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Westwood

TRAFFIC STUDY

Fountain Wind Power

Shasta County, California

July 28, 2023

Prepared For:

ConnectGEN

Traffic Study

Fountain Wind Project

Shasta County, California

Project Number: 0023714.00

Date: 7/28/2023

Prepared for:

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1.0 INTRODUCTION

The Fountain Wind project is proposed as a 205 MW wind project consisting of 48 wind turbines with associated access roads, collection system, meteorological (MET) towers, operations and maintenance facility (O&M), staging yards, substation, and interconnection. The construction of the Fountain Wind project will generally require conventional construction worker personal vehicles, logging trucks, aggregate dump trucks, concrete ready-mix trucks, single unit and semi-tractor trailer trucks, crawler cranes, and a limited number of specialized transportation vehicles for the oversize/overweight vehicles associated with the delivery of wind turbine components and substation main power transformers (MPTs).

The scope of this report is to determine the total number of vehicles entering the project site from public roads and to calculate the approximate peak hourly traffic entering the site from public roads.

This report also contains responses to comments made by the California Energy Commission (CEC). A spreadsheet containing point-by-point responses to CEC comments is contained in **Appendix H**.

2.0 PROJECT ACCESS

Traffic entering the project site is composed of commuter trips for construction workers and delivery trips for materials and equipment. Materials and equipment deliveries include aggregate, concrete, and water, as well as turbines, electrical equipment and cables, and items such as reinforcing steel and forms for concrete foundations.

All traffic will reach the site using State Route (SR) 299 (see **Exhibit 1**). Deliveries of manufactured components (e.g., turbine components and turbine blades) will likely originate from the east and travel from Reno, Nevada to the site via US 395 and SR 299. These deliveries would be scheduled to avoid the peak hours of traffic on SR 299 and the scheduled first trip of the westbound Burney Express bus departing Burney at 5:50 am and arriving in Redding at 7:15 am (see **Appendix A**).

Locally sourced materials such as aggregate and water will likely come from Burney, located approximately 6 miles to the east of the project site, or from pits and quarries east of Burney. If the concrete is not batched on-site, there are several concrete plants in Redding about 35 miles to the west of the project site that can provide concrete during project construction.

Project workers will most likely commute from towns located both to the east and to the west of the project. The Burney Express does not appear to be a convenient option for commuters (see **Appendix A**). Redding is the largest town in the region. Other towns west of the project are very small and not likely to be able to accommodate many project workers. Several small towns including Burney, Fall River Mills, and McArthur are located east of the project and may also accommodate project workers. Based on the relative size of towns located to the east and west of the project site, this study assumes that 60 percent of the commuting traffic travels to the site from the west and that 40 percent travels to the site from the east on SR 299. **Exhibits 2 and 3** illustrate the assumed regional and local delivery routes for manufactured components, turbine blades, and building materials and the anticipated commuter routes. SR 299 is a Terminal Access (STAA) truck route (see **Appendix A**).

Two access roads are proposed to coincide with existing logging roads at the intersections with SR 299 (see **Exhibit 1**). The West Access is proposed along a road called G Line, which intersects with SR 299 approximately 37 miles east of the interchange with I-5 in Redding. There is a widened shoulder at this intersection, but no turn lanes.

The East Access is approximately eight miles west of Burney. This access is proposed along an existing and unnamed logging road that provides access to the area south of SR 299. As with the other access points, there is a widened shoulder at this access, but no turn lanes.

As points of reference, the Shasta Green plant lies along SR 299 approximately 4.4 miles east of the East Access, and the Sierra Pacific Industries plant lies another 1.2 miles to the east of that. The Shasta Green plant has both eastbound and westbound turn lanes along SR 299. The Sierra Pacific Industries plant has no turn lanes.

The nearby Hatchet Ridge Wind Farm accesses SR 299 at Bunch Grass Lookout Road. This access is approximately one mile east of the East Access for the Fountain Wind project. Both eastbound and westbound turn lanes serve the Hatchet Ridge access. Bunch Grass Lookout Road is located at a four-way intersection on SR 299, with Terry Mill Road accessing to the south.

3.0 EXISTING TRAFFIC CONDITIONS

According to the Caltrans 2020 listing of Annual Average Daily Traffic (AADT) volumes (see **Appendix A**), urban centers on each end of SR 229 record the highest traffic volumes, then diminish significantly in the rural and mountainous areas in between. There are nine daily and peak hour count locations listed between I-5 in Redding, California, and Plumas Street in Burney, California[1].

The highest existing two-way AADT on SR 299 is 18,800 vehicles per day at I-5 in Redding where the highway has a four-lane freeway alignment. The highest existing two-way peak hour volume is 2,200 vehicles per hour. The capacity of a lane along a freeway segment is calculated as a function of the Free-Flow Speed (FFS), which is affected by the

[1] CalTrans Traffic Census Program.

percentage of heavy trucks traveling along the segment (see **Appendix A**), the average grade of the segment (see **Appendix A**), and either the observed free-flow speed or the average number of access points per mile within the segment.

The two access roads for the Fountain Wind project are all located within the segment of SR 299 between Big Bend Road and Tamarack Road. Volume, speed, and classification counts were collected at two locations along this segment on April 4, April 5, and April 6, 2023 (see **Appendix B**). The observed AADT along this segment was 1.55 times less than the 2020 Caltrans AADT collected along this segment. Additionally, the observed truck percentage along this segment was 1.4 times higher than the 2020 Caltrans observed truck percentage.

Roadway segment traffic volume and capacity information is summarized in **Table 1.1**. Roadway segment geometric and general crash information (see **Appendix C**) are summarized in **Table 1.2** and **Table 1.3**. To facilitate statewide crash averages for similar facilities in California, crash comparisons were initially performed for the most recent year, 2020. However, due to the Covid-19 pandemic, Westwood expanded crash data analysis to include the years 2018, 2019, and 2020 to ensure any pandemic outliers did not skew data analysis. To include the expanded data set, **Table 1.2** was updated and **Table 1.3** was added to reflect additional crash analysis within boundaries of the project site commuter and delivery routes, in conjunction with statewide data (see **Appendix C**). The crash rates along the roadway segments of SR 299 are less than the statewide averages for similar 4-lane divided and 2/3-lane facilities.

Specific crash information pertaining to primary crash factor (PCF) violation, set forth by the Transportation Injury Mapping System (TIMS) data tool is summarized in **Table 1.4**. Of the 81 crashes observed along SR-299, of which were 7 fatal crashes, 40% had an "Improper Turning" Primary Crash Factor (PCF). For fatal crashes, the predominant PCF, comprising of 43% of all fatal crashes, was "Improper Turning", 75% of all crashes occurred under daylight conditions, and 99% of crashes occurred on roads with "No Unusual Conditions". Based on these results, the crashes observed along SR-299 appear to be due to driver behavior instead of roadway characteristics. Assorted conditions of the studied crashes are included in **Tables 1.5** through **Tables 1.12**.

Roadway capacity calculations are included in **Appendix D**. Roadway capacity analysis was performed with Highway Capacity Software (HCS) for the pre-construction, construction, and post-construction scenarios. Traffic data collected by Caltrans in 2020 and roadway characteristics observed from desktop review (i.e., speed limit, number and width of lanes, etc.) were used to calculate roadway capacity. The roadway segments that are affected by project traffic are anticipated to have sufficient capacity for construction demand and post-construction demand.

Table 1.1 - Roadway Segment Traffic Information Summary

Segment Number	Road Name	Location	Milepost (From-To)	2020 Caltrans AADT Two-Way		2023 Observed AADT		2020 Caltrans Peak Hour Two-Way		2023 Observed Peak Hour		Construction Peak Hour		Post-Construction Peak Hour		Heavy Vehicles			Capacity pc/h/ln		Pre-Construction LOS Better than C? (D/C)[f]		Construction LOS Better than C? (D/C)[f]		Post-Construction LOS Better than C? (D/C)[f]	
				Ahead	Back	EB	WB	EB (Ahead)	EB (Back)	EB	WB	EB	WB	EB	WB	(%)	SUT	TT	EB	WB	EB	WB	EB	WB	EB	WB
0		I-5 Junction (Redding)	24.8																							
1		I-5 to Hawley Road	24.9-25.5	10800	18800			575[c]	1100[c]			666[e]	1160[e]	583[e]	1108[e]	4.73	17	83	2006	2006	(YES)-A 0.16	(YES)-B 0.31	(YES)-A 0.19	(YES)-B 0.33	(YES)-A 0.16	(YES)-B 0.31
2		Hawley Road to Old Oregon Trail	25.5 -27.2	9500	10800			475[c]	575[c]			566[e]	635[e]	483[e]	583[e]	3.76	23	77	1998	2006	(YES)-A 0.13	(YES)-A 0.16	(YES)-A 0.16	(YES)-A 0.18	(YES)-A 0.14	(YES)-A 0.16
3		Old Oregon Trail to Deschutes Road	27.2-31.5	4750	7700			260[c]	455[c]			351[e]	515[e]	268[e]	463[e]	3.76[a]			1700	1700	(YES)-A 0.16	(YES)-B 0.28	(YES)-B 0.22	(YES)-C 0.32	(YES)-A 0.17	(YES)-C 0.29
4		Deschutes Road to Terry Mill Road	31.5-53.3	3950	3900			130[c]	130[c]			221[e]	190[e]	138[e]	138[e]	14.9[a]			1400	1400	(YES)-A 0.1	(YES)-A 0.1	(YES)-A 0.17	(YES)-A 0.14	(YES)-A 0.1	(YES)-A 0.1
5	CA-299 E	Terry Mill Road to Big Bend Road	53.5-60.1	3350	3550			135[c]	135[c]			226[e]	195[e]	143[e]	143[e]	14.9[a]			1700	1700	(YES)-A 0.08	(YES)-A 0.08	(YES)-A 0.14	(YES)-A 0.12	(YES)-A 0.09	(YES)-A 0.09
6		Big Bend Road to Site Entrance 1	60.1-62.3	3350[a]	3550[a]	1275[b]	1255[b]	168[a&c&g]	168[a&c&g]	138[b&d]	133[b&d]	259[e]	228[e]	176[e]	176[e]	31[b]			1700	1700	(YES)-A 0.11	(YES)-A 0.11	(YES)-B 0.16	(YES)-A 0.14	(YES)-A 0.11	(YES)-A 0.11
7		Site Entrance 1 to Site Entrance 2	62.3-67.3	3250[a]	3350[a]	1269[a]	1259[a]	168[a&c&g]	168[a&c&g]	161[a&b&d]	133[a&b&d]	259[e]	228[e]	176[e]	176[e]	31[b]			1100	1100	(YES)-A 0.16	(YES)-A 0.16	(YES)-A 0.25	(YES)-A 0.22	(YES)-A 0.17	(YES)-A 0.17
8		Site Entrance 2 to Tamarack Road	67.3 -73.1	3150	3150	1263[b]	1263[b]	200[c]	200[c]	161[b&d]	126[b&d]	291[e]	260[e]	208[e]	208[e]	30[b]			1100	1700	(YES)-A 0.19	(YES)-A 0.13	(YES)-A 0.28	(YES)-B 0.16	(YES)-A 0.2	(YES)-A 0.13
9		Tamarack Road to Elm Street	73.1-74.5	3600	2400			180[c]	185[c]			271[e]	245[e]	188[e]	193[e]	17.5			1700	1700	(YES)-A 0.11	(YES)-A 0.12	(YES)-A 0.17	(YES)-A 0.15	(YES)-A 0.12	(YES)-A 0.12
10		Elm Street to Plumas Street (Burney)	74.5-75.0	8200	3600			435[c]	180[c]			526[e]	240[e]	443[e]	188[e]	19			1700	1700	(YES)-C 0.27	(YES)-A 0.11	(YES)-C 0.33	(YES)-A 0.15	(YES)-C 0.28	(YES)-A 0.12

Table Notes:

(a) - Assumed Value from Neighboring Segment. Segment 7 volumes are averages.

(b) - Observed Value from counts performed on April 4, 5, and 6 of 2023

(c) - Numbers listed in Appendix A were representatives of two-way traffic. These Numbers are divided by two under the assumption of equal traffic in each direction.

(d) - Peak Hour Count from QC - Were Adjusted using a correction factor of 1.55

(e) - Peak hour analysis used the highest AM or PM Volumes.

(f) - Demand over Capacity Ratio

(g) – Reference values only, not used for peak hour construction volumes analysis

Table 1.2 - Roadway Segment Geometric and Crash Information

Segment Number	Road Name	Location	Milepost (From-To)	Length (mi)	Surface / Condition	Elevation Start (ft)	Elevation End (ft)	Eastbound Average Grade	Westbound Average Grade	Lane Width (ft)	Shoulder Width (ft)	Number of Directional Travel Lanes	Passing Zones	Roadway Functional Classification	Passing Zones	Average Access Points per Mile	Truck Route Designation	Weight and Load Limitations	Posted Speed Limit
0	CA-299 E	I-5 Junction (Redding)	24.8		Asphalt / Good	640				12	6	2		Principal Arterial			Terminal Access / STAA Route	80000 lb Max	55
1		I-5 to Hawley Road	24.9 - 25.5	0.6		641	628	-0.41	0.41				n/a			0			
2		Hawley Road to Old Oregon Trail	25.5 -27.2	1.7		628	621	-0.08	0.08							0			
3		Old Oregon Trail to Deschutes Road	27.2 - 31.5	4.3		621	539	-0.36	0.36			1	Passing Zones	Minor Arterial	Passing Zones	8			
4		Deschutes Road to Terry Mill Road	31.5 - 53.3	21.8		539	2092	1.35	-1.35				Passing Lanes		Passing Lanes	4			
5		Terry Mill Road to Big Bend Road	53.5 - 60.1	6.8		2092	3128	2.89	-2.89				Passing Lanes EB only		Passing Lanes EB only	6			
6		Big Bend Road to Site Entrance 1	60.1 - 62.3	2.3		3128	3640	4.22	-4.22				Passing Zones		Passing Zones	3			
7		Site Entrance 1 to Site Entrance 2	62.3 - 67.3	4.9		3640	4215	2.22	-2.22				Passing Lanes		Passing Lanes	2			
8		Site Entrance 2 to Tamarack Road	67.3 -73.1	5.8		4215	3209	-3.29	3.29				Passing Lanes EB only		Passing Lanes EB only	2			
9		Tamarack Road to Elm Street	73.1 - 74.5	1.4		3209	3189	-0.27	0.27				Passing Zones		Passing Zones	5			
10		Elm Street to Plumas Street (Burney)	74.5 - 75.0	0.5		3189	3125	-2.42	2.42				Constricted		Constricted	22			

Table 1.3 - Roadway Segment Geometric and Crash Collision Rates

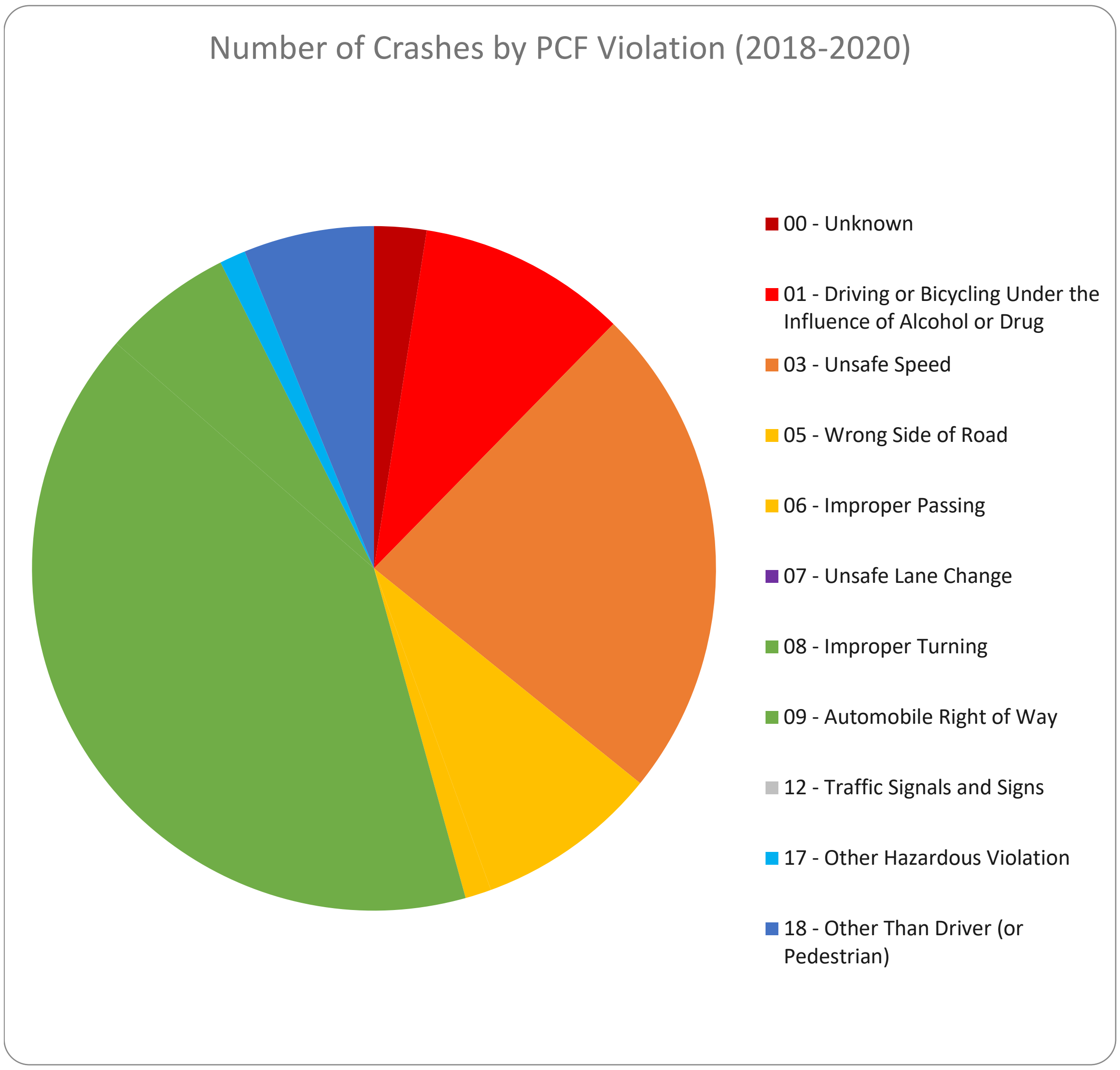
																	SR-299 (TIMS Tool- UC Berkeley)				Rural 2 and 3 Ln 3-Yr Rates (2018, 2019, 2020)		Urban 2 and 3 Ln 3-Yr Rates (2018, 2019, 2020)		Statewide 3-Yr Rates (2018, 2019, 2020)	
Segment Number	**Road Name**	**Location**	**Milepost (From-To)**	**Length (mi)**	**2020 Caltrans Ahead AADT 2wy**	**2020 Caltrans Back AADT 2wy**	**Ahead MVM**	**Back MVM**	**Total MVM**	**Number of Directional Travel Lanes**	**Passing Zones**	**Roadway Functional Classification**	**Passing Zones**	**Average Access Points per Mile**	**Truck Route Designation**	**Weight and Load Limitations**	**Number of Crashes 2018-2020**	**Number of Fatal Crashes 2018-2020**	**Crash Total per MVM**	**Fatal+Injury per MVM**	**Crash Total per MVM**	**Fatal+Injury per MVM**	**Crash Total per MVM**	**Fatal+Injury per MVM**	**Crash Total per MVM**	**Fatal+Injury per MVM**
0		I-5 Junction (Redding)	24.8																							
1 *		I-5 to Hawley Road	24.9 - 25.5	0.6	10800	18800	2.3652	4.1172	6.4824	2	n/a	Principal Arterial		0			5	0	0.77	0.00	-	-	1.13	0.56	1.05	0.5
2 *		Hawley Road to Old Oregon Trail	25.5 -27.2	1.7	9500	10800	5.89475	6.7014	12.59615					0			1	0	0.08	0.00	-	-	1.13	0.56	1.05	0.5
3 **		Old Oregon Trail to Deschutes Road	27.2 - 31.5	4.3	4750	7700	7.455125	12.08515	19.540275		Passing Zones		Passing Zones	8			16	0	0.82	0.00	1.03	0.46	-	-	1.07	0.47
4 **		Deschutes Road to Terry Mill Road	31.5 - 53.3	21.8	3950	3900	31.43015	31.0323	62.46245		Passing Lanes		Passing Lanes	4			37	6	0.59	0.10	1.03	0.46	-	-	1.07	0.47
5 **	CA-299 E	Terry Mill Road to Big Bend Road	53.5 - 60.1	6.8	3350	3550	8.3147	8.8111	17.1258		Passing Lanes EB only		Passing Lanes EB only	6	Terminal Access / STAA Route	80000 lb Max	11	0	0.64	0.00	1.03	0.46	-	-	1.07	0.47
6 **		Big Bend Road to Site Entrance 1	60.1 - 62.3	2.3	3350 [a]	3550 [a]	2.812325	2.980225	5.79255		Passing Zones		Passing Zones	3			0	0	0.00	0.00	1.03	0.46	-	-	1.07	0.47
7 **		Site Entrance 1 to Site Entrance 2	62.3 - 67.3	4.9	3250 [a]	3350 [a]	5.812625	5.991475	11.8041	1	Passing Lanes	Minor Arterial	Passing Lanes	2			4	0	0.34	0.00	1.03	0.46	-	-	1.07	0.47
8 **		Site Entrance 2 to Tamarack Road	67.3 -73.1	5.8	3150	3150	6.66855	6.66855	13.3371		Passing Lanes EB only		Passing Lanes EB only	2			4	0	0.30	0.00	1.03	0.46	-	-	1.07	0.47
9 *		Tamarack Road to Elm Street	73.1 - 74.5	1.4	3600	2400	1.8396	1.2264	3.066		Passing Zones		Passing Zones	5			1	0	0.33	0.00	-	-	1.20	0.52	1.07	0.47
10 *		Elm Street to Plumas Street (Burney)	74.5 - 75.0	0.5	8200	3600	1.4965	0.657	2.1535		Constricte d		Constricted	22			2	0	0.93	0.00	-	-	1.20	0.52	1.07	0.47

Table Notes:

(*) - Urbanized roadway segment based on road geometry and proximity to urban centers

(**) - Rural roadway segment based on road geometry and distance from urban centers

Table 1.4 Primary Crash Factor (PCF) Violation Category	Count	%
00 - Unknown	2	2.47%
01 - Driving or Bicycling Under the Influence of Alcohol or Drug	8	9.88%
03 - Unsafe Speed	19	23.46%
05 - Wrong Side of Road	7	8.64%
06 - Improper Passing	1	1.23%
07 - Unsafe Lane Change	0	0.00%
08 - Improper Turning	33	40.74%
09 - Automobile Right of Way	5	6.17%
12 - Traffic Signals and Signs	0	0.00%
17 - Other Hazardous Violation	1	1.23%
18 - Other Than Driver (or Pedestrian)	5	6.17%
Total	**81**	**100.00%**



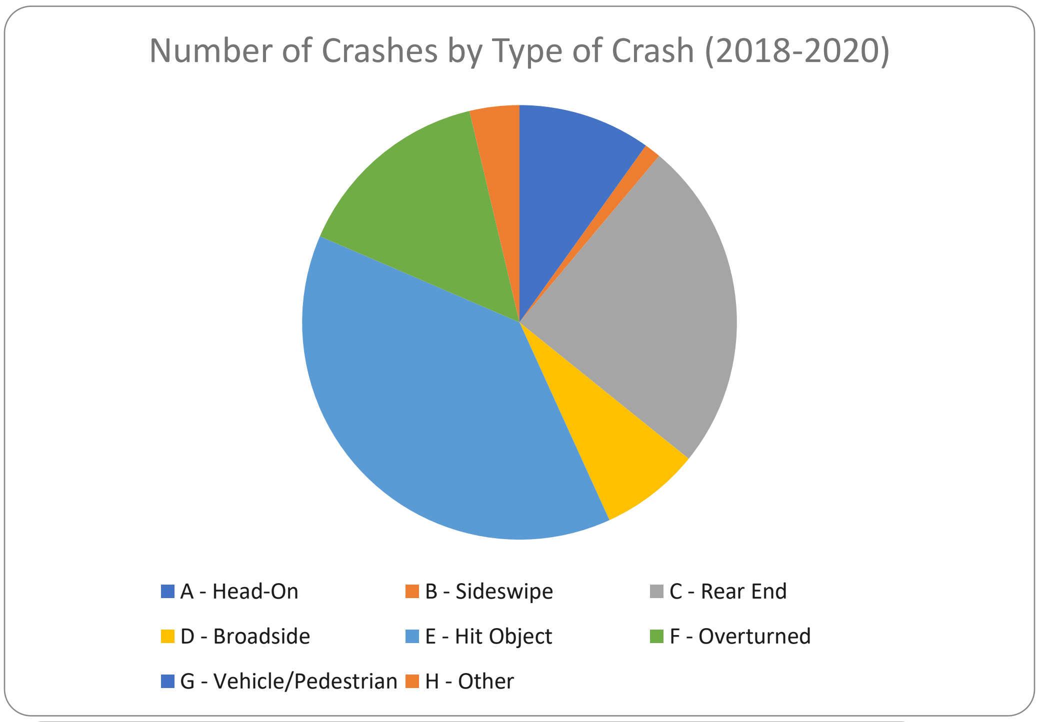
Improper Turning Crashes

13 were "ran off road; hit fixed object"
6 were "other unsafe turn; hit fixed object"
4 were "ran off road; overturned"
3 were "other unsafe turn; overturned; noncollision"
1 was "ran off road; hit other object"
1 was "proceeding straight; overturned"
1 was "other unsafe turn; hit other vehicles"
1 was "crossed into opposing lane" (fatal crash)
1 was "proceeding straight; hit fixed object"
1 was "making R turn; overturned"

Table 1.5 Lighting Condition	Count	%
Not Stated	0	0%
A - Daylight	61	75%
B - Dusk - Dawn	1	1%
C - Dark - Street Lights	2	2%
D - Dark - No Street Lights	17	21%
E - Dark - Street Lights Not Functioning	0	0%
Total	**81**	**100%**

Table 1.6 Crash Severity	Count	%
1 - Fatal	7	8.64%
2 - Injury (Severe)	11	13.58%
3 - Injury (Other Visible)	27	33.33%
4 - Injury (Complaint of Pain)	36	44.44%
Total	**81**	**100.00%**

Table 1.7 Type of Crash	Count	%
A - Head-On	8	9.88%
B - Sideswipe	1	1.23%
C - Rear End	20	24.69%
D - Broadside	6	7.41%
E - Hit Object	31	38.27%
F - Overturned	12	14.81%
G - Vehicle/Pedestrian	0	0.00%
H - Other	3	3.70%
Total	**81**	**100.00%**



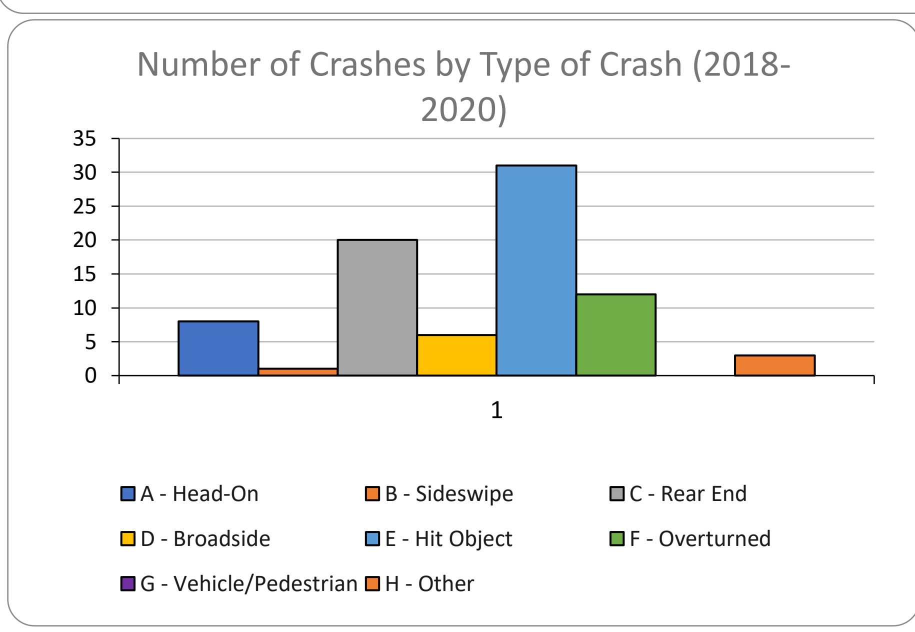


Table 1.8 Fatal Crash Analysis

Lighting in Fatal Crashes	Count	%
Not Stated	0	0%
A - Daylight	6	86%
B - Dusk - Dawn	0	0%
C - Dark - Street Lights	0	0%
D - Dark - No Street Lights	1	14%
E - Dark - Street Lights Not Functioning	0	0%
Total	**7**	**100%**

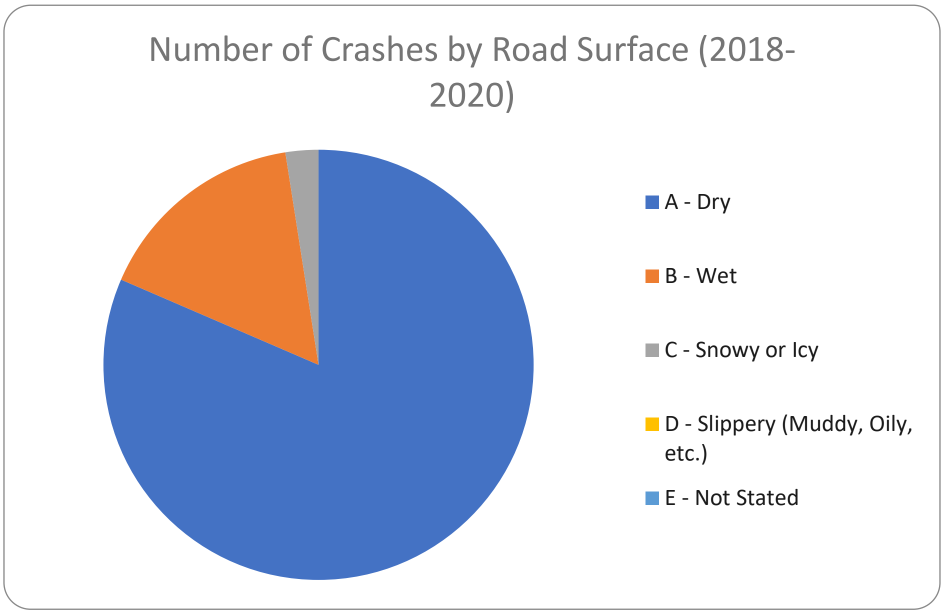
Crash Type in Fatal Crashes	Count	%
A - Head-On	7	100%
B - Sideswipe	0	0%
C - Rear End	0	0%
D - Broadside	0	0%
E - Hit Object	0	0%
F - Overturned	0	0%
G - Vehicle/Pedestrian	0	0%
H - Other	0	0%
Total	**7**	**100%**

Primary Crash Factor (PCF) Violation in Fatal Crashes	Count	%
00 - Unknown	0	0.00%
01 - Driving or Bicycling Under the Influence of Alcohol or Drug	2	28.57%
03 - Unsafe Speed	0	0.00%
05 - Wrong Side of Road	1	14.29%
06 - Improper Passing	0	0.00%
07 - Unsafe Lane Change	0	0.00%
08 - Improper Turning	3	42.86%
09 - Automobile Right of Way	0	0.00%
12 - Traffic Signals and Signs	0	0.00%
17 - Other Hazardous Violation	1	14.29%
18 - Other Than Driver (or Pedestrian)	0	0.00%
Total	**7**	**100.00%**

Road Surface in Fatal Crashes	Count	%
A - Dry	7	100%
B - Wet	0	0%
C - Snowy or Icy	0	0%
D - Slippery (Muddy, Oily, etc.)	0	0%
E - Not Stated	0	0%
Total	**7**	**100%**

Road Condition 1 in Fatal Crashes	Count	%
A - Holes, Deep Ruts	0	0.00%
B - Loose Material on Roadway	0	0.00%
C - Obstruction on Roadway	0	0.00%
D - Construction or Repair Zone	0	0.00%
E - Reduced Roadway Width	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - No Unusual Condition	7	100.00%
I - Not Stated	0	0.00%
Total	**7**	**100.00%**

Table 1.9 Road Surface	Count	%
A - Dry	66	81.48%
B - Wet	13	16.05%
C - Snowy or Icy	2	2.47%
D - Slippery (Muddy, Oily, etc.)	0	0.00%
E - Not Stated	0	0.00%
Total	**81**	**100.00%**



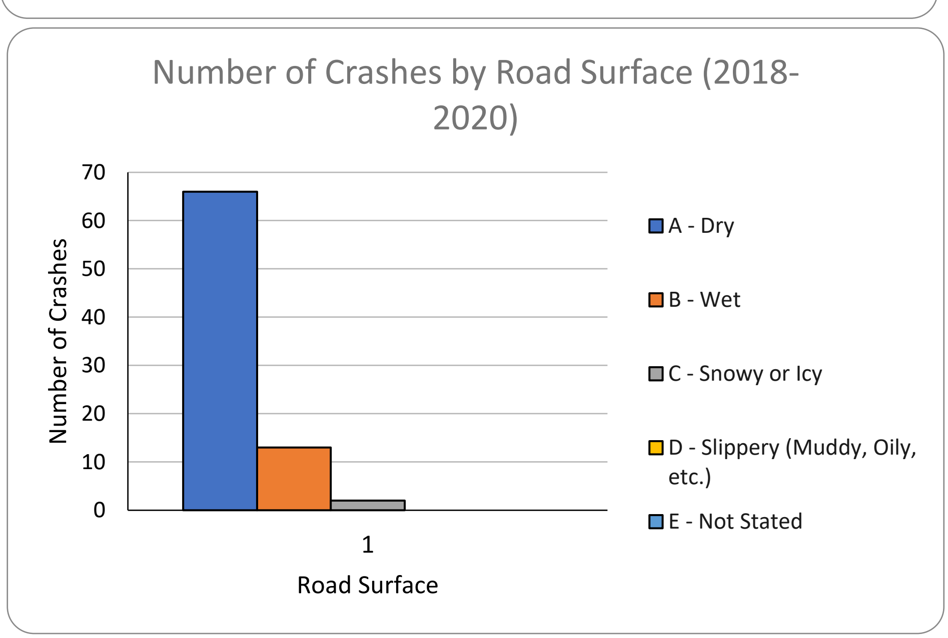


Table 1.10 Road Condition 1	Count	%
A - Holes, Deep Ruts	0	0.00%
B - Loose Material on Roadway	0	0.00%
C - Obstruction on Roadway	0	0.00%
D - Construction or Repair Zone	1	1.23%
E - Reduced Roadway Width	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - No Unusual Condition	80	98.77%
I - Not Stated	0	0.00%
Total	**81**	**100.00%**

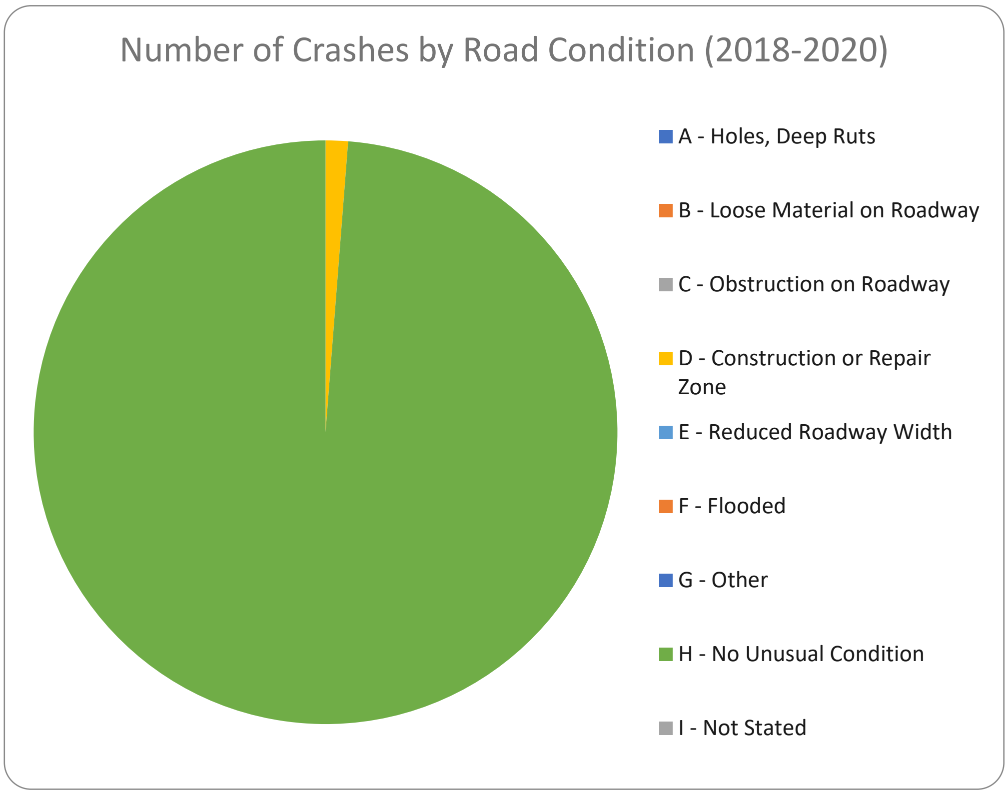


Table 1.11 Weather Conditions

Weather Condition 1	Count	%
A - Clear	65	80.25%
B - Cloudy	14	17.28%
C - Raining	2	2.47%
D - Snowing	0	0.00%
E - Fog	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - Wind	0	0.00%
I - Not Stated	0	0.00%
Total	**81**	**100.00%**

Secondary Cloudy Weather Condition	Count	%
C - Raining	5	6.17%
D - Snowing	2	2.47%
E - Fog	1	1.23%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - Wind	0	0.00%
I - Not Stated	6	7.41%
Total	**14**	**17.28%**

Table 1.12 Crash Data by Segment

Segment 1: I-5 to Hawley Road

Crash Severity	Count	%
1 - Fatal	0	0.00%
2 - Injury (Severe)	1	20.00%
3 - Injury (Other Visible)	2	40.00%
4 - Injury (Complaint of Pain)	2	40.00%
Total	**5**	**100.00%**

Lighting	Count	%
Not Stated	0	0%
A - Daylight	2	40%
B - Dusk - Dawn	1	20%
C - Dark - Street Lights	2	40%
D - Dark - No Street Lights	0	0%
E - Dark - Street Lights Not Functioning	0	0%
Total	**5**	**100%**

Crash Type	Count	%
A - Head-On	1	20%
B - Sideswipe	0	0%
C - Rear End	3	60%
D - Broadside	1	20%
E - Hit Object	0	0%
F - Overturned	0	0%
G - Vehicle/Pedestrian	0	0%
H - Other	0	0%
Total	**5**	100%

Primary Crash Factor (PCF) Violation	Count	%
00 - Unknown	1	20.00%
01 - Driving or Bicycling Under the Influence of Alcohol or Drug	1	20.00%
03 - Unsafe Speed	0	0.00%
05 - Wrong Side of Road	2	40.00%
06 - Improper Passing	0	0.00%
07 - Unsafe Lane Change	0	0.00%
08 - Improper Turning	0	0.00%
09 - Automobile Right of Way	1	20.00%
12 - Traffic Signals and Signs	0	0.00%
17 - Other Hazardous Violation	0	0.00%
18 - Other Than Driver (or Pedestrian)	0	0.00%
Total	**5**	100.00%

Road Surface	Count	%
A - Dry	5	100%
B - Wet	0	0%
C - Snowy or Icy	0	0%
D - Slippery (Muddy, Oily, etc.)	0	0%
E - Not Stated	0	0%
Total	**5**	100%

Road Condition 1	Count	%
A - Holes, Deep Ruts	0	0.00%
B - Loose Material on Roadway	0	0.00%
C - Obstruction on Roadway	0	0.00%
D - Construction or Repair Zone	0	0.00%
E - Reduced Roadway Width	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - No Unusual Condition	5	100.00%
I - Not Stated	0	0.00%
Total	**5**	100.00%

Weather Condition 1	Count	%
A - Clear	5	100.00%
B - Cloudy	0	0.00%
C - Raining	0	0.00%
D - Snowing	0	0.00%
E - Fog	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - Wind	0	0.00%
I - Not Stated	0	0.00%
Total	**5**	**100.00%**

Segment 2: Hawley Road to Old Oregon Trail

Crash Severity	Count	%
1 - Fatal	0	0.00%
2 - Injury (Severe)	0	0.00%
3 - Injury (Other Visible)	1	100.00%
4 - Injury (Complaint of Pain)	0	0.00%
Total	**1**	100.00%

Lighting	Count	%
Not Stated	0	0%
A - Daylight	1	100%
B - Dusk - Dawn	0	0%
C - Dark - Street Lights	0	0%
D - Dark - No Street Lights	0	0%
E - Dark - Street Lights Not Functioning	0	0%
Total	**1**	**100%**

Crash Type	Count	%
A - Head-On	0	0%
B - Sideswipe	0	0%
C - Rear End	1	100%
D - Broadside	0	0%
E - Hit Object	0	0%
F - Overturned	0	0%
G - Vehicle/Pedestrian	0	0%
H - Other	0	0%
Total	**1**	**100%**

Primary Crash Factor (PCF) Violation	Count	%
00 - Unknown	0	0.00%
01 - Driving or Bicycling Under the Influence of Alcohol or Drug	0	0.00%
03 - Unsafe Speed	1	100.00%
05 - Wrong Side of Road	0	0.00%
06 - Improper Passing	0	0.00%
07 - Unsafe Lane Change	0	0.00%
08 - Improper Turning	0	0.00%
09 - Automobile Right of Way	0	0.00%
12 - Traffic Signals and Signs	0	0.00%
17 - Other Hazardous Violation	0	0.00%
18 - Other Than Driver (or Pedestrian)	0	0.00%
Total	**1**	**100.00%**

Road Surface	Count	%
A - Dry	1	100%
B - Wet	0	0%
C - Snowy or Icy	0	0%
D - Slippery (Muddy, Oily, etc.)	0	0%
E - Not Stated	0	0%
Total	**1**	**100%**

Road Condition 1	Count	%
A - Holes, Deep Ruts	0	0.00%
B - Loose Material on Roadway	0	0.00%
C - Obstruction on Roadway	0	0.00%
D - Construction or Repair Zone	0	0.00%
E - Reduced Roadway Width	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - No Unusual Condition	1	100.00%
I - Not Stated	0	0.00%
Total	**1**	**100.00%**

Weather Condition 1	Count	%
A - Clear	1	100.00%
B - Cloudy	0	0.00%
C - Raining	0	0.00%
D - Snowing	0	0.00%
E - Fog	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - Wind	0	0.00%
I - Not Stated	0	0.00%
Total	**1**	**100.00%**

Segment 3: Old Oregon Trail to Deschutes Road

Crash Severity	Count	%
1 - Fatal	0	0.00%
2 - Injury (Severe)	2	12.50%
3 - Injury (Other Visible)	8	50.00%
4 - Injury (Complaint of Pain)	6	37.50%
Total	**16**	**100.00%**

Lighting	Count	%
Not Stated	0	0%
A - Daylight	14	88%
B - Dusk - Dawn	0	0%
C - Dark - Street Lights	2	13%
D - Dark - No Street Lights	0	0%
E - Dark - Street Lights Not Functioning	0	0%
Total	**16**	**100%**

Crash Type	Count	%
A - Head-On	1	6%
B - Sideswipe	0	0%
C - Rear End	9	56%
D - Broadside	2	13%
E - Hit Object	4	25%
F - Overturned	0	0%
G - Vehicle/Pedestrian	0	0%
H - Other	0	0%
Total	**16**	**100%**

Primary Crash Factor (PCF) Violation	Count	%
00 - Unknown	0	0.00%
01 - Driving or Bicycling Under the Influence of Alcohol or Drug	1	6.25%
03 - Unsafe Speed	8	50.00%
05 - Wrong Side of Road	2	12.50%
06 - Improper Passing	0	0.00%
07 - Unsafe Lane Change	0	0.00%
08 - Improper Turning	4	25.00%
09 - Automobile Right of Way	1	6.25%
12 - Traffic Signals and Signs	0	0.00%
17 - Other Hazardous Violation	0	0.00%
18 - Other Than Driver (or Pedestrian)	0	0.00%
Total	**16**	**100.00%**

Road Surface	Count	%
A - Dry	14	88%
B - Wet	2	13%
C - Snowy or Icy	0	0%
D - Slippery (Muddy, Oily, etc.)	0	0%
E - Not Stated	0	0%
Total	**16**	**100%**

Road Condition 1	Count	%
A - Holes, Deep Ruts	0	0.00%
B - Loose Material on Roadway	0	0.00%
C - Obstruction on Roadway	0	0.00%
D - Construction or Repair Zone	0	0.00%
E - Reduced Roadway Width	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - No Unusual Condition	16	100.00%
I - Not Stated	0	0.00%
Total	**16**	**100.00%**

Weather Condition 1	Count	%
A - Clear	14	77.78%
B - Cloudy	2	11.11%
C - Raining	2	11.11%
D - Snowing	0	0.00%
E - Fog	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - Wind	0	0.00%
I - Not Stated	0	0.00%
Total	**18**	**100.00%**

Segment 4: Deschutes Road to Terry Mill Road

Crash Severity	Count	%
1 - Fatal	6	16.22%
2 - Injury (Severe)	3	8.11%
3 - Injury (Other Visible)	10	27.03%
4 - Injury (Complaint of Pain)	18	48.65%
Total	**37**	**100.00%**

Lighting	Count	%
Not Stated	0	0%
A - Daylight	25	68%
B - Dusk - Dawn	0	0%
C - Dark - Street Lights	0	0%
D - Dark - No Street Lights	12	32%
E - Dark - Street Lights Not Functioning	0	0%
Total	**37**	**100%**

Crash Type	Count	%
A - Head-On	3	8%
B - Sideswipe	1	3%
C - Rear End	5	14%
D - Broadside	1	3%
E - Hit Object	18	49%
F - Overturned	8	22%
G - Vehicle/Pedestrian	0	0%
H - Other	1	3%
Total	**37**	**100%**

Primary Crash Factor (PCF) Violation	Count	%
00 - Unknown	1	2.70%
01 - Driving or Bicycling Under the Influence of Alcohol or Drug	5	13.51%
03 - Unsafe Speed	4	10.81%
05 - Wrong Side of Road	3	8.11%
06 - Improper Passing	1	2.70%
07 - Unsafe Lane Change	0	0.00%
08 - Improper Turning	19	51.35%
09 - Automobile Right of Way	1	2.70%
12 - Traffic Signals and Signs	0	0.00%
17 - Other Hazardous Violation	1	2.70%
18 - Other Than Driver (or Pedestrian)	2	5.41%
Total	**37**	**100.00%**

Road Surface	Count	%
A - Dry	29	78%
B - Wet	8	22%
C - Snowy or Icy	0	0%
D - Slippery (Muddy, Oily, etc.)	0	0%
E - Not Stated	0	0%
Total	**37**	**100%**

Road Condition 1	Count	%
A - Holes, Deep Ruts	0	0.00%
B - Loose Material on Roadway	0	0.00%
C - Obstruction on Roadway	0	0.00%
D - Construction or Repair Zone	0	0.00%
E - Reduced Roadway Width	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - No Unusual Condition	37	100.00%
I - Not Stated	0	0.00%
Total	**37**	**100.00%**

Weather Condition 1	Count	%
A - Clear	28	75.68%
B - Cloudy	9	24.32%
C - Raining	0	0.00%
D - Snowing	0	0.00%
E - Fog	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - Wind	0	0.00%
I - Not Stated	0	0.00%
Total	**37**	**100.00%**

Table 1.12 Crash Data by Segment (continued)

Segment 5: Terry Mill Road to Big Bend Road

Crash Severity	Count	%
1 - Fatal	1	9.09%
2 - Injury (Severe)	2	18.18%
3 - Injury (Other Visible)	2	18.18%
4 - Injury (Complaint of Pain)	6	54.55%
Total	**11**	**100.00%**

Lighting	Count	%
Not Stated	0	0%
A - Daylight	9	82%
B - Dusk - Dawn	0	0%
C - Dark - Street Lights	0	0%
D - Dark - No Street Lights	2	18%
E - Dark - Street Lights Not Functioning	0	0%
Total	**11**	**100%**

Crash Type	Count	%
A - Head-On	1	9%
B - Sideswipe	0	0%
C - Rear End	1	9%
D - Broadside	1	9%
E - Hit Object	7	64%
F - Overturned	1	9%
G - Vehicle/Pedestrian	0	0%
H - Other	0	0%
Total	**11**	**100%**

Primary Crash Factor (PCF) Violation	Count	%
00 - Unknown	0	0.00%
of Alcohol or Drug	0	0.00%
03 - Unsafe Speed	3	27.27%
05 - Wrong Side of Road	0	0.00%
06 - Improper Passing	0	0.00%
07 - Unsafe Lane Change	0	0.00%
08 - Improper Turning	7	63.64%
09 - Automobile Right of Way	0	0.00%
12 - Traffic Signals and Signs	0	0.00%
17 - Other Hazardous Violation	0	0.00%
18 - Other Than Driver (or Pedestrian)	1	9.09%
Total	**11**	**100.00%**

Road Surface	Count	%
A - Dry	9	82%
B - Wet	2	18%
C - Snowy or Icy	0	0%
D - Slippery (Muddy, Oily, etc.)	0	0%
E - Not Stated	0	0%
Total	**11**	**100%**

Road Condition 1	Count	%
A - Holes, Deep Ruts	0	0.00%
B - Loose Material on Roadway	0	0.00%
C - Obstruction on Roadway	0	0.00%
D - Construction or Repair Zone	0	0.00%
E - Reduced Roadway Width	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - No Unusual Condition	11	100.00%
I - Not Stated	0	0.00%
Total	**11**	**100.00%**

Weather Condition 1	Count	%
A - Clear	9	81.82%
B - Cloudy	1	9.09%
C - Raining	1	9.09%
D - Snowing	0	0.00%
E - Fog	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - Wind	0	0.00%
I - Not Stated	0	0.00%
Total	**11**	**100.00%**

Segment 7: Site Entrance 1 to Site Entrance 2

Crash Severity	Count	%
1 - Fatal	0	0.00%
2 - Injury (Severe)	1	50.00%
3 - Injury (Other Visible)	0	0.00%
4 - Injury (Complaint of Pain)	1	50.00%
Total	**2**	**100.00%**

Lighting	Count	%
Not Stated	0	0%
A - Daylight	2	100%
B - Dusk - Dawn	0	0%
C - Dark - Street Lights	0	0%
D - Dark - No Street Lights	0	0%
E - Dark - Street Lights Not Functioning	0	0%
Total	**2**	**100%**

Crash Type	Count	%
A - Head-On	1	50%
B - Sideswipe	0	0%
C - Rear End	0	0%
D - Broadside	0	0%
E - Hit Object	0	0%
F - Overturned	1	50%
G - Vehicle/Pedestrian	0	0%
H - Other	0	0%
Total	**2**	**100%**

Primary Crash Factor (PCF) Violation	Count	%
00 - Unknown	0	0.00%
of Alcohol or Drug	0	0.00%
03 - Unsafe Speed	0	0.00%
05 - Wrong Side of Road	1	50.00%
06 - Improper Passing	0	0.00%
07 - Unsafe Lane Change	0	0.00%
08 - Improper Turning	1	50.00%
09 - Automobile Right of Way	0	0.00%
12 - Traffic Signals and Signs	0	0.00%
17 - Other Hazardous Violation	0	0.00%
18 - Other Than Driver (or Pedestrian)	0	0.00%
Total	**2**	**100.00%**

Road Surface	Count	%
A - Dry	1	50%
B - Wet	0	0%
C - Snowy or Icy	1	50%
D - Slippery (Muddy, Oily, etc.)	0	0%
E - Not Stated	0	0%
Total	**2**	**100%**

Road Condition 1	Count	%
A - Holes, Deep Ruts	0	0.00%
B - Loose Material on Roadway	0	0.00%
C - Obstruction on Roadway	0	0.00%
D - Construction or Repair Zone	0	0.00%
E - Reduced Roadway Width	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - No Unusual Condition	2	100.00%
I - Not Stated	0	0.00%
Total	**2**	**100.00%**

Weather Condition 1	Count	%
A - Clear	1	50.00%
B - Cloudy	1	50.00%
C - Raining	0	0.00%
D - Snowing	0	0.00%
E - Fog	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - Wind	0	0.00%
I - Not Stated	0	0.00%
Total	**2**	**100.00%**

Segment 8: Site Entrance 2 to Tamarack Road

Crash Severity	Count	%
1 - Fatal	0	0.00%
2 - Injury (Severe)	1	16.67%
3 - Injury (Other Visible)	4	66.67%
4 - Injury (Complaint of Pain)	1	16.67%
Total	**6**	**100.00%**

Lighting	Count	%
Not Stated	0	0%
A - Daylight	5	83%
B - Dusk - Dawn	0	0%
C - Dark - Street Lights	0	0%
D - Dark - No Street Lights	1	17%
E - Dark - Street Lights Not Functioning	0	0%
Total	**6**	**100%**

Crash Type	Count	%
A - Head-On	0	0%
B - Sideswipe	0	0%
C - Rear End	1	17%
D - Broadside	0	0%
E - Hit Object	2	33%
F - Overturned	2	33%
G - Vehicle/Pedestrian	0	0%
H - Other	1	17%
Total	**6**	**100%**

Primary Crash Factor (PCF) Violation	Count	%
00 - Unknown	0	0.00%
of Alcohol or Drug	0	0.00%
03 - Unsafe Speed	0	0.00%
05 - Wrong Side of Road	1	50.00%
06 - Improper Passing	0	0.00%
07 - Unsafe Lane Change	0	0.00%
08 - Improper Turning	1	50.00%
09 - Automobile Right of Way	0	0.00%
12 - Traffic Signals and Signs	0	0.00%
17 - Other Hazardous Violation	0	0.00%
18 - Other Than Driver (or Pedestrian)	0	0.00%
Total	**2**	**100.00%**

Road Surface	Count	%
A - Dry	4	67%
B - Wet	0	0%
C - Snowy or Icy	2	33%
D - Slippery (Muddy, Oily, etc.)	0	0%
E - Not Stated	0	0%
Total	**6**	**100%**

Road Condition 1	Count	%
A - Holes, Deep Ruts	0	0.00%
B - Loose Material on Roadway	0	0.00%
C - Obstruction on Roadway	0	0.00%
D - Construction or Repair Zone	0	0.00%
E - Reduced Roadway Width	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - No Unusual Condition	6	100.00%
I - Not Stated	0	0.00%
Total	**6**	**100.00%**

Weather Condition 1	Count	%
A - Clear	4	66.67%
B - Cloudy	1	16.67%
C - Raining	1	16.67%
D - Snowing	0	0.00%
E - Fog	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - Wind	0	0.00%
I - Not Stated	0	0.00%
Total	**6**	**100.00%**

Segment 9: Tamarack Road to Elm Street

Crash Severity	Count	%
1 - Fatal	0	0.00%
2 - Injury (Severe)	1	100.00%
3 - Injury (Other Visible)	0	0.00%
4 - Injury (Complaint of Pain)	0	0.00%
Total	**1**	**100.00%**

Lighting	Count	%
Not Stated	0	0%
A - Daylight	1	100%
B - Dusk - Dawn	0	0%
C - Dark - Street Lights	0	0%
D - Dark - No Street Lights	0	0%
E - Dark - Street Lights Not Functioning	0	0%
Total	**1**	**100%**

Crash Type	Count	%
A - Head-On	1	100%
B - Sideswipe	0	0%
C - Rear End	0	0%
D - Broadside	0	0%
E - Hit Object	0	0%
F - Overturned	0	0%
G - Vehicle/Pedestrian	0	0%
H - Other	0	0%
Total	**1**	**100%**

Primary Crash Factor (PCF) Violation	Count	%
00 - Unknown	0	0.00%
of Alcohol or Drug	0	0.00%
03 - Unsafe Speed	0	0.00%
05 - Wrong Side of Road	1	100.00%
06 - Improper Passing	0	0.00%
07 - Unsafe Lane Change	0	0.00%
08 - Improper Turning	0	0.00%
09 - Automobile Right of Way	0	0.00%
12 - Traffic Signals and Signs	0	0.00%
17 - Other Hazardous Violation	0	0.00%
18 - Other Than Driver (or Pedestrian)	0	0.00%
Total	**1**	**100.00%**

Road Surface	Count	%
A - Dry	1	100%
B - Wet	0	0%
C - Snowy or Icy	0	0%
D - Slippery (Muddy, Oily, etc.)	0	0%
E - Not Stated	0	0%
Total	**1**	**100%**

Road Condition 1	Count	%
A - Holes, Deep Ruts	0	0.00%
B - Loose Material on Roadway	0	0.00%
C - Obstruction on Roadway	0	0.00%
D - Construction or Repair Zone	0	0.00%
E - Reduced Roadway Width	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - No Unusual Condition	1	100.00%
I - Not Stated	0	0.00%
Total	**1**	**100.00%**

Weather Condition 1	Count	%
A - Clear	1	100.00%
B - Cloudy	0	0.00%
C - Raining	0	0.00%
D - Snowing	0	0.00%
E - Fog	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - Wind	0	0.00%
I - Not Stated	0	0.00%
Total	**1**	**100.00%**

Table 1.12 Crash Data by Segment (continued)

Segment 10: Elm Street to Plumas Street

Crash Severity	Count	%
1 - Fatal	0	0.00%
2 - Injury (Severe)	0	0.00%
3 - Injury (Other Visible)	0	0.00%
4 - Injury (Complaint of Pain)	2	100.00%
Total	**2**	**100.00%**

Lighting	Count	%
Not Stated	0	0%
A - Daylight	2	100%
B - Dusk - Dawn	0	0%
C - Dark - Street Lights	0	0%
D - Dark - No Street Lights	0	0%
E - Dark - Street Lights Not Functioning	0	0%
Total	**2**	**100%**

Crash Type	Count	%
A - Head-On	0	0%
B - Sideswipe	0	0%
C - Rear End	0	0%
D - Broadside	2	100%
E - Hit Object	0	0%
F - Overturned	0	0%
G - Vehicle/Pedestrian	0	0%
H - Other	0	0%
Total	**2**	**100%**

Primary Crash Factor (PCF) Violation	Count	%
00 - Unknown	0	0.00%
of Alcohol or Drug	0	0.00%
03 - Unsafe Speed	0	0.00%
05 - Wrong Side of Road	0	0.00%
06 - Improper Passing	0	0.00%
07 - Unsafe Lane Change	0	0.00%
08 - Improper Turning	0	0.00%
09 - Automobile Right of Way	2	100.00%
12 - Traffic Signals and Signs	0	0.00%
17 - Other Hazardous Violation	0	0.00%
18 - Other Than Driver (or Pedestrian)	0	0.00%
Total	**2**	**100.00%**

Road Surface	Count	%
A - Dry	2	100%
B - Wet	0	0%
C - Snowy or Icy	0	0%
D - Slippery (Muddy, Oily, etc.)	0	0%
E - Not Stated	0	0%
Total	**2**	**100%**

Road Condition 1	Count	%
A - Holes, Deep Ruts	0	0.00%
B - Loose Material on Roadway	0	0.00%
C - Obstruction on Roadway	0	0.00%
D - Construction or Repair Zone	0	0.00%
E - Reduced Roadway Width	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - No Unusual Condition	2	100.00%
I - Not Stated	0	0.00%
Total	**2**	**100.00%**

Weather Condition 1	Count	%
A - Clear	2	100.00%
B - Cloudy	0	0.00%
C - Raining	0	0.00%
D - Snowing	0	0.00%
E - Fog	0	0.00%
F - Flooded	0	0.00%
G - Other	0	0.00%
H - Wind	0	0.00%
I - Not Stated	0	0.00%
Total	**2**	**100.00%**

4.0 CONSTRUCTION TRAFFIC OVERVIEW

Westwood estimated the full construction period traffic volume based on the types of delivery, construction, operations, maintenance, and worker vehicles required during the various phases of the project. Westwood estimated trips into and out of the development area based on the projected number of deliveries, the required types of equipment and material, and the projected number of employees necessary to complete the project over the estimated construction period. Typically, the selected construction contractor will determine the project timeline. These volumes of trips were calculated using a spreadsheet that lists every known phase of construction with corresponding equipment, material, and numbers of employees, which are then averaged over the course of the project period.

During construction, the project will employ an estimated maximum number of 199 workers/day during the peak period of construction, which include construction workers, project management staff, equipment operators, survey staff, and delivery vehicle drivers during the peak period. The calculation of workers and delivery vehicles was developed using a construction estimation based on time and materials and using crew productivity data from RS Means, an industry-standard construction cost estimating software package. The total number of trips was determined by using the number of employees in each of the categories listed above, dividing that number by an estimated vehicle occupancy of 2 employees and multiplying by the number of workdays for each employee category. Typically, construction projects show a bell-curve distribution of workers through the construction period. Initial site mobilization and early site preparation work will have fewer workers. The number of workers will build to a peak during the period of greatest activity. As construction draws to a close, the average number of workers per day will decrease as crews complete their work.

As a result, the estimated number of workdays and total number of two-way trips for each category are:

- 250 days for commuters (36,966 total two-way trips);
- 250 days for equipment (262 total two-way trips);
- 250 days for aggregate deliveries (26,749 total two-way trips);
- 200 days for turbine deliveries (5,909 total two-way trips);
- 230 days for concrete deliveries (5,140 total two-way trips);
- 250 days for miscellaneous materials deliveries (560 total two-way trips) and;
- 250 days for water deliveries (8,418 total two-way trips)

Thus, over the estimated two-year construction period, the total number of all two-way trips is approximately 84,003 trips.

After the construction of the wind farm, operations, and maintenance traffic will be limited to a few passenger vehicle trips per day.

General summaries of the construction work tasks, and related delivery and construction vehicles are listed below.

4.1 WORK TASKS

Work Tasks are generally listed in chronological order, but extensive overlap can be expected depending on the contractor's scheduling.

- Survey the project site and set construction stakes
- Install and maintain erosion and sediment control
- Timber removal/clear and grub laydown, substations, O&M, access roads, and turbine pads areas
- Grade field office and O&M locations
- Deliver and Install Field Office trailers
- Grade temporary laydown areas
- Improve logging roads/construct access roads – grade and place aggregate
- Erect security fencing – enclosing laydown yards and facilities
- Excavate turbine foundations
- Place foundation mud mat
- Place foundation reinforcing
- Place foundation forms
- Place foundation concrete
- Strip forms
- Backfill foundations
- Unload turbine components
- Erect turbine tower sections using base crane
- Erect top turbine tower section, nacelle, hub, and blades using topping crane
- Grade transformer pad areas
- Install turbine transformers
- Connect turbine to transformer wiring
- Grade substation and switching substation areas
- Construct substation and O&M foundations
- Trench underground collector system (34.5kV)
- Install overhead collection system lines (34.5kV)
- Construct O&M Facility
- Construct substation and switching substation equipment and main power transformer foundations
- Install step-up substation and switching substation equipment and Supervisory Control and Data Acquisition (SCADA)
- Place step-up substation and switching substation aggregate
- Install security fence around step-up substation and switching substation
- Connect step-up substation to switching substation
- Connect switching substation to transmission line
- Test and commission equipment

- Remove field offices, security fencing, and replace topsoil
- Remove staging area security fences and replace topsoil
- Restore, revegetate, and remove temporary erosion and sediment control

4.2 CONSTRUCTION EQUIPMENT

Examples of the types of equipment generally used in wind farm construction are listed below. **Exhibit 4** lists the number and type of equipment assumed for construction:

- Erosion and sediment control – silt fence trenchers
- Timber harvest/removal – typical forestry equipment such as feller-bunchers, shears, skidders, hydro-axe, and logging trucks
- Grading (field office location, staging areas, O&M facility, step-up substation, and switching substation) – medium bulldozers, scrapers, road grader, compaction rollers, and water trucks
- Logging road/access road improvements – medium bulldozers, road grader, scrapers, compaction rollers, and water trucks
- Materials handling equipment (unloading wind turbine components) – hydraulic (helper) cranes, small flat-bed trailers pulled by pick-up trucks, heavy crawler cranes
- Security fencing – skid-steer with auger attachment, and hydraulic post driver attachment, and hand tools for each crew
- Turbine foundations – medium bulldozer, excavator, hydraulic crane, and concrete pump truck
- Tower base erection – hydraulic (helper) cranes and base crane
- Tower top/nacelle/hub/blades erection – hydraulic cranes and topper crane
- Pad mounted transformers at each turbine – truck mounted or mobile hydraulic crane
- Turbine wiring – hand tools
- 34.5 kV underground collector trenching – specialized trenching equipment, cable plows, and back hoes, cable reel trailers
- 34.5 kV overhead collection line – backhoe with auger attachment, specialized pole setting equipment (boom trucks), bucket trucks, cable reel trailers
- O&M and substation equipment foundations – back hoe
- Substation construction – bulldozer, backhoe, compaction roller, water trucks, mobile hydraulic crane, large crane (MPT)
- Switching substation construction – bulldozers, backhoes, compaction rollers, water trucks, mobile hydraulic crane
- Substation to interconnect transmission line – foundation auger mounted on back hoe, mobile hydraulic crane
- O&M Building – mobile hydraulic crane
- Removal of temporary aggregate (field office location and staging areas) – Front end loader

- Revegetation and removal of erosion and sediment control – chisel plow (decompaction), small tractor and tilling equipment, skid steer loader, hydro seeding/hydro-mulching equipment

4.3 MATERIALS

Examples of materials used in the construction of wind farms is listed below. **Exhibit 4** lists the materials assumed for construction:

- Silt fence, bio log, and other erosion and sediment control materials
- Aggregate (access roads, staging areas, O&M facility, substations)
- Security fencing (field office location, staging areas, substations)
- Field Offices and storage trailers
- Formwork for foundations (equipment pads, O&M, substation transformers and equipment, and switching substation equipment)
- Rebar for above concrete foundations
- Concrete for wind turbine foundations and transformer pads
- Concrete for O&M facility foundation
- Concrete for substation foundations (Main Power Transformer (MPT), electrical equipment, and control building)
- O&M Building materials
- Collection system wiring (underground and overhead)
- Electrical equipment (transformers, switch gear, circuit breakers, junction boxes, conduit, SCADA, etc.)
- Structural steel for substation racking
- Structural steel poles for overhead collection line
- Main power transformers
- Transmission line cables (from switching substation to transmission line)
- Water for aggregate/backfill compaction, vegetation establishment, and dust control
- Miscellaneous consumables
- Plant stock, seed, and mulch

4.4 MATERIAL DELIVERY VEHICLES

The types of vehicles used for material deliveries is listed below. **Exhibit 4** lists the material delivery vehicles assumed for construction:

- Semi-Trailer Flatbed Trucks for hauling logs off of site
- Single Unit Flatbed Trucks - Erosion and sediment control materials, plant stock, seed, and mulch, miscellaneous consumables
- Gravel Semi-Trailer Dump Trucks with a 16 cubic yard load capacity (loose volume) with an approximate gross vehicle weight of 80,000 pounds and a load weight of approximately 40,000 pounds.
- Field office trailers (one 40’ x 12’ for PM use; 12’ x 36’ triple wide for subs use)

- Concrete Trucks- with a 10 CY capacity, weighing approximately 69,000 pounds
- Semi-Trailer Flat Bed – security fence, concrete forms, rebar, O&M building components, transformers, miscellaneous turbine materials, structural steel for substations, electrical equipment for substation, - Non-permit load size 8'-6" x 8'-6" x 48'-0", gross vehicle weight 80,000 pounds, up to 45,000 pound loads
- Cable trailers – 34.5 kV underground, 34.5 kV overhead, and overhead transmission from switching substation to transmission line
- Overhead collection system pole trailers
- Water trucks – 4000 gallon capacity, single unit tank trucks, weighing approximately 59,000 pounds
- Lowboy Multi-Axel Trailer –Main power transformer, substation control building
- Workers' trucks (Pick-up trucks –average 1.5 occupants)

4.5 EQUIPMENT DELIVERY VEHICLES

Types of vehicles used for the delivery of construction equipment:

- Lowboy semi-trailer – Logging equipment, bulldozers, scrapers, compaction rollers, road grader, excavator, trenching equipment, backhoes, hydraulic (helper) cranes, crawler cranes, skid steer loaders, trenchers, cable plows, agricultural plows
- Single unit flatbed truck – Hydro much/hydro-seed equipment
- Small flatbed trailers towed behind pick-up trucks for small equipment and tools

5.0 CONSTRUCTION & SCHEDULE

Construction of wind farms requires that a few tasks be repeated across the project site. Some sequencing of tasks is required, but many tasks may overlap across the site for efficient scheduling. The construction of the operations and maintenance facility, substation, switching substation, and underground and overhead collection systems can overlap with other tasks or can be exceptions, depending on the scheduling of and priority of precedent activities.

For the purpose of determining the daily volume of traffic, construction time is estimated to take approximately two years (approximately 250 business days), with construction occurring only during the spring, summer, and fall. Wind farm sites are large and allow many crews to work simultaneously without interfering with one another. Nevertheless, the size of the project (number of wind turbines) impacts the construction time significantly because the cost of mobilizing the large cranes required for turbine erection is high, and because the cranes are in such high demand that mobilizing a small number of cranes is typical on wind projects.

6.0 OVERSIZED LOADS AND PERMITTING

The logistics of delivering the oversized loads for the wind turbines, with the use of specialized transportation vehicles, also creates schedule constraints. A Transportation Management Plan would be prepared to minimize impacts from the transportation of oversized loads and to direct deliveries to off-peak hours.

Trucks carrying turbine components such as blades and nacelles will be oversized and will be required to be accompanied by pilot cars. Oversized load transportation permits will be obtained in coordination with CalTrans.

These oversized trucks would likely be required to travel over bridges and overpasses. Weight and size limits may require detours in accordance with Caltrans direction. A logistical route analysis that focuses more on geometrics and bridge capacity will be performed following the final selection of the turbine model to be used for the project. Because there is direct project access to the state highway, and based on the fact that the adjacent Hatchet Ridge project delivered oversized components along this same infrastructure, the existing highway and bridge geometrics will likely be able to accommodate the planned deliveries. This will be verified by a logistical route survey when a turbine manufacturer, turbine model, and contractor have been selected.

Westwood has contacted Caltrans' Office of Transportation Permits. This office reviews and approves oversize/overweight permits along state highways. They have responded that any specific weight and height limitations would only be determined once a contractor has been selected and a Route Request Permit defining the origin and destination of the equipment/components is requested. The Caltrans variance coordinator will then review the request and issue the permit.

Variance permits are required for anything over 53 feet in length with a maximum kingpin of 43 feet. A variance permit would be required for each blade or component delivery.

Once the requested route permit has been received by Caltrans, it will take up to thirty days to review and issue the permit. Bridge ratings will be tested depending on the loads forecast for each component and delivery vehicle.

Also, the Transportation Permit office states that even though SR 299 is identified as a "Blue Route" and pilot cars will be assumed for each blade delivery vehicle, the contractor will likely be required to contract with the California Highway Patrol (CHP) for escorts.

As far as roadway connections to SR 299, Caltrans Transportation Permits Office noted that coordination with the District 2 Encroachments Office will be required to determine what additional planning or roadway improvements would be needed to accommodate the oversized loads. A "Swept Path Analysis" must be completed that shows turn-by-turn impacts that might be experienced by the oversized loads along SR 299 or at side road intersections.

In summary, the sizes and weights of the selected components, the dimensions of the vehicles delivering them, the delivery routes and the route surveys will be completed as part of the Caltrans review process.

Nevertheless, all deliveries of components and materials for the Fountain Wind project will be similar to those of the Hatchet Ridge project, with the exception of turbine blade deliveries. Fountain is proposing WTG ranging from 3 to 7.2 MW. WTG models in the lower size range of those proposed will have similar blade lengths as the 2.3 MW Siemens WTGs constructed on Hatchet Ridge. The largest blade length proposed for Fountain would be approximately 261’ in length, which would be approximately 90’ longer than those delivered to Hatchet Ridge. Although Fountain may utilize longer blade lengths, the haul trucks will include rear-axle steering capabilities, thereby mitigating potential turning constraints.

Caltrans roads are designed to comply with the state Highway Design Manual. Vehicular design speeds are listed for various highway types. For conventional rural highways, the following design speeds are listed:

- Flat terrain 55-70 mph
- Rolling terrain 50-60 mph
- Mountainous terrain 40-50 mph

It is uncertain as to which design speed SR 299 is designed. It is likely that the design speed varies throughout its length – flat to rolling near Redding, rolling to mountainous near Montgomery Creek and Hillcrest.

According to the Caltrans Highway Design Manual, the k-value is the distance in feet required to achieve a 1% change in grade. Thus, the following k-values are listed under each condition:

- For stopping sight distances on crest vertical curves, the k-value = 68 feet when design speed is 40 mph
- For stopping sight distances on crest vertical curves, the k-value = 139 feet when design speed is 50 mph
- For stopping sight distances on sag vertical curves, the k-value = 62 feet when design speed is 40 mph
- For stopping sight distances on sag vertical curves, the k-value = 97 feet when design speed is 50 mph

According to a "desktop review", there appear to be no underpasses along SR 299 east of I-5. There are two overpasses, however – one at Churn Creek Road and one at Old Oregon Trail on the east side of Redding. Further to the east, there appear to be two creek crossings (Salt Creek Bridge 6-49 and Cedar Creek Bridge 6-20) along SR 299 between I-5 and the proposed access roadways for Fountain Wind. There is one creek crossing along SR 299 between the proposed access roads for Fountain Wind and Burney (Burney Creek Bridge 6-12). As of this writing, weight limits for these bridges have not been determined.

Regarding horizontal curves, a "desktop review" of SR 299 shows three curves with radii less than 1,000 feet. SR 299 has a curve with a radius of approximately 600 feet near Montgomery Creek. SR 299 has a curve with a radius of approximately 700 feet near Hillcrest. Near Burney, there appears to be a curve with a radius of approximately 650 feet.

The speed limit along SR 299 is 55 mph for trucks with three or more axles, but there are places along SR 299 where the advisory speed drops to 40 and 45 mph approaching the sharper curves. Also, there are passing lanes at some of the steeper inclines.

The geometry resulting from the basic highway design criteria appears to exceed the requirements for turbine component delivery, which requires a minimum k-value in the range of 20 (and which comfortably falls within the k-values of the highway design above). Further, turbine component delivery specifications require a minimum horizontal curve of 200'. Therefore, while it appears there is little risk that the turbine delivery vehicles will not be able to navigate the existing geometry of the highway, a route survey by a permit service and a "swept path" analysis will be able to verify this statement and support Caltrans authorizations.

Upon approach to the site, turbine deliveries will be directed to proceed directly to the appropriate turbine pad sites for offloading. Construction access points off SR 299 will provide adequate turning radii to ingress/egress the site with minimal time required for turning maneuvers. Because the turbine pad sites are distributed throughout the site and not directly adjacent to state SR 299, if queuing were to occur, it is expected that the queues would take place on access roads near the turbine pad sites – wholly within the project site.

7.0 CONSTRUCTION TRAFFIC MANAGEMENT PLAN

A Construction Traffic Management Plan (CTMP) will be developed and presented once the construction contractor has been selected. Upon selection, the contractor will review the site and available aggregate and water sources. The contractor will provide input on project staging and equipment delivery that will be incorporated and used to define the CTMP. Therefore, the CTMP will be specific to the construction approach and phasing, as well as specific to the location and environment, of the project area.

Specifically, the CTMP will be implemented for the Fountain Wind Project site during construction to address the safety requirements of the project. This plan will reflect the assessment conducted to define the plan, as well as the details of the plan itself. The CTMP will include:

- A consideration of the existing traffic, pedestrian, and cycling activity along SR 299 as well as the related road/intersection operations;
- A determination of the route that minimizes conflicts with emergency vehicles between staging/loading sites and proposed wind turbine sites;
- An articulation plan to manage construction traffic in a manner that minimizes the potential impact on local wildlife;
- The specific measures to be implemented during the construction phase of the project, which incorporate the principles and guidelines of the Caltrans Transportation Permits Manual; and
- Any additional environmental protection measures that the project proposed to further avoid or minimize potential impacts to traffic and safety. **Appendix E** of this report includes a list of potential Environmental Protection Measures (EPMs) that may be applicable for inclusion in the CTMP prepared for the Fountain Wind project.

The ConnectGen/Westwood Team will work with the contractor to ensure that key transportation considerations related to residents and businesses along SR 299 and within Shasta County and the planned construction of wind turbines are sensitive to the following:

- Potential conflicts between construction-related traffic and the day-to-day activities associated with the local area, including local travel by car, school bus, bicycle, or on foot as well as the movement of logging equipment;
- The need to ensure that residents and emergency response agencies are aware of the temporary conditions during construction that could affect traffic mobility and safety in various parts of the county depending on the location of the work sites; and,
- The need to ensure that local wildlife and its habitat are not adversely impacted by the construction traffic associated with the project.

The ConnectGen/Westwood Team will work with the contractor to develop a public information strategy to ensure that communication of the traffic plan will be shared with the residents and businesses in the area. This includes installing Road Restriction Notice Signs near all work sites a minimum of one week before any lane closures or detours. This will allow residents to effectively plan their routes, and mitigate the overall impact caused by the work and deliveries to the site. An activity forecast report shall be provided to the California Energy Commission and Shasta County outlining construction activity a minimum of two weeks before any work commencing.

8.0 ANALYSIS

The traffic impacts of the Fountain Wind Project were evaluated with three different analyses during the project construction period and after the project construction period. **Vehicle Miles Traveled** (VMT) were calculated per the requirements of California Senate Bill 743. **Intersection Level of Service** (LOS) was analyzed at the intersections of the two Project access roads with SR 299. **Left Turn Warrants** were also evaluated at the intersections of the two Project access roads with SR 299.

8.1 VMT ANALYSIS

California Senate Bill 743 was signed into law in 2013 in order to utilize VMT to review the potential impact of land use projects on the State Highway System. As of July 1, 2020, the state of California has fully adopted a change in the California Environmental Quality Act (CEQA) significant impact methodology for transportation impacts to use VMT as opposed to LOS. The intent of SB 743 is to align transportation impacts under CEQA with the State's overall goals of increasing long-term sustainability by encouraging infill development, increasing reliance on mass transit, and reducing greenhouse gas (GHG) emissions. VMT analysis focuses on automobile and light-duty truck trips, although heavy duty truck trips can be included in the analysis for convenience (OPR, 2018). Construction trips typically are not analyzed in a VMT analysis because they are temporary and would not impact overall per capita VMT in the region; however, they are provided here for informational purposes. Note also that CEQA Guidelines section 15064.3 (b)(3) suggests that analysis of VMT from construction traffic be qualitative. This same section also suggests that the focus be on automobile (e.g. passenger vehicle) trips.

VMT is calculated by multiplying the amount of daily traffic on a roadway segment by the length of the segment, then summing all the segments (see **Exhibit 4**). Westwood estimated the number of trips taken by trucks and other vehicles to haul equipment, material, aggregate, turbines, concrete, water, and employees. Westwood then estimated the mileage that would be logged to perform these trips during the two-year construction period.

For this analysis, it was assumed that deliveries of manufactured components (i.e., turbine components and blades) will likely originate from the east and travel from Reno, Nevada to the site via US 395, SR 139, and SR 299. Similarly, the Project identified other equipment and materials would be delivered prior to construction from the city of Redding to the west and the town of Burney to the east. From these calculations, it is estimated that the total VMT during the construction period will be **4,283,329 vehicle miles traveled** (see **Exhibit 4**) based on the following number of workdays and total VMT of two-way trips for each trip category:

- 250 days for commuters (1,256,844 total two-way VMT)

- 250 days for equipment (13,100 total two-way VMT)
- 250 days for aggregate trips (534,980 total two-way VMT)
- 250 days for turbine deliveries (2,025,068 total two-way VMT)
- 250 days for concrete deliveries (257,000 total two-way VMT)
- 250 days for miscellaneous materials deliveries (27,978 total two-way VMT) and;
- 250 days for water deliveries (168,360 total two-way VMT)

As provided above, the majority of VMT results from delivery of turbine components, due to the long distance traveled from Reno, NV. Construction commuter trips are the next largest contributor to construction VMT, due to the number of daily trips from construction workers. However, most of these workers are expected to come from the region and would not represent a large influx of commutes, but rather a redistribution from other construction sites in the region to the Project site. Note again that all of these vehicle miles travelled are temporary and would cease to occur following completion of construction. SB 743 was enacted to chiefly address on-going sources of greenhouse gas emissions from land use projects such as residential, office, and retail developments and not to address temporary construction traffic for renewable energy projects.

The post-construction VMT would be much less. Westwood assumed there would be four (4) vehicles per day utilized for operations and maintenance of the wind farm. It is assumed that each vehicle would be traveling an average of 60 miles per day from their place of origin to the wind farm for inspection, maintenance, and operation, and then return. Therefore, the total VMT per day post-construction is estimated to be **240 vehicle miles traveled**. Assuming a vehicle occupancy of two (2) full-time employees per vehicle, the per capita daily VMT for the permanent employees at the facility is estimated to be approximately **30 vehicle miles per day**.

It is recommended that in adopting a VMT significance threshold for this project, the California Energy Commission choose a metric that takes into account that the ultimate goal and purpose of the project is to create a utility-scale electricity generation source with near-zero GHG emissions and to displace the generation of electricity through the use of GHG-emitting fossil fuels. As set forth in the Shasta County Draft EIR on VMT:

> *The intent of SB 743 is to encourage land use and transportation planning decisions and investments to reduce VMT and thereby contribute to the reduction of GHG emissions, as required by Assembly Bill 32. Therefore, for purposes of this Project, the Project's impact to VMT would be significant if it would conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs. The evalution of Impact 3.10-2 in Section 3.10, GHG Emissions, concludes that the Project would*

> *result in a less-than-significant impact related to a potential conflict with an applicable plan, policy or regulation adopted for the purpose of reducing GHG emissions, aso too would result in a less-than-significant transportation impact relating to VMTs.*

Shasta County Draft EIR at p. 3.14-12.

Naturally, travel to and from the project is temporarily increased during construction. However, long-term travel to the project is negligible post-construction. Any potential reduction in VMT would likely occur in the construction phase, through the implementation of various Transportation Demand Management (TDM) programs that are designed to reduce trips. These programs are anticipated to provide other benefits such as reduction in travel times, parking requirements, traffic congestion and air pollution. All of these benefits can be achieved by reducing trips and shifting travel times and modes. Measures such as carpooling for construction workers between the site and hotels/residences in both Redding and Burney can reduce the total VMT during construction. Given the location of the site, carpooling is likely the only feasible method for reducing construction VMT, as there are no public transit facilities that serve the project site.

Additionally, most workers will arrive at the site in the early morning, and stay on-site all day, leaving in the late afternoon or early evening outside of peak hours. Accordingly, project construction will not adversely affect traffic conditions (as discussed further below).

Finally, heavy construction equipment and wind turbine components (e.g., blades, nacelles) would be delivered to the Project Site using area roadways, some of which may require transport by oversize/overweight vehicles. The transport of these materials would require Caltrans review. Further, heavy equipment associated with these components would not be hauled to/from the site daily, but rather would be hauled in and out on an as needed basis. Heavy vehicle deliveries also will arrive outside peak hours to facilitate smooth flow of traffic. The Project would implement a CTMP, as well as identify anticipated construction delivery times and vehicle travel routes to potential conflicts with other travelers. Accordingly, no significant environmental impacts are anticipated from the use of oversized vehicles to transport large turbine components.

8.2 PROJECT ACCESS LOS ANALYSIS

A **Level of Service** (LOS) analysis measured delay per vehicle and operational performance. The LOS analysis was performed using the traffic engineering industry-standard software package *Synchro/SimTraffic* for AM and PM peak hour conditions for periods during and after construction. The LOS analysis in *Synchro/SimTraffic* is based on the Two-Way Stop Control (TWSC) methodology from the 6th edition of the Highway Capacity Manual (HCM). It is noted that LOS-A generally represents free-flow conditions, while LOS-F generally represents gridlock conditions.

To estimate peak hour conditions, Westwood used the peak hour volumes that were collected on April 4, 5, and 6 (see **Appendix A**). Since the observed AADT along the segment were significantly lower than the AADT collected by Caltrans in 2020, these peak hour volumes were multiplied by a factor of 1.55, consistent with the difference in observed AADT along this segment and the 2020 Caltrans AADT collected along this segment. For the commuter traffic it was assumed that 60% of the peak hour background traffic would be coming to and from the west, while 40% would be coming to and from the east.

Directional distribution of the construction, equipment and material delivery trips was made based on the number of projected wind turbines along each access road. Therefore, it was assumed that 56% of the construction trips would use the West Access Road, and 44% would use the East Access Road. Construction trips were assigned based on these percentages.

Consistent with the proposed CTMP, it is assumed that heavy vehicle trips will occur outside the peak hours and only commuter trips will affect the peak hour traffic movements. Consistent with information provided by ConnectGen, seventy-five percent (75%) of the commuting workers are anticipated to arrive during a morning hour of 6am – 7am. Forty percent (40%) of the commuting workers are anticipated to leave the site during an afternoon peak hour of 5pm – 6pm.

Figure 1 shows the resulting turning movements projected during the construction phase of the project. The red numbers indicate the AM peak hour directional flow (either left turn, through traffic, or right turn). Likewise, blue numbers represent the PM peak hour turning volumes. **Table 2** lists the resulting levels of service by both intersection and movement in the construction phase of the project.

Table *2* - Level of Service – During and Post Construction

INTERSECTION	TRAFFIC MANEUVER	CONSTRUCTION CONDITIONS				POST CONSTRUCTION CONDITIONS			
		AM		PM		AM		PM	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
INTERSECTION CONTROL		TWSC Unmitigated				TWSC Unmitigated			
#1 SR-299 and West Access	Overall	A	*1.0*	A	*1.3*	A	*0.2*	A	*0.2*
	NBL	A	*0.00*	B	*10.10*	A	*0.00*	B	*10.10*
	NBR	A	*0.00*	A	*0.00*	A	*0.00*	A	*0.00*
	EBT	A	*0.00*	A	*0.00*	A	*0.00*	A	*0.00*
	EBR	A	*0.00*	A	*0.00*	A	*0.00*	A	*0.00*
	WBL	A	*7.70*	A	*0.00*	A	*7.30*	A	*0.00*
	WBT	A	*0.00*	A	*0.00*	A	*0.00*	A	*0.00*
INTERSECTION CONTROL		TWSC Unmitigated				TWSC Unmitigated			
#2 SR-299 and East Access	Overall	A	*0.8*	A	*1.2*	A	*0.2*	A	*0.2*
	NBL	A	*0.00*	B	*10.10*	A	*0.00*	B	*10.10*
	NBR	A	*0.00*	A	*0.00*	A	*0.00*	A	*0.00*
	EBT	A	*0.00*	A	*0.00*	A	*0.00*	A	*0.00*
	EBR	A	*0.00*	A	*0.00*	A	*0.00*	A	*0.00*
	WBL	A	*7.50*	A	*0.00*	A	*7.50*	A	*0.00*
	WBT	A	*0.00*	A	*0.00*	A	*0.00*	A	*0.00*

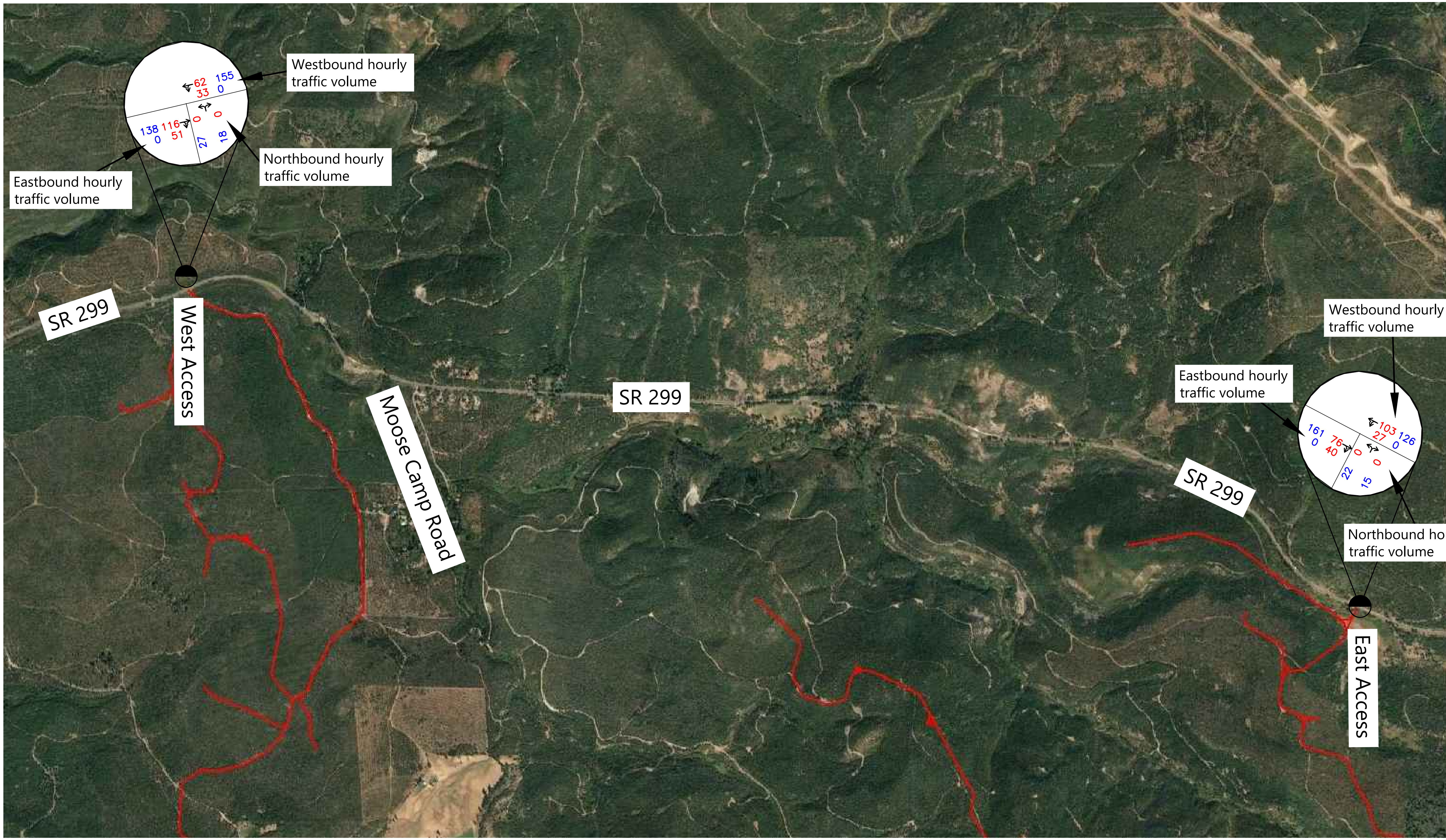
(Source: Westwood Professional Services, 2023)
NBL – Northbound Left; NBR – Northbound Right; EBT – Eastbound Through; EBR – Eastbound Right; WBL – Westbound Left; WBT – Westbound Through

In the post-construction (i.e., day-to-day operation and maintenance) scenario, there are a minimal number of employees accessing the site for operations and maintenance activities. Therefore, it was assumed a total of eight (8) operations and maintenance workers in four (4) commuter vehicles daily would be entering any of the access points during the AM peak hour from the east and west, and four would be exiting east/westbound during the PM peak hour.

Figure 2 shows the resulting turning movements projected during the post-construction phase of the project. **Table 2** also lists the resulting levels of service by both intersection and movement in the day-to-day operation and maintenance of the project.

Detailed Level of Service calculations are included in **Appendix F**.

Commuting vehicles are anticipated to enter and exit the site during the AM and PM peak hours with minimal delay under construction conditions and post-construction conditions.



Legend

LANE DESIGNATION	
AM PEAK HOUR TRAFFIC VOLUME	XX
PM PEAK HOUR TRAFFIC VOLUME	XX
SIGNALIZED INTERSECTION	
UNSIGNALIZED INTERSECTION	

0' 2000' 4000'

FOUNTAIN WIND POWER - SHASTA COUNTY, CA
CONSTRUCTION PEAK HOUR CONDITIONS

FIGURE 1

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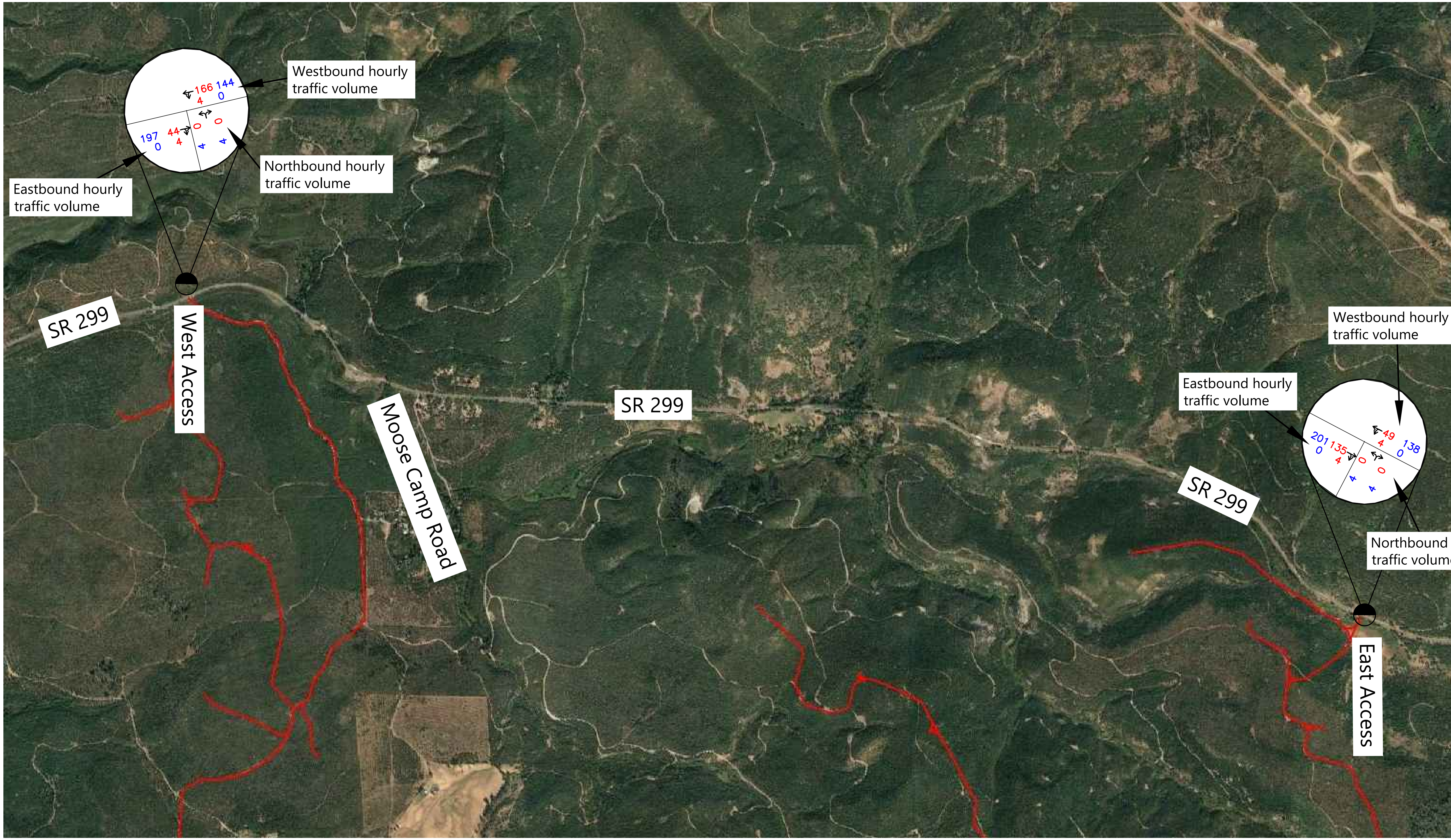
Fax (702) 284-5399
westwoodps.com
Westwood Professional Services, Inc.
5725 W. Badura Avenue, Suite 100
Las Vegas, NV 89118



Legend

LANE DESIGNATION	
AM PEAK HOUR TRAFFIC VOLUME	XX
PM PEAK HOUR TRAFFIC VOLUME	XX
SIGNALIZED INTERSECTION	
UNSIGNALIZED INTERSECTION	

0' 2000' 4000'

FOUNTAIN WIND POWER - SHASTA COUNTY, CA
POST CONSTRUCTION PEAK HOUR CONDITIONS

FIGURE 2

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Westwood Professional Services, Inc.
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Las Vegas, NV 89118

8.3 PROJECT ACCESS LEFT TURN LANE WARRANT ANALYSIS

To test whether any access required left turn lanes, Westwood utilized AASHTO Green Book, 2018 Edition Table 9-25, "Suggested Left-Turn Treatment Guidelines Based on Results from Benefit-Cost Evaluations for Intersections on Two-Lane Highways in Rural Areas".[2] Westwood calculated whether any project intersection met the guidelines for bypass lanes or left turn lanes on the two-lane highway. **Appendix G** of this document shows that access point left turn lanes are necessary during the AM and PM peak hour in the construction scenario. This analysis assumes that peak hour traffic will only be impacted by commuter traffic for the project. Shifting the arrival of at least seventy-five percent (75%) of the commuting AM hour traffic to 6am – 7am, promoting carpooling, and adding ingressing left turn lanes for commuters traveling to the site from Burney would further reduce congestion at project access intersections. Commuters from Burney could also be directed to drive westbound past both accesses and enter the Hillcrest Rest Area located approximately 1.6 miles to the west of the project site to turn around and head eastbound to turn right into the project site.

[2] Table 9-25, Suggested Left-Turn Treatment Guidelines Based on Results from Benefit-Cost Evaluations for Intersections on Two-Lane Highways in Rural Areas, A Policy on Geometric Design of Highways and Streets, 7th Edition, American Association of State Highway and Transportation Officials, Washington, DC, 2018.

9.0 SIGNAGE

The number of trucks turning from SR 299 onto the access roads may require advance warning signs based on sight distance. Caltrans may require any of the following to signs to be installed along SR 299 in advance of the access roads during construction.

C44 W2-2 W2-3

(These signs may be black on orange for construction)

10.0 SUMMARY

During construction, the project will employ an estimated maximum number of 199 workers/day during the peak period of construction, which include construction workers, project management staff, equipment operators, survey staff, and delivery vehicle drivers during the peak period. Thus, over the estimated two-year construction period, the total number of all two-way trips is approximately 84,003 trips.

After construction of the wind farm, operations and maintenance traffic will be limited to a few passenger vehicle trips per day.

Westwood estimated that the total VMT during the construction period will be **4,766,749 vehicle miles traveled**. The total VMT per day post-construction is assumed to be **240 vehicle miles traveled**. Per capita daily VMT during operations is estimated to be **30 miles per day**. It is recommended that in adopting a VMT significance threshold for this project, the California Energy Commission choose a metric that takes into account that the ultimate goal and purpose of the project is to create a utility-scale electricity generation source with near-zero GHG emissions and to displace the generation of electricity through the use of GHG-emitting fossil fuels. Naturally, travel to and from the project is temporarily increased during construction. However, long-term travel to the project is negligible post-construction. Any potential reduction in VMT would likely occur in the construction phase, through the implementation of various Transportation Demand Management (TDM) programs that are designed to reduce trips. These programs are anticipated to provide other benefits such as reduction in travel times, parking requirements, traffic congestion and air pollution. All of these benefits can be achieved by reducing trips and shifting travel times and modes. Measures such as carpooling for construction workers between the site and hotels/residences in both Redding and Burney can reduce the total VMT during construction. Given the location of the site, carpooling is likely the only feasible method for reducing construction VMT, as there are no public transit facilities that serve the project site.

Commuting vehicles are anticipated to enter and exit the site during the AM and PM peak hours with minimal delay under construction conditions and post-construction conditions.

Both project access intersections meet the warrants for left turn lanes during the AM and PM peak hour in the construction scenario. Shifting the arrival of at least seventy-five percent (75%) of the commuting AM peak hour traffic to 6am – 7am, promoting carpooling, and adding ingressing left turn lanes for commuters traveling to the site from Burney would further reduce congestion at project access intersections. Commuters from Burney could also be directed to drive westbound past both accesses and enter the Hillcrest Rest Area located approximately 1.6 miles to the west of the project site to turn around and head eastbound to turn right into the project site.

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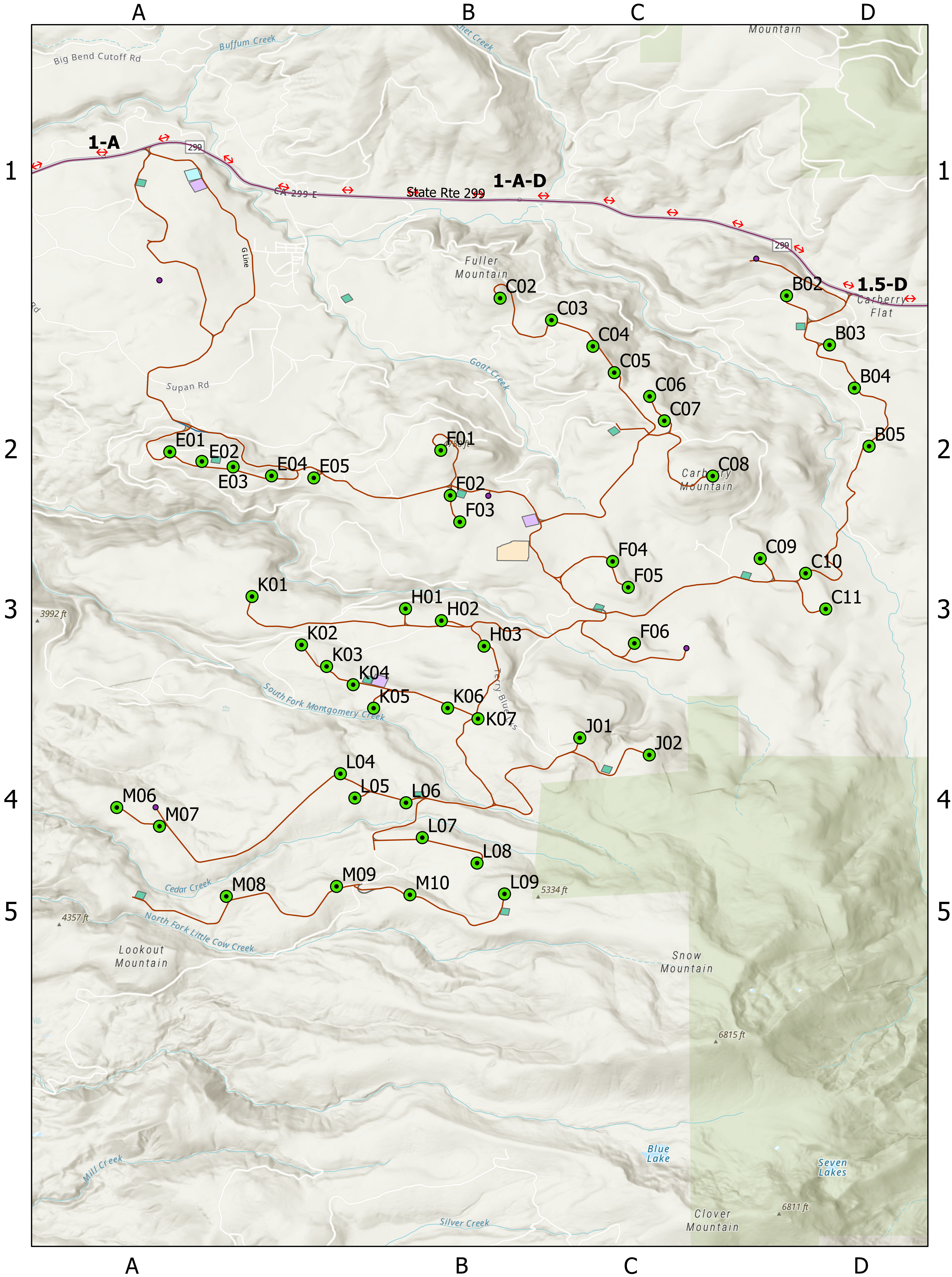

Data Source(s): Westwood (2023); .

Turbines
Delivery Flow
Major Roads
Access Roads
Batching Plants
O&M Facility
Staging Areas
Substation Switching Station

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N

0 0.25 0.5 1 Miles

Fountain Wind Project

Shasta County, California

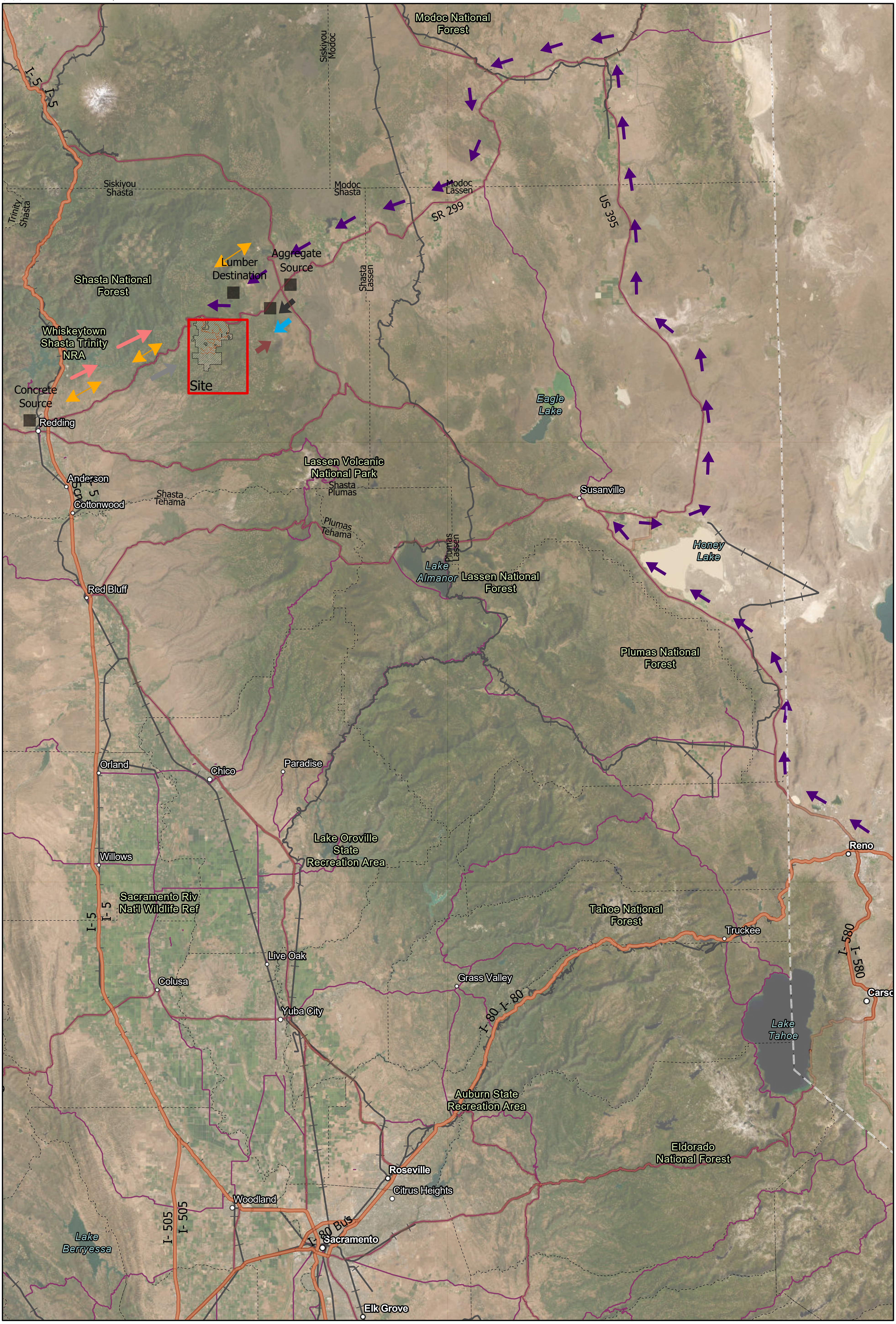
Project Site Plan

EXHIBIT 1

May 13, 2023

Map Document: \\westwoodps.local\GFS\Global Projects\0023714.00\GIS\ArcPro\Traffic Study\Fountain Wind TIS_1.aprx 5/13/2023 7:53 PM Lalhodi

Map Document: \\westwoodps.local\GFS\Global Projects\0023714.00\GIS\ArcPro\Traffic Study\Fountain Wind TIS_1.aprx 5/13/2023 7:50 PM PLahoti



Data Source(s): Westwood (2023); .

- Material Locations
- Turbines Related Deliveries
- National Highways
- California Rail Network
- Major Roads
- Concrete Delivery Route
- Timber Removed Route
- Aggregate Delivery Route
- Water Delivery Route
- Worker Commute Route
- Equipment and Miscellaneous Deliveries

N 0 5 10 20 Miles

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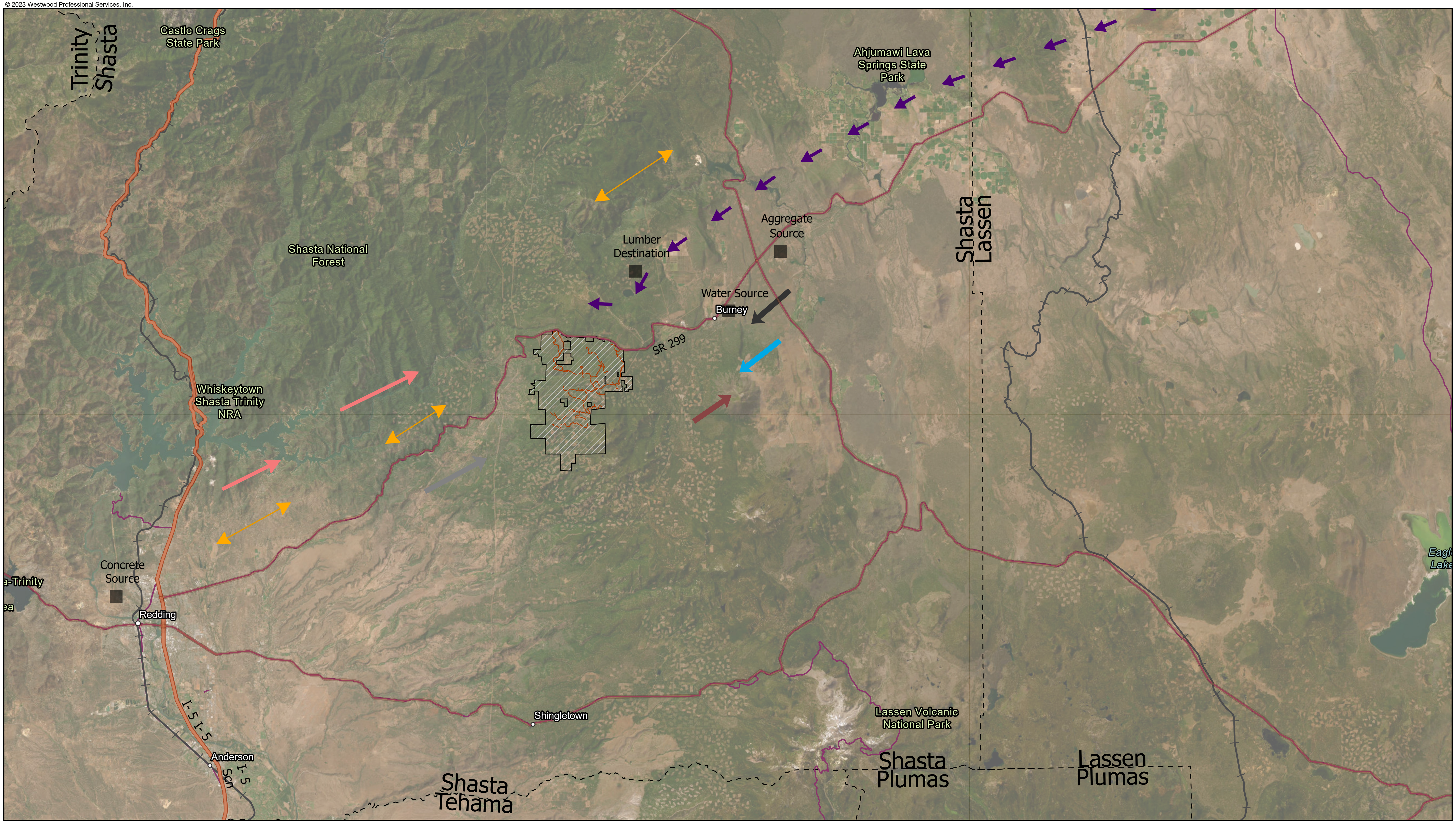
Fountain Wind Project

Shasta County, California

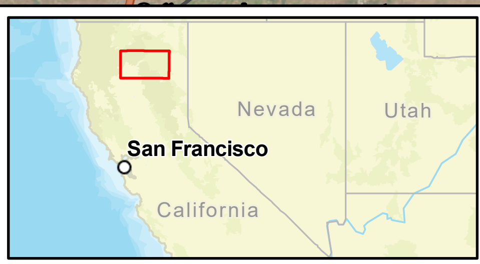
Regional Delivery Routes

EXHIBIT 2

May 13, 2023



Data Source(s): Westwood (2023); .



Material Locations
Equipment and Miscellaneous Deliveries
Water Delivery Route
Aggregate Delivery Route
Timber Removed Route
Worker Commute Route
Concrete Delivery Route
Turbines Related Deliveries
Major Roads

N
0 2.5 5 10 Miles

Fountain Wind Project

Shasta County, California

Local Delivery Routes

EXHIBIT 3

May 13, 2023

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Exhibit 4 - Fountain Wind Project - Estimated Vehicle Trips During Construction

Vehicles	Number of One Way Truck Trips	Number of Two-Way Truck Trips	Estimated Gross Vehicle Weight (Pounds)	Load Weight (Pounds)	Miles	VMT	Notes/ Assumptions
Total Pick-up Trucks Two-Way Trips	18483	36,966				1,256,844	36,966 two-way truck trips derived from developers full time labor calculations. 2 Full-Time Employees assumed per truck VMT calcs Assume 60% trips from West (50 mile trip) and 40% trips from East (10 mile trip)
Peak Number of Pick-up Truck Trips/Day	100	200					
Equipment							
Feller Buncher (logging)	2	4	71,711		50	200	2 nos. (Cat 522B)
Logging Trucks	8	16	35,000		50	800	8 Flat-Bed Semi Trailers and Tractors
Skidder	2	4	41,000		50	200	2 skidders
Bulldozer (medium)	14	28	57,440		50	1,400	14 nos. (Cat D7 Bulldozers)
Scraper	2	8	93,000		50	400	4 nod. (Cat 627K's)
Drum Compactor	4	16	41,000		50	800	8 Cat CS41B
Skid Steer Loader	13	26	4,000		50	1,300	13 nos. (Cat 272D2)
Road Grader	3	6	42,647		50	300	3 nos. (Cat 12M)
Excavator	5	10	66,250		50	500	5 nos. (Cat 326F)
Trenching Equipment	4	8	52,000		50	400	4 nos. (Wolfe 7000)
Backhoe Loader (includes setting collector system poles)	4	8	24,000		50	400	4 nos. (Cat 415F2)
Cable Reel Truck (Includes auger for pole foundations)	7	14	46,000		50	700	7 nos. (Includes manlift basket for rigging poles)
Concrete Pump Truck	2	4	46,000		50	200	2 nos. (Schwing 31 XT)
Mobile Hydraulic Crane	19	38	117,235		50	1,900	19 nos. (Grove RT890E)
Rubber Tired Forklifts	7	14	52,000		50	700	7 nos. (Forklift)
Hydro Axe	2	4	52,000		50	200	2 nos.
Boom Lift	12	24	93,000		50	1,200	12 nos.
Large Crawler Crane	4	8	794,000		50	400	4 nos. (Terrex Demag CC2800-1)
Equipments	**114**	240				12,000	Assume all trips from SR 299 West - Schedule to avoid peak hours
Mobile Home (Field Office)	11	22	60,000	40,000	50	1,100	Assume all trips from SR 299 West - Schedule to avoid peak hours
Total Equipments Trips	125	262			50	13,100	
Materials							
Erosion and Sediment Control Materials	4	8	45,000	10,000	20	160	Based on perimeter control on one side of road length
Public Road Aggregate	60	121	80,000	40,200	20	2,420	Based on 2000 feet of public road improvements, 6" depth
Access Road Aggregate	9,005	18,011	80,000	40,200	20	360,220	Based on 42 miles of access roads, 8 trucks
Temporary Laydown Area Aggregate	1,923	3,846	80,000	40,200	20	76,920	Based on 18 staging areas totaling 44 acres
Substation Aggregate	218	437	80,000	40,200	20	8,740	Based on a 5 acre substation
O&M/Field Office Aggregate	218	437	80,000	40,200	20	8,740	Based on a 5 acre O&M/Field Office Area
Switching Substation Aggregate	655	1,311	80,000	40,200	20	26,220	Based on an 15 acre switching substation
Total Aggregate for Compaction Deliveries	12,084	24,171				483,420	Assume all trips from SR 299 East - Schedule to avoid peak hours
Substation Rock	328	656	80,000	40,200	20	13,120	Based on a 3.5 acre substation
Field Office/O&M Rock	230	460	80,000	40,200	20	9,200	Based on a 3.5 acre O&M/Field Office Area
Switching Substation Rock	721	1,442	80,000	40,200	20	28,840	Based on an 11 acre battery storage system
Concrete Aggregate	10	20	80,000	40,200	20	400	Based on Aggregate equal to 76% of weight
Total Aggregate Deliveries for structures	1289	2,578	26,159	Tons		51,560	Assume all trips from SR 299 East - Schedule to avoid peak hours
Total Aggregate Deliveries	13,373	26,749				534,980	Assume all trips from SR 299 East - Schedule to avoid peak hours
Wind Turbine Tower Base	48	96		153,400	255	24,480	Based on GE 3.4 137, HH 110m
Wind Turbine Tower Lower Mid-Section	48	96		120,100	255	24,480	Based on GE 3.4 137, HH 110m
Wind Turbine Tower Upper Mid-Section	48	96		112,850	255	24,480	Based on GE 3.4 137, HH 110m
Wind Turbine Tower Top Section	48	96		86,900	255	24,480	Based on GE 3.4 137, HH 110m
Wind Turbine Nacelle	48	96		150,700	255	24,480	Based on GE 3.4 137
Wind Turbine Hub	48	96		88,050	255	24,480	Based on GE 3.4 137
Wire and Cable - Underground Colletion System	38	76	80,000	45,000	255	19,380	Based on 3 conductors, 1.9 pounds/foot
Wire and Cable - Overhead Collection System	12	24	80,000	45,000	255	6,120	Based on 3 conductors, 2.1 pounds/foot
Overhead Collection Line Poles	85	170	30,000	15,000	255	43,223	Assume 250' wire span, 4 - 2000 pound Poles per trailer
Transmission Line Poles	77	154	27,000	12,000	255	39,270	Assume 750' wire span, 1 - 8000 pound Pole per trailer
Met Poles	5	10			255	2,550	Assume 1 Met Pole can be carried on a single truck
Transformers	48	96	80,000	45,000	255	24,480	Based on 3.5 MW transformer
Miscellaneous Turbine Components	192	384	80,000	45,000	255	97,920	Based on 4 miscellaneous deliveries per turbine
Pilot Cars (Front and Back)	1,490	2979			255	759,645	Pilot Cars for Wind Turbines
Wind Turbine Blades (3)	144	288		37,750	255	177,120	Based on GE 3.4 137
Pilot Cars for blades (Front and Back)	576	1152			255	708,480	Pilot Cars for Wind Turbines Blades
Total Turbine Related Deliveries	2,234	5,909		3,989		2,025,068	Assume all trips from SR 299 East and US-395 from Reno - Schedule to avoid peak hours
Concrete for Turbine Foundations	2400	4,800	69,000	40,000	50	240,000	48 turbines
Concrete Pump Trucks	2	4			50	200	2 trucks
Concrete for Substation Foundations	41	82	69,000	40,000	50	4,100	Based on 2 MPT - Foundation 8'-6" x 24'-0" x 1'-4"
Concrete for Switching Station Foundations	41	82	69,000	40,000	50	4,100	Based on 40' container each with 6 foundation pies
Concrete for Overhead Collection System Pole Foundations	25	50	40,332	11,332	50	2,500	Assume 1 concrete foundations (terminations & angles)
Concrete for Transformer Pads	48	96	41,180	12,180	50	4,800	Assume Pad 9' x 9' x 1'
Concrete for O&M Building	13	26	69,000	40,000	50	1,300	Based on foundation wall 78' x 70' x 1' thick x 5' deep + 4" floor slab
Total Concrete Deliveries	2,570	5,140	24,946	CuYds		257,000	Assume all trips from SR 299 West - Schedule to avoid peak hours
Cement for Concrete Batch Plant	2	4	80,000	40,000	50	198	Based on Aggregate equal to 16% of weight
Formwork	2	3.84	80,000	45,000	50	192	Based on 25 reuses of forms
Reinforcing Steel (Rebar)	96	192	80,000	45,000	50	9,600	Based on 45 tons per turbine
Building Materials	20	40	80,000	45,000	50	2,000	Based on 5460 square foot prefabricated metal building
Structural Steel - Substation	4	9	80,000	45,000	50	444	Based on 200,000 Pounds of Structural Steel
Structural Steel - Switching Substation	4	8	80,000	45,000	50	400	Based on 200,000 Pounds of Structural Steel
Elecrical Equipment - Substation	10	20	80,000	45,000	50	1,000	Includes Control Building, switch gear, capacitors, etc.
Elecrical Equipment - Switchingsubstation	10	20	80,000	45,000	50	1,000	Includes Control Building, switch gear, capacitors, etc.
CMP Culverts	4	8	80,000	45,000	50	400	Culvert Extensions and new culverts
Chain Link Fence	7	14	80,000	45,000	50	724	Based on 30,600 linear feet of fence at 10.65 pounds/ ft
Micellaneous Consumables	26	52	60,000	20,000	50	2,600	10 Trucks
Fuel Deliveries	25	50	26,000	7,000	50	2,500	Based on 2000 Gallons/week ea. of diesel on-road & off road
Sanitation	52	104	50,000	10,000	50	5,200	Based on weekly maintenance visits
Plant Stock, Seed and Mulch	17	34	52,600	12,800	50	1,719	Based on 2.5 tons/acre
Total Miscellaneous Deliveries	**280**	560				27,978	Assume all trips from SR 299 West - Schedule to avoid peak hours
Water (Compaction)	1,228	2456	33,400	0	20	49,120	Based on 20 gallons/ton of aggregate (Roads, Laydown, etc.)
Water (Dust Control)	2,869	5738	33,400	0	20	114,760	Based on 300 gallons/acre/day of Road, staging, and field office area areas, 6 trucks
Water (Vegetation establishment)	110	220	33,400	0	20	4,400	Based on 10,000 gallons/acre of Laydown areas
Water (Concrete Batching)	2	4	33,400	0	20	80	Based on Aggregate equal to 8% of weight
Total Water	4,209	8,418	16,826,893	Gallons		168,360	Assume all trips from SR 299 East- Schedule to avoid peak hours
Total Trips	41,274	84,003			TOTAL VMT	4,283,329	

Exhibit 4 - Fountain Wind Project - Estimated Vehicle Trips - Post-Construction

Vehicles	Number of One way Truck Trips	Number of One way Truck Trips	Miles	VMT	Notes/ Assumptions
Pick-Up Trucks - 8 Full time Employees					
Total Pick-up Trucks	4	8	50 - West ; 10 - East	240	
Equipment					
Equipment Operators	0			0	Assume all trips on SR 299 West
Mobile Home (Field Office)	0		50	0	
Materials					
Total Aggregate for Compaction Deliveries	0			0	Assume all trips on SR 299 East
Concrete Aggregate	0		0	0	Based on Aggregate equal to 76% of weight
Total Aggregate Deliveries	0			0	Assume all trips on SR 299 East
Total Turbine Related Deliveries	0			0	Assume all trips on SR 299 west - Schedule to avoid peak hours
Total Concrete Deliveries	0			0	Assume all trips on SR 299 west
Cement for Concrete Batch Plant	0		0	0	Based on Aggregate equal to 16% of weight
Total Miscellaneous Deliveries	0			0	Assume all trips on SR 299 West
Total Water	0			0	Assume all trips on SR 299 East
	Trucks				
SR 299 West	2	4		200	
SR 299 East	2	4		40	
Total Trips	4	8	TOTAL VMT	240	