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# Applicant's Supplemental Information

*Information in Appendix A was submitted by the applicant, RES America Developments, Inc. It does not necessarily reflect the analysis and conclusions of Shasta County or ICF Jones & Stokes.*



## Hatchet Ridge Wind, LLC

An affiliate of



### RES America Developments, Inc.

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February 11, 2008

Bill Walker  
Shasta County  
Department of Resources Management  
1855 Placer Street, Suite 103  
Redding, CA 96001-1759

RE: Technical Information and Recommended Responses to Comments Suggesting Moving Turbines to Address Visual Impacts

Dear Mr. Walker,

Hatchet Ridge Wind, LLC (HRW) would like to submit additional project information and recommended responses for addressing concerns raised by the public over visual impacts associated with the Project. Please consider this information in preparation of the Final EIR.

RES understands that there are significant visual impacts associated with the Project. Several individuals have questioned why the turbines cannot be moved back away from the edge of Hatchet Ridge to minimize the view of the turbines from the town of Burney. While this seems like a simple solution, the proposed locations of the turbines were chosen based on several factors, which are equally important in maximizing the energy output while minimizing the number of turbines.

The placement of wind turbines at Hatchet Ridge is constrained by several factors including (i) existing wind resource/wind speed, (ii) existing project boundaries, (iii) setbacks from neighboring landowners and existing transmission lines, (iv) existing microwave paths, and (v) minimum spacing between wind turbines. Each of these constraints is discussed below. When combined, the constraints provide virtually no flexibility for moving turbines upwind from their proposed locations.

Wind Resource: In order to minimize the cost of generating electricity from a wind project, turbines need to be sited at the windiest locations and within the other constraints described herein. Because the power generated by a wind turbine is a function of the cube of the wind speed, small changes in wind speed result in significant changes in power generated. As illustrated below, a 10% decrease in wind speed results in a 33% decrease in power generated.

Power Generated = function of velocity cubed  
=  $f(\text{Velocity}^3)$   
=  $f(\text{Velocity} \times \text{Velocity} \times \text{Velocity})$   
=  $f(1.10 \times 1.10 \times 1.10)$   
=  $f(1.33)$

The greatest wind speeds at the Hatchet Ridge Wind Project site occur on the “downwind edge” of project site. This is common among wind project sites where the topography provides for some elevation differences (hills, ridges, mesas, etc.). At Hatchet Ridge, wind flows primarily from the southwest. Upwind of the ridge the elevation of the landscape increases in the direction of wind flow. As the wind reaches the most northeasterly portions of the ridgeline, it is “sucked” into the lower elevation area known as Goose Valley. This suction effect causes the wind flow to accelerate at the most “downwind edge” of the Project site. Wind turbines placed along this portion of the ridge will generate the greatest amount of electricity and will minimize the cost of electricity generated by the Project. Relocating turbines upwind of these positions will reduce Project output and increase cost of generating electricity, ultimately making the project economically infeasible.

Existing Project Boundaries: Hatchet Ridge Wind, LLC has obtained wind energy lease rights for a defined area. Turbine placement outside of the defined area is not permitted. In addition, only the property leased by Hatchet Ridge Wind, LLC has been subject to CEQA environmental analysis. Placement of turbines outside of the leased area would require additional CEQA analysis.

Setbacks: After consulting with Shasta County, Hatchet Ridge Wind, LLC was advised to design the Project such that the distance between wind turbines and the boundaries of leased property is no less than the tip height of the wind turbine (i.e., the height of the turbine, including the blade, when the blade tip is at its highest point). Tip height of the turbines and the associated setback from the boundaries of the leased area is estimated to be approximately 420’. In addition, Hatchet Ridge Wind has imposed 150 meter (483 feet) setbacks of existing overhead power lines within the Project area. These setbacks place additional restrictions on the location of wind turbines. When combined with the other constraints, there is virtually no flexibility for relocating wind turbines to alternative locations.

Microwave Paths: Wind turbines can interfere with the microwave paths by physically blocking the line-of-sight between two microwave transmitters. Hatchet Ridge Wind, LLC hired a third-party consultant to identify existing microwave paths at the Project site on the basis of FCC databases and field visits. The consultant identified 62 microwave paths that intersect the project area, each using a transmitter at either the Bunchgrass Communication Site at the northwestern edge of the Project area or the Hatchet Ridge Communication Site at the southeastern edge of the Project area. The presence of the multiple microwave paths severely reduces the flexibility for siting wind turbines.

Minimum Turbine Spacing: Wind turbines create wakes which propagate downwind of and laterally from the turbine location. The resulting turbulence creates additional forces and stresses on neighboring wind turbines that increase the risk of turbine component failure, increase maintenance costs and reduce the life of the machine. For these reasons, turbine manufacturers advise that wind projects be designed with minimum spacing between turbines. In fact, minimum turbine spacing is *required* by turbine manufacturers in order to secure a turbine warranty. For the Hatchet Ridge Wind Project, turbine manufacturers require minimum spacing of 2.5 – 3.0 times the turbine rotor diameter (238 – 285 meters; 779 – 935 feet) for turbines within the same row and approximately 7.5 times the turbine rotor diameter

(713 meters; 2335 feet; 0.44 miles) between turbine rows. These constraints provide virtually no flexibility for maintaining Project size and the associated economies of scale. Relocation of turbines will disrupt the current Project layout, reduce overall Project size and severely harm Project economics.

RES appreciates your consideration of this additional information. If the County needs further information regarding how wind turbines are sited, please feel free to call or write.

Sincerely,



Nicole S. Hughes, M.A. RPA  
RES America Developments, Inc.



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February 11, 2008

Bill Walker  
Shasta County  
Department of Resources Management  
1855 Placer Street, Suite 103  
Redding, CA 96001-1759

RE: Technical Information and Responses to PUC Comments

Dear Mr. Walker,

RES would like to assist Shasta County in addressing comments on the Draft EIR provided by the State of California Public Utilities Commission (letter dated January 28, 2008).

#### **Chapter 2 Project Description**

*PUC Comment:* The DEIR should include visual simulations of these components from multiple viewpoints in the environment in which they will be situated. This recommendation applies to the substation; the switching station; the 230 Kv circuit; the interconnection system; the operation and maintenance building; and any other aboveground facility.

*Suggested Response:* The visual simulations and analysis were conducted from key vantage points identified in the following areas: Nearby communities, including residences and businesses; areas used for recreational purposes, such as McArthur –Burney Memorial Park; and roadway travel routes. The facilities suggested by the CUP as requiring visual simulations would not be visible under the current simulation strategy. For example, Figure 3.1-12 shows an existing view and simulated view of the proposed project from SR299 in Haynes Flat. The existing Bunchgrass communications station on Hatchet Ridge is barely visible from the viewpoint, and then the only components that are visible are the largest communication towers. If we use this as a comparison, the following facilities proposed for Hatchet Ridge would also not be visible from this location, given their comparison in size and design to the communication station; the substation, switching station, 230 kV circuit, the interconnection system, and the operation and maintenance building. The same would be true of the simulated views from SR 299 at Round Mountain (Figure 3.1-11) and SR299 in Burney (figure 3.1-13).

The purpose of the simulations is to determine what the project would potentially look like from key vantage points. In order to capture the suggested facilities in visual simulations, simulations would need to be prepared from areas much closer to the project, which would potentially not be defined as key vantage points. These points would be along SR299 within 1 mile or so of the proposed facilities, where roadway travelers do not typically stop to enjoy views, and no residential or commercial zones are

located. It is unwarranted to prepare visual simulations for proposed facilities for the purpose of merely capturing these in a visual simulation unless there is a targeted view point from which to run the simulation.

Additionally, it is not a requirement of CEQA or a standard of the wind energy industry to run visual simulations on associated facilities. Also, we do not know of any visual simulations that were prepared for the existing Bunchgrass communication station or the existing 230 kV transmission line in the area. The visual simulations are typically reserved for facilities which pose direct visual impacts on key vantage points.

*PUC Comment:* the DEIR should include a single overhead diagram of the project that illustrates the layout of all of the project components to be developed in connection with this project.

*Suggested Response:* The DEIR does include a map (Figure 2-1) which shows the location of all associated facilities, with the exception of the switching station. The switching station location is identified in the DEIR as within Section 28 of Township 35N, Range 2E. The exact location of the switching station will be determined upon investigation by transmission facilities specialists and PGE before construction begins. The entire Section 28 was reviewed in the environmental analysis to determine potential impacts, given the uncertainty over the exact location of the switching station.

*PUC Comment:* the DEIR should include a full impact analysis of the switching facility

*Suggested Response:* see previous response

*PUC Comment:* the DEIR should indicate the type of transmission towers the applicant intends to install to support the 230 kV circuit.

*Suggested Response:* the DEIR states that either single steel poles or double wood poles should likely support the overhead transmission lines.

### **Section 2.6.3 Communication**

*PUC Comment:* This section states that the project will include an underground fiber optic system to enable monitoring and control from “remote locations.” The DEIR does not identify the location of the remote monitoring facility or whether the fiber optic intends to directly connect with this facility or interconnect to into the Public Switched Telephone Network (PSTN).

- The DEIR should indicate whether the fiber optic system will be interconnected with the PSTN; and
- The DEIR should include a overhead map that indicates where trenching will take place and where conduit will be installed. The map should identify the facilities that will be directly connected to the fiber optic system.

*Suggested Response:* The communication cables including fiber optic for turbine monitoring and control would be located in the underground collector system trench back to the project substation. The overhead ground wire on the 230 kV line would contain the fiber optic between the project substation and the POI. No new facilities or trenches will be needed to contain the communication fiber optic system.



## Section 2.6.6 Permanent Meteorological Towers

*PUC Comment:* Aside from noting the towers will be built, the DEIR does not appear to include the towers in any visual simulation, not does it identify the locations of these towers on the project area maps.

*Suggested Response:* The permanent meteorological towers will not be visible from the key vantage points used in the visual simulations due to their small size. Refer to Figure 3.1-12, the Bunchgrass communication station contains towers similar in height and build to a permanent meteorological tower that are not visible in the simulations.

The exact location of the permanent meteorological towers has not been determined and will be determined after installation of the turbines. The environmental review for the project included analysis for the installation of up to 4 meteorological towers.

## Chapter 3. Environmental Analysis

### Section 3.3 Air Quality

*PUC Comment:* this section states that greenhouse gases (GHG) are thought to be responsible for the greenhouse effect or global warming. Aside from noting that GHGs are a problem, the DEIR does not appear to estimate or forecast the amount of carbon dioxide that may be generate as a result of the project.

- The DEIR should estimate to level of carbon dioxide, methane, and nitrous oxide that may be generated as a result of the project.

*Suggested Response:* The following levels of carbon dioxide, methane, and nitrous oxide are expected from operation of the wind facility.

Carbon dioxide – 0

Methane – 0

Nitrous oxide – 0

Construction of the wind facility and manufacturing of the turbines and associated infrastructure will likely result in minor emissions of green house gases. These values have not been calculated, but can be considered comparative to other industrial manufacturing and large construction projects. Typical emissions associated with large construction projects include emissions from diesel construction and transfer vehicles and passenger vehicles used on site by construction crews. Though some vehicles will be on site during operations, the largest concentration of potential emissions will occur during a 9-12 month construction period. Greenhouse gas emissions from turbine manufacturing will not impact the local air quality, nor that of the State of California because the parts will be imported. Please refer to the attached AWEA fact sheet for more information on comparative emissions

RES appreciates your consideration of this additionally information. If the County needs further information regarding the information provided in this letter, please feel free to call or write.

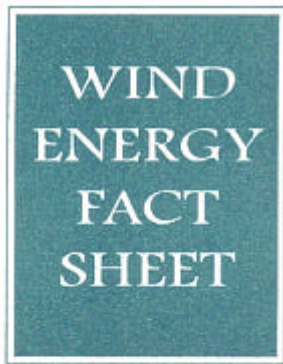
Sincerely,



Nicole S. Hughes, M.A. RPA  
RES America Developments, Inc.

Enclosures:

AWEA fact sheet on greenhouse gas emissions



# Comparative Air Emissions Of Wind and Other Fuels

Wind energy's most important environmental benefit is its lack of emissions of both air pollutants and greenhouse gases when compared with alternative methods of generating electricity.

American Wind Energy Association

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The American Wind Energy Association (AWEA) has developed a set of statistics to quantify the comparative emissions of wind and other fuels, based on data gathered by the U.S. Department of Energy's Energy Information Administration (EIA)[1], which collects information on the U.S. utility industry.

This, and similar fact sheets, can be found online at <http://www.awea.org/pubs/factsheets.html>.

**For carbon dioxide (CO<sub>2</sub>), the leading greenhouse gas associated with global warming, comparative emissions during electricity generation are as follows:**

| Fuel                      | CO <sub>2</sub> Emitted Per Kilowatt-hour (kWh) Generated (in pounds) | KWh Generated, 1997 (billions) | CO <sub>2</sub> Emitted, Total Generation (billion pounds) |
|---------------------------|---|--------------------------------|--|
| Coal                      | 2.13  | 1,788                          | 3,807  |
| Natural Gas               | 1.03  | 283.6                          | 291  |
| Oil                       | 1.56  | 77.8                           | 122  |
| U.S. Average Fuel Mix [2] | 1.52  | 3,494                          | 5,313  |
| Wind                      | --0--   | 3.4                            | --0--  |

**For sulfur dioxide (SO<sub>2</sub>), the leading precursor of acid rain:**

| Fuel                      | SO <sub>2</sub> Emitted Per Kilowatt-hour (kWh) Generated (in pounds) | KWh Generated, 1997 (billions) | SO <sub>2</sub> Emitted, Total Generation (million pounds) |
|---------------------------|---|--------------------------------|--|
| Coal                      | 0.0134  | 1,788                          | 24,028   |
| Natural Gas               | 0.000007  | 283.6                          | 2  |
| Oil                       | 0.0112  | 77.8                           | 870  |
| U.S. Average Fuel Mix [2] | 0.0080  | 3,494                          | 27,914   |
| Wind                      | --0--   | 3.4                            | --0--  |

**For nitrogen oxides (NOx), another acid rain precursor and the leading component of smog:**

| Fuel                         | NOx Emitted Per<br>Kilowatt-hour (kWh)<br>Generated (in pounds) | KWh Generated,<br>1997 (billions) | NOx Emitted, Total<br>Generation (million<br>pounds) |
|------------------------------|---|-----------------------------------|--|
| Coal                         | 0.0076  | 1,788                             | 13,668   |
| Natural Gas                  | 0.0018  | 283.6                             | 504  |
| Oil                          | 0.0021  | 77.8                              | 162  |
| U.S. Average<br>Fuel Mix [2] | 0.0049  | 3,494                             | 17,112   |
| Wind                         | --0--   | 3.4                               | --0--  |

A single 750-kilowatt wind turbine, operated for one year at a site with Class 4 wind speeds (winds averaging 12.5-13.4 mph at 10 meters height), can be expected to displace a total of 2,697,175 pounds of carbon dioxide, 14,172 pounds of sulfur dioxide, and 8,688 pounds of nitrogen oxides, based on the U.S. average utility generation fuel mix.[3]

AWEA has prepared a spreadsheet which permits calculations based on these and other air emissions statistics and which can be e-mailed to researchers on request.

**NOTE**

1. Emissions data in this fact sheet are based on statistics provided in the EIA's *Annual Energy Review 1998*. (Washington, D.C.: Energy Information Administration, DOE/EIA-0384 ((98)), July 1998.) The Annual Energy Review can be accessed on the Web at <<http://www.eia.doe.gov/aer>>.
2. The numbers for kilowatt-hours generated and emissions for "Coal," "Natural Gas," and "Oil" are based on U.S. electric utility generation. The numbers for kilowatt-hours generated and emissions for "US Average Fuel Mix" and "Wind" are the totals for all U.S. generation, including nonutility plants."
3. Estimate derived by AWEA using data from *Renewable Energy Technology Characterizations*, published by the U.S. Department of Energy and the Electric Power Research Institute, December 1997.



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February 13, 2008

Bill Walker  
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1855 Placer Street, Suite 103  
Redding, CA 96001-1759

RE: Technical Information and Recommended Responses to CADFG Comments

Dear Mr. Walker,

Hatchet Ridge Wind, LLC (HRW) would like to submit additional project information and recommended responses for addressing concerns raised by the California Department of Fish and Game in their letter to you dated January 25, 2008. The following information was gathered from scientists and project developers with years of experience working in the wind industry. Please consider this information in preparation of the Final EIR.

*DFG Comment:* DFG recommends the applicant be required to provide these reports (monitoring reports) to DFG by December 31<sup>st</sup> of any operating year in which turbines operate.

*Response:* This is a standard mitigation measure in the wind industry. HRW recommends more frequent reporting of monitoring reports considering the high number of comments received from concerned citizens and conservation groups. We feel that open, frequent analysis of actual impacts will help address concerns and alleviate fears of unaddressed impacts.

*DFG Comment:* DFG suggests that the time frame for mortality monitoring be established as the operational period for the project.

*Response:* This is not an industry standard, and is not supported by the CEC Guidelines, adopted in 2007. The Guidelines specifically recommend against open-ended mitigation and provide recommendations for monitoring studies based on potential impacts ascertained from pre-construction impacts studies. According to the CEC Guidelines, Hatchet Ridge would be considered a Category 2 or 3 site. The CEC Guidelines recommend monitoring for 2 years post-construction at such sites.

*DFG Comment:* DFG recommends monitoring per the CEC Guidelines must continue as this plantation forest matures to assure that increased bird use of the site does not result in mortality of protected bird species.

*Response:* The CEC Guidelines recommend monitoring for 2 years post-construction for a project such as Hatchet Ridge. The argument that the area will see an increase in bird use as the trees around the project mature is unsubstantiated. The site is currently managed as a tree plantation and the project will not change that use, nor does it propose to change the current land management practices. Mature trees in the project area will be harvested by the property owners when commercially viable. The current land management of the site has the effect of periodic large-scale disturbance, which creates suitable habitat for a suite of species while eliminating it as habitat for others. For example, spotted owls, which generally occupy mature or old growth forests, are unlikely to occur on site as over the long-term the forest characteristics are not suitable for spotted owl. The land management of the site has the general effect of reducing potential mature forest habitat in the area, resulting in a less than likely scenario for impacts to protected bird species.

*DFG Comment:* DFG recommends a requirement for avian use surveys during early project operations be added to MM BIO-6.

*Response:* HRW does not support the recommendation for use surveys during early project operations. The CEC Guidelines state that the primary goals of operations monitoring are to determine “whether estimated fatality rates described in pre-permitting assessment were reasonably accurate; whether the avoidance, minimization, and mitigation measures implemented for the project were adequate or whether additional corrective action or compensatory mitigation is warranted; whether overall bird and bat fatality rates are low, moderate, or high relative to other projects.” The CEC Guidelines do suggest one year of post-construction bird use count studies; however, the pre-project studies did not document high use of the site by sensitive bird resources which could be targeted with bird use surveys for assessing indirect effects. The results of the pre-project surveys do not support using bird use surveys in the post-construction monitoring. HRW does, however, recommend reconsidering this mitigation measure if results from carcass searches vary considerably from the data acquired during pre-construction use count studies.

*DFG Comment:* DFG suggests that other forms of mitigation including other minimization schemes and compensatory mitigation may be available.

*Response:* HRW supports this recommendation. Shasta County was provided with a list of potential mitigation measures including compensatory mitigation that are consistent with the CEC Guidelines. (See comments submitted by David Young, WEST, Inc., January 28, 2008.)

*DFG Comment:* DFG recommends reconfiguring turbine layout.

*Response:* The DEIR identified no impacts to wildlife which are directly linked to or mitigated by a change in the currently proposed layout. Additionally, the pre-construction studies did not identify any sensitive resources or high use areas that would warrant a change in the turbine layout. HRW has provided a letter explaining the reasons why the proposed layout is optimal for maximizing energy output, while minimizing environmental impacts to the extent feasible. (See HRW’s letter regarding alternatives analysis, January 28, 2008.)

*DFG Comment:* DFG recommends considering repowering using latest technology, utilizing alternative designs, or adjusting the height of the rotor sweep of constructed or yet-to-be constructed turbines.

Response: HRW feels that this mitigation measure is too open-ended to be feasible. It is impossible to require a developer to change project components when new technology becomes available without knowing what that new technology would be or whether the new technology is appropriate for addressing the specific environmental concern. Additionally, the DEIR considered potentially appropriate alternatives for the project, including alternative technologies, an alternative layout, and changes in the height of turbines, but none were considered feasible because they do not meet the key objectives of the project and are therefore not viable. (See HRW's letter regarding alternatives analysis, January 28, 2008.)

*DFG Comment:* DFG recommends consideration of lighting schemes which may reduce bird attraction.

*Response:* Several studies have been conducted at operating wind farms that have analyzed potential impacts associated with lit versus unlit turbines. Results of these studies indicate that there are no correlations between turbine lighting schemes and avian fatalities. The current lighting requirements of the FAA do not appear to influence bird or bat mortality at turbines. The following studies addressed the issue of lit turbines and avian and bat mortality.

Arnett, E.B., W.P. Erickson, J. Kerns, and J. Horn. 2005. Relationships between Bats and Wind Turbines in Pennsylvania and West Virginia: An Assessment of Fatality Search Protocols, Patterns of Fatality, and Behavioral Interactions with Wind Turbines. Prepared for the Bats and Wind Energy Cooperative, March 2005.

Erickson, W.P., B. Gritski, and K. Kronner. 2003. Nine Canyon Wind Power Project Avian and Bat Monitoring Report, September 2002 – August 2003. Technical report submitted to Energy Northwest and the Nine Canyon Technical Advisory Committee.

Erickson, W.P., J. Jeffrey, K. Kronner, and K. Bay. 2004. Stateline Wind Project Wildlife Monitoring Final Report, July 2001 – December 2003. Technical report peer-reviewed by and submitted to FPL Energy, the Oregon Energy Facility Siting Council, and the Stateline Technical Advisory Committee.

Johnson, G., W. Erickson, J. White, R. McKinney. 2003. Avian and Bat Mortality During the First Year of Operation at the Klondike Phase I Wind Plant, Sherman County, Oregon. Technical report prepared for Northwestern Wind Power, Goldendale, Washington. March 2003.

Young, Jr., D.P., J.D. Jeffrey, W.P. Erickson, K.J. Bay, and V.K. Poulton. 2006. Eurus Combine Hills Turbine Ranch Phase 1 Post Construction Wildlife Monitoring First Annual Report February 2004 – February 2005. Prepared for Eurus Energy America Corporation and Combine Hills Technical Advisory committee, Umatilla County, Oregon. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, Wyoming and Walla Walla, Washington, February 21, 2006.

Young, Jr., D.P., W.P. Erickson, J.D. Jeffrey, and V.K. Poulton. 2007. Puget Sound Energy Hopkins Ridge Wind Project Phase 1 Post-Construction Avian and Bat Monitoring First Annual Report, January - December 2006. Technical report for Puget Sound Energy, Dayton, Washington and Hopkins Ridge Wind Project Technical Advisory Committee, Columbia County, Washington. Western EcoSystems Technology, Inc. Cheyenne, Wyoming, and Walla Walla, Washington. 25pp.

*DFG Comment:* DFG states that any mortality of special status raptors should result in implementation of avoidance measures.

*Response:* A comprehensive mitigation plan for impacts to birds has been presented that is consistent with the CEC Guidelines and which considers raptors. Mortality thresholds for raptors were provided in the recommended mitigation that would trigger additional mitigation if exceeded. This mitigation plan is comprehensive following an adaptive management approach and includes coordination with the agencies when determining additional necessary measures. Mortality of any special status species will be reported to the Technical Advisory Committee and/or the CDFG and USFWS during the post-construction monitoring. Additional appropriate measures for mitigation of impacts to special status species may include drawing upon the compensatory mitigation fund, habitat alterations, or additional research. Additional research may be warranted to determine what the actual cause of the impact is before appropriate mitigation may be determined.

*DFG Comment:* DFG believes that take of golden eagle is likely, and that impacts to golden eagle should be considered potentially significant.

*Response:* David Young, of WEST, Inc., submitted a comment letter discussing the inconsistencies between actual point count data and the information provided in Table 3.4-3. This comment from CDFG is a good example of the erroneous conclusions that are drawn by readers of the DEIR if based solely on the rankings in the table. CDFG concluded that there would be a high potential for impact based on the table, while in fact, the high ranking does not equate to high risk or high potential impact. While there was actually only one golden eagle seen at the site over a 12-month period, Table 3.4-3 suggests there is a high potential for occurrence of golden eagle. Additionally, the table indicates there is no suitable habitat for golden eagle; therefore, a determination that there is a high potential for golden eagle to occur or be impacted is inconsistent with the available information. Similar inconsistencies are found elsewhere in this table. HRW suggests revising the table to more accurately reflect the true potential for occurrence as reflected in the actual point count data. Potential for occurrence should be based upon best available data for the project area, not on the regulatory status of a species or existing regulations for protection.

*DFG Comment:* DFG suggests impacts to sandhill crane migration (related to the overhead transmission line) could be significant, since cranes are known to have particular difficulty in avoiding collisions with high voltage power lines.

*Response:* The concern that sandhill cranes will be impacted by the overhead transmission line is unfounded due to the lack of habitat for this species in the project area. While sandhill cranes were observed flying high over the site during migration, there are no site characteristics or habitat that would attract sandhill cranes to the site and put them in close proximity to the transmission line. Additionally, the transmission line will be located in a treed area, where migrating birds are unlikely to be impacted because they are flying over at an elevation much higher than the tree line and proposed transmission line. Sandhill cranes have been known to collide with power lines, but these collisions are generally reported in areas where transmission lines are near roosting habitat such as wet meadows, sandbars, or agricultural fields utilized by cranes (Brown et al. 1987, Morkill and Anderson 199, Lewis et al 1992, Brown and Drewien 1995). Most documented crane collisions with powerlines occur when they are flushed or disturbed from roosts. It is highly unlikely that sandhill cranes will roost on the site due to lack of habitat, and sandhill cranes flying over the HRW site will be well above the transmission line and unlikely to be exposed to potential risk of collision.



Brown, W. M., Drewien, R.C., & Bizeau, E.G. 1987. Mortality of cranes and waterfowl from power line collisions in the San Luis Valley, Colorado. In J. C. Lewis, (Ed.), *Proc. 1985 Crane Workshop* (pp. 128-136). Grand Island, NE: Platte River Whooping Crane Habitat Maintenance Trust.

Brown, W. M., & Drewien, R.C. 1995. Evaluation of two power line markers to reduce crane and waterfowl collision mortality. *Wildlife Society Bulletin*, 23:217-227.

Lewis, J.C., Kuyt, E., Schwindt, K.E., & Stehn, T.V. (1992a). Mortality in fledged cranes of the Aransas-Wood Buffalo population. In D.A. Wood, (Ed.), *Proc. 1988 N. Am. Crane Workshop* (pp. 145-148). Tallahassee, FL: Florida Game and Fresh Water Fish Commission.

Morkill, A.E. and S. H. Anderson. 1991. Effectiveness of marking powerlines to reduce sandhill crane collisions. *Wildlife Society Bulletin* 19: 442 – 449.

*DFG Comment:* DFG recommends protection of riparian areas for cascades frog, yellow warbler, and willow flycatcher protection

*Response:* There were no riparian areas identified in the area of impact for the proposed project and therefore no mitigation buffer is required.

*DFG Comment:* DFG requests a minimum of 200-foot buffer around nesting willow flycatchers and yellow warblers instead of 100 feet. DFG further notes that if willow flycatcher impacts are expected, an incidental take permit is needed.

*Response:* There were no riparian areas identified in the area of impact for the proposed project and therefore no mitigation buffer is required. No willow flycatchers were observed during the pre-construction studies. They are not expected to occur on site due to lack of habitat and the project will not affect willow flycatcher.

*DFG Comment:* The EIR needs to provide details and locations of stream crossings.

*Response:* This information was provided and can be found in Appendix C-3 Wetlands and Other Surface Waters Report.

*DFG Comment:* DFG suggests performing nocturnal surveys for owls

*Response:* HRW previously submitted a letter to Shasta County in response to the late comments on the NOP received from the CADFG. (See attached.) In this letter, HRW explained why the area is marginal habitat for owls and not suitable for northern or California spotted owls. Current timber harvest operations have been approved in this area without the requirement of nocturnal owl surveys. The project would have no further impact on potential or future habitat for owls than current or future timber harvest operations.

RES appreciates your consideration of this additional information. If the County needs further information regarding wildlife concerns as they relate to wind projects, please feel free to call or write.

Sincerely,

A handwritten signature in black ink, appearing to read "N. Hughes".

Nicole S. Hughes, M.A. RPA  
RES America Developments, Inc.

Enclosures (1)

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September 17, 2007

Bill Walker  
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Dear Mr. Walker,

Hatchet Ridge Wind, LLC (HRW) would like to inform the County of our proposed measures for addressing concerns raised by California Department of Fish and Game (CADFG) and the US Fish and Wildlife Service (USFWS) regarding additional studies recommended for the proposed Hatchet Ridge Wind Energy Project (the Project). Concerns over the Northern Spotted Owl and Bald Eagle were addressed in the revised Biological dates September 4, 2007; therefore, recommendations and proposed studies concerning these species will not be discussed in this letter.

#### **Rare, Threatened, Endangered Plants**

The CADFG requested in their NOP comment letter that a study be conducted to determine whether sensitive plant species are present. This study was conducted by WEST and the results of the study were incorporated into the Revised Baseline Ecological Study.

During the rare plants survey, one rare plant was identified. The Butte County morning glory is listed as CNPS 1B.2, which is defined as "fairly threatened in California." The WEST report concluded, "The density of the plant and propensity for it to occur in disturbed areas, precludes implementing effective avoidance mitigation measures. Construction activity will impact individuals and patches of the plant but will not affect the population viability due to the large area over which the species occurs. It is likely that natural recruitment of plants in disturbed construction areas will include Butte County morning glory throughout the area where it occurs. Reclamation measures should include consideration for maintaining low overall vegetative plant cover in this area to facilitate the natural recruitment of the species." (Young et al. 2007)

#### **Critical Deer Habitat**

HRW understands that the project area is in critical deer habitat as suggested by the CADFG in their NOP comment letter. CADFG requested that no fencing be included in the project proposal that will cause harm or allow jumping attempts. HRW plans to place fencing around facilities that pose electrocution threats, this includes the substation and switching station. The fencing will be approximately 15 feet tall and will enclose a very small area with limited browse which could attract deer. HRW feels that the proposed fencing plan will not harm deer, including fawns.

### **Wetlands, Stream Crossings**

HRW commissioned a study of wetlands and waters potentially impacted in the project area. The results of these studies are included in Wetlands and Surface Waters Report, submitted September 17, 2007.

No wetlands were located in the project area. One potentially jurisdictional waterway was identified in the proposed project area. The waterway appears to be an intermittent stream that is currently crossed by the existing access road. A request for jurisdictional status letter will be drafted and sent to the Army Corps of Engineers. If the waterway is determined jurisdictional a 404 permit may be required if alterations to the existing culvert are needed.

### **Existing Vegetation Community**

CADFG suggests in their NOP comment letter that the existing vegetation community of the project has been misrepresented in discussions and documents submitted thus far in the environmental review process. The primary concern of CADFG was that the existing vegetation community be represented in the EIR and supporting documents. HRW feels that the existing vegetation community has been correctly represented in documents submitted to the County thus far. Please refer to the section entitled Study Area in the Ecological Baseline Study for a description of the existing vegetation community. HRW has also provided a planting map and aerial photos of the project area provided by Sierra Pacific Industries, as an attachment to this document (Appendix A). HRW does not feel that any additional work is necessary to revise the existing vegetation community description for the EIR and supporting documents.

### **CEC Draft Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development**

CADFG suggests in their NOP comment letter that a comparative analysis be prepared to evaluate the protocols used for the avian studies at Hatchet Ridge with the recommended studies provided in the Draft CEC Guidelines (the Guidelines). HRW would first like to point out that the CADFG approved the proposed avian study protocols for the Project in the fall of 2005. Secondly, the Guidelines are currently in draft form and are not a citeable document at this point. CADFG should not be requesting compliance with the Guidelines as they are in draft form and will most likely be revised prior to finalization of the draft EIR. In a 1999 California court case (See *County of Amador v. El Dorado County Water Agency* (1999) 76 Cal. App. 4th 931 ) it was determined that a lead agency should not rely on an unadopted general plan for CEQA purposes. Regardless of the legality of the CADFG's request, it is unfair to expect HRW to apply new, unadopted, draft Guidelines to previously approved study protocols and a project that has already been in the permitting process for 2 years. HRW therefore asks that CADFG reconsider and rescind its request in light of the draft status of the Guidelines. Were the County to do as CADFG requests and improperly rely on the draft Guidelines, the County could be legally vulnerable in litigation challenging the agency's CEQA compliance, as in the *County of Amador* case. Furthermore, the California Supreme Court recently confirmed that agencies may not rely on future, unadopted planning documents and EIRs for the purposes of conducting their CEQA analysis (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (40 Cal.4th 412, 440); the same principle would hold true for reliance on draft regulatory documents such as the Guidelines.

### **Owls**

The USFWS and CADFG have requested that nocturnal acoustic surveys be conducted to determine the presence of owls in the Project area. HRW has looked into the issue and has identified several concerns with this recommendation: First, the appropriate season for conducting owl surveys is typically May-July (Owl breeding season). HRW feels strongly that the publication of the Final EIR should not be put on hold for nine to eleven months to satisfy the demands of the agencies who failed to submit timely

comments in response to the NOP; these comments came 109 days after the deadline the County set for responses to the NOP.

Second, HRW and WEST feel that the Project area currently should not be classified as prime owl habitat due to the relatively young age of the plantation. A study for northern spotted owl which was conducted in the two sections of land directly north of the Project area resulted in zero owl identifications (the results of this study are referenced in the Revised BA submitted September 4, 2007). Additionally, there should be no concerns for impacts to future owl habitat since trees planted after construction of the project is completed will be allowed to grow to full commercial potential. Any future timber harvest conducted by the landowners in the Project area will be subject to environmental requirements identified in the Timber Harvest Plan and will be the responsibility of the landowners.

Finally, few pre-project studies of wind projects in the U.S. have addressed presence of owls and usually this is limited to species of concern such as the burrowing owl. Furthermore, in post-construction studies conducted at other wind energy projects in the northwest and eastern U.S., where forest dwelling species are common, it was determined through carcass studies and pre-construction surveys that owls and in particular forest dwelling species were unlikely or very rarely impacted by wind energy projects (see Erickson et al. 2001; Johnson et al. 2000; Nicholson 2002, 2003; Kerns and Kerlinger 2004; Koford et al. 2005; Arnett et al. 2005; Jain et al 2007.) Owls typically remain within the canopy of the forest and it is unlikely that they will be travelling within the rotor-swept area. For these reasons, HRW and its expert consultants feel that the available evidence does not support a determination to conduct nocturnal acoustic owl studies prior to finalizing the EIR. HRW would not be opposed to conducting the studies during post-construction monitoring if additional evidence leads to a determination that such monitoring is warranted; however, considering the results of the previous studies mentioned earlier, HRW questions the necessity.

#### **Radar Surveys**

HRW has hired WEST to conduct radar surveys to address concerns over potential impacts to nocturnal migrants. The results of these studies will be available before the EIR is finalized.

Thank you for taking the time to review the attached document, if you have any questions please feel free to call me directly at 503-341-0185.

Sincerely,

Nicole S. Hughes  
NW Regional Permitting Specialist

Cc:

Bruce Webb, CADFG, Staff Environmental Scientist, 601 Locust Street, Redding, CA 96001  
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Amy Fesnock, USFWS, Senior Wildlife Biologist, Endangered Species Division  
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John Forsythe, Senior Project Manager, Jones and Stokes, 2600 V Street  
Sacramento, CA 95818

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# Hatchet Ridge Wind, LLC

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February 13, 2008

Bill Walker  
Shasta County  
Department of Resources Management  
1855 Placer Street, Suite 103  
Redding, CA 96001-1759

RE: Technical Information and Recommended Responses to Wintu Audubon Society Comments

Dear Mr. Walker,

Hatchet Ridge Wind, LLC (HRW) would like to submit additional project information and recommended responses for addressing concerns raised by the Wintu Audubon Society in their letter to you dated January 22, 2008. The following information was gathered from scientists and project developers with years of experience working in the wind industry. Please consider this information in preparation of the Final EIR.

*Wintu Comment:* A study for monitoring nocturnal avian migrants must be implemented.

*Response:* A final study will be available prior to issuance of the final EIR. Consistent with the results of the other pre-project baseline studies, the results of the nocturnal migration study suggest that the project will not result in significant impacts to nocturnal migrants flying over the site. The vast majority of the targets recorded during the study were flying higher than the proposed turbines and the turbine exposure index ranged from only 1 to approximately 16 targets per day. HRW's biological consultant, Mr. David Young of WEST, Inc., is currently preparing a technical memorandum that further explains how the risks of turbine exposure and potential collision translate into actual impacts. We hope to be able to provide you with that additional information very soon.

*Wintu Comment:* The project must reduce impacts to Butte County morning glory by altering locations of turbines.

*Response:* Mr. Young submitted a comment letter to Shasta County dated January 28, 2008. In this letter, Mr. Young, who oversaw the sensitive plant study for the project, suggested that the impact analysis of the Butte County morning glory is overstated in the DEIR, and the DEIR did not take into account the abundance, distribution, and current status of the species when determining recommended mitigation measures. Additionally, current Timber Harvest Plans in the project vicinity (reviewed by the California Department of Fish and Game) have been approved with no restrictions on harvest operations in or near known Butte County morning glory populations. Also, the CDFG made no mention of concern for the species in its comment letter on the DEIR. The agency's silence on this issue suggests that the

agency's stance on the species in regards to potential impacts from tree harvesting may differ from Audubon's. It has been determined through recent studies that the species thrives in areas where ground-disturbing activities have taken place and survives frequent herbicide applications in transmission line right-of-ways. (See Mr. Young's comment letter, January 28, 2008.) For these reasons, the project is actually likely to have a net increase in habitat for the species, and therefore avoidance measures are unwarranted. The project will have an overall beneficial effect on Butte County morning glory.

*Wintu Comment:* Use of alternative technology (VAWT manufactured by Terra Moya Aqua)

*Response:* HRW submitted a comment letter to Shasta County on January 28, 2008 which describes the infeasibility of using a technology such as vertical axis wind turbines as suggested by the Wintu Audubon Society. The VAWT suggested by the Wintu Audubon Society is not only not commercially available, but is also not manufactured in capacities which are considered viable for a utility-scale wind energy project such as the one HRW proposes. Even if the technology were commercially available, use of the VAWT would require a significantly greater number of machines to produce the minimum feasible output of 102 MW, which would in turn have a greater environmental impact. (See HRW's comment letter regarding alternatives analysis, dated January 28, 2008, page 3, footnote 1.)

Furthermore, HRW is unaware of any peer-reviewed impact studies that have been undertaken for this technology. The manufacturer's website claims the technology reduces impacts, but those claims are unsupported by any references to the kinds of peer-reviewed analysis sufficient to support a conclusion that the technology is in fact superior to the turbines proposed for the project site. In light of the fact that the technology is commercially unavailable for a project of this size, the footprint impacts of such technology would be greater than with the turbines HRW proposes to use, and the claimed environmental benefits are unproven, HRW would consider it irresponsible to require VAWT technology to be used on this site.

*WINTU Comment:* Establish a concrete and meaningful mitigation plan which includes compensatory mitigation, detailed monitoring methodologies and requirements, adaptive operations and mitigation mechanisms

*Response:* Mr. Young provided Shasta County with a list of suggested mitigation measures in his comment letter dated January 28, 2008. These mitigation measures are consistent with the CEC Guidelines and fulfill the recommendations of the Wintu Audubon Society by providing concrete, meaningful mitigation measures, options for compensatory mitigation, and monitoring methods and requirements.

*WINTU Comment:* Contract with the CEC to manage the implementation of the mitigation measures.

*Response:* CEC is not the permitting authority for this project, and therefore, it is not the appropriate agency to handle oversight of environmental mitigation measures. The CEC Guidelines suggest cooperation with the CDFG, USFWS, and the permitting agency (here, the County) to ensure appropriate mitigation measures are in place and are followed. As explained in Mr. Young's comment letter, the mitigation measures HRW has suggested for potential impacts from the project on birds and bats are consistent with the CEC Guidelines.

*WINTU Comment:* Incidental take permit and habitat conservation plan for northern spotted owl



*Response:* The project will not affect northern spotted owls and needs no further review under the ESA for potential impacts to federally listed species. According to information from the U.S. Fish and Wildlife Service, the Pit River north of the project area is the southern boundary for northern spotted owls. Spotted owls occurring north of the Pit River are listed as threatened under the ESA. Spotted owls south of the Pit River are considered California spotted owls and, while a species of concern, are not listed under the ESA and no incidental take permit is required. In addition, the site is currently managed as a tree plantation and the forest characteristics on site are not considered suitable habitat for spotted owls. Further, surveys for spotted owls by the land owner have not documented either species in the project area. Land management practices for the site will not be affected by the project, and thus, it will continue to be unsuitable or marginal habitat at best for spotted owls.

*WINTU Comment:* Cumulative impacts (other wind farms projects in the immediate vicinity need to be analyzed).

*Response:* HRW is not aware of any proposals or applications for permits for other wind projects in the region. Since there are no pending applications for review of proposed wind farm developments in the vicinity, there are no other wind projects to include in an analysis of potential cumulative impacts.

RES appreciates your consideration of this additional information. If the County needs further information regarding wildlife concerns as they relate to wind projects, please feel free to call or write.

Sincerely,



Nicole S. Hughes, M.A. RPA  
RES America Developments, Inc.





Western EcoSystems Technology, Inc. 2003 Central Ave., Cheyenne, WY 82001  
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## MEMORANDUM

**Date:** February 19, 2008

**Subject:** Avian Risk Assessment – Hatchet Ridge Wind Project, California

**To:** Bill Walker, Shasta County

**From:** David Young, WEST, Inc., Senior Biologist

---

At the request of Shasta County the following memorandum presents an evaluation of expected impacts to birds from the Hatchet Ridge wind project based on (1) the results of site specific field studies and (2) what we know about impacts from wind turbines from results from other studies at existing wind projects.

Impacts from wind projects on birds and bats are often erroneously equated with risk or exposure to turbines. True impacts are not known until a project is built and the impacts can be observed or measured. Risk is often used as a description or an estimate of impacts for projects that have not been built. In most cases risk is greater than true impacts, for example, more birds are at risk of collision than actually collide with turbines because of reasons such as behavioral avoidance or simple chance of flying through the rotor swept area in areas not occupied by the blades at the time of exposure.

One common method of estimating risk is to quantify how many birds or bats are exposed to potential collision with turbines based on data collected during field surveys at a site. Studies to observe the number (abundance) of birds in the project area and/or behavioral patterns are means of estimating risk. We have taken the approach of calculating a standardized “use” estimate for species observed in the project area as the number for each species observed during a standard length survey within a standard plot size. This provides a relative estimate of abundance for a species compared to all species observed during the study. Use provides a measure for which species will likely be the most exposed to turbines either because they are very abundant or occur very frequently on the site but does not take into account behavior. To account for behavior, which includes flight characteristics, we calculate an exposure index that factors in the percent of time a species is observed flying, the percent of time it is observed flying in the zone of risk (height of the rotor swept area), and the relative abundance. The use and exposure indices provide measures of risk but do not equate to true impacts (actual collisions).

For nocturnal migration studies, the common metrics that are measured to provide a measure of risk are: (1) the passage rate, defined as the number of targets passing overhead for a given period of time and that cross a given length of migratory front; and (2) flight altitude, providing a measure of the relative percent of targets passing overhead within the zone of risk (height of the rotor swept area).

For bats the common metric measured with field studies is the number of bat detections (often called passes) per detector-night. Because of the difficulty of observing bats at night, it is difficult to gather specific information such as flight height for bats. With the AnaBat detector data the assumption is made that all the bats recorded are generally exposed to turbines because they are recorded in the project area in locations where turbines are likely to be built.

Results of monitoring studies at existing wind projects have shown that not every bird or bat that is exposed to turbines (or at risk) is actually impacted (see Erickson et al 2001 for a discussion of impacts from wind turbines). A number of modern wind projects in the Pacific Northwest and California have been monitored and results have been fairly consistent (Table 1). The overall range of avian mortality was approximately 0.9 to 3.1 birds per MW of capacity per year with an overall average of approximately 2.0 birds per MW per year.. Mortality expressed as the number per MW adjusts for differences in turbine sizes and the corresponding rotor swept area (zone of risk). For all the studies turbine size ranged from 660 kW to 1.8 MW.

A good example for illustrating that not all birds or bats exposed to potential turbine collision are actually impacted is to compare: (1) the nocturnal radar study from the site to show the total number of targets passing overhead and exposed to turbines; and (2) the results of monitoring studies at existing modern wind projects which show that only a tiny fraction of the migrants passing overhead actually collide with turbines.

- The nocturnal migration study of the Hatchet Ridge project area recorded on average 290 targets per kilometer per hour passing over the site. If we assume that there was 10 hours of night migration per night, then an average of 2,900 targets passed over per kilometer per night.
- The prevailing direction of targets was southwest, which is roughly perpendicular to the Hatchet ridgeline and the line of proposed turbines. The proposed turbine string is approximately 9 km long. Therefore approximately 26,100 targets passed over the proposed development area per night. [ $290 \times 10 \times 9 = 26,100$ ]
- The study was run for a 39-day period. Over the course of the study, approximately 1,017,900 targets passed overhead.
- Based on the flight altitudes recorded during the study, on average 8% of the targets were below 125 m – the approximate height of turbines or the zone of risk. Over the course of the study, approximately 81,432 targets passed overhead in the zone of risk. [ $1,017,900 \times 8\%$ ] (Note: this percentage assumes a rotor swept area of 125 m so it actually overestimates the number of targets exposed to turbines; the true rotor swept area will be between approximately 87 and 104 m depending on the turbine used for the project).
- Based on nine recent monitoring studies at modern wind projects in the Washington, Oregon and California (see Table 1), on average 0.51 nocturnal migrant fatalities occurred per MW of capacity per year of operation. If mortality rates at these studies are

similar to what will occur at Hatchet Ridge, then on average 51 nocturnal migrant bird fatalities would be expected per year if a 100 MW wind project is constructed. Under the assumption that one-half of the nocturnal migrant mortality occurs in the spring and one-half occurs in the fall, this equates to approximately 0.03% of the total number of fall migrants passing over the site within the zone of risk  $[(51/2) / 81,432 = 0.000313]$ , and an immeasurably small fraction of all migrants passing overhead during the nocturnal migration study  $[(51/2) / 1,017,900 = 0.000025]$

The major assumptions for this exercise are that the mortality of nocturnal migrants calculated in the other studies will be representative of that at Hatchet Ridge and that all the migrant mortality would occur during the migration season as defined by the study period. Additionally, this estimate is based on data that was collected under typically good weather conditions (the conditions during sampling). Risk and impacts could change under adverse weather conditions that could affect behavior of birds and put them at greater risk during certain periods. Further, the number of targets passing overhead is based on the airspace up to 1.5 km above ground and is considered an index to the true number of birds passing overhead. Studies have shown that many migrants fly even higher than 1.5 km and not all targets represent a single bird. Some targets were likely flocks of birds flying close together so the mean number of birds per target is likely greater than one. Also, the typical migration season is longer than 39 days and an unknown percentage of the targets were likely migrant bats, although based on the sampling period, this percentage is believed to be minimal. In general, the evaluation represents a 'worse-case scenario' as the true number of migrant birds passing over the site is undoubtedly greater than the calculated numbers (see Young and Erickson 2006 for further discussion of risk to nocturnal migrants). Under this worse case scenario, it is not expected that impacts from the HRW project on migrant birds would be greater than results from other modern wind projects that have been studied.

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Table 1. Avian fatality estimates for modern wind power projects in the Washington, Oregon and California

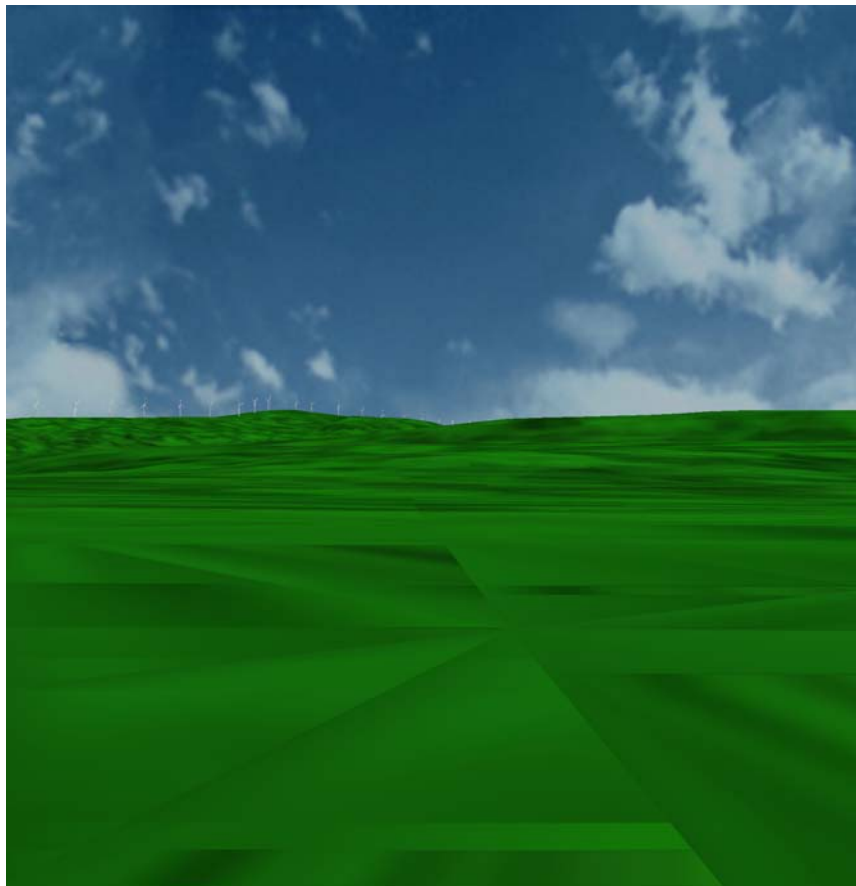
| Wind Project       | Project Size |            | Turbine Characteristics |                           |             | All Bird Mortality |               | Raptor Mortality |               | Nocturnal Migrants |               | Source                |
|--------------------|--------------|------------|-------------------------|---------------------------|-------------|--------------------|---------------|------------------|---------------|--------------------|---------------|-----------------------|
|                    | No. turbs    | No. MW     | Rotor Diameter          | Rotor Area                | MW          | No. per turb/yr    | No. per MW/yr | No. per turb/yr  | No. per MW/yr | No. per turb/yr    | No. per MW/yr |                       |
| High Winds, CA     | 90           | 162        | 80 m                    | 5027 m <sup>2</sup>       | 1.80        | 2.45               | 1.36          | 0.76             | 0.42          | 0.41               | 0.23          | Kerlinger et al. 2006 |
| Diablo Winds, CA   | 31           | 20         | 47 m                    | 1735 m <sup>2</sup>       | 0.66        | 1.40               | 2.12          | 0.37             | 0.56          | 0.03               | 0.27          | WEST, Inc. 2006       |
| Stateline, OR/WA   | 454          | 300        | 47 m                    | 1735 m <sup>2</sup>       | 0.66        | 1.93               | 2.92          | 0.06             | 0.09          | 0.48               | 0.73          | Erickson et al. 2004  |
| Vansycle, OR       | 38           | 25         | 47 m                    | 1735 m <sup>2</sup>       | 0.66        | 0.63               | 0.95          | 0                | 0             | 0.21               | 0.32          | Erickson et al 2000   |
| Combine Hills, OR  | 41           | 41         | 61 m                    | 2961 m <sup>2</sup>       | 1.00        | 2.56               | 2.56          | 0                | 0             | 0.27               | 0.27          | Young et al. 2005     |
| Klondike I, OR     | 16           | 24         | 65 m                    | 3318 m <sup>2</sup>       | 1.50        | 1.42               | 0.95          | 0                | 0             | 0.53               | 0.35          | Johnson et al. 2003b  |
| Klondike II, OR    | 50           | 75         | 65 m                    | 3318 m <sup>2</sup>       | 1.50        | 4.71               | 3.14          | 0.17             | 0.11          | 2.30               | 1.54          | NWC and WEST 2007     |
| Hopkins Ridge, WA  | 83           | 150        | 80 m                    | 5027 m <sup>2</sup>       | 1.80        | 2.21               | 1.23          | 0.25             | 0.14          | 0.82               | 0.46          | Young et al. 2007     |
| Nine Canyon, WA    | 37           | 48         | 62 m                    | 3019 m <sup>2</sup>       | 1.30        | 3.59               | 2.76          | 0.07             | 0.05          | 0.59               | 0.45          | Erickson et al. 2003b |
| <b>Sum/Average</b> | <b>840</b>   | <b>845</b> | <b>62 m</b>             | <b>3097 m<sup>2</sup></b> | <b>1.21</b> | <b>2.32</b>        | <b>1.99</b>   | <b>0.19</b>      | <b>0.15</b>   | <b>0.63</b>        | <b>0.51</b>   |                       |





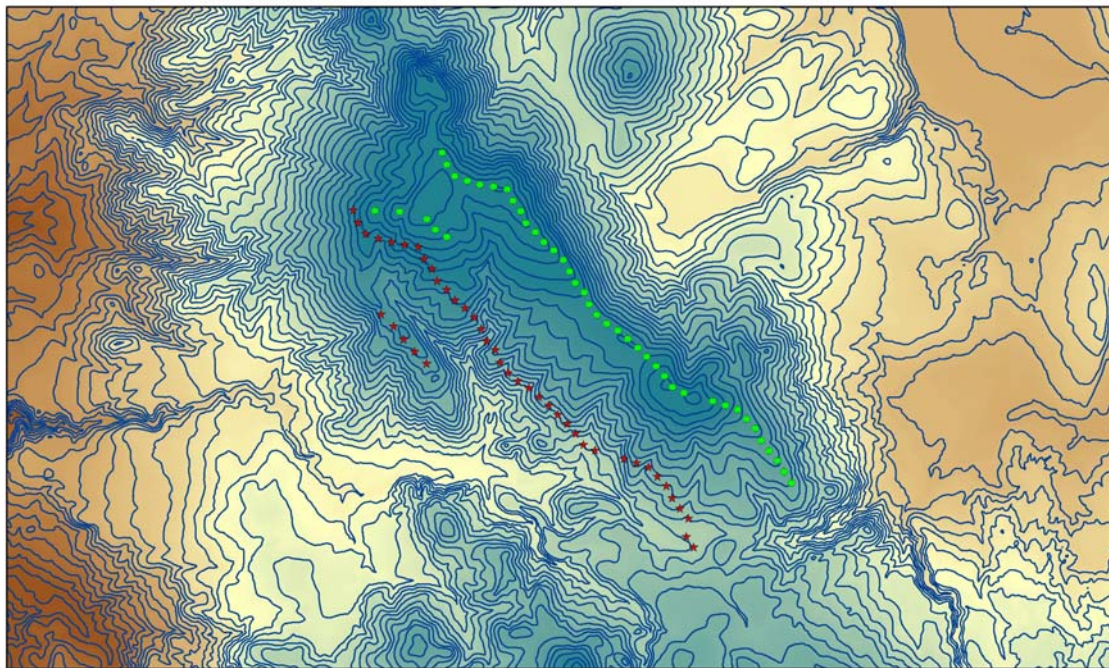
**Shasta County, California Zone of Visual Influence Assessment**

Per the request of Shasta County for the Project Applicant of the Hatchet Ridge Wind Project to come up with a site plan that would eliminate views of the Project from the town of Burney, Babcock and Brown, LP meteorological and technical team (B&B) has; 1) investigated the zone of visual influence (ZVI) for the town of Burney, CA using the proposed Hatchet Ridge Project turbine layout and 2) calculated the production that would occur from relocating the turbines. Based upon the proposed site plan of forty three 2.4 MW MHI turbines mounted on 80 meter towers, as shown on Figure 1, many of the turbines are visible on the ridgeline when viewed from the Burney area looking west.

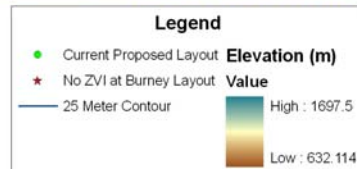


**Figure 1.** View looking West from Burney (current proposed MWT95 2.4 MW Layout)

To remove the turbines from the Burney area zone of visual influence, B&B performed a ZVI turbine location analysis that would eliminate all views of turbines from Burney. To achieve this goal, all turbines would have to be moved southwest approximately one mile and off the main ridgeline. Figure 2 shows a map of the current proposed layout (green dots), and the new layout with the turbines off the ridgeline and longer visible from Burney (red stars).



**Hatchet Ridge Project: Current Proposed and No Zone of Visual Influence from Burney Layout**



**Figure 2.** Hatchet Ridge Project current proposed layout with no impact on Burney.

Figure 3 shows the same viewpoint as from figure 1 with the new layout (red stars).



**Figure 3.** View looking West from Burney (No ZVI Layout)

#### TECHNICAL AND ECONOMIC FEASIBILITY OF NO ZVI SITE PLAN

There are at least three issues associated with moving the turbines to this new location. They include; 1) the wind resource and resulting energy production at the new location, 2) constructability of the new area and, 3) environmental and/or property setback issues. This report is not qualified to comment on environmental or property

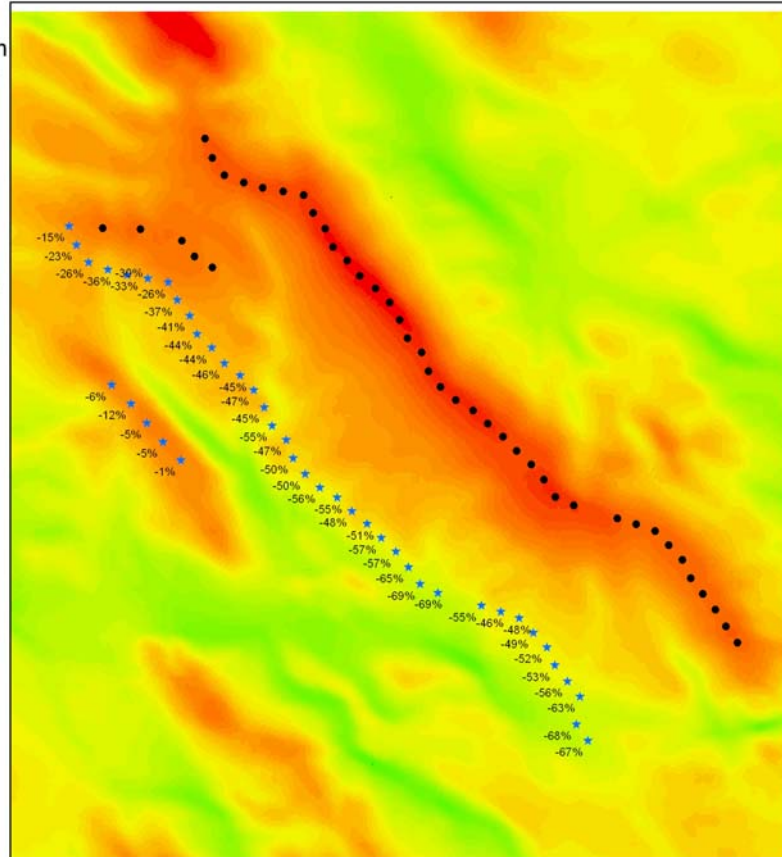
setback issues that might arise from the new site plan. However, B&B's in-house technical department is well versed in employing standard, well understood and accepted wind industry modeling software. Specifically, with multiple years of on-site wind data at Hatchet Ridge and using the Wind Atlas Analysis and Application Program (WAsP) and WindFarmer software packages, we are able to produce wind speed distributions for each turbine location at 25 m grid spacing across a project area. This data is then used to generate net annual energy production estimates for the entire project using the wind turbine's respective power curve and then making appropriate deductions for availability, electrical, icing, wake and other operational losses.

As mentioned earlier, wind speed information was produced for the entire site at each turbine location; however, due to the confidentiality of the data, a map showing relative annual energy production was produced (Figure 4). Results from the analysis indicate that the much lower wind speeds at the new turbine locations, the annual energy production of this layout would be approximately 40% less than our proposed layout (with a standard deviation of 10% plus or minus based on model error). In addition, the steep slope of the new turbine locations would be extremely problematic to build if not technically unfeasible. Figure 4 shows a map of the annual energy production for site with the two layouts overlaid. The negative percentages on the No ZVI layout represent the percent change in annual energy production from moving the turbines off of the ridge.

**Hatchet Ridge Project:  
Project Annual Energy Production**

**Map Description:**  
Wind data collected onsite was used to calculate the net annual energy production for the site using the WAsP (Wind Atlas Analysis and Application Program) and Windfarmer wind flow modeling software packages for both layouts.

The percentages labeled on the No ZVI layout represent the net annual energy yield lost per turbine from the turbines being placed off of the ridge.



Privileged and Confidential  
22 April 2008

In conclusion, moving the turbines sufficiently off the ridgelines as to make them invisible in Burney renders the Project economically and technically unfeasible. Please do not hesitate to call me if you have any questions and/or comments.

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