APPENDIX D

Energy Calculations

Table 1. Summary of Energy Use During Construction

Fuel Type	Quantity
Diesel	
On-Site Construction Equipment	112,779 Gallons
Off-Site Motor Vehicles	12,171,021 Gallons
Total	12,283,800 Gallons
Gasoline	
On-Site Construction Equipment	0 Gallons
Off-Site Motor Vehicles	48,097,334 Gallons
Total	48,097,334 Gallons
Electricity	216 kWh

Table 2. Summary of Annual Energy Use During Operation

Source	Units	Project	Existing	Net Difference
Electricity				
General Office Building	kWh/yr	0	383,205	-383,205
Apartments High Rise	kWh/yr	2,257,250	0	2,257,250
Parking Structure	kWh/yr	363,320	0	363,320
Building Subtotal	kWh/yr	2,620,570	383,205	2,237,365
Indoor Water Use	kWh/yr	483,571	68,271	415,300
Outdoor Water Use	kWh/yr	260,152	35,702	224,449
Water Subtotal	kWh/yr	743,723	103,973	639,750
Electricity Total	kWh/yr	3,364,293	487,178	2,877,115
Natural Gas				
General Office Building	kBtu/yr	0	307,095	-307,095
Apartments High Rise	kBtu/yr	5,253,660	0	5,253,660
Parking Structure	kBtu/yr	0	0	0
Natural Gas Total	kBtu/yr	5,253,660	307,095	4,946,565
Mobile				
Diesel	gallons	24,434	4,198	20,235
Gasoline	gallons	158,356	27,210	131,146

Table 3. Water by Land Use

		Project			Existing			Net Difference		
Land Use	**Units**	**Indoor/Outdoor Use**	**Indoor Use**	**Outdoor Use**	**Indoor/Outdoor Use**	**Indoor Use**	**Outdoor Use**	**Indoor/Outdoor Use**	**Indoor Use**	**Outdoor Use**
Apartments High Rise	Mgal	37.1378/23.416	37.1378	23.416	5.24315/3.21354	5.24315	3.21354	4.2741/4.44733	31.89465	20.20246
Parking Structure	Mgal	0/0	0	0	0/0	0	0	0/0	0	0

Water and Wastewater Electricity Intensity (kWh/gallon)

Supply Water	0.009727
Treat Water	0.000111
Distribute Water	0.001272
Wastewater Treatment	0.001911

Source: CalEEMod User's Guide, Appendix D, Table 9.2 Los Angeles - South Coast Air District

Indoor Water Factor	0.013021	kWh/gallon (supply, treat, distribute, wastewater treatment)
Outdoor Water Factor	0.01111	kWh/gallon (supply, treat, and distribute)

Notes:

Electricity and Natural Gas for the Project is total operational usage. Net difference, takes total Project usage and subtracts existing uses. Mobile gasoline and diesel usage was calculated using VMT which was provided by the CalEEMod output files as further explained in ***Table 7*** *. The VMT already assumes a net difference.*

Table 4. Off-road Equipment Fuel Usage During Construction

Phase Name	Off-road Equipment Type	Amount	Hours per Day	Horsepower	Load Factor	Number of Days	Diesel Fuel Usage (Gallons per Project)
Demolition	Excavators	3	8	158	0.38	103	7,421
Demolition	Concrete/Industrial Saqs	1	8	81	0.73	103	2,436
Demolition	Rubber Tired Dozers	2	8	247	0.4	103	8,141
Site Preparation	Rubber Tired Dozers	3	8	247	0.4	132	15,650
Site Preparation	Tractors/Loaders/Backhoes	4	8	97	0.37	132	7,580
Grading	Excavators	1	8	158	0.38	24	576
Grading	Rubber Tired Dozers	1	8	247	0.4	24	948
Grading	Tractors/Loaders/Backhoes	3	8	97	0.37	24	1,034
Grading	Graders	1	8	187	0.41	24	736
Building Construction	Cranes	1	7	231	0.29	498	11,676
Building Construction	Forklifts	3	8	89	0.2	498	10,637
Building Construction	Generator Sets	1	8	84	0.74	498	12,382
Building Construction	Tractors/Loaders/Backhoes	3	7	97	0.37	498	18,767
Building Construction	Welders	1	8	46	0.45	498	4,123
Paving	Cement and Mortar Mixers	2	6	9	0.56	55	166
Paving	Pavers	1	8	130	0.42	55	1,201
Paving	Paving Equipment	2	6	132	0.36	55	1,568
Paving	Rollers	2	6	80	0.38	55	1,003
Paving	Tractors/Loaders/Backhoes	1	8	97	0.37	55	790
Architectural Coating	Air Compressors	1	6	78	0.48	529	5,942
							112,779

Notes:

Equipment assumptions from CalEEMod.

Fuel usage estimate of 0.05 gallons per horsepower-hour is from the SCAQMD CEQA Air Quality Handbook, Table A9-3 E.

Table 5. On road Vehicle Fuel Usage During Construction

		Daily	Total			Trip Length (Miles)			Total Length (Miles)			Fuel Consumption (Gallons)	
Phase Name	**Days**	**Worker Trips**	**Worker Trips**	**Vendor Trips**	**Haul Trips**	**Worker**	**Vendor**	**Hauling**	**Worker**	**Vendor**	**Hauling**	**Gasoline**	**Diesel**
Demolition	103	17	1,751	0	134	15	7	20	25,740	0	2,680	637,154	161,089
Site Preparation	132	17	2,244	25	0	15	7	20	32,987	173	0	816,547	207,523
Grading	24	21	504	65	0	15	7	20	7,409	449	0	183,396	49,174
Building Construction	498	84	41,832	70	0	15	7	20	614,930	483	0	15,221,841	3,851,490
Paving	55	147	8,085	45	0	15	7	20	118,850	311	0	2,941,972	745,748
Architectural Coating	529	147	77,763	45	0	15	7	20	1,143,116	311	0	28,296,424	7,155,996
Total	**1341**	**433**	**132,179**	**250**	**134**	**n/a**	**n/a**	**n/a**	**1,943,031**	**1,725**	**2,680**	**48,097,334**	**12,171,021**

Fuel Efficiency

Workers	24.8
Vendor/Haul Trucks	6.3

Notes:

Fuel efficiency calculated in ***Table 10, EMFAC2017 Results - Construction.***

Table 6. Water Usage for Control of Fugitive Dust During Construction

Phase Name	Days	Total Disturbed Acreage	Gallons for Project	Electricity (kWh)
Demolition	103	3.67	11,083	108
Site Preparation	132	0	0	0
Grading	24	3.67	11,083	108
Building Construction	498	0	0	0
Paving	55	0	0	0
Architectural Coating	529	0	0	0
Total	**1341**	**N/A**	**22,167**	**216**

Notes:

Total disturbed acreage for demolition per Project description, Project Site area. Total disturbed acreage for site preparation through architectural coating per CalEEMod for proposed Project.

Construction Schedule

5 days per week

22 days per month

Water Usage

3,020 gallons per acre per day

Source: Air & Waste Management Association, Air Pollution Engineering Manual, 1992 Edition

Supply Water Electricity Intensity

0.009727 kWh/gallons (CalEEMod default for South Coast Air Basin)

Table 7. On road Vehicles - Operational

Scenario	Annual VMT	Fuel Consumption (gal)	
		Gasoline	Diesel
Future Project	4,031,898	158,356	24,434
Existing	692,791	27,210	4,198

Table 8. Fuel Consumption Summary

Fuel	Fuel Efficiency (MPG)	%Fleet
Gasoline	24.0	94.4
Diesel	9.3	5.6

Notes:

Percent fleet based on VMT from EMFAC2017 as shown in ***Table 9, EMFAC2017 Emissions Inventory-Operations*** *.*

Annual VMT obtained from CalEEMod outputs for the proposed Project.

Fuel efficiency based on calculations in ***Table 9, EMFAC2017 Emissions Inventory-Operations,*** *from EMFAC2017.*

Table 9. EMFAC2014 Emissions Inventory - Operations

Fuel	VMT (miles/day)	Fuel Consumption (1,000 gal/day)	Fuel Efficiency (miles per gallon)	Fuel Percentage
GAS	262,131,526	10,909	24.0	94.4
DSL	15,626,251	1,683	9.3	5.6

Note: Fuel percentage based on VMT.
Fuel efficiency calculated using fuel consumption and VMT from EMFAC2017.

EMFAC2017 (v1.0.2) Emissions Inventory
Region Type: Sub-Area
Region: Los Angeles (SC)
Calendar Year: 2019
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	Population	VMT	Trips	Fuel Consumption
Los Angele	2019	All Other Buses	Aggregated	Aggregated	DSL	2259.90235	131435.5296	18983.17976	13.66292
Los Angele	2019	LDA	Aggregated	Aggregated	GAS	3824691.22	151393815.7	18027338.26	5386.432
Los Angele	2019	LDA	Aggregated	Aggregated	DSL	28023.0913	1131318.278	131436.7404	25.88697
Los Angele	2019	LDA	Aggregated	Aggregated	ELEC	48227.0538	1868211.138	242582.0984	0
Los Angele	2019	LDT1	Aggregated	Aggregated	GAS	414008.59	15846032.62	1897905.486	653.5327
Los Angele	2019	LDT1	Aggregated	Aggregated	DSL	347.149149	8765.049263	1239.756272	0.413331
Los Angele	2019	LDT1	Aggregated	Aggregated	ELEC	1195.47979	40706.92535	5745.878809	0
Los Angele	2019	LDT2	Aggregated	Aggregated	GAS	1298970.48	50631402.19	6073756.947	2311.088
Los Angele	2019	LDT2	Aggregated	Aggregated	DSL	6219.76006	284822.9329	30920.53937	8.917529
Los Angele	2019	LDT2	Aggregated	Aggregated	ELEC	6300.02799	220572.3339	32115.47304	0
Los Angele	2019	LHD1	Aggregated	Aggregated	GAS	106632.405	3979863.121	1588663.959	391.5912
Los Angele	2019	LHD1	Aggregated	Aggregated	DSL	49697.5227	2199080.991	625132.3159	105.6062
Los Angele	2019	LHD2	Aggregated	Aggregated	GAS	17307.9464	621230.0872	257862.6118	70.17687
Los Angele	2019	LHD2	Aggregated	Aggregated	DSL	20034.4574	855069.0774	252008.2701	45.57409

Los Angele	2019	MCY	Aggregated	Aggregated	GAS	155070.671	1122451.783	310141.3425	31.38123
Los Angele	2019	MDV	Aggregated	Aggregated	GAS	888685.123	32077377.96	4105187.128	1782.116
Los Angele	2019	MDV	Aggregated	Aggregated	DSL	13746.8578	582073.9425	68145.51042	23.63127
Los Angele	2019	MDV	Aggregated	Aggregated	ELEC	1191.24119	41902.69663	6070.767129	0
Los Angele	2019	MH	Aggregated	Aggregated	GAS	18867.4825	187915.2952	1887.502947	38.01058
Los Angele	2019	MH	Aggregated	Aggregated	DSL	4940.88628	52784.32924	494.0886279	5.175664
Los Angele	2019	Motor Coach	Aggregated	Aggregated	DSL	682.950615	86179.02944	9971.078977	14.09796
Los Angele	2019	OBUS	Aggregated	Aggregated	GAS	4019.29961	177590.6172	80418.14652	36.6869
Los Angele	2019	PTO	Aggregated	Aggregated	DSL	0	74265.93642	0	15.81055
Los Angele	2019	SBUS	Aggregated	Aggregated	GAS	1075.22141	45425.07347	4300.885628	5.080275
Los Angele	2019	SBUS	Aggregated	Aggregated	DSL	3356.4354	106571.1621	38732.79918	14.34579
Los Angele	2019	T6 Ag	Aggregated	Aggregated	DSL	12.1661878	109.9905742	53.53122637	0.013098
Los Angele	2019	T6 CAIRP heavy	Aggregated	Aggregated	DSL	251.791023	50598.85756	3676.148928	4.745109
Los Angele	2019	T6 CAIRP small	Aggregated	Aggregated	DSL	132.325609	7053.90405	1931.953889	0.699688
Los Angele	2019	T6 instate construct	Aggregated	Aggregated	DSL	2356.06562	158439.0972	10651.68108	16.67076
Los Angele	2019	T6 instate construct	Aggregated	Aggregated	DSL	8089.36376	407875.548	36571.69905	42.4496
Los Angele	2019	T6 instate heavy	Aggregated	Aggregated	DSL	9448.65211	1278509.888	109036.1353	126.3389
Los Angele	2019	T6 instate small	Aggregated	Aggregated	DSL	35858.7971	1773509.281	413805.5463	183.4579
Los Angele	2019	T6 OOS heavy	Aggregated	Aggregated	DSL	144.503328	29105.5677	2109.748594	2.728366
Los Angele	2019	T6 OOS small	Aggregated	Aggregated	DSL	76.3379242	4044.40368	1114.533693	0.40152
Los Angele	2019	T6 Public	Aggregated	Aggregated	DSL	4375.49169	67044.25049	13272.32478	8.677248
Los Angele	2019	T6 utility	Aggregated	Aggregated	DSL	979.899395	16375.67381	11268.84304	1.818733
Los Angele	2019	T6TS	Aggregated	Aggregated	GAS	14359.3955	787937.6444	287302.7844	162.1605
Los Angele	2019	T7 Ag	Aggregated	Aggregated	DSL	4.42538997	126.8052859	19.47171586	0.02334
Los Angele	2019	T7 CAIRP	Aggregated	Aggregated	DSL	5377.21309	1009859.832	78507.31114	154.5031
Los Angele	2019	T7 CAIRP constructi	Aggregated	Aggregated	DSL	599.841065	113808.1799	2711.858133	16.56607
Los Angele	2019	T7 NNOOS	Aggregated	Aggregated	DSL	6033.63346	1231074.056	88091.04848	182.6952
Los Angele	2019	T7 NOOS	Aggregated	Aggregated	DSL	2118.32872	396774.5101	30927.59935	62.09806
Los Angele	2019	T7 POLA	Aggregated	Aggregated	DSL	7603.03752	909805.8247	57783.08512	166.2646
Los Angele	2019	T7 Public	Aggregated	Aggregated	DSL	5303.42494	107410.9642	16087.05564	19.25088
Los Angele	2019	T7 Single	Aggregated	Aggregated	DSL	5526.27405	374018.1003	63772.43633	60.65305
Los Angele	2019	T7 single constructi	Aggregated	Aggregated	DSL	4060.2238	282337.1615	18356.11393	44.85333
Los Angele	2019	T7 SWCV	Aggregated	Aggregated	DSL	1885.94158	77056.51707	7355.172143	38.11196
Los Angele	2019	T7 SWCV	Aggregated	Aggregated	NG	2078.28919	84546.45018	8105.327856	39.39347
Los Angele	2019	T7 tractor	Aggregated	Aggregated	DSL	11262.4805	1576438.891	143033.5021	238.267
Los Angele	2019	T7 tractor construct	Aggregated	Aggregated	DSL	3322.85757	232903.301	15022.50988	37.21464

Los Angele	2019	T7 utility	Aggregated	Aggregated	DSL	395.321047	8023.352148	4546.192035	1.349094
Los Angele	2019	T7IS	Aggregated	Aggregated	GAS	70.1376342	5745.854855	1403.313786	1.512804
Los Angele	2019	UBUS	Aggregated	Aggregated	GAS	448.160627	32414.88694	1792.642509	7.991984
Los Angele	2019	UBUS	Aggregated	Aggregated	DSL	14.1944	1580.590656	56.7776	0.258578
Los Angele	2019	UBUS	Aggregated	Aggregated	ELEC	12	1070.403311	48	0
Los Angele	2019	UBUS	Aggregated	Aggregated	NG	4052.98369	429071.0422	16211.93478	107.8728

Table 10. EMFAC2017 Results - Construction

Vehicle Class	Fuel	VMT (miles per day)	Fuel (1,000 gal per day)	Fuel Efficiency (miles per gallon)
LDA	GAS	151,393,816	5,386	28.11
LDT1	GAS	15,846,033	654	24.25
LDT2	GAS	50,631,402	2,311	21.91
			Average (LDA, LDT1, LDT2)	**24.75**
T7 Tractor Construction	DSL	232,903	37	6.26

Construction Worker Fleet Mix

LDA	50%
LDT1	25%
LDT2	25%

Vendor and Delivery/Haul Truck Fleet Mix

HHDT	100%

EMFAC2017 (v1.0.2) Emissions Inventory
Region Type: Sub-Area
Region: Los Angeles (SC)
Calendar Year: 2019
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT	Trips	Fuel_Consumption
Los Angeles (SC)	2019	LDA	Aggregated	Aggregated	GAS	3824691.219	151393815.7	18027338.26	5386.432
Los Angeles (SC)	2019	LDA	Aggregated	Aggregated	DSL	28023.09126	1131318.278	131436.7404	25.88697
Los Angeles (SC)	2019	LDA	Aggregated	Aggregated	ELEC	48227.0538	1868211.138	242582.0984	0
Los Angeles (SC)	2019	LDT1	Aggregated	Aggregated	GAS	414008.5904	15846032.62	1897905.486	653.5327
Los Angeles (SC)	2019	LDT1	Aggregated	Aggregated	DSL	347.1491486	8765.049263	1239.756272	0.413331
Los Angeles (SC)	2019	LDT1	Aggregated	Aggregated	ELEC	1195.479786	40706.92535	5745.878809	0
Los Angeles (SC)	2019	LDT2	Aggregated	Aggregated	GAS	1298970.477	50631402.19	6073756.947	2311.088
Los Angeles (SC)	2019	LDT2	Aggregated	Aggregated	DSL	6219.760059	284822.9329	30920.53937	8.917529
Los Angeles (SC)	2019	LDT2	Aggregated	Aggregated	ELEC	6300.027992	220572.3339	32115.47304	0
Los Angeles (SC)	2019	T7 tractor constr	Aggregated	Aggregated	DSL	3322.857569	232903.301	15022.50988	37.21464