

Appendix O

Energy Calculations

APPENDIX O
ENERGY CALCULATION WORKSHEETS

EXISTING CONDITIONS

ANNUAL ENERGY CONSUMPTION SUMMARY – EXISTING USE

Land Use	Direct Electricity Consumption (kWh/yr) ¹	Indirect Water-Related Electricity Consumption (kWh/yr) ²	Total Electricity Consumption (kWh/yr)	Natural Gas Consumption (kBTU/yr) ³	Natural Gas Consumption (cf/yr) ⁴	VMT (miles) ⁵	Gasoline Consumption (gal/yr) ⁶	Diesel Consumption (gal/yr) ⁷
General Light Industry	335,320	68,638	403,958	529,452	543,218	526,035	20,307	2,176
<p>Notes:</p> <p>kWh/yr = kilowatt hours per year; kBTU/yr = kilo-British thermal unit per year; cf/yr = cubic feet; gal = gallons</p> <p>1 Source: CalEEMod data sheets prepared for the air quality and greenhouse gas analyses.</p> <p>2 Based on a site- and land use-specific consumption rate of 6.18363 million gallons per year for indoor water use and 0 gallons per year for outdoor water use. The delivery, treatment, and distribution of water within Southern California requires 0.0111 kWh of electricity per indoor gallon and 0.009727 kWh of electricity per outdoor gallon. Source: CalEEMod.</p> <p>3 Source: CalEEMod data sheets prepared for the air quality and greenhouse gas analyses.</p> <p>4 1 kBTU/yr = 1.026 cf/yr.</p> <p>5 Source: CalEEMod data sheets prepared for the air quality and greenhouse gas analyses.</p> <p>6 Based on a county-specific percentage of VMT by gasoline-powered fleet of 93.90 percent and a county-specific gasoline mpg weighted for associated percentage of VMT of 24.32 mpg for 2018 (the baseline year). Source: EMFAC2017; Season: Annual, Vehicles: All, Model Year: Aggregate, Speed: Aggregate.</p> <p>7 Based on a county-specific percentage of VMT by diesel-powered fleet of 5.44 percent and a county-specific diesel mpg weighted for associated percentage of VMT of 13.16 mpg for 2018 (the baseline year). Source: EMFAC2017; Season: Annual, Vehicles: All, Model Year: Aggregate, Speed: Aggregate.</p> <p>Source (table): EcoTierra Consulting, Inc., 2020.</p>								

CONSTRUCTION

**CONSTRUCTION ELECTRICITY CONSUMPTION FROM WATER USAGE
– PROJECT AND FLEXIBILITY OPTION**

Phase	Duration (days)	Daily Acreage Disturbed ¹	Associated Water (gal) ²	Associated Electricity (kWh) ³
Demolition	21	0	0	0
Grading	66	0.02	3,986	40
Building Construction	435	0	0	0
Architectural Coating	44	0	0	0
Total			3,986	40
Notes: gal = gallons; kWh = kilowatt hours 1 Based on the project-specific total acreage disturbed during each phase of construction divided by the number of days for that phase. 2 Water associated with dust control is based on an application rate of 3,020 gal/acre/day. Source: Air & Waste Management Association, Air Pollution Engineering Manual (1992 Edition). 3 Each gallon of delivered water for outdoor use in Southern California is associated with 0.009727 kWh of electricity. Source: CalEEMod. Source (table): EcoTierra Consulting, Inc., 2020.				

**CONSTRUCTION ELECTRICITY CONSUMPTION FROM EQUIPMENT
(GENERATOR EQUIVALENCY)
– PROJECT AND FLEXIBILITY OPTION**

Generator ¹	
Horse Power (kW)	84
Typical Load (%)	74
Average Output (kW)	62.16
Daily Usage (hours)	8
Average Daily Output (kWh/day)	497.28
Building Construction Duration (days)	435
Total (kWh)	216,317
Notes: kW = kilowatt; % = percent); kWh/day = kilowatt hours per day 1 Horse power rating, load factor, daily usage hours information is based on project-specific equipment assumptions contained in the CalEEMod sheets prepared for the air quality and greenhouse gas analyses. Source (table): EcoTierra Consulting, Inc., 2020.	

Subtotal Water	40 kWh
Subtotal Generator	216,317 kWh
Total Construction Electricity – Project and Flexibility Option	216,357 kWh

Construction Diesel Consumption From Off-Road Equipment – Project and Flexibility Option

OFFROAD2011 Consumption Rate:¹ 0.05 gallons per hp-hr

Total hp-hr: 901,930 hp-hr

Total Off-Road Diesel Consumption (Project and Flexibility Option): 45,097 gallons

- 1 California Air Resources Board, OFFROAD2017: average of <50 hp and >50 hp.

Construction Phase ¹	Equipment ¹	Number ¹	Hours/Day ¹	HP ¹	Load ¹	Days ¹	Total hp-hr
Demolition	Concrete/Industrial Saws	1	8	81	0.73	21	9934
Demolition	Rubber Tired Dozers	1	8	247	0.40	21	16598
Demolition	Tractors/Loaders/Backhoes	3	8	97	0.37	21	18089
Grading	Excavators	1	7	158	0.38	66	27738
Grading	Graders	0	0	187	0.41	66	0
Grading	Rubber Tired Dozers	1	6	247	0.40	66	39125
Grading	Tractors/Loaders/Backhoes	2	7	97	0.37	66	33162
Building Construction	Cranes	1	6	231	0.29	435	174844
Building Construction	Forklifts	1	6	89	0.20	435	46458
Building Construction	Generator Sets	1	8	84	0.74	435	216317
Building Construction	Tractors/Loaders/Backhoes	1	6	97	0.37	435	93673
Building Construction	Welders	3	8	46	0.45	435	216108
Architectural Coating	Air Compressors	1	6	78	0.48	44	9884
Total							901,930

Notes:

hp = horse power; hp-hr = horse power hours; gal = gallons

1 Equipment details based on project-specific assumptions. Source: CalEEMod data sheets prepared for the air quality and greenhouse gas analyses.

Source (table): EcoTierra Consulting, Inc., 2020.

Construction Diesel Consumption From On-Road Equipment - Project

EMFAC2017 Diesel Fuel Consumption Factor – Vendor:¹ 16.96 miles per gallon
 Total On-Road Vendor VMT: 126,063 miles
 Total Vendor Diesel Consumption: 7,433 gallons

EMFAC2017 Diesel Fuel Consumption Factor – Hauler:² 6.40 miles per gallon
 Total On-Road Hauler VMT: 285,480 miles
 Total Hauler Diesel Consumption: 44,606 gallons

Total On-Road Diesel (Project): 52,039 gallons

- 1 California Air Resources Board, EMFAC2017: Los Angeles County, 2021 (construction year), Season: Annual, Vehicles: LHDT1, LHDT2, MHDT, Model Year: Aggregate, Speed: Aggregate.
- 2 California Air Resources Board, EMFAC2017: Los Angeles County, 2021 (construction year), Season: Annual, Vehicles: HHDT, Model Year: Aggregate, Speed: Aggregate.

Phase ¹	Days ¹	Vendor			Hauler		
		Trips ¹	Miles/Trip ¹	VMT	Trips ¹	Miles/Trip ¹	VMT
Demolition	21	0	6.9	0	204	30	6,120
Grading	66	0	6.9	0	9312	30	279,360
Building Construction	435	42	6.9	126,063	0	30	0
Architectural Coating	44	0	6.9	0	0	30	0
Total				126,063			285,480
1 Equipment details based on project-specific assumptions. Source: CalEEMod data sheets prepared for the air quality and greenhouse gas analyses. Source (table): EcoTierra Consulting, Inc., 2020.							

Subtotal Off-Road 45,097 gallons
 Subtotal On-Road 52,039 gallons
Total Construction Diesel – Project 97,136 gallons

Construction Diesel Consumption From On-Road Equipment – Flexibility Option

EMFAC2017 Diesel Fuel Consumption Factor – Vendor:¹ 16.96 miles per gallon
 Total On-Road Vendor VMT: 129,065 miles
 Total Vendor Diesel Consumption: 7,610 gallons

EMFAC2017 Diesel Fuel Consumption Factor – Hauler:² 6.40 miles per gallon
 Total On-Road Hauler VMT: 285,510 miles
 Total Hauler Diesel Consumption: 44,611 gallons

Total On-Road Diesel (Flexibility Option): 52,221 gallons

- 1 California Air Resources Board, EMFAC2017: Los Angeles County, 2021 (construction year), Season: Annual, Vehicles: LHDT1, LHDT2, MHDT, Model Year: Aggregate, Speed: Aggregate.
- 2 California Air Resources Board, EMFAC2017: Los Angeles County, 2021 (construction year), Season: Annual, Vehicles: HHDT, Model Year: Aggregate, Speed: Aggregate.

Phase ¹	Days ¹	Vendor			Hauler		
		Trips ¹	Miles/Trip ¹	VMT	Trips ¹	Miles/Trip ¹	VMT
Demolition	21	0	6.9	0	204	30	6,120
Grading	66	0	6.9	0	9313	30	279,390
Building Construction	435	43	6.9	129,065	0	30	0
Architectural Coating	44	0	6.9	0	0	30	0
Total				129,065			285,510
<p>1 Equipment details based on project-specific assumptions. Source: CalEEMod data sheets prepared for the air quality and greenhouse gas analyses. Source (table): EcoTierra Consulting, Inc., 2020.</p>							

Subtotal Off-Road 45,097 gallons
 Subtotal On-Road 52,221 gallons

**676 Mateo Street Project
Energy Calculation Worksheets**

Total Construction Diesel – Flexibility Option 97,317 gallons

Construction Gasoline Consumption From On-Road Equipment – Project

EMFAC2017 Gasoline Fuel Consumption Factor – Worker:¹ 26.14 miles per gallon

Total On-Road Worker VMT: 1,246,854 miles

Total Worker Gasoline Consumption (Project): 47,699 gallons

- 1 California Air Resources Board, EMFAC2017: Los Angeles County, 2021 (construction year), Season: Annual, Vehicles: LDA, LDT1, LDT2, Model Year: Aggregate, Speed: Aggregate.

Phase ¹	Days ¹	Trips ¹	Miles/Trip ¹	VMT
Demolition	21	13	14.7	4,013
Grading	66	10	14.7	9,702
Building Construction	435	189	14.7	1,208,561
Architectural Coating	44	38	14.7	24,578
Total				1,246,854
<p>1 Equipment details based on project-specific assumptions. Source: CalEEMod data sheets prepared for the air quality and greenhouse gas analyses. Source (table): EcoTierra Consulting, Inc., 2020.</p>				

Construction Gasoline Consumption From On-Road Equipment – Flexibility Option

EMFAC2017 Gasoline Fuel Consumption Factor – Worker:¹ 26.14 miles per gallon
 Total On-Road Worker VMT: 1,175,221 miles
Total Worker Gasoline Consumption (Flexibility Option): 44,959 gallons

1 California Air Resources Board, EMFAC2017: Los Angeles County, 2021 (construction year), Season: Annual, Vehicles: LDA, LDT1, LDT2, Model Year: Aggregate, Speed: Aggregate.

Phase ¹	Days ¹	Trips ¹	Miles/Trip ¹	VMT
Demolition	21	13	14.7	4,013
Grading	66	10	14.7	9,702
Building Construction	435	189	14.7	1,138,221
Architectural Coating	44	38	14.7	23,285
Total				1,175,221
¹ Equipment details based on project-specific assumptions. Source: CalEEMod data sheets prepared for the air quality and greenhouse gas analyses. Source (table): EcoTierra Consulting, Inc., 2020.				

OPERATION

676 Mateo Street Project
Energy Calculation Worksheets

ANNUAL ENERGY CONSUMPTION SUMMARY – PROJECT

Land Use	Direct Electricity Consumption (kWh/yr) ¹	Indirect Water-Related Electricity Consumption (kWh/yr) ²	Total Electricity Consumption (kWh/yr)	Natural Gas Consumption (kBtu/yr) ³	Natural Gas Consumption (cf/yr) ⁴	VMT (miles) ⁵	Gasoline Consumption (gal/yr) ⁶	Diesel Consumption (gal/yr) ⁷
Apartments – Mid Rise	683646	180950	864,596	2030960	2083765	2154929	70854	6992
Enclosed Parking with Elevator	577044	0	577,044	0	0	0	0	0
General Office Building	45322.7	10288	55,610	40599	41655	53894	1772	175
High Turnover (Sit Down Restaurant)	622170	43286	665,456	3462550	3552576	1473649	48453	4781
Regional Shopping Center	95237.2	9213	104,450	13735	14092	171478	5638	556
Total:	2,023,420	243,737	2,267,157	5,547,844	5,692,088	3,853,950	126,718	12,504

Notes:

kWh/yr = kilowatt hours per year; kBtu/yr = kilo-British thermal unit per year; cf/yr = cubic feet; gal = gallons

1 Source: CalEEMod data sheets prepared for the air quality and greenhouse gas analyses.

2 Based on size- and land use-specific yearly consumption rates for indoor and outdoor water use. The delivery, treatment, and distribution of water within Southern California requires 0.0111 kWh of electricity per indoor gallon and 0.009727 kWh of electricity per outdoor gallon. Source: CalEEMod.

3 Source: CalEEMod data sheets prepared for the air quality and greenhouse gas analyses.

4 1 kBtu/yr = 1.026 cf/yr.

5 Source: CalEEMod data sheets prepared for the air quality and greenhouse gas analyses.

6 Based on a county-specific percentage of VMT by gasoline-powered fleet of 91.74 percent and a county-specific gasoline mpg weighted for associated percentage of VMT of 27.90 mpg for 2023 (the operation year). Source: EMFAC2017; Season: Annual, Vehicles: All, Model Year: Aggregate, Speed: Aggregate.

7 Based on a county-specific percentage of VMT by diesel-powered fleet of 6.53 percent and a county-specific diesel mpg weighted for associated percentage of VMT of 20.11 mpg for 2023 (the operation year). Source: EMFAC2017; Season: Annual, Vehicles: All, Model Year: Aggregate, Speed: Aggregate.

Source (table): EcoTierra Consulting, Inc., 2020.

ANNUAL ENERGY CONSUMPTION SUMMARY – FLEXIBILITY OPTION

Land Use	Direct Electricity Consumption (kWh/yr) ¹	Indirect Water-Related Electricity Consumption (kWh/yr) ²	Total Electricity Consumption (kWh/yr)	Natural Gas Consumption (kBtu/yr) ³	Natural Gas Consumption (cf/yr) ⁴	VMT (miles) ⁵	Gasoline Consumption (gal/yr) ⁶	Diesel Consumption (gal/yr) ⁷
Apartments – Mid Rise	587566	155519	743,085	1745530	1790914	1851974	60893	6009
Enclosed Parking with Elevator	577044	0	577,044	0	0	0	0	0
General Office Building	303232	68822	372,054	271628	278690	360685	11859	1170
High Turnover (Sit Down Restaurant)	622170	43286	665,456	3462550	3552576	1473572	48451	4781
Regional Shopping Center	95237.2	9213	104,450	13735	14092	171478	5638	556
Total:	2,185,249	276840	2,462,089	5,493,443	5,636,273	3,857,709	126,841	12,517

Notes:

kWh/yr = kilowatt hours per year; kBtu/yr = kilo-British thermal unit per year; cf/yr = cubic feet; gal = gallons

- 1 Source: CalEEMod data sheets prepared for the air quality and greenhouse gas analyses.
 - 2 Based on size- and land use-specific yearly consumption rates for indoor and outdoor water use. The delivery, treatment, and distribution of water within Southern California requires 0.0111 kWh of electricity per indoor gallon and 0.009727 kWh of electricity per outdoor gallon. Source: CalEEMod.
 - 3 Source: CalEEMod data sheets prepared for the air quality and greenhouse gas analyses.
 - 4 1 kBtu/yr = 1.026 cf/yr.
 - 5 Source: CalEEMod data sheets prepared for the air quality and greenhouse gas analyses.
 - 6 Based on a county-specific percentage of VMT by gasoline-powered fleet of 91.74 percent and a county-specific gasoline mpg weighted for associated percentage of VMT of 27.90 mpg for 2023 (the operation year). Source: EMFAC2017; Season: Annual, Vehicles: All, Model Year: Aggregate, Speed: Aggregate.
 - 7 Based on a county-specific percentage of VMT by diesel-powered fleet of 6.53 percent and a county-specific diesel mpg weighted for associated percentage of VMT of 20.11 mpg for 2023 (the operation year). Source: EMFAC2017; Season: Annual, Vehicles: All, Model Year: Aggregate, Speed: Aggregate.
- Source (table): EcoTierra Consulting, Inc., 2020.

NET ANNUAL ENERGY CONSUMPTION SUMMARY – PROJECT

	Electricity (kWh/yr)	Natural Gas (cf/yr)	Gasoline (gal/yr)	Diesel (gal/yr)
Project Consumption	2,267,157	5,692,088	126,718	12,504
Existing Consumption	403,958	543,218	20,307	2,176
Net Consumption:	1,863,199	5,148,870	106,411	10,328
Notes: kWh/yr = kilowatt hours per year; cf/yr = cubic feet per year; gal/yr = gallons per year Source (table): EcoTierra Consulting, Inc., 2020.				

NET ANNUAL ENERGY CONSUMPTION SUMMARY – FLEXIBILITY OPTION

	Electricity (kWh/yr)	Natural Gas (cf/yr)	Gasoline (gal/yr)	Diesel (gal/yr)
Flexibility Option Consumption	2,462,089	5,636,273	126,841	12,517
Existing Consumption	403,958	543,218	20,307	2,176
Net Consumption:	2,058,131	5,093,055	106,534	10,341
Notes: kWh/yr = kilowatt hours per year; cf/yr = cubic feet per year; gal/yr = gallons per year Source (table): EcoTierra Consulting, Inc., 2020.				