

# Appendix E

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Energy Calculations

# Ventana at Duncan Canyon EIR - Planning Areas 1 & 2

Last Updated: 1/12/2022

Compression-Ignition Engine Brake-Specific Fuel Consumption (BSFC) Factors [1]:

HP: 0 to 100	0.0588	HP: Greater than 100	0.0529
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Values above are expressed in gallons per horsepower-hour/BSFC.

CONSTRUCTION EQUIPMENT						
Construction Equipment	#	Hours per Day	Horsepower	Load Factor	Construction Phase	Fuel Used (gallons)
Rubber Tired Dozers	6	8	247	0.4	Site Preparation Phase	2,507
Tractors/Loaders/Backhoes	8	8	97	0.37	Site Preparation Phase	1,350
Excavators	4	8	158	0.38	Grading Phase	3,554
Graders	2	8	187	0.41	Grading Phase	2,270
Rubber Tired Dozers	2	8	247	0.4	Grading Phase	2,925
Scrapers	4	8	367	0.48	Grading Phase	10,429
Tractors/Loaders/Backhoes	4	8	367	0.48	Grading Phase	5,637
Cranes	2	7	231	0.29	Building Construction Phase	18,343
Forklifts	6	8	89	0.2	Building Construction Phase	18,577
Generator Sets	2	8	84	0.74	Building Construction Phase	21,624
Tractors/Loaders/Backhoes	6	7	97	0.37	Building Construction Phase	32,775
Welders	2	8	46	0.45	Building Construction Phase	7,201
Air Compressors	2	6	78	0.48	Architectural Coating Phase	4,884
Pavers	4	8	130	0.42	Paving Phase	3,232
Paving Equipment	4	8	132	0.36	Paving Phase	2,813
Rollers	4	8	80	0.38	Paving Phase	2,001
<b>Total Fuel Used</b>						<b>140,122</b> (Gallons)

Construction Phase	Days of Operation
Site Preparation Phase	10
Grading Phase	35
Building Construction Phase	370
Paving Phase	35
Architectural Coating Phase	185
<b>Total Days</b>	<b>635</b>

WORKER TRIPS				
Constuction Phase	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
Site Preparation Phase	15.0	35	14.7	343
Grading Phase	15.0	40	14.7	1,372
Building Construction Phase	15.0	765	14.7	277,389
Paving Phase	15.0	153	14.7	5,248
Architectural Coating Phase	15.0	30	14.7	5,439
<b>Total</b>				<b>289,791</b>

HAULING AND VENDOR TRIPS				
Trip Class	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
<b>HAULING TRIPS</b>				
Site Preparation Phase	7.5	0	20.0	0
Grading Phase	7.5	0	20.0	0
Building Construction Phase	7.5	0	20.0	0
Paving Phase	7.5	0	20.0	0
Architectural Coating Phase	7.5	0	20.0	0
<b>Total</b>				<b>-</b>
<b>VENDOR TRIPS</b>				

Site Preparation Phase	7.5	0	6.9	0
Grading Phase	7.5	0	6.9	0
Building Construction Phase	7.5	212	6.9	72,165
Paving Phase	7.5	0	6.9	0
Architectural Coating Phase	7.5	0	6.9	0
<b>Total</b>				<b>72,164.80</b>

<b>Total Gasoline Consumption (gallons)</b>	<b>289,791</b>
<b>Total Diesel Consumption (gallons)</b>	<b>212,287</b>

**Sources:**

[1] United States Environmental Protection Agency. 2021. *Exhaust and Crankcase Emission Factors for Nonroad Compression-Ignition Engines in MOVES3.0.2*. September. Available at: <https://www.epa.gov/system/files/documents/2021-08/420r21021.pdf>.

[2] United States Department of Transportation, Bureau of Transportation Statistics. 2021. *National Transportation Statistics*. Available at: <https://www.bts.gov/topics/national-transportation-statistics>.

# Ventana at Duncan Canyon EIR - Planning Area 3

Last Updated: 1/12/2022

Compression-Ignition Engine Brake-Specific Fuel Consumption (BSFC) Factors [1]:

HP: 0 to 100	0.0588	HP: Greater than 100	0.0529
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Values above are expressed in gallons per horsepower-hour/BSFC.

CONSTRUCTION EQUIPMENT						
Construction Equipment	#	Hours per Day	Horsepower	Load Factor	Construction Phase	Fuel Used (gallons)
Rubber Tired Dozers	3	8	247	0.4	Site Preparation Phase	1,253
Tractors/Loaders/Backhoes	4	8	97	0.37	Site Preparation Phase	675
Excavators	2	8	158	0.38	Grading Phase	1,523
Graders	1	8	187	0.41	Grading Phase	973
Rubber Tired Dozers	1	8	247	0.4	Grading Phase	1,253
Scrapers	2	8	367	0.48	Grading Phase	4,470
Tractors/Loaders/Backhoes	2	8	367	0.48	Grading Phase	5,637
Cranes	1	7	231	0.29	Building Construction Phase	7,436
Forklifts	3	8	89	0.2	Building Construction Phase	7,531
Generator Sets	1	8	84	0.74	Building Construction Phase	8,767
Tractors/Loaders/Backhoes	3	7	97	0.37	Building Construction Phase	13,287
Welders	1	8	46	0.45	Building Construction Phase	2,919
Air Compressors	1	6	78	0.48	Architectural Coating Phase	1,980
Pavers	2	8	130	0.42	Paving Phase	924
Paving Equipment	2	8	132	0.36	Paving Phase	804
Rollers	2	8	80	0.38	Paving Phase	572
<b>Total Fuel Used</b>						<b>60,004</b>
						(Gallons)

Construction Phase	Days of Operation
Site Preparation Phase	10
Grading Phase	30
Building Construction Phase	300
Paving Phase	20
Architectural Coating Phase	150
<b>Total Days</b>	<b>510</b>

WORKER TRIPS				
Constuction Phase	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
Site Preparation Phase	15.0	18	14.7	176
Grading Phase	15.0	20	14.7	588
Building Construction Phase	15.0	285	14.7	83,790
Paving Phase	15.0	15	14.7	294
Architectural Coating Phase	15.0	57	14.7	8,379
<b>Total</b>				<b>93,227</b>

HAULING AND VENDOR TRIPS				
Trip Class	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
<b>HAULING TRIPS</b>				
Site Preparation Phase	7.5	0	20.0	0
Grading Phase	7.5	0	20.0	0
Building Construction Phase	7.5	0	20.0	0
Paving Phase	7.5	0	20.0	0
Architectural Coating Phase	7.5	0	20.0	0
<b>Total</b>				<b>-</b>
<b>VENDOR TRIPS</b>				

Site Preparation Phase	7.5	0	6.9	0
Grading Phase	7.5	0	6.9	0
Building Construction Phase	7.5	42	6.9	11,592
Paving Phase	7.5	0	6.9	0
Architectural Coating Phase	7.5	0	6.9	0
<b>Total</b>				<b>11,592.00</b>

<b>Total Gasoline Consumption (gallons)</b>	<b>93,227</b>
<b>Total Diesel Consumption (gallons)</b>	<b>71,596</b>

**Sources:**

[1] United States Environmental Protection Agency. 2021. *Exhaust and Crankcase Emission Factors for Nonroad Compression-Ignition Engines in MOVES3.0.2*. September. Available at: <https://www.epa.gov/system/files/documents/2021-08/420r21021.pdf>.

[2] United States Department of Transportation, Bureau of Transportation Statistics. 2021. *National Transportation Statistics*. Available at: <https://www.bts.gov/topics/national-transportation-statistics>.

# Ventana at Duncan Canyon EIR - Planning Areas 4-5

Last Updated: 1/12/2022

Compression-Ignition Engine Brake-Specific Fuel Consumption (BSFC) Factors [1]:

HP: 0 to 100	0.0588	HP: Greater than 100	0.0529
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Values above are expressed in gallons per horsepower-hour/BSFC.

CONSTRUCTION EQUIPMENT						
Construction Equipment	#	Hours per Day	Horsepower	Load Factor	Construction Phase	Fuel Used (gallons)
Rubber Tired Dozers	3	8	247	0.4	Site Preparation Phase	2,507
Tractors/Loaders/Backhoes	4	8	97	0.37	Site Preparation Phase	1,350
Excavators	2	8	158	0.38	Grading Phase	2,285
Graders	1	8	187	0.41	Grading Phase	1,459
Rubber Tired Dozers	1	8	247	0.4	Grading Phase	1,880
Scrapers	2	8	367	0.48	Grading Phase	6,704
Tractors/Loaders/Backhoes	2	8	367	0.48	Grading Phase	5,637
Cranes	1	7	231	0.29	Building Construction Phase	12,394
Forklifts	3	8	89	0.2	Building Construction Phase	12,552
Generator Sets	1	8	84	0.74	Building Construction Phase	14,611
Tractors/Loaders/Backhoes	3	7	97	0.37	Building Construction Phase	22,145
Welders	1	8	46	0.45	Building Construction Phase	4,866
Air Compressors	1	6	78	0.48	Architectural Coating Phase	3,300
Pavers	2	8	130	0.42	Paving Phase	1,616
Paving Equipment	2	8	132	0.36	Paving Phase	1,407
Rollers	2	8	80	0.38	Paving Phase	1,000
<b>Total Fuel Used</b>						<b>95,713</b>

(Gallons)

Construction Phase	Days of Operation
Site Preparation Phase	20
Grading Phase	45
Building Construction Phase	500
Paving Phase	35
Architectural Coating Phase	250
<b>Total Days</b>	<b>850</b>

WORKER TRIPS				
Constuction Phase	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
Site Preparation Phase	15.0	18	14.7	353
Grading Phase	15.0	20	14.7	882
Building Construction Phase	15.0	502	14.7	245,980
Paving Phase	15.0	15	14.7	515
Architectural Coating Phase	15.0	100	14.7	24,500
<b>Total</b>				<b>272,229</b>

HAULING AND VENDOR TRIPS				
Trip Class	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
<b>HAULING TRIPS</b>				
Site Preparation Phase	7.5	0	20.0	0
Grading Phase	7.5	0	20.0	0
Building Construction Phase	7.5	0	20.0	0
Paving Phase	7.5	0	20.0	0
Architectural Coating Phase	7.5	0	20.0	0
<b>Total</b>				<b>-</b>
<b>VENDOR TRIPS</b>				

Site Preparation Phase	7.5	0	6.9	0
Grading Phase	7.5	0	6.9	0
Building Construction Phase	7.5	96	6.9	44,160
Paving Phase	7.5	0	6.9	0
Architectural Coating Phase	7.5	0	6.9	0
			<b>Total</b>	<b>44,160.00</b>

<b>Total Gasoline Consumption (gallons)</b>	<b>272,229</b>
<b>Total Diesel Consumption (gallons)</b>	<b>139,873</b>

**Sources:**

[1] United States Environmental Protection Agency. 2021. *Exhaust and Crankcase Emission Factors for Nonroad Compression-Ignition Engines in MOVES3.0.2*. September. Available at: <https://www.epa.gov/system/files/documents/2021-08/420r21021.pdf>.

[2] United States Department of Transportation, Bureau of Transportation Statistics. 2021. *National Transportation Statistics*. Available at: <https://www.bts.gov/topics/national-transportation-statistics>.

# Ventana at Duncan Canyon EIR - Planning Area 6

Last Updated: 1/12/2022

Compression-Ignition Engine Brake-Specific Fuel Consumption (BSFC) Factors [1]:

HP: 0 to 100	0.0588	HP: Greater than 100	0.0529
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Values above are expressed in gallons per horsepower-hour/BSFC.

CONSTRUCTION EQUIPMENT						
Construction Equipment	#	Hours per Day	Horsepower	Load Factor	Construction Phase	Fuel Used (gallons)
Rubber Tired Dozers	3	8	247	0.4	Site Preparation Phase	1,253
Tractors/Loaders/Backhoes	4	8	97	0.37	Site Preparation Phase	675
Excavators	1	8	158	0.38	Grading Phase	508
Graders	1	8	187	0.41	Grading Phase	648
Rubber Tired Dozers	1	8	247	0.4	Grading Phase	836
Tractors/Loaders/Backhoes	3	8	367	0.48	Grading Phase	5,637
Cranes	1	7	231	0.29	Building Construction Phase	5,701
Forklifts	3	8	89	0.2	Building Construction Phase	5,774
Generator Sets	1	8	84	0.74	Building Construction Phase	6,721
Tractors/Loaders/Backhoes	3	7	97	0.37	Building Construction Phase	10,187
Welders	1	8	46	0.45	Building Construction Phase	2,238
Air Compressors	1	6	78	0.48	Architectural Coating Phase	1,518
Pavers	2	8	130	0.42	Paving Phase	924
Paving Equipment	2	8	132	0.36	Paving Phase	804
Rollers	2	8	80	0.38	Paving Phase	572
<b>Total Fuel Used</b>						<b>43,995</b>

(Gallons)

Construction Phase	Days of Operation
Site Preparation Phase	10
Grading Phase	20
Building Construction Phase	230
Paving Phase	20
Architectural Coating Phase	115
<b>Total Days</b>	<b>395</b>

WORKER TRIPS				
Constuction Phase	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
Site Preparation Phase	15.0	18	14.7	176
Grading Phase	15.0	15	14.7	294
Building Construction Phase	15.0	140	14.7	31,556
Paving Phase	15.0	15	14.7	294
Architectural Coating Phase	15.0	28	14.7	3,156
<b>Total</b>				<b>35,476</b>

HAULING AND VENDOR TRIPS				
Trip Class	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
<b>HAULING TRIPS</b>				
Site Preparation Phase	7.5	0	20.0	0
Grading Phase	7.5	0	20.0	0
Building Construction Phase	7.5	0	20.0	0
Paving Phase	7.5	0	20.0	0
Architectural Coating Phase	7.5	0	20.0	0
<b>Total</b>				<b>-</b>
<b>VENDOR TRIPS</b>				
Site Preparation Phase	7.5	0	6.9	0



Grading Phase	7.5	0	6.9	0
Building Construction Phase	7.5	35	6.9	7,406
Paving Phase	7.5	0	6.9	0
Architectural Coating Phase	7.5	0	6.9	0
			<b>Total</b>	<b>7,406.00</b>

<b>Total Gasoline Consumption (gallons)</b>	<b>35,476</b>
<b>Total Diesel Consumption (gallons)</b>	<b>51,401</b>

**Sources:**

[1] United States Environmental Protection Agency. 2021. *Exhaust and Crankcase Emission Factors for Nonroad Compression-Ignition Engines in MOVES3.0.2*. September. Available at: <https://www.epa.gov/system/files/documents/2021-08/420r21021.pdf>.

[2] United States Department of Transportation, Bureau of Transportation Statistics. 2021. *National Transportation Statistics*. Available at: <https://www.bts.gov/topics/national-transportation-statistics>.

# Ventana at Duncan Canyon EIR - Planning Areas 1 & 2

Last Updated: 1/12/2022

Populate one of the following tables (Leave the other blank):

<b>Annual VMT</b>	<b>OR</b>	<b>Daily Vehicle Trips</b>
Annual VMT: 51,853,104		Daily Vehicle Trips: Average Trip Distance:

Fleet Class	Fleet Mix	Fuel Economy (MPG) [1]	
Light Duty Auto (LDA)	0.537356	Passenger Vehicles	24.1
Light Duty Truck 1 (LDT1)	0.064746	Light-Med Duty Trucks	17.9
Light Duty Truck 2 (LDT2)	0.188411	Heavy Trucks/Other	7.5
Medium Duty Vehicle (MDV)	0.126034	Motorcycles	44
Light Heavy Duty 1 (LHD1)	0.023886		
Light Heavy Duty 2 (LHD2)	0.006883		
Medium Heavy Duty (MHD)	0.012812		
Heavy Heavy Duty (HHD)	0.008954		
Other Bus (OBUS)	0.000819		
Urban Bus (UBUS)	0.000470		
Motorcycle (MCY)	0.025457		
School Bus (SBUS)	0.000765		
Motorhome (MH)	0.003406		

Fleet Mix					
Vehicle Type	Percent	Fuel Type	Annual VMT:		Fuel Consumption
			VMT	Vehicle Trips: VMT	(Gallons)
Passenger Vehicles	53.74%	Gasoline	27,863,577	0.00	1,156,165
Light-Medium Duty Trucks	37.92%	Gasoline	19,662,230	0.00	1,098,449
Heavy Trucks/Other	5.80%	Diesel	3,007,221	0.00	400,963
Motorcycle	2.55%	Gasoline	1,320,024	0.00	30,001

<b>Total Gasoline Consumption (gallons)</b>	<b>2,284,614</b>
<b>Total Diesel Consumption (gallons)</b>	<b>400,963</b>

**Sources:**

[1] United States Department of Transportation, Bureau of Transportation Statistics. 2021. National Transportation Statistics. Available at: <https://www.bts.gov/topics/national-transportation-statistics>.

Equipment	Horsepower	Load Factor
Aerial Lifts	63	0.31
Air Compressors	78	0.48
Bore/Drill Rigs	221	0.5
Cement and Mortar Mixers	9	0.56
Concrete/Industrial Saws	81	0.73
Cranes	231	0.29
Crawler Tractors	212	0.43
Crushing/Proc. Equipment	85	0.78
Dumpers/Tenders	16	0.38
Excavators	158	0.38
Forklifts	89	0.2
Generator Sets	84	0.74
Graders	187	0.41
Off-Highway Tractors	124	0.44
Off-Highway Trucks	402	0.38
Other Construction Equipment	172	0.42
Other General Industrial Equipment	88	0.34
Other Material Handling Equipment	168	0.4
Pavers	130	0.42
Paving Equipment	132	0.36
Plate Compactors	8	0.43
Pressure Washers	13	0.3
Pumps	84	0.74
Rollers	80	0.38
Rough Terrain Forklifts	100	0.4
Rubber Tired Dozers	247	0.4
Rubber Tired Loaders	203	0.36
Scrapers	367	0.48
Signal Boards	6	0.82
Skid Steer Loaders	65	0.37
Surfacing Equipment	263	0.3
Sweepers/Scrubbers	64	0.46
Tractors/Loaders/Backhoes	97	0.37
Trenchers	78	0.5
Welders	46	0.45