

Appendix J

Energy Consumption Calculations

**City of Long Beach Los Cerritos Wetlands
Construction Energy Analysis**

Annual Fuel Summary

398,124 gallons of diesel fuel for heavy-duty construction equipment
47,005 gallons of diesel fuel for haul trucks
7,021 gallons of diesel fuel for vendor trucks
20,158 gallons of fuel (primarily gasoline) for workers

452,149 Total Gallons Diesel
20,158 Total Gallons Gasoline

4.0 Estimated Project Construction Duration (years)

113,037 Annual Average Gallons Diesel
5,039 Annual Average Gallons Gasoline

State Fuel Consumption (2015, gallons)		Percent of Annual Project Compared to State
Diesel	3,400,000,000	0.00332%
Gasoline	14,400,000,000	0.00003%

Estimated Fuel Savings from Project Regulatory Compliance and Mitigation Measures

Estimated Diesel Fuel Savings from Tier 4 equipment compared to Tier 3:

42,162 gallons diesel fuel savings (total)
10,541 gallons diesel fuel savings (annual)

Estimated Diesel Fuel Savings from Anti-Idling Regulation:

6,648 gallons diesel fuel savings (total)
1,662 gallons diesel fuel savings (annual)

Off-Road Equipment

Estimated Fuel Savings from Tier 3:
42,162

Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Proposed Project							
Site Preparation/Demolition	Tractors/Loaders/Backhoes	9	6	75	0.37	85	127,373
Site Preparation/Demolition	Excavators	3	8	175	0.73	85	260,610
Site Preparation/Demolition	Graders	1	8	174	0.41	85	48,511
Site Preparation/Demolition	Rubber Tired Dozers	3	8	255	0.4	85	208,080
Well Cellars	Cranes	3	4	208	0.29	261	188,922
Well Cellars	Forklifts	1	6	149	0.2	261	46,667
Well Cellars	Tractors/Loaders/Backhoes	6	8	75	0.37	261	347,652
Well Cellars	Rollers	2	6	84	0.38	261	99,973
Well Cellars	Generator Sets	4	8	84	0.74	261	519,160
Well Cellars	Air Compressors	2	6	78	0.48	261	117,262
Well Cellars	Welders	3	6	46	0.45	261	97,249
Process Equipment	Cranes	2	6	208	0.29	325	235,248
Process Equipment	Forklifts	1	6	149	0.2	325	58,110
Process Equipment	Tractors/Loaders/Backhoes	5	6	75	0.37	325	270,563
Process Equipment	Rubber Tired Dozers	1	6	358	0.4	325	279,240
Process Equipment	Rollers	1	6	84	0.38	325	62,244
Process Equipment	Air Compressors	1	6	78	0.48	325	73,008
Process Equipment	Generator Sets	4	8	84	0.74	325	646,464
Process Equipment	Welders	3	8	46	0.45	325	161,460
Tank Construction	Cranes	1	4	226	0.29	120	31,459
Tank Construction	Forklifts	2	6	89	0.2	120	25,632
Tank Construction	Tractors/Loaders/Backhoes	2	8	97	0.37	120	68,909
Tank Construction	Air Compressors	1	6	78	0.48	120	26,957
Wetlands Restoration	Pavers	2	8	125	0.42	172	144,480
Wetlands Restoration	Paving Equipment	2	8	130	0.36	172	128,794
Wetlands Restoration	Rollers	2	8	80	0.38	172	83,661
Wetlands Restoration	Excavators	2	8	162	0.38	172	169,413
Wetlands Restoration	Graders	1	8	174	0.41	172	98,164
Wetlands Restoration	Rubber Tired Dozers	1	8	255	0.4	172	140,352
Wetlands Restoration	Scrapers	2	8	361	0.48	172	476,867
Wetlands Restoration	Tractors/Loaders/Backhoes	2	8	97	0.37	172	98,769
Wetlands Restoration	Cranes	1	7	226	0.29	172	78,910
Wetlands Restoration	Other Construction Equipment	1	7	275	0.29	172	96,019
Wetlands Restoration	Tractors/Loaders/Backhoes	2	7	97	0.37	172	86,423
Wetlands Restoration	Generator Sets	1	8	84	0.74	172	85,532
Wetlands Restoration	Pavers	2	8	125	0.42	172	144,480
Wetlands Restoration	Paving Equipment	2	6	130	0.36	172	96,595
Office/Warehouse/Parking	Plate Compactors	3	4	8	0.43	183	7,554
Office/Warehouse/Parking	Air Compressors	1	6	78	0.48	160	35,942
Office/Warehouse/Parking	Cement and Mortar Mixers	4	6	9	0.56	160	19,354
Office/Warehouse/Parking	Cranes	1	4	226	0.29	160	41,946
Office/Warehouse/Parking	Forklifts	2	6	89	0.2	160	34,176
Office/Warehouse/Parking	Pavers	1	7	125	0.42	160	58,800
Office/Warehouse/Parking	Rollers	1	7	80	0.38	160	34,048
Office/Warehouse/Parking	Tractors/Loaders/Backhoes	3	8	97	0.37	160	137,818
Landfill Excavation	Bore/Drill Rigs	1	7	221	0.5	100	77,350
Landfill Excavation	Excavators	1	8	158	0.38	100	48,032
Landfill Excavation	Rubber Tired Dozers	1	8	200	0.4	100	64,000
Landfill Excavation	Pumps	3	24	84	0.74	100	447,552
Landfill Excavation	Graders	1	8	187	0.41	100	61,336
Landfill Excavation	Off-Highway Trucks	1	4	402	0.38	100	61,104
Off-Site	Air Compressors	2	6	78	0.48	87	39,087
Off-Site	Concrete/Industrial Saws	1	8	81	0.73	87	41,154
Off-Site	Crawler Tractors	1	6	240	0.43	87	53,870
Off-Site	Excavators	2	6	270	0.38	87	107,114
Off-Site	Forklifts	1	6	90	0.2	87	9,396
Off-Site	Generator Sets	1	6	125	0.74	87	48,285
Off-Site	Generator Sets	2	2	25	0.74	87	6,438
Off-Site	Graders	1	6	174	0.41	87	37,239
Off-Site	Rubber Tired Dozers	1	1	255	0.4	87	8,874
Off-Site	Rubber Tired Loaders	2	6	115	0.36	87	43,222
Off-Site	Tractors/Loaders/Backhoes	1	6	95	0.37	87	18,348
Off-Site	Welders	4	4	50	0.45	87	31,320
Off-Site	Cement and Mortar Mixers	1	6	125	0.42	87	27,405
Off-Site	Pavers	1	6	125	0.42	87	27,405
Off-Site	Paving Equipment	1	8	130	0.36	87	32,573
Off-Site	Rollers	1	7	80	0.38	87	18,514
Off-Site	Tractors/Loaders/Backhoes	1	8	97	0.37	87	24,979
					Total >50 hp		7,310,073
					Total <50 hp		323,374

**City of Long Beach Los Cerritos Wetlands
Construction Energy Analysis**

On-Road Haul Trucks

EMFAC2014 Diesel Fuel Consumption Factor:¹ 0.1693 gallons/mile
 Total Haul Truck VMT: 268,400 miles
Total VMT diesel gallons (on-road haul trucks): 45,440 5.91

EMFAC2014 Diesel Fuel Consumption Factor:² 1.6569 gallons/hour
 Total Haul Truck Idle-Hours per Year: 945 hours
Total Idling diesel gallons (on-road haul trucks): 1,565

*Estimated Fuel Savings from
 Anti-Idling Regulation (64 percent based on
 estimated CARB emissions reductions):³
 4,347*

**Total diesel gallons (on-road haul trucks): 47,005 gal 54,026
 13,506.46**

1. California Air Resources Board, EMFAC2014 (California State-wide; T7 Single Construction; Annual; CY 2017; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2014 (California State-wide; T7 Single Construction; Annual; CY 2017; Aggregate MY; 5 miles per hour converted to hourly rate)
3. Source: California Air Resources Board (CARB), 2004. Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling, Appendix F, July 2004, <https://www.arb.ca.gov/regact/idling/idling.htm>, accessed November 2016.

Phase	Days	Total One-Way Trips	Miles/Trip	VMT	Idle Hours
Proposed Project					
Site Preparation/Demolition	85	105	23.1	2,426	9
Well Cellars	261	-	-	-	-
Process Equipment	325	-	-	-	-
Tank Construction	120	-	-	-	-
Wetlands Restoration	172	4,625	20.0	92,500	385
Office/Warehouse/Parking	160	-	-	-	-
Landfill Excavation (Simi Valley)	65	2,370	61.2	145,044	198
Landfill Excavation (Irwindale)	20	3,750	5.0	18,750	313
Off-Site	87	484	20.0	9,680	40
Total Haul Truck VMT:				268,400	
Total Idle-Hours:					945

**City of Long Beach Los Cerritos Wetlands
Construction Energy Analysis**

On-Road Vendor Trucks

EMFAC2014 Diesel Fuel Consumption Factor:¹ 0.1591 gallons/mile
 Total Vendor Truck VMT: 38,923 miles
Total VMT diesel gallons (on-road vendor trucks): 6,193

EMFAC2014 Diesel Fuel Consumption Factor:² 1.7620 gallons/hour
 Total Haul Truck Idle-Hours per Year: 470 hours
Total Idling diesel gallons (on-road haul trucks): 828

Total diesel gallons (on-road haul trucks): 7,021 gal
1,755 gal

*Estimated Fuel Savings from
 Anti-Idling Regulation (64 percent based on
 estimated CARB emissions reductions):³ 2,301*

1. California Air Resources Board, EMFAC2014 (California State-wide; HHDT and MHDT; Annual; CY 2017; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2014 (California State-wide; HHDT and MHDT; Annual; CY 2017; Aggregate MY; 5 miles per hour converted to hourly rate)
3. Source: California Air Resources Board (CARB), 2004. Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling, Appendix F, July 2004, <https://www.arb.ca.gov/regact/idling/idling.htm>, accessed November 2016.

Phase	Days	Trips/Day	Miles/Trip	VMT	Idle Hours
Proposed Project					
Site Preparation/Demolition	85	-	-	-	-
Well Cellars	261	2	6.9	3,602	44
Process Equipment	325	11	6.9	24,668	298
Tank Construction	120	2	6.9	1,656	20
Wetlands Restoration	172	2	6.9	2,374	29
Office/Warehouse/Parking	160	6	6.9	6,624	80
Landfill Excavation (Simi Valley)	65	-	-	-	-
Landfill Excavation (Irwindale)	20	-	-	-	-
Off-Site	87	-	-	-	-
Total Vendor Truck VMT:				38,923	
Total Idle-Hours:					470

**City of Long Beach Los Cerritos Wetlands
Construction Energy Analysis**

On-Road Workers (LDA, LDT1, LDT2)

EMFAC2014 Gasoline Fuel Consumption Factor:¹ 0.0422 gallons/mile
 Total Worker VMT: 477,678 miles
Total VMT gasoline gallons (workers): 20,158
5,039

1. California Air Resources Board, EMFAC2014 (California State-wide; LDA, LDT1, LDT2; CY 2017; Aggregate MY; Aggregate Speed)

Phase	Days	One-Way Trips/Day	Miles/Trip	VMT
Proposed Project				
Site Preparation/Demolition	85	28	14.7	34,986
Well Cellars	261	6	14.7	23,020
Process Equipment	325	27	14.7	128,993
Tank Construction	120	5	14.7	8,820
Wetlands Restoration	172	40	14.7	101,136
Office/Warehouse/Parking	160	35	14.7	82,320
Landfill Excavation (Simi Valley)	65	5	61.2	19,890
Landfill Excavation (Irwindale)	20	5	5.0	500
Off-Site	87	61	14.7	78,013
Total Worker VMT:				477,678

**City of Long Beach Los Cerritos Wetlands
Operational Energy Analysis**

Annual Fuel Summary

171,167 gallons of diesel fuel for heavy-duty construction equipment
80,891 gallons of diesel fuel for haul trucks
- gallons of diesel fuel for vendor trucks
47,760 gallons of fuel (primarily gasoline) for workers

252,057 Total Gallons Diesel
47,760 Total Gallons Gasoline

252,057 Annual Average Gallons Diesel
47,760 Annual Average Gallons Gasoline

State Fuel Consumption (2015, gallons)		Percent of Annual Project Compared to State
Diesel	3,400,000,000	0.00741%
Gasoline	14,400,000,000	0.00033%

Estimated Fuel Savings from Project Regulatory Compliance and Mitigation Measures

Estimated Diesel Fuel Savings from Tier 4 Generators compared to Tier 3 (MM-AIR-1):

18,442 gallons diesel fuel savings (total)
18,442 gallons diesel fuel savings (annual)

Estimated Diesel Fuel Savings from Anti-Idling Regulation:

5,584 gallons diesel fuel savings (total)
5,584 gallons diesel fuel savings (annual)

Off-Road Equipment

pounds fuel/hp-hr (OFFROAD2011 model, ≤ 50 hp):	0.408 lb/hp-hr
diesel pounds/gallon (CARB density assumption):	7.07 lb/gal
diesel gallons/hp-hr:	0.0577 gal/hp-hr
Total <50	- hp-hr
Total diesel gallons:	- gal

pounds fuel/hp-hr (OFFROAD2011 model, > 50 hp):	0.367	lb/hp-hr
diesel pounds/gallon (CARB density assumption):	7.07	lb/gal
diesel gallons/hp-hr:	0.0519	gal/hp-hr
Total >50	3,297,408	hp-hr
Total diesel gallons:	171,167	gal

3,197,400

165,975

18,442

Total diesel gallons (off-road equipment): 171,167 gal

Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Proposed Project							
Pumpkin Patch	Cranes	1	4	226	0.29	100	26,216
Pumpkin Patch	Forklifts	1	4	89	0.2	100	7,120
Visitor Center	Cranes	1	4	226	0.29	100	26,216
Visitor Center	Forklifts	1	4	89	0.2	100	7,120
LWCA	Cranes	1	4	226	0.29	100	26,216
LWCA	Forklifts	1	4	89	0.2	100	7,120
Drilling	Bore/Drill Rigs	2	12	500	0.73	365	3,197,400
						Total >50	3,297,408
						Total <50	-

**City of Long Beach Los Cerritos Wetlands
Operational Energy Analysis**

On-Road Haul Trucks

EMFAC2014 Diesel Fuel Consumption Factor:¹ 0.1693 gallons/mile
 Total Haul Truck VMT: 465,920 miles
Total VMT diesel gallons (on-road haul trucks): 78,880 gal 5.91

EMFAC2014 Diesel Fuel Consumption Factor:² 1.6569 gallons/hour
 Total Haul Truck Idle-Hours per Year: 1,213 hours
Total Idling diesel gallons (on-road haul trucks): 2,010 gal

*Estimated Fuel Savings from
 Anti-Idling Regulation (64 percent based on
 estimated CARB emissions reductions):³
 5,584*

Total diesel gallons (on-road haul trucks): 80,891 gal

1. California Air Resources Board, EMFAC2014 (California State-wide; T7 Single Construction; Annual; CY 2017; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2014 (California State-wide; T7 Single Construction; Annual; CY 2017; Aggregate MY; 5 miles per hour converted to hourly rate)
3. Source: California Air Resources Board (CARB), 2004. Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling, Appendix F, July 2004, <https://www.arb.ca.gov/regact/idling/idling.htm>, accessed November 2016.
4. Oil trucks were accounted for in modeling as a conservative estimate. There is a chance existing and project oil facilities would both be operating at maximum capacity and trucks would be needed until existing wells are no longer running at full capacity.

Phase	Days	Total One-Way Trips	Miles/Trip	VMT	Idle Hours
Proposed Project					
Oil Haul Trucks				465,920	1,213
			Total Haul Truck VMT:	465,920	
			Total Idle-Hours:		1,213

**City of Long Beach Los Cerritos Wetlands
Operational Energy Analysis**

On-Road Workers and Visitors (LDA, LDT1, LDT2)

EMFAC2014 Gasoline Fuel Consumption Factor:¹ 0.0422 gallons/mile

Total Worker VMT: 1,131,746 miles

Total VMT gasoline gallons (workers): 47,760 gal

1. California Air Resources Board, EMFAC2014 (California State-wide; LDA, LDT1, LDT2; CY 2017; Aggregate MY; Aggregate Speed)

Phase	Days	One-Way Trips/Day	Miles/Trip	VMT
Proposed Project				
Pumpkin Patch				247,981
Visitor Center				722,390
LWCA				11,100
Wetlands				123,447
Drilling	365	5	14.7	26,828
Total Worker and Visitor VMT:				1,131,746

