Appendix K

Traffic Study
North Sky River Wind Energy Project and
Jawbone Wind Energy Project
Preliminary Traffic Assessment
North Sky River Wind Energy Project
Kern County, California

April 2011

Prepared for
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Juno Beach, FL, 33408

Prepared by
CH2MHILL
Introduction

North Sky River Energy, LLC (NSRE), a wholly owned subsidiary of NextEra Energy Resources, LLC, proposes to develop the North Sky River Wind Energy Project (NSR) in southeastern Kern County, California. The project consists of up to 102 wind turbine generators for a nominal output of up to 255 megawatts (MW) and a new 13-mile-long 230-kilovolt (kV) generation-tie (gen-tie) line interconnecting to the Sky River Substation.

CH2M HILL has prepared the following preliminary Traffic Assessment which includes a description of the surrounding roadways, determines the project trip generation during construction and operation of the project, determines the project trip distribution, and evaluates the potential project impacts to the surrounding roadways.

Project Description

Project Setting
The project site is located within the Tehachapi Wind Resource Area (TWRA) of southeastern Kern County, approximately 15 miles north of Tehachapi and 20 miles north of Mojave. Specifically, the site is bordered by vacant land to the north and east, the Los Angeles Department of Water and Power (LADWP) Pine Tree Wind Farm to the south, and State Route 14 and the Jawbone Off-Highway Vehicle Open Area to the east. Primary access to the site is from State Route 14 via Jawbone Canyon Road at the northeast corner of the site. A vicinity map of the project location is presented in Figure 1.

Project Facilities and Access
NSR will produce up to 300 MW of wind energy using up to 102 wind turbine generators (WTGs). Figure 2 provides an overview of the proposed project layout. The project will include the following components:

- Temporary construction laydown areas to support WTG component staging, office trailers, sanitary portable installations, and portable concrete batch plants
- Operations and maintenance (O&M) facilities
- Internal roadway system
- Ingress/egress to the project site from Jawbone Canyon Road via State Route (SR) 14
- Onsite collector substation and underground and overhead electrical collection lines to collect energy from the WTGs
- An approximately 13-mile-long gen-tie line to the existing NextEra Sky River Substation
- Regional transmission line upgrades to the existing Wilderness transmission line system

The existing internal project site roads (which are primarily unpaved) would be improved and widened to approximately 34 feet and engineered for heavy equipment for
construction. Following completion of construction, the roads would be restored to approximately 20- to 24-foot-wide permanent site roads.

The estimated project life depends primarily on the demand for power, however, the lifetime of NSR is anticipated to be more than 30 years. Upgrading and replacing equipment could extend the operating life indefinitely, assuming a future demand exists for the electricity generated by the project.

Proposed Construction Schedule

Construction of the proposed project, from mobilization through restoration activities is expected to last approximately 12 months, including installation of the roadway/access systems, construction office trailers, construction staging areas, other ancillary facilities required for construction, construction of WTG foundations and installation of the WTGs and interconnection facilities. After the WTGs are installed, the roadways would be reduced in width, and all exposed areas no longer needed for access will be restored to preconstruction conditions.

Construction would occur during daylight hours; however, some activities may require extended hours because of scheduling constraints or other time-sensitive matters, or to maintain structural integrity of concrete placement. Construction Workforce and Equipment

Based on data provided for typical wind energy projects of similar size, an average of 120 workers will be employed during construction (with a peak work force of 150 between Months 4 and 9). Craft workers employed for construction would include millwrights, iron workers, electricians, equipment operators, carpenters, laborers, and truck drivers. Raw materials required for project implementation include gravel and aggregate for roads; concrete, sand, and cement for foundations; and water for concrete, dust control, and erosion controls. The heavy equipment listed in Table 1 would be used during construction.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office staff and management</td>
<td>Pickup trucks, passenger cars</td>
</tr>
<tr>
<td>Foundations</td>
<td>Dozer, grader, excavator or drill rig, crane, concrete trucks, concrete pump trucks, pickup trucks with trailers, all-terrain forklifts, water trucks, dump trucks, compactors, generators, welders</td>
</tr>
<tr>
<td>Roads</td>
<td>Dozer, grader, front-end loaders, compactor, roller, pickup trucks, water trucks, dump trucks, compactors, scrapers</td>
</tr>
<tr>
<td>WTG component unloading crew (pad site)</td>
<td>Cranes, all-terrain forklifts, pickup trucks with trailers</td>
</tr>
<tr>
<td>WTG erecting</td>
<td>Cranes, pickup trucks with trailers</td>
</tr>
<tr>
<td>Environmental</td>
<td>Pickup and flatbed trucks</td>
</tr>
<tr>
<td>Substation</td>
<td>Cranes, forklifts, pickup trucks, water trucks, concrete trucks, concrete pump trucks, dump trucks, compactors, generators, welders, scrapers</td>
</tr>
<tr>
<td>Collection system</td>
<td>Trencher, grader, forklift, small cranes</td>
</tr>
<tr>
<td>Directional boring</td>
<td>Boring machine, pickup trucks</td>
</tr>
</tbody>
</table>
### TABLE 1
Typical Construction Equipment

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gen-tie line</td>
<td>Cranes, excavator, drill rig, pickup trucks</td>
</tr>
<tr>
<td>Laborers</td>
<td>Pickup trucks</td>
</tr>
<tr>
<td>Owner representatives</td>
<td>Pickup trucks</td>
</tr>
<tr>
<td>Turbine supplier</td>
<td>Pickup trucks</td>
</tr>
</tbody>
</table>

**Project Operations**

Once constructed, up to 20 full- and part-time wind turbine technicians, operations personnel, administrative personnel, and managers would be employed to operate and maintain the project. The O&M staff would monitor WTG and system operation, perform routine maintenance, troubleshoot malfunctions, shutdown and restart WTGs (when necessary), and provide security. They would be headquartered at the O&M facility and travel around the site as needed. Normal operations could involve deployment of up to three crews of two technicians around the site and two to three personnel in the office. Staff may not be present at the site 24 hours per day. However, operations would be continuously monitored through the supervisory control and data acquisition (SCADA) system from a NSRE-operated remote location. Project access roads would also be periodically graded and compacted to maintain the design, safety, and environmental requirements during the life of the project.
Kern County and Caltrans Traffic Impact Study Guidelines

The Circulation Element of the County’s General Plan identifies Level of Service (LOS) D as the minimum traffic level to be considered acceptable for County maintained roads. Mitigation is required if development causes affected roadways to fall below LOS D.

In addition, the project traffic will access the regional circulation system via SR 14, which is part of the State highway system and under jurisdiction of Caltrans. Based on the Caltrans Guide for the Preparation of Traffic Impact Studies a Traffic Impact Study is needed when a project:

1. Generates over 100 peak hour trips assigned to a State highway facility; or
2. Generates 50 to 100 peak hour trips assigned to a State highway facility and the affected State facility is experiencing noticeable delay and approaching unstable traffic flow conditions (LOS C or LOS D); or
3. Generates 1 to 49 peak hour trips assigned to a State highway facility and any of the following conditions exist:
   a. Affected State highway facilities experiencing significant delay; unstable or forced traffic flow conditions (Level of Service “E” or “F”).
   b. The potential risk for a traffic incident is significantly increased (i.e., congestion related collisions, non-standard sight distance considerations, increase in traffic conflict points, etc.).
   c. Change in local circulation networks that impact a State highway facility (i.e., direct access to State highway facility, a non-standard highway geometric design, etc.).

Per Caltrans guidelines, the proposed project may be deemed to have a significant transportation/circulation effect if it will cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e. result in a substantial increase in either the number of vehicle trips, the volume-to-capacity ratio on the roads, or congestion at intersections) or result in a safety hazard to pedestrians or motorists. The proposed NSR project has been evaluated against these thresholds.

Existing Street Network

The primary regional transportation corridors within the study area include State Route 58 and State Route 14. The local circulation system near the project site consists of South Kelso Valley Road, Jawbone Canyon Road, and Pine Tree Canyon Road (see Figure 1). The local roadway characteristics are generally rural in nature, with limited access control. Traffic volumes on the major roadways in the project vicinity are under capacity and the roadways currently operate at acceptable levels of service. A written description of the study roadways follows.

**State Route 58** provides for interregional and interstate travel, and is one of two major east-west thoroughfares through Kern County. SR 58 also serves as an alternative route to Interstate 5, to and from the Central Valley. The route accommodates significant volumes of heavy trucks traveling between central and southern California. Within the vicinity of the project area, SR 58 provides two lanes in each direction. Interchanges along SR 58 in the area are located at Bealville Road, Hart Flat Road, Woodford- Tehachapi Road, Broome Road, SR...
202 (West Tehachapi Boulevard,) and North Mill Street. A future interchange is planned at Dennison Road, which is currently an under-crossing. SR 58 carries less than 14,000 average daily trips near its junction with SR 14 (CALTRANS, 2009).

**State Route 14** (also called the Antelope Valley Freeway in the project area) is the principal regional access route leading to the project site. SR 14 is a two- and four-lane north–south state highway that, along with U.S. Highway 395, connects Mojave, south of the project site, to the cities of Lone Pine, Big Pine, Bishop, and the Mammoth Mountain Resort areas to the north. Access to the project is provided via a “T” intersection controlled by a stop sign on Jawbone Canyon Road. Near this intersection, SR 14 carries less than 7,000 average daily trips (CALTRANS, 2009).

**South Kelso Valley Road** is a north-south paved road running between Jawbone Canyon Road to south and SR 178 (Isabella Walker Pass Road) to the north. South Kelso Valley Road provides access to remote residences in the Kelso Valley and connects up to the Onyx Ranch Headquarters near SR 178.

**Jawbone Canyon Road** is a County-maintained road of approximately 25 feet in width that runs northwest from its intersection with SR 14 to the Sequoia National Forest. At its junction with SR 14, the road travels westerly through the Jawbone Canyon Open Area for approximately 6 miles, at which point it turns northward. As it exits the Jawbone Canyon Open Area, the road becomes a dirt road. On private property within the Open Area, the road right-of-way is 60 feet wide. Heading up into the mountains of the Sequoia National Forest (at approximately 7,000’) the road becomes very steep and windy. Traffic volumes on this roadway are generally very low. However, use increases considerably on holiday weekends and winter weekends as recreational users visit the Jawbone Canyon Open Area. The roadway and surrounding hills in the Open Area are used by off-road vehicles for recreation. Access to the project is proposed from Jawbone Canyon Road and SR 14.

**Pine Tree Canyon Road** is a dirt road located south of Jawbone Canyon Road that runs west from its intersection with SR 14. This roadway is very lightly traveled. It is maintained by LADWP to provide access to transmission facilities and two Los Angeles Aqueducts.

In addition to the roads described above, the Southern Pacific Railroad (SPRR) runs northeast from Mojave along SR 14, just east of the project site. The rail line bends further east just north of the intersection of SR 14 and Jawbone Canyon Road. The SPRR continues northeast to the town of Searles, where it splits and continues briefly east and for a considerable distance north along U.S. 395 and the eastern Sierra Nevada Mountains. In Mojave, the railroad intersects several other lines running to the south, east, and west.

**Project Trip Generation**

The project is proposed to be constructed over a 12-month period. Traffic associated with the project after the 12-month construction period is expected to be minimal. Therefore the project trip generation analysis focuses on the project traffic under a worst-case peak construction period.
The magnitude of traffic produced by a new development is typically estimated by applying the size of the project to the applicable trip generation rate contained in the Institute of Transportation Engineers (ITE) Trip Generation Manual. Since the ITE manual does not include trip generation rates for wind farms, the amount of traffic generated by the proposed project was estimated based on the anticipated construction schedule, activities, and workforce, including the number of employees, employee shift times, and anticipated daily truck activity at the site. The vehicular trips associated with the proposed project were separated into construction worker trips (generally auto trips) and delivery trips (truck trips). The total project trip generation is summarized in Table 5 and discussed in further detail below.

**Auto Trips**

Auto trips refer to all passenger vehicle trips that would be generated by the proposed project. These trips would mainly represent employee trips to and from the site throughout their work shifts. It is anticipated that the number of construction workers will fluctuate throughout the 12-month construction period, with the peak construction effort occurring between Months 4 through 9. During this period, a peak of approximately 150 employees per day is expected on site. The proposed construction workforce per month is presented in Table 2 below.

<table>
<thead>
<tr>
<th>Month</th>
<th>Number of Construction Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>100-120</td>
</tr>
<tr>
<td>4-9</td>
<td>150 workers</td>
</tr>
<tr>
<td>10-12</td>
<td>60-80</td>
</tr>
</tbody>
</table>

NOTE: Peak period shown in bold.

To the extent feasible employee start and end times will be staggered to minimize arrivals and departures during peak hours. However, as a worst-case analysis it is assumed that the majority of employees will arrive between 6:00 AM and 8:00 AM and depart between 4:00 PM and 6:00 PM, Monday through Friday. Assuming 1 incoming and 1 outgoing trip per employee, it is estimated that the proposed project would generate a total of 300 daily auto trips, with 75 trips occurring during the morning peak hour and 75 trips occurring during the afternoon peak hour. The peak employee trips per hour are presented in Table 5.

**Truck Trips**

The expected truck traffic generated by the proposed project would mainly be composed of heavy equipment delivery (e.g., cranes and bulldozers), and material deliveries (e.g., turbine components, aggregate, and concrete). Peak construction periods are expected to occur during installation of the access roads and WTG foundations.

Table 3 presents the total truck trips (incoming and outgoing) estimated during the 12 month construction period. As shown in Table 3, the construction truck traffic would peak during Month 5, with an average of 366 trips per day during this month.
### TABLE 3
Estimated Construction Truck Trips (Incoming and Outgoing)

| Wind Energy Facility/230-kV Gen-tie Line |

<table>
<thead>
<tr>
<th>Activity</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>Total</th>
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<tr>
<td>Site preparation and grading for staging/</td>
<td>200</td>
<td>150</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>450</td>
</tr>
<tr>
<td>construction offices</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Water Delivery</td>
<td>550</td>
<td>550</td>
<td>1,150</td>
<td>2,100</td>
<td>2,100</td>
<td>2,100</td>
<td>2,100</td>
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<td>650</td>
<td></td>
<td></td>
<td></td>
<td>13,400</td>
</tr>
<tr>
<td>Access road construction</td>
<td>100</td>
<td>150</td>
<td>200</td>
<td>1,323</td>
<td>1,323</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,096</td>
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<tr>
<td>Road Aggregate Delivery</td>
<td>386</td>
<td>773</td>
<td>1,932</td>
<td>2,318</td>
<td>2,319</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7,728</td>
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<tr>
<td>WTG foundation installation</td>
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<td></td>
<td></td>
<td>600</td>
<td>1,200</td>
<td>1,200</td>
<td>450</td>
<td>200</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td>3,750</td>
</tr>
<tr>
<td>Fine and Coarse Aggregate Delivery</td>
<td>305</td>
<td>914</td>
<td>609</td>
<td>609</td>
<td>305</td>
<td>305</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,047</td>
</tr>
<tr>
<td>WTG parts delivery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td>1,280</td>
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<td>Pole placement</td>
<td>203</td>
<td>203</td>
<td>203</td>
<td>203</td>
<td>203</td>
<td>202</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,014</td>
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<tr>
<td>Line stringing</td>
<td>40</td>
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<td>40</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>160</td>
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<tr>
<td>Collector substation and O&amp;M facility construction</td>
<td></td>
<td></td>
<td></td>
<td>200</td>
<td>200</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>600</td>
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<tr>
<td>Construction Clean-up</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>630</td>
</tr>
<tr>
<td>Site Reclamation and Revegetation</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>300</td>
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<tr>
<td>Total by Month</td>
<td>1,236</td>
<td>1,623</td>
<td>3,382</td>
<td>6,849</td>
<td>8,059</td>
<td>4,472</td>
<td>3,922</td>
<td>3,367</td>
<td>1,615</td>
<td>460</td>
<td>280</td>
<td>190</td>
<td>35,455</td>
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<tr>
<td>Total by Day</td>
<td>56</td>
<td>74</td>
<td>154</td>
<td>311</td>
<td>366</td>
<td>203</td>
<td>178</td>
<td>153</td>
<td>73</td>
<td>21</td>
<td>13</td>
<td>9</td>
<td>1,611</td>
</tr>
</tbody>
</table>

(22 construction days per month)
The assumptions used for the truck trip generation during Month 5 are presented in Table 4.

**TABLE 4**

<table>
<thead>
<tr>
<th>Equipment Delivery</th>
<th>Assumptions</th>
<th>Number of Daily Construction Truck Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Trucks</td>
<td>24 trucks needed, 2 round trips per day each</td>
<td>96 trips</td>
</tr>
<tr>
<td>Cement Trucks</td>
<td>9 trucks needed, 3 round trips per day each</td>
<td>54 trips</td>
</tr>
<tr>
<td>Aggregate Delivery Trucks</td>
<td>36 trucks needed, 2 round trips per day each</td>
<td>144 trips</td>
</tr>
<tr>
<td>Delivery Trucks</td>
<td>36 trucks needed, 1 round trip per day each</td>
<td>72 trips</td>
</tr>
<tr>
<td>Total Daily Truck Trips</td>
<td>-</td>
<td>366 trips</td>
</tr>
</tbody>
</table>

In order to determine the trip generation during peak hours, the truck trips were further broken down by arrival/departure time for a typical day. It is anticipated that the trucks would arrive to the site evenly distributed between the hours of 6:00 AM and 2:00 PM, and depart the site between the hours of 10:00 AM and 6:00 PM. Table 5 presents the truck trips per hour for Month 5.

Overall, the project is estimated to generate a total of 666 daily trips, with 98 (98 inbound and 0 outbound) trips occurring during the typical AM peak hour (7:00 – 8:00 AM) and 98 (0 inbound and 98 outbound) trips during the typical PM peak hour (4:00 – 5:00 PM). The daily trip generation estimates are presented in Table 5.

**TABLE 5**

<table>
<thead>
<tr>
<th>Hours of Operation</th>
<th>Autos (Personnel)</th>
<th>Trucks (Deliveries)</th>
<th>Total Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In</td>
<td>Out</td>
<td>Total</td>
</tr>
<tr>
<td>6:00-7:00 AM</td>
<td>75</td>
<td>0</td>
<td>75</td>
</tr>
<tr>
<td>7:00-8:00 AM</td>
<td>75</td>
<td>0</td>
<td>75</td>
</tr>
<tr>
<td>8:00-9:00 AM</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9:00-10:00 AM</td>
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</tr>
<tr>
<td>10:00-11:00 AM</td>
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<tr>
<td>11:00-12:00 PM</td>
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<td>12:00-1:00 PM</td>
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<td>1:00-2:00 PM</td>
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<td>2:00-3:00 PM</td>
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<tr>
<td>3:00-4:00 PM</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4:00-5:00 PM</td>
<td>0</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>5:00-6:00PM</td>
<td>0</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>150</td>
<td>150</td>
<td>300</td>
</tr>
</tbody>
</table>

**NOTE:** Peak hour trips are shaded in bold.

### Project Trip Distribution

The project related construction traffic for the AM peak hour (98 trips) and the PM peak hour (98 trips) was distributed and assigned to the local street network based on the regional street network and current travel patterns, and anticipated delivery and employee origins and destinations. The percentage of project traffic distributed on the road system is illustrated in Figure 3. In general, the project traffic was distributed as follows.
TABLE 6
Project Construction Trip Distribution

<table>
<thead>
<tr>
<th>Roadway</th>
<th>Direction (To/From)</th>
<th>Percentage</th>
<th>Autos</th>
<th>Trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR 14</td>
<td>South</td>
<td>95%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>SR 14</td>
<td>North</td>
<td>5%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table 6, it is anticipated that a minimum of 95 percent of the workers would live or stay in the surrounding communities to the south of the project (Lancaster, Palmdale, Tehachapi, Mojave). A small percentage of employees are anticipated to come from areas to the north. Workers would arrive at the site via SR 14 to Jawbone Canyon Road and then proceed to project staging areas. Workers would then take a shuttle to the construction areas, while materials would be delivered by the appropriate construction equipment to move such materials.

WTG and gen-tie line components would be delivered by rail or truck to Mojave, Tehachapi, or Lancaster, and then be transported via SR 14 to material storage/staging/laydown areas within the wind energy facility or the gen-tie line corridor.

Conclusion

NSRE, LLC is proposing to construct NSR, which includes construction and operation of up to 102 wind turbine generators for a nominal output of up to 300 MW, and associated facilities, including a new substation, interconnection line, O&M building, internal road network, and improved access. Construction of the project is anticipated to occur over a 12-month period, with a peak construction workforce of 150 employees needed between Months 4 through 9. The proposed project would result in temporary, short-term increases in local traffic as a result of construction-related workforce traffic (employee travel to and from the site), heavy equipment delivery (e.g., cranes and bulldozers), and material deliveries (e.g., turbine components, gravel and concrete). Based on the above analysis, during peak construction, the project is projected to add 666 daily trips, with 98 trips occurring during the morning peak hour and 98 trips occurring during the afternoon peak hour.

Although detailed level of service analyses were not completed at this time, the surrounding roadways and intersections are assumed to operate well below capacity given the remote and rural nature of the area, and the existing low daily volumes on these roadways. Though the project will result in a temporary increase in traffic, it is anticipated that the increase will have little effect on roadway and intersection operations and will still be well within the County and Caltrans’ acceptable capacities. Additionally, based on the short-term duration of the projected traffic generation the volume increase would be less than significant compared to the typical volume on SR 14.

While many of the trucks bringing WTG components to the site will be oversized (extra-long for WTG blade and tower transport and heavy-load for WTG nacelles), it is anticipated that no major road improvements will be needed to accommodate delivery and construction
traffic along the public roads and highways. However, minor improvements may be required along internal site roads. As required, NSRE will install all roads in accordance with local, state, and federal requirements and obtain all necessary permits. Additionally, a transportation management program will be developed to address issues specific to transporting turbine components, gen-tie line components, main assembly cranes, and other construction equipment. Since project construction will require the use of traffic control (signage, flaggers, lead vehicles, etc.), a detailed traffic control plan will be prepared prior to construction for review and approval by Caltrans and the County, and prepared in accordance with the California Supplement of the Manual of Uniform Traffic Control Devices (MUTCD). Project ingress and egress routes shall be designated, and project-related vehicle traffic outside these routes shall not be allowed. Nearby intersections will be evaluated to determine whether large trucks could complete turning maneuvers through the intersections. Turning templates will be used for both typical delivery trucks and large tractor-trailers.

References

CALTRANS Traffic Data Branch, Traffic and Vehicle Data Systems Unit, 2009 All Traffic Volumes on CSHS

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Figure 2 – Project Site Plan
Figure 3 – Project Trip Distribution Percentages
FIGURE 1
Regional Location Map
North Sky River Wind Energy Project
Kern County
January, 2011
FIGURE 2
Project Site Plan
North Sky River Wind Energy Project
January, 2011
North Sky River Wind Energy Project
Kern County
January, 2011

FIGURE 3
Project Trip Distribution Percentages
North Sky River Wind Energy Project
Kern County
January, 2011

Legend:
- Pacific Crest Trail
- Southern Pacific Railroad
- Highways
- Paved Roads
- Dirt Roads
- North Sky River Boundary
- Truck Traffic
- Auto Traffic
TRAFFIC STUDY

JAWBONE WIND ENERGY PROJECT
KERN COUNTY, CALIFORNIA

Prepared for:
SAPPHOS ENVIRONMENTAL, INC.

November 2010

Prepared by:

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INTRODUCTION

The purpose of this study is to evaluate potential traffic impacts resulting from the construction and operation of the Jawbone Wind Energy Project in Kern County, California. This study includes analyses of roadway and intersection capacities, impacts to air traffic patterns, oversized loads and heavy vehicles, potential roadway hazards, emergency access, and on-site parking capacity.

PROJECT DESCRIPTION

The project site has a proposed project area of 640 acres of property located approximately four miles northwest of California City in an uninhabited area of Kern County. The Sierra Nevada Mountains lie to the north of the project, the City of Mojave is located 16 miles to the south, State Route 14 is located 12 miles to the east, and the Piute Mountains and Tehachapi Mountains lie to the west. A vicinity map is presented in Figure 1 and a location map is presented in Figure 2.

The project will generate electricity from wind-driven turbines for sale to the regulated energy markets in California. The project involves the installation of up to 20 wind turbine generators along selected ridgelines on privately owned land. The project includes a power collection and transmission system, an operations and maintenance building and storage yard, and access and maintenance roads.

PROJECT AREA

A. Site Use and Access

The project site is located in a remote area that is used primarily for cattle ranching. Primary access to the site would be provided from State Route 14 via Jawbone Canyon Road through the Jawbone Canyon Open Area (see below).

No developed roadway system currently exists within the project site. However, there are existing two-track dirt roads that have been used historically to support ranch operations.
B. Jawbone Canyon Open Area

The Jawbone Canyon Open Area is located off State Route 14 at Jawbone Canyon Road. It is managed by the Bureau of Land Management and contains more than 7,000 acres of open-use public lands for cross-country recreation. The Jawbone Canyon Open Area is a popular destination for off-highway vehicle users. The high-use recreation period begins with the Veterans Day holiday weekend and extends through the Memorial Day holiday weekend.

C. Roadways and Intersections

State Route 14 is a north-south state highway that extends approximately 118 miles from Interstate 5 in Santa Clarita to US 395 in Inyokern. It serves as the principal regional route in the project vicinity where it operates with four lanes and paved shoulders.

Jawbone Canyon Road is a two-lane paved roadway that extends west from State Route 14 approximately 16 miles north of State Route 58 in the City of Mojave. It exists as a paved roadway from its easterly terminus at State Route 14 to the western boundary of the Jawbone Canyon Open Area, approximately seven miles west of State Route 14. Jawbone Canyon Road continues to the west as a dirt road to its westerly terminus in the Sequoia National Forest, approximately 25 miles west of State Route 14.

The State Route 14/Jawbone Canyon Road intersection is controlled by a stop sign on Jawbone Canyon Road. The intersection includes left- and right-turn channelization on State Route 14 and an acceleration lane on State Route 14 for eastbound-to-northbound traffic from Jawbone Canyon Road.

PROJECT CONSTRUCTION

Construction of the project is expected to occur simultaneously with the North Sky River Wind Energy Project, which is located along Jawbone Canyon Road.

Project construction will be divided into several phases: roads, pads and foundations, electrical infrastructure, turbine assembly and installation, substation and interconnection, electrical system upgrades, and turbine commissioning. It is anticipated that work on multiple phases will occur concurrently at several locations at various times throughout construction.
A. Construction Components

Wind Turbines

The project involves the installation of up to 20 wind turbines. Each turbine will be mounted atop a tower supported by a steel reinforced concrete foundation. The total height of each wind turbine structure will be less than 500 feet tall, and the proposed project would generate up to 35 Megawatts (MW).

Power Collection and Transmission

A small step-up transformer will be installed near the base of each wind turbine to increase the output voltage of the power generated by each turbine to 34.5 kV for local power collection. A network of underground cables will be installed for the purpose of power collection and transmission between the individual wind turbine step-up transformers and the substation(s). The substation(s) will convert the power from 34.5 kV to 230 kV for transport over transmission lines. A 230-kV transmission line will be constructed for the transmission of power from the substation(s) to a switching station or connection with the Pine Tree Wind Development Project. The height of the transmission line towers will range between 70 and 100 feet.

Access and Maintenance Roads

A network of unpaved roads currently exists within the project site boundaries. New unpaved roads will be constructed to serve as access roads from the existing road network to the wind turbines. Gravel access roads will be 16 feet wide with 10-foot shoulders.

Operations and Maintenance Facility

A permanent building and storage yard will be constructed to serve as the base of operations for ongoing operations and maintenance of the project.

Temporary Construction Facilities

A temporary construction compound will be constructed along with one staging area and/or concrete batch plants. Laydown areas may be needed for material handling, temporary storage and project staging activities.
B. Construction Schedule and Personnel

Construction is scheduled to begin in February 2012 and is expected to take six to ten months to complete. It is anticipated that construction operations will take place six days a week between the hours of 5:30 AM and 9:00 PM. In addition, when required, construction will occur on Sundays between 7:00 AM and 6:00 PM. Batch plant operations are expected to occur between the months of March and May on a 10-hour-a-day operation schedule.

Approximately 30 workers are expected to be on site daily during the peak of construction operations. Most of these workers are likely to be temporary workers from outside the local area and are expected to stay in hotels in the Mojave area. It is anticipated that all of these workers will carpool to the project site and access the site via State Route 14 to Jawbone Canyon Road.

C. Construction Traffic

Most of the construction traffic is expected to access the project site from State Route 14 via Jawbone Canyon Road. Construction vehicles will range in size from half-ton pickup trucks to semi-tractor trailers carrying heavy earthmoving equipment in the early stages of construction to cranes and wind turbine components in the later stages. Construction workers will report to the designated construction laydown yard prior to the start of each work day. Worker vehicles will be parked in these yards for the duration of the work day.

PROJECT OPERATIONS AND MAINTENANCE

It is anticipated that six to twelve workers will be on site daily to operate and maintain the power generation and transmission facilities after construction is completed. All of these workers are expected to access the site from State Route 14 via Jawbone Canyon Road and conduct daily activities utilizing pick-up trucks.
PROJECT TRIP GENERATION

A. Construction Phase

Traffic generated during the construction phase will include worker vehicles and heavy trucks. It is anticipated that all of the construction traffic will access the project site via Jawbone Canyon Road from State Route 14. Trip generation estimates for construction traffic utilizing these roadways are presented in Table 1.

<table>
<thead>
<tr>
<th>Traffic Type</th>
<th>Variable</th>
<th>ADT</th>
<th>In % Split/ Trips</th>
<th>Out % Split/ Trips</th>
<th>In % Split/ Trips</th>
<th>Out % Split/ Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel</td>
<td>30 (per day)</td>
<td>30</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>15</td>
</tr>
<tr>
<td>Heavy Truck</td>
<td>12 (per day)</td>
<td>30</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>0%</td>
<td>0%</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

As noted previously, approximately 30 workers are expected to be on site daily during the peak of the construction operations. It is anticipated that workers will commute to and from the project site in carpools on a 2:1 ratio (two workers per vehicle) and that all personnel vehicles will access the project site from the east via the State Route 14/Jawbone Canyon Road intersection.

It was assumed for the purposes of this study that all heavy trucks used during construction would access the project site via Jawbone Canyon Road from State Route 14. An estimate of 12 heavy trucks entering and departing the project site per day during the peak of construction operations was provided by others for use in this study. This translates to 30 passenger car equivalent (PCE) truck trips per day by applying a PCE factor of 2.5 for rolling terrain. It was assumed that these truck trips would enter and exit the project site throughout the work day, which equates to approximately eight peak hour PCE truck trips. Project trips are shown in Figure 4 for the PM peak hour.
B. Operation Phase

As noted previously, six to twelve workers are expected to be on site daily to operate and maintain the power generation and transmission facilities after construction is completed. It is anticipated that all of the operation and maintenance workers will commute to and from the project site from the east via the State Route 14/Jawbone Canyon intersection. Trip generation estimates for traffic accessing the project site by way of this intersection are presented in Table 2.

### Table 2

**Project Trip Generation – Operation Phase**

**State Route 14/Jawbone Canyon Road**

<table>
<thead>
<tr>
<th>Traffic Type</th>
<th>Variable</th>
<th>ADT</th>
<th>AM Peak Hour Trips</th>
<th>PM Peak Hour Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>% Split/ Trips</td>
<td>% Split/ Trips</td>
</tr>
<tr>
<td>Personnel</td>
<td>12 (per day)</td>
<td>24</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>0</td>
<td>12</td>
</tr>
</tbody>
</table>

**EXISTING AND CONSTRUCTION YEAR TRAFFIC**

Existing PM peak hour turning movement volumes were field measured at the intersection of State Route 14 and Jawbone Canyon Road in November 2010. These volumes are shown in Figure 3.

The construction year (2012) traffic, including expected construction traffic from the North Sky River Wind Energy Project is shown in Figure 5. Construction year (2012) plus project traffic is shown in Figure 6.

**IMPACT ANALYSIS**

A. Intersection LOS

The study intersection, State Route 14 and Jawbone Canyon Road, will operate at a LOS B during the construction year of 2012. The LOS calculation includes traffic generated by the North Sky River Wind Energy Project. In accordance with Caltrans guidelines, a traffic impact analysis of this intersection is not required. Caltrans “Guide for the Preparation of Traffic Impact Studies”, dated June 2001, states that a traffic study is required when a project will generate more than 100 trips at a facility.
operating above a LOS C. This intersection currently operates above LOS C and the project is expected to generate fewer than 100 peak hour trips during both the construction and operation phases.
Jawbone Wind Energy Project
State Route 14 at Jawbone Canyon Road

FIGURE 3
2010 PM PEAK HOUR TRAFFIC

LEGEND

O STUDY INTERSECTION
- - EXISTING ROAD
- - FUTURE ROAD

NOT TO SCALE

N

Project Site

California City Blvd

California City

Randsburg Culoff Rd

Randsburg

Phillips Rd

Neutra Rd

Munsey Rd

Redrock Randsburg Rd

S Redrock knoxem Rd

Jawbone Canyon Rd

Khallo Valley Rd

Khallo Valley Rd

Khallo Valley Rd

Khallo Valley Rd

Khallo Valley Rd
Traffic Study 419-02

Jawbone Wind Energy Project
State Route 14 at Jawbone Canyon Road

FIGURE 6: 2012+PROJECT PM PEAK HOUR TRAFFIC

Project Site

LEGEND
O STUDY INTERSECTION
--- EXISTING ROAD
- - FUTURE ROAD

NOT TO SCALE
B. Roadway Capacity

Table 3 contains roadway capacity data for State Route 14 in the vicinity of Jawbone Canyon Road. A volume-to-capacity ratio (v/c) of greater than 0.80 corresponds to a LOS of less than C, as defined in the Highway Capacity Manual.

<table>
<thead>
<tr>
<th>Street</th>
<th>2009¹ ADT</th>
<th>Project 2012</th>
<th>2012+ Construction</th>
<th>Existing Capacity</th>
<th>v/c (Ex) 2009</th>
<th>v/c (Ex) 2012</th>
<th>v/c (Ex) 2012+Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Route 14: At Redrock Randsburg Rd</td>
<td>6800</td>
<td>54</td>
<td>7241</td>
<td>7295</td>
<td>30000</td>
<td>0.23</td>
<td>0.24</td>
</tr>
</tbody>
</table>

¹Published ADT data

State Route 14 currently operates with minimal delay at Jawbone Canyon Road. In accordance with Caltrans guidelines, a traffic impact analysis of State Route 14 in the vicinity of Jawbone Canyon Road is not required since this roadway segment currently operates above LOS C and the project is expected to generate fewer than 100 peak hour trips during both the construction and operation phases.

C. Air Traffic Patterns

The Kern County Zoning Ordinance (Title 19 of the Kern County Ordinance Code) restricts the height of structures within military flight test pathways. The height of project wind turbine structures, transmission line towers and meteorological towers comply with all applicable zoning requirements, and therefore, does not result in a significant project impact.

D. Oversized Loads and Heavy Vehicles

Movement of large vehicles delivering materials and construction equipment to and from the project site can adversely impact both traffic flow and roadway condition in the project vicinity.

**Oversized Loads**

Large trucks with oversized loads can affect traffic flow on roadways from trip origin to trip destination and usually require permits issued by governing jurisdictions. A permit load would not constitute a significant impact since special traffic control measures (e.g., pilot cars, escorts, etc.) are generally required under the permit to warn motorists about the oversized load.
It is anticipated that most of the large trucks with oversized loads delivering materials and equipment to the project site will originate from the Los Angeles and Bakersfield metropolitan areas to the south and west. The State Route 14/Jawbone Canyon intersection provides channelization for northbound-to-westbound traffic and eastbound-to-southbound traffic, and therefore, no significant impact to traffic flow is anticipated.

**Heavy Loads**

State Route 14, a state highway, is designed to withstand heavy truck loads. However, large trucks transporting heavy materials and equipment to and from the project site may cause damage to Jawbone Canyon Road, a county road that is not designed to the state highway standard. Mitigation in the form of repair of roadway damage caused by traffic generated by the project would reduce any such impact to less-than-significant levels.

**E. Potential Roadway Hazards**

The Jawbone Canyon Open Area is located off State Route 14 at Jawbone Canyon Road and contains more than 7,000 acres open-use public lands for cross-country recreational use. The Jawbone Canyon Open Area is utilized primarily by off-highway vehicle users with peak use occurring from the Veterans Day holiday weekend through the Memorial Day holiday weekend.

Jawbone Canyon Road exists as a two-lane paved roadway from its easterly terminus at State Route 14 to the westerly boundary of the Jawbone Canyon Open Area. There is little signage or other forms of traffic control along Jawbone Canyon Road within the Open Area, and consequently, the potential for conflict exists between project construction traffic and off-highway vehicle users.

**F. Emergency Access**

The project would not block or otherwise interfere with existing emergency access routes. Access roads widened and constructed as part of the project would facilitate emergency access to and from the site. No significant impact is anticipated.
G. On-Site Parking Capacity

Adequate on-site parking will be available during both the construction and operational phases of the project. No significant impact is anticipated.

CONCLUSIONS AND RECOMMENDATIONS

The project will not create any significant impacts that cannot be mitigated, to any of the roadways affected by the project, during both the operational and construction phases. Therefore no permanent physical mitigation measures are required. The following are recommendations based on the findings of the study.

- Monitor the roads for physical deterioration due to construction traffic. The roads shall be repaired by the applicant as needed.

- Install appropriate signs along State Route 14 to indicate the presence of heavy vehicles and construction traffic.

- Construction activities should be limited during holidays and peak use times of off highway vehicle use.
REFERENCES

1. 1992 through 2009 Traffic Volumes on California State Highways, State of California, Business, Transportation and Housing Agency, Department of Transportation (Caltrans)