite.	**Not expected to Occur:** The project site does not support nesting habitat suitable for this species. The adjacent riparian area does not provide dense riparian habitat preferred by this species.
Yellow-headed blackbird *Xanthocephalus xanthocephalus*	None	SSC	No	Marsh and swamp, wetland. Nests in freshwater emergent wetlands with dense vegetation and deep water. Often along borders of lakes or ponds. Nests only where large insects such as Odonata are abundant, nesting timed with maximum emergence of aquatic insects.	**Not expected to Occur:** The project site does not support marsh, swamp or wetland habitat suitable for this species.

Name	Federal Status[1]	State Status[1]	SSHCP	Habitat	Potential to Occur in the Project Site
Mammals					
Western red bat *Lasiurus blossevillii*	None	SSC	Covered	Cismontane woodland, lower montane coniferous forest, riparian forest, riparian woodland. Roosts primarily in trees, 2-40 feet above ground, from sea level up through mixed conifer forests. Prefers habitat edges and mosaics with trees that are protected from above and open below with open areas for foraging.	**Not expected to Occur:** The project site does not support habitat suitable for this species. The cottonwood trees do not provide suitable habitat as they are below the surrounding ground level and existing tall ruderal vegetation does not provide open areas below the trees.
American badger *Taxidea taxus*	None	SSC	Covered	Alkali marsh, alkali playa, alpine, alpine dwarf scrub, bog a fen, brackish marsh, broadleaved upland forest, chaparral, chenopod scrub, cismontane woodland, closed-cone coniferous forest, coastal bluff scrub, coastal dunes, coastal prairie. Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Needs sufficient food, friable soils, and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	**Not expected to Occur:** Badger has not been documented and is not expected to occur on the project site.

General references: Unless otherwise noted all habitat and distribution data provided by CNDDB.

Note: CNDDB = California Natural Diversity Database

[1] Legal Status Definitions

Federal:
FE Endangered (legally protected)
FT Threatened (legally protected)
FC Candidate

State:
FP Fully protected (legally protected)
SSC Species of special concern (no formal protection other than CEQA consideration)
SE Endangered (legally protected)
ST Threatened (legally protected)

SSHCP:

Covered Species is covered under the SSHCP
No Species is not covered under the SSHCP

[2] Potential for Occurrence Definitions

Not expected to occur: Species is unlikely to be present in the plan area due to poor habitat quality, lack of suitable habitat features, or restricted current distribution of the species.

May occur: Suitable habitat is available in the plan area; however, there are little to no other indicators that the species might be present.

Likely to occur: All of the species life history requirements can be met by habitat present on the site, and populations/occurrences are known to occur in the immediate vicinity.

Source: CNDDB 2021; SSHCP 2018, USFWS 2021

Appendix C

Noise Modeling Data

Construction Noise

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
Threshold	50	86.1
Residential	4740	46.6

Equipment	Reference Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Excavator	85	0.4
Paver	85	0.5
Dozer	85	0.4

Ground Type	hard
Source Height	8
Receiver Height	5
Ground Factor[2]	0.00

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Excavator	81.0
Paver	82.0
Dozer	81.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
86.1

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Figure 6-5 from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 6-23).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 12-3).

$L_{eq}(equip) = E.L.+10*\log(U.F.) - 20*\log(D/50) - 10*G*\log(D/50)$

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2006: pg 6-23); and

D = Distance from source to receiver.