

Appendix C

Air Pollutant Emissions Calculations

SCR-3 Project

Construction Emission Estimate Assumptions/Methods

General Assumptions

- 1) Work occurs 5 days a week, 7 am to 7 pm, excepting major holidays (average 22 days/month).
- 2) For air quality analysis purpose, an accelerated construction schedule for both Reaches 1-3 and Reach 4 were used.
- 3) Construction schedule, equipment needs, material use, provided by VCWPD.

Onroad Equipment Emission Calculations Assumptions

- 1) CARB EMFAC2014 model emission factors for Ventura County are used to estimate on-road emissions. All passenger vehicles are assumed to be gasoline-fueled and all delivery and heavy heavy duty trucks are assumed to be diesel-fueled. Emission factor for each of three classes is weight-averaged emission factor based on the total miles traveled by each EMFAC 2011 vehicle class and total emissions.
- 2) Trip estimates are based on raw material import/export trips, equipment delivery, and worker trips provided by VCWPD.
- 3) Trip distance assumptions: 20 miles/round trip for imported/exported fill trucks, concrete trucks, green waste trucks, and fuel trucks; 30 miles/round trip for construction worker vehicles, crew trucks, and water trucks; 40 miles/trip for hydromulching trucks; 50 miles/trip for finished goods delivery trucks (VC County line to site); and 80 miles for concrete pump trucks (to account for engine use while pumping).
- 4) Unpaved distance per trip determined based on type of trip/use of vehicle, where the detailed assumptions are provided with the schedule and equipment data.

Offroad Equipment Emission Calculation Assumptions

- 1) CARB OFFROAD model emission factors in Ventura County are used to estimate ROG, NO_x, and PM emissions for off-road equipment. SO_x determined using sulfur content mass balance based on OFFROAD fuel use estimates.
- 2) SCAQMD CEQA website emission factors are used for CO for all offroad equipment (2016 EFs).

Fugitive Dust Emission Calculations Assumptions

- 1) Earthmoving emission factors are calculated using the recent version of USEPA AP-42 Section 11.9 for Dozing and Grading, and Section 13.2.4 for soil handling (drop emissions).
- 2) Paved road emission factors are calculated using the most current version of USEPA AP-42 Section 13.2.1 and use the following assumptions:
 - A) Silt loading is 0.06 g/m² for 5,000<ADT<10,0000 of Table 13.2.1-2; B) average vehicle weight is calculated on VMT average basis.
- 3) Unpaved road emission factors are calculated using the most current version of USEPA AP-42 Section 13.2.2 and use the following assumptions:
 - A) Silt content is 7.5% for unpaved roads; B) average vehicle weight is calculated on VMT average basis.
- 4) For windblown emissions, emission factor of 0.38 tons/disturbed acres/year is used (AP-42 Section 11.9).

SCR-3 Project
Construction - Summary
Option 1A

Maximum Daily Emissions (lbs/day)

Reaches 1-3 Tasks 7 and 10 overlap for all but NOx and PM, where NOx is Tasks 7 and 9 overlap and PM is Task 6 only

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad	2.09	14.27	32.99	0.08	0.03	0.01
Offroad	3.97	23.77	31.64	0.02	2.14	1.97
Fugitive Dust	---	---	---	---	488.49	72.21
Total	6.06	38.03	64.63	0.11	490.66	74.19

Total Emissions (tons) - Reach 1-3 and Reach 4

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad	0.15	1.05	1.70	0.00	0.05	0.03
Offroad	0.47	2.54	3.34	0.00	0.15	0.14
Fugitive Dust	---	---	---	---	19.57	2.39
Total	0.61	3.59	5.03	0.01	19.78	2.56

Option 1B

Maximum Daily Emissions (lbs/day)

Reaches 1-3 Tasks 7, 9, 10 and 11 overlap for all but PM, which is Task 6 only

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad	2.10	14.22	35.71	0.08	0.03	0.01
Offroad	3.83	37.87	55.52	0.05	2.14	1.97
Fugitive Dust	---	---	---	---	486.15	71.73
Total	5.92	52.09	91.23	0.14	488.31	73.71

Total Emissions (tons) - Reach 1-3 and Reach 4

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad	0.13	0.93	1.48	0.00	0.05	0.03
Offroad	0.44	2.47	3.11	0.00	0.14	0.13
Fugitive Dust	---	---	---	---	15.78	1.84
Total	0.57	3.40	4.59	0.01	15.97	2.00

SCR-3 Project

Construction - Controlled Emissions Summary

Option 1A

Maximum Daily Emissions (lbs/day)

Reaches 1-3 Tasks 7 and 10 overlap for all but PM, which is Task 6 only

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad	2.09	14.27	35.73	0.08	0.03	0.01
Offroad	2.54	23.77	12.77	0.02	1.01	0.93
Fugitive Dust	---	---	---	---	167.27	23.36
Total	4.63	38.03	48.50	0.11	168.31	24.30

Total Emissions (tons) - Reach 1-3 and Reach 4

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad	0.15	1.05	1.70	0.00	0.05	0.03
Offroad	0.33	2.54	1.46	0.00	0.08	0.07
Fugitive Dust	---	---	---	---	7.91	0.95
Total	0.47	3.59	3.16	0.01	8.04	1.05

Option 1B

Maximum Daily Emissions (lbs/day)

Reaches 1-3 Tasks 7, 9, 10 and 11 overlap for all but PM, which is Task 6 only

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad	2.10	14.22	35.71	0.08	0.03	0.01
Offroad	1.90	37.87	27.03	0.05	1.01	0.93
Fugitive Dust	---	---	---	---	166.36	23.18
Total	4.00	52.09	62.74	0.14	167.39	24.12

Total Emissions (tons) - Reach 1-3 and Reach 4

	VOC	CO	NOx	SOx	PM10	PM2.5
Onroad	0.13	0.93	1.48	0.00	0.05	0.03
Offroad	0.32	2.47	1.41	0.00	0.07	0.07
Fugitive Dust	---	---	---	---	6.53	0.75
Total	0.45	3.40	2.88	0.01	6.65	0.85

SCR-3 Project

Construction - Schedule & Equipment Use

Option 1A

Assumptions:

1. Worker parking will require no more than 0.1 mile round trip on unpaved surface.
2. Unpaved road distances assumed consistently based on type of vehicle and use.
3. Work occurs 5 days a week, 7 am to 7 pm, excepting major holidays (average 22 days/month).
4. Equipment, truck trip, and employee estimates provided by the Ventura County Watershed Protection District.
5. 1 monitor, 1 inspector are assumed after mobilization; and 1 manager and one foreman assumed throughout.
6. No rideshare assumed for employee commuting vehicles.
7. When crew truck is specified it is assume one trip per day during entire task
8. Aspen assumed 1 on-road legal water truck every day after active construction starts and 1 fuel truck delivery daily weekdays after active construction starts throughout project.
9. The water truck would obtain water from local fire hydrant close to site.
10. Trips are round trips.

Construction Schedule (reaches 1-3)

	Task	Duration (days)	Employees
1	Mobilization	20	6
2	Clearing and Grubbing	10	10
3	Demolition & Removals	10	6
4	Diversion and Control of Water	n/a	n/a
5	Traffic Control	10	2
6	Foundation Excavation	20	8
7	Levee Embankment Fill	60	8
8	Landfill Tie-In	5	6
9	Rock Riprap	40	20
10	Concrete Retaining Wall	15	20
11	Structural Excavation & Backfill	10	6
12	Flap Gate - 24", 66"	5	4
13	Slide Gate - 24", 48", 66", & 72"	10	4
14	CMB Access Road (12' wide x 6" thick)	20	15
15	6' Chain Link Fence	5	6
16	Chain Link Gate	2	6
17	Hydroseeding (slopes)	1	4
18	Vegetation Thinning	5	8

Task Overlaps

1,18
2,3,5
2,3,5
n/a
2,3,5
none
7,10 and 7,11
8,9,14
8,9,14 and 7,9
7,10
7,11
none
none
8,9,14
none
none
none
1,18

Construction Schedule (reach 4)

	Phase	Duration (days)	Employees
1	Mobilization	20	6
2	Clearing and Grubbing	10	10
3	Demolition and Removals	10	6
4	Diversion & Control of Water	5	4
5	Traffic Control	10	2
6	Flood Wall Foundation Excavation	20	8
7	RC Flood Wall - Riverside	70	14
8	RC Flood Wall - Landside	50	14
9	Sheet Pile Wall and Scour Protection	55	6
10	UPRR Embankment Fill	10	8
11	El Rio Drain Channel Modification	15	8
12	Riprap Removal & Replacement	10	8
13	6' Chain Link Fence	4	4
14	Chain Link Gate	2	4
15	RC Drain Channel & Flap Gate	2	4
16	HP Gas Valve Relocations	5	6
17	Landscaping	5	8
18	Concrete Trail	10	8
19	CMB Access Road	5	4
20	Soil Cement Access Road	10	6
21	Flood Break Gate System		
21a	Utility Relocations	5	8
21b	Concrete Abutments	10	8
21c	Flood Break Gate Installation	5	8
21d	Street Modifications	10	8

Task Overlaps

1, 5
2,3,4,5
2,3,4,5
2,3,4,5
1,5 and 2,3,4,5
6,9 and 6,7
6,7 and 7,8
7,8 and 8,16,21a
6,9
10-12,19, 21b and 10-12,20,21b
10-12,19, 21b; 10-12,20,21b; and 11,20,21c
10-12,19, 21b and 10-12,20,21b
13,17
none
15,21d
8,16,21a
13,17
none
10-12,19, 21b
10-12,20,21b and 11,20,20c
8,16,21a
10-12,19, 21b and 10-12,20,21b
11,20,20c
15,21d

SCR-3 Project
Construction - Schedule & Equipment Use
Option 1A

Onroad Equipment Use (Reach 1-3)

						Total		Unpaved		Paved		
	Onroad Equipment	Total VMT/Trip	Unpaved VMT/Trip	Trips/Day	Total Trips	VMT/Day	Total VMT	VMT/Day	Total VMT	VMT/Day	Total VMT	
1	Mobilization	Employee Vehicle	30	0.1	6	120	180	3,600	1	12	179	3,588
		Crew Truck	30	5	1	20	30	600	5	100	25	500
		Delivery Truck	50	0.1	10	100	500	5,000	1	10	499	4,990
2	Clearing and Grubbing	Employee Vehicle	30	0.1	10	100	300	3,000	1	10	299	2,990
		Dump Truck	20	0.5	6	40	120	800	3	20	117	780
3	Demolition & Removals	Employee Vehicle	30	0.1	6	60	180	1,800	1	6	179	1,794
		Dump Truck	20	0.5	4	20	80	400	2	10	78	390
5	Traffic Control	Employee Vehicle	30	0	2	20	60	600	0	0	60	600
		Crew Truck	30	0	1	10	30	300	0	0	30	300
		Truck	30	0	1	10	30	300	0	0	30	300
		Delivery Truck	50	0	2	20	100	1,000	0	0	100	1,000
6	Foundation Excavation	Employee Vehicle	30	0.1	8	160	240	4,800	1	16	239	4,784
7	Levee Embankment Fill	Employee Vehicle	30	0.1	8	480	240	14,400	1	48	239	14,352
		Dump Truck	20	0.5	75	3,000	1,500	60,000	38	1,500	1,463	58,500
8	Landfill Tie-In	Employee Vehicle	30	0.1	6	30	180	900	1	3	179	897
		Dump Truck	20	0.5	4	10	80	200	2	5	78	195
9	Rock Riprap	Employee Vehicle	30	0.1	20	800	600	24,000	2	80	598	23,920
		Dump Truck	20	0.5	17	667	334	13,340	8	334	325	13,007
10	Concrete Retaining Wall	Employee Vehicle	30	0.1	20	300	600	9,000	2	30	598	8,970
		Delivery Truck	50	0.1	8	68	400	3,400	1	7	399	3,393
		Concrete Truck	20	0.5	2	22	40	440	1	11	39	429
11	Structural Excavation & Backfill	Employee Vehicle	30	0.1	6	60	180	1,800	1	6	179	1,794
		Dump Truck	20	0.5	4	42	80	840	2	21	78	819
12	Flap Gate – 24", 66"	Employee Vehicle	30	0.1	4	20	120	600	0	2	120	598
		Delivery Truck	50	0.1	1	1	50	50	0	0	50	50
		Crew Truck	30	5	1	5	30	150	5	25	25	125
13	Slide Gate – 24", 48", 66", & 72"	Employee Vehicle	30	0.1	4	40	120	1,200	0	4	120	1,196
		Delivery Truck	50	0.1	1	2	50	100	0	0	50	100
		Crew Truck	30	5	1	10	30	300	5	50	25	250
14	CMB Access Road (12' wide x 6" thick)	Employee Vehicle	30	0.1	15	300	450	9,000	2	30	449	8,970
		Dump Truck	20	0.5	10	163	200	3,260	5	82	195	3,179
15	6' Chain Link Fence	Employee Vehicle	30	0.1	6	30	180	900	1	3	179	897
		Crew Truck	30	5	1	5	30	150	5	25	25	125
		Delivery Truck	50	0.1	1	1	50	50	0	0	50	50
16	Chain Link Gate	Employee Vehicle	30	0.1	6	12	180	360	1	1	179	359
		Crew Truck	30	5	1	2	30	60	5	10	25	50
17	Hydroseeding (slopes)	Employee Vehicle	30	0	4	4	120	120	0	0	120	120
		Hydromulching Truck	40	10	1	1	40	40	10	10	30	30
18	Vegetation Thinning	Employee Vehicle	30	0.1	8	40	240	1,200	1	4	239	1,196
		Dump Truck	20	0.5	4	10	80	200	2	5	78	195
	Daily Needs	Pickup Truck	30	5	4	610	120	18,300	20	3,050	100	15,250
		Water Truck	30	25	1	224	30	6,720	25	5,600	5	1,120
		Fuel Truck	20	1	1	140	20	2,800	1	140	19	2,660

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Construction - Schedule & Equipment Use

Option 1A

Onroad Equipment Use (Reach 4)

		Onroad Equipment	Total VMT/Trip	Unpaved VMT/Trip	Trips/Day	Total Trips	Total		Unpaved		Paved	
							VMT/Day	Total VMT	VMT/Day	Total VMT	VMT/Day	Total VMT
1	Mobilization	Employee Vehicle	30	0.1	6	120	180	3,600	1	12	179	3,588
		Crew Truck	30	5	1	20	30	600	5	100	25	500
		Delivery Truck	50	0.1	10	100	500	5,000	1	10	499	4,990
2	Clearing and Grubbing	Employee Vehicle	30	0.1	10	100	300	3,000	1	10	299	2,990
		Dump Truck	20	0.5	3	20	60	400	2	10	59	390
3	Demolition and Removals	Employee Vehicle	30	0.1	6	60	180	1,800	1	6	179	1,794
		Delivery Truck	50	0.1	4	20	200	1,000	0	2	200	998
4	Diversion & Control of Water	Employee Vehicle	30	0.1	4	20	120	600	0	2	120	598
		Dump Truck	20	0.5	2	5	40	100	1	3	39	98
5	Traffic Control	Employee Vehicle	30	0	2	20	60	600	0	0	60	600
		Delivery Truck	50	0	2	20	100	1,000	0	0	100	1,000
		Crew Truck	30	0	1	10	30	300	0	0	30	300
6	Flood Wall Foundation Excavation	Employee Vehicle	30	0.1	8	160	240	4,800	1	16	239	4,784
		Dump Truck	0.5	0.5	20	375	10	188	10	188	0	0
7	RC Flood Wall – Riverside	Employee Vehicle	30	0.1	14	980	420	29,400	1	98	419	29,302
		Pump Truck	80	0.1	1	70	80	5,600	0	7	80	5,593
		Concrete Truck	20	0.1	3	159	60	3,180	0	16	60	3,164
		Delivery Truck	50	0.1	5	341	250	17,050	1	34	250	17,016
		Crew Truck	30	5	1	70	30	2,100	5	350	25	1,750
8	RC Flood Wall – Landside	Employee Vehicle	30	0.1	14	700	420	21,000	1	70	419	20,930
		Pump Truck	80	0.1	1	50	80	4,000	0	5	80	3,995
		Concrete Truck	20	0.1	3	123	60	2,460	0	12	60	2,448
		Delivery Truck	50	0.1	7	337	350	16,850	1	34	349	16,816
		Crew Truck	30	5	1	50	30	1,500	5	250	25	1,250
9	Sheet Pile Wall and Scour Protection	Employee Vehicle	30	0.1	6	330	180	9,900	1	33	179	9,867
		Delivery Truck	50	0.1	2	55	100	2,750	0	6	100	2,745
10	UPRR Embankment Fill	Employee Vehicle	30	0.1	8	80	240	2,400	1	8	239	2,392
		Dump Truck	0.5	0.5	6	50	3	25	3	25	0	0
11	El Rio Drain Channel Modification	Employee Vehicle	30	0.1	8	120	240	3,600	1	12	239	3,588
		Concrete Truck	20	0.1	1	15	20	300	0	2	20	299
12	Riprap Removal & Replacement	Employee Vehicle	30	0.1	8	80	240	2,400	1	8	239	2,392
		Dump Truck	0.5	0.5	12	92	6	46	6	46	0	0
		Dump Truck	20	0.1	8	50	160	1,000	1	5	159	995
		Concrete Truck	20	0.1	1	5	20	100	0	1	20	100
13	6' Chain Link Fence	Employee Vehicle	30	0.1	4	16	120	480	0	2	120	478
		Delivery Truck	50	0.1	1	1	50	50	0	0	50	50
		Crew Truck	30	5	1	4	30	120	5	20	25	100
14	Chain Link Gate	Employee Vehicle	30	0.1	4	8	120	240	0	1	120	239
		Crew Truck	30	5	1	2	30	60	5	10	25	50
15	RC Drain Channel & Flap Gate	Employee Vehicle	30	0.1	4	8	120	240	0	1	120	239
		Delivery Truck	50	0.1	1	1	50	50	0	0	50	50
		Crew Truck	30	5	1	2	30	60	5	10	25	50
16	HP Gas Valve Relocations	Employee Vehicle	30	0.1	6	30	180	900	1	3	179	897
		Delivery Truck	50	0.1	1	1	50	50	0	0	50	50
		Crew Truck	30	5	1	5	30	150	5	25	25	125
17	Landscaping	Employee Vehicle	30	0.1	8	40	240	1,200	1	4	239	1,196
		Crew Truck	30	5	1	5	30	150	5	25	25	125
		Delivery Truck	50	0.1	1	2	50	100	0	0	50	100
18	Concrete Trail	Employee Vehicle	30	0.1	8	80	240	2,400	1	8	239	2,392
		Pump Truck	80	0.1	1	10	80	800	0	1	80	799
		Concrete Truck	20	0.1	4	18	80	360	0	2	80	358
19	CMB Access Road	Employee Vehicle	30	0.1	4	20	120	600	0	2	120	598
		Concrete Truck	20	0.1	2	8	40	160	0	1	40	159
20	Soil Cement Access Road	Employee Vehicle	30	0.1	6	60	180	1,800	1	6	179	1,794
		Delivery Truck	50	0.1	2	20	100	1,000	0	2	100	998

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Construction - Schedule & Equipment Use

Option 1A

Onroad Equipment Use (Reach 4), cont.

	Onroad Equipment	Total VMT/Trip	Unpaved VMT/Trip	Trips/Day	Total Trips	Total		Unpaved		Paved		
						VMT/Day	Total VMT	VMT/Day	Total VMT	VMT/Day	Total VMT	
21	Flood Break Gate System											
21a	Utility Relocations	Employee Vehicle	30	0	8	40	240	1,200	0	0	240	1,200
		Material Truck	30	0	1	1	30	30	0	0	30	30
		Crew Truck	30	0	1	5	30	150	0	0	30	150
21b	Concrete Abutments	Employee Vehicle	30	0	8	80	240	2,400	0	0	240	2,400
		Pump Truck	80	0	1	2	80	160	0	0	80	160
		Concrete Truck	20	0	1	2	20	40	0	0	20	40
		Delivery Truck	50	0	1	2	50	100	0	0	50	100
21c	Flood Break Gate Installation	Employee Vehicle	30	0	8	40	240	1,200	0	0	240	1,200
		Delivery Truck	50	0	2	2	100	100	0	0	100	100
21d	Street Modifications	Employee Vehicle	30	0	8	80	240	2,400	0	0	240	2,400
		Concrete Truck	20	0	4	19	80	380	0	0	80	380
	Daily Needs	Pickup Truck	30	5	4	930	120	27,900	20	4,650	100	23,250
		Water Truck	30	25	1	336	30	10,080	25	8,400	5	1,680
		Fuel Truck	20	1	1	240	20	4,800	1	240	19	4,560

Offroad Equipment Use (Reaches 1-3)

	Offroad Equipment	HP	Model	Quantity	Hr/day	Days
1	Mobilization	None				
2	Clearing and Grubbing	Chainsaw	Stihl	4	6	10
		Wood Chipper	BC1200XL	1	4	10
		Backhoe	416F2	1	4	10
3	Demolition & Removals	Backhoe	416F2	1	6	10
5	Traffic Control	None				
6	Foundation Excavation	Grader	120M2	1	6	20
		Scraper	621K	2	8	20
		Compactor	815F	1	6	20
7	Levee Embankment Fill	Excavator	320E	1	8	60
		Grader	120M2	1	8	60
		Compactor	815F	1	8	60
8	Landfill Tie-In	Loader	963D	1	4	5
		Excavator	320E	1	8	5
		Compactor	815F	1	4	5
9	Rock Riprap	Loader	963D	1	8	40
		Excavator	320E	1	8	40
10	Concrete Retaining Wall	Generator		1	8	15
		Forklift	TH255C	1	4	15
		Concrete Vibrator	BP-35	1	4	15
		Compactor Roller	CB44B	1	4	15
11	Structural Excavation & Backfill	Excavator	320E	1	4	10
		Compactor	815F	1	4	10
		Backhoe	416F2	1	6	10
12	Flap Gate – 24", 66"	Excavator	320E	1	6	5
		Backhoe	416F2	1	4	5
13	Slide Gate – 24", 48", 66", & 72"	Excavator	320E	1	4	10
		Backhoe	416F2	1	4	10
14	CMB Access Road (12' wide x 6" thick)	Grader	120M2	1	6	20
		Compactor Roller	CB44B	1	6	20
		Backhoe	416F2	1	4	20
15	6' Chain Link Fence	Bobcat with Drill	S570	1	4	2
16	Chain Link Gate	Welder/Generator		1	4	1
		Bobcat	S450	1	4	1
17	Hydroseeding (slopes)	None				
18	Vegetation Thinning	Chainsaw	Stihl	4	6	5
		Backhoe	416F2	1	4	5

SCR-3 Project

Construction - Schedule & Equipment Use

Option 1A

Offroad Equipment Use (Reaches 4)

		Offroad Equipment	HP	Model	Quantity	Hr/day	Days
1	Mobilization	None					
2	Clearing and Grubbing	Chainsaw	4	Stihl	4	6	10
		Wood Chipper	85	BC1200XL	1	4	10
		Backhoe	87	416F2	1	4	10
3	Demolition and Removals	Backhoe	87	416F2	1	4	10
4	Diversion & Control of Water	Excavator	153	320E	1	6	5
		Backhoe	87	416F2	1	4	5
		Loader	189	963D	1	4	5
5	Traffic Control	None					
6	Flood Wall Foundation Excavation	Excavator	153	320E	1	8	10
		Loader	189	963D	1	6	10
7	RC Flood Wall – Riverside	Loader	189	963D	1	4	70
		Backhoe	87	416F2	1	4	70
		Concrete Vibrator	5	BP-35	1	4	70
		Generator	100	0	1	4	70
8	RC Flood Wall – Landside	Loader	189	963D	1	4	50
		Backhoe	87	416F2	1	4	50
		Concrete Vibrator	5	BP-35	1	4	50
		Generator	100	0	1	4	50
9	Sheet Pile Wall and Scour Protection	55 ton Crane	240	RT765E-2	1	4	55
		55 ton Crane w/ESF14 Vibro Hammer	240	RT765E-2	1	8	55
		Vibro Hammer/Powerpack	350	PS350	1	8	55
10	UPRR Embankment Fill	Backhoe	87	416F2	1	4	10
		Dozer	238	D7E	1	6	10
		Compactor Roller	102	CB44B	1	6	10
11	El Rio Drain Channel Modification	Excavator	153	320E	1	4	15
		Backhoe	87	416F2	1	4	15
12	Riprap Removal & Replacement	Excavator	153	320E	1	8	10
		Backhoe	87	416F2	1	6	10
13	6' Chain Link Fence	Bobcat with Drill	61	S570	1	4	1
14	Chain Link Gate	Welder/Generator	50		1	4	2
		Bobcat	49	S450	1	4	2
15	RC Drain Channel & Flap Gate	Excavator	153	320E	1	6	2
		Backhoe	87	416F2	1	6	2
16	HP Gas Valve Relocations	Backhoe	87	416F2	1	4	5
17	Landscaping	Backhoe	87	416F2	1	4	5
18	Concrete Trail	Excavator	153	320E	1	4	10
		Backhoe	87	416F2	1	4	10
19	CMB Access Road	Grader	145	120M2	1	6	5
		Compactor Roller	102	CB44B	1	4	5
		Backhoe	87	416F2	1	4	5
20	Soil Cement Access Road	Grader	145	120M2	1	6	10
		Soil Concrete Mixer - Excavator	153	320E	1	6	10
		Compactor Roller	102	CB44B	1	4	10
21a	Utility Relocations	Backhoe	87	416F2	1	4	5
21b	Concrete Abutments	Loader	189	963D	1	4	10
		Backhoe	87	416F2	1	4	10
21c	Flood Break Gate Installation	55 ton Crane	240	RT765E-2	1	4	5
21d	Street Modifications	Backhoe	87	416F2	1	4	10
		Grader	145	120M2	1	4	10
		Paver	142	AP500E	1	6	10

SCR-3 Project

Construction - Schedule & Equipment Use Option 1B

Assumptions:

1. Worker parking will require no more than 0.1 mile round trip on unpaved surface.
2. Unpaved road distances assumed consistently based on type of vehicle and use.
3. Work occurs 5 days a week, 7 am to 7 pm, excepting major holidays (average 22 days/month).
4. Equipment, truck trip, and employee estimates provided by the Ventura County Watershed Protection District.
5. 1 monitor, 1 inspector are assumed after mobilization; and 1 manager and one foreman assumed throughout.
6. No rideshare assumed for employee commuting vehicles.
7. When crew truck is specified it is assume one trip per day during entire task
8. Aspen assumed 1 on-road legal water truck every day after active construction starts and 1 fuel truck delivery daily weekdays after active construction starts throughout project.
9. The water truck would obtain water from local fire hydrant close to site.
10. Trips are round trips.

Construction Schedule (reaches 1-3)

	Task	Duration (days)	Employees
1	Mobilization	20	6
2	Clearing and Grubbing	10	10
3	Demolition & Removals	10	6
4	Diversion and Control of Water	5	4
5	Traffic Control	10	2
6	Foundation Excavation	10	8
7	Levee Embankment Fill	40	8
8	Landfill Tie-In	10	6
9	Rock Riprap	32	10
10	Golf Course Fill	45	8
11	66-inch RCP	10	8
12	Flap Gate – 24", 66"	5	4
13	Slide Gate – 24", 48", 66", & 72"	10	4
14	Concrete Headwall	5	6
15	CMB Access Road (12' wide x 6" thick)	10	15
16	6' Chain Link Fence	5	6
17	Chain Link Gate	2	6
18	Hydroseeding (slopes)	1	4
19	Vegetation Thinning	5	8

Task Overlaps

none
 2,3,5,19
 2,3,5,19
 n/a
 2,3,5,19
 none
 7,10,11
 8,10
 7,9,10,11; and 6,9,10; and 9,10
 7,10,11; and 8,10; and 9,10
 7,10,11
 12,14
 none
 12,14
 none
 none
 none
 2,3,5,19

SCR-3 Project

Construction - Schedule & Equipment Use

Option 1B

Construction Schedule (reach 4)

(Same as Under Option 1A)

Onroad Equipment Use (Reach 1-3)

		Onroad Equipment	Total VMT/Trip	Unpaved VMT/Trip	Trips/Day	Total Trips	Total		Unpaved		Paved	
							VMT/Day	Total VMT	VMT/Day	Total VMT	VMT/Day	Total VMT
1	Mobilization	Employee Vehicle	30	0.1	6	120	180	3,600	1	12	179	3,588
		Crew Truck	30	5	1	20	30	600	5	100	25	500
		Delivery Truck	50	0.1	10	100	500	5,000	1	10	499	4,990
2	Clearing and Grubbing	Employee Vehicle	30	0.1	10	100	300	3,000	1	10	299	2,990
		Dump Truck	20	0.5	6	40	120	800	3	20	117	780
3	Demolition & Removals	Employee Vehicle	30	0.1	6	60	180	1,800	1	6	179	1,794
		Dump Truck	20	0.5	4	20	80	400	2	10	78	390
4	Diversion and Control of Water	Employee Vehicle	30	0.1	4	20	120	600	0	2	120	598
		Dump Truck	20	0.5	2	5	40	100	1	3	39	98
5	Traffic Control	Employee Vehicle	30	0	2	20	60	600	0	0	60	600
		Crew Truck	30	0	1	10	30	300	0	0	30	300
		Truck	30	0	1	10	30	300	0	0	30	300
		Delivery Truck	50	0	2	20	100	1,000	0	0	100	1,000
6	Foundation Excavation	Employee Vehicle	30	0.1	8	80	240	2,400	1	8	239	2,392
7	Levee Embankment Fill	Employee Vehicle	30	0.1	8	320	240	9,600	1	32	239	9,568
		Dump Truck	20	0.5	40	1,084	800	21,680	20	542	780	21,138
8	Landfill Tie-In	Employee Vehicle	30	0.1	6	60	180	1,800	1	6	179	1,794
		Dump Truck	20	0.5	4	20	80	400	2	10	78	390
9	Rock Riprap	Employee Vehicle	30	0.1	10	320	300	9,600	1	32	299	9,568
		Dump Truck	20	0.5	14	421	280	8,420	7	211	273	8,210
10	Golf Course Fill	Employee Vehicle	30	0.1	8	360	240	10,800	1	36	239	10,764
		Dump Truck	20	0.5	40	1,325	800	26,500	20	663	780	25,838
11	66-inch RCP	Employee Vehicle	30	0.1	8	80	240	2,400	1	8	239	2,392
		Delivery Truck	50	0.1	2	5	100	250	0	1	100	250
12	Flap Gate – 24", 66"	Employee Vehicle	30	0.1	4	20	120	600	0	2	120	598
		Delivery Truck	50	0.1	1	1	50	50	0	0	50	50
		Crew Truck	30	5	1	5	30	150	5	25	25	125
13	Slide Gate – 24", 48", 66", & 72"	Employee Vehicle	30	0.1	4	40	120	1,200	0	4	120	1,196
		Delivery Truck	50	0.1	1	2	50	100	0	0	50	100
		Crew Truck	30	5	1	10	30	300	5	50	25	250
14	Concrete Headwall	Employee Vehicle	30	0.1	6	30	180	900	1	3	179	897
		Delivery Truck	50	0.1	1	1	50	50	0	0	50	50
		Concrete Truck	20	0.5	0	1	0	20	0	1	0	20
15	CMB Access Road (12' wide x 6" thick)	Employee Vehicle	30	0.1	15	150	450	4,500	2	15	449	4,485
		Dump Truck	20	0.5	10	65	200	1,300	5	33	195	1,268
16	6' Chain Link Fence	Employee Vehicle	30	0.1	6	30	180	900	1	3	179	897
		Crew Truck	30	5	1	5	30	150	5	25	25	125
		Delivery Truck	50	0.1	1	1	50	50	0	0	50	50
17	Chain Link Gate	Employee Vehicle	30	0.1	6	12	180	360	1	1	179	359
		Crew Truck	30	5	1	2	30	60	5	10	25	50
18	Hydroseeding (slopes)	Employee Vehicle	30	0	4	4	120	120	0	0	120	120
		Hydromulching Truck	40	10	1	1	40	40	10	10	30	30
19	Vegetation Thinning	Employee Vehicle	30	0.1	8	40	240	1,200	1	4	239	1,196
		Dump Truck	20	0.5	4	10	80	200	2	5	78	195
Daily Needs	Daily Needs	Pickup Truck	30	5	4	540	120	16,200	20	2,700	100	13,500
		Water Truck	30	25	1	203	30	6,090	25	5,075	5	1,015
		Fuel Truck	20	1	1	120	20	2,400	1	120	19	2,280

SCR-3 Project

Construction - Schedule & Equipment Use

Option 1B

Offroad Equipment Use (Reaches 1-3)

		Offroad Equipment	HP	Model	Quantity	Hr/day	Days
1	Mobilization	None					
2	Clearing and Grubbing	Chainsaw	4	Stihl	4	6	10
		Wood Chipper	85	BC1200XL	1	4	10
		Backhoe	87	416F2	1	4	10
3	Demolition & Removals	Backhoe	87	416F2	1	6	10
4	Diversion and Control of Water	Excavator	153	320E	1	6	5
		Backhoe	87	416F2	1	6	5
		Loader	189	963D	1	6	5
5	Traffic Control	None					
6	Foundation Excavation	Grader	145	120M2	1	6	10
		Scraper	407	621K	2	8	10
		Compactor	232	815F	1	6	10
7	Levee Embankment Fill	Excavator	153	320E	1	8	40
		Grader	145	120M2	1	8	40
		Compactor	232	815F	1	8	40
8	Landfill Tie-In	Loader	189	963D	1	4	10
		Excavator	153	320E	1	8	10
		Compactor	232	815F	1	4	10
9	Rock Riprap	Loader	189	963D	1	8	32
		Excavator	153	320E	1	8	32
10	Golf Course Fill	Loader	189	963D	1	8	45
		Excavator	153	320E	1	4	45
		Backhoe	87	416F2	1	4	45
		Compactor	232	815F	1	6	45
11	66-inch RCP	Excavator	153	320E	1	4	10
		Compactor	232	815F	1	4	10
		Backhoe	87	416F2	1	6	10
12	Flap Gate – 24", 66"	Excavator	153	320E	1	6	5
		Backhoe	87	416F2	1	4	5
13	Slide Gate – 24", 48", 66", & 72"	Excavator	153	320E	1	4	10
		Backhoe	87	416F2	1	4	10
14	Concrete Headwall	Backhoe	87	416F2	1	6	5
		Compactor Roller	102	CB44B	1	4	5
		Concrete Vibrator	5	BP-35	1	4	5
15	CMB Access Road (12' wide x 6" thick)	Grader	145	120M2	1	6	10
		Compactor Roller	102	CB44B	1	6	10
		Backhoe	87	416F2	1	4	10
16	6' Chain Link Fence	Bobcat with Drill	61	S570	1	4	2
17	Chain Link Gate	Welder/Generator	50		1	4	1
		Bobcat	49	S450	1	4	1
18	Hydroseeding (slopes)	None					
19	Vegetation Thinning	Chainsaw	4	Stihl	4	6	5
		Backhoe	87	416F2	1	4	5

SCR-3 Project
Construction - On-road Equipment Emissions Calculations
Option 1A

Assumptions:

1. CARB EMFAC 2014 model emission factors for South Coast Air Basin are used to estimate on-road emissions.
2. Assumptions on Vehicle Class and resulting emissions factors used for each vehicle type are provided below:

Onroad Emission Factors - 2016 (pounds/mile)

	VOC	CO	NOx	SOx	PM10	PM2.5	Vehicle Class Assumption
Delivery Truck	0.00072	0.00459	0.01765	0.00004	0.00045	0.00031	HHDT
Crew Truck	0.00143	0.00710	0.00697	0.00002	0.00025	0.00013	Average of LHDT1 and LHDT2
Dump Truck	0.00072	0.00459	0.01765	0.00004	0.00045	0.00031	HHDT
Truck	0.00078	0.00723	0.00097	0.00001	0.00010	0.00004	MDV
Water Truck	0.00072	0.00459	0.01765	0.00004	0.00045	0.00031	HHDT
Employee Vehicles	0.00065	0.00503	0.00075	0.00001	0.00011	0.00005	Average of LDA, LDT1, LDT2, MDV, LHDT1, and MCY
Material Truck	0.00095	0.00652	0.01067	0.00003	0.00062	0.00043	MHDT
Concrete Truck	0.00072	0.00459	0.01765	0.00004	0.00045	0.00031	HHDT
Hydro-Mulching Truck	0.00095	0.00652	0.01067	0.00003	0.00062	0.00043	MHDT
Pickup truck	0.00078	0.00723	0.00097	0.00001	0.00010	0.00004	MDV
Fuel Truck	0.00095	0.00652	0.01067	0.00003	0.00062	0.00043	MHDT
Pump Truck	0.00072	0.00459	0.01765	0.00004	0.00045	0.00031	HHDT

Daily and Total Task Emissions

Reach 1-3 Tasks

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Mobilization	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	3,600	2.35	18.10	2.72	0.03	0.39	0.17
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	600	0.86	4.26	4.18	0.01	0.15	0.08
	Delivery Truck	500	0.36	2.30	8.82	0.02	0.23	0.16	5,000	3.62	22.96	88.23	0.19	2.27	1.56
	Totals		0.52	3.41	9.17	0.02	0.25	0.17	Totals	6.83	45.32	95.13	0.23	2.81	1.80

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Clearing and Grubbing	Employee Vehicle	300	0.20	1.51	0.23	0.00	0.03	0.01	3,000	1.96	15.08	2.26	0.03	0.33	0.14
	Dump Truck	120	0.09	0.55	2.12	0.00	0.05	0.04	800	0.58	3.67	14.12	0.03	0.36	0.25
	Totals		0.28	2.06	2.34	0.01	0.09	0.05	Totals	2.54	18.76	16.38	0.06	0.69	0.39

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Demolition & Removals	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	1,800	1.17	9.05	1.36	0.02	0.20	0.08
	Dump Truck	80	0.06	0.37	1.41	0.00	0.04	0.02	400	0.29	1.84	7.06	0.02	0.18	0.12
	Totals		0.18	1.27	1.55	0.00	0.06	0.03	Totals	1.46	10.89	8.42	0.03	0.38	0.21

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Traffic Control	Employee Vehicle	60	0.04	0.30	0.05	0.00	0.01	0.00	600	0.39	3.02	0.45	0.01	0.07	0.03
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	300	0.43	2.13	2.09	0.00	0.07	0.04
	Truck	30	0.02	0.22	0.03	0.00	0.00	0.00	300	0.24	2.17	0.29	0.00	0.03	0.01
	Delivery Truck	100	0.07	0.46	1.76	0.00	0.05	0.03	1,000	0.72	4.59	17.65	0.04	0.45	0.31
	Totals		0.18	1.19	2.05	0.01	0.06	0.04	Totals	1.78	11.91	20.48	0.05	0.62	0.39

SCR-3 Project
Construction - On-road Equipment Emissions Calculations
Option 1A

Reach 1-3 Tasks, cont.

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Foundation Excavation	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	4,800	3.13	24.14	3.62	0.04	0.52	0.22
Totals			0.16	1.21	0.18	0.00	0.03	0.01	Totals	3.13	24.14	3.62	0.04	0.52	0.22

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Levee Embankment Fill	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	14,400	9.39	72.41	10.87	0.12	1.56	0.67
	Dump Truck	1,500	1.09	6.89	26.47	0.06	0.68	0.47	60,000	43.48	275.47	1,058.79	2.29	27.25	18.66
Totals			1.24	8.09	26.65	0.06	0.71	0.48	Totals	52.87	347.88	1,069.66	2.41	28.81	19.34

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Landfill Tie-In	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	900	0.59	4.53	0.68	0.01	0.10	0.04
	Dump Truck	80	0.06	0.37	1.41	0.00	0.04	0.02	200	0.14	0.92	3.53	0.01	0.09	0.06
Totals			0.18	1.27	1.55	0.00	0.06	0.03	Totals	0.73	5.44	4.21	0.02	0.19	0.10

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
	Employee Vehicle	600	0.39	3.02	0.45	0.01	0.07	0.03	24,000	15.65	120.68	18.11	0.21	2.60	1.12
	Dump Truck	334	0.24	1.53	5.89	0.01	0.15	0.10	13,340	9.67	61.25	235.41	0.51	6.06	4.15
Totals			0.63	4.55	6.34	0.02	0.22	0.13	Totals	25.31	181.93	253.52	0.71	8.66	5.27

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Concrete Retaining Wall	Employee Vehicle	600	0.39	3.02	0.45	0.01	0.07	0.03	9,000	5.87	45.25	6.79	0.08	0.98	0.42
	Delivery Truck	400	0.29	1.84	7.06	0.02	0.18	0.12	3,400	2.46	15.61	60.00	0.13	1.54	1.06
	Concrete Truck	40	0.03	0.18	0.71	0.00	0.02	0.01	440	0.32	2.02	7.76	0.02	0.20	0.14
Totals			0.71	5.04	8.22	0.02	0.26	0.16	Totals	8.65	62.88	74.55	0.22	2.72	1.62

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Structural Excavation & Backfill	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	1,800	1.17	9.05	1.36	0.02	0.20	0.08
	Dump Truck	80	0.06	0.37	1.41	0.00	0.04	0.02	840	0.61	3.86	14.82	0.03	0.38	0.26
Totals			0.18	1.27	1.55	0.00	0.06	0.03	Totals	1.78	12.91	16.18	0.05	0.58	0.35

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Flap Gate – 24", 66"	Employee Vehicle	120	0.08	0.60	0.09	0.00	0.01	0.01	600	0.39	3.02	0.45	0.01	0.07	0.03
	Delivery Truck	50	0.04	0.23	0.88	0.00	0.02	0.02	50	0.04	0.23	0.88	0.00	0.02	0.02
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	150	0.22	1.06	1.04	0.00	0.04	0.02
Totals			0.16	1.05	1.18	0.00	0.04	0.02	Totals	0.64	4.31	2.38	0.01	0.12	0.06

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Slide Gate – 24", 48", 66", & 72"	Employee Vehicle	120	0.08	0.60	0.09	0.00	0.01	0.01	1,200	0.78	6.03	0.91	0.01	0.13	0.06
	Delivery Truck	50	0.04	0.23	0.88	0.00	0.02	0.02	100	0.07	0.46	1.76	0.00	0.05	0.03
	Crew Truck	30	0.02	0.14	0.53	0.00	0.01	0.01	300	0.43	2.13	2.09	0.00	0.07	0.04
Totals			0.14	0.97	1.50	0.00	0.05	0.03	Totals	1.29	8.62	4.76	0.02	0.25	0.13

SCR-3 Project
Construction - On-road Equipment Emissions Calculations
Option 1A

Reach 1-3 Tasks, cont.

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
CMB Access Road (12' wide x 6" thick)	Employee Vehicle	450	0.29	2.26	0.34	0.00	0.05	0.02	9,000	5.87	45.25	6.79	0.08	0.98	0.42
	Dump Truck	200	0.14	0.92	3.53	0.01	0.09	0.06	3,260	2.36	14.97	57.53	0.12	1.48	1.01
Totals			0.44	3.18	3.87	0.01	0.14	0.08	Totals	8.23	60.22	64.32	0.20	2.46	1.44

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
6' Chain Link Fence	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	900	0.59	4.53	0.68	0.01	0.10	0.04
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	150	0.22	1.06	1.04	0.00	0.04	0.02
	Delivery Truck	50	0.04	0.23	0.88	0.00	0.02	0.02	50	0.04	0.23	0.88	0.00	0.02	0.02
Totals			0.20	1.35	1.23	0.00	0.05	0.03	Totals	0.84	5.82	2.61	0.01	0.16	0.08

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Chain Link Gate	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	360	0.23	1.81	0.27	0.00	0.04	0.02
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	60	0.09	0.43	0.42	0.00	0.01	0.01
Totals			0.16	1.12	0.34	0.00	0.03	0.01	Totals	0.32	2.24	0.69	0.00	0.05	0.02

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Hydroseeding (slopes)	Employee Vehicle	120	0.08	0.60	0.09	0.00	0.01	0.01	120	0.08	0.60	0.09	0.00	0.01	0.01
	Hydromulching Truck	40	0.04	0.26	0.43	0.00	0.02	0.02	40	0.04	0.26	0.43	0.00	0.02	0.02
Totals			0.12	0.86	0.52	0.00	0.04	0.02	Totals	0.12	0.86	0.52	0.00	0.04	0.02

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Vegetation Thinning	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	1,200	0.78	6.03	0.91	0.01	0.13	0.06
	Dump Truck	80	0.06	0.37	1.41	0.00	0.04	0.02	200	0.14	0.92	3.53	0.01	0.09	0.06
Totals			0.21	1.57	1.59	0.01	0.06	0.04	Totals	0.93	6.95	4.43	0.02	0.22	0.12

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Daily Needs	Pickup Truck	120	0.09	0.87	0.12	0.00	0.01	0.01	18,300	14.34	132.37	17.82	0.23	1.91	0.81
	Water Truck	30	0.02	0.14	0.53	0.00	0.01	0.01	6,720	4.87	30.85	118.58	0.26	3.05	2.09
	Fuel Truck	20	0.02	0.13	0.21	0.00	0.01	0.01	2,800	2.65	18.27	29.88	0.07	1.75	1.20
Totals			0.13	1.14	0.86	0.00	0.04	0.02	Totals	21.86	181.49	166.28	0.55	6.71	4.09

Maximum Overlap

Daily Emissions lbs					
ROG	CO	NOx	SOx	PM	PM2.5
2.09	14.27	35.73	0.08	1.01	0.67

Total Emissions lbs

ROG	CO	NOx	SOx	PM	PM2.5
139.31	992.56	1,808.14	4.64	55.98	35.65

SCR-3 Project
Construction - On-road Equipment Emissions Calculations
Option 1A

Reach 4 Tasks

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Mobilization	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	3,600	2.35	18.10	2.72	0.03	0.39	0.17
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	600	0.86	4.26	4.18	0.01	0.15	0.08
	Delivery Truck	500	0.36	2.30	8.82	0.02	0.23	0.16	5,000	3.62	22.96	88.23	0.19	2.27	1.56
Totals		0.52	3.41	9.17	0.02	0.25	0.17	Totals	6.83	45.32	95.13	0.23	2.81	1.80	

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Clearing and Grubbing	Employee Vehicle	300	0.20	1.51	0.23	0.00	0.03	0.01	3,000	1.96	15.08	2.26	0.03	0.33	0.14
	Dump Truck	60	0.04	0.28	1.06	0.00	0.03	0.02	400	0.29	1.84	7.06	0.02	0.18	0.12
Totals		0.24	1.78	1.29	0.00	0.06	0.03	Totals	2.25	16.92	9.32	0.04	0.51	0.26	

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Demolition and Removals	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	1,800	1.17	9.05	1.36	0.02	0.20	0.08
	Delivery Truck	200	0.14	0.92	3.53	0.01	0.09	0.06	1,000	0.72	4.59	17.65	0.04	0.45	0.31
Totals		0.26	1.82	3.67	0.01	0.11	0.07	Totals	1.90	13.64	19.00	0.05	0.65	0.40	

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Diversion & Control of Water	Employee Vehicle	120	0.08	0.60	0.09	0.00	0.01	0.01	600	0.39	3.02	0.45	0.01	0.07	0.03
	Dump Truck	40	0.03	0.18	0.71	0.00	0.02	0.01	100	0.07	0.46	1.76	0.00	0.05	0.03
Totals		0.11	0.79	0.80	0.00	0.03	0.02	Totals	0.46	3.48	2.22	0.01	0.11	0.06	

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Traffic Control	Employee Vehicle	60	0.04	0.30	0.05	0.00	0.01	0.00	600	0.39	3.02	0.45	0.01	0.07	0.03
	Delivery Truck	100	0.07	0.46	1.76	0.00	0.05	0.03	1,000	0.72	4.59	17.65	0.04	0.45	0.31
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	300	0.43	2.13	2.09	0.00	0.07	0.04
Totals		0.15	0.97	2.02	0.00	0.06	0.04	Totals	1.55	9.74	20.19	0.05	0.59	0.38	

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Flood Wall Foundation Excavation	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	4,800	3.48	22.04	84.70	0.18	2.18	1.49
	Dump Truck	10	0.01	0.05	0.18	0.00	0.00	0.00	188	0.14	0.86	3.31	0.01	0.09	0.06
Totals		0.16	1.25	0.36	0.00	0.03	0.01	Totals	3.61	22.90	88.01	0.19	2.27	1.55	

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
RC Flood Wall – Riverside	Employee Vehicle	420	0.27	2.11	0.32	0.00	0.05	0.02	29,400	19.17	147.83	22.19	0.25	3.19	1.38
	Pump Truck	80	0.06	0.37	1.41	0.00	0.04	0.02	5,600	4.06	25.71	98.82	0.21	2.54	1.74
	Concrete Truck	60	0.04	0.28	1.06	0.00	0.03	0.02	3,180	2.30	14.60	56.12	0.12	1.44	0.99
	Delivery Truck	250	0.18	1.15	4.41	0.01	0.11	0.08	17,050	12.36	78.28	300.87	0.65	7.74	5.30
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	2,100	3.01	14.90	14.63	0.03	0.52	0.27
Totals		0.60	4.12	7.41	0.02	0.23	0.14	Totals	40.90	281.32	492.63	1.27	15.43	9.68	

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
RC Flood Wall – Landside	Employee Vehicle	420	0.27	2.11	0.32	0.00	0.05	0.02	21,000	13.69	105.59	15.85	0.18	2.28	0.98
	Pump Truck	80	0.06	0.37	1.41	0.00	0.04	0.02	4,000	2.90	18.36	70.59	0.15	1.82	1.24
	Concrete Truck	60	0.04	0.28	1.06	0.00	0.03	0.02	2,460	1.78	11.29	43.41	0.09	1.12	0.77
	Delivery Truck	350	0.25	1.61	6.18	0.01	0.16	0.11	16,850	12.21	77.36	297.34	0.64	7.65	5.24
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	1,500	2.15	10.64	10.45	0.02	0.37	0.19
Totals		0.67	4.57	9.17	0.02	0.28	0.18	Totals	32.73	223.26	437.64	1.09	13.23	8.42	

SCR-3 Project
Construction - On-road Equipment Emissions Calculations
Option 1A

Reach 4 Tasks, cont.

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Sheet Pile Wall and Scour Protection	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	9,900	6.45	49.78	7.47	0.08	1.07	0.46
	Delivery Truck	100	0.07	0.46	1.76	0.00	0.05	0.03	2,750	1.99	12.63	48.53	0.10	1.25	0.86
	Totals		0.19	1.36	1.90	0.01	0.06	0.04	Totals	8.45	62.41	56.00	0.19	2.32	1.32
		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
UPRR Embankment Fill	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	2,400	1.56	12.07	1.81	0.02	0.26	0.11
	Dump Truck	3	0.00	0.01	0.05	0.00	0.00	0.00	25	0.02	0.11	0.44	0.00	0.01	0.01
	Totals		0.16	1.22	0.23	0.00	0.03	0.01	Totals	1.58	12.18	2.25	0.02	0.27	0.12
		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
El Rio Drain Channel Modification	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	3,600	2.35	18.10	2.72	0.03	0.39	0.17
	Concrete Truck	20	0.01	0.09	0.35	0.00	0.01	0.01	300	0.22	1.38	5.29	0.01	0.14	0.09
	Totals		0.17	1.30	0.53	0.00	0.04	0.02	Totals	2.56	19.48	8.01	0.04	0.53	0.26
		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Riprap Removal & Replacement	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	2,400	1.56	12.07	1.81	0.02	0.26	0.11
	Dump Truck	6	0.00	0.03	0.11	0.00	0.00	0.00	46	0.03	0.21	0.81	0.00	0.02	0.01
	Dump Truck	160	0.12	0.73	2.82	0.01	0.07	0.05	1,000	0.72	4.59	17.65	0.04	0.45	0.31
	Concrete Truck	20	0.00	0.00	0.00	0.00	0.00	0.00	100	0.07	0.46	1.76	0.00	0.05	0.03
Totals		0.28	1.97	3.11	0.01	0.10	0.06	Totals	2.40	17.33	22.03	0.06	0.78	0.47	
		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
6' Chain Link Fence	Employee Vehicle	120	0.08	0.60	0.09	0.00	0.01	0.01	480	0.31	2.41	0.36	0.00	0.05	0.02
	Delivery Truck	50	0.04	0.23	0.88	0.00	0.02	0.02	50	0.04	0.23	0.88	0.00	0.02	0.02
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	120	0.17	0.85	0.84	0.00	0.03	0.02
Totals		0.16	1.05	1.18	0.00	0.04	0.02	Totals	0.52	3.49	2.08	0.01	0.10	0.05	
		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Chain Link Gate	Employee Vehicle	120	0.08	0.60	0.09	0.00	0.01	0.01	240	0.16	1.21	0.18	0.00	0.03	0.01
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	60	0.09	0.43	0.42	0.00	0.01	0.01
	Totals		0.12	0.82	0.30	0.00	0.02	0.01	Totals	0.24	1.63	0.60	0.00	0.04	0.02
		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
RC Drain Channel & Flap Gate	Employee Vehicle	120	0.08	0.60	0.09	0.00	0.01	0.01	240	0.16	1.21	0.18	0.00	0.03	0.01
	Delivery Truck	50	0.04	0.23	0.88	0.00	0.02	0.02	50	0.04	0.23	0.88	0.00	0.02	0.02
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	60	0.09	0.43	0.42	0.00	0.01	0.01
Totals		0.16	1.05	1.18	0.00	0.04	0.02	Totals	0.28	1.86	1.48	0.00	0.06	0.03	
		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
HP Gas Valve Relocations	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	900	0.59	4.53	0.68	0.01	0.10	0.04
	Delivery Truck	50	0.04	0.23	0.88	0.00	0.02	0.02	50	0.04	0.23	0.88	0.00	0.02	0.02
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	150	0.22	1.06	1.04	0.00	0.04	0.02
Totals		0.20	1.35	1.23	0.00	0.05	0.03	Totals	0.84	5.82	2.61	0.01	0.16	0.08	
		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Landscaping	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	1,200	0.78	6.03	0.91	0.01	0.13	0.06
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	150	0.22	1.06	1.04	0.00	0.04	0.02
	Delivery Truck	50	0.04	0.23	0.88	0.00	0.02	0.02	100	0.07	0.46	1.76	0.00	0.05	0.03
Totals		0.24	1.65	1.27	0.00	0.06	0.03	Totals	1.07	7.56	3.72	0.02	0.21	0.11	

SCR-3 Project
Construction - On-road Equipment Emissions Calculations
Option 1A

Reach 4 Tasks, cont.

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Concrete Trail	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	2,400	1.56	12.07	1.81	0.02	0.26	0.11
	Pump Truck	80	0.06	0.37	1.41	0.00	0.04	0.02	800	0.58	3.67	14.12	0.03	0.36	0.25
	Concrete Truck	80	0.06	0.37	1.41	0.00	0.04	0.02	360	0.26	1.65	6.35	0.01	0.16	0.11
Totals			0.27	1.94	3.00	0.01	0.10	0.06	Totals	2.41	17.39	22.28	0.06	0.79	0.47

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
CMB Access Road	Employee Vehicle	120	0.08	0.60	0.09	0.00	0.01	0.01	600	0.39	3.02	0.45	0.01	0.07	0.03
	Concrete Truck	40	0.03	0.18	0.71	0.00	0.02	0.01	160	0.12	0.73	2.82	0.01	0.07	0.05
Totals			0.11	0.79	0.80	0.00	0.03	0.02	Totals	0.51	3.75	3.28	0.01	0.14	0.08

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Soil Cement Access Road	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	1,800	1.17	9.05	1.36	0.02	0.20	0.08
	Delivery Truck	100	0.07	0.46	1.76	0.00	0.05	0.03	1,000	0.72	4.59	17.65	0.04	0.45	0.31
Totals			0.19	1.36	1.90	0.01	0.06	0.04	Totals	1.90	13.64	19.00	0.05	0.65	0.40

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Utility Relocations	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	1,200	0.78	6.03	0.91	0.01	0.13	0.06
	Material Truck	30	0.03	0.20	0.32	0.00	0.02	0.01	30	0.03	0.20	0.32	0.00	0.02	0.01
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	150	0.22	1.06	1.04	0.00	0.04	0.02
Totals			0.23	1.62	0.71	0.00	0.05	0.03	Totals	1.03	7.29	2.27	0.01	0.19	0.09

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Concrete Abutments	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	2,400	1.56	12.07	1.81	0.02	0.26	0.11
	Pump Truck	80	0.06	0.37	1.41	0.00	0.04	0.02	160	0.12	0.73	2.82	0.01	0.07	0.05
	Concrete Truck	20	0.01	0.09	0.35	0.00	0.01	0.01	40	0.03	0.18	0.71	0.00	0.02	0.01
	Delivery Truck	50	0.04	0.23	0.88	0.00	0.02	0.02	100	0.07	0.46	1.76	0.00	0.05	0.03
Totals			0.27	1.90	2.83	0.01	0.09	0.06	Totals	1.78	13.45	7.11	0.03	0.40	0.21

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Flood Break Gate Installation	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	1,200	0.78	6.03	0.91	0.01	0.13	0.06
	Delivery Truck	100	0.07	0.46	1.76	0.00	0.05	0.03	100	0.07	0.46	1.76	0.00	0.05	0.03
Totals			0.23	1.67	1.95	0.01	0.07	0.04	Totals	0.85	6.49	2.67	0.01	0.18	0.09

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Street Modifications	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	2,400	1.56	12.07	1.81	0.02	0.26	0.11
	Concrete Truck	80	0.06	0.37	1.41	0.00	0.04	0.02	380	0.28	1.74	6.71	0.01	0.17	0.12
Totals			0.21	1.57	1.59	0.01	0.06	0.04	Totals	1.84	13.81	8.52	0.04	0.43	0.23

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Daily Needs	Pickup Truck	120	0.09	0.87	0.12	0.00	0.01	0.01	27,900	21.87	201.82	27.16	0.35	2.91	1.23
	Water Truck	30	0.02	0.14	0.53	0.00	0.01	0.01	10,080	7.31	46.28	177.88	0.38	4.58	3.14
	Fuel Truck	20	0.02	0.13	0.21	0.00	0.01	0.01	4,800	4.54	31.32	51.22	0.12	3.00	2.05
Totals			0.13	1.14	0.86	0.00	0.04	0.02	Totals	33.71	279.41	256.26	0.85	10.48	6.42

Maximum Overlap					
Daily Emissions lbs					
ROG	CO	NOx	SOx	PM	PM2.5
0.98	7.17	7.50	0.02	0.29	0.17

Total Emissions lbs					
ROG	CO	NOx	SOx	PM	PM2.5
152.19	1,103.58	1,584.30	4.37	53.32	32.99

SCR-3 Project
Construction - On-road Equipment Emissions Calculations
Option 1A

Assumptions:

1. CARB EMFAC 2014 model emission factors for South Central Coast Air Basin are used to estimate on-road emissions.
2. Assumptions on Vehicle Class and resulting emissions factors used for each vehicle type are provided below:

Onroad Emission Factors - 2016 (pounds/mile)

	VOC	CO	NOx	SOx	PM10	PM2.5	Vehicle Class Assumption
Delivery Truck	0.00072	0.00459	0.01765	0.00004	0.00045	0.00031	HHDT
Crew Truck	0.00143	0.00710	0.00697	0.00002	0.00025	0.00013	Average of LHDT1 and LHDT2
Dump Truck	0.00072	0.00459	0.01765	0.00004	0.00045	0.00031	HHDT
Truck	0.00078	0.00723	0.00097	0.00001	0.00010	0.00004	MDV
Water Truck	0.00072	0.00459	0.01765	0.00004	0.00045	0.00031	HHDT
Employee Vehicles	0.00065	0.00503	0.00075	0.00001	0.00011	0.00005	Average of LDA, LDT1, LDT2, MDV, LHDT1, and MCY
Material Truck	0.00095	0.00652	0.01067	0.00003	0.00062	0.00043	MHDT
Concrete Truck	0.00072	0.00459	0.01765	0.00004	0.00045	0.00031	HHDT
Hydro-Mulching Truck	0.00095	0.00652	0.01067	0.00003	0.00062	0.00043	MHDT
Pickup truck	0.00078	0.00723	0.00097	0.00001	0.00010	0.00004	MDV
Fuel Truck	0.00095	0.00652	0.01067	0.00003	0.00062	0.00043	MHDT
Pump Truck	0.00072	0.00459	0.01765	0.00004	0.00045	0.00031	HHDT

Daily and Total Task Emissions

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Mobilization	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	3,600	2.35	18.10	2.72	0.03	0.39	0.17
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	600	0.86	4.26	4.18	0.01	0.15	0.08
	Delivery Truck	500	0.36	2.30	8.82	0.02	0.23	0.16	5,000	3.62	22.96	88.23	0.19	2.27	1.56
	Totals		0.52	3.41	9.17	0.02	0.25	0.17	Totals	6.83	45.32	95.13	0.23	2.81	1.80

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Clearing and Grubbing	Employee Vehicle	300	0.20	1.51	0.23	0.00	0.03	0.01	3,000	1.96	15.08	2.26	0.03	0.33	0.14
	Dump Truck	120	0.09	0.55	2.12	0.00	0.05	0.04	800	0.58	3.67	14.12	0.03	0.36	0.25
	Totals		0.28	2.06	2.34	0.01	0.09	0.05	Totals	2.54	18.76	16.38	0.06	0.69	0.39

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Demolition & Removals	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	1,800	1.17	9.05	1.36	0.02	0.20	0.08
	Dump Truck	80	0.06	0.37	1.41	0.00	0.04	0.02	400	0.29	1.84	7.06	0.02	0.18	0.12
	Totals		0.18	1.27	1.55	0.00	0.06	0.03	Totals	1.46	10.89	8.42	0.03	0.38	0.21

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Diversion and Control of Water	Employee Vehicle	120	0.08	0.60	0.09	0.00	0.01	0.01	600	0.39	3.02	0.45	0.01	0.07	0.03
	Dump Truck	40	0.03	0.18	0.71	0.00	0.02	0.01	100	0.07	0.46	1.76	0.00	0.05	0.03
	Totals		0.11	0.79	0.80	0.00	0.03	0.02	Totals	0.46	3.48	2.22	0.01	0.11	0.06

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Traffic Control	Employee Vehicle	60	0.04	0.30	0.05	0.00	0.01	0.00	600	0.39	3.02	0.45	0.01	0.07	0.03
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	300	0.43	2.13	2.09	0.00	0.07	0.04
	Truck	30	0.02	0.22	0.03	0.00	0.00	0.00	300	0.24	2.17	0.29	0.00	0.03	0.01
	Delivery Truck	100	0.07	0.46	1.76	0.00	0.05	0.03	1,000	0.72	4.59	17.65	0.04	0.45	0.31
	Totals		0.18	1.19	2.05	0.01	0.06	0.04	Totals	1.78	11.91	20.48	0.05	0.62	0.39

SCR-3 Project
Construction - On-road Equipment Emissions Calculations
Option 1A

		VMT	Daily Emissions lbs					VMT	Task Total Emissions lbs						
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Foundation Excavation	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	2,400	1.56	12.07	1.81	0.02	0.26	0.11
	Totals		0.16	1.21	0.18	0.00	0.03	0.01	Totals	1.56	12.07	1.81	0.02	0.26	0.11
Levee Embankment Fill	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	9,600	6.26	48.27	7.24	0.08	1.04	0.45
	Dump Truck	800	0.58	3.67	14.12	0.03	0.36	0.25	21,680	15.71	99.54	382.58	0.83	9.85	6.74
	Totals		0.74	4.88	14.30	0.03	0.39	0.26	Totals	21.97	147.81	389.82	0.91	10.89	7.19
Landfill Tie-In	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	1,800	1.17	9.05	1.36	0.02	0.20	0.08
	Dump Truck	80	0.06	0.37	1.41	0.00	0.04	0.02	400	0.29	1.84	7.06	0.02	0.18	0.12
	Totals		0.18	1.27	1.55	0.00	0.06	0.03	Totals	1.46	10.89	8.42	0.03	0.38	0.21
Rock Riprap	Employee Vehicle	300	0.20	1.51	0.23	0.00	0.03	0.01	9,600	6.26	48.27	7.24	0.08	1.04	0.45
	Dump Truck	280	0.20	1.29	4.94	0.01	0.13	0.09	8,420	6.10	38.66	148.58	0.32	3.82	2.62
	Totals		0.40	2.79	5.17	0.01	0.16	0.10	Totals	12.36	86.93	155.83	0.40	4.86	3.07
Golf Course Fill	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	10,800	7.04	54.31	8.15	0.09	1.17	0.51
	Dump Truck	800	0.58	3.67	14.12	0.03	0.36	0.25	26,500	19.20	121.67	467.63	1.01	12.04	8.24
	Totals		0.74	4.88	14.30	0.03	0.39	0.26	Totals	26.25	175.97	475.78	1.10	13.21	8.75
66-inch RCP	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	2,400	1.56	12.07	1.81	0.02	0.26	0.11
	Delivery Truck	100	0.07	0.46	1.76	0.00	0.05	0.03	250	0.18	1.15	4.41	0.01	0.11	0.08
	Totals		0.23	1.67	1.95	0.01	0.07	0.04	Totals	1.75	13.22	6.22	0.03	0.37	0.19
Flap Gate – 24", 66"	Employee Vehicle	120	0.08	0.60	0.09	0.00	0.01	0.01	600	0.39	3.02	0.45	0.01	0.07	0.03
	Delivery Truck	50	0.04	0.23	0.88	0.00	0.02	0.02	50	0.04	0.23	0.88	0.00	0.02	0.02
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	150	0.22	1.06	1.04	0.00	0.04	0.02
Totals		0.16	1.05	1.18	0.00	0.04	0.02	Totals	0.64	4.31	2.38	0.01	0.12	0.06	
Slide Gate – 24", 48", 66", & 72"	Employee Vehicle	120	0.08	0.60	0.09	0.00	0.01	0.01	1,200	0.78	6.03	0.91	0.01	0.13	0.06
	Delivery Truck	50	0.04	0.23	0.88	0.00	0.02	0.02	100	0.07	0.46	1.76	0.00	0.05	0.03
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	300	0.43	2.13	2.09	0.00	0.07	0.04
Totals		0.16	1.05	1.18	0.00	0.04	0.02	Totals	1.29	8.62	4.76	0.02	0.25	0.13	

SCR-3 Project
Construction - On-road Equipment Emissions Calculations
Option 1A

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Concrete Headwall	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	900	0.59	4.53	0.68	0.01	0.10	0.04
	Delivery Truck	50	0.04	0.23	0.88	0.00	0.02	0.02	50	0.04	0.23	0.88	0.00	0.02	0.02
	Concrete Truck	0	0.00	0.00	0.00	0.00	0.00	0.00	20	0.01	0.09	0.35	0.00	0.01	0.01
Totals			0.15	1.13	1.02	0.00	0.04	0.02	Totals	0.64	4.85	1.91	0.01	0.13	0.06

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
CMB Access Road (12' wide x 6" thick)	Employee Vehicle	450	0.29	2.26	0.34	0.00	0.05	0.02	4,500	2.93	22.63	3.40	0.04	0.49	0.21
	Dump Truck	200	0.14	0.92	3.53	0.01	0.09	0.06	1,300	0.94	5.97	22.94	0.05	0.59	0.40
Totals			0.44	3.18	3.87	0.01	0.14	0.08	Totals	3.88	28.60	26.34	0.09	1.08	0.62

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
6' Chain Link Fence	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	900	0.59	4.53	0.68	0.01	0.10	0.04
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	150	0.22	1.06	1.04	0.00	0.04	0.02
	Delivery Truck	50	0.04	0.23	0.88	0.00	0.02	0.02	50	0.04	0.23	0.88	0.00	0.02	0.02
Totals			0.20	1.35	1.23	0.00	0.05	0.03	Totals	0.84	5.82	2.61	0.01	0.16	0.08

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Chain Link Gate	Employee Vehicle	180	0.12	0.91	0.14	0.00	0.02	0.01	360	0.23	1.81	0.27	0.00	0.04	0.02
	Crew Truck	30	0.04	0.21	0.21	0.00	0.01	0.00	60	0.09	0.43	0.42	0.00	0.01	0.01
Totals			0.16	1.12	0.34	0.00	0.03	0.01	Totals	0.32	2.24	0.69	0.00	0.05	0.02

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Hydroseeding (slopes)	Employee Vehicle	120	0.08	0.60	0.09	0.00	0.01	0.01	120	0.08	0.60	0.09	0.00	0.01	0.01
	Hydromulching Truck	40	0.04	0.26	0.43	0.00	0.02	0.02	40	0.04	0.26	0.43	0.00	0.02	0.02
Totals			0.12	0.86	0.52	0.00	0.04	0.02	Totals	0.12	0.86	0.52	0.00	0.04	0.02

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Vegetation Thinning	Employee Vehicle	240	0.16	1.21	0.18	0.00	0.03	0.01	1,200	0.78	6.03	0.91	0.01	0.13	0.06
	Dump Truck	80	0.06	0.37	1.41	0.00	0.04	0.02	200	0.14	0.92	3.53	0.01	0.09	0.06
Totals			0.21	1.57	1.59	0.01	0.06	0.04	Totals	0.93	6.95	4.43	0.02	0.22	0.12

		VMT	Daily Emissions lbs						VMT	Task Total Emissions lbs					
		Daily	VOC	CO	NOx	SOx	PM10	PM2.5	Total	VOC	CO	NOx	SOx	PM10	PM2.5
Daily Needs	Pickup Truck	120	0.09	0.87	0.12	0.00	0.01	0.01	16,200	12.70	117.18	15.77	0.20	1.69	0.72
	Water Truck	30	0.02	0.14	0.53	0.00	0.01	0.01	6,090	4.41	27.96	107.47	0.23	2.77	1.89
	Fuel Truck	20	0.02	0.13	0.21	0.00	0.01	0.01	2,400	2.27	15.66	25.61	0.06	1.50	1.02
Totals			0.13	1.14	0.86	0.00	0.04	0.02	Totals	19.38	160.80	148.85	0.49	5.95	3.63

Maximum Overlap					
Daily Emissions lbs					
ROG	CO	NOx	SOx	PM	PM2.5
1.84	12.56	31.40	0.07	0.89	0.59

Total Emissions lbs					
ROG	CO	NOx	SOx	PM	PM2.5
106.45	760.27	1,373.00	3.53	42.58	27.11

SCR-3 Project

**Construction - Off-road Equipment Emissions Calculations
Option 1A**

Assumptions:

1. CARB OFFROAD model emission factors in the South Central Coast Air Basin are used to estimate ROG, NOx, and PM emissions for off-road equipment, except for the small gasoline engine equipment. CARB OFFROAD model calculated BSCF and load factor data is used to determine SOx emissions based on 15 ppm sulfur diesel fuel.
2. 2016 SCAQMD CEQA website emission factors are used for CO for all offroad equipment.

Offroad Emission Factors - 2016 (pounds/hour)

Equipment Name	HP	Model	Load Factor	Off-road Emission Factor - lbs/hour *				
				ROG	CO	NOx	SOx	PM
Chainsaw	4	Stihl	NA	0.3580	1.2259	0.0148	0.0000	0.0019
Wood Chipper	85	BC1200XL	0.4154	0.0459	0.3662	0.4983	0.0004	0.0386
Backhoe	87	416F2	0.3685	0.0324	0.2508	0.3717	0.0004	0.0280
Excavator	153	320E	0.3819	0.0401	0.5812	0.5509	0.0006	0.0259
Loader	189	963D	0.3618	0.0504	0.6741	0.7914	0.0007	0.0263
Compactor	232	815F	0.3752	0.0558	0.3214	0.9423	0.0010	0.0288
Dozer	238	D7E	0.4288	0.0869	0.4238	1.4067	0.0011	0.0525
55 ton Crane	240	RT765E-2	0.2881	0.0843	0.2528	1.1970	0.0008	0.0511
Generator	100		0.4154	0.0540	0.3972	0.5862	0.0005	0.0454
Forklift	74	TH255C	0.4020	0.0169	0.2609	0.2569	0.0003	0.0140
Bobcat	49	S450	0.3685	0.0426	0.2890	0.2104	0.0002	0.0181
Welder/Generator	50		0.4154	0.0492	0.2393	0.2530	0.0003	0.0225
Skip Loader	87	416F2	0.3685	0.0324	0.2508	0.3717	0.0004	0.0280
Caterpillar (Dozer)	238	D7E	0.4288	0.0869	0.4238	1.4067	0.0011	0.0525
Compactor Roller	102	CB44B	0.3752	0.0462	0.3375	0.5110	0.0004	0.0361
Bobcat with Drill	61	S570	0.3685	0.0227	0.3598	0.2606	0.0003	0.0196
Paver	142	AP500E	0.4154	0.0485	0.5834	0.6573	0.0006	0.0315
Grader	145	120M2	0.4087	0.0910	0.6057	1.1200	0.0007	0.0605
Scraper	407	621K	0.4824	0.1758	0.8227	2.6851	0.0022	0.1004
55 ton Crane w/ESF14 Vibro Hammer	240	RT765E-2	0.2881	0.0843	0.2528	1.1970	0.0008	0.0511
Vibro Hammer/Powerpack	350	PS350	0.4154	0.1085	0.4488	1.8049	0.0016	0.0624
Soil Concrete Mixer - Excavator	153	320E	0.3819	0.0401	0.5812	0.5509	0.0006	0.0259
Concrete Vibrator	5	BP-35	NA	0.4475	1.5324	0.0185	0.0000	0.0024

*Emissions factors include load factor, and gasoline equipment (chainsaw) emission factors are estimated based on the rate in g/hp-hr provided in the Gasoline Equipment Emission Factor Rates table for EPA/ARB compliant four-cycle engines.

Reach 1-3 Construction Activities

Clearing and Grubbing	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Chainsaw	4	4	0.3580	1.2259	0.0148	0.0000	0.0019	6	8.59	29.42	0.36	0.00	0.05	10	85.93	294.22	3.56	0.01	0.46
Wood Chipper	85	1	0.0459	0.3662	0.4983	0.0004	0.0386	4	0.18	1.46	1.99	0.00	0.15	10	1.84	14.65	19.93	0.02	1.54
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	10	1.30	10.03	14.87	0.01	1.12
									8.91	31.89	3.84	0.00	0.31		89.06	318.90	38.36	0.04	3.13

Demolition & Removals	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	6	0.19	1.50	2.23	0.00	0.17	10	1.94	15.05	22.30	0.02	1.68
									0.19	1.50	2.23	0.00	0.17		1.94	15.05	22.30	0.02	1.68

Foundation Excavation	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Grader	145	1	0.0910	0.6057	1.1200	0.0007	0.0605	6	0.55	3.63	6.72	0.00	0.36	20	10.92	72.68	134.40	0.08	7.27
Scraper	407	2	0.1758	0.8227	2.6851	0.0022	0.1004	8	2.81	13.16	42.96	0.03	1.61	20	56.25	263.26	859.23	0.69	32.14
Compactor	232	1	0.0558	0.3214	0.9423	0.0010	0.0288	6	0.33	1.93	5.65	0.01	0.17	20	6.69	38.57	113.08	0.12	3.45
									3.69	18.73	55.34	0.04	2.14		73.87	374.51	1,106.71	0.89	42.86

Levee Embankment Fill	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	8	0.32	4.65	4.41	0.01	0.21	60	19.24	278.98	264.41	0.31	12.42
Grader	145	1	0.0910	0.6057	1.1200	0.0007	0.0605	8	0.73	4.85	8.96	0.01	0.48	60	43.69	290.72	537.60	0.32	29.06
Compactor	232	1	0.0558	0.3214	0.9423	0.0010	0.0288	8	0.45	2.57	7.54	0.01	0.23	60	26.77	154.27	452.31	0.46	13.82
									1.49	12.07	20.91	0.02	0.92		89.70	723.97	1,254.33	1.09	55.30

Landfill Tie-In	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Loader	189	1	0.0504	0.6741	0.7914	0.0007	0.0263	4	0.20	2.70	3.17	0.00	0.11	5	1.01	13.48	15.83	0.01	0.53
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	8	0.32	4.65	4.41	0.01	0.21	5	1.60	23.25	22.03	0.03	1.03
Compactor	232	1	0.0558	0.3214	0.9423	0.0010	0.0288	4	0.22	1.29	3.77	0.00	0.12	5	1.12	6.43	18.85	0.02	0.58
									0.75	8.63	11.34	0.01	0.43		3.73	43.16	56.71	0.06	2.14

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Rock Riprap	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Loader	189	1	0.0504	0.6741	0.7914	0.0007	0.0263	8	0.40	5.39	6.33	0.01	0.21	40	16.14	215.72	253.26	0.24	8.42
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	8	0.32	4.65	4.41	0.01	0.21	40	12.82	185.99	176.27	0.21	8.28
									0.72	10.04	10.74	0.01	0.42		28.97	401.70	429.53	0.45	16.69

Concrete Retaining Wall	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Generator	100	1	0.0540	0.3972	0.5862	0.0005	0.0454	8	0.43	3.18	4.69	0.00	0.36	15	6.48	47.67	70.35	0.05	5.45
Forklift	74	1	0.0169	0.2609	0.2569	0.0003	0.0140	4	0.07	1.04	1.03	0.00	0.06	15	1.01	15.65	15.42	0.02	0.84
Concrete Vibrator	5	1	0.4475	1.5324	0.0185	0.0000	0.0024	4	1.79	6.13	0.07	0.00	0.01	15	26.85	91.94	1.11	0.00	0.14
Compactor Roller	102	1	0.0462	0.3375	0.5110	0.0004	0.0361	4	0.18	1.35	2.04	0.00	0.14	15	2.77	20.25	30.66	0.03	2.16
									2.47	11.70	7.84	0.01	0.57		37.12	175.52	117.54	0.10	8.59

Structural Excavation & Backfill	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	4	0.16	2.32	2.20	0.00	0.10	10	1.60	23.25	22.03	0.03	1.03
Compactor	232	1	0.0558	0.3214	0.9423	0.0010	0.0288	4	0.22	1.29	3.77	0.00	0.12	10	2.23	12.86	37.69	0.04	1.15
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	6	0.19	1.50	2.23	0.00	0.17	10	1.94	15.05	22.30	0.02	1.68
									0.58	5.12	8.20	0.01	0.39		5.78	51.15	82.03	0.09	3.87

Flap Gate – 24", 66"	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	6	0.24	3.49	3.31	0.00	0.16	5	1.20	17.44	16.53	0.02	0.78
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	5	0.65	5.02	7.43	0.01	0.56
									0.37	4.49	4.79	0.01	0.27		1.85	22.45	23.96	0.03	1.34

Slide Gate – 24", 48", 66", & 72"	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	4	0.16	2.32	2.20	0.00	0.10	10	1.60	23.25	22.03	0.03	1.03
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	10	1.30	10.03	14.87	0.01	1.12
									0.29	3.33	3.69	0.00	0.22		2.90	33.28	36.90	0.04	2.15

CMB Access Road (12' wide x 6" thick)	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Grader	145	1	0.0910	0.6057	1.1200	0.0007	0.0605	6	0.55	3.63	6.72	0.00	0.36	20	10.92	72.68	134.40	0.08	7.27
Compactor Roller	102	1	0.0462	0.3375	0.5110	0.0004	0.0361	6	0.28	2.03	3.07	0.00	0.22	20	5.55	40.50	61.33	0.05	4.33
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	20	2.59	20.07	29.74	0.03	2.24
									0.95	6.66	11.27	0.01	0.69		19.06	133.25	225.46	0.16	13.83

6' Chain Link Fence	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Bobcat with Drill	61	1	0.0227	0.3598	0.2606	0.0003	0.0196	4	0.09	1.44	1.04	0.00	0.08	2	0.18	2.88	2.08	0.00	0.16
									0.09	1.44	1.04	0.00	0.08		0.18	2.88	2.08	0.00	0.16

Chain Link Gate	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Welder/Generator	50	1	0.0492	0.2393	0.2530	0.0003	0.0225	4	0.20	0.96	1.01	0.00	0.09	1	0.20	0.96	1.01	0.00	0.09
Bobcat	49	1	0.0426	0.2890	0.2104	0.0002	0.0181	4	0.17	1.16	0.84	0.00	0.07	1	0.17	1.16	0.84	0.00	0.07
									0.37	2.11	1.85	0.00	0.16		0.37	2.11	1.85	0.00	0.16

Vegetation Thinning	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Chainsaw	4	4	0.3580	1.2259	0.0148	0.0000	0.0019	6	8.59	29.42	0.36	0.00	0.05	5	42.96	147.11	1.78	0.00	0.23
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	5	0.65	5.02	7.43	0.01	0.56
									8.72	30.43	1.84	0.00	0.16		43.61	152.13	9.21	0.01	0.79

Maximum Overlap (Tasks 7 and 10)

Daily Emissions lbs				
ROG	CO	NOx	SOx	PM
3.97	23.77	28.74	0.02	1.49

Total Emissions lbs				
ROG	CO	NOx	SOx	PM
398.13	2,450.07	3,406.98	2.97	152.69

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Reach 4 Construction Activities

Clearing and Grubbing	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Chainsaw	4	4	0.3580	1.2259	0.0148	0.0000	0.0019	6	8.59	29.42	0.36	0.00	0.05	10	85.93	294.22	3.56	0.01	0.46
Wood Chipper	85	1	0.0459	0.3662	0.4983	0.0004	0.0386	4	0.18	1.46	1.99	0.00	0.15	10	1.84	14.65	19.93	0.02	1.54
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	10	1.30	10.03	14.87	0.01	1.12
									8.91	31.89	3.84	0.00	0.31		89.06	318.90	38.36	0.04	3.13

Demolition and Removals	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	10	1.30	10.03	14.87	0.01	1.12
									0.13	1.00	1.49	0.00	0.11		1.30	10.03	14.87	0.01	1.12

Diversion & Control of Water	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	6	0.24	3.49	3.31	0.00	0.16	5	1.20	17.44	16.53	0.02	0.78
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	5	0.65	5.02	7.43	0.01	0.56
Loader	189	1	0.0504	0.6741	0.7914	0.0007	0.0263	4	0.20	2.70	3.17	0.00	0.11	5	1.01	13.48	15.83	0.01	0.53
									0.57	7.19	7.96	0.01	0.37		2.86	35.94	39.79	0.04	1.86

Flood Wall Foundation Excavation	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	8	0.32	4.65	4.41	0.01	0.21	10	3.21	46.50	44.07	0.05	2.07
Loader	189	1	0.0504	0.6741	0.7914	0.0007	0.0263	6	0.30	4.04	4.75	0.00	0.16	10	3.03	40.45	47.49	0.04	1.58
									0.62	8.69	9.16	0.01	0.36		6.23	86.94	91.55	0.10	3.65

RC Flood Wall – Riverside	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Loader	189	1	0.0504	0.6741	0.7914	0.0007	0.0263	4	0.20	2.70	3.17	0.00	0.11	70	14.12	188.75	221.60	0.21	7.36
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	70	9.07	70.23	104.08	0.10	7.84
Concrete Vibrator	5	1	0.4475	1.5324	0.0185	0.0000	0.0024	4	1.79	6.13	0.07	0.00	0.01	70	125.31	429.07	5.19	0.01	0.68
Generator	100	1	0.0540	0.3972	0.5862	0.0005	0.0454	4	0.22	1.59	2.34	0.00	0.18	70	15.13	111.23	164.14	0.13	12.71
									2.34	11.42	7.07	0.01	0.41		163.63	799.28	495.01	0.45	28.58

RC Flood Wall – Landside	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Loader	189	1	0.0504	0.6741	0.7914	0.0007	0.0263	4	0.20	2.70	3.17	0.00	0.11	50	10.09	134.82	158.29	0.15	5.26
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	50	6.48	50.16	74.34	0.07	5.60
Concrete Vibrator	5	1	0.4475	1.5324	0.0185	0.0000	0.0024	4	1.79	6.13	0.07	0.00	0.01	50	89.51	306.48	3.70	0.01	0.48
Generator	100	1	0.0540	0.3972	0.5862	0.0005	0.0454	4	0.22	1.59	2.34	0.00	0.18	50	10.80	79.45	117.25	0.09	9.08
									2.34	11.42	7.07	0.01	0.41		116.88	570.92	353.58	0.32	20.42

Sheet Pile Wall and Scour Protection	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
55 ton Crane	240	1	0.0843	0.2528	1.1970	0.0008	0.0511	4	0.34	1.01	4.79	0.00	0.20	55	18.54	55.62	263.35	0.17	11.23
55 ton Crane w/ESF14 Vibro Hammer	240	1	0.0843	0.2528	1.1970	0.0008	0.0511	8	0.67	2.02	9.58	0.01	0.41	55	37.09	111.24	526.70	0.34	22.46
Vibro Hammer/Powerpack	350	1	0.1085	0.4488	1.8049	0.0016	0.0624	8	0.87	3.59	14.44	0.01	0.50	55	47.75	197.46	794.14	0.71	27.46
									1.88	6.62	28.80	0.02	1.11		103.38	364.32	1,584.19	1.21	61.15

UPRR Embankment Fill	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	10	1.30	10.03	14.87	0.01	1.12
Dozer	238	1	0.0869	0.4238	1.4067	0.0011	0.0525	6	0.52	2.54	8.44	0.01	0.31	10	5.21	25.43	84.40	0.07	3.15
Compactor Roller	102	1	0.0462	0.3375	0.5110	0.0004	0.0361	6	0.28	2.03	3.07	0.00	0.22	10	2.77	20.25	30.66	0.03	2.16
									0.93	5.57	12.99	0.01	0.64		9.28	55.71	129.93	0.11	6.43

El Rio Drain Channel Modification	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	4	0.16	2.32	2.20	0.00	0.10	15	2.40	34.87	33.05	0.04	1.55
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	15	1.94	15.05	22.30	0.02	1.68
									0.29	3.33	3.69	0.00	0.22		4.35	49.92	55.35	0.06	3.23

Riprap Removal & Replacement	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	8	0.32	4.65	4.41	0.01	0.21	10	3.21	46.50	44.07	0.05	2.07
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	6	0.19	1.50	2.23	0.00	0.17	10	1.94	15.05	22.30	0.02	1.68
									0.51	6.15	6.64	0.01	0.37		5.15	61.55	66.37	0.07	3.75

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	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs					
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM	
6' Chain Link Fence																				
Bobcat with Drill	61	1	0.0227	0.3598	0.2606	0.0003	0.0196	4	0.09	1.44	1.04	0.00	0.08	1	0.09	1.44	1.04	0.00	0.08	0.08
									0.09	1.44	1.04	0.00	0.08		0.09	1.44	1.04	0.00	0.08	
Chain Link Gate																				
Welder/Generator	50	1	0.0492	0.2393	0.2530	0.0003	0.0225	4	0.20	0.96	1.01	0.00	0.09	2	0.39	1.91	2.02	0.00	0.18	
Bobcat	49	1	0.0426	0.2890	0.2104	0.0002	0.0181	4	0.17	1.16	0.84	0.00	0.07	2	0.34	2.31	1.68	0.00	0.14	
									0.37	2.11	1.85	0.00	0.16		0.73	4.23	3.71	0.00	0.33	
RC Drain Channel & Flap Gate																				
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	6	0.24	3.49	3.31	0.00	0.16	2	0.48	6.97	6.61	0.01	0.31	
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	6	0.19	1.50	2.23	0.00	0.17	2	0.39	3.01	4.46	0.00	0.34	
									0.43	4.99	5.54	0.01	0.32		0.87	9.98	11.07	0.01	0.65	
HP Gas Valve Relocations																				
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	5	0.65	5.02	7.43	0.01	0.56	
									0.13	1.00	1.49	0.00	0.11		0.65	5.02	7.43	0.01	0.56	
Landscaping																				
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	5	0.65	5.02	7.43	0.01	0.56	
									0.13	1.00	1.49	0.00	0.11		0.65	5.02	7.43	0.01	0.56	
Concrete Trail																				
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	4	0.16	2.32	2.20	0.00	0.10	10	1.60	23.25	22.03	0.03	1.03	
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	10	1.30	10.03	14.87	0.01	1.12	
									0.29	3.33	3.69	0.00	0.22		2.90	33.28	36.90	0.04	2.15	
CMB Access Road																				
Grader	145	1	0.0910	0.6057	1.1200	0.0007	0.0605	6	0.55	3.63	6.72	0.00	0.36	5	2.73	18.17	33.60	0.02	1.82	
Compactor Roller	102	1	0.0462	0.3375	0.5110	0.0004	0.0361	4	0.18	1.35	2.04	0.00	0.14	5	0.92	6.75	10.22	0.01	0.72	
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	5	0.65	5.02	7.43	0.01	0.56	
									0.86	5.99	10.25	0.01	0.62		4.30	29.94	51.26	0.04	3.10	
Soil Cement Access Road																				
Grader	145	1	0.0910	0.6057	1.1200	0.0007	0.0605	6	0.55	3.63	6.72	0.00	0.36	10	5.46	36.34	67.20	0.04	3.63	
Soil Concrete Mixer - Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	6	0.24	3.49	3.31	0.00	0.16	10	2.40	34.87	33.05	0.04	1.55	
Compactor Roller	102	1	0.0462	0.3375	0.5110	0.0004	0.0361	4	0.18	1.35	2.04	0.00	0.14	10	1.85	13.50	20.44	0.02	1.44	
									0.97	8.47	12.07	0.01	0.66		9.71	84.71	120.69	0.10	6.63	
Utility Relocations																				
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	5	0.65	5.02	7.43	0.01	0.56	
									0.13	1.00	1.49	0.00	0.11		0.65	5.02	7.43	0.01	0.56	
Concrete Abutments																				
Loader	189	1	0.0504	0.6741	0.7914	0.0007	0.0263	4	0.20	2.70	3.17	0.00	0.11	10	2.02	26.96	31.66	0.03	1.05	
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	10	1.30	10.03	14.87	0.01	1.12	
									0.33	3.70	4.65	0.00	0.22		3.31	37.00	46.53	0.04	2.17	
Flood Break Gate Installation																				
55 ton Crane	240	1	0.0843	0.2528	1.1970	0.0008	0.0511	4	0.34	1.01	4.79	0.00	0.20	5	1.69	5.06	23.94	0.02	1.02	
									0.34	1.01	4.79	0.00	0.20		1.69	5.06	23.94	0.02	1.02	
Street Modifications																				
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	10	1.30	10.03	14.87	0.01	1.12	
Grader	145	1	0.0910	0.6057	1.1200	0.0007	0.0605	4	0.36	2.42	4.48	0.00	0.24	10	3.64	24.23	44.80	0.03	2.42	
Paver	142	1	0.0485	0.5834	0.6573	0.0006	0.0315	6	0.29	3.50	3.94	0.00	0.19	10	2.91	35.00	39.44	0.04	1.89	
									0.49	3.43	5.97	0.00	0.35		4.94	34.26	59.67	0.04	3.54	

Maximum Overlap

Daily Emissions lbs				
ROG	CO	NOx	SOx	PM
2.93	24.74	38.22	0.03	2.07

Total Emissions lbs

ROG	CO	NOx	SOx	PM
534.07	2,625.96	3,265.83	2.74	155.61

SCR-3 Project

Construction - Off-road Equipment Emissions Calculations

Option 1B

Assumptions:

1. CARB OFFROAD model emission factors in the South Central Coast Air Basin are used to estimate ROG, NOx, and PM emissions for off-road equipment, except for the small gasoline engine equipment. CARB OFFROAD model calculated BSCF and load factor data is used to determine SOx emissions based on 15 ppm sulfur diesel fuel.
2. 2016 SCAQMD CEQA website emission factors are used for CO for all offroad equipment.

Offroad Emission Factors - 2016 (pounds/hour)

Equipment Name	HP	Model	Load Factor	Off-road Emission Factor - lbs/hour *				
				ROG	CO	NOx	SOx	PM
Chainsaw	4	Stihl	NA	0.3580	1.2259	0.0148	0.0000	0.0019
Wood Chipper	85	BC1200XL	0.4154	0.0459	0.3662	0.4983	0.0004	0.0386
Backhoe	87	416F2	0.3685	0.0324	0.2508	0.3717	0.0004	0.0280
Excavator	153	320E	0.3819	0.0401	0.5812	0.5509	0.0006	0.0259
Loader	189	963D	0.3618	0.0504	0.6741	0.7914	0.0007	0.0263
Loader/Excavator	189	963D	0.3618	0.0504	0.6741	0.7914	0.0007	0.0263
Compactor	232	815F	0.3752	0.0558	0.3214	0.9423	0.0010	0.0288
Dozer	238	D7E	0.4288	0.0869	0.4238	1.4067	0.0011	0.0525
55 ton Crane	240	RT765E-2	0.2881	0.0843	0.2528	1.1970	0.0008	0.0511
Generator	100		0.4154	0.0540	0.3972	0.5862	0.0005	0.0454
Concrete Pump	30	Reed A30H	0.4154	0.0295	0.1076	0.1518	0.0002	0.0135
Forklift	74	TH255C	0.4020	0.0169	0.2609	0.2569	0.0003	0.0140
Bobcat	49	S450	0.3685	0.0426	0.2890	0.2104	0.0002	0.0181
Welder/Generator	50		0.4154	0.0492	0.2393	0.2530	0.0003	0.0225
Skip Loader	87	416F2	0.3685	0.0324	0.2508	0.3717	0.0004	0.0280
Caterpillar (Dozer)	238	D7E	0.4288	0.0869	0.4238	1.4067	0.0011	0.0525
Compactor Roller	102	CB44B	0.3752	0.0462	0.3375	0.5110	0.0004	0.0361
Bobcat with Drill	61	S570	0.3685	0.0227	0.3598	0.2606	0.0003	0.0196
Paver	142	AP500E	0.4154	0.0485	0.5834	0.6573	0.0006	0.0315
Grader	145	120M2	0.4087	0.0910	0.6057	1.1200	0.0007	0.0605
Scraper	407	621K	0.4824	0.1758	0.8227	2.6851	0.0022	0.1004
Giken Press-in Machine	310	ECO700S	0.2881	0.0843	0.2528	1.1970	0.0008	0.0511
Soil Concrete Mixer - Excavator	153	320E	0.3819	0.0401	0.5812	0.5509	0.0006	0.0259
Concrete Vibrator	5	BP-35	NA	0.4475	1.5324	0.0185	0.0000	0.0024

*Emissions factors include load factor, and gasoline equipment (chainsaw) emission factors are estimated based on the rate in g/hp-hr provided in the Gasoline Equipment Emission Factor Rates table for EPA/ARB compliant four-cycle engines.

Reach 1-3 Construction Activities

Activity	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Clearing and Grubbing																			
Chainsaw	4	4	0.3580	1.2259	0.0148	0.0000	0.0019	6	8.59	29.42	0.36	0.00	0.05	10	85.93	294.22	3.56	0.01	0.46
Wood Chipper	85	1	0.0459	0.3662	0.4983	0.0004	0.0386	4	0.18	1.46	1.99	0.00	0.15	10	1.84	14.65	19.93	0.02	1.54
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	10	1.30	10.03	14.87	0.01	1.12
									8.91	31.89	3.84	0.00	0.31		89.06	318.90	38.36	0.04	3.13
Demolition & Removals																			
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	6	0.19	1.50	2.23	0.00	0.17	10	1.94	15.05	22.30	0.02	1.68
									0.19	1.50	2.23	0.00	0.17		1.94	15.05	22.30	0.02	1.68
Diversion and Control of Water																			
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	6	0.24	3.49	3.31	0.00	0.16	5	1.20	17.44	16.53	0.02	0.78
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	6	0.19	1.50	2.23	0.00	0.17	5	0.97	7.52	11.15	0.01	0.84
Loader	189	1	0.0504	0.6741	0.7914	0.0007	0.0263	6	0.30	4.04	4.75	0.00	0.16	5	1.51	20.22	23.74	0.02	0.79
									0.74	9.04	10.28	0.01	0.48		3.69	45.18	51.42	0.05	2.40
Foundation Excavation																			
Grader	145	1	0.0910	0.6057	1.1200	0.0007	0.0605	6	0.55	3.63	6.72	0.00	0.36	10	5.46	36.34	67.20	0.04	3.63
Scraper	407	2	0.1758	0.8227	2.6851	0.0022	0.1004	8	2.81	13.16	42.96	0.03	1.61	10	28.13	131.63	429.62	0.35	16.07
Compactor	232	1	0.0558	0.3214	0.9423	0.0010	0.0288	6	0.33	1.93	5.65	0.01	0.17	10	3.35	19.28	56.54	0.06	1.73
									3.69	18.73	55.34	0.04	2.14		36.93	187.26	553.36	0.44	21.43

SCR-3 Project
Construction - Off-road Equipment Emissions Calculations
Option 1B

Activity	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Levee Embankment Fill																			
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	8	0.32	4.65	4.41	0.01	0.21	40	12.82	185.99	176.27	0.21	8.28
Grader	145	1	0.0910	0.6057	1.1200	0.0007	0.0605	8	0.73	4.85	8.96	0.01	0.48	40	29.13	193.81	358.40	0.21	19.38
Compactor	232	1	0.0558	0.3214	0.9423	0.0010	0.0288	8	0.45	2.57	7.54	0.01	0.23	40	17.85	102.85	301.54	0.31	9.21
									1.49	12.07	20.91	0.02	0.92		59.80	482.65	836.22	0.73	36.86
Landfill Tie-In																			
Loader	189	1	0.0504	0.6741	0.7914	0.0007	0.0263	4	0.20	2.70	3.17	0.00	0.11	10	2.02	26.96	31.66	0.03	1.05
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	8	0.32	4.65	4.41	0.01	0.21	10	3.21	46.50	44.07	0.05	2.07
Compactor	232	1	0.0558	0.3214	0.9423	0.0010	0.0288	4	0.22	1.29	3.77	0.00	0.12	10	2.23	12.86	37.69	0.04	1.15
									0.75	8.63	11.34	0.01	0.43		7.45	86.32	113.42	0.12	4.27
Rock Riprap																			
Loader	189	1	0.0504	0.6741	0.7914	0.0007	0.0263	8	0.40	5.39	6.33	0.01	0.21	32	12.91	172.57	202.61	0.19	6.73
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	8	0.32	4.65	4.41	0.01	0.21	32	10.26	148.79	141.02	0.16	6.62
									0.72	10.04	10.74	0.01	0.42		23.17	321.36	343.63	0.36	13.35
Golf Course Fill																			
Loader	189	1	0.0504	0.6741	0.7914	0.0007	0.0263	8	0.40	5.39	6.33	0.01	0.21	45	18.16	242.68	284.91	0.27	9.47
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	4	0.16	2.32	2.20	0.00	0.10	45	7.21	104.62	99.15	0.12	4.66
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	45	5.83	45.15	66.91	0.06	5.04
Compactor	232	1	0.0558	0.3214	0.9423	0.0010	0.0288	6	0.33	1.93	5.65	0.01	0.17	45	15.06	86.78	254.43	0.26	7.77
									1.03	10.65	15.68	0.02	0.60		46.26	479.23	705.40	0.71	26.93
66-inch RCP																			
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	4	0.16	2.32	2.20	0.00	0.10	10	1.60	23.25	22.03	0.03	1.03
Compactor	232	1	0.0558	0.3214	0.9423	0.0010	0.0288	4	0.22	1.29	3.77	0.00	0.12	10	2.23	12.86	37.69	0.04	1.15
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	6	0.19	1.50	2.23	0.00	0.17	10	1.94	15.05	22.30	0.02	1.68
									0.58	5.12	8.20	0.01	0.39		5.78	51.15	82.03	0.09	3.87
Flap Gate – 24", 66"																			
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	6	0.24	3.49	3.31	0.00	0.16	5	1.20	17.44	16.53	0.02	0.78
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	5	0.65	5.02	7.43	0.01	0.56
									0.37	4.49	4.79	0.01	0.27		1.85	22.45	23.96	0.03	1.34
Slide Gate – 24", 48", 66", & 72"																			
Excavator	153	1	0.0401	0.5812	0.5509	0.0006	0.0259	4	0.16	2.32	2.20	0.00	0.10	10	1.60	23.25	22.03	0.03	1.03
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	10	1.30	10.03	14.87	0.01	1.12
									0.29	3.33	3.69	0.00	0.22		2.90	33.28	36.90	0.04	2.15
Concrete Headwall																			
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	6	0.19	1.50	2.23	0.00	0.17	5	0.97	7.52	11.15	0.01	0.84
Compactor Roller	102	1	0.0462	0.3375	0.5110	0.0004	0.0361	4	0.18	1.35	2.04	0.00	0.14	5	0.92	6.75	10.22	0.01	0.72
Concrete Vibrator	5	1	0.4475	1.5324	0.0185	0.0000	0.0024	4	1.79	6.13	0.07	0.00	0.01	5	8.95	30.65	0.37	0.00	0.05
									2.17	8.98	4.35	0.00	0.32		10.85	44.92	21.74	0.02	1.61
CMB Access Road (12' wide x 6" thick)																			
Grader	145	1	0.0910	0.6057	1.1200	0.0007	0.0605	6	0.55	3.63	6.72	0.00	0.36	10	5.46	36.34	67.20	0.04	3.63
Compactor Roller	102	1	0.0462	0.3375	0.5110	0.0004	0.0361	6	0.28	2.03	3.07	0.00	0.22	10	2.77	20.25	30.66	0.03	2.16
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	10	1.30	10.03	14.87	0.01	1.12
									0.95	6.66	11.27	0.01	0.69		9.53	66.62	112.73	0.08	6.92
6' Chain Link Fence																			
Bobcat with Drill	61	1	0.0227	0.3598	0.2606	0.0003	0.0196	4	0.09	1.44	1.04	0.00	0.08	2	0.18	2.88	2.08	0.00	0.16
									0.09	1.44	1.04	0.00	0.08		0.18	2.88	2.08	0.00	0.16
Chain Link Gate																			
Welder/Generator	50	1	0.0492	0.2393	0.2530	0.0003	0.0225	4	0.20	0.96	1.01	0.00	0.09	1	0.20	0.96	1.01	0.00	0.09
Bobcat	49	1	0.0426	0.2890	0.2104	0.0002	0.0181	4	0.17	1.16	0.84	0.00	0.07	1	0.17	1.16	0.84	0.00	0.07
									0.37	2.11	1.85	0.00	0.16		0.37	2.11	1.85	0.00	0.16
Vegetation Thinning																			
Chainsaw	4	4	0.3580	1.2259	0.0148	0.0000	0.0019	6	8.59	29.42	0.36	0.00	0.05	5	42.96	147.11	1.78	0.00	0.23
Backhoe	87	1	0.0324	0.2508	0.3717	0.0004	0.0280	4	0.13	1.00	1.49	0.00	0.11	5	0.65	5.02	7.43	0.01	0.56
									8.72	30.43	1.84	0.00	0.16		43.61	152.13	9.21	0.01	0.79

Maximum Overlap (Tasks 7, 10, 11)

Reach 4 Construction Activities
Same as under Option 1A

Daily Emissions lbs				
ROG	CO	NOx	SOx	PM
3.10	27.83	44.78	0.04	1.91

Total Emissions lbs				
ROG	CO	NOx	SOx	PM
343.38	2,311.50	2,954.61	2.73	127.06

SCR-3 Project

**Construction - Off-road Equipment Emissions Calculations -
Controlled Option 1A**

Assumptions: OFFROAD model emission factors in the South Central Coast Air Basin are used to estimate ROG, NOx, and PM emissions for off-road equipment, except for the small gasoline engine equipment. CARB OFFROAD model calculated BSCF and load factor data is used to determine SOx emissions based on 15 ppm sulfur diesel fuel.
2. 2016 SCAQMD CEQA website emission factors are used for CO for all offroad equipment.

Offroad Emission Factors - 2016

Equipment Name	H	Mod	Loa Fracto	Off-road Emission Factor - lbs/				
				RO	hour * CO	NOx	SOx	P
Generator	14	416F	0.368	0.012	0.250	0.209	0.000	0.013
Excavator	15	320	0.381	0.021	0.581	0.319	0.000	0.020
Load	18	63	0.361	0.038	0.674	0.394	0.000	0.019
Compact	23	15	0.375	0.023	0.321	0.460	0.001	0.018
Doze	23	D7	0.428	0.037	0.423	0.559	0.001	0.024
55 ton	24	RT765E-	0.288	0.023	0.252	0.375	0.000	0.015
Generator	40	2	0.415	0.013	0.397	0.262	0.000	0.015
Forkli	7	TH255	0.402	0.007	0.260	0.184	0.000	0.011
Bobc	4	S45	0.368	0.042	0.289	0.210	0.000	0.018
Welder/	6	0	0.415	0.049	0.239	0.253	0.000	0.022
Generator	8	416F	0.368	0.012	0.250	0.209	0.000	0.013
Generator	23	D7	0.428	0.037	0.423	0.559	0.001	0.024
Generator	30	CB44	0.375	0.010	0.337	0.240	0.000	0.013
Bobcat with	6	S57	0.368	0.008	0.359	0.147	0.000	0.009
Pave	14	AP500	0.415	0.017	0.583	0.316	0.000	0.017
Grad	24	#20M	0.408	0.027	0.605	0.331	0.000	0.020
Scrap	40	21	0.482	0.077	0.822	0.087	0.002	0.048
55 ton Crane w/ESF14 Vibro	24	RT765E-	0.288	0.023	0.252	0.375	0.000	0.015
Hammer/	65	PS35	0.408	0.049	0.448	0.798	0.001	0.031
Soil Concrete Mixer -	05	20	0.381	0.021	0.581	0.319	0.000	0.020
Generator	35	BP-3	0.447	0.018	2.532	0.018	0.000	0.002
Vibrator	5	A	5	4	5	0	4	

*Emissions factors include load factor, and gasoline equipment (chainsaw) emission factors are estimated based on the rate in g/hp-hr provided in the Gasoline Equipment Emission Factor Rates table for EPA/ARB compliant four-cycle engines.

Reach 1-3 Construction Activities

Activity	H	Numb	Emission Factor lbs/					Hours/	Daily Emissions					Day	Total Emissions				
			RO	CO	SO	P	Hours/		RO	C	lbs NOx	SO	P		Day	RO	lbs CO	NOx	SO
Clearing and Grubbing	14	er 4	0.358	1.025	0.014	0.000	0.001	day6	0.5	29.4	0.3	0.0	0.0	s1	85.9	294.2	3.5	0.0	0.4
	8	1	0.011	0.366	0.223	0.000	0.013	4	0.0	1.4	0.8	0.0	0.0	0	0.4	14.6	8.9	0.0	0.5
	8	1	0.012	0.250	0.209	0.000	0.013	4	0.0	6.0	0.8	0.0	0.0	0	0.4	40.0	8.3	0.0	0.5
	7	4	8	6	4	5	9	9	9	9	0	5	0	8	0	7	4	3	
Demolition & Removal	8	er 1	0.012	0.250	0.209	0.000	0.013	day6	0.0	1.5	1.2	0.0	0.0	s1	0.7	15.0	12.5	0.0	0.8
	7	4	8	6	4	5	7	0	6	0	8	0	0	4	5	8	2	1	
Foundation Excavation	14	er 1	0.027	0.605	0.331	0.000	0.020	day6	0.1	3.6	1.9	0.0	0.1	s2	3.2	72.6	39.7	0.0	2.4
	40	2	0.077	0.822	1.087	0.002	0.048	8	0.2	18.1	17.4	0.0	0.7	2	24.7	263.2	348.0	0.7	15.4
	23	1	0.023	0.321	0.460	0.001	0.018	6	0.1	6.9	2.7	0.0	0.1	0	2.7	68.5	55.2	0.1	2.2
	2	2	4	8	0	9	4	3	5	4	1	5	1	9	9	6			
Levee Embankment Fill	15	er 1	0.021	0.581	0.319	0.000	0.020	day8	0.1	4.6	2.5	0.0	0.1	s6	10.4	278.9	153.5	0.3	9.6
	44	1	0.027	0.605	0.331	0.000	0.020	8	0.2	4.8	2.6	0.0	0.1	6	12.9	890.7	259.0	0.3	9.8
	23	1	0.023	0.321	0.460	0.001	0.018	8	0.1	8.5	3.6	0.0	0.1	6	11.1	154.2	221.1	0.4	9.0
	2	2	4	8	0	9	0.5	12.0	6.9	0.0	0.4	0	34.5	723.9	533.7	6.0	28.5		
								8	7	0	2	8	0	1	7	7	8	5	

SCR-3 Project
Construction - Off-road Equipment Emissions Calculations - Controlled
Option 1A

Activity	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs					
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM	
Landfill Tie-In																				
Loader	189	1	0.0389	0.6741	0.3947	0.0008	0.0199	4	0.16	2.70	1.58	0.00	0.08	5	0.78	13.48	7.89	0.02	0.40	
Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	8	0.17	4.65	2.56	0.01	0.16	5	0.87	23.25	12.79	0.03	0.80	
Compactor	232	1	0.0232	0.3214	0.4608	0.0010	0.0189	4	0.09	1.29	1.84	0.00	0.08	5	0.46	6.43	9.22	0.02	0.38	
									0.42	8.63	5.98	0.01	0.32		2.11	43.16	29.90	0.06	1.58	
Rock Riprap																				
Loader	189	1	0.0389	0.6741	0.3947	0.0008	0.0199	8	0.31	5.39	3.16	0.01	0.16	40	12.45	215.72	126.30	0.24	6.36	
Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	8	0.17	4.65	2.56	0.01	0.16	40	6.94	185.99	102.34	0.21	6.41	
									0.48	10.04	5.72	0.01	0.32		19.39	401.70	228.65	0.45	12.77	
Concrete Retaining Wall																				
Generator	100	1	0.0134	0.3972	0.2628	0.0005	0.0155	8	0.11	3.18	2.10	0.00	0.12	15	1.61	47.67	31.54	0.05	1.86	
Forklift	74	1	0.0070	0.2609	0.1846	0.0003	0.0114	4	0.03	1.04	0.74	0.00	0.05	15	0.42	15.65	11.08	0.02	0.69	
Concrete Vibrator	5	1	0.4475	1.5324	0.0185	0.0000	0.0024	4	1.79	6.13	0.07	0.00	0.01	15	26.85	91.94	1.11	0.00	0.14	
Compactor Roller	102	1	0.0101	0.3375	0.2404	0.0004	0.0138	4	0.04	1.35	0.96	0.00	0.06	15	0.60	20.25	14.42	0.03	0.83	
									1.97	11.70	3.88	0.01	0.23		29.49	175.52	58.15	0.10	3.52	
Structural Excavation & Backfill																				
Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	4	0.09	2.32	1.28	0.00	0.08	10	0.87	23.25	12.79	0.03	0.80	
Compactor	232	1	0.0232	0.3214	0.4608	0.0010	0.0189	4	0.09	1.29	1.84	0.00	0.08	10	0.93	12.86	18.43	0.04	0.76	
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	6	0.07	1.50	1.26	0.00	0.08	10	0.74	15.05	12.58	0.02	0.81	
									0.25	5.12	4.38	0.01	0.24		2.54	51.15	43.80	0.09	2.37	
Flap Gate – 24", 66"																				
Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	6	0.13	3.49	1.92	0.00	0.12	5	0.65	17.44	9.59	0.02	0.60	
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	5	0.25	5.02	4.19	0.01	0.27	
									0.18	4.49	2.76	0.01	0.17		0.90	22.45	13.79	0.03	0.87	
Slide Gate – 24", 48", 66", & 72"																				
Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	4	0.09	2.32	1.28	0.00	0.08	10	0.87	23.25	12.79	0.03	0.80	
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	10	0.49	10.03	8.38	0.01	0.54	
									0.14	3.33	2.12	0.00	0.13		1.36	33.28	21.18	0.04	1.34	
CMB Access Road (12' wide x 6" thick)																				
Grader	145	1	0.0270	0.6057	0.3314	0.0007	0.0205	6	0.16	3.63	1.99	0.00	0.12	20	3.24	72.68	39.77	0.08	2.46	
Compactor Roller	102	1	0.0101	0.3375	0.2404	0.0004	0.0138	6	0.06	2.03	1.44	0.00	0.08	20	1.21	40.50	28.85	0.05	1.65	
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	20	0.99	20.07	16.77	0.03	1.08	
									0.27	6.66	4.27	0.01	0.26		5.44	133.25	85.39	0.16	5.19	
6' Chain Link Fence																				
Bobcat with Drill	61	1	0.0087	0.3598	0.1470	0.0002	0.0095	4	0.03	1.44	0.59	0.00	0.04	2	0.07	2.88	1.18	0.00	0.08	
									0.03	1.44	0.59	0.00	0.04		0.07	2.88	1.18	0.00	0.08	
Chain Link Gate																				
Welder/Generator	50	1	0.0492	0.2393	0.2530	0.0003	0.0225	4	0.20	0.96	1.01	0.00	0.09	1	0.20	0.96	1.01	0.00	0.09	
Bobcat	49	1	0.0426	0.2890	0.2104	0.0002	0.0181	4	0.17	1.16	0.84	0.00	0.07	1	0.17	1.16	0.84	0.00	0.07	
									0.37	2.11	1.85	0.00	0.16		0.37	2.11	1.85	0.00	0.16	
Vegetation Thinning																				
Chainsaw	4	4	0.3580	1.2259	0.0148	0.0000	0.0019	6	8.59	29.42	0.36	0.00	0.05	5	42.96	147.11	1.78	0.00	0.23	
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	5	0.25	5.02	4.19	0.01	0.27	
									8.64	30.43	1.19	0.00	0.10		43.21	152.13	5.97	0.01	0.50	

Maximum Overlap (Tasks 7 and 10)

Daily Emissions lbs				
ROG	CO	NOx	SOx	PM
2.54	23.77	12.77	0.02	0.71

Total Emissions lbs

ROG	CO	NOx	SOx	PM
257.75	2,450.07	1,500.16	2.96	79.42

SCR-3 Project
Construction - Off-road Equipment Emissions Calculations -
Controlled Option 1A

Reach 4 Construction Activities

Activity	H	Numb	Emission Factor lbs/				Hours/	Daily Emissions					Day	Total Emissions					
			RO	CO	SO	P		RO	C	lbs NOx	SO	P		RO	lbs CO	NOx	SO	P	
Clearing and Grubbing	Backhoe	4	0.358	1.025	0.014	0.000	0.001	6	0.5	29.4	0.3	0.0	0.0	s1	0.5	29.4	0.3	0.0	0.0
	Wood	1	0.011	0.366	0.223	0.000	0.013	4	0.0	2.4	0.8	0.0	0.0	0	0.4	24.6	0.9	0.0	0.5
	Backhoe	1	0.012	0.250	0.209	0.000	0.013	4	0.0	6.0	0.8	0.0	0.0	0	0.4	6.0	0.8	0.0	0.5
	Generator	7	4	8	6	4	5	9	9	9	0	5	0	8	0	7	4	3	
Demolition and Removal	Backhoe	1	0.012	0.366	0.209	0.000	0.013	4	0.0	0.0	0.8	0.0	0.0	s1	0.4	10.0	8.3	0.0	0.5
	Backhoe	7	4	8	6	4	5	0.0	0.0	0.8	0.0	0.0	0	0.4	10.0	8.3	0.0	0.5	
	Backhoe	1	0.012	0.250	0.209	0.000	0.013	4	0.0	0.0	0.8	0.0	0.0	0	0.4	10.0	8.3	0.0	0.5
	Generator	7	4	8	6	4	5	5	0	4	0	5	0	9	3	8	1	4	
Diversion & Control of Water	Excavator	1	0.021	0.861	0.319	0.000	0.020	6	0.1	3.4	1.9	0.0	0.1	s5	0.6	17.4	9.5	0.0	0.6
	Backhoe	1	0.012	0.250	0.209	0.000	0.013	4	0.0	0.0	0.8	0.0	0.0	5	0.2	4.0	4.1	0.0	0.2
	Loader	1	0.038	0.674	0.394	0.000	0.019	4	0.1	0.7	4.5	0.0	0.0	5	0.7	13.4	7.8	0.0	0.4
	Generator	9	9	1	7	8	9	0.3	0.1	0.3	0.0	0.2	0	0.6	0.5	2.6	0.0	0.2	
Flood Wall Foundation	Excavator	1	0.021	0.861	0.319	0.000	0.020	6	0.1	4.6	2.5	0.0	0.1	s1	0.7	46.5	25.5	0.0	0.6
	Loader	1	0.038	0.674	0.394	0.000	0.019	6	0.2	4.0	2.3	0.0	0.1	0	2.3	40.4	23.6	0.0	0.1
	Loader	9	9	1	7	8	9	0.4	0.6	7.9	0.0	0.2	0	4.0	66.9	49.2	0.1	0.7	
	Generator	9	9	1	7	8	9	1	9	3	1	8	0	7	4	7	0	9	
RC Flood Wall - Riverside	Backhoe	1	0.012	0.250	0.209	0.000	0.013	4	0.0	0.0	0.8	0.0	0.0	0	0.4	50.2	28.6	0.1	0.7
	Concrete	1	0.447	8.532	0.018	0.000	0.002	4	5.7	6.1	0.0	0.0	0	105.3	429.0	5.1	0.0	0.6	
	Generator	10	4	2	8	5	5	0.0	3.5	7.0	0.0	0.0	0	13.7	711.2	78.5	0.1	0.3	
	Generator	10	4	2	8	5	5	0.0	11.4	5.5	0.0	0.2	0	143.4	799.2	247.9	0.4	14.3	
RC Flood Wall - Land	Backhoe	1	0.012	0.250	0.209	0.000	0.013	4	0.0	0.0	0.8	0.0	0.0	0	0.4	50.1	41.9	0.0	2.7
	Concrete	1	0.447	8.532	0.018	0.000	0.002	4	5.7	6.1	0.0	0.0	0	89.5	306.4	2.7	0.0	0.4	
	Generator	10	4	2	8	5	5	0.0	3.5	7.0	0.0	0.0	0	2.6	79.4	52.5	0.0	0.1	
	Generator	10	4	2	8	5	5	0.0	11.4	5.5	0.0	0.2	0	102.4	570.9	177.1	0.3	10.2	
Sheet Pile Wall and Scour Protection	Crane w/ESF14 Vibro	1	0.023	0.862	0.375	0.000	0.015	4	0.0	0.0	1.5	0.0	0.0	s5	0.1	55.6	82.5	0.1	3.6
	Micro Hammer/Powerpack	1	0.049	0.448	0.798	0.001	0.031	8	0.4	2.5	0.3	0.0	0.2	5	0.7	49.4	65.1	0.7	13.7
	Micro Hammer/Powerpack	1	0.049	0.448	0.798	0.001	0.031	8	0.4	2.5	0.3	0.0	0.2	5	0.7	49.4	65.1	0.7	13.7
	Generator	10	4	2	8	5	5	0.0	11.4	5.5	0.0	0.2	0	102.4	570.9	177.1	0.3	10.2	
UPRR Embankment Fill	Backhoe	1	0.012	0.366	0.209	0.000	0.013	4	0.0	0.0	0.8	0.0	0.0	s1	0.4	10.0	8.3	0.0	0.5
	Dozer	1	0.037	0.423	0.559	0.001	0.024	6	0.2	2.5	3.3	0.0	0.1	0	0.2	25.4	38.5	0.0	1.4
	Compactor Roller	1	0.010	0.337	0.240	0.000	0.013	6	0.0	2.0	3.4	0.0	0.0	0	0.6	20.2	34.4	0.0	0.8
	Generator	2	1	5	4	4	8	0.3	5.5	5.6	0.0	0.2	0	0.3	55.7	56.3	0.1	2.8	
EI Rio Drain Channel Modification	Excavator	1	0.021	0.861	0.319	0.000	0.020	6	0.1	2.8	1.2	0.0	0.0	s1	0.3	34.8	19.1	0.0	0.2
	Backhoe	1	0.012	0.250	0.209	0.000	0.013	4	0.0	2.0	0.8	0.0	0.0	5	0.7	75.0	42.5	0.0	0.8
	Backhoe	7	4	8	6	4	5	0.1	0.3	2.1	0.0	0.1	5	2.0	49.9	21.7	0.0	2.0	
	Generator	7	4	8	6	4	5	4	3	2	0	3	0	4	2	7	6	1	
Riprap Removal & Replacement	Excavator	1	0.021	0.861	0.319	0.000	0.020	6	0.1	4.6	2.5	0.0	0.1	s1	0.7	46.5	25.5	0.0	0.6
	Backhoe	1	0.012	0.250	0.209	0.000	0.013	6	0.0	5.5	6.2	0.0	0.0	0	0.7	65.0	42.5	0.0	0.8
	Backhoe	7	4	8	6	4	5	0.2	6.1	6.8	0.0	0.2	0	2.4	61.5	38.1	0.0	2.4	
	Generator	7	4	8	6	4	5	5	5	2	1	4	0	8	5	6	7	1	

SCR-3 Project
Construction - Off-road Equipment Emissions Calculations - Controlled
Option 1A

	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs					
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM	
6' Chain Link Fence																				
Bobcat with Drill	61	1	0.0087	0.3598	0.1470	0.0002	0.0095	4	0.03	1.44	0.59	0.00	0.04	1	0.03	1.44	0.59	0.00	0.04	
									0.03	1.44	0.59	0.00	0.04		0.03	1.44	0.59	0.00	0.04	
Chain Link Gate																				
Welder/Generator	50	1	0.0492	0.2393	0.2530	0.0003	0.0225	4	0.20	0.96	1.01	0.00	0.09	2	0.39	1.91	2.02	0.00	0.18	
Bobcat	49	1	0.0426	0.2890	0.2104	0.0002	0.0181	4	0.17	1.16	0.84	0.00	0.07	2	0.34	2.31	1.68	0.00	0.14	
									0.37	2.11	1.85	0.00	0.16		0.73	4.23	3.71	0.00	0.33	
RC Drain Channel & Flap Gate																				
Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	6	0.13	3.49	1.92	0.00	0.12	2	0.26	6.97	3.84	0.01	0.24	
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	6	0.07	1.50	1.26	0.00	0.08	2	0.15	3.01	2.52	0.00	0.16	
									0.20	4.99	3.18	0.01	0.20		0.41	9.98	6.35	0.01	0.40	
HP Gas Valve Relocations																				
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	5	0.25	5.02	4.19	0.01	0.27	
									0.05	1.00	0.84	0.00	0.05		0.25	5.02	4.19	0.01	0.27	
Landscaping																				
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	5	0.25	5.02	4.19	0.01	0.27	
									0.05	1.00	0.84	0.00	0.05		0.25	5.02	4.19	0.01	0.27	
Concrete Trail																				
Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	4	0.09	2.32	1.28	0.00	0.08	10	0.87	23.25	12.79	0.03	0.80	
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	10	0.49	10.03	8.38	0.01	0.54	
									0.14	3.33	2.12	0.00	0.13		1.36	33.28	21.18	0.04	1.34	
CMB Access Road																				
Grader	145	1	0.0270	0.6057	0.3314	0.0007	0.0205	6	0.16	3.63	1.99	0.00	0.12	5	0.81	18.17	9.94	0.02	0.61	
Compactor Roller	102	1	0.0101	0.3375	0.2404	0.0004	0.0138	4	0.04	1.35	0.96	0.00	0.06	5	0.20	6.75	4.81	0.01	0.28	
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	5	0.25	5.02	4.19	0.01	0.27	
									0.25	5.99	3.79	0.01	0.23		1.26	29.94	18.94	0.04	1.16	
Soil Cement Access Road																				
Grader	145	1	0.0270	0.6057	0.3314	0.0007	0.0205	6	0.16	3.63	1.99	0.00	0.12	10	1.62	36.34	19.89	0.04	1.23	
Soil Concrete Mixer - Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	6	0.13	3.49	1.92	0.00	0.12	10	1.30	34.87	19.19	0.04	1.20	
Compactor Roller	102	1	0.0101	0.3375	0.2404	0.0004	0.0138	4	0.04	1.35	0.96	0.00	0.06	10	0.40	13.50	9.62	0.02	0.55	
									0.33	8.47	4.87	0.01	0.30		3.33	84.71	48.69	0.09	2.98	
Utility Relocations																				
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	5	0.25	5.02	4.19	0.01	0.27	
									0.05	1.00	0.84	0.00	0.05		0.25	5.02	4.19	0.01	0.27	
Concrete Abutments																				
Loader	189	1	0.0389	0.6741	0.3947	0.0008	0.0199	4	0.16	2.70	1.58	0.00	0.08	10	1.56	26.96	15.79	0.03	0.79	
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	10	0.49	10.03	8.38	0.01	0.54	
									0.21	3.70	2.42	0.00	0.13		2.05	37.00	24.17	0.04	1.33	
Flood Break Gate Installation																				
55 ton Crane	240	1	0.0233	0.2528	0.3752	0.0008	0.0159	4	0.09	1.01	1.50	0.00	0.06	5	0.47	5.06	7.50	0.02	0.32	
									0.09	1.01	1.50	0.00	0.06		0.47	5.06	7.50	0.02	0.32	
Street Modifications																				
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	10	0.49	10.03	8.38	0.01	0.54	
Grader	145	1	0.0270	0.6057	0.3314	0.0007	0.0205	4	0.11	2.42	1.33	0.00	0.08	10	1.08	24.23	13.26	0.03	0.82	
Paver	142	1	0.0171	0.5834	0.3165	0.0007	0.0173	6	0.10	3.50	1.90	0.00	0.10	10	1.03	35.00	18.99	0.04	1.04	
									0.16	3.43	2.16	0.00	0.14		1.58	34.26	21.64	0.04	1.36	

Maximum Overlap				
Daily Emissions lbs				
ROG	CO	NOx	SOx	PM
1.18	24.74	17.78	0.03	1.03

Total Emissions lbs				
ROG	CO	NOx	SOx	PM
396.55	2,625.96	1,425.43	2.74	72.84

SCR-3 Project

**Construction - Off-road Equipment Emissions Calculations - Controlled
Option 1B**

Assumptions:

1. CARB OFFROAD model emission factors in the South Central Coast Air Basin are used to estimate ROG, NOx, and PM emissions for off-road equipment, except for the small gasoline engine equipment. CARB OFFROAD model calculated BSCF and load factor data is used to determine SOx emissions based on 15 ppm sulfur diesel fuel.
2. 2016 SCAQMD CEQA website emission factors are used for CO for all offroad equipment.
3. Controlled emissions assume Tier 3 equipment years from OFFROAD before any integration of Interim or Full Tier 4 for all diesel equipment over 50 hp.

Offroad Emission Factors - 2016 (pounds/hour)

Equipment Name	HP	Model	Load Factor	Off-road Emission Factor - lbs/hour *				
				ROG	CO	NOx	SOx	PM
Chainsaw	4		NA	0.3580	1.2259	0.0148	0.0000	0.0019
Wood Chipper	85	BC1200XL	0.4154	0.0114	0.3662	0.2234	0.0004	0.0132
Backhoe	87	416F2	0.3685	0.0124	0.2508	0.2096	0.0004	0.0135
Excavator	153	320E	0.3819	0.0217	0.5812	0.3198	0.0006	0.0200
Loader	189	963D	0.3618	0.0389	0.6741	0.3947	0.0008	0.0199
Compactor	232	815F	0.3752	0.0232	0.3214	0.4608	0.0010	0.0189
Dozer	238	D7E	0.4288	0.0379	0.4238	0.5591	0.0011	0.0247
55 ton Crane	240	RT765E-2	0.2881	0.0233	0.2528	0.3752	0.0008	0.0159
Generator	100		0.4154	0.0134	0.3972	0.2628	0.0005	0.0155
Forklift	74	TH255C	0.4020	0.0070	0.2609	0.1846	0.0003	0.0114
Bobcat	49	S450	0.3685	0.0426	0.2890	0.2104	0.0002	0.0181
Welder/Generator	50		0.4154	0.0492	0.2393	0.2530	0.0003	0.0225
Skip Loader	87	416F2	0.3685	0.0124	0.2508	0.2096	0.0004	0.0135
Caterpillar (Dozer)	238	D7E	0.4288	0.0379	0.4238	0.5591	0.0011	0.0247
Compactor Roller	102	CB44B	0.3752	0.0101	0.3375	0.2404	0.0004	0.0138
Bobcat with Drill	61	S570	0.3685	0.0087	0.3598	0.1470	0.0002	0.0095
Paver	142	AP500E	0.4154	0.0171	0.5834	0.3165	0.0007	0.0173
Grader	145	120M2	0.4087	0.0270	0.6057	0.3314	0.0007	0.0205
Scraper	407	621K	0.4824	0.0773	0.8227	1.0876	0.0022	0.0482
Giken Press-in Machine	310	ECO700S	0.2881	0.0233	0.2528	0.3752	0.0008	0.0159
Soil Concrete Mixer - Excavator	153	320E	0.3819	0.0217	0.5812	0.3198	0.0006	0.0200
Concrete Vibrator	5	BP-35	NA	0.4475	1.5324	0.0185	0.0000	0.0024

*Emissions factors include load factor, and gasoline equipment (chainsaw) emission factors are estimated based on the rate in g/hp-hr provided in the Gasoline Equipment Emission Factor Rates table for EPA/ARB compliant four-cycle engines.

Reach 1-3 Construction Activities

Activity	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs				
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
Clearing and Grubbing																			
Chainsaw	4	4	0.3580	1.2259	0.0148	0.0000	0.0019	6	8.59	29.42	0.36	0.00	0.05	10	85.93	294.22	3.56	0.01	0.46
Wood Chipper	85	1	0.0114	0.3662	0.2234	0.0004	0.0132	4	0.05	1.46	0.89	0.00	0.05	10	0.46	14.65	8.94	0.02	0.53
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	10	0.49	10.03	8.38	0.01	0.54
									8.69	31.89	2.09	0.00	0.15		86.88	318.90	20.87	0.04	1.53
Demolition & Removals																			
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	6	0.07	1.50	1.26	0.00	0.08	10	0.74	15.05	12.58	0.02	0.81
									0.07	1.50	1.26	0.00	0.08		0.74	15.05	12.58	0.02	0.81
Diversion and Control of Water																			
Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	6	0.13	3.49	1.92	0.00	0.12	5	0.65	17.44	9.59	0.02	0.60
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	6	0.07	1.50	1.26	0.00	0.08	5	0.37	7.52	6.29	0.01	0.40
Loader	189	1	0.0389	0.6741	0.3947	0.0008	0.0199	6	0.23	4.04	2.37	0.00	0.12	5	1.17	20.22	11.84	0.02	0.60
									0.44	9.04	5.54	0.01	0.32		2.19	45.18	27.72	0.05	1.60
Foundation Excavation																			
Grader	145	1	0.0270	0.6057	0.3314	0.0007	0.0205	6	0.16	3.63	1.99	0.00	0.12	10	1.62	36.34	19.89	0.04	1.23
Scraper	407	2	0.0773	0.8227	1.0876	0.0022	0.0482	8	1.24	13.16	17.40	0.03	0.77	10	12.36	131.63	174.01	0.35	7.71
Compactor	232	1	0.0232	0.3214	0.4608	0.0010	0.0189	6	0.14	1.93	2.76	0.01	0.11	10	1.39	19.28	27.65	0.06	1.14
									1.54	18.73	22.15	0.04	1.01		15.38	187.26	221.54	0.44	10.08

SCR-3 Project
Construction - Off-road Equipment Emissions Calculations - Controlled
Option 1B

Activity	HP	Number	Emission Factor lbs/hour					Hours/day	Daily Emissions lbs					Days	Total Emissions lbs					
			ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM	
Levee Embankment Fill																				
Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	8	0.17	4.65	2.56	0.01	0.16	40	6.94	185.99	102.34	0.21	6.41	
Grader	145	1	0.0270	0.6057	0.3314	0.0007	0.0205	8	0.22	4.85	2.65	0.01	0.16	40	8.65	193.81	106.06	0.21	6.56	
Compactor	232	1	0.0232	0.3214	0.4608	0.0010	0.0189	8	0.19	2.57	3.69	0.01	0.15	40	7.42	102.85	147.45	0.31	6.06	
									0.58	12.07	8.90	0.02	0.48		23.00	482.65	355.85	0.72	19.03	
Landfill Tie-In																				
Loader	189	1	0.0389	0.6741	0.3947	0.0008	0.0199	4	0.16	2.70	1.58	0.00	0.08	10	1.56	26.96	15.79	0.03	0.79	
Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	8	0.17	4.65	2.56	0.01	0.16	10	1.73	46.50	25.59	0.05	1.60	
Compactor	232	1	0.0232	0.3214	0.4608	0.0010	0.0189	4	0.09	1.29	1.84	0.00	0.08	10	0.93	12.86	18.43	0.04	0.76	
									0.42	8.63	5.98	0.01	0.32		4.22	86.32	59.81	0.12	3.16	
Rock Riprap																				
Loader	189	1	0.0389	0.6741	0.3947	0.0008	0.0199	8	0.31	5.39	3.16	0.01	0.16	32	9.96	172.57	101.04	0.19	5.09	
Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	8	0.17	4.65	2.56	0.01	0.16	32	5.55	148.79	81.88	0.16	5.13	
									0.48	10.04	5.72	0.01	0.32		15.51	321.36	182.92	0.36	10.21	
Golf Course Fill																				
Loader	189	1	0.0389	0.6741	0.3947	0.0008	0.0199	8	0.31	5.39	3.16	0.01	0.16	45	14.00	242.68	142.09	0.27	7.15	
Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	4	0.09	2.32	1.28	0.00	0.08	45	3.90	104.62	57.57	0.12	3.61	
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	45	2.23	45.15	37.73	0.06	2.43	
Compactor	232	1	0.0232	0.3214	0.4608	0.0010	0.0189	6	0.14	1.93	2.76	0.01	0.11	45	6.26	86.78	124.41	0.26	5.12	
									0.59	10.65	8.04	0.02	0.41		26.39	479.23	361.80	0.71	18.30	
66-inch RCP																				
Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	4	0.09	2.32	1.28	0.00	0.08	10	0.87	23.25	12.79	0.03	0.80	
Compactor	232	1	0.0232	0.3214	0.4608	0.0010	0.0189	4	0.09	1.29	1.84	0.00	0.08	10	0.93	12.86	18.43	0.04	0.76	
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	6	0.07	1.50	1.26	0.00	0.08	10	0.74	15.05	12.58	0.02	0.81	
									0.25	5.12	4.38	0.01	0.24		2.54	51.15	43.80	0.09	2.37	
Flap Gate – 24", 66"																				
Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	6	0.13	3.49	1.92	0.00	0.12	5	0.65	17.44	9.59	0.02	0.60	
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	5	0.25	5.02	4.19	0.01	0.27	
									0.18	4.49	2.76	0.01	0.17		0.90	22.45	13.79	0.03	0.87	
Slide Gate – 24", 48", 66", & 72"																				
Excavator	153	1	0.0217	0.5812	0.3198	0.0006	0.0200	4	0.09	2.32	1.28	0.00	0.08	10	0.87	23.25	12.79	0.03	0.80	
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	10	0.49	10.03	8.38	0.01	0.54	
									0.14	3.33	2.12	0.00	0.13		1.36	33.28	21.18	0.04	1.34	
Concrete Headwall																				
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	6	0.07	1.50	1.26	0.00	0.08	5	0.37	7.52	6.29	0.01	0.40	
Compactor Roller	102	1	0.0101	0.3375	0.2404	0.0004	0.0138	4	0.04	1.35	0.96	0.00	0.06	5	0.20	6.75	4.81	0.01	0.28	
Concrete Vibrator	5	1	0.4475	1.5324	0.0185	0.0000	0.0024	4	1.79	6.13	0.07	0.00	0.01	5	8.95	30.65	0.37	0.00	0.05	
									1.90	8.98	2.29	0.00	0.15		9.52	44.92	11.47	0.02	0.73	
CMB Access Road (12' wide x 6" thick)																				
Grader	145	1	0.0270	0.6057	0.3314	0.0007	0.0205	6	0.16	3.63	1.99	0.00	0.12	10	1.62	36.34	19.89	0.04	1.23	
Compactor Roller	102	1	0.0101	0.3375	0.2404	0.0004	0.0138	6	0.06	2.03	1.44	0.00	0.08	10	0.60	20.25	14.42	0.03	0.83	
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	10	0.49	10.03	8.38	0.01	0.54	
									0.27	6.66	4.27	0.01	0.26		2.72	66.62	42.69	0.08	2.60	
6' Chain Link Fence																				
Bobcat with Drill	61	1	0.0087	0.3598	0.1470	0.0002	0.0095	4	0.03	1.44	0.59	0.00	0.04	2	0.07	2.88	1.18	0.00	0.08	
									0.03	1.44	0.59	0.00	0.04		0.07	2.88	1.18	0.00	0.08	
Chain Link Gate																				
Welder/Generator	50	1	0.0492	0.2393	0.2530	0.0003	0.0225	4	0.20	0.96	1.01	0.00	0.09	1	0.20	0.96	1.01	0.00	0.09	
Bobcat	49	1	0.0426	0.2890	0.2104	0.0002	0.0181	4	0.17	1.16	0.84	0.00	0.07	1	0.17	1.16	0.84	0.00	0.07	
									0.37	2.11	1.85	0.00	0.16		0.37	2.11	1.85	0.00	0.16	
Vegetation Thinning																				
Chainsaw	4	4	0.3580	1.2259	0.0148	0.0000	0.0019	6	8.59	29.42	0.36	0.00	0.05	5	42.96	147.11	1.78	0.00	0.23	
Backhoe	87	1	0.0124	0.2508	0.2096	0.0004	0.0135	4	0.05	1.00	0.84	0.00	0.05	5	0.25	5.02	4.19	0.01	0.27	
									8.64	30.43	1.19	0.00	0.10		43.21	152.13	5.97	0.01	0.50	

Maximum Overlap (Tasks 7, 10, 11)

Daily Emissions lbs						Total Emissions lbs				
ROG	CO	NOx	SOx	PM		ROG	CO	NOx	SOx	PM
1.42	27.83	21.32	0.04	1.12		234.99	2,311.50	1,385.01	2.73	73.37

Reach 4 Construction Activities
Same as under Option 1A

SCR-3 Project

Construction - Fugitive Dust Emissions

Option 1A

Assumptions:

1. Fugitive dust emissions are estimated using AP-42.
2. Equipment usage, amount of material handling, and VMT assumptions are presented under "Schedule & Equipment" and "Onroad Vehicles Emission Calculations" above.

Emission Categories

- 1) Earthmoving
- 2) Road Dust Paved/Unpaved
- 3) Disturbed Area Windblown Emissions

1) Earthmoving

Emission Types

- A) Dozing
- B) Grading
- C) Material Loading/Handling
- D) Scraper Loading and Unloading

A) Dozing (AP-42 Section 11.9 for overburden)

$$E = k \times (s)^{1.5} / (M)^{1.4} \text{ For PM10 and } k \times 5.7 \times (s)^{1.2} / (M)^{1.3} \text{ for PM2.5}$$

$$E = \text{lb/hr}$$

k = Scaling Constant (0.75 for PM10 and 0.105 for PM2.5)

s = Silt Content (assumed to be 7.5% - SCAQMD Handbook for overburden)

M = Moisture Content = 2% uncontrolled and 12% controlled

Dozers are only used in Reach 4

Emission Factor, lb/hr

PM10	PM2.5
5.83729	2.72771
0.47512	0.26558

Maximum Daily Dozer Use - No dozer use in maximum PDozer Emissions (Lbs/day)

Total Dozer Use

	Hrs/year
Reach 4	60

Dozer Emissions (Tons/year)

	PM10	PM2.5	
Reach 4	0.18	0.08	Uncontrolled
Reach 4	0.01	0.01	Controlled

B) Grading (AP-42 Section 11.9)

$$E = k \times 0.051 \times (S)^{2.0} \text{ for PM10 and } k \times 0.040 \times (S)^{2.5} \text{ for PM2.5}$$

$$E = \text{lb/VMT}$$

k = Scaling Constant (0.60 for PM10 and 0.031 for PM2.5)

S = Mean Vehicle Speed assumed to be 3 mph

Assumes VMT = 3 x hours in use

Emission Factor, lb/VMT

PM10	PM2.5
0.27540	0.01933

Emission Control

68%

Watering is assumed as a control measure.

Maximum Daily Grader Use - During foundation excavation phase

	Hrs/day	VMT/day
Foundation Exc.	6	18

Grading Emissions (Lbs/day)

	PM10	PM2.5	
Uncontrolled Foundation Exc.	4.96	0.35	
Controlled Foundation Exc.	1.59	0.11	

Annual Grader VMT

	Hrs/year	VMT/year
Reach 1-3	720	2160
Reach 4	130	390

Grading Emissions (Tons/year)

	PM10	PM2.5	
Uncontrolled Reach 1-3	0.30	0.02	
Uncontrolled Reach 4	0.05	0.00	
Controlled Reach 1-3	0.10	0.01	
Controlled Reach 4	0.02	0.00	

SCR-3 Project

Construction - Fugitive Dust Emissions

Option 1A

C) Material Loading/Handling (AP-42, p. 13.2.4.3)

$$E = (k)(0.0032)[(U/5)^{1.3}]/[(M/2)^{1.4}]$$

E = lb/ton

k = Particle Size Constant (0.35 for PM10 and 0.053 for PM2.5)

U = average wind speed = 25 MPH worst day, 8 MPH avg daytime (engineering assumption)

M = moisture content = 2% uncontrolled and 12% controlled

Two separate drops are assumed for bulk material movement, except for scrapers

Foundation excavation scraper loading emissions calculated separately

	tons/period	Transfer Points
Foundation Exc.	6,400	1
Reach 1-3	500,000	2
Reach 4	250,000	2

Emission Factors and Emissions

Emission Factors

PM10 Daily	PM2.5 Daily	PM10 Annual	PM2.5 Annual	
0.00908	0.00137	0.00206	0.00031	Uncontrolled
0.00074	0.00011	0.00017	0.00003	Controlled

Emissions (Lbs/day)

	PM10	PM2.5	
Foundation Exc.	58.08	8.80	Uncontrolled
Foundation Exc.	4.73	0.72	

Emissions (Tons)

	PM10	PM2.5	
Reach 1-3	1.03168	0.15623	Uncontrolled
Reach 4	0.51584	0.07811	Uncontrolled
Reach 1-3	0.08397	0.01272	Controlled
Reach 4	0.04199	0.00636	Controlled

C) Scraper Loading and Unloading (AP-42, Table 11.9-4)

E = 0.058 lbs/ton for scraper loading - For TSP

PM10 and PM2.5 fractions of TSP are 0.489 and 0.102 respectively per CEIDARS factors from SCAQMD CEQA Website

Emissions are controlled by 69 percent by keeping moisture content at 12 percent or more

	tons/day	Total Tons
Foundation Exc.	6,400	91,200

Emissions	PM10	PM2.5	
	181.52	37.86	Uncontrolled
	56.27	11.74	Controlled
	Lbs/day	Lbs/day	

	PM10	PM2.5	
	1.29	0.27	Uncontrolled
	0.40	0.08	Controlled
	Total Tons	Total Tons	

SCR-3 Project

Construction - Fugitive Dust Emissions

Option 1A

2) Road Dust

Emission Types

- A) Paved Road Dust
- B) Unpaved Road Dust

A) Paved Road Dust

$$E = [k \times (sL)^{0.91} \times (W)^{1.02}] \times (1-P/4N)$$

E = lb/VMT

k = Constant (0.0022 for PM10 and 0.00054 for PM2.5)

sL = Silt Loading (assumed to be 0.06 g/m² for 5,000<ADT<10,000 of Table 13.2.1-2)

W = Average weight of vehicles in tons (calculated below)

P = Days of precipitation (34 assumed for annual calculation)

N = Days in period (365 for annual calculation)

Average Vehicle Weight Calculation

Assumptions

Passenger Vehicles = 2 tons average

Midsize "Delivery" Vehicles = 8 ton average

Heavy-Heavy Duty Trucks = 30 tons average (loaded 40 tons, unloaded 20 tons)

Daily Case VMT	Passenger Vehicles	Delivery/Work Vehicles	Heavy-Heavy Duty Vehicles	Total Paved VMT	Average Weight (Tons)
Foundation Exc.	339	19	5	363	2.7

Total VMT	Passenger Vehicles	Delivery/Work Vehicles	Heavy-Heavy Duty Vehicles	Total Paved VMT	Average Weight (Tons)
Reach 1-3	92,275	4,340	88,196	184,811	15.5
Reach 4	121,109	25,806	48,853	195,768	9.8

Daily Emission Factors (lb/VMT)

	PM10 Daily	PM2.5 Daily
Foundation Exc.	0.00047	0.00011

Emissions (Lbs/day)

	PM10	PM2.5
Foundation Exc.	0.17	0.04

Annual Emission Factors (lb/VMT)

	PM10 Annual	PM2.5 Annual
Reach 1-3	0.0027	0.0007
Reach 4	0.0017	0.0004

Emissions (Tons)

	PM10	PM2.5
Reach 1-3	0.25	0.06
Reach 4	0.17	0.04

B) Unpaved Road Dust

$$E = (k)[(s/12)^{0.9}][W/3]^{0.45}[(365-P)/365]$$

k = constant = 1.5 lb/VMT for PM10 and 0.15 lb/VMT for PM2.5

s = Silt Content (assumed to be 7.5% - SCAQMD Handbook for overburden)

W = avg. vehicle weight = calculated below

No correction for number of wet days due to assumption of working in dry season

Average Vehicle Weight Calculation

Assumptions

Personal/Professionals/inspection Vehicles = 2 tons average

Midsize "Delivery" Vehicles = 8 ton average

Heavy-Heavy Duty Trucks = 30 tons average (loaded 40 tons, unloaded 20 tons)

Scrapers = 54 tons average (loaded 68 tons, empty 40 tons)

SCR-3 Project
Construction - Fugitive Dust Emissions
Option 1A

Daily Case VMT	Passenger Vehicles	Delivery/Work Vehicles	Heavy-Heavy Duty Vehicles	Scrapers	Total Unpaved VMT	Average Weight (Tons)
Foundation Exc.	21	1	25	114	161	43.3

Annual Case VMT	Passenger Vehicles	Delivery/Work Vehicles	Heavy-Heavy Duty Vehicles	Scrapers	Total Unpaved VMT	Average Weight (Tons)
Reach 1-3	3,305	360	7,604	1,629	12,898	25.2
Reach 4	4,951	1,064	8,776	0	14,791	19.0

Uncontrolled Emission Factors and Emissions

Daily Emission Factors (lb/VMT)

	PM10 Daily	PM2.5 Daily
Foundation Exc.	3.27	0.33

Emissions (Lbs/day)

	PM10	PM2.5
Foundation Exc.	525.03	52.50

Annual Emission Factors (lb/VMT)

	PM10 Annual	PM2.5 Annual
Reach 1-3	2.56	0.26
Reach 4	2.26	0.23

Emissions (Tons/year)

	PM10	PM2.5
Reach 1-3	16.52	1.65
Reach 4	16.69	1.67

Uncontrolled Emissions (assumes 55% control watering)

Controlled emissions assumes additional 57% for 15 mph speed limit (80.7 percent total)

Emissions (Lbs/day)

	PM10	PM2.5
Foundation Exc.	236.26	23.63
Foundation Exc.	101.59	10.16

Emission Control	
55%	Uncontrolled
81%	Controlled

Emissions (Tons/year)

	PM10	PM2.5
Reach 1-3	7.44	0.75
Reach 4	7.51	0.75
Reach 1-3	3.20	0.32
Reach 4	3.23	0.32

SCR-3 Project
Construction - Fugitive Dust Emissions
Option 1A

3) Disturbed Area Windblown Emissions

Assumptions

Emission Factor is 0.38 tons/disturbed acres/year of Total Suspended Particulate (AP-42 Section 11.9)
 PM10 and PM2.5 fractions of TSP are 0.489 and 0.102 respectively per CEIDARS factors from SCAQMD CEQA Website
 There are permanent and temporary disturbed acres that make up the total acre-years of disturbed area
 Disturbed areas are controlled by watering - 61% control
 Restoration of disturbed acres creates no net emission increase of permanently disturbed acres

Disturbed Acres (acre)	Emissions (Lbs/day)		Total Emissions (Tons)			
	PM10	PM2.5	PM10	PM2.5		
7.210	7.50	1.54	0.84	0.17	Reach 1-3	Uncontrolled
7.210	2.92	0.60	0.33	0.07	Reach 1-3	Controlled
1.160	--	--	0.20	0.04	Reach 4	Uncontrolled
1.160	--	--	0.08	0.02	Reach 4	Controlled

* Disturbance area includes piles of earth fill.

Fugitive Dust Emissions Summary

Maximum Day (Reach 1-3 Task 5 - Foundation Excavation)

	Uncontrolled Emissions		Controlled Emissions	
	PM10	PM2.5	PM10	PM2.5
Dozing	---	---	---	---
Grading	4.96	0.35	1.59	0.11
Material Loading/Handling	58.08	8.80	4.73	0.72
Scraper Loading	181.52	37.86	56.27	11.74
Paved Road Dust	0.17	0.04	0.17	0.04
Unpaved Road Dust	236.26	23.63	101.59	10.16
Disturbed Area Windblown Emissions	7.50	1.54	2.92	0.60
Total	488.49	72.21	167.27	23.36

Total Fugitive Emissions	Uncontrolled Emissions		Controlled Emissions	
	Reach 1-3		Reach 1-3	
	PM10	PM2.5	PM10	PM2.5
Dozing	---	---	---	---
Grading	0.30	0.02	0.10	0.01
Material Loading/Handling	1.03	0.16	0.08	0.01
Scraper Loading/Unloading	1.29	0.27	0.40	0.08
Paved Road Dust	0.25	0.06	0.25	0.06
Unpaved Road Dust	7.44	0.75	3.20	0.32
Disturbed Area Windblown Emissions	0.84	0.17	0.33	0.07
Total	11.15	1.43	4.36	0.55

	Uncontrolled Emissions		Controlled Emissions	
	Reach 4		Reach 4	
	PM10	PM2.5	PM10	PM2.5
Dozing	0.18	0.08	0.01	0.01
Grading	0.05	0.00	0.02	0.00
Material Loading/Handling	0.52	0.08	0.04	0.01
Paved Road Dust	0.17	0.04	0.17	0.04
Unpaved Road Dust	7.51	0.75	3.23	0.32
Disturbed Area Windblown Emissions	--	--	0.08	0.02
Total	8.42	0.96	3.55	0.40

SCR-3 Project

Construction - Fugitive Dust Emissions

Option 1B

Assumptions:

1. Fugitive dust emissions are estimated using AP-42.
2. Equipment usage, amount of material handling, and VMT assumptions are presented under "Schedule & Equipment" and "Onroad Vehicles Emission Calculations" above.
3. Reach 4 is identical to that shown for Option 1A

Emission Categories

- 1) Earthmoving
- 2) Road Dust Paved/Unpaved
- 3) Disturbed Area Windblown Emissions

1) Earthmoving

Emission Types

- A) Dozing
- B) Grading
- C) Material Loading/Handling

A) No Dozers used for Option 1B Reach 1-3

B) Grading (AP-42 Section 11.9)

$E = k \times 0.051 \times (S)^{2.0}$ for PM10 and $k \times 0.040 \times (S)^{2.5}$ for PM2.5

$E = \text{lb/VMT}$

k = Scaling Constant (0.60 for PM10 and 0.031 for PM2.5)

S = Mean Vehicle Speed assumed to be 3 mph

Assumes VMT = 3 x hours in use

Emission Factor, lb/VMT

PM10	PM2.5
0.27540	0.01933

Emission Control

68%

Watering is assumed as a control measure.

Maximum Daily Grader Use - During foundation excavation phase

	Hrs/day	VMT/day
Foundation Exc.	6	18

Grading Emissions (Lbs/day)

		PM10	PM2.5
Uncontrolled	Foundation Exc.	4.96	0.35
Controlled	Foundation Exc.	1.59	0.11

Annual Grader VMT

	Hrs/year	VMT/year
Reach 1-3	440	1320

Grading Emissions (Tons/year)

		PM10	PM2.5
Uncontrolled	Reach 1-3	0.18	0.01
Controlled	Reach 1-3	0.06	0.00

SCR-3 Project

Construction - Fugitive Dust Emissions

Option 1B

C) Material Loading/Handling (AP-42, p. 13.2.4.3)

$$E = (k)(0.0032)[(U/5)^{1.3}]/[(M/2)^{1.4}]$$

E = lb/ton

k = Particle Size Constant (0.35 for PM10 and 0.053 for PM2.5)

U = average wind speed = 25 MPH worst day, 8 MPH avg daytime (engineering assumption)

M = moisture content = 2% uncontrolled and 12% controlled

Four separate drops are assumed

	tons/period	Transfer Points
Foundation Exc.	6,400	1
Reach 1-3	300,000	2

Emission Factors and Emissions

Emission Factors

PM10 Daily	PM2.5 Daily	PM10 Annual	PM2.5 Annual	
0.00908	0.00137	0.00206	0.00031	Uncontrolled
0.00074	0.00011	0.00017	0.00003	Controlled

Emissions (Lbs/day)

	PM10	PM2.5	
Foundation Exc.	58.08	8.80	Uncontrolled
Foundation Exc.	4.73	0.72	Controlled

Emissions (Tons)

	PM10	PM2.5	
Reach 1-3	0.61901	0.09374	Uncontrolled
Reach 1-3	0.05038	0.00763	Controlled

C) Scraper Loading and Unloading (AP-42, Table 11.9-4)

E = 0.058 lbs/ton for scraper loading - For TSP

PM10 and PM2.5 fractions of TSP are 0.489 and 0.102 respectively per CEIDARS factors from SCAQMD CEQA Website

Emissions are controlled by 69 percent by keeping moisture content at 12 percent or more

	tons/day	Total Tons
Foundation Exc.	6,400	19,488

Emissions	PM10	PM2.5	
	181.52	37.86	Uncontrolled
	56.27	11.74	Controlled
	Lbs/day	Lbs/day	

	PM10	PM2.5	
	0.28	0.06	Uncontrolled
	0.09	0.02	Controlled
	Total Tons	Total Tons	

SCR-3 Project
Construction - Fugitive Dust Emissions
Option 1B

2) Road Dust

Emission Types

A) Paved Road Dust

B) Unpaved Road Dust

A) Paved Road Dust

$$E = [k \times (sL)^{0.91} \times (W)^{1.02}] \times (1-P/4N)$$

E = lb/VMT

k = Constant (0.0022 for PM10 and 0.00054 for PM2.5)

sL = Silt Loading (assumed to be 0.06 g/m2 for 5,000<ADT<10,000 of Table 13.2.1-2)

W = Average weight of vehicles in tons (calculated below)

P = Days of precipitation (34 assumed for annual calculation)

N = Days in period (365 for annual calculation)

Average Vehicle Weight Calculation

Assumptions

Passenger Vehicles = 2 tons average

Midsize "Delivery" Vehicles = 8 ton average

Heavy-Heavy Duty Trucks = 30 tons average (loaded 40 tons, unloaded 20 tons)

Daily Case VMT	Passenger Vehicles	Delivery/Work Vehicles	Heavy-Heavy Duty Vehicles	Total Paved VMT	Average Weight (Tons)
Foundation Exc.	339	19	5	363	2.7

Total VMT	Passenger Vehicles	Delivery/Work Vehicles	Heavy-Heavy Duty Vehicles	Total Paved VMT	Average Weight (Tons)
Reach 1-3	69,296	3,960	65,829	139,084	15.4

Daily Emission Factors (lb/VMT)

	PM10 Daily	PM2.5 Daily
Foundation Exc.	0.00047	0.00011

Emissions (Lbs/day)

	PM10	PM2.5
Foundation Exc.	0.17	0.04

Annual Emission Factors (lb/VMT)

	PM10 Annual	PM2.5 Annual
Reach 1-3	0.0027	0.0007

Emissions (Tons)

	PM10	PM2.5
Reach 1-3	0.19	0.05

SCR-3 Project

Construction - Fugitive Dust Emissions

Option 1B

B) Unpaved Road Dust

$$E = (k)[(s/12)^{0.9}][[(W/3)^{0.45}][[(365-P)/365]$$

k = constant = 1.5 lb/VMT for PM10 and 0.15 lb/VMT for PM2.5

s = Silt Content (assumed to be 7.5% - SCAQMD Handbook for overburden)

W = avg. vehicle weight = calculated below

No correction for number of wet days due to assumption of working in dry season

Average Vehicle Weight Calculation

Assumptions

Personal/Professionals/inspection Vehicles = 2 tons average

Midsize "Delivery" Vehicles = 8 ton average

Heavy-Heavy Duty Trucks = 30 tons average (loaded 40 tons, unloaded 20 tons)

Scrapers = 54 tons average (loaded 68 tons, empty 40 tons)

Daily Case VMT	Passenger Vehicles	Delivery/Work Vehicles	Heavy-Heavy Duty Vehicles	Scrapers	Total Unpaved VMT	Average Weight (Tons)
Foundation Exc.	21	1	25	114	161	43.3

Annual Case VMT	Passenger Vehicles	Delivery/Work Vehicles	Heavy-Heavy Duty Vehicles	Scrapers	Total Unpaved VMT	Average Weight (Tons)
Reach 1-3	2,884	340	6,582	348	10,154	22.1

Uncontrolled Emission Factors and Emissions

Daily Emission Factors (lb/VMT)

	PM10 Daily	PM2.5 Daily
Foundation Exc.	3.27	0.33

Emissions (Lbs/day)

	PM10	PM2.5
Foundation Exc.	525.03	52.50

Annual Emission Factors (lb/VMT)

	PM10 Annual	PM2.5 Annual
Reach 1-3	2.42	0.24

Emissions (Tons/year)

	PM10	PM2.5
Reach 1-3	12.26	1.23

Controlled Emissions (assumes 68% control watering and additional 44% for 15 mph speed limit - 82 percent total)

Emissions (Lbs/day)

	PM10	PM2.5	
Foundation Exc.	236.26	23.63	Uncontrolled
Foundation Exc.	101.59	10.16	Controlled

Emission Control

55%	Uncontrolled
81%	Controlled

Emissions (Tons/year)

	PM10	PM2.5	
Reach 1-3	5.52	0.55	Uncontrolled
Reach 1-3	2.37	0.24	Controlled

SCR-3 Project
Construction - Fugitive Dust Emissions
Option 1B

3) Disturbed Area Windblown Emissions

Assumptions

Emission Factor is 0.38 tons/disturbed acres/year of Total Suspended Particulate (AP-42 Section 11.9)
 PM10 and PM2.5 fractions of TSP are 0.489 and 0.102 respectively per CEIDARS factors from SCAQMD CEQA Website
 There are permanent and temporary disturbed acres that make up the total acre-years of disturbed area
 Disturbed areas are controlled by watering - 61% control
 Restoration of disturbed acres creates no net emission increase of permanently disturbed acres

Disturbed Acres (acre)	Emissions (Lbs/day)		Total Emissions (Tons)			
	PM10	PM2.5	PM10	PM2.5		
4.955	5.15	1.06	0.57704	0.11819	Reach 1-3	Uncontrolled
4.955	2.01	0.41	0.22504	0.04609	Reach 1-3	Controlled

* Disturbance area includes piles of earth fill.

Fugitive Dust Emissions Summary

Maximum Day (Reach 1-3 Task 5 - Foundation Excavation)

	Uncontrolled Emissions		Controlled Emissions	
	PM10	PM2.5	PM10	PM2.5
Dozing	---	---	---	---
Grading	4.96	0.35	1.59	0.11
Material Loading/Handling	58.08	8.80	4.73	0.72
Scraper Loading	181.52	37.86	56.27	11.74
Paved Road Dust	0.17	0.04	0.17	0.04
Unpaved Road Dust	236.26	23.63	101.59	10.16
Disturbed Area Windblown Emissions	5.15	1.06	2.01	0.41
Total	486.15	71.73	166.36	23.18

Total Fugitive Emissions	Uncontrolled Emissions		Controlled Emissions	
	Reach 1-3		Reach 1-3	
	PM10	PM2.5	PM10	PM2.5
Dozing	---	---	---	---
Grading	0.18	0.01	0.06	0.00
Material Loading/Handling	0.62	0.09	0.05	0.01
Scraper Loading	0.28	0.06	0.09	0.02
Paved Road Dust	0.19	0.05	0.19	0.05
Unpaved Road Dust	5.52	0.55	2.37	0.24
Disturbed Area Windblown Emissions	0.58	0.12	0.23	0.05
Total	7.36	0.88	2.98	0.36

SCR-3 Project

Operation Emissions Calculations

Assumptions:

- 1) Operation is limited to an increase in annual maintenance that consists of two weeks (10 working days) of vegetation thinning and 12 inspections.
- 2) Emissions for O&M vegetation thinning are conservatively derived from the construction vegetation thinning phase data and 2016 on-road and off-road emissions factors.
- 3) Inspections are assumed to require 12 passenger size vehicle trips at 20 miles per trip.
- 4) Fugitive dust emissions are considered to be negligible during vegetation thinning and inspection. Only paved road dust emissions are included based on Alternative 1A daily construction emissions factors of 0.00047 lbs/mile for PM10 and 0.00011 lbs per mile for PM2.5.
- 5) Worst case day includes inspection and vegetation thinning.

Off-road Equipment Emissions - Vegetation Thinning

Daily Emissions - lbs/day						Annual Emissions - lbs/year					
ROG	CO	NOx	SOx	PM	PM2.5	ROG	CO	NOx	SOx	PM	PM2.5
8.72	30.43	1.84	0.00	0.16	0.15	87.22	304.26	18.42	0.02	1.58	1.46

On-road Vehicle Emissions - Vegetation Thinning

Daily Emissions - lbs/day						Annual Emissions - lbs/year					
ROG	CO	NOx	SOx	PM	PM2.5	ROG	CO	NOx	SOx	PM	PM2.5
0.21	1.57	1.59	0.01	0.21	0.07	2.14	15.74	15.93	0.05	2.13	0.71

On-road Vehicle Emissions - Inspection

Daily Emissions - lbs/day						Annual Emissions - lbs/year					
ROG	CO	NOx	SOx	PM	PM2.5	ROG	CO	NOx	SOx	PM	PM2.5
0.03	0.14	0.14	0.00	0.01	0.00	0.34	1.70	1.67	0.00	0.17	0.06

Total Operation Emissions

Daily Emissions - lbs/day						Annual Emissions - lbs/year					
ROG	CO	NOx	SOx	PM	PM2.5	ROG	CO	NOx	SOx	PM	PM2.5
8.97	32.14	3.57	0.01	0.39	0.22	89.71	321.70	36.02	0.08	3.88	2.23