Appendix H
Transportation

Westwood

TRAFFIC STUDY

Fountain Wind Power

Shasta County, California

February 11, 2020

Prepared For:

ConnectGEN

Traffic Study

Fountain Wind Project

Shasta County, California

Project Number: 0023714.00

Date: 2/11/2020

ADMINISTRATIVE DRAFT

Prepared for:

ConnectGEN

Prepared by:

Westwood

CONTENTS

FIGURES

EXHIBITS

TABLES

APPENDIX

1.0 INTRODUCTION

The Fountain Wind project is proposed as a 216 MW wind project consisting of up to 72 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, and single unit and semi-tractor trailer trucks, crawler cranes and a few specialized transportation vehicles for the oversize/overweight vehicles associated with the delivery of wind turbine components. The other anticipated oversized deliveries will be the 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. Trips are summarized as trips each way. Trips for both the delivery and removal of equipment, field offices, and temporary aggregate surfaces are shown.

2.0 TRAFFIC PROJECTION

Traffic entering the project site will comprise trips by construction workers, materials delivery, and equipment delivery. Materials 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). Manufactured components will likely originate from Interstate 5 (I-5) to the west or from US 395 and SR 139 to the east. The direction of turbine component deliveries is assumed to be from the Port of Stockton, CA. Locally sourced materials such as aggregate and water will likely come from Burney, 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 will likely be the source. Project workers will most likely commute from both east and west of the project. 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 some project workers. For this study the split for commuting traffic is assumed to be 60 percent from the west and 40 percent from the east on SR-299. (See Exhibit 1.)

Three access roads are proposed to coincide with existing logging roads at the intersections with SR-299. 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 North Access is approximately three miles east of the West Access. This access is proposed along an existing and unnamed logging road that intersects SR-299 just to the east of Little Hatchet Creek. As with the West Access, there is a widened shoulder at this access, but no turn lanes.

The East Access is approximately two miles east of the North Access and 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.

The West and East Access roads will serve the majority of the turbines of the Fountain Wind project. The North Access will serve only a few wind turbines. As a result, the heaviest direction for peak hour traffic (eastbound) will make right turns from SR-299 onto the access roads, and the lighter direction of traffic (westbound) will make left turns from SR-299 into the project site.

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 road for the Fountain Wind project. Both eastbound and westbound turn lanes serve the Hatchet Ridge access. It is noted that this is a four-way intersection on SR-299, with Terry Mill Road accessing to the south.

3.0 EXISTING TRAFFIC CONDITIONS

According to the Caltrans 2017 listing of traffic volumes (see Exhibit 2), urban centers on each end of SR 229 record the highest traffic volumes, then diminish significantly in the rural and mountainous areas in between. Between I-5, in Redding and Plumas Street, in Burney, California, there are 9 daily and peak hour count locations listed.[1]

The highest existing annual average daily traffic (AADT) on SR-299 is 21,000 vehicles per day at I-5 in Redding where the highway has a four-lane freeway alignment.[2] The peak hour volume is 2,150 vehicles per hour. The base capacity of a freeway segment is

[1] CalTrans Traffic Census Program.

[2] CalTrans Traffic Census Program, https://dot.ca.gov/programs/traffic-operations/census/traffic-volumes/2017/route-280-405, 2017.

2,300 passenger cars/hour/lane; which, for a four-lane section, would equal 9,200 vehicles per hour.[3]

The base capacity of a two-lane rural roadway segment is 2,000 passenger cars/hour/lane; which, for a two-lane section, would equal 4,000 vehicles per hour. In the two-lane rural section of SR-299 between Deschutes Road (on the east edge of Redding) and Elm Street (on the west edge of Burney), the peak hour volume never exceeds 490 vehicles per hour (See Exhibit 2).

The three access roads for the Fountain Wind project are all located within the segment of SR-299 between Big Bend Road and Tamarack Road. CalTrans has listed AADT and peak hour volumes for this segment as 3,000 vehicles per day and 320 vehicles per hour, respectively. (See Tamarack Road volumes in Exhibit 2.)

Heavy vehicle traffic does constitute a notable percentage of the background traffic on this segment of SR-299. At Mile Post 72.64 west of Burney, the heavy vehicle percentage on SR-299 was recorded in 2014 as 13.79%.[4]

4.0 CONSTRCUTION 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 400 construction workers, project management staff, equipment operators, survey staff, and delivery vehicle drivers during the peak period, with the average number of workers on-site in the range of 325 based on preliminary schedule development. 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. 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 (2.0 for survey crews;

[3] Highway Capacity Manual, 6th Edition (2018), c(basic freeway segment) = 2,200 + 10 * (Free-Flow Speed$_{adj}$ – 50) = 2,300 passenger cars/hour/lane
[4] CalTrans Planning Profile, ArcGIS.

1.5 for all other categories, except for delivery vehicles with an occupancy of 1.0) and multiplying by the number of work days for each employee category.

As a result, the estimated number of work days and total number of trips for each category are:

- 100 days for survey (400 total trips);
- 250 days for construction trades (24,000 total trips);
- 250 days for project management staff (2,500 total trips);
- 200 days for equipment operators (6,267 total trips);
- 250 days for small equipment on flatbed trailers (1,250 total trips); and
- 230 days for deliveries (56,079 total trips).

Thus, over the estimated two-year construction period, the total number of all trips could be approximately 93,088 trips.

After 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 scheduling.

- Survey 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 3 in the Appendix lists the number and type of equipment assumed for construction:

- Survey – one pick-up truck for each 2 person crew
- 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 3 in the Appendix 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 3 in the Appendix 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 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, 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 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 required from 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 final selection of the turbine model to be used for the project. Because there is direct project access to the state highway, and the fact that the adjacent Hatchet Ridge project delivered oversized components along this same infrastructure indicates that 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 application 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 3-5.7MW. 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 show two curves with radii less than 1,000 feet. SR-299 has a curve with a radius of approximately 600-foot near Montgomery Creek. SR-299 has a curve with a radius of approximately 700-foot 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 permit 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 from a safety perspective and emergency access perspective 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 A 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 local residents and emergency response agencies are aware of the temporary conditions during construction that could affect traffic mobility and safety on 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 prior to 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 Shasta County outlining construction activity a minimum of two weeks prior to any work commencing.

8.0 ANALYSIS

Two forms of traffic analysis were conducted. Both **Level of Service** (LOS) and **Vehicle Miles Traveled** (VMT) were calculated for the three Project intersections during construction and post-construction. Westwood also tested each access for left turn warrants along SR-299.

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. It is noted that LOS-A generally represents free-flow conditions, while LOS-F generally represents gridlock conditions.

To estimate peak hour conditions, Westwood reviewed historical traffic volumes for the segment, and found that peak hour volumes have not changed appreciably over the years.[5] Therefore, it is assumed background volumes will stay constant during and after construction of the wind farm. 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. Therefore, 192 background peak hour trips would approach from the west while 128 background peak hour trips would approach 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.

[5] Comparison of 2014 and 2017 CalTrans Traffic Volume Books.

Therefore, it was assumed that 62% of the construction trips would use the East Access road, 29% would use the West Access road and 9% would use the North Access road. Construction trips were assigned based on these percentages.

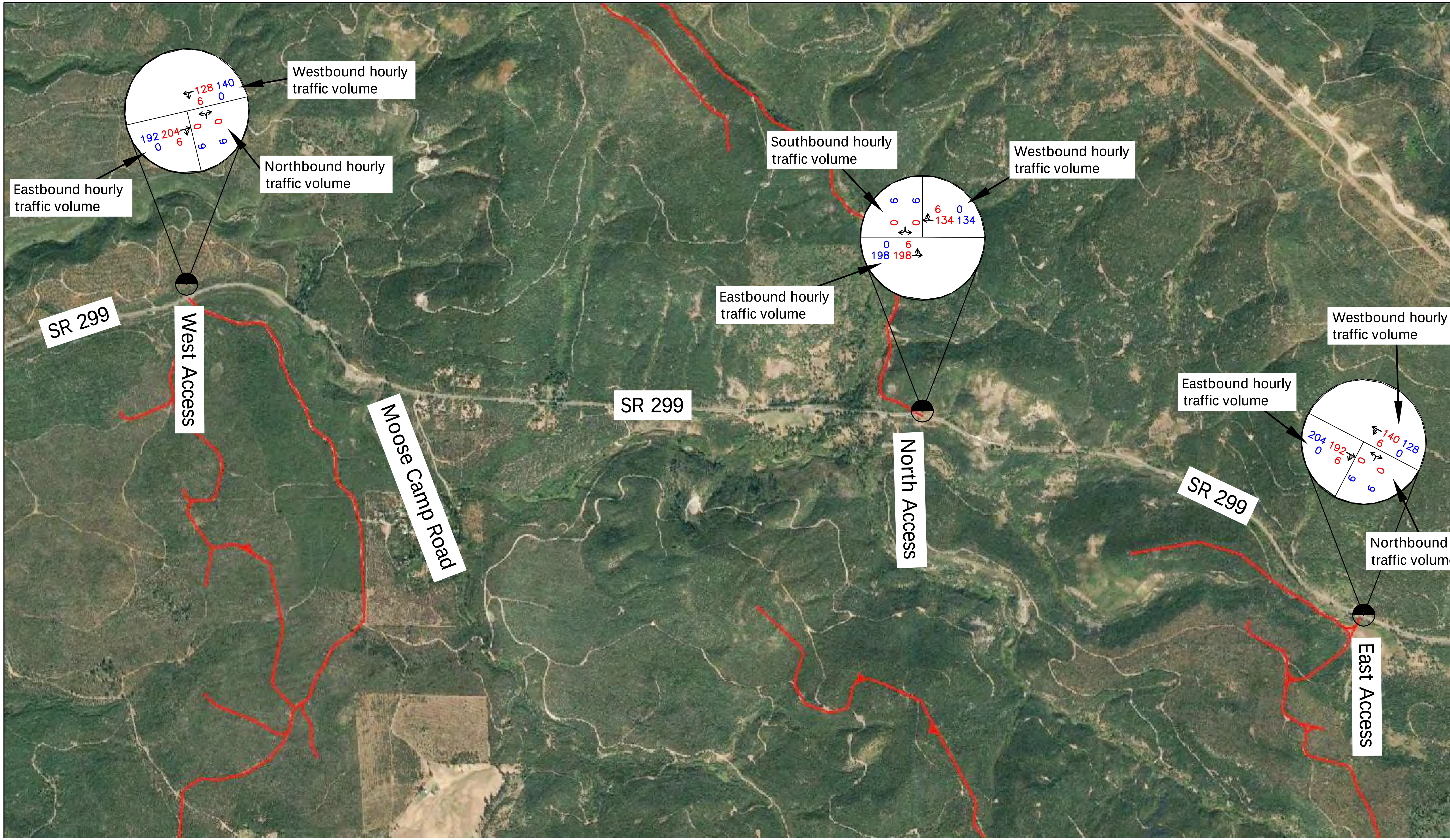
Figure 1 shows the resulting turning movements projected during the construction phase of the project. The red numbers indicate the a.m. peak hour directional flow (either left turn, through traffic or right turn). Likewise, blue numbers represent the p.m. peak hour turning volumes. Table 1 lists the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

Table 1 – Level of Service – During Construction

Intersection	Lane Assignment	Intersection Traffic Control	Construction Conditions							
			AM PEAK				PM PEAK			
			Intersection Delay and LOS	Level of Service	Approach Delay (sec)	95th %ile Queue (ft)	Intersection Delay and LOS	Level of Service	Approach Delay (sec)	95th %ile Queue (ft)
West Access & SR 299	EB Thru	N	4.8 sec/veh = LOS A	A	5.3	n.a.	2.2 sec/veh = LOS A	A	1.0	n.a.
	EB Right			A	3.9	n.a.		-	0.0	n.a.
	WB Left			A	4.2	77		-	0.0	n.a.
	WB Thru			A	3.8	77		A	1.4	n.a.
	NB Left			-	0.0	n.a.		A	7.6	55
	NB Right			-	0.0	n.a.		A	3.9	55
North Access & SR 299	EB Left	N	3.8 sec/veh = LOS A	A	5.0	46	2.6 sec/veh = LOS A	-	0.0	n.a.
	EB Thru			A	4.2	46		A	2.4	n.a.
	WB Thru			A	3.2	n.a.		A	2.5	n.a.
	WB Right			A	0.5	n.a.		-	0.0	n.a.
	SB Left			-	0.0	n.a.		A	7.7	46
	SB Right			-	0.0	n.a.		A	3.9	46
East Access & SR 299	EB Thru	N	7.2 sec/veh = LOS A	A	6.7	13	4.4 sec/veh = LOS A	A	2.3	n.a.
	EB Right			A	2.6	13		-	0.0	n.a.
	WB Left			B	11.2	94		-	0.0	n.a.
	WB Thru			A	8.8	94		A	1.3	n.a.
	NB Left			-	0.0	n.a.		A	8.8	108
	NB Right			-	0.0	n.a.		A	6.9	108

(Source: Westwood Professional Services, 2019)

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



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Legend

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

0' 2000' 4000'

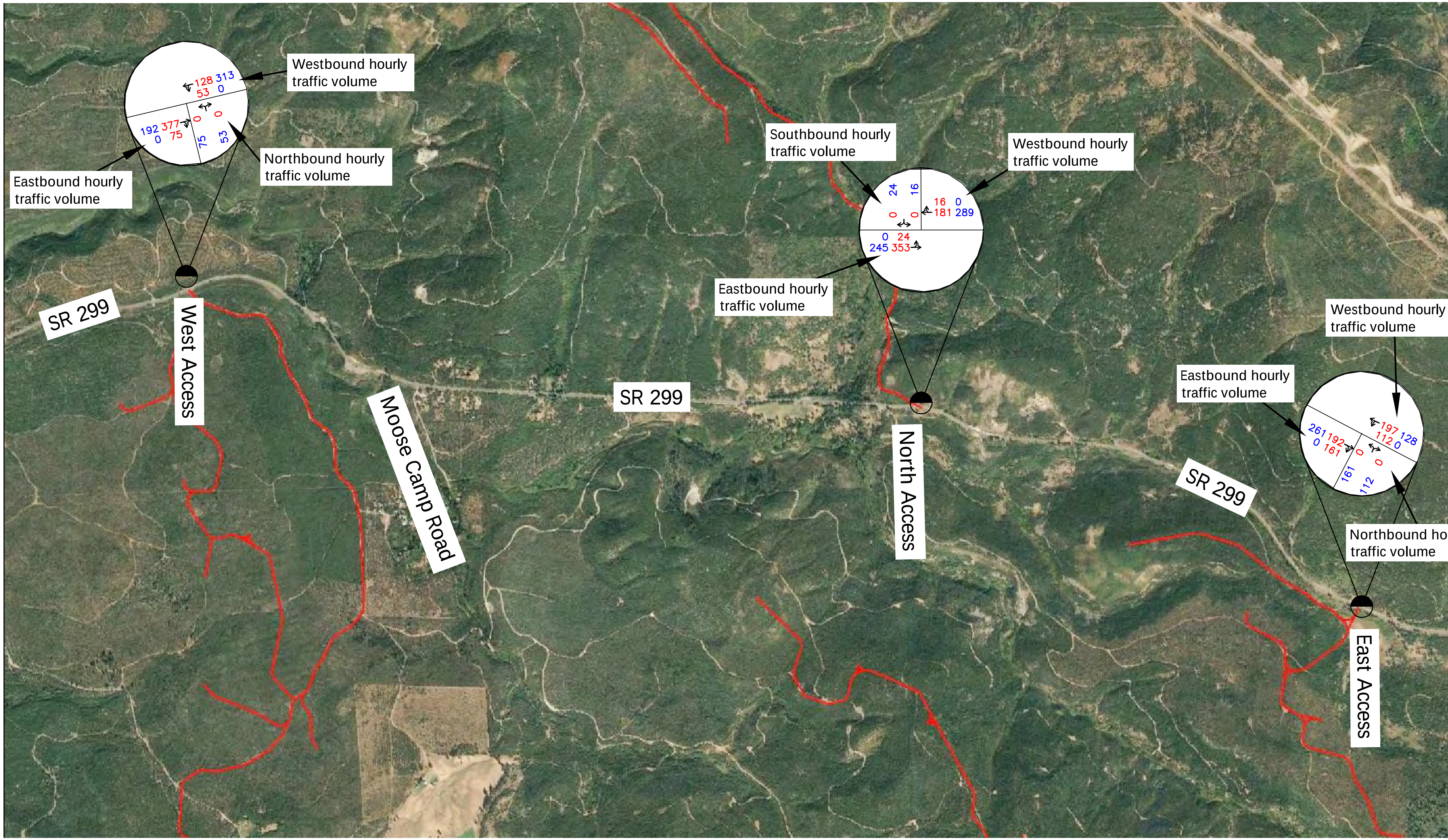
Fountain Wind Power

Shasta County, CA

Post Construction Peak Hour Conditions

Figure 2

Date: 11/14/19



Fountain Wind Power

Shasta County, CA

Construction Peak Hour Conditions

Figure 1

Date: 11/14/19

Legend

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

0' 2000' 4000'

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Table 2 – Level of Service – Post-Construction

Intersection	Lane Assignment	Intersection Traffic Control	Post Construction Conditions							
			AM PEAK				PM PEAK			
			Intersection Delay and LOS	Level of Service	Approach Delay (sec)	95th %ile Queue (ft)	Intersection Delay and LOS	Level of Service	Approach Delay (sec)	95th %ile Queue (ft)
West Access & SR 299	EB Thru	N	2.2 sec/veh = LOS A	A	2.9	n.a.	0.6 sec/veh = LOS A	A	0.4	n.a.
	EB Right			A	3.4	n.a.		-	0.0	n.a.
	WB Left			A	0.5	n.a.		-	0.0	n.a.
	WB Thru			A	1.0	n.a.		A	0.8	n.a.
	NB Left			-	0.0	n.a.		A	4.2	18
	NB Right			-	0.0	n.a.		A	1.9	18
North Access & SR 299	EB Left	N	2.7 sec/veh = LOS A	A	1.3	9	2.1 sec/veh = LOS A	-	0.0	n.a.
	EB Thru			A	2.6	9		A	2.1	n.a.
	WB Thru			A	2.8	n.a.		A	1.9	n.a.
	WB Right			A	1.4	n.a.		-	0.0	n.a.
	SB Left			-	0.0	n.a.		A	3.2	28
	SB Right			-	0.0	n.a.		A	2.4	28
East Access & SR 299	EB Thru	N	2.1 sec/veh = LOS A	A	1.5	n.a.	1.1 sec/veh = LOS A	A	1.3	n.a.
	EB Right			A	0.5	n.a.		-	0.0	n.a.
	WB Left			A	0.3	9		-	0.0	n.a.
	WB Thru			A	2.9	9		A	0.7	n.a.
	NB Left			-	0.0	n.a.		A	4.2	36
	NB Right			-	0.0	n.a.		A	2.1	36

(Source: Westwood Professional Services, 2019)

In the post-construction scenario, there are a minimal number of employees accessing the site for operations and maintenance activities. Therefore, it was assumed a total of six (6) operations and maintenance workers daily would be entering any of the access points during the AM peak hour from the east and west, and six would be exiting east/westbound during the PM peak hour.

Westwood also estimated **Vehicle Miles Traveled** (VMT). 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.

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 3). 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 turbine equipment and material would be delivered from the Port of Stockton, CA. The turbine equipment pick-up location will be finalized prior to construction, upon the selection of the turbine type to be used for the Project; however, the Port of Stockton provides a feasible and realistic turbine delivery location for the purpose of assessing transportation impacts. Similarly, the Project will identify the locations from where other equipment or material would be delivered prior to construction, therefore, the VMT estimations were limited to the city of Redding on the west and the town of Burney on the east. From these calculations, it is estimated that the total VMT during the construction period will be **2,168,492 vehicle miles traveled**.

The material delivery vehicle trips will be spread out throughout the day. The maximum number of aggregate deliveries per day is approximately 90 deliveries, constrained by the loading and unloading times. The maximum number of concrete deliveries per day is approximately 50 deliveries (100 trips), constrained by the rate that ready mix plants can batch concrete, and the rate the contractor can unload trucks. The maximum rate of deliveries is approximately 6 to 8 per hour, equivalent to placing a wind turbine foundation during a single work shift.

The post-construction VMT will be much less. Westwood assumed there would be six (6) trucks per day utilized for operations and maintenance of the wind farm. It is assumed that each truck would be traveling 50 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 assumed to be **300 vehicle miles traveled**. Per capita daily VMT for the permanent employees at the facility is estimated to be approximately **50 vehicle miles per day**.

It is unknown what VMT significance thresholds the County of Shasta will adopt for the construction and operational phases of the project, pursuant to the California Environmental Quality Act (CEQA). Naturally, travel to and from wind farms is increased during construction. However, travel to the wind farms is negligible post-construction. Any potential reduction in VMT would likely occur in the construction phase, through the implementation of carpooling and ridesharing, as applicable.

No significant environmental impacts are anticipated from the use of oversized vehicles to transport large turbine components.

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".[6] Westwood calculated whether any project intersection met the guidance for left turns on the two-lane highway. Appendix B of this document shows that during the a.m. peak hour of the construction phase, each of the three intersections will meet the warranted volumes for left turn lanes on the two-lane highway. None of the intersections meets the warrants for left turn lanes during the p.m. peak hour.

[6] 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.

During the a.m. peak hour of the post construction phase, only the West Access and the East Access roads warrant left turn lanes on SR-299. Warrants for a left turn lane on SR-299 at the North Access road are only marginally met during the post construction phase. Again, none of the intersections meets the warrants for left turn lanes during the p.m. peak hour. The number of trips generated by the wind farm reduces significantly after construction, since this phase comprises operations and maintenance activities.

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

The Appendix shows the types and numbers of vehicles projected for the construction of the Fountain Wind Project. The design of the project is preliminary, so material quantities are based on information contained in the permitting documents and preliminary CADD design files used to determine the feasibility of grading access roads and turbine pads. The specific assumptions for each line item are shown in the Notes/Assumptions column.

The project could generate approximately 93,100 trips during the duration of the 250 construction day period. Approximately 68,800 of these trips are commuting trips by the construction workers and project management staff. Aggregate is responsible for the largest portion of the material trips. Construction equipment deliveries account for a small amount of the trips, and turbine component deliveries account for only about 2,744 trips in the two-year period (excluding pilot cars). The maximum number of turbine component delivery trips is approximately 10 deliveries per day. These deliveries can be scheduled to avoid the peak hours.

For this analysis, it was assumed that turbine equipment and material would be delivered from the Port of Stockton, CA. Use of oversized trucks is anticipated to be required to carry turbine components such as nacelle and turbine blades. It is assumed I-5 will be the primary delivery route to State Route 299 in Redding. Appropriate permits will be required from CalTrans.

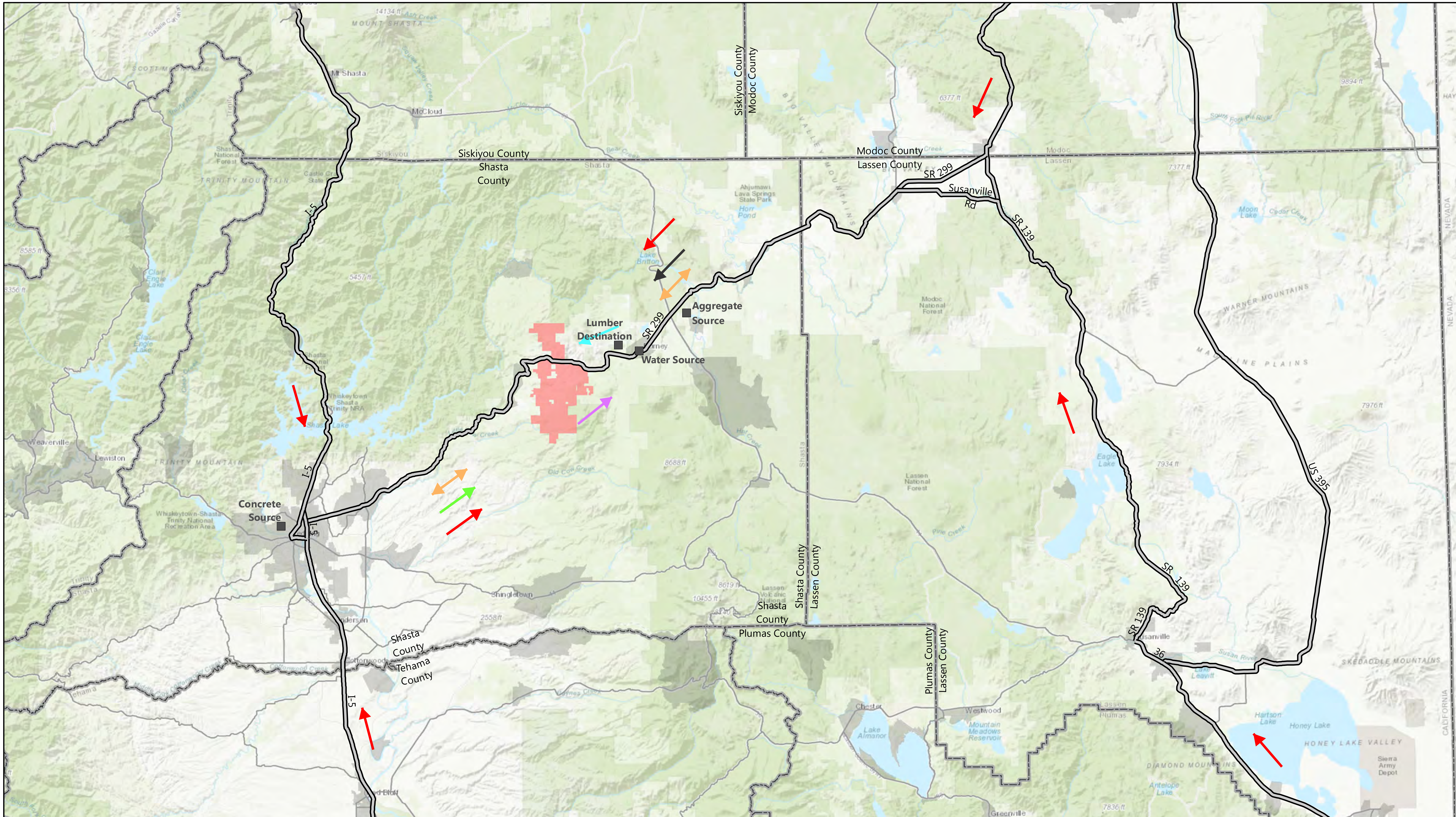
SR-299 west of the project site will likely be the source for concrete, and other components, and a majority of the commuting trips. State Route 299 east of the project site will see a lesser percentage of trips than SR-299 west of the project site. Delivery of aggregate, water, and a share of the worker commuting trips may originate within, and to the east of Burney. Nevertheless, based on the relative sizes of, and distances to Redding and the small towns east of the project site, this traffic study estimated 60 percent of the construction worker traffic using SR-299 from the west, and 40 percent using SR-299 from the east of the project.

Based on a project duration of approximately 250 work days, peak hour vehicle counts would be approximately 453 trips each way per day, with the highest hourly volume of approximately 260 vehicles per hour during the morning and afternoon peaks on SR-299 from the west, and 181 vehicles per hour from the east. The majority of the peak hour project related trips are commuting trips. A portion of the commuting trips are likely to occur before the peak hour since it is customary on construction projects to begin work earlier than other types of work.

Left turn lanes are projected to be warranted on SR-299 at each of the access roads during the construction period. During the operations and maintenance phase post construction, only the East and West Access roads will warrant left turn lanes along SR-299. The North Access road only marginally warrants a left turn lane along SR-299 post construction.

Westwood looked at both levels of service (LOS) and vehicle miles traveled (VMT) in this analysis. In estimating LOS, Westwood assigned peak hour trips at each access road intersections with SR-299. In each case, the intersection level of service was acceptable in the construction and post-construction phase at each access.

Westwood also estimated vehicle miles traveled (VMT). Westwood projected 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. It is estimated that the total VMT during the construction period could be **2,168,492 vehicle miles traveled**. The total VMT per day post-construction is assumed to be **300 vehicle miles traveled**. Per capita daily VMT during operations is estimated to be **32.49 miles per day**.



Data Source(s): US Census Bureau (2018); Westwood (2019); .

Legend

- Worker Commute Route
- Aggregate Delivery Route
- Concrete Delivery Route
- Timber Removed Route
- Turbine/Other Delivery Route
- Water Delivery Route
- Project Boundary
- Material Location

N

0 — 10 Miles

Fountain Wind Project

Shasta County, California

Delivery Route

EXHIBIT 1

Westwood

Toll Free (888) 937-5150 westwoodps.com

Westwood Professional Services, Inc.

Map Document: N:\0012693.00\GIS\FW_DeliveryRoute_811_190315.mxd 3/15/19 1:40:33 PM NEObrien

Exhibit 2

Dist	Route	County	Post Mile	Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour	Ahead Peak Month	Ahead AADT
1	299	HUM	7.139	OLD HIGHWAY	480	5400	4700	490	5400	4700
1	299	HUM	19.05	BAIR ROAD	380	4800	4300	530	5600	5300
1	299	HUM	38.833	WILLOW CREEK, JCT. RTE. 96 NORTH	530	5600	5300	490	5300	5000
1	299	HUM	38.9	WILLOW CREEK, RIVER ROAD	500	5300	4400	500	5300	4400
1	299	HUM	41.86	GAMBI VILLAGE, EAST	560	5500	4450	470	4500	3900
1	299	HUM	43.035	HUMBOLT/TRINITY COUNTY LINE	400	5000	3450			
2	299	TRI	0	HUMBOLT/TRINITY COUNTY LINE				420	4300	3100
2	299	TRI	1.3	EAST LIMITS SALYER	330	3750	2950	250	2950	2500
2	299	TRI	11.53	BURNT RANCH ROAD	250	2750	2350	210	2200	1850
2	299	TRI	21.731	DEL LOMA	210	2200	1850	210	2150	1800
2	299	TRI	24.263	LITTLE FRENCH CR	200	2150	1800	190	2150	1800
2	299	TRI	31.45	BIGFLATCMP-WHEELGLUCHRD	190	2150	1800	340	3700	2550
2	299	TRI	51.03	WEAVERVILLE, WEST CITY LIMITS	490	4950	3100	490	4950	3400
2	299	TRI	52.07	WEAVERVILLE, WASHINGTON STREET	1100	11500	10700	1100	11500	10700
2	299	TRI	52.72	MARTIN/NUGGET ROAD	730	9000	8800	340	7000	6600
2	299	TRI	58.11	EAST JCT. RTE. 3	550	6100	4750	430	4900	4150
2	299	TRI	63.51	LEWISTON ROAD	430	4900	4150	420	4750	3950
2	299	TRI	67.425	NEW LEWISTON ROAD	440	4950	3950	440	4900	3900
2	299	TRI	72.246	TRINITY/SHASTA COUNTY LINE	440	4900	3900			
2	299	SHA	0	TRINITY/SHASTA COUNTY LINE				450	5000	3900
2	299	SHA	8.648	FRENCH GULCH ROAD	450	5000	4000	540	6100	4900
2	299	SHA	16.47	KENNEDY DRIVE	590	6200	4950	830	7600	6700
2	299	SHA	17.739	ROCK CREEK ROAD	830	7600	6700	1200	13900	10400
2	299	SHA	21.648	REDDING, WEST CITY LIMITS	1200	14100	10500	1200	14100	10500
2	299	SHA	22.226	REDDING, BUENAVENTURA BLVD	1200	14100	10500	1700	18700	14200
2	299	SHA	23.81	REDDING, COURT STREET	2150	22500	20400	2050	22500	20300
2	299	SHA	24.088	JCT. RTES. 273 AND 299	2050	21600	20300	2050	21600	20300
2	299	SHA	24.822	REDDING, JCT. RTE. 5	2050	21600	20300	2150	22800	21000
2	299	SHA	25.54	HAWLEY ROAD	2150	22800	21000	1150	12600	11600
2	299	SHA	27.239	OLD OREGON TRAIL	1150	12600	11600	940	10500	9700
2	299	SHA	31.46	DESCHUTES ROAD	580	8000	6200	490	5600	4850

Exhibit 2

Dist	Route	County	Post Mile	Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour	Ahead Peak Month	Ahead AADT
2	299	SHA	53.263	TERRY MILL ROAD	360	4750	3550	360	4900	3650
2	299	SHA	60.05	BIG BEND ROAD	310	4450	3200	320	3800	2850
2	299	SHA	73.13	TAMARACK ROAD	320	3550	3000	320	3550	3000
2	299	SHA	74.48	ELM STREET	380	3900	2450	370	9400	3300
2	299	SHA	74.98	BURNEY, PLUMAS STREET	370	9400	3300	880	9300	8400
2	299	SHA	76.181	BLACK RANCH ROAD	880	9300	8400	550	6400	5200
2	299	SHA	78.65	PINE ST LT	530	6600	5500	440	5200	4100
2	299	SHA	80.085	FOUR CORNERS, JCT. RTE. 89	490	5300	4500	370	3900	3200
2	299	SHA	91.08	GLENBURN/DANA ROAD	370	3900	3200	370	3800	3300
2	299	SHA	91.56	FALL RIVER MILLS, MAIN STREET	370	3800	3300	490	5300	4200
2	299	SHA	95.24	MCARTHUR-GLENBURN RD	420	4300	3900	360	3750	3250
2	299	SHA	96.78	PITTVILLE ROAD	360	3750	3250	160	1700	1400
2	299	SHA	99.361	SHASTA/LASSEN COUNTY LINE	160	1700	1400			
2	299	LAS	0	SHASTA/LASSEN COUNTY LINE				160	1700	1400
2	299	LAS	10.407	CEMETERY ROAD	160	1700	1400	180	1900	1600
2	299	LAS	15.101	LOOKOUT ROAD	190	2100	1800	120	1200	970
2	299	LAS	25.635	LASSEN/MODOC COUNTY LINE	120	1200	970			
2	299	MOD	0	LASSEN/MODOC COUNTY LINE				120	1200	970
2	299	MOD	0.332	ADIN, JCT. RTE. 139, SOUTH	100	1100	960	150	1900	1450
2	299	MOD	21.749	JCT. RTE. 139 NORTH	140	1600	1100	160	2000	1450
2	299	MOD	22.435	CANBY RANGER STA LT	170	1850	1450	170	1850	1450
2	299	MOD	40.276	ALTURAS, JUNIPER STREET	160	1850	1450	420	3600	2750
2	299	MOD	40.64	ALTURAS, JCT. RTE. 395	530	5300	4400	110	990	850
2	299	MOD	57.354	LAKE CITY ROAD	90	790	700	40	290	250
2	299	MOD	66.632	NEVADA STATE LINE	20	120	75			
8	330	SBD	28.696	JCT. RTE. 210				1550	13200	11000
8	330	SBD	29.605	SAN BERNARDINO, HIGHLAND AVENUE	1550	13200	11000	1700	14400	12000
8	330	SBD	44.118	RUNNING SPRINGS, JCT. RTE. 18	1700	14400	12000			
8	371	RIV	56.467	JCT. RTE. 79				620	6600	6300
8	371	RIV	60.23	WILSON VALLEY ROAD	740	7400	7100	780	7800	7500
8	371	RIV	67.657	CARY ROAD	740	7600	7300	740	7600	7300
8	371	RIV	71.31	ANZA, CONTRERAS ROAD	720	7400	7100	720	7400	7100

Exhibit 3 - Fountain Wind Project - Estimated Vehicle Trips During Construction

	Number of Truck Trips	Estimated Gross Vehicle Weight (Pounds)	Load Weight (Pounds)	Miles	VMT	Notes/ Assumptions
Pick-Up Trucks						
Survey	400	7,000	500	0	0	
Construction Trades	24,000	7,000	500	0	0	Average number of crews (30)
Project Management Staff	2,500	7,000	500	0	0	Includes inspectors
Equipment Operators	6,267	7,000	500	0	0	
Small Equipment on Flatbed Trailer	1,250	12,000	5,000	0	0	
Total Pick-up Trucks	34,417				0	
Peak Number of Pick-up Truck Trips/Day	173					
Total Pick-up Trucks	20650			50	1,032,500.00	Assume 60% SH 299 West
Peak Number of Pick-up Trucks/Day	104					Assume 60% SH 299 West
Total Pick-up Trucks	13766.667			10	137,666.67	Assume 40% SH 299 East
Peak Number of Pick-up Trucks/Day	69					Assume 40% SH 299 East
Equipment						
Feller Buncher (logging)	2	71,711		20	40	Cat 522B
Logging Trucks	8	35,000		50	400	Flat-Bed Semi Trailer and Tractor
Bulldozer (medium)	4	57,440		50	200	Cat D7
Scraper	2	93,000		50	100	Cat 627K
Drum Compactor	4	41,000		50	200	Cat CS41B
Skid Steer Loader	4	4,000		50	200	Cat 272D2
Road Grader	1	42,647		50	50	Cat 12M
Excavator	1	66,250		50	50	Cat 326F
Trenching Equipment	4	52,000		50	200	Wolfe 7000
Backhoe Loader (includes setting collector system poles)	4	24,000		50	200	Cat 415F2
Cable Reel Truck (Includes auger for pole foundations)	2	46,000		50	100	Includes manlift basket for rigging poles
Concrete Pump Truck	1	46,000		50	50	Schwing 31 XT
Mobile Hydraulic Crane	6	117,235		50	300	Grove RT890E
Large Crawler Crane	2	794,000		50	100	Terrex Demag CC2800-1
Equipment Operators	47				2,190	Assume all trips on SR 299 West
Mobile Home (Field Office)	11	60,000	40,000	50	550	Assume all trips on SR 299 west - Schedule to avoid peak hours
Materials						
Erosion and Sediment Control Materials	4	45,000	10,000	20	72	Based on perimeter control on one side of road length
Public Road Aggregate	0	80,000	40,200	20	0	Based on 4832 feet of public road improvements, 6" depth
Access Road Aggregate	0	80,000	40,200	20	0	Based on 40 miles of access roads
Temporary Laydown Area Aggregate	1,923	80,000	40,200	20	38,451	Based on 18 staging areas totaling 44 acres
Substation Aggregate	218	80,000	40,200	20	4,369	Based on a 5 acre substation
O&M/Field Office Aggregate	218	80,000	40,200	20	4,369	Based on a 5 acre O&M/Field Office Area
Switching Substation Aggregate	655	80,000	40,200	20	13,108	Based on an 15 acre switching substation
Total Aggregate for Compaction Deliveries	3,019				60,370	Assume all trips on SR 299 East
Substation Rock	328	80,000	40,200	20	6,560	Based on a 3.5 acre substation
Field Office/O&M Rock	0	80,000	40,200	20	0	Based on a 3.5 acre O&M/Field Office Area
Switching Substation Rock	721	80,000	40,200	20	14,420	Based on an 11 acre battery storage system
Concrete Aggregate	9	80,000	40,200	20	185	Based on Aggregate equal to 76% of weight
Total Aggregate Deliveries	1,058	21,497	Tons		21,165	Assume all trips on SR 299 East
Wind Turbine Tower Base	72		153,400	270	19,440	Based on GE 3.4 137, HH 110m
Wind Turbine Tower Lower Mid-Section	72		120,100	270	19,440	Based on GE 3.4 137, HH 110m
Wind Turbine Tower Upper Mid-Section	72		112,850	270	19,440	Based on GE 3.4 137, HH 110m
Wind Turbine Tower Top Section	72		86,900	270	19,440	Based on GE 3.4 137, HH 110m
Wind Turbine Nacelle	72		150,700	270	19,440	Based on GE 3.4 137
Wind Turbine Hub	72		88,050	270	19,440	Based on GE 3.4 137
Wind Turbine Blades (3)	216		37,750	270	58,320	Based on GE 3.4 137
Wire and Cable - Underground Colletion System	38	80,000	45,000	270	10,260	Based on 3 conductors, 1.9 pounds/foot
Wire and Cable - Overhead Collection System	12	80,000	45,000	270	3,240	Based on 3 conductors, 2.1 pounds/foot
Overhead Collection Line Poles	85	30,000	15,000	270	22,883	Assume 250' wire span, 4 - 2000 pound Poles per trailer
Transmission Line Poles	77	27,000	12,000	270	20,790	Assume 750' wire span, 1 - 8000 pound Pole per trailer
Met Poles	5			270	1,350	Assume 1 Met Pole can be carried on a single truck
Transformers	72	80,000	45,000	270	19,440	Based on 3.5 MW transformer
Miscellaneous Turbine Components	288	80,000	45,000	270	77,760	Based on 4 miscellaneous deliveries per turbine
Formwork	3	80,000	45,000	50	144	Based on 25 reuses of forms
Reinforcing Steel (Rebar)	144	80,000	45,000	50	7,200	Based on 45 tons per turbine
Pilot Cars (Front and Back)	1,296			270	349,920	Pilot Cars for Wind Turbines
Total Turbine Related Deliveries	2,668				687,947	Assume all trips on SR 299 west and I-5 from Stockton - Schedule to avoid pe
Concrete for Turbine Foundations	3,600	69,000	40,000	50	180,000	
Concrete Pump Trucks	2			50	100	
Concrete for Substation Foundations	41	69,000	40,000	50	2,050	Based on 2 MPT - Foundation 8'-6" x 24'-0" x 1'-4"
Concrete for Switching Station Foundations	41	69,000	40,000	50	2,050	Based on 40' container each with 6 foundation pies
Concrete for Overhead Collection System Pole Foundations	36	40,332	11,332	50	1,800	Assume 1 concrete foundations (terminations & angles)
Concrete for Transformer Pads	72	41,180	12,180	50	3,600	Assume Pad 9' x 9' x 1'
Concrete for O&M Building	13	69,000	40,000	50	650	Based on foundation wall 78' x 70' x 1' thick x 5' deep + 4" floor slab
Total Concrete Deliveries	3,805	36,946	CuYds		190,250	Assume all trips on SR 299 west

Cement for Concrete Batch Plant	2	80,000	40,000	50	99	Based on Aggregate equal to 16% of weight
Building Materials	20	80,000	45,000	50	1,000	Based on 5460 square foot prefabricated metal building
Structural Steel - Substation	4	80,000	45,000	50	222	Based on 200,000 Pounds of Structural Steel
Structural Steel - Switching Substation	4	80,000	45,000	50	200	Based on 200,000 Pounds of Structural Steel
Elecrical Equipment - Substation	10	80,000	45,000	50	500	Includes Control Building, switch gear, capacitors, etc.
Elecrical Equipment - Switchingsubstation	10	80,000	45,000	50	500	Includes Control Building, switch gear, capacitors, etc.
CMP Culverts	4	80,000	45,000	50	200	Culvert Extensions and new culverts
Chain Link Fence	7	80,000	45,000	50	362	Based on 30,600 linear feet of fence at 10.65 pounds/ ft
Micellaneous Consumables	26	60,000	20,000	50	1,300	
Fuel Deliveries	25	26,000	7,000	50	1,250	Based on 2000 Gallons/week ea. of diesel on-road & off road
Sanitation	52	50,000	10,000	50	2,600	Based on weekly maintenance visits
Plant Stock, Seed and Mulch	17	52,600	12,800	50	859	Based on 2.5 tons/acre
Total Miscellaneous Deliveries	182				9,093	Assume all trips on SR 299 West
Water (Compaction)	307	33,400	0	20	6,140	Based on 20 gallons/ton of aggregate (Roads, Laydown, etc.)
Water (Dust Control)	919	33,400	0	20	18,380	Based on 300 gallons/acre/day of Road, staging, and field office area areas
Water (Vegetation establishment)	110	33,400	0	20	2,200	Based on 10,000 gallons/acre of Laydown areas
Water (Concrete Batching)	2	33,400	0	20	40	Based on Aggregate equal to 8% of weight
Total Water	1,338	5,345,014	Gallons		26,760	Assume all trips on SR 299 East

	Trucks	Trips		
SR 299 West	27,362	54725		1,922,529
SR 299 East	19,181	38363		245,962
Total Trips	46,544	93,088	TOTAL VMT	2,168,492

Exhibit 3 - Fountain Wind Project - Estimated Vehicle Trips - Post-Construction

Vehicles	Number of Truck Trips	Estimated Gross Vehicle Weight (Pounds)	Load Weight (Pounds)	Miles	VMT	Notes/ Assumptions
Pick-Up Trucks						
Survey	0	7,000	500	0	0	
Construction Trades	0	7,000	500	0	0	Average number of crews (30)
Project Management Staff	0	7,000	500	0	0	Includes inspectors
Equipment Operators	6	7,000	500	50	300	
Small Equipment on Flatbed Trailer	0	12,000	5,000	0	0	
Total Pick-up Trucks	6				300	
Peak Number of Pick-up Truck Trips/Day	173					
Total Pick-up Trucks	3.6			50	180	Assume 60% SH 299 West
Peak Number of Pick-up Trucks/Day	104					Assume 60% SH 299 West
Total Pick-up Trucks	2.4			10	120	Assume 40% SH 299 East
Peak Number of Pick-up Trucks/Day	69					Assume 40% SH 299 East
Equipment						
Equipment Operators	0				0	Assume all trips on SR 299 West
Mobile Home (Field Office)	0	60,000	40,000	50	0	0
Materials						
Total Aggregate for Compaction Deliveries	0				0	Assume all trips on SR 299 East
Concrete Aggregate	0	80,000	40,200	0	0	Based on Aggregate equal to 76% of weight
Total Aggregate Deliveries	0	21,309	Tons		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	38,946	CuYds		0	Assume all trips on SR 299 west
Cement for Concrete Batch Plant	0	80,000	40,000	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	1,679,962	Gallons		0	Assume all trips on SR 299 East
	Trucks	Trips				
SR 299 West	4	8			180	
SR 299 East	2	5			120	
Total Trips	6	13		TOTAL VMT	300	

APPENDIX A – Potential Transportation Environmental Protection Measures for the Fountain Wind Project

Resource Category	Measure	Implementation			
		Preconstruction	Construction	Operations	Decommissioning
Transportation					
TRANS-1	[Project] will coordinate with CalTrans and Shasta County to implement a Transportation and Traffic Management Plan that minimizes risks and inconvenience to the public, while ensuring safe and efficient construction of the Project. The plan will focus on turbine component deliveries, traffic and circulation primarily within and in the vicinity of the Project area. It will be designed to minimize potential hazards from increased truck traffic and worker traffic and to minimize impacts to traffic flow in the vicinity of the Project.	X	X		
TRANS-2	To minimize conflicts between Project traffic and background traffic, deliveries of project components will be scheduled around local volume peaks to the extent feasible.		X		
TRANS-3	Road clearances may include temporarily blocking road intersections via construction cones and/or staffing blocked intersections with a traffic-control flagger to allow haul trucks sole access to the road while delivering Project components. If required, public road closures are not expected to exceed 15 minutes during each/any road closure event.		X		X
TRANS-4	The Project will coordinate with CalTrans to determine whether temporary speed limit reductions during construction are applicable where Project access points intersect with State Highway 299.	X	X		
TRANS-5	Construction deliveries would be coordinated to avoid major traffic-generating events in Redding, to the extent practicable.		X		
TRANS-6	The Project would coordinate with local law enforcement, to manage traffic flows and monitor traffic speed during deliveries.		X		X
TRANS-7	All staging activities and parking of equipment and vehicles would occur within the Project Area and would not occur on maintained State Highways or County roads.		X		

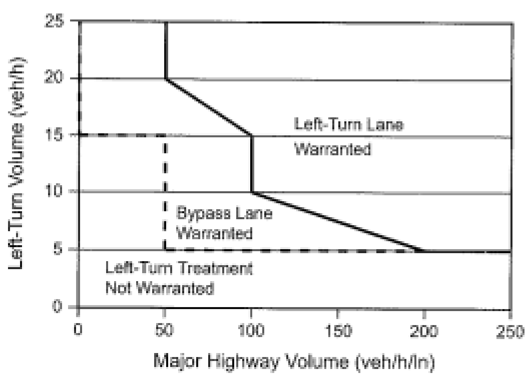
Resource Category	Measure	Implementation			
		Preconstruction	Construction	Operations	Decommissioning
TRANS-8	Equipment and material deliveries to the site would be performed by professional transportation companies familiar with the type of equipment, loads involved, and U.S. DOT, CalTrans, and Shasta County regulations.		X		X
TRANS-9	Road signs would be erected to notify travelers and local residents that construction is occurring in the area and provide information regarding the timing and route for oversized vehicle movements and deliveries. The erection/placement of road signs and the Project construction activities would be performed in accordance with the Shasta County and CalTrans requirements.		X		
TRANS-10	Escort vehicles would assist delivery of oversized turbine components to give drivers additional warning of oversized loads.		X		

APPENDIX B – AASHTO Guidance for Left Turn Lanes on Two Lane Highways (AASHTO Green Book, Seventh 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 (*16*)

Left-Turn Lane Peak-Hour Volume (veh/h)	Three-Leg Intersection, Major-Road Two-Lane Highway Peak-Hour Volume (veh/h/ln) that Warrants a Bypass Lane	Three-Leg Intersection, Major-Road Two-Lane Highway Peak-Hour Volume (veh/h/ln) that Warrants a Left-Turn Lane	Four-Leg Intersection, Major-Road Two-Lane Highway Peak-Hour Volume (veh/h/ln) that Warrants a Left-Turn Lane
5	50	200	150
10	50	100	50
15	< 50	100	50
20	< 50	50	< 50
25	< 50	50	< 50
30	< 50	50	< 50
35	< 50	50	< 50
40	< 50	50	< 50
45	< 50	50	< 50
50 or More	< 50	50	< 50

Note: These guidelines apply where the major road is uncontrolled and the minor-road approaches are stop- or yield-controlled. Both the left-turn peak-hour volume and the major-rad volume warrants should be met as shown in Figure 9-36.



(a) Three-Leg Intersections

NOTE: The analysis on the following page shows that SR 299 either meets warrants or is marginally warranted for left turn lanes at the access roads. The RED shading above indicates the warrant guidelines that were met, while the PURPLE shading above indicates that warrants were marginally met for one access.

Figure 9-36. Suggested Left-Turn Treatment Warrants Based on Results from Benefit–Cost Evaluations for Intersections on Two-Lane Highways in Rural Areas (*16*)

<u>The construction and post construction volumes have been applied using the AASHTO warrants above, and have yielded the following results:</u>

DURING CONSTRUCTION

West Access

A.M. Peak Hour

128 Westbound Through
53 Westbound Left

Eastbound Through	377
Eastbound Right	75
Total	**452**

Therefore Left Turn Lane **IS WARRANTED**

P.M. Peak Hour

313 Westbound Through
0 Westbound Left

Eastbound Through	192
Eastbound Right	0
Total	**192**

Therefore Left Turn Lane **IS NOT WARRANTED**

North Access

A.M. Peak Hour

16 Westbound Right
181 Westbound Through
197 Total

Eastbound Left	**24**
Eastbound Through	353

Therefore Left Turn Lane **IS WARRANTED**

P.M. Peak Hour

0 Westbound Right
289 Westbound Through
289 Total

Eastbound Left	**0**
Eastbound Through	245

Therefore Left Turn Lane **IS NOT WARRANTED**

East Access

A.M. Peak Hour

197 Westbound Through
112 Westbound Left

Eastbound Through	192
Eastbound Right	161
Total	**353**

Therefore Left Turn Lane **IS WARRANTED**

P.M. Peak Hour

128 Westbound Through
0 Westbound Left

Eastbound Through	261
Eastbound Right	0
Total	**261**

Therefore Left Turn Lane **IS NOT WARRANTED**

POST CONSTRUCTION

West Access

A.M. Peak Hour

128 Westbound Through
6 Westbound Left

Eastbound Through	204
Eastbound Right	6
Total	**210**

Therefore Left Turn Lane **IS WARRANTED**

P.M. Peak Hour

140 Westbound Through
0 Westbound Left

Eastbound Through	192
Eastbound Right	0
Total	**192**

Therefore Left Turn Lane **IS NOT WARRANTED**

North Access

A.M. Peak Hour

6 Westbound Right
134 Westbound Through
140 Total

Eastbound Left	**6**
Eastbound Through	198

Therefore Left Turn Lane **IS NOT WARRANTED**

P.M. Peak Hour

0 Westbound Right
134 Westbound Through
134 Total

Eastbound Left	**0**
Eastbound Through	198

Therefore Left Turn Lane **IS NOT WARRANTED**

East Access

A.M. Peak Hour

140 Westbound Through
6 Westbound Left

Eastbound Through	192
Eastbound Right	6
Total	**198**

Therefore Left Turn Lane **IS MARGINALLY WARRANTED**

P.M. Peak Hour

128 Westbound Through
0 Westbound Left

Eastbound Through	204
Eastbound Right	0
Total	**204**

Therefore Left Turn Lane **IS NOT WARRANTED**