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SUBJECT: OLEANDER BUSINESS PARK ENERGY TABLES

The following Energy Tables were prepared for the proposed Oleander Business Park development (referred to as “Project”) which is located in the County of Riverside.

CONSTRUCTION EQUIPMENT ELECTRICITY USAGE ESTIMATES

Based on the *2017 National Construction Estimator*, Richard Pray (2017) (1), the typical power cost per 1,000 square feet of building construction per month is estimated to be \$2.32. The proposed development consists of 710,736 square feet (sf) of high-cube warehouse and manufacturing uses divided over two buildings and is anticipated to be completed within a 23-month period. Table 1 estimates the total power cost of the on-site electricity usage during the construction of the proposed Project to be approximately \$37,924.87.

TABLE 1: PROJECT CONSTRUCTION POWER COST

Land Use	Power Cost (per 1,000 SF of construction per month)	Total Project Size (1,000 SF)	Construction Duration (months)	Total Project Construction Power Cost
Building A				
High-Cube Warehouse	\$2.32	290.694	23	\$15,511.43
Manufacturing	\$2.32	72.673	23	\$3,877.83
Building B				
High-Cube Warehouse	\$2.32	277.895	23	\$14,828.48
Manufacturing	\$2.32	69.474	23	\$3,707.13
TOTAL PROJECT CONSTRUCTION COST				\$37,924.87

Electricity will be provided to the Project by Southern California Edison (SCE). As shown in Table 2, using the total power cost (calculated in Table 1) and SCE’s July 26, 2019, general service rate schedule (GS-1) for industrial land uses of \$0.08 per kWh of electricity (2), the total electricity usage from on-site Project construction related activities is estimated to be approximately 474,061 kWh.

TABLE 2: PROJECT CONSTRUCTION ELECTRICITY USAGE

Land Use	Cost per kWh	Total Project Construction Electricity Usage (kWh)
Building A		
High-Cube Warehouse	\$0.08	193,893
Manufacturing	\$0.08	48,473
Building B		
High-Cube Warehouse	\$0.08	185,356
Manufacturing	\$0.08	46,339
TOTAL PROJECT CONSTRUCTION ELECTRICTY USAGE (kWh)		474,061

CONSTRUCTION EQUIPMENT FUEL ESTIMATES

Fuel consumption estimates are presented in Table 3. The aggregate fuel consumption rate for all equipment is estimated at 18.5 hp-hr-gal., obtained from California Air Resources Board (CARB) 2018 Emissions Factors Tables and cited fuel consumption rate factors presented in Table D-24 of the Moyer guidelines (3). For the purposes of this analysis, the calculations are based on all construction equipment being diesel-powered which is standard practice consistent with industry standards. Diesel fuel would be supplied by existing commercial fuel providers serving the City and region. As presented in Table 3, Project construction activities would consume an estimated 125,156 gallons of diesel fuel.

TABLE 3: CONSTRUCTION EQUIPMENT FUEL CONSUMPTION ESTIMATES

Activity/Duration	Equipment	HP Rating	Quantity	Usage Hours	Load Factor	HP-hrs/day	Total Fuel Consumption (gal. diesel fuel)
Site Preparation (30 days)	Crawler Tractors	212	4	8	0.43	2,917	4,730
	Rubber Tired Dozers	247	3	8	0.40	2,371	3,845
Grading (75 days)	Crawler Tractors	212	2	8	0.43	1,459	5,913
	Excavators	158	2	8	0.38	961	3,894
	Graders	187	1	8	0.41	613	2,487
	Rubber Tired Dozers	247	1	8	0.40	790	3,204
	Scrapers	367	2	8	0.48	2,819	11,427
Building Construction (400 days)	Cranes	231	1	8	0.29	536	11,587
	Crawler Tractors	212	3	8	0.43	2,188	47,305
	Forklifts	89	3	8	0.20	427	9,237
	Generator Sets	84	1	8	0.74	497	10,752
	Welders	46	1	8	0.45	166	3,581
Paving (55 days)	Pavers	130	2	8	0.42	874	2,597
	Paving Equipment	132	2	8	0.36	760	2,260
	Rollers	80	2	8	0.38	486	1,446
Architectural Coating (55 days)	Air Compressors	78	1	8	0.48	300	890
CONSTRUCTION FUEL DEMAND (GALLONS DIESEL FUEL)							125,156

CONSTRUCTION WORKER FUEL ESTIMATES

It is assumed that all construction worker trips are from light duty autos (LDA) along area roadways. Data regarding Project related construction worker trips were based on CalEEMod 2016.3.2 model defaults utilized within the AQIA. Vehicle fuel efficiencies for LDAs were estimated using information generated within the 2017 version of the EMFAC developed by the CARB.

Table 4 provides an estimated annual fuel consumption resulting from the Project generated by LDAs related to construction worker trips. Based on Table 4, it is estimated that 127,719 gallons of fuel will be consumed related to construction worker trips during full construction of the proposed Project.

TABLE 4: CONSTRUCTION WORKER FUEL CONSUMPTION ESTIMATES

Construction Activity	Worker Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Site Preparation (30 days)	18	14.7	7,938	30.76	258
Grading (75 days)	20	14.7	22,050	30.76	717
Building Construction (400 days)	654	14.7	3,845,520	31.26	123,007
Paving (55 days)	15	14.7	12,128	31.59	384
Architectural Coating (55 days)	131	14.7	105,914	31.59	3,353
CONSTRUCTION WORKER FUEL CONSUMPTION					127,719

CONSTRUCTION VENDOR FUEL ESTIMATES

It is assumed that 50% of all vendor trips are from Medium-Heavy-Duty-Trucks (MHDT), 50% are from Heavy-Heavy-Duty Trucks (HHDT), and 100% of all hauling trips are HHDTs. These assumptions are consistent with the 2016.3.2 CalEEMod defaults utilized within the within the AQIA. Vehicle fuel efficiencies for MHDTs and HHDTs were estimated using information generated within EMFAC2017.

Tables 5 and 6 shows the estimated fuel economy of MHDTs and HHDTs accessing the Project site. Based on Tables 5 and 6, fuel consumption from construction trips will total approximately 1,983,968 gallons.

TABLE 5: CONSTRUCTION VENDOR FUEL CONSUMPTION ESTIMATES (MHD TRUCKS)

Construction Activity	Vendor Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Vendor					
Building Construction (400 days)	128	6.9	351,900	9.67	36,409
TOTAL PROJECT MEDIUM-DUTY TRUCK TOTAL (VENDOR)					36,409

TABLE 6: CONSTRUCTION VENDOR/HAULING FUEL CONSUMPTION ESTIMATES (HHD TRUCKS)

Construction Activity	Vendor Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Vendor					
Building Construction (400 days)	128	6.9	351,900	6.89	51,080
Hauling					
Grading (75 days)	8,625	20	12,937,500	6.82	1,896,480
TOTAL PROJECT HEAVY-DUTY TRUCK TOTAL (HAULING)					1,947,559

TRANSPORTATION ENERGY DEMANDS

Energy that would be consumed by Project-generated traffic is a function of total VMT and estimated vehicle fuel economies of vehicles accessing the Project site. Table 7 presents the estimated annual fuel consumption from project-generated traffic.

TABLE 7: PROJECT-GENERATED TRAFFIC ANNUAL FUEL CONSUMPTION (1 OF 2)

Vehicle Type	Annual Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Annual Fuel Consumption (gallons)
Passenger Cars			
LDA	3,459,661	31.59	109,534
LDT1	239,815	26.44	9,071
LDT2	1,181,924	24.76	47,736
MDV	756,258	19.93	37,952

TABLE 7: PROJECT-GENERATED TRAFFIC ANNUAL FUEL CONSUMPTION (2 OF 2)

Vehicle Type	Annual Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Annual Fuel Consumption (gallons)
Trucks			
LHDT	893,406	14.09	63,388
MHDT	1,108,988	9.73	113,948
HHDT	3,358,033	6.93	484,416
TOTAL	10,998,084		866,046

FACILITY ENERGY DEMANDS

Project building operations and Project site maintenance activities would result in the consumption of natural gas and electricity. Natural gas would be supplied to the Project by Southern California Gas (SoCalGas) and electricity would be supplied to the Project by SCE. Annual natural gas and electricity demands of the Project are summarized in Table 8.

TABLE 8: PROJECT ANNUAL OPERATIONAL ENERGY DEMAND SUMMARY

Natural Gas Demand	kBTU/year
Manufacturing	2,257,210
Other Non-Asphalt Surfaces	0
Parking Lot	0
High-Cube Warehouse	564,127
TOTAL PROJECT NATURAL GAS DEMAND	2,821,337
Electricity Demand	kWh/year
Manufacturing	705,161
Other Non-Asphalt Surfaces	0
Parking Lot	83,000
High-Cube Warehouse	655,832
TOTAL PROJECT ELECTRICITY DEMAND	1,443,993

REFERENCES

1. **Pray, Richard.** *2017 National Construction Estimator.* Carlsbad : Craftsman Book Company, 2017.
2. **Southern California Edison.** Schedule GS-1 General Service. *Regulatory Information - Rates Pricing.* [Online] https://library.sce.com/content/dam/sce-doelib/public/regulatory/tariff/electric/schedules/general-service-&-industrial-rates/ELECTRIC_SCHEDULES_GS-1.pdf.
3. **California Air Resources Board.** *Methods to Find the Cost-Effectiveness of Funding Air Quality Projects For Evaluating Motor Vehicle Registration Fee Projects And Congestion Mitigation and Air Quality Improvement (CMAQ) Projects, Emission Factor Tables.* 2018.