
Appendix G
Energy Worksheets



Westfield North County - Energy Calculations

Summary of Energy Use During Construction

	Existing	Project Without Project Features	Project With Project Features
Diesel			
Off Road	-	15,495	15,495 Gallons
On Road	-	3,817	3,817 Gallons
Total:	-	19,312	19,312 Gallons
Gasoline			
Off Road	-	0	0
On Road	-	3,804	3,804 Gallons
Total:	-	3,804	3,804 Gallons
Electricity			
Water Consumption	-	617	617 kWh
Total:	-	617	617 kWh

Summary of Energy Use During Operations

	Project Witl	Project With Project Features	Percent Reduction
Mobile			
Diesel	29,108	21,829 Gallons	-25%
Gasoline	214,976	161,220 Gallons	-25%
Natural Gas			
	5,654	5,000 therms	-12%
Electricity			
Electricity (building)	453,150	430,795 kWh/Year	-5%
Electricity (water)	211,485	169,188 kWh/Year	-20%
Electricity Total	664,635	599,983 kWh/Year	-10%

Calculation of Diesel Usage During Construction (Offroad Equipment):

Phase Name	Off Road Equipment Type	Units	Hours	HP	Load Factor	Avg. Daily Factor	Number of Days	Diesel Fuel Usage
Demolition	Concrete/Industrial Saws	1	8	81	0.73	0.6	11	156
Demolition	Crushing/Proc. Equipment	1	8	85	0.78	0.6	11	175
Demolition	Rubber Tired Loaders	2	8	199	0.36	0.6	11	378
Demolition	Tractors/Loaders/Backhoes	2	8	97	0.37	0.6	11	189
Grading	Graders	1	8	174	0.41	0.6	10	171
Grading	Rubber Tired Dozers	1	8	255	0.4	0.6	10	245
Grading	Rubber Tired Loaders	1	8	199	0.36	0.6	10	172
Grading	Scrapers	1	8	361	0.48	0.6	10	416
Grading	Tractors/Loaders/Backhoes	1	8	97	0.37	0.6	10	86
Foundation	Bore/Drill Rigs	1	8	205	0.5	0.6	21	517
Foundation	Cranes	1	8	226	0.29	0.6	21	330
Foundation	Forklifts	1	8	89	0.2	0.6	21	90
Foundation	Tractors/Loaders/Backhoes	1	8	97	0.37	0.6	21	181
Building Construction	Cranes	1	8	226	0.29	0.6	197	3,099
Building Construction	Forklifts	1	8	89	0.2	0.6	197	842
Building Construction	Generator Sets	1	8	84	0.74	0.6	197	2,939
Building Construction	Tractors/Loaders/Backhoes	1	8	97	0.37	0.6	197	1,697
Building Construction	Welders	3	8	46	0.45	0.6	197	2,936
Architectural Coating	Air Compressors	1	6	78	0.48	0.6	54	364
Paving	Cement and Mortar Mixers	1	8	9	0.56	0.6	11	13
Paving	Pavers	1	8	125	0.42	0.6	11	139
Paving	Paving Equipment	1	8	130	0.36	0.6	11	124
Paving	Rollers	1	8	80	0.38	0.6	11	80
Paving	Skid Steer Loaders	1	8	64	0.37	0.6	11	63
Paving	Tractors/Loaders/Backhoes	1	8	97	0.37	0.6	11	95
Total Diesel Usage for Construction (Offroad Equipment):								15,495.5 gallons of diesel fuel

gallons of diesel fuel per horsepower-hour= 0.05

Notes: Equipment assumptions are provide in the CalEEMod output files and fuel usage estimate of 0.05 gallons of diesel fuel per horsepower-hour is from the SCAQMD CEQA Air Quality Handbook, Table A9-3E.

EMFAC2011 Emissions Inventory

Region Type: Air Basin

Region: San Diego

Calendar Year: 2016

Season: Annual

Vehicle Classification: EMFAC2011 Categories

Region	Veh_Class	Fuel	Speed (miles/hr)	Population (vehicles)	VMT (miles/day)	Trips (trips/day)	Fuel_Gas (1000 gallons/day)	Fuel_DSL (1000 gallons/day)	Miles per Gallon
San Diego	LDA	GAS	Aggregate	1212193.67	44519568.47	7649996.343	1934.945712	0	23.0
San Diego	LDT1	GAS	Aggregate	179177.623	6436190.298	1096392.251	324.4024113	0	19.8
San Diego	LDT2	GAS	Aggregate	438511.941	16857635.96	2762187.991	995.9805284	0	16.9
						Construction Worker Trip (Composite LDA/LDT1/LDT2):			20.7
San Diego	T7 tractor cnstruction	DSL	Aggregate	821.333384	63100.37085	0	0	11.20924784	5.6

Notes: Consistent with CalEEMod, a construction worker trip is assumed to be a composite of 50% LDA, 25% for LDT1, and 25% for LDT2. Used EMFAC 2011 Categories for construction as EMFAC2011 has specific categories for vehicle class T7.

Calculation of Gasoline and Diesel Usage During Phase 1 Construction (Onroad Vehicles):

Phase Name	Daily Woker Trips	Daily Vendor Trips	Days	Total Worker Trips	Total Vendor Trips	Total Haul Trips	Trip Length (miles)			Total Length (miles)			Avg. Daily Factor (worker and vendor)	Gallons of Fuel	
							Worker	Vendor	Haul	Worker	Vendor	Haul		Gasoline	Diesel
Demolition	15	0	11	165	0	391	10.8	7.3	20	1782	0	7820	0.6	51.7	1,389.2
Grading	15	0	10	150	0	625	10.8	7.3	20						
Foundation	30	20	21	630	420	0	10.8	7.3	20						
Building Construction	60	15	197	11820	2955	0	10.8	7.3	20	127656	21571.5	0	0.6	3,701.0	2,299.2
Architectural Coating	10	0	54	540	0	0	10.8	7.3	20						
Paving	15	15	11	165	165	0	10.8	7.3	20	1782	1204.5	0	0.6	51.7	128.4
Total:													3,804.3	3,816.7	

Worker Miles per gallon= 20.70 gasoline
 Vedor/Haul miles per gallon= 5.63 diesel

Notes: Consistent with CalEEMod worker vehicles are assumed to be gasoline and 50% LDA, 25%LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy Duty Trucks (T7)

Water Usage for Control of Fugitive Dust during Construction:

Phase	Days	Average Daily Acreage Disturbed	Gallons Per Year	Electricity (kWhr)
Demolition	11	1	33,220	323
Site Grading/Landscaping/Construction	10	1	30,200	294
Total:			63,420	617

Water application rate= 3020 gal/acre/day
kWhr equivalent= 0.01 kWhr

Notes: 1) Gallons per year of water usage for dust control is calculated based on a minimum control efficiency of 66% (three times daily) with an application rate of 3,020 gal/acre/day (Air & Waste Management Association Air Pollution Engineering Manual (1992 Edition)) and average of 26 construction days per month.

2) CalEEMod Default: Each gallon of delivered potable water in Southern California is associated with 0.009727 kWhr of electricity).

EMFAC2011 Emissions Inventory
 Region Type: Air Basin
 Region: San Diego
 Calendar Year: 2017
 Season: Annual
 Vehicle Classification: EMFAC2007 Categories

Region	CalYr	Season	Veh_Class	Fuel	MdYr	Speed (miles/hr)	Population (vehicles)	VMT (miles/day)	Trips (trips/day)	Fuel_Gas (1000 gallons/day)	Fuel_DSL (1000 gallons/day)		
San Diego	2017	Annual	LDA	GAS	Aggregated	Aggregated	1223491.29	44980425.56	7725016.8	1954.358189	0		
San Diego	2017	Annual	LDA	DSL	Aggregated	Aggregated	5720.04732	199103.3726	34644.969	0	7.463040736		
San Diego	2017	Annual	LDT1	GAS	Aggregated	Aggregated	180664.779	6487520.22	1104456.3	326.9055269	0		
San Diego	2017	Annual	LDT1	DSL	Aggregated	Aggregated	219.275722	7672.065446	1218.4856	0	0.289906517		
San Diego	2017	Annual	LDT2	GAS	Aggregated	Aggregated	441927.91	17023061.8	2783108.3	1005.035112	0		
San Diego	2017	Annual	LDT2	DSL	Aggregated	Aggregated	195.059641	7736.288673	1185.6387	0	0.289872862		
San Diego	2017	Annual	LHD1	GAS	Aggregated	Aggregated	53152.7254	2125286.782	791896.37	250.0692673	0		
San Diego	2017	Annual	LHD1	DSL	Aggregated	Aggregated	27694.2858	1109933.185	348359.29	0	57.89322621		
San Diego	2017	Annual	LHD2	GAS	Aggregated	Aggregated	4432.41044	176028.6464	66036.305	20.68371621	0		
San Diego	2017	Annual	LHD2	DSL	Aggregated	Aggregated	7251.07223	285947.4164	91209.364	0	14.91519678		
San Diego	2017	Annual	MCY	GAS	Aggregated	Aggregated	64258.8331	579777.813	128504.82	16.44447233	0		
San Diego	2017	Annual	MDV	GAS	Aggregated	Aggregated	314267.635	11710728.02	1952799	882.7933888	0		
San Diego	2017	Annual	MDV	DSL	Aggregated	Aggregated	343.480934	13216.59502	2049.4279	0	0.499163403		
San Diego	2017	Annual	MH	GAS	Aggregated	Aggregated	20715.2522	264639.5526	2072.354	21.5247799	0		
San Diego	2017	Annual	MH	DSL	Aggregated	Aggregated	3388.32369	42317.23332	338.83235	0	5.067642719		
San Diego	2017	Annual	OBUS	GAS	Aggregated	Aggregated	1339.51456	67256.93242	61173.299	5.948754538	0		
San Diego	2017	Annual	OBUS	DSL	Aggregated	Aggregated	1239.78379	97599.99173	0	0	14.702308		
San Diego	2017	Annual	SBUS	GAS	Aggregated	Aggregated	316.924004	14546.83807	1267.696	1.375483381	0		
San Diego	2017	Annual	SBUS	DSL	Aggregated	Aggregated	1074.05444	39352.11126	0	0	5.466867541		
San Diego	2017	Annual	T6	GAS	Aggregated	Aggregated	3562.47231	174253.7474	71277.946	15.07724608	0		
San Diego	2017	Annual	T6	DSL	Aggregated	Aggregated	16756.3346	953866.9693	0	0	113.6976563		
San Diego	2017	Annual	T7	GAS	Aggregated	Aggregated	205.948093	27036.75798	4120.6096	2.085223921	0		
San Diego	2017	Annual	T7	DSL	Aggregated	Aggregated	13569.1782	1942659.282	0	0	351.4338377		
San Diego	2017	Annual	UBUS	GAS	Aggregated	Aggregated	229.420805	31250.41434	917.68317	2.805325253	0		
San Diego	2017	Annual	UBUS	DSL	Aggregated	Aggregated	1121.36263	152745.7241	4485.4506	0	38.2784301		
							Totals	88,513,963.32		4,505.11	610.00	MPG	Gallons Per Mile
							Total (GAS)	83,661,813.09	0.95			17.3	0.06
							Total (DSL)	4,852,150.24	0.05			18.6	0.05
												8.0	0.13

**Westfield North County Project Operations BAU 2020
San Diego, Annual**

Land Use Details

<i>Land Uses</i>	<i>Size</i>	<i>Metric</i>	<i>Lot Acreage</i>	<i>Floor Surface Area</i>	<i>Population</i>
Movie Theater	54.75	1000sqft	1.26	54,750.00	0

Trip Summary Information

<i>Land Uses</i>	<i>Average Daily Trip Rate</i>			<i>Unmitigated</i>
	<i>Weekday</i>	<i>Saturday</i>	<i>Sunday</i>	
Movie Theater	2,243.09	2,243.09	2,243.09	4,223,737
Total	2,243.09	2,243.09	2,243.09	4,223,737

Unmitigated Gasoline and Diesel Usage

	<i>Gasoline</i>	<i>Diesel</i>
<i>Miles/Gallon</i>	18.6	8.0
<i>% Fleet Mix</i>	94.5%	5.5%
Total (Gallons):	214,976	29,108

Energy by Land Use - Natural Gas (Unmitigated)

<i>Land Uses</i>	<i>kBTU/yr</i>	<i>cu ft/mo</i>
Movie Theater	593,627	47,113
Total	593,627	47,113

Energy by Land Use - Electricity (Unmitigated)

<i>Land Uses</i>	<i>kWH/yr</i>
Movie Theater	453,150
Total	453,150

Water Detail (Unmitigated)

<i>Land Uses</i>	<i>Indoor Use (Mgal)</i>	<i>Outdoor Use (Mgal)</i>	<i>Electricity Use (kWh/yr)</i>
Movie Theater	20.22	1.29	211,485
Total	20.22	1.29	211,485

Notes: Indoor water results in 0.0111 kWhr of electricity usage per gallon from delivery, treatment, and distribution of water within Southern California (CalEEMod). Outdoor water results in 0.009727 kWhr of electricity usage per gallon from delivery and distribution of water within Southern California (CalEEMod).

**Westfield North County Project Operations 2020
Los Angeles-South Coast County, Annual**

Land Use Details

<i>Land Uses</i>	<i>Size</i>	<i>Metric</i>	<i>Lot Acreage</i>	<i>Floor Surface Area</i>	<i>Population</i>
Movie Theater	50.35	1000sqft	1.28	50350	0

Trip Summary Information

<i>Land Uses</i>	<i>Average Daily Trip Rate</i>			<i>Mitigated</i>
	<i>Weekday</i>	<i>Saturday</i>	<i>Sunday</i>	
Movie Theater	1,682.19	1,682.19	1,682.19	3,167,566
Total	1,682.19	1,682.19	1,682.19	3,167,566

Mitigated Gasoline and Diesel Usage

	<i>Gasoline</i>	<i>Diesel</i>
<i>Miles/Gallon</i>	18.6	8.0
<i>% Fleet Mix</i>	94.5%	5.5%
Total (Gallons):	161,220	21,829

Energy by Land Use - Natural Gas (Mitigated)

<i>Land Uses</i>	<i>kBTU/yr</i>	<i>cu ft/mo</i>
Movie Theater	525,050	41,671
Total	525,050	41,671

Energy by Land Use - Electricity (Mitigated)

<i>Land Uses</i>	<i>kWH/yr</i>
Movie Theater	430,795
Total	430,795

Water Detail (Unmitigated)

<i>Land Uses</i>	<i>Indoor Use (Mgal)</i>	<i>Outdoor Use (Mgal)</i>	<i>Electricity Use (kWh/yr)</i>
Movie Theater	16.18	1.03	169,188
Total	16.18	1.03	169,188

Notes: Indoor water results in 0.0111 kWhr of electricity usage per gallon from delivery, treatment, and distribution of water within Southern California (CalEEMod). Outdoor water results in 0.009727 kWhr of electricity usage per gallon from delivery and distribution of water within Southern California (CalEEMod).