



Wind Turbine Noise Studies: *In-House Capabilities*

Ambient Sound Measurement Capabilities

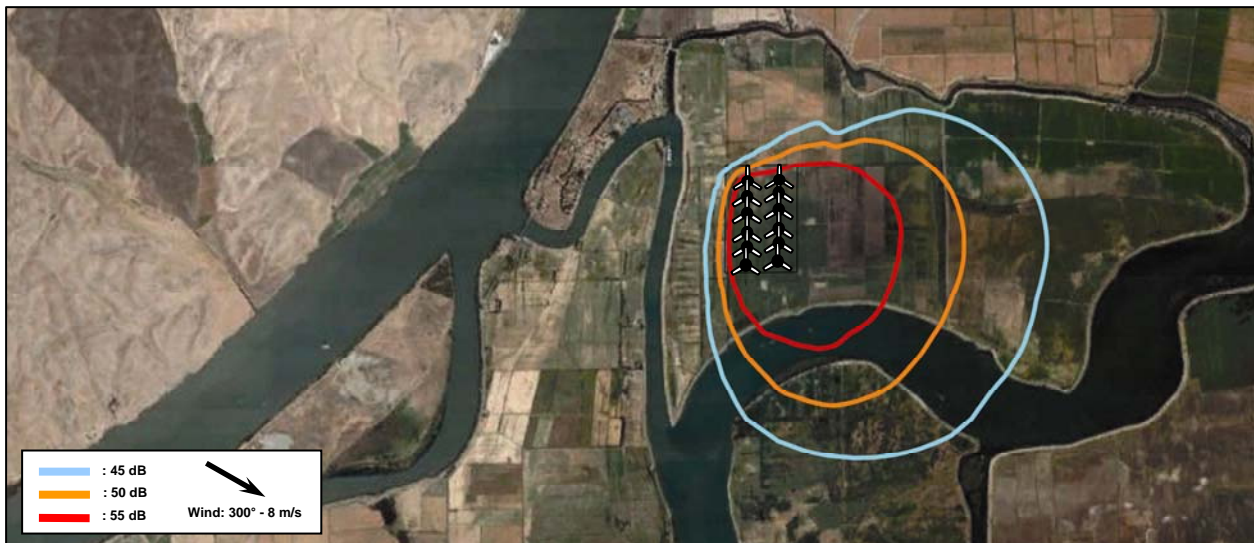
- American National Standards Institute (ANSI) type 1 sound level meters
- 1/3-Octave and FFT band sound level meter capabilities.
- Low frequency / Infrasound measurements and equipment.
- Continuous sound monitoring and data logging

Turbine Noise Analysis, Contour Mapping, and Report Preparation

- Over 20-years of experience preparing wind turbine noise studies.
- Turbine noise contour modeling using computer aided noise modeling software packages.
- Noise study preparation by recognized member of the Institute of Noise Control Engineering (INCE). j.c. brennan & associates, Inc. specializes in acoustics and noise control.

Wind Turbine Noise Ordinance Development

- Development of noise criteria
- Development of Protocols for ambient noise surveys and impact analyses





JIM BRENNAN, INCE | President

Education

B.S. Community Sciences, 1978, University of Wisconsin at Green Bay

Registration / Certifications

Member, Institute of Noise Control Engineering (INCE)

Member, Acoustical Society of America
Member, California Chapter APA

Key Experience

- Architectural Acoustics
- Community Noise Ordinances
- Construction Noise/Vibration
- EIR / EIS Noise Studies
- General Plan Noise Elements
- Highway/Roadway Projects
- Industrial Noise Control
- Master Plan / Community Plan Noise
- Monitoring
- Wind Turbine Noise Analyses

Publications

- Snowmaking Nozzle Noise Levels and the use of Enclosures as a Method of Noise Control, Noise-Con 96, Seattle, Washington

Current Wind Projects

- Wilson Creek Wind Turbine Project - Lincoln County, Nevada
- Cinder Mountain Wind Turbine Project - Storey County, Nevada
- Lummi Nation Wind Turbine Project - Bellingham, Washington

Jim is the owner of j.c. brennan & associates, Inc., which was founded in 2005. For the previous six years, Jim was a founding partner of Bollard & Brennan, Inc. His skills include the technical expertise in the use of computer models used for predicting noise propagation in complex environments, and developing noise control strategies and mitigation measures for abating noise impacts.

Jim's experience includes managing acoustical analyses related to wind turbine projects, traffic noise, architectural acoustics, and other environmental noise sources including railroads, rapid transit, helipad relocations, snowmaking operations, industrial facilities, residential developments, marina and harbor expansions, and mining operations.

PROJECT EXPERIENCE

Klamath Falls Peaker Power Plant

Klamath Falls, Oregon – Noise Consultant

Project Manager. The Klamath Generation Peaker Project (KGP) consists of dual Twin-Pac gas turbine power generation units and associated 500 kV transformer. The KGP project was proposed to be located to the west of the existing Klamath Cogeneration Project (KCP), and the proposed Klamath Cogeneration Facility (KGF). Responsibilities included conducting background noise and vibration monitoring associated with the existing Cogeneration Power Plants, and developing noise contours associated with the existing and proposed plants. Mitigation measures included recommended enclosures and silencing equipment for the proposed turbines.

Enron Wind Turbine Project

Solano County, California – Noise Consultant

Project Manager. This was a wind turbine project which currently constructed within Solano County California. As project manager, detailed noise contours were developed for the turbine array using the Environmental Noise Model (ENM). Direct inputs to the model included sound power data for each turbine, topographic data to account for shielding effects from intervening topography, and atmospheric conditions, including wind rows data. Project noise levels were compared to the Solano County General Plan noise level criteria ambient noise measurement data collected for the project. This was an EIR under the California Environmental Quality Act.

Virginia Peak Wind Turbine Project

Washoe County, Nevada – Noise Consultant

Project Manager. Provided analysis for the noise impacts of the Wind Turbine array.



LUKE SAXELBY, INCE | Senior Consultant

Education

B.S. Mechanical Engineering, California State University, Sacramento, California, 2004

FHWA Traffic Noise Model (TNM) Training Course, Completed Burlington, MA, April 2005

Registration / Certifications

Member, Institute of Noise Control Engineering

Board for Professional Engineers and Land Surveyors: Engineer-In-Training Certification (EIT) #116045 – January 23, 2003

Publications

- *Noise Control for a Metal Shredder and Recycling System*, Noise-Con 2011, Portland, Oregon.

Key Experience

- Architectural Acoustics
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Wind Projects

- Upper and Lower Tehachapi Wind Energy Projects – Kern County, California
- Clear Vista Wind Energy Project – Kern County, California
- Cinder Mountain Wind Turbine Project– Storey County, Nevada
- Lummi Nation Wind Turbine Project – Bellingham, Washington

Mr. Saxelby has managed hundreds of noise studies for various types of projects, including specific plan and master plan developments, commercial development projects, ski resorts, roadway improvement project, architectural acoustics design/testing/litigation, wind energy projects, and various Environmental Impact Reports (EIR) and Environmental Impact Statements (EIS).

Mr. Saxelby has developed skills in the use of complex noise modeling programs including the Federal Highway Administration Traffic Noise Prediction Model (TNM) and the CadnaA sound prediction model. Special interests and areas of practice include the application of noise control techniques for mechanical systems, building acoustics, and architectural acoustics for multi-family residential dwellings.

PROJECT EXPERIENCE

Isabella Dam Safety Modification EIS

Lake Isabella, CA – Noise Consultant

Project Manager / Senior Consultant. Responsible for preparing the Noise and Vibration study for the Army Corps of Engineers proposed modifications and/or replacement of the Lake Isabella Main and Auxiliary dam structures. Prepared a technical noise study report for the project EIS addressing potential noise and vibration impacts associated with the proposed project at sensitive receptors located around the project. Recommended noise control measures where necessary to reduce the potential impacts.

Central Trunk Sewer Rehabilitation Construction Project,

Sacramento, CA – Noise Consultant

Project Manager / Senior Consultant. Responsible for conducting noise and vibration monitoring and development of Noise/Vibration Reduction Plan prior to, and during construction. Worked with the Sacramento Area Sewer District and the project contractor to develop noise reduction measures for construction equipment during the project stages and to respond to various noise complaints.

State Route 70 / Feather River Boulevard Interchange

Yuba County, CA – Noise Consultant

Project Manager / Senior Consultant. Responsible for preparing the Caltrans Noise and Vibration Study for the proposed project. Conducted field noise measurements relative to Caltrans guidelines and prepared a project Noise Study Report (NSR) for delivery to the local agency and Caltrans.



REPRESENTATIVE PROJECTS – ENERGY PROJECTS

j.c. brennan & associates, Inc.

Project: Great Basin Wind Energy Acoustical Consulting Assistance (2010)
Location: Washoe County, Nevada
Client: Great Basin Wind

j.c. brennan & associates, Inc. is working with Great Basin Wind to provide assistance to the Washoe County Planning staff and Planning Commission to develop a wind farm ordinance. Our assistance is specific to assisting in the development of the noise section of the ordinance. The ordinance provides guidelines for conducting ambient noise studies, performance standards for wind turbine operations, setbacks from residential uses, procedures and guidelines for conducting environmental noise studies, and procedures for follow-up noise monitoring.

Project: Virginia Peak Wind Project (2009)
Location: Washoe County, Nevada
Client: Environmental Stewardship and Planning

j.c. brennan & associates Inc. prepared preliminary environmental noise assessments for the proposed Virginia Peak Wind farm project in Washoe County Nevada. Impacts were evaluated using the three dimensional sound prediction program, the Environmental Noise Model (ENM), with manufacturers' noise emission data for wind turbines. Impacts were identified where project generated noise levels were predicted to comply with the Washoe County noise standards and would not significantly exceed expected ambient noise levels.

Project: Windstar Wind Energy Projects (2010)
Location: Kern County, California
Client: Western Wind Energy

j.c. brennan & associates Inc. prepared environmental noise assessments for the proposed Upper and Lower Windstar Wind farm projects. Existing ambient noise levels in the project vicinity were quantified through a series of continuous and short-term ambient noise surveys and measurement of low-frequency infrasound. Impacts were evaluated using the three dimensional sound prediction program, the Environmental Noise Model (ENM), with manufacturers' noise emission data for wind turbines. Impacts were identified where project generated noise levels were predicted to exceed Kern County noise standards or significantly exceed measured ambient noise levels.



Project: Clear Vista Wind Energy Project (2009)
Location: Kern County, California
Client: Stantec Consulting

j.c. brennan & associates Inc. prepared noise contours and exterior noise calculations for the proposed Clear Vista Wind Energy Project in Kern County, California. Impacts were evaluated using the three dimensional sound prediction program, the Environmental Noise Model (ENM), with manufacturers' noise emission data for wind turbines. The noise contours were incorporated into the project Draft Environmental Impact Report (DEIR)

Project: KRCD Parlier Baseload Power Plant (2007)
Location: Fresno County, California
Client: Navigant Consulting, Inc.

j.c. brennan & associates, Inc. prepared an environmental noise assessment of the proposed 500 MW King's River Conservation District Power Plant. Short-term and continuous ambient noise measurements were conducted in the vicinity of the nearest noise sensitive receivers, according to the procedures established by the California Energy Commission (CEC). Potential noise impacts relating to the construction and operation of the proposed power plant were discussed. Mitigation measures were specified where significant impacts were identified.

Project: Enron Wind Energy Project (2001)
Location: Solano County, California
Client: Environmental Stewardship and Planning

j.c. brennan & associates Inc. staff prepared an environmental noise assessment for the proposed Enron Wind Energy project. Existing ambient noise levels in the project vicinity were quantified through a series of continuous and short-term ambient noise surveys. Impacts were evaluated using the three dimensional sound prediction program, the Environmental Noise Model (ENM), with manufacturers' noise emission data for wind turbines. Impacts were identified where project generated noise levels were predicted to exceed Solano County noise standards or significantly exceed measured ambient noise levels.