Criteria Temporal Summary - Mitigated

Month	Activity	Criteria Emissions (lbs/day)				
		ROG	CO	NO_X	PM_{10}	$PM_{2.5}$
#1	Grading/Roads/Earthwork	0.98	16.98	17.43	14.81	2.30
	Solar Panel Construction	1.14	18.90	20.85	24.94	3.41
	Substation and O&M Building Construction	0.39	5.52	7.93	3.31	0.60
	Month 1 Totals	***2.5***	***41.4***	***46.2***	***43.1***	***6.3***
#2	Solar Panel Construction	1.14	18.90	20.85	24.94	3.41
	Substation and O&M Building Construction	0.39	5.52	7.93	3.31	0.60
	Month 2 Totals	***1.5***	***24.4***	***28.8***	***28.2***	***4.0***
#3	Solar Panel Construction	1.14	18.90	20.85	24.94	3.41
	Paving	0.19	3.00	3.72	1.42	0.32
	Month 3 Totals	***1.3***	***21.9***	***24.6***	***26.4***	***3.7***
#4	Solar Panel Construction	1.14	18.90	20.85	24.94	3.41
	Month 4 Totals	***1.1***	***18.9***	***20.8***	***24.9***	***3.4***
#5	Offsite Transmission Facilities	0.83	6.12	6.77	2.77	0.67
	Month 5 Totals	***0.8***	***6.1***	***6.8***	***2.8***	***0.7***
Lyons Solar Farm Maximum Daily		***2.5***	***41.4***	***46.2***	***43.1***	***6.3***
Thresholds		*75*	*550*	*100*	*150*	*N/A*
Exceeds?		*N*	*N*	*N*	*N*	

Criteria Temporal Summary - Unmitigated

Month	Activity	Criteria Emissions (lbs/day)				
		ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
#1	Grading/Roads/Earthwork	3.06	16.98	23.47	33.14	4.76
	Solar Panel Construction	2.84	18.90	25.87	57.18	7.30
	Substation and O&M Building Construction	1.33	5.52	11.38	7.55	1.27
	Month 1 Totals	***7.2***	***41.4***	***60.7***	***97.9***	***13.3***
#2	Solar Panel Construction	2.84	18.90	25.87	57.18	7.30
	Substation and O&M Building Construction	1.33	5.52	11.38	7.55	1.27
	Month 2 Totals	***4.2***	***24.4***	***37.2***	***64.7***	***8.6***
#3	Solar Panel Construction	2.84	18.90	25.87	57.18	7.30
	Paving	0.58	3.00	4.90	3.14	0.58
	Month 3 Totals	***3.4***	***21.9***	***30.8***	***60.3***	***7.9***
#4	Solar Panel Construction	2.84	18.90	25.87	57.18	7.30
	Month 4 Totals	***2.8***	***18.9***	***25.9***	***57.2***	***7.3***
#5	Offsite Transmission Facilities	1.44	6.12	8.40	6.04	1.17
	Month 5 Totals	***1.4***	***6.1***	***8.4***	***6.0***	***1.2***
Lyons Solar Farm Maximum Daily		***7.2***	***41.4***	***60.7***	***97.9***	***13.3***
Thresholds		*75*	*550*	*100*	*150*	*N/A*
Exceeds?		*N*	*N*	*N*	*N*	

Operational Emissions

Vehicle Activity

Activity	Vehicle Type		Workdays per Year	Trips per day	Round Trip (mi)	VMT per day	Anual VMT (mi)
On-site	Pickup Trucks	LDT2	244	2.00	10	20	4,880
	Utility/Service Vehicles	T6	244	0.25	10	3	610
	Water Truck	T7	244	0.33	10	3	805
Off-site	Worker Commute *	LDA+	244	4.55	30	136	33,273
	Carpenter Service Vehicle	LHD1	244	0.50	30	15	3,660
	Electrical Service Vehicle	LHD1	244	0.50	30	15	3,660
	Equipment/Material Delivery	MDV	244	0.10	30	3	732
					Totals	***195***	***47,620***

Criteria Emissions

Activity	Vehicle Type	Pounds per Day				
		ROG	CO	NO_X	PM_{10}	$PM_{2.5}$
On-site	Pickup Trucks	0.004	0.127	0.017	0.002	0.001
	Utility/Service Vehicles	0.000	0.016	0.002	0.000	0.000
	Water Truck	0.001	0.021	0.003	0.000	0.000
	Activity Type Total	**0.005**	**0.163**	**0.022**	**0.003**	**0.001**
Off-site	Worker Commute	0.026	0.863	0.114	0.014	0.006
	Carpenter Service Vehicle	0.003	0.095	0.013	0.002	0.001
	Electrical Service Vehicle	0.003	0.095	0.013	0.002	0.001
	Equipment/Material Delivery	0.001	0.019	0.003	0.000	0.000
	Activity Type Total	**0.033**	**1.072**	**0.142**	**0.017**	**0.007**
	Totals	***0.04***	***1.24***	***0.16***	***0.02***	***0.01***

GHG Emissions

Activity	Vehicle Type	Total Tonnes			
		CO_2	CH_4	N_2O	CO_2e
On-site	Pickup Trucks	1.99	0.0002	0.0002	2.06
	Utility/Service Vehicles	0.63	0.0004	0.0003	0.74
	Water Truck	1.29	0.0005	0.0004	1.43
Off-site	Worker Commute	10.65	0.0010	0.0011	11.03
	Carpenter Service Vehicle	2.06	0.0001	0.0002	2.11
	Electrical Service Vehicle	2.06	0.0001	0.0002	2.11
	Equipment/Material Delivery	0.39	0.0000	0.0000	0.40
	Totals	***19.1***	***0.0022***	***0.0025***	***19.9***

* *Worker commute trips per day was estimated based on 5 full-time employees plus occasional extra workers for PV cleaning*

Criteria Emissions Summary

Unmitigated

Phase Activity	Category	Criteria Emissions (lbs/d)				
		ROG	CO	NO_X	PM_{10}	$PM_{2.5}$
Grading/Roads/Earthwork	Off-road	2.81	11.79	20.87	1.26	1.26
	On-site Mobile	0.01	0.04	0.22	0.02	0.01
	Vendors	0.04	0.16	1.73	0.04	0.03
	Employees	0.21	5.00	0.64	0.07	0.03
	Road Dust	--	--	--	31.22	3.37
	Grading Fugitive	--	--	--	0.53	0.06
	Phase 1 Activity Total	***3.1***	***17.0***	***23.5***	***33.1***	***4.8***
Solar Panel Construction	Off-road	2.30	9.08	16.66	1.06	1.06
	On-site Mobile	0.01	0.06	0.38	0.03	0.02
	Vendors	0.16	0.68	7.66	0.19	0.14
	Employees	0.37	9.07	1.16	0.13	0.05
	Road Dust	--	--	--	55.77	6.02
	Phase 2 Activity Total	***2.8***	***18.9***	***25.9***	***57.2***	***7.3***
Substation and O&M Building Construction	Off-road	1.26	4.36	10.65	0.48	0.48
	On-site Mobile	0.01	0.04	0.22	0.02	0.01
	Vendors	0.01	0.06	0.38	0.02	0.02
	Employees	0.04	1.06	0.14	0.02	0.01
	Road Dust	--	--	--	7.01	0.76
	Phase 3 Activity Total	***1.3***	***5.5***	***11.4***	***7.5***	***1.3***
Offsite Transmission Facilities	Off-road	1.38	5.10	7.65	0.55	0.55
	Vendors	0.03	0.11	0.64	0.03	0.03
	Employees	0.04	0.91	0.12	0.01	0.01
	Road Dust	--	--	--	5.45	0.59
	Phase 4 Activity Total	***1.4***	***6.1***	***8.4***	***6.0***	***1.2***
Paving	Off-road	0.55	2.46	3.97	0.25	0.25
	On-site Mobile	0.00	0.02	0.09	0.01	0.00
	Vendors	0.02	0.07	0.77	0.02	0.01
	Employees	0.02	0.45	0.06	0.01	0.00
	Road Dust	--	--	--	2.85	0.31
	Phase 5 Activity Total	***0.6***	***3.0***	***4.9***	***3.1***	***0.6***

Mitigated

Phase Activity	Category	Criteria Emissions (lbs/d)				
		ROG	CO	NO_X	PM_{10}	$PM_{2.5}$
Grading/Roads/Earthwork	Off-road	0.73	11.79	14.83	0.72	0.72
	On-site Mobile	0.01	0.04	0.22	0.02	0.01
	Vendors	0.04	0.16	1.73	0.04	0.03
	Employees	0.21	5.00	0.64	0.07	0.03
	Road Dust	--	--	--	13.43	1.45
	Grading Fugitive	--	--	--	0.53	0.06
	Phase 1 Activity Total	***1.0***	***17.0***	***17.4***	***14.8***	***2.3***
Solar Panel Construction	Off-road	0.60	9.08	11.65	0.61	0.61
	On-site Mobile	0.01	0.06	0.38	0.03	0.02
	Vendors	0.16	0.68	7.66	0.19	0.14
	Employees	0.37	9.07	1.16	0.13	0.05
	Road Dust	--	--	--	23.98	2.59
	Phase 2 Activity Total	***1.1***	***18.9***	***20.8***	***24.9***	***3.4***
Substation and O&M Building Construction	Off-road	0.32	4.36	7.20	0.24	0.24
	On-site Mobile	0.01	0.04	0.22	0.02	0.01
	Vendors	0.01	0.06	0.38	0.02	0.02
	Employees	0.04	1.06	0.14	0.02	0.01
	Road Dust	--	--	--	3.02	0.33
	Phase 3 Activity Total	***0.4***	***5.5***	***7.9***	***3.3***	***0.6***
Offsite Transmission Facilities	Off-road	0.77	5.10	6.02	0.38	0.38
	Vendors	0.03	0.11	0.64	0.03	0.03
	Employees	0.04	0.91	0.12	0.01	0.01
	Road Dust	--	--	--	2.34	0.25
	Phase 4 Activity Total	***0.8***	***6.1***	***6.8***	***2.8***	***0.7***
Paving	Off-road	0.15	2.46	2.79	0.16	0.16
	On-site Mobile	0.00	0.02	0.09	0.01	0.00
	Vendors	0.02	0.07	0.77	0.02	0.01
	Employees	0.02	0.45	0.06	0.01	0.00
	Road Dust	--	--	--	1.23	0.13
	Phase 5 Activity Total	***0.2***	***3.0***	***3.7***	***1.4***	***0.3***

GHG Emissions Summary

Phase Activity	Category	GHG Emissions (tonnes)			
		CO_2	CH_4	N_2O	CO_2e
Grading/Roads/Earthwork	Off-road	29.68	0.0030	N/A	29.75
	On-site Mobile	0.14	0.0001	0.0001	0.15
	Vendors	1.35	0.0005	0.0005	1.51
	Employees	2.90	0.0055	0.0050	4.58
	Phase Activity Total	***34.1***	***0.009***	***0.006***	***36.0***
Solar Panel Construction	Off-road	73.76	0.0086	N/A	73.94
	On-site Mobile	0.78	0.0002	0.0002	0.79
	Vendors	4.27	0.0017	0.0015	4.78
	Employees	28.11	0.0530	0.0488	44.34
	Phase Activity Total	***106.9***	***0.064***	***0.051***	***123.9***
Substation and O&M Building Construction	Off-road	22.73	0.0019	N/A	22.77
	On-site Mobile	0.14	0.0000	0.0000	0.14
	Vendors	1.12	0.0005	0.0005	1.27
	Employees	1.54	0.0029	0.0027	2.43
	Phase Activity Total	***25.5***	***0.005***	***0.003***	***26.6***
Offsite Transmission Facilities	Off-road	7.94	0.0012	N/A	7.97
	Vendors	0.81	0.0003	0.0003	0.91
	Employees	0.88	0.0017	0.0015	1.39
	Phase Activity Total	***9.6***	***0.003***	***0.002***	***10.3***
Paving	Off-road	1.16	0.0001	N/A	1.16
	On-site Mobile	0.00	0.0000	0.0000	0.00
	Vendors	0.31	0.0001	0.0001	0.35
	Employees	0.13	0.0002	0.0002	0.21
	Phase Activity Total	***1.6***	***0.001***	***0.000***	***1.7***
Grand Total for Lyons Solar Farm		***177.8***	***0.082***	***0.061***	***198.4***

Employee Commute

Vehicle Activity

Activity	Total Trips (days)	Trips per day	Round Trip (mi)	VMT per day	Total VMT (mi)
Grading/Roads/Earthwork	13	23	30	696	9,070
Solar Panel Construction	70	42	30	1,263	87,802
Substation and O&M Building Construction	33	5	30	148	4,810
Offsite Transmission Facilities	22	4	30	127	2,749
Paving	7	2	30	63	412
			Totals	***2,296***	***104,843***

Criteria Emissions

Activity	Pounds per Day				
	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$
Grading/Roads/Earthwork	0.206	4.996	0.638	0.072	0.030
Solar Panel Construction	0.373	9.068	1.157	0.131	0.055
Substation and O&M Building Construction	0.044	1.060	0.135	0.015	0.006
Offsite Transmission Facilities	0.037	0.908	0.116	0.013	0.005
Paving	0.019	0.454	0.058	0.007	0.003
Totals	***0.68***	***16.49***	***2.10***	***0.24***	***0.10***

GHG Emissions

Activity	Total Tonnes			
	CO_2	CH_4	N_2O	CO_2e
Grading/Roads/Earthwork	2.90	0.0055	0.0050	4.58
Solar Panel Construction	28.11	0.0530	0.0488	44.34
Substation and O&M Building Construction	1.54	0.0029	0.0027	2.43
Offsite Transmission Facilities	0.88	0.0017	0.0015	1.39
Paving	0.13	0.0002	0.0002	0.21
Totals	***33.6***	***0.0633***	***0.0582***	***52.9***

On-site Mobile Equipment Emissions

Grading/Roads/Earthwork

Vehicle	Type	# Days	VMT per Day	Avg Number	Total VMT	Criteria Emissions (lbs/d)					GHG Emissions (tonnes)			
						ROG	CO	NO_x	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
Water Trucks	T6	13	5.45	0.82	58	0.002	0.011	0.063	0.005	0.003	0.066	0.0000	0.0000	0.07
Pick Up Trucks	LDT2	13	5.45	1.36	97	0.002	0.011	0.063	0.005	0.003	0.044	0.0000	0.0000	0.04
Flatbed Delivery Trucks	MDV	13	5.45	0.27	19	0.002	0.011	0.063	0.005	0.003	0.011	0.0000	0.0000	0.01
Lube/Fuel Trucks	T6	13	2.73	0.55	19	0.001	0.005	0.032	0.002	0.002	0.022	0.0000	0.0000	0.02
				Totals	***194***	***0.01***	***0.04***	***0.22***	***0.02***	***0.01***	***0.14***	***0.000***	***0.000***	***0.15***

Solar Panel Construction

Vehicle	Type	# Days	VMT per Day	Avg Number	Total VMT	Criteria Emissions (lbs/d)					GHG Emissions (tonnes)			
						ROG	CO	NO_x	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
Water Trucks	T6	70	5.45	0.18	67	0.002	0.011	0.063	0.005	0.003	0.076	0.000	0.000	0.08
Concrete Trucks	T6	70	5.45	0.11	43	0.002	0.011	0.063	0.005	0.003	0.048	0.000	0.000	0.05
Pick Up Trucks	LDT2	70	5.45	1.36	517	0.002	0.011	0.063	0.005	0.003	0.233	0.000	0.000	0.23
Flatbed Delivery Trucks	MDV	70	5.45	0.55	207	0.002	0.011	0.063	0.005	0.003	0.121	0.000	0.000	0.12
Service Trucks	LHD1	70	2.73	0.55	103	0.001	0.005	0.032	0.002	0.002	0.064	0.000	0.000	0.06
Dump Trucks	T6	70	5.45	0.27	103	0.002	0.011	0.063	0.005	0.003	0.118	0.000	0.000	0.12
Lube/Fuel Trucks	T6	70	2.73	0.55	103	0.001	0.005	0.032	0.002	0.002	0.118	0.000	0.000	0.12
		Totals			***1,144***	***0.01***	***0.06***	***0.38***	***0.03***	***0.02***	***0.78***	***0.000***	***0.000***	***0.79***

Substation and O&M Building Construction

Vehicle	Type	# Days	VMT per Day	Avg Number	Total VMT	Criteria Emissions (lbs/d)					GHG Emissions (tonnes)			
						ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
Pick Up Trucks	LDT2	33	5.45	0.82	145	0.002	0.011	0.063	0.005	0.003	0.066	0.0000	0.0000	0.07
Flatbed Delivery Trucks	MDV	33	5.45	0.27	48	0.002	0.011	0.063	0.005	0.003	0.028	0.0000	0.0000	0.03
Service Trucks	LHD1	33	2.73	0.45	40	0.001	0.005	0.032	0.002	0.002	0.025	0.0000	0.0000	0.03
Concrete Trucks	T6	33	5.45	0.09	16	0.002	0.011	0.063	0.005	0.003	0.018	0.0000	0.0000	0.02
				Totals	***250***	***0.01***	***0.04***	***0.22***	***0.02***	***0.01***	***0.14***	***0.000***	***0.000***	***0.14***

Paving

Vehicle	Type	# Days	VMT per Day	Avg Number	Total VMT	Criteria Emissions (lbs/d)					GHG Emissions (tonnes)			
						ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
Pick Up Trucks	LDT2	7	5.45	0.18	6	0.002	0.011	0.063	0.005	0.003	0.003	0.0000	0.0000	0.00
Service Trucks	LHD1	7	2.73	0.18	3	0.001	0.005	0.032	0.002	0.002	0.002	0.0000	0.0000	0.00
				Totals	***10***	***0.00***	***0.02***	***0.09***	***0.01***	***0.00***	***0.00***	***0.000***	***0.000***	***0.00***

Note: Lbs/day emission estimates assume worst-case af all vehicles operating on the same day traveling full mileage

Vendor Off-site Activity

Vehicle Activity

Activity Phase	Vehicle Type (EMFAC)	Days per Phase	Trips per day	Round Trip (mi)	VMT per day	Total VMT (mi)
Grading/Roads/Earthwork	Flatbed/Delivery Trucks (T7)	13	2.00	30	60	782
	Porto-Let Trucks (T6)	13	0.25	30	8	98
				Activity Phase Total	***68***	***880***
Solar Panel Construction	Flatbed/Delivery Trucks (T7)	70	1.18	30	35	2,453
	PV Panel Delivery Trucks (T7)	70	3.51	70	246	17,082
	Concrete Trucks (T6)	70	0.41	30	12	859
	Porto-Let Trucks (T6)	70	0.16	30	5	338
				Activity Phase Total	***298***	***20,732***
Substation and O&M Building Construction	Concrete Trucks (T6)	33	0.33	30	10	326
	Porto-Let Trucks (T6)	33	0.25	30	8	244
	Flatbed/Delivery Trucks (T7)	33	0.50	30	15	489
				Activity Phase Total	***32***	***1,059***
Offsite Transmission Facilities	Concrete Trucks (T6)	22	0.17	30	5	109
	Fuel & Lube Trucks (T7)	22	1.00	30	30	652
	Flatbed/Delivery Trucks (T7)	22	0.67	30	20	435
				Activity Phase Total	***55***	***1,195***
Paving	Flatbed/Delivery Trucks (T7)	7	0.67	30	20	130
	Fuel & Lube Trucks (T7)	7	0.33	30	10	65
				Activity Phase Total	***30***	***196***
				Project Totals	***483***	***24,062***

Criteria Emissions

Activity Phase	Vehicle Type (EMFAC)	Pounds per Day				
		ROG	CO	NO_X	PM_{10}	$PM_{2.5}$
Grading/Roads/Earthwork	Flatbed/Delivery Trucks (T7)	0.031	0.138	1.542	0.038	0.028
	Porto-Let Trucks (T6)	0.004	0.017	0.193	0.005	0.003
	Activity Phase Total	***0.04***	***0.16***	***1.73***	***0.04***	***0.03***
Solar Panel Construction	Flatbed/Delivery Trucks (T7)	0.018	0.081	0.907	0.022	0.016
	PV Panel Delivery Trucks (T7)	0.128	0.564	6.315	0.156	0.114
	Concrete Trucks (T6)	0.006	0.028	0.318	0.008	0.006
	Porto-Let Trucks (T6)	0.003	0.011	0.125	0.003	0.002
	Activity Phase Total	***0.16***	***0.68***	***7.66***	***0.19***	***0.14***
Substation and O&M Building Construction	Concrete Trucks (T6)	0.005	0.019	0.116	0.006	0.005
	Porto-Let Trucks (T6)	0.003	0.015	0.087	0.005	0.003
	Flatbed/Delivery Trucks (T7)	0.007	0.029	0.174	0.010	0.007
	Activity Phase Total	***0.01***	***0.06***	***0.38***	***0.02***	***0.02***
Offsite Transmission Facilities	Concrete Trucks (T6)	0.002	0.010	0.058	0.003	0.002
	Fuel & Lube Trucks (T7)	0.014	0.058	0.348	0.019	0.014
	Flatbed/Delivery Trucks (T7)	0.009	0.039	0.232	0.013	0.009
	Activity Phase Total	***0.03***	***0.11***	***0.64***	***0.03***	***0.03***
Paving	Flatbed/Delivery Trucks (T7)	0.010	0.046	0.514	0.013	0.009
	Fuel & Lube Trucks (T7)	0.005	0.023	0.257	0.006	0.005
	Activity Phase Total	***0.02***	***0.07***	***0.77***	***0.02***	***0.01***
	Project Totals	***0.25***	***1.08***	***11.19***	***0.31***	***0.22***

GHG Emissions

Activity Phase	Vehicle Type (EMFAC)	Total Tonnes			
		CO_2	CH_4	N_2O	CO_2e
Grading/Roads/Earthwork	Flatbed/Delivery Trucks (T7)	1.25	0.0005	0.0004	1.39
	Porto-Let Trucks (T6)	0.10	0.0001	0.0001	0.12
	Activity Phase Total	***1.3***	***0.0005***	***0.0005***	***1.5***
Solar Panel Construction	Flatbed/Delivery Trucks (T7)	3.92	0.0015	0.0014	4.37
	PV Panel Delivery Trucks (T7)	27.28	0.0103	0.0095	30.44
	Concrete Trucks (T6)	0.89	0.0005	0.0005	1.04
	Porto-Let Trucks (T6)	0.35	0.0002	0.0002	0.41
	Activity Phase Total	***32.4***	***0.0125***	***0.0115***	***36.3***
Substation and O&M Building Construction	Concrete Trucks (T6)	0.34	0.0002	0.0002	0.40
	Porto-Let Trucks (T6)	0.25	0.0001	0.0001	0.30
	Flatbed/Delivery Trucks (T7)	0.78	0.0003	0.0003	0.87
	Activity Phase Total	***1.4***	***0.0006***	***0.0006***	***1.6***
Offsite Transmission Facilities	Concrete Trucks (T6)	0.11	0.0001	0.0001	0.13
	Fuel & Lube Trucks (T7)	1.04	0.0004	0.0004	1.16
	Flatbed/Delivery Trucks (T7)	0.69	0.0003	0.0002	0.77
	Activity Phase Total	***1.8***	***0.0007***	***0.0007***	***2.1***
Paving	Flatbed/Delivery Trucks (T7)	0.21	0.0001	0.0001	0.23
	Fuel & Lube Trucks (T7)	0.10	0.0000	0.0000	0.12
	Activity Phase Total	***0.3***	***0.0001***	***0.0001***	***0.3***
	Totals	***37.3***	***0.0145***	***0.0134***	***41.8***

Off Road Equipment Emissions

Grading/Roads/Earthwork

Equipment Type	Activity						Criteria Emissions (lbs/d)					GHG Emissions (tonnes)		
	BHP	Load Factor	Length (wkday)	hrs/ day	Avg Daily Number	total hours	ROG	CO	NO_x	PM_{10}	$PM_{2.5}$	CO_2	CH_4	CO_2e
Crawler Tractors	185	0.43	13	8	1.0	104	0.80	2.30	7.06	0.27	0.27	4.71	0.0004	4.72
Generator Sets	30	0.74	13	8	0.8	104	0.45	1.47	1.58	0.12	0.12	1.05	0.0002	1.06
Scrapers	365	0.48	13	8	1.0	104	1.66	6.20	14.28	0.55	0.55	10.38	0.0009	10.40
Rubber Tired Loaders	78	0.36	13	8	2.0	104	0.86	3.94	5.40	0.45	0.45	3.33	0.0005	3.34
Graders	185	0.41	13	8	1.0	104	0.62	1.84	5.67	0.20	0.20	4.50	0.0003	4.50
Rollers	83	0.38	13	4	1.5	52	0.37	1.62	2.37	0.20	0.20	1.40	0.0002	1.41
Pavers	173	0.42	13	4	2.0	52	0.96	4.39	7.43	0.41	0.41	4.31	0.0005	4.32
						Totals	***2.8***	***11.8***	***20.9***	***1.3***	***1.3***	***29.7***	***0.003***	***29.7***

Solar Panel Construction

Equipment Type	Activity						Criteria Emissions (lbs/d)					GHG Emissions (tonnes)		
	BHP	Load Factor	Length (wkday)	hrs/ day	Avg Daily Number	total hours	ROG	CO	NO_x	PM_{10}	$PM_{2.5}$	CO_2	CH_4	CO_2e
Generator Sets	30	0.74	70	8	1.0	556	0.56	1.83	1.98	0.15	0.15	7.02	0.0016	7.05
Air Compressors	25	0.48	70	8	1.0	556	0.20	0.59	1.06	0.06	0.06	3.79	0.0006	3.81
Crawler Tractors	185	0.43	70	4	1.0	278	0.40	1.15	3.53	0.13	0.13	12.57	0.0011	12.60
Rubber Tired Loaders	78	0.36	70	4	1.0	278	0.22	0.98	1.35	0.11	0.11	4.44	0.0006	4.45
Rubber Tired Forklifts	99	0.40	70	5	1.5	348	0.52	2.56	3.34	0.28	0.28	11.73	0.0015	11.77
Trenchers	115	0.50	70	4	1.5	278	0.81	3.09	4.99	0.42	0.42	13.63	0.0023	13.68
Oher construction equipment	310	0.42	70	4	1.0	278	0.35	1.30	3.45	0.11	0.11	20.58	0.0010	20.60
						Totals	***2.3***	***9.1***	***16.7***	***1.1***	***1.1***	***73.8***	***0.009***	***73.9***

Substation and O&M Building Construction

Equipment Type	Activity						Criteria Emissions (lbs/d)					GHG Emissions (tonnes)		
	BHP	Load Factor	Length (wkday)	hrs/ day	Avg Daily Number	total hours	ROG	CO	NO_x	PM_{10}	$PM_{2.5}$	CO_2	CH_4	CO_2e
Air Compressors	25	0.48	33	6	1.0	196	0.15	0.44	0.79	0.05	0.05	1.33	0.0002	1.34
Crawler Tractors	185	0.43	33	2	1.0	65	0.20	0.58	1.76	0.07	0.07	2.95	0.0003	2.95
Rubber Tired Loaders	78	0.36	33	2	1.0	65	0.11	0.49	0.68	0.06	0.06	1.04	0.0001	1.04
Oher construction equipment	310	0.42	33	4	1.0	130	0.35	1.30	3.45	0.11	0.11	9.65	0.0005	9.66
Trenchers	115	0.50	33	2	1.0	65	0.27	1.03	1.66	0.14	0.14	2.13	0.0004	2.14
Cranes	250	0.29	33	6	0.7	196	0.33	0.96	3.09	0.11	0.11	5.64	0.0004	5.65
						Totals	***1.3***	***4.4***	***10.6***	***0.5***	***0.5***	***22.7***	***0.002***	***22.8***

Offsite Transmission Facilities

Equipment Type	Activity						Criteria Emissions (lbs/d)					GHG Emissions (tonnes)		
	BHP	Load Factor	Length (wkday)	hrs/ day	Avg Daily Number	total hours	ROG	CO	NO_x	PM_{10}	$PM_{2.5}$	CO_2	CH_4	CO_2e
Generator Sets	30	0.74	22	8	1.0	174	0.56	1.83	1.98	0.15	0.15	2.19	0.0005	2.20
Crawler Tractors	185	0.43	22	2	1.0	43	0.20	0.58	1.76	0.07	0.07	1.96	0.0002	1.97
Rubber Tired Loaders	78	0.36	22	4	1.0	87	0.22	0.98	1.35	0.11	0.11	1.39	0.0002	1.39
Rubber Tired Forklifts	99	0.40	22	2	1.0	43	0.14	0.68	0.89	0.08	0.08	0.98	0.0001	0.98
Trenchers	115	0.50	22	2	1.0	43	0.27	1.03	1.66	0.14	0.14	1.42	0.0002	1.42
						Totals	***1.4***	***5.1***	***7.6***	***0.5***	***0.5***	***7.9***	***0.001***	***8.0***

Paving

Equipment Type	Activity						Criteria Emissions (lbs/d)					GHG Emissions (tonnes)		
	BHP	Load Factor	Length (wkday)	hrs/ day	Avg Daily Number	total hours	ROG	CO	NO_x	PM_{10}	$PM_{2.5}$	CO_2	CH_4	CO_2e
Pavers	173	0.42	7	6	0.5	39	0.36	1.65	2.78	0.15	0.15	0.81	0.0001	0.81
Rollers	83	0.38	7	6	0.5	39	0.19	0.81	1.19	0.10	0.10	0.35	0.0000	0.35
						Totals	***0.5***	***2.5***	***4.0***	***0.3***	***0.3***	***1.2***	***0.000***	***1.2***

Mitigated Off Road Equipment Emissions

Grading/Roads/Earthwork

Equipment Type	Activity							Mitigated Emissions (lbs/d)				
	BHP	Load Factor	Length (wkday)	Length (months)	hrs/ day	Avg Daily Number	total hours	ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
Crawler Tractors	185	0.43	13	0.6	8	1.0	104	0.20	2.30	4.76	0.10	0.10
Generator Sets	30	0.74	13	0.6	8	0.8	104	0.45	1.47	1.58	0.12	0.12
Scrapers	365	0.48	13	0.6	8	1.0	104	0.40	6.20	9.44	0.21	0.21
Rubber Tired Loaders	78	0.36	13	0.6	8	2.0	104	0.20	3.94	4.17	0.25	0.25
Graders	185	0.41	13	0.6	8	1.0	104	0.15	1.84	3.83	0.07	0.07
Rollers	83	0.38	13	0.6	4	1.5	52	0.09	1.62	1.83	0.11	0.11
Pavers	173	0.42	13	0.6	4	2.0	52	0.29	4.39	5.01	0.30	0.30
							Totals	***0.7***	***11.8***	***14.8***	***0.7***	***0.7***

Solar Panel Construction

Equipment Type	Activity							Mitigated Emissions (lbs/d)				
	BHP	Load Factor	Length (wkday)	Length (months)	hrs/ day	Avg Daily Number	total hours	ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
Generator Sets	30	0.74	70	3.2	8	1.0	556	0.56	1.83	1.98	0.15	0.15
Air Compressors	25	0.48	70	3.2	8	1.0	556	0.20	0.59	1.06	0.06	0.06
Crawler Tractors	185	0.43	70	3.2	4	1.0	278	0.10	1.15	2.38	0.05	0.05
Rubber Tired Loaders	78	0.36	70	3.2	4	1.0	278	0.05	0.98	1.04	0.06	0.06
Rough Terrain Forklifts	99	0.40	70	3.2	5	1.5	348	0.12	2.56	2.58	0.15	0.15
Trenchers	115	0.50	70	3.2	4	1.5	278	0.24	3.09	3.37	0.30	0.30
Oher construction equipment	310	0.42	70	3.2	4	1.0	278	0.08	1.30	2.28	0.04	0.04
							Totals	***0.6***	***9.1***	***11.6***	***0.6***	***0.6***

Substation and O&M Building Construction

Equipment Type	Activity							Mitigated Emissions (lbs/d)				
	BHP	Load Factor	Length (wkday)	Length (months)	hrs/ day	Avg Daily Number	total hours	ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
Air Compressors	25	0.48	33	1.5	6	1.0	196	0.15	0.44	0.79	0.05	0.05
Crawler Tractors	185	0.43	33	1.5	2	1.0	65	0.05	0.58	1.19	0.03	0.03
Rubber Tired Loaders	78	0.36	33	1.5	2	1.0	65	0.03	0.49	0.52	0.03	0.03
Oher construction equipment	310	0.42	33	1.5	4	1.0	130	0.08	1.30	2.28	0.04	0.04
Trenchers	115	0.50	33	1.5	2	1.0	65	0.08	1.03	1.12	0.10	0.10
Cranes	250	0.29	33	1.5	6	0.7	196	0.08	0.96	2.09	0.04	0.04
							Totals	***0.3***	***4.4***	***7.2***	***0.2***	***0.2***

Offsite Transmission Facilities

Equipment Type	Activity							Mitigated Emissions (lbs/d)				
	BHP	Load Factor	Length (wkday)	Length (months)	hrs/ day	Avg Daily Number	total hours	ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
Generator Sets	30	0.74	22	1.0	8	1.0	174	0.56	1.83	1.98	0.15	0.15
Crawler Tractors	185	0.43	22	1.0	2	1.0	43	0.05	0.58	1.19	0.03	0.03
Rubber Tired Loaders	78	0.36	22	1.0	4	1.0	87	0.05	0.98	1.04	0.06	0.06
Rough Terrain Forklifts	99	0.40	22	1.0	2	1.0	43	0.03	0.68	0.69	0.04	0.04
Trenchers	115	0.50	22	1.0	2	1.0	43	0.08	1.03	1.12	0.10	0.10
							Totals	***0.8***	***5.1***	***6.0***	***0.4***	***0.4***

Paving

Equipment Type	Activity							Mitigated Emissions (lbs/d)				
	BHP	Load Factor	Length (wkday)	Length (months)	hrs/ day	Avg Daily Number	total hours	ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
Pavers	173	0.42	7	0.3	6	0.5	39	0.11	1.65	1.88	0.11	0.11
Rollers	83	0.38	7	0.3	6	0.5	39	0.04	0.81	0.92	0.05	0.05
							Totals	***0.2***	***2.5***	***2.8***	***0.2***	***0.2***

Entrained Road Dust

Entrained road dust emissions are generated by vehicles traveling on both paved and unpaved roads. These equations are based on the paved and unpaved roads emission factors found in AP-42. Defaults are from URBEMIS.

Emission Factors - Paved Roads

EF PM_{10} = $k \times (sL \div 2) \times 0.65 \times (W \div 3) \times 1.5 =$ 0.000057 lbs PM_{10}/VMT

Constant	Description	Value
k =	*particle size multiplier for particle size range and units of interest*	*0.016*
sL =	*road surface silt loading in g/m^2 (allowable range is 0.02 to 400 g/m^2)*	*0.1*
W =	*average weight of the vehicles traveling the road in megagrams (mean average fleet vehicle weight ranging from 1.8 - 39 megagrams or 2.0 - 42 tons)*	*2.2*

Emission Factors - Unpaved Roads

EF PM_{10} = $(k \times (s \div 12) \times 1.0 \times (S \div 30) \times 0.5) \div ((M \div 0.5) \times 0.2 =$ 0.086 lbs PM_{10}/VMT

Constant	Description	Value
k =	*the fraction of particles less than or equal to the particle size cutoff of 10 microns*	*1.8*
s =	*surface material silt content (%) (allowable range [1.8 - 25.2 %])*	*4.3%*
S =	*the average vehicle speed (mph) (allowable range [10 - 43 mph])*	*40*
M =	*surface moisture content (%) (allowable range 0.03 – 13 %)*	*0.5%*

Entrained Road Dust Emissions

Phase/Category		VMT/d		Paved Roads (lbs/d)		Unpaved Roads (lbs/d)		Total Roads (lbs/d)		Mitigated (lbs/d)	
		(paved)	(unpaved)	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Grading/Roads/ Earthwork	Employee	348	348	0.020	0.002	29.919	3.231	29.939	3.233	12.874	1.390
	Vendor	68	15	0.004	0.000	1.279	0.138	1.283	0.139	0.552	0.060
	TOTAL	**415**	**363**	**0.02**	**0.00**	**31.20**	**3.37**	**31.22**	**3.37**	**13.43**	**1.45**
Solar Panel Construction	Employee	631	631	0.0361	0.0039	54.305	5.8637	54.3412	5.8676	23.367	2.523
	Vendor	298	16	0.0171	0.0018	1.415	0.1528	1.4319	0.1546	0.616	0.066
	TOTAL	**930**	**648**	**0.05**	**0.01**	**55.72**	**6.02**	**55.77**	**6.02**	**23.98**	**2.59**
Substation and O&M Building Construction	Employee	74	74	0.0042	0.0005	6.347	0.6853	6.3507	0.6857	2.731	0.295
	Vendor	32	8	0.0019	0.0002	0.661	0.0714	0.6629	0.0716	0.285	0.031
	TOTAL	**106**	**81**	**0.01**	**0.00**	**7.01**	**0.76**	**7.01**	**0.76**	**3.02**	**0.33**
Offsite Transmission Facilities	Employee	63	63	0.0036	0.0004	5.440	0.5874	5.4435	0.5878	2.341	0.253
	Vendor	55	0	0.0031	0.0003	0.000	0.0000	0.0031	0.0003	0.001	0.000
	TOTAL	**118**	**63**	**0.01**	**0.00**	**5.44**	**0.59**	**5.45**	**0.59**	**2.34**	**0.25**
Paving	Employee	32	32	0.0018	0.0002	2.720	0.2937	2.7217	0.2939	1.170	0.126
	Vendor	30	1	0.0017	0.0002	0.128	0.0138	0.1296	0.0140	0.056	0.006
	TOTAL	**62**	**33**	**0.004**	**0.00**	**2.85**	**0.31**	**2.85**	**0.31**	**1.23**	**0.13**
GRAND TOTAL		***1,631***	***1,189***	***0.1***	***0.0***	***102.2***	***11.0***	***102.3***	***11.0***	***44.0***	***4.8***

Notes: Mitigation of 57% for traffic speed restriction

Per ICAPCD, vehicular in Imperial County is 50% on unpaved roads.

Grading Fugitive Dust

Fugitive dust emissions from grading equipment passes are estimated using the methodology described in Section 11.9, Western Surface Coal Mining, of the EPA AP-42.

AP-42 estimates the emission factor of PM_{10} applying a scaling factor to that of PM_{15}. Similarly, the emission factor of $PM_{2.5}$ is scaled from that of total suspended particulates (TSP). The equations used to calculate the emission factors for PM_{15} and TSP and the scaling factor for those of PM_{10} and $PM_{2.5}$ are presented below:

Emission Factors (lbs/day)

EF PM_{15} =	$0.051 \times S^{2.0}$ =	2.571
EF PM_{TSP} =	$0.04 \times S^{2.5}$ =	5.373

S **=** *mean vehicle speed (mph). The AP-42 default value is* *7.1*

EF PM_{10} =	$EF_{PM15} \times F_{PM10}$ =	1.5
EF $PM_{2.5}$ =	$EF_{PMTSP} \times F_{PM2.5}$ =	0.167

F_{PM10} = *PM_{10} scaling factor. The AP-42 default value is* *0.6*

$F_{PM2.5}$ = *$PM_{2.5}$ scaling factor. The AP-42 default value is* *0.031*

Emissions

The grading dust emissions are calculated by multiplying the emission factors with the total vehicle miles traveled (VMT) for the grading equipment (i.e., grader). The VMT for grader (VMT_G) are estimated based on the dimensions of the grading area and the blade width of the grading equipment.

Emissions (lb) = **EF × VMT_G** *# of Days = 70*

Pollutant	Emissions	
	total lbs	lbs/d
PM_{10}	36.69	0.528
$PM_{2.5}$	3.96	0.057

where VMT = $A_S \div W_b \times$ ft^2 per acre ÷ ft per mile = 23.8

A_S = *conservative acreage of disturbance is approximately 25% of gross acreage* *34.6*

W_b = *Blade width of the grading equipment. (default based on Caterpillar's 140 Motor Grader.* *12*

EMFAC 2011

2014 Estimated Annual Emission Rates

EMFAC2011 Vehicle Categories

Imperial COUNTY

Vehicle Info			Emission Factor (grams/mile)											
Type	Fuel	VMT	ROG	CO	NO_x	PM_{10}			$PM_{2.5}$			CO_2	CH_4	N_2O
						Exhaust	TW+BW	Total	Exhaust	TW+BW	Total			
LDA	GAS	3,810,354	0.1431	3.1103	0.4072	0.0018	0.0447	0.0466	0.0017	0.0177	0.0194	285.7	0.0278	0.0294
LDA	DSL	11,288	0.0376	0.1941	0.5580	0.0275	0.0447	0.0723	0.0253	0.0177	0.0431	308.5		
LDT1	GAS	590,382	0.1877	5.1765	0.5521	0.0042	0.0447	0.0489	0.0038	0.0177	0.0215	334.2	0.0315	0.0433
LDT1	DSL	665	0.0584	0.2682	0.7043	0.0477	0.0447	0.0925	0.0439	0.0177	0.0617	314.9		
LDT2	GAS	1,391,517	0.0872	2.8720	0.3791	0.0020	0.0447	0.0467	0.0018	0.0177	0.0195	408.7	0.0315	0.0433
LDT2	DSL	806	0.0417	0.2235	0.6565	0.0317	0.0447	0.0765	0.0292	0.0177	0.0469	320.0		
Weighted Average for Employees			***0.1340***	***3.2569***	***0.4156***	***0.0022***	***0.0447***	***0.0469***	***0.0020***	***0.0177***	***0.0197***	***320.2***	***0.0291***	***0.0342***
LHD1	GAS	219,732	0.1010	2.2642	0.8235	0.0009	0.0447	0.0456	0.0008	0.0177	0.0186	562.1	0.0315	0.0433
MDV	GAS	1,385,611	0.0964	3.1290	0.5245	0.0018	0.0447	0.0465	0.0016	0.0177	0.0194	531.4	0.0315	0.0433
T6 instate construction small	DSL	16,565	0.2062	0.8836	5.2659	0.2342	0.1423	0.3765	0.2154	0.0589	0.2743	1,031.2	0.6037	0.5554
T7 tractor construction	DSL	12,313	0.2371	1.0418	11.6587	0.1899	0.0977	0.2877	0.1747	0.0355	0.2102	1,597.1	0.6037	0.5554

Notes: - Criteria and CO_2 factors come from 2014 EMFAC2011 and represent Estimated Annual Emission Rates for Imperial County in the Salton Sea Air Basin

- CH_4 and N_2O factors come from Local Government Operations Protocol: For the quantification and reporting of greenhouse gas emissions inventories. Version 1.1. California Air Resources Board, California Climate Action Registry, ICLEI - Local Governments for Sustainability, and The Climate Registry. May 2010

2014 Offroad Emission Factors (g/hp/hr)

Veh Type	BHP	Load Factor	Emission Factor (g/bhp-hr)						
			ROG	CO	NO_X	PM_{10}	$PM_{2.5}$	CO_2	CH_4
Air Compressors	25	0.48	0.960	2.780	5.000	0.291	0.291	568.3	0.086
Cranes	250	0.29	0.496	1.427	4.605	0.160	0.160	568.3	0.044
Crawler Tractors	185	0.43	0.571	1.640	5.029	0.192	0.192	568.3	0.051
Generator Sets	30	0.74	1.427	4.683	5.048	0.389	0.389	568.3	0.128
Graders	185	0.41	0.464	1.379	4.241	0.146	0.146	568.3	0.041
Other Construction Equipment	310	0.42	0.308	1.135	3.008	0.098	0.098	568.3	0.027
Pavers	173	0.42	0.750	3.429	5.794	0.319	0.319	568.3	0.067
Rollers	83	0.38	0.887	3.882	5.690	0.475	0.475	568.3	0.080
Rough Terrain Forklifts	99	0.40	0.798	3.905	5.107	0.431	0.431	568.3	0.072
Rubber Tired Loaders	78	0.36	0.869	3.973	5.454	0.459	0.459	568.3	0.078
Scrapers	365	0.48	0.536	2.007	4.621	0.178	0.178	568.3	0.048
Trenchers	115	0.50	1.061	4.063	6.558	0.550	0.550	568.3	0.095

From: CalEEMod Users Guide - Appendix D, CalEEMod User's Tips (June 2011), and 2011 Carl Moyer Program Guidelines

Mitigated Off-Road Emission Factors

Percentage Reduction from Tier 1 to Tier 2

Engine Size (hp)	Tier 1 to Tier 2		
	ROG	NO_x	PM
75 - 99	76.5%	22.9%	45.7%
100 - 174	70.1%	32.5%	27.6%
175 - 299	75.5%	32.5%	62.5%
300 - 600	76.0%	33.9%	62.5%

Mitigation Measures and Control Efficiencies page at SCAQMD (http://www.aqmd.gov/ceqa/handbook/mitigation/MM_intro.html)

Adjusted Offroad Emission Factors (g/hp/hr)

Veh Type	BHP	Emission Factor (g/bhp-hr)			
		ROG	NO_x	PM_{10}	$PM_{2.5}$
Cranes	250	0.122	3.107	0.060	0.060
Crawler Tractors	185	0.140	3.393	0.072	0.072
Graders	185	0.114	2.861	0.055	0.055
Other Construction Equipment	310	0.074	1.988	0.037	0.037
Pavers	173	0.224	3.909	0.231	0.231
Rollers	83	0.209	4.387	0.258	0.258
Rough Terrain Forklifts	99	0.188	3.938	0.234	0.234
Rubber Tired Loaders	78	0.204	4.205	0.249	0.249
Scrapers	365	0.129	3.054	0.067	0.067
Trenchers	115	0.317	4.424	0.398	0.398

Activity Data

Lyons Solar Farm

MW = 40

Phase	Schedule		Average Daily Trips			
	Mo	WD	Emp	Emp w/rs	Vendors	
					T6	T7
Grading/Roads/Earthwork	0.6	13.0	26	23	0.1	0.3
Solar Panel Construction	3.2	69.5	46	42	0.1	0.9
Substation, Building and Water Tank Construction	1.5	32.6	5	5	3.8	0.1
Offsite Transmission Facilities	1.0	21.7	5	4	0.2	0.3
Paving	0.3	6.5	2	2	0.1	0.1

From TIA	
92	employees
6	trucks