



**DATE:** July 20, 2012

**TO:** Planning Commission

**SUBJECT:** WIND ENERGY ZONING ORDINANCE AMENDMENT AND GENERAL PLAN AMENDMENT TO THE MOUNTAIN EMPIRE SUBREGIONAL PLAN (BOULEVARD CHAPTER) AND BORREGO SPRINGS COMMUNITY PLAN TO ALLOW WIND ENERGY DEVELOPMENT; POD 10-007 (District: All)

**SUMMARY:**

**Overview**

On February 25, 2009 (2), The Board of Supervisors directed staff to develop a new two tiered framework for wind turbine regulations to simplify processing and bring regulations in line with current wind turbine technologies. The wind energy Zoning Ordinance and General Plan Amendment were presented at the April 13, 2012, Planning Commission hearing. A workshop was conducted May 11, 2012 to review the various project issues (mainly relating to biology and noise impacts) that came up at the hearing. The Planning Commission directed staff to further research and respond to a number of questions and issues that were discussed at the workshop and continued the hearing until July 20, 2012.

**Recommendation(s)**

**DEPARTMENT OF PLANNING AND LAND USE**

That the Planning Commission take the following actions:

1. Review and consider the Draft Environmental Impact Report (“DEIR”) dated April 13, 2012 on file with the Department of Planning and Land Use as Environmental Review Number 09-00-003.
2. Review and consider the revised (attached) Form of Ordinance (Attachment A) and recommend the Board of Supervisors adopt:

“AN ORDINANCE AMENDING THE ZONING ORDINANCE RELATED TO WIND ENERGY SYSTEMS (POD 10-007)”

Or provide staff directions regarding alternative forms of the ordinance.

3. Review and consider the resolution approving General Plan Amendment

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(GPA) 12-001 (Attachment C, April 13, 1012, Staff Report); or provide staff direction regarding alternative forms of the General Plan Amendment.

**Business Impact Statement**

The Proposed Project will further County, State and Federal goals of utilizing alternative passive and renewable energy resources. The proposed ordinance streamlines and clarifies existing wind energy regulations and will increase development opportunities for both small and large wind turbines when compared to existing regulations.

**Advisory Board Statement**

N/A

**Involved Parties**

County of San Diego

**BACKGROUND:**

The project is composed of amendments to the County's Zoning Ordinance related to wind turbines and meteorological testing facilities (MET) facilities. The amendments consist of clarifications, deletions, and revisions to provide an updated set of definitions, procedures, and standards for review and permitting of wind turbines and MET facilities. The amendments include allowing small wind turbines that meet the definition and specifications of the Zoning Ordinance to be permitted with a streamlined Zoning Verification Permit prior to issuance of a building permit to verify that each small wind turbine complies with the Zoning Ordinance. Large wind turbines, as defined by the Zoning Ordinance, would continue to be subject to Major Use Permit procedures and requirements, and would require separate project-specific environmental review. Amendments to the Zoning Ordinance related to large wind turbines are proposed to bring development parameters up to date with current technology. An additional amendment allows a MET facility that meets the height designator of the zone to be allowed without discretionary review. A Zoning Verification Permit would be required prior to issuance of a building permit for each MET facility to ensure it complies with the Zoning Ordinance.

The project also includes a General Plan Amendment to modify the Boulevard chapter of the Mountain Empire Subregional Plan (Boulevard Community Plan) to increase opportunities for large wind turbine projects through the Major Use Permit process. Proposed changes to the Borrego Springs Community Plan would allow opportunities for small wind turbine development.

**OUTSTANDING ISSUES**

Responses to the research topics and issue areas identified by the Planning Commission at the May 11, 2012 Workshop are as follows:

Noise:

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A. **Clarify low frequency noise provision** - Staff has reviewed the public testimony and Commission discussion concerning the low frequency noise provision included in the proposed ordinance amendment. Under this provision, large turbine applicants would be required to establish turbine setbacks from property lines using an “increase over ambient” threshold and then be required to demonstrate compliance with this standard through mandated post-construction monitoring. Based upon staff’s review and continued research it appears the post construction monitoring provision will be difficult to implement due to the complexities of calculating the increase over ambient threshold in an “on the ground” scenario. In short, isolating the low frequency noise contribution from turbines for measurement purposes will be difficult due to the contribution of surrounding noise sources, various metrological variables, technical limitations of measurement equipment and a lack of consensus among acousticians on the methodology to perform such a measurement. In order to elevate these challenges and clarify the ordinance staff is recommended the following modifications to the large turbine noise provisions:

- a. Utilize the increase over ambient approach to establish turbine setbacks from property lines. The increase over ambient approach can be implemented during the permit review process through readily available acoustical analysis models, and is not compromised by the complexities of post construction monitoring noted above. Projects will also need to demonstrate compliance with the County existing (a-weighted) noise regulations and remain subject to the existing a-weighted standards during the operational phase of the project.
- b. Remove post-construction sound monitoring mandate and replace with code compliance reporting requirement every two years detailing any complainants and the corrective actions taken to remedy them. Turbine operations that are found to be out of compliance with County regulations or Major Use Permit conditions may be subject to review by the Approving Authority. If the Approving Authority finds that circumstances or conditions have changed so the use no longer meets the County regulations or conditions of the Major Use Permit, the permit may be modified or revoked whichever is more appropriate.
- c. Incorporate a steady pure tone provision which reduces the dBA thresholds when a pure tone exists. Pure tones may be more commonly referred to as a whine, screech or hum and due to the characteristics are more perceptible and therefore more likely to create an annoyance. The incorporation of a pure tone provision would reduce the County’s existing (a-weighted) threshold by 5db. Therefore in the case of our rural back country, if a pure tone was detected as a result of a large turbine operation, the operator would be required to eliminate the pure tone or meet a 40 dBA threshold at the property line (45 dBA maximum rural night time sound threshold, minus 5dB pure tone penalty, equals 40 dBA maximum rural night time sound threshold).

The result of these revisions would clarify the noise provisions and provide certainty to both the applicant and County with regard to post construction enforcement. Maintaining the increase over ambient approach to establish setbacks will result in setbacks ranging from 4,800 – 6,400 feet for larger size turbine projects. This range is in line with recent research

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trends calling for 1- 1.5 mile setbacks. Additional attributes of the noise provision which establish setbacks from property lines versus sensitive receptors and the incorporation of a pure tone penalty add additional protections to neighboring property owners.

- B. Evaluate the implications of the proposed low frequency noise provisions on wind farm projects** - Utility scale wind turbine development is achievable under the proposed ordinance. While many areas of the County by virtue of their surrounding land use, density or proximity to transmission lines are less viable, there remain portions of the County where utility scale wind turbine development is achievable. An applicant wishing to develop a wind farm under the proposed ordinance has a number of options available to comply with noise provisions. First an applicant may acquire the appropriate amount of land to site a project and or adjust the scale of the project such as the size and number of turbines to align with the applicable setback requirements. Second, if necessary an applicant may seek consent for a setback reduction from willing property owners through the ordinance's participating property provision; and as a final option, a waiver provision is proposed that allows decision makers to waive noise setback requirements if the projects benefits are found to outweigh its negatives. The 20 db increase over ambient approach is supported through research and backed by organizations such as the World Health Organization and the International Electrotechnical Commission (IEC) a recognized international standards organization. It should be noted that the fact that noise setbacks around County wind resource areas do not align with a single ownership interest does not mean the proposed low frequency noise provision is too restrictive or infeasible, as some have argued. It is standard industry practice for wind farm developers to acquire additional property ownership interest or secure setback reduction consent from adjacent property owners. The purpose of the proposed noise provisions is to protect residents from unwanted noise, not to prevent wind developers from working with willing neighbors. Finally, staff has consulted with wind industry developers regarding the proposed noise revisions outlined above. The general consensus is that the proposed revisions do provide clarity and provide a greater degree of certainty and therefore provide workable opportunities for wind farm development.
- C. Provide Staff's position on available infrasound research** – At the request of the Department of Planning and Land Use, The County Health and Human Services Agency (HHSA) conducted research on the human health effects of wind turbines including infrasound and issued a Public Health Position Statement (Attachment C). HHSA's research notes that while the effects of low frequency infrasound (less than 20Hz) on humans are not well understood, several authors have concluded low frequency noise emitted by wind turbines is minimal; and have concluded that there is no evidence of health effects arising from infrasound generated by turbines. An opposing view regarding low frequency turbine noise has been put forth by pediatrician, Dr. Nina Pierpoint, who states that noise from turbines produces a cluster of symptoms which she terms Wind Turbine Syndrome. However, Dr. Pierpoint's assertions are yet to be published in a peer reviewed journal.
- D. Research Biological implications of low frequency noise on wild life species and determine if there are any thresholds or guidelines** - Much like studies conducted to determine the effects of low frequency noise on humans, studies on low frequency noise

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impacts to wildlife have a wide range of results and conclusions. Not only do different species respond differently to noise input, individuals within a specific population will respond differently. As with humans, noise sensitivity appears to be unique to the receptor. Therefore, a source of chronic low frequency noise, such as an operating wind turbine, may disturb wildlife.

More and more studies are being conducted on the impacts to wildlife from wind turbine noise, including infrasound effects. While there are no universally accepted guidelines or thresholds from which low frequency noise impacts to wildlife may be assessed; all large turbines are subject to discretionary review and required to obtain a Major Use Permit under the existing and proposed wind ordinance. As part of the County's discretionary review process all large turbine projects would be evaluated under CEQA and would be required to implement measures to minimize impacts to biological resources. Biological resource studies for wind turbine projects should include discussions of how low frequency noise may affect species known to occur within a mile of the project site.

Biology:

**A. Status of work with wildlife agencies regarding small turbine sitting criteria and permit requirements for small turbine in PAMA –**

*Background:*

The Board of Supervisors directed staff to prepare an ordinance that will allow for the development of small residential wind turbines without a discretionary permit. This requires that any permitting criteria included in the ordinance to minimize environmental impacts be implemented using objective measurements without need for discretion by County staff. In response to public comments on the project, the following ministerial permit criteria were added to the ordinance:

- a. Only turbines certified by the California Energy Commission shall be permitted.
- b. The use of trellis style towers is prohibited.
- c. The use of guy wires is prohibited.
- d. 25 feet of vegetation shall be cleared around the turbine base.
- e. Power lines shall be undergrounded.
- f. Turbines shall not be sited within 4,000 feet of known golden eagle nests.
- g. No part of the wind turbine shall be closer than 300 feet or 5 times the turbine height, whichever is greater, from the following:
  - a. Power transmission towers and lines
  - b. Blue line watercourse(s) as identified on the United States Geological Survey Topographic Map
  - c. Significant roost sites for sensitive bat species as mapped on the California Natural Diversity Database
- h. No more than one small turbine is allowed on a legal lot designated as Pre-Approved Mitigation Area within the Multiple Species Conservation Program Subarea Plan.

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Though the wildlife agencies were generally in support of the above criteria, they noted additional concerns in meetings and correspondence with staff. Subsequent to the Planning Commission Workshop on May 11<sup>th</sup>, County staff met with the wildlife agencies on June 5<sup>th</sup> and June 19<sup>th</sup>. Per their recommendations, the following additional criteria have been included in the project:

- a. Ministerial permits for small wind turbines issued within the MSCP shall include a certificate of inclusion conveying third party beneficiary status for take that only covers the construction/development of the turbine. A notice to the permittee shall explicitly state that the operation of the turbine is not covered by the MSCP and may require consultation and additional permits from the US Fish and Wildlife Service and the California Department of Fish and Game.
- b. No part of the wind turbine shall be closer than 300 feet or 5 times the turbine height, whichever is greater, from the following:
  - a. Any open space easement, and designated preserve area,
  - b. Any riparian vegetation as mapped on the US Fish and Wildlife Service Wetland Vegetation Map.
- c. The map of known golden eagle nests shall be updated every five years.
- d. A joint evaluation of the permitted small turbines will be conducted five years after the ordinance goes into effect and after the first 100 small wind turbines are permitted. These evaluations will summarize where the majority of turbines are located, how many are roof-mounted, how many are vertical axis, what the average height is, etc.

There is one additional provision which the wildlife agencies have recommended:

- a. No turbines shall be permitted in areas designated as Pre-Approved Mitigation Area within the Multiple Species Conservation Program (MSCP) Subarea Plan without a discretionary Administrative Permit.

County Staff has not included this provision into the ordinance due to the fact that it is more restrictive than current regulations. Currently, a single small turbine is allowed on properties located in the PAMA without discretionary approval, requiring discretionary approval for a small turbine in PAMA would contradict the Board of Supervisors direction to streamline the permitting process. With the exception of this one provision there is general agreement among the wildlife agency and staff concerning siting criteria for small turbine.

- B. Determine if bird and bat mortality can be projected based on where large turbine projects would likely be located in San Diego County** - As part of the proposed Wind Energy Ordinance, potential bird and bat mortality in the region cannot be predicted quantitatively. Too many important factors are unknown, such as how many turbines will be permitted, how tall they will be, where exactly they will be located, and which migratory or resident species use the sites. Individual large wind turbine projects can conduct site-specific studies to develop “encounter rates” which can help to predict collision rates prior to applying mitigation measures. Yet it should be noted that there is not a strong correlation between encounter rates and mortality rates due to the many variables that factor into bird

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and bat strikes. The US Fish and Wildlife Service Land-Based Wind Energy Guidelines published in March of 2012 state:

For most populations, risk cannot easily be reduced to a strict metric, especially in the absence of population viability models for most species. Consequently, estimating the quantitative risk to populations is usually beyond the scope of project studies due to the difficulties in evaluating these metrics, and therefore risk assessment will be qualitative.

Below is the best available information County staff has regarding potential bird and bat impacts in the wind resource areas of San Diego County.

*Qualitative Assessment*

Compared to other wind resource areas in California, San Diego County is believed to have a moderate risk of bird and bat collisions. The project area for large wind turbines does not support large bodies of water that attract large migration stopovers for avian and bat species and it is not directly within the Pacific flyway. However, birds migrating in the Pacific Flyway may cross over the East County area. And resident birds and bats use the project area for their particular needs (breeding, nesting, foraging, movement, etc.). Golden eagle and other raptors have a high potential to forage over the project area due to suitable habitat and known occurrences.

The factors that can affect the frequency of bird and bat strikes include species characteristics (e.g., flight behavior, migration pattern, preferred habitat, etc.), population characteristics (e.g., abundance, distribution, nest/roost locations), turbine height/design, weather, topography, and on-going mitigation measures employed (e.g., adaptive management). It should be noted that bird and bat mortality or loss can also result from other adverse effects associated with the development of large wind turbines. Loss of habitat, electrocution, noise, lighting, dust, and altered drainage patterns can significantly impact wildlife.

*Quantitative Assessment*

While predicting bird and bat impacts is always extremely difficult, individual projects can attempt to estimate collision mortality with survey data and examples from other wind projects. For example, the Tule Wind project prepared an impact analysis for its proposed 128-turbine project in McCain Valley. Using the avian use and flight behavior surveys prepared by Tetra Tech EC, Inc. conducted 2005-2006 and 2007-2008, encounter rates were developed. An encounter rate is an estimate of the frequency with which a species is observed at the elevations of the proposed turbine's rotor swept area. Raptor encounters were reported at 0.58 birds/30 minutes in 2005–2006 and 0.98 birds/30 minutes in 2007–2008. Non-raptor encounters were 11.83 birds/30 minutes in 2005–2006 and 8.37 birds/30 minutes in 2007–2008. Although the analysis does not convert these encounter rates into mortality rates, it does provide an example for raptor mortality where an encounter rate of 2.0 birds/30 minutes would be loosely correlated with a mortality rate of 0.4 birds/megawatt/year on the high end and 1.0 bird/30 minutes would be loosely correlated with 0.2 birds/megawatt/year.

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Encounter rates for bats are roughly correlated with post-construction mortality rates (Kunz et al. 2007). Based solely on the correlation between pre-project bat use and post-construction bat mortality, the Tule Wind Project was estimated to have the potential to result in up to 2.5 bat fatalities/megawatt/year (WEST 2009, 2011).

Future projects proposed under the County Wind Energy Ordinance will be required to prepare qualitative and quantitative impact analyses whenever practicable. This will assist in developing the most effective avian and bat protection plans to prevent turbine related bird and bat mortality.

**C. Assess the implications of new Federal Golden Eagle Guidelines on the ordinance -**

Background Information:

*Federal Regulation*

The Bald and Golden Eagle Protection Act provides for the protection of the bald eagle and the golden eagle (as amended in 1962). It prohibits anyone from taking, possessing, or transporting a bald eagle (*Haliaeetus leucocephalus*) or golden eagle (*Aquila chrysaetos*), or the parts, nests, or eggs of such birds without prior authorization. This includes inactive nests as well as active nests. Take means to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb. Activities that directly or indirectly lead to take are prohibited without a permit. There are a number of different types of activities and projects that are eligible for a permit under the Bald and Golden Eagle Protection Act.

*2009 Eagle Rule*

The US Fish and Wildlife Service (USFWS) published a Final Eagle Permit Rule (2009 Final Eagle Permit Rule) on September 11, 2009 under the Bald and Golden Eagle Protection Act (BGEPA; 16 USC 668-668d and 50 CFR 22.26 and 22.27) authorizing limited issuance of permits to take bald and golden eagles where the take is associated with but not the purpose of an otherwise lawful activity, and cannot practicably be avoided. These regulations may apply to projects such as wind turbines and transmission lines. The new permit program has the potential to provide significant benefits to eagles because it requires permittees to conduct advanced conservation practices to benefit eagles. The new rule was followed by issuance of guidance documents for inventory and monitoring protocols and for avian protection plans.

*Federal Guidance*

In February 2011, the USFWS released the Draft Eagle Conservation Plan (ECP) Guidance, aimed at clarifying expectations for acquiring take permits by wind power projects consistent with the 2009 rule. It is written to guide wind-facility projects starting from the earliest conceptual planning phase. The ECP Guidance uses a 5-tiered process that includes: 1) early landscape-level site assessments; 2) site specific surveys; 3) risk assessment; 4) avoiding, minimizing and mitigating impacts; and 5) post-construction monitoring.

In March of 2012 the USFWS published final Voluntary Land-Based Wind Energy Guidelines. These guidelines are compatible with the ECP Guidelines and also take a 5-tiered approach to assess, minimize, and monitor impacts to wildlife.



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*State of California*

Under the State's Fish and Game Code, the golden eagle is a Fully Protected Species but not a listed species under the California Endangered Species Act (CESA). Under Section 86 of the Fish and Game Code, take is defined as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." As defined here, take of Fully Protected Species is prohibited and no licenses or permits may be issued. Wind turbine projects may result in direct impacts to golden eagle but not meet the definition of "take" in the Fish and Game Code. It is recommended that wind energy developers in California follow the "California Energy Commission Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development" in order to minimize/avoid potential impacts to Fully Protected Species. This would be done in close coordination with the California Department of Fish and Game (CDFG).

*How Do Golden Eagle Regulations Affect the Proposed Wind Ordinance?*

Future large wind turbine projects processed in the County of San Diego will need to follow the guidance documents described above and listed here:

- a. California Energy Commission Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development
- b. USFWS Voluntary Land-Based Wind Energy Guidelines
- c. Draft Eagle Conservation Plan Guidance

As part of the Wind Energy Ordinance project, the County is proposing mitigation measures M-BIO-1 and M-BIO-2, which are abbreviated here:

- a. M-BIO-1: During the environmental review process for future Major Use Permits for wind turbines, the County Guidelines for Determining Significance for Biological Resources shall be applied.
- b. M-BIO-2: Update the County Guidelines for Determining Significance for Biological Resources to include, or incorporate by reference, recommendations from the California Department of Fish and Game, the Avian Power Line Interaction Committee, the USFWS Draft Guidance, and the California Energy Commission (e.g., California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development).

Therefore, the existing State and Federal regulations and guidance documents, combined with the mitigation for the County's Wind Energy Ordinance, will result in stricter environmental review for future wind farm projects. The permitting process outlined for large wind projects in the draft ordinance allows for applicants to simultaneously follow golden eagle (and other wildlife) guidelines and permitting processes.

Health:

- A. **Provide overview of currently available health impact research** – As previously mentioned, The County Health and Human Services Agency (HHSA) conducted research on the human health effects of wind turbines and issued a Public Health Position Statement (Attachment C). HHSA's research included noise, electromagnetic radiation and interference, shadow flicker, blade glint and land surface temperature relationship concerns. HHSA's Public Health Position Statements concludes:

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The health effects of many forms of renewable energy generation, such as wind turbines, have not been assessed to the same extent as those from traditional energy sources (e.g., fossil fuel, radiation, etc.). The pathological effects on humans due to wind farms have only recently begun to be studied. This review of the available evidence, including journal articles, surveys, literature review and government reports, supports the statement: *There are no direct pathological effects from wind turbines and that any potential impact on humans can be minimized by following existing planning guidelines.*

## Economics:

- A. **Determine what percentage of the County's overall energy could be produced through wind and how it corresponds to other energy sources** – San Diego Gas and Electric (SDG&E) reported to the California Public Utilities Commission (CPUC) that 20.8 percent of the energy delivered to retail customers in 2011 was provided by renewable energy sources. Of the overall 20.8 percent in retail renewable sales, geothermal, biomass, biogas, and solar projects accounted for approximately 40 percent of the power and approximately 60 percent was attributed to wind power. The Kumeyaay Wind Project located on the Campo Indian reservation is the only current provider of wind energy within the County, the remaining wind power is imported. SDG&E reports it is on track to meet the state's mandate that 33 percent of its retail sales be produced from renewable energy projects by 2020.

Determining what percentage of the SDG&E's future renewable portfolio will be produced from wind cannot be actuality predicted at the present time. Power purchase agreements between SDG&E and renewable energy providers are largely negotiated in confidence to foster competitive pricing. Based upon a review of the California Independent System Operator (Cal ISO) Generation Queue there are 12 renewable energy projects requesting interconnection to the SDG&E transmission grid. While the exact name and location of these projects is kept confidential, the type of energy source (solar, wind, etc) and total power output are disclosed. Of these 12 identified projects six projects with a total power output of approximately 1,537 Megawatts would be derived from wind and six projects with a total power output of approximately 280 Megawatts would be derived from solar. It is important to note that inclusion on the CAL ISO queue does not guarantee a project will ultimately come on line. It is common practice for projects to drop from the queue due to regulatory or financial obstacles. Finally it is important to consider that renewable energy production is intermittent. While solar projects meet there peak production level during the day, wind projects typically reach peak production at night. Utility providers such as SDG&E strive to maintain diverse energy portfolios to accommodate for intermittent energy production protect against outages and foster competitive prices among their energy providers. Therefore future energy production will likely remain diverse among a variety of renewable energy sources for the foreseeable future.

## Solar Alternative:

- A. **Provide a comparative analysis of utility scale solar versus utility scale wind** - Utility scale wind turbine development is not achievable under the County's existing regulations.

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Large wind turbines are restricted in height to 80 feet and cannot have a cumulative blade swept area greater than 6,400 square feet. Modern utility scale wind turbine typically range in height from 350-500 feet and have blade swept areas that are more than ten times greater than the current blade swept area restrictions ( ex. Vestas V90- 1.8 MW turbine has a blade swept area of 68,349 square feet and is approximately 400 feet in height). Under the proposed ordinance project height and blade swept area limits for large wind turbine would be removed which in turn would allow for the development of utility scale wind turbines also commonly referred to as “wind farms”. The following analysis provides an overview and description of the general characteristics of both a wind farm and solar farm (utility scale solar) development followed by a comparative analysis of the two renewable energy technologies.

*Overview:*

Wind Farm - The California Energy Commission classifies wind turbines greater than 500 kW as “utility scale” however in practice most current utility scale wind farm developers are seeking entitlements for projects which utilize turbines ranging from 1.5 - 3MW in rated capacity. Turbines are typically clustered together in groups or laid out in rows often referred to as “strings”. Turbines are typically spaced at least three times their blade diameter apart to maximize energy production. Clusters and strings can range from as few as two or three turbines to over one hundred. Unpaved access roads typically run between turbine clusters or along turbine strings to provide access for inspection and maintenance. On site operation and maintenance buildings are common on wind farms as well.

Solar Farm – There are two main types of solar energy systems, photovoltaic (PV) and concentrating solar power plants. There are no known concentrating solar power plant projects under review within the County of San Diego’s land use jurisdiction, therefore for purposes of this analysis we will focus on PV systems. Photovoltaic systems are classified as flat-plate or concentrating photovoltaic systems (CPV). Concentrating photovoltaic systems use lenses or mirrors to concentrate sunlight onto high-efficiency solar cells. These solar cells are typically more expensive than conventional cells used for flat-plate photovoltaic systems. However, the concentration decreases the required cell area while also increasing the cell efficiency. CPV panels are generally mounted at heights ranging 20-35 feet. Mounting systems can either be “fixed tilt” or “multi axis” with tracking systems to optimize the panel’s alignment with the sun to maximize energy output. Solar farms can range in size from less than ten acres with a 2MW rated capacity to several hundred acres with rated capacities in excess of 150 MW. CPV solar farms are also equipped with inverter stations which convert the direct current generated by the solar panel into alternating current that may be transmitted into the electrical grid. Unpaved access roads are often located around the perimeter of the project site to provide access for inspection and maintenance and periodic washing of the panels. Solar farms are typically unmanned and monitored and controlled remotely. Larger size facilities may include operation and maintenance buildings.

The following Table provides a comparative analysis between utility scale wind farms and utility scale solar farms. The analysis was conducted at a generalized level, project specific

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impacts for specific wind and solar project may differ from those characterized in the analysis as a result of project specific analysis:

### Comparative Analysis – Wind vs. Solar

<b>Subject Area</b>	<b>Wind Farm</b>	<b>Solar Farm</b>
Availability of Renewable Resource	The entire incorporated County has approximately 807,000 acres of identified wind resource area; of this total approximately 193,000 acres (are within the County's jurisdiction. Commercial wind farm development is generally targeted to wind resources areas classified as good, excellent, outstanding or super (NREL, annual average wind resource, 50 meter height Data). Approximately 39,000 acres or slightly less than 5% of the incorporated County wind resource area fall into one of these categories. Approximately 1.5% of the unincorporated County have wind resources suitable for utility scale wind farm development.	The entire incorporated County has approximately 2,726,993 acres of identified solar resource area; of this total approximately 787,950 acres are within the County's jurisdiction. Commercial solar farm development is generally targeted to solar resources areas classified 6.0 or higher (NREL, annual average daily total concentrating solar power (CSP) resource data). Approximately 461,827 acres or slightly less than 17% of the incorporated County wind resource area fall into one of these categories. Approximately 59% of the unincorporated County have solar resources suitable for utility scale solar farm development
Compliance with existing Zoning Regulations	Utility scale wind turbine development is not achievable under the County's existing regulations. Large wind turbines are restricted in height to 80 feet and cannot have a cumulative blade swept area greater than 6,400 square feet. Modern utility scale wind turbine typically range in height from 350-500 feet and have blade swept areas that are more than ten times greater than the current blade swept area restrictions	Utility scale solar development is permitted under the existing ordinance. PV solar energy systems for offsite use with a project area less than 10 acres are allowed with approval of an Administrative Permit. PV solar energy systems for offsite use with a project greater than 10 acres are allowed with approval of a Major Use Permit. All other utility scale solar energy systems (concentrating solar power plants) require approval of a Major Use Permit
Estimated land requirements to produce 10 megawatts of power	The estimated land required to site five Vestas V90 2.0 mw turbines spaced three blade diameter lengths apart and 1.1 the distance to property lines would require approximately 110 acres of land. This total does not include additional land that would be required to met noise setback requirements	The estimated land required to generate 1 megawatt through solar power ranges from 5-7.5 acres depending on the efficiency of the solar cell and tracking system employed. Therefore, 10 megawatts of solar energy is estimated to require 50-75 acres of land.
Aesthetics	Utility scale turbine development may impact view sheds and scenic vistas by	CPV panels are generally mounted at heights ranging 20-35 feet. Mounting systems can

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	<p>introducing tall vertical elements into undeveloped or minimally developed regions of the County. The aesthetic component of a community's character may be impacted or altered by the introduction of "wind farm" development. Tall utility scale wind turbines may affect visual contrast or create view blockages. Mitigation measures such as painting and buffering with landscaping are ineffective on structures of this size and scale.</p> <p>"Shadow Flicker" is also associated with utility scale turbines, this event occurs when the sun rises or sets behind a turbine. The shadow cast from the spinning blades can create a pulsating flicker which in turn can be a disturbance or annoyance to neighboring property owners.</p>	<p>either be "fixed tilt" or "multi axis" with tracking systems to optimize the panel's alignment with the sun to maximize energy output. Aesthetics impacts for project of this height and scale can be mitigated through landscaping, berms and site design.</p>
<p>Biological Resources</p>	<p>All large turbines are subject to discretionary review and required to obtain a Major Use Permit under the existing and proposed wind ordinance. As part of the County's discretionary review process all large turbine projects would be evaluated under CEQA and would be required to implement measures to minimize impacts to biological resources. Impacts to biological resources can generally be categorized into three areas, construction related, project related and ongoing (operational). Construction and project related impacts could include impacts to vegetative communities, wildlife displacement, habitat fragmentation, and breeding disturbance. Ongoing impacts are largely attributed to the increased risk of birds and bat collision with turbine blades. Wildlife species may also be impacted by turbine noise (additional information regarding noise related impacts to wildlife species is found under Noise, D. above)</p>	<p>All utility scale solar projects are subject to discretionary review and required to obtain a Administrative Permit or Major Use Permit under the County's Zoning Ordinance. As part of the County's discretionary review process all utility scale solar projects would be evaluated under CEQA and would be required to implement measures to minimize impacts to biological resources. Impacts to biological resources are generally construction or project related. Construction and project related impacts could include impacts to vegetative communities, wildlife displacement, habitat fragmentation, and breeding disturbance. Solar farms at not known to generate ongoing (operational) impacts to biological resources.</p>
<p>Noise</p>	<p>A significant portion of sound energy generated by large wind turbines is at lower frequencies. The low-frequency character of the noise means that often you</p>	<p>CPV solar farms are equipped with inverter stations which convert the direct current generated by the solar panel into alternating current that may be transmitted into the</p>

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	<p>feel it, not just hear it. The “thumping and swooshing” of wind turbine noise makes it harder to ignore or get used to. Wind turbine operations are on-going and can occur all day and all night. Lastly, wind turbines tend to be located in quite rural environments where even low level noise is more perceptible and therefore more likely to create an annoyance. Recent research suggests a growing consensus that generally accepted community noise standards are not adequately protecting communities from wind turbine noise. As wind turbines become larger and become developed in less remote and more populated areas concerns over wind turbine noise impacts have become more prevalent. While county staff have seen papers suggesting noise setbacks as low as 1,000 feet to as much as 10 kilometers, a growing body of recommendations is coalescing at distances of between 1 to 1 and ½ miles</p>	<p>electrical grid. Inverter station are a known noise source, but noise levels can be mitigated through setback compliance or sound barriers such as berms.</p>
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**Other Considerations:**

At the May 11, 2012 Planning Commission Workshop staff presented a series of maps an analysis of the land use and parcelization pattern in the Boulevard community area. This area of the County is widely considered the most viable area within the County’s land use jurisdictions for utility scale wind turbine development due to the availability of wind resources and proximity to transmission lines. Staff’s analysis found that the areas south of Interstate 8 are highly parcelized and contains a number of residences within the expected setback buffers of the wind resources. Therefore, wind farm development is likely unachievable on these wind resources area. The area north of Interstate 8 was found to be less parcelized and contained fewer residences within the expected setback buffers of the wind resources and is therefore a more viable area for wind farm development. Staff has carried forward the land use and parcelization pattern analysis to other significant wind resources in the County (Ranchita, Santa Ysabel, Ocotillo Wells) and found these areas are constrained due to the number of residences within the expected setback buffers of the wind resources, parcelization pattern and lack transmission capacity. Based on staff’s analysis it appears the wind resource areas north of Interstate 8 in Boulevard are the most viable location for wind farm development. The Planning Commission may wish to consider a recommendation that focuses or limits wind farm development to this area.

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## **Summary:**

The following list summarizes the issues and responses provided in this report:

1. **Clarify low frequency noise provision** Staff has revised the large turbine noise provision to clarify the “increase over ambient” approach and provide certainty to both the applicant and County. The key changes are as follows:
  - The “increase over ambient” approach will be used to establish project setbacks, but not as an ongoing enforcement threshold post construction.
  - Post construction sound measurements will not be mandated, Code compliance reports will be required every two years detailing any complaints and the corrective actions taken to remedy them.
  - A steady pure tone provision is added which reduces dBA thresholds when a pure tone exists.
2. **Evaluate the implications of the proposed low frequency noise provisions on wind farm projects** Staff’s analysis concludes that wind farm development is achievable under the proposed ordinance.
3. **Provide Staff’s position on available infrasound research** HHSA’s research notes that while the effects of low frequency infrasound (less than 20Hz) on humans are not well understood, several authors have concluded low frequency noise emitted by wind turbines is minimal; and have concluded that there is no evidence of health effects arising from infrasound generated by turbines.
4. **Research Biological implications of low frequency noise on wild life species and determine if there are any thresholds or guidelines** Staff’s analysis concludes there are no universally accepted guidelines or thresholds from which low frequency noise impacts to wildlife may be assessed; all large turbines are subject to discretionary review and. Biological resource studies for wind turbine projects should include discussions of how low frequency noise may affect species known to occur within a mile of the project site.
5. **Status of work with wildlife agencies regarding small turbine siting criteria and permit requirements for small turbine in PAMA** Staff’s continued dialog with the wildlife agencies has resulted in further siting criteria for small turbines. While there is general agreement among the wildlife agency and staff concerning siting criteria for small turbine, staff remains opposed to the wildlife agencies recommendation to require discretionary permits for small turbine located in the PAMA due to the fact that it is more restrictive than current regulations and contradicts Board of Supervisor direction
6. **Determine if bird and bat mortality can be projected based on where large turbine projects would likely be located in San Diego County** Staff analysis concluded that bird and bat mortality cannot be predicted at the macro scale because too many important factors are unknown, such as how many turbines will be permitted, how tall they will be, where exactly they will be located, and which migratory or resident species use the sites.

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- 7. **Assess the implications of new Federal Golden Eagle Guidelines on the ordinance** Staff’s analysis concludes State and Federal regulations and guidance documents, combined with the mitigation for the County’s Wind Energy Ordinance, will result in stricter environmental review for future wind farm projects. The permitting process outlined for large wind projects in the draft ordinance allows for applicants to simultaneously follow golden eagle (and other wildlife) guidelines and permitting processes.
- 8. **Provide overview of currently available health impact research** HHSA has provided a Public Health Policy Statement concerning the human health effects of wind turbines. The policy statement concludes: “There are no direct pathological effects from wind turbines and that any potential impact on humans can be minimized by following existing planning guidelines.”
- 9. **Determine what percentage of the County’s overall energy could be produced through wind and how it corresponds to other energy sources** Slightly more than 20% of the County’s energy comes from renewable sources. 60% of the energy derived from renewable source comes from wind. Utility providers such as SDG&E strive to maintain diverse energy portfolios to accommodate for intermittent energy production, protect against outages and foster competitive prices among their energy providers. Therefore future energy production will likely remain diverse among a variety of renewable energy sources for the foreseeable future.
- 10. **Provide a comparative analysis of utility scale solar versus utility scale wind** A comparative analysis of wind farm versus solar farm development has been provided with this report
- 11. **Other Considerations** A land use and parcelization analysis of the County’s wind resource areas indicates wind resources areas north of Interstate 8 in Boulevard are the County’s most viable wind resource areas.

cc:

All Community Planning and Sponsor Groups

**ATTACHMENTS:**

- Attachment A – Resolution or Form of Decision Approving (POD10-007)
- Attachment B – Resolution or Form of Decision Approving (POD10-007)-Strikeout/Underline
- Attachment C – Health and Human Services Agency – Policy Statement
- Attachment D – References

**CONTACT PERSON:**

Matthew Schneider

\_\_\_\_\_  
Name

858-694-3714

\_\_\_\_\_  
Phone



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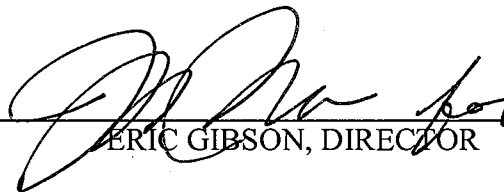
O650

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E-mail

**AUTHORIZED REPRESENTATIVE:**



ERIC GIBSON, DIRECTOR

**Attachment A**  
**Form of Ordinance**  
**Approving (POD10-007)**

ORDINANCE NO. \_\_\_\_\_ (NEW SERIES)

**AN ORDINANCE AMENDING THE  
SAN DIEGO COUNTY ZONING ORDINANCE  
RELATED TO WIND ENERGY SYSTEMS**

The Board of Supervisors of the County of San Diego ordains as follows:

**Section 1.** The Board of Supervisors finds and determines that wind power is an important renewable source of energy, and the Zoning Ordinance should be amended to update and streamline the provisions that regulate wind energy systems. This ordinance is consistent with State laws that encourage the construction of wind energy systems. The amendments made by this ordinance are intended to set forth reasonable standards and procedures for the installation and operation of Wind Turbine Systems to improve and enhance public welfare and safety, and to implement the Energy Element of the San Diego County General Plan.

**Section 2.** Section 1110, DEFINITIONS (A), of the Zoning Ordinance is amended to add a definition for A-Weighted Sound Level (dBA), to read as follows:

A-Weighted Sound Level (dBA). The sound level in decibels as measured on a sound level meter using the A-weighted network. The A-weighted network is the network for measuring sound that most closely resembles what the human ear hears. Sound measured using the A-weighted network is designated dBA.

**Section 3.** Section 1110, DEFINITIONS (B), of the Zoning Ordinance is amended to add a definition for Background Sound ( $L_{90}$ ), to read as follows:

Background Sound Level ( $L_{90}$ ). The sound level that is exceeded for 90 percent of the total measurement period as described by the current edition of the American National Standard Institution. Background Sound Level may be measured relative to A-weighting or C-weighting, in which case it would be denoted as  $L_{A90}$  and  $L_{C90}$ , respectively.

**Section 4.** Section 1110, DEFINITIONS (C), of the Zoning Ordinance is amended to add a definition for C-Weighted Sound Level (dBC), to read as follows:

C-Weighted Sound Level ( $L_{Ceq}$ ). The sound level in decibels as measured on a sound level meter using the C-weighting network. The C-weighting network measures sound that contains large low-frequency components. Sound measured using the C-weighting network is designated dBC.

**Section 5.** Section 1110, DEFINITIONS (M), of the Zoning Ordinance is amended to add a definition for Military Operating Area, to read as follows:

Military Operating Area. A three dimensional airspace designated for military training and transport activities that has a defined floor (minimum altitude) and ceiling (maximum altitude) above mean sea level.

**Section 6.** Section 1110, DEFINITIONS (N) of the Zoning Ordinance is amended to add a definition for Nacelle to read as follows;

Nacelle. Wind turbine component which typically houses internal mechanical and electrical parts, such as generators, gearboxes, drive trains, and brake assembly.

**Section 7.** Section 1110, DEFINITIONS (R), of the Zoning Ordinance is amended to add a definition for Residual Background Sound Criterion, and Ridgeline, to read as follows:

Residual Background Sound Criterion (RBSC<sub>L90</sub>) for Wind Energy Facilities. Background Sound Level measured relative to A-weighting (L<sub>A90</sub>) plus 5 dBA.

Ridgeline. The plateau or maximum elevation which extends along the top of Steep Slope Lands.

**Section 8.** Section 1110, DEFINITIONS (T), of the Zoning Ordinance is amended to add a definition for Trellis Tower, to read as follows:

Trellis Tower: A structure made of interwoven pieces of wood, metal or synthetic material to support an object, such as a wind turbine or antenna array.

**Section 9.** Section 1110, DEFINITIONS (W), of the Zoning Ordinance is amended to delete the definition of Wind Turbine System, Medium, add definitions for Wind Turbine Height, and Wind Turbine Tower Height, and to revise the definitions of Wind Turbine System ,Small; Wind Turbine System, Large; and Wind Turbine, Non Operational to read as follows:

Wind Turbine: A device which converts the kinetic energy of wind into a usable form of electric energy. A wind turbine may consist of a tower, turbine, support structures, electrical wires, guy wires and other related equipment.

Wind Turbine Height: The distance from existing grade at the base of the tower to the highest point of the turbine blade when in use

Wind Turbine Tower Height: The distance from existing grade at the base of the wind turbine tower to the top of the tower excluding the nacelle and turbine blades.

Small Wind Turbine: A wind turbine with or without a tower, which has a rated capacity of not more than 50 kilowatts that generates electricity primarily for use on the same lot on which the wind turbine is located.

Large Wind Turbine: A wind turbine with or without a tower, which has a rated capacity of more than 50 kilowatts, that generates electricity for use on or off the same lot on which the turbine is located. "Large Wind Turbine " shall be classified as a Major Impact Services and Utilities use type.

Wind Turbine, Non-Operational: A wind turbine that is mechanically inoperable or otherwise no longer converting the kinetic energy of wind into a usable form of electric energy

**Section 10.** Section 1110, DEFINITIONS (Z), of the Zoning Ordinance is amended to add a definition for Zoning Verification, to read as follows:

Zoning Verification Permit. A ministerial permit issued by the Department of Planning and Land Use for purposes of verifying that a particular use or structure complies with all applicable Zoning Ordinance regulations.

**Section 11.** Section 6123 of the Zoning Ordinance is amended to read as follows:

6123 METEOROLOGICAL TESTING FACILITY

A Meteorological Testing (MET) Facility is permitted as a temporary use if the following requirements are met:

- a. An Administrative Permit must be obtained in accordance with the Administrative Permit Procedure commencing at Section 7050. The following findings must be made prior to approval of an Administrative Permit:
  1. The location, size, design, and operating characteristics of the proposed use will be compatible with adjacent uses, residents, buildings, or structures, with consideration given to:
    - i. Harmony in scale, bulk, coverage and density;
    - ii. The availability of public facilities, services and utilities;
    - iii. The harmful effect, if any, upon desirable neighborhood character;
    - iv. The generation of traffic and the capacity and physical character of surrounding streets;
    - v. The suitability of the site for the type and intensity of use or development which is proposed; and to
    - vi. Any other relevant impact of the proposed use;
  2. The impacts, as described in paragraph "a.1" of this section, and the location of the proposed use will be consistent with the San Diego County General Plan; and
  3. The requirements of the California Environmental Quality Act have been complied with.
- b. Location. A MET Facility is prohibited on property subject to the S81 Use Regulations.
- c. Notification. Notice shall be provided pursuant to Section 7060c.
- d. Setback. The MET Facility shall be set back from all property lines and roads by a minimum of the distance equal to the height of the tallest structure (tower, equipment, etc.) or the applicable setback requirements of

the zone, whichever is greater. The setback requirements of the zone shall apply to all components of the MET Facility including, but not limited to, a tower, guy wires, guy wire anchors and any other related equipment.

- e. Minimum Spacing. The MET Facility shall be located at least 500 feet from any other MET Facility.
- f. Area of Disturbance. The MET Facility shall not disturb an area more than is necessary for the base of a tower, the guy wire anchors, other authorized equipment for the Facility and/or an access road. The equipment may include sonar equipment. The entire area of disturbance shall be clearly shown on the plans.
- g. Size. The MET Facility may include one temporary structure other than a tower or a sonar equipment trailer. The temporary structure is limited to 120 square feet in size including fencing and noise attenuation walls and may be used to store equipment for the MET Facility.
- h. Illumination. No exterior lights are allowed on a MET Facility except as required by law.
- i. Height. The MET Facility shall be less than 200 feet in height.
- j. Duration. The MET Facility shall not operate for more than three years from the date of approval of the Administrative Permit unless the Director grants an extension. The Director may grant an extension of time upon the applicant submitting written justification for the continued use of the facility and filing for a modification of the Administrative Permit pursuant to Section 7072. A MET Facility is approved by a Use Permit may operate for the time period specified in the Use Permit. The MET Facility shall be removed within 30 days of the expiration of the three-year period specified in the Administrative Permit or the time period specified in the Use Permit.
- k. Security. The operator shall provide security in the form and amount determined by the Director to ensure removal of the MET Facility. The security shall be provided to DPLU prior to building permit issuance. Once the MET Facility has been removed from the property pursuant to a demolition permit to the satisfaction of the Director, the security may be released to the operator of the MET Facility.
- l. A MET Facility that complies with the height designator in the height schedule of the zone in which the facility is located, is allowed with a Zoning Verification Permit if the facility meets the requirements of subsections b, d, e, f, g, h, and k of this section. The MET Facility shall be removed within three years of the Zoning Verification Permit approval date.

**Section 12.** Subsection z of Section 6156 of the Zoning Ordinance is amended to read as follows:

- z. Small Wind Turbine. A small wind turbine shall be allowed in accordance with the Renewable Energy Regulations commencing at Section 6951

**Section 13.** Subsection b of Section 6158 of the Zoning Ordinance is amended to read as follows:

- b. Small Wind Turbine. A small wind turbine shall be allowed in accordance with the Renewable Energy Regulations commencing at Section 6951.

**Section 14.** Section 6861 of the Zoning Ordinance is repealed.

**Section 15.** Section 6862 of the Zoning Ordinance is amended to read as follows:

6862 NONCONFORMING WIND TURBINES.

a. A nonconforming wind turbine, or a series of wind turbines, which meets the definition of "Wind Turbine, Non-Operational" in Section 1110 shall be removed within 60 days of becoming non-operational at the property owner's expense, and the site shall be restored to a condition compatible with surrounding properties as determined by the Director of Planning and Land Use. Upon written request by the Department of Planning and Land Use, the owner of a property on which a nonconforming wind turbine is located shall provide documentation to the satisfaction of the Director of Planning and Land Use that the Director may use to determine the operational status of the wind turbine.

**Section 16.** Section 6950 of the Zoning Ordinance is amended to read as follows:

6950 RENEWABLE ENERGY

The provisions of Section 6950 thru 6959 shall be known as the Renewable Energy Regulations. The purpose of these provisions is to prescribe reasonable standards and procedures for the installation and operation of Solar Energy Systems and Wind Turbines.

**Section 17.** Section 6951 of the Zoning Ordinance is amended to read as follows:

6951 SMALL WIND TURBINE

Small wind turbines shall comply with the following provisions:

- a. A maximum of three small wind turbines is allowed on a legal lot as an accessory use to the primary use of the lot in accordance with the following requirements:
  - 1. Setbacks.
    - i. A wind turbine that meets the height limit of the zone shall comply with the main building setbacks and may be mounted on a permitted structure, such as an accessory structure allowed pursuant to the accessory use regulations in section 6150.
    - ii. A wind turbine that exceeds the height limit of the zone shall be setback from all property lines, open space easements, conservation easements, private

road easements and public roads by a minimum of the distance equal to the wind turbine height or the applicable setback requirements of the zone, whichever is greater.

- iii. No part of the wind turbine shall be closer than 30 feet to any property line. No part of the wind turbine when installed at grade shall be closer than 10 feet to any existing structure. The wind turbine shall also meet fire code setback requirements.
  - iv. No part of the wind turbine shall be closer than 300 feet or five times the turbine height, whichever is greater, from the following:
    - a. Electric power transmission towers and lines.
    - b. Blue line watercourses or water bodies as identified on the current United States Geological Survey Topographic Map.
    - c. Significant roost sites for sensitive bat species as mapped on the California Natural Diversity Database.
    - d. Recorded open space easement and designated preserve areas
    - e. Riparian vegetation as identified on the County Wetland Vegetation Map dated xx-xx-xxxx.
  - v. No part of a wind turbine shall be closer than 4,000 feet from a known golden eagle nest site.
2. Area of Disturbance. A small wind turbine shall not result in an area of ground disturbance (including grading, clearing, brushing, or grubbing) that is larger than a 25 foot radius around the base of a tower, and an access path to the tower that is a maximum of four feet wide. The entire area of disturbance shall be clearly defined on the plans submitted for Zoning Verification Permit review.
  3. Barriers. Public access to a small wind turbine shall be restricted through the use of a fence with locked gates or non-climbable towers.
  4. Noise. A small wind turbine shall comply with the applicable sound level limits in the Noise Ordinance, County Code section 36.401 et seq.
  5. Height. The small wind turbine height may exceed the height limit of the zone in accordance with section 4620.j, but shall not exceed 80 feet.
  6. Lighting. The small wind turbine shall not include any exterior lights unless required by law.
  7. Turbine Certification. The small wind turbine shall be certified by the California Energy Commission.



8. Historic Resources. A small wind turbine shall not be located on a parcel listed in the National Register of Historic Places or the California Register of Historical Resources.
9. Ridgelines. Small wind turbines towers shall not be located on ridgelines.
10. Design. The small wind turbine shall meet the following design criteria:
  - i. Trellis. Use of trellis style towers is prohibited.
  - ii. Guy -Wires. Use of guy-wires is prohibited; turbine towers shall be self supporting.
  - iii. Tower Base. The entire area within 10 feet of the base of a turbine tower shall be cleared of all vegetation and shall be covered with gravel, mulch or other similar material to prevent the growth of vegetation.
  - iv. Power lines. All power lines connecting turbine towers and/or generators to a structure(s) shall be installed underground.
  - v. Safety. The small wind turbine shall be equipped with manual and automatic over speed controls.
  - vi. Non-Operational. Except for periods of maintenance, a small wind turbine that which meets the definition of "Wind Turbine, Non-Operational" in Section 1110 shall be removed from the site within 180 days of becoming non-operational Upon written request by the Department of Planning and Land Use, the owner of the property on which a turbine is located shall provide documentation to the satisfaction of the Director of Planning and Land Use that that the Director may use to determine the operational status of the small turbine.
11. Military Operating Areas. The Department of Planning and Land Use shall provide written notice to the appropriate branch of the United States military prior to the issuance of a Zoning Verification Permit for a small wind turbine located in a Military Operating Area. The notice shall include a description of the location and height of the proposed small wind turbine.
12. Pre-Approved Mitigation Area. No more than one small turbine is allowed on a legal lot designated as Pre-Approved Mitigation Area within the boundaries of the Multiple Species Conservation Program Subarea Plan. An Administrative Permit may be approved for more than one turbine if all of the requirements of subsection "a" of this section are met and the cumulative rated capacity of the turbines does not exceed 50 kilowatts
  - b. Up to two additional small wind turbines (five total) are allowed when all wind turbines comply with the requirements of subsection "a" above and all turbines:
    1. Meet the height limit of the zone; and

- 2. Are mounted on an existing permitted structure, such as an accessory structure, allowed pursuant to the Accessory Use Regulations in section 6150.
- c. An Administrative Permit may be approved for more than three tower-mounted small wind turbines or more than five roof-mounted small wind turbines if all of the requirements of subsection "a" of this section are met and the cumulative rated capacity of all of the turbines does not exceed 50 kilowatts.
- d. The cumulative rated capacity of all small wind turbines on single legal lot shall not shall not exceed 50 kilowatts.
- e. Before a building permit is issued for a small wind turbine, the applicant shall obtain a Zoning Verification Permit to verify that each small wind turbine complies with the requirements listed in Section 6951.

**Section 18.** Section 6952 of the Zoning Ordinance is amended to read as follows:

**6952. LARGE WIND TURBINE**

Any number of large wind turbines may be allowed as a Major Impact Services and Utilities use type with a Major Use Permit approved in accordance with the Use Permit Procedure commencing at Section 7350 and subject to the following requirements:

- a. Lot size and status. The lot on which the large wind turbine(s) is to be located shall be at least five acres in size and shall be a legal lot.
- b. Location. The lot shall be located in a wind resources area shown on the Wind Resources Map approved by the Board of Supervisors on \_\_\_\_\_ and on file at the Clerk of the Board of Supervisors as document number \_\_\_\_\_.
- ac. Setbacks. The minimum setbacks listed below shall apply. All setbacks shall be measured from the property line to the closest point on the base or support structure of each tower.
  - 1. From private road easements, open space easements, conservation easements and public roads, the minimum setback shall be a distance equal to 1.1 times the wind turbine height.
  - 2. From all property lines and existing residences or buildings occupied by civic use types, the minimum setback shall be a distance equal to 1.1 times the wind turbine height.
  - 3. Additional setbacks may be required to meet the Noise Ordinance, County Code section 36.401 et seq., and/or the noise requirements in subsection "f" below.
  - 4. Setback Reduction. If the noise levels resulting from a proposed large turbine exceed the requirements of Noise Ordinance, County Code section 36.401 et seq., and or the noise requirements in subsection "f" below, the setback

requirements in subsections 6952.c.2 and 3 shall be reduced if the following provisions are met:

- i. A minimum setback equal to 1.1 times the wind turbine height shall be maintained from all existing residences or buildings occupied by civic use types, private road easements, open space easements, conservation easements and public roads; and
  - ii. The applicant has submitted to the Department of Planning and Land Use a document titled, "Consent to Reduce Setbacks" from the owner of each property affected by the proposed setback reduction. The Consent to Reduce Setbacks shall identify the affected property, the owner of the affected property, the property line(s) to which the reduced setback would apply, the reduced setback distance to which the property owner consents and shall include any other information specified by the Director. The property owner's signature shall be acknowledged. The Consent to Reduce Setbacks shall meet the requirements of state law for a recordable document and will be recorded by the Department of Planning and Land Use with the San Diego County Recorder's Office if the provisions of section 6952c.4 are met.
  - iii. If the adjoining property that would be affected by a setback reduction is not subject to the County's land use regulations, the applicant shall submit documentation to the satisfaction of the Director that the adjoining property owner does not object to the setback reduction. Section 6952.c.4.i shall apply, but section 6952c.4.ii shall not apply.
- d. Barriers. Public access to a large wind turbine shall be restricted through the use of a fence with locked gates, non-climbable towers or other suitable ~~methods~~ measures.
- e. Signs. A warning sign containing only a telephone number and an address for emergency calls and informational inquiries shall face each vehicular access point to the turbine. Individual signs shall be between five and 16 square feet in size.
- f. Noise. The following noise provisions shall apply:
1. Acoustical Study. The applicant shall prepare and submit an acoustical study. The study shall be conducted by a County-approved acoustical consultant and shall demonstrate that (a) each large wind turbine complies with all applicable sound level limits in the Noise Ordinance, County Code section 36.401 et seq.; and (b) the C-weighted sound level from each large wind turbine while operating does not exceed the Residual Background Sound Criterion for Wind Energy Facilities by more than 20 decibels as both sound levels are measured at each property line of the lot on which the large turbine is located.
  2. Noise Waiver. An increase in the C-weighted sound level limit specified in section 6259.f.1 for one or more turbines may be approved in accordance with the following provisions:

- a) The large wind turbine complies with all other applicable sound level limits in the Noise Ordinance, County Code section 36.401 et seq.; and
  - b) The higher C-weighted sound limit is acceptable due to specific economic, social, technological or other benefits that will result from approval of the Major Use Permit and implementation of the Proposed Project,
3. Pure Tone. If the sound from a large wind turbine while operating contains a steady pure tone, such as a whine, screech or hum, the applicable standards for noise set forth in County Code section 36.404 shall be reduced by five dBA. A "pure tone" exists if one-third of the octave band sound pressure level in the band, including the tone, exceeds the arithmetic average of sound pressure levels of the two contiguous one-third octave bands by five dBA for center frequencies of 500 Hz or more, by eight dBA for center frequencies between 160 Hz and 400 Hz, or by 15 dBA for center frequencies less than or equal to 125 Hz.
4. Compliance Review. A Major Use Permit for a large turbine shall be conditioned to require the submittal of a compliance report to the Department of Planning and Development Services once every two years (from the date of approval of the Use Permit) that demonstrates, to the satisfaction of the Director, that the use meets the requirements of this section and all applicable noise related conditions of the Major Use Permit. The compliance report shall describe any complaints filed with the County during the previous two year period and all corrective actions taken if the use was found to be out of compliance with the requirements of this section and/or the applicable noise related Major Use Permit conditions. As a result of this review, the Director shall determine that the use is in compliance with the requirements of this section and the applicable noise related Major Use Permit conditions or that the Major Use Permit shall be subject to review by the Approving Authority. If the Approving Authority finds that the use no longer complies with the requirements of this section and/or the applicable noise related conditions of the Major Use Permit, the Approving Authority may modify or revoke the permit after giving proper notice and holding a hearing.
- g. Height. A large wind turbine shall comply with Federal Aviation Administration height requirements and day and night marking requirements and shall not create an airport hazard or interfere with military or emergency services aviation operations, such as aerial firefighting.
  - h. Turbine Description. The Major Use Permit shall include the following information:
    - 1. The wind turbine manufacturer(s), model(s), power rating(s) and blade dimensions.
    - 2. The tower manufacturer and model.

- i. **Manufacture Specifications.** An application for one or more large wind turbine(s), shall include a copy of the manufacturer's specifications for each proposed wind turbine. The applicant may submit multiple manufactures specifications.
  
- j. **Nonoperational Wind Turbines.** Except for periods of maintenance, a large wind turbine that is non-operational for 180 consecutive days shall be decommissioned as specified in subsection 2 below.
  - 1. **Upon written request by the Department of Planning and Land Use, the Permittee of a Major Use Permit for a large wind turbine shall provide data to the satisfaction of the Director to allow the Director to determine the operational-status of the wind turbine.**
  - 2. **Decommissioning Plan.** The applicant shall prepare and submit a decommissioning plan to the Director for his review and approval. The plan shall provide for the removal of all components of each large wind turbine and the restoration of the site to a condition compatible with surrounding properties within 180 days of the wind turbine becoming non-operational.
  - 3. **Secured Agreement.** The applicant shall also enter into a secured agreement with the County that requires the decommissioning plan to be implemented and completed. The terms and conditions of the agreement shall be to the satisfaction of the Director. The Director is authorized to sign the agreement on behalf of the County. The security provided with the agreement shall be in an amount sufficient to cover the County's costs, as determined by the Director, to implement and complete the decommissioning plan in case the owner or operator fails to implement and/or complete the plan. The security shall be in a form approved by the Director. Typical forms of security include a surety bond, irrevocable letter of credit or trust funds. The security shall remain in effect for the entire time that the large wind turbine is operational and for any additional time until the decommissioning has been completed in accordance with the decommissioning plan.
  - 4. **Building Permit.** No building permit for any component of a large wind turbine may be issued until the Director approves the decommissioning plan, signs the secured agreement and accepts the security.
  
- jk. **Existing Administrative Permits for Wind Turbine Projects - Modification or Revocation.** Administrative permits for wind turbine projects granted pursuant to Section 7060 prior to January 1, 1986, shall be treated for all purposes as if they are Major Use Permits and shall be subject to all the provisions of the Zoning Ordinance which apply to Major Use Permits for purpose of modification or revocation.
  
- l. **Design.** When a Major Use Permit authorizes more than one large wind turbine, all of the large wind turbines subject to the Major Use Permit shall be uniform in color and tower and turbine design (pole, nacelle, etc.). In addition if there are existing large wind turbines on a lot that abuts the lot on which proposed large wind turbines would be located, the color and tower and turbine design of the proposed large wind turbines shall be uniform with that of the existing large wind

turbines. Tower and turbine design does not include turbine height which may vary.

**Section 19.** Section 7359 of the Zoning Ordinance is amended to read as follows:

7359 FINDINGS REQUIRED FOR PARTICULAR USE PERMITS.

Before a use permit may be granted or modified for a "Specific Hazardous Waste Facility Project" as defined in Health and Safety Code Section 25199.1 or a "Large Wind Turbine" as defined in Section 1110, the following provisions shall be met:

a. "Specific Hazardous Waste Facility Project." In addition to the findings required by Section 7358, it shall be found that the proposed facility complies with the following siting criteria documents of the County of San Diego Hazardous Waste Management Plan 1989-2000, all of which documents are on file with the Clerk of the Board of Supervisors as Exhibit A to Ordinance No. 8093 (N.S.):

- a1. Section E, entitled "Local and Regional Facility Needs", of Chapter IX, entitled "Siting and Permitting of Hazardous Waste Facilities" (Pages IX-35 through IX-37);
- b2. Appendix IX-A, entitled "Siting Criteria For Evaluating Hazardous Waste Management Facility Siting Proposals in San Diego County", and
- c3. Appendix IX-B, entitled "'General Areas' For Siting Hazardous Waste Management Facilities."

b. Large Wind Turbine. In lieu of the findings required by Section 7358, it shall be found that the location, size and design of the proposed large wind turbine project will not adversely affect or be materially detrimental to the surrounding community with consideration given to:

- 1. The physical suitability of the site for the type and intensity of the wind turbine project which is proposed;
- 2. Any harmful effect from the wind turbine project on desirable neighborhood character;
- 3. The availability of public facilities, services and utilities to serve the wind turbine project;
- 4. The generation of traffic and the capacity and physical character of surrounding streets;
- 5. The requirements of the California Environmental Quality Act;
- 6. The wind turbine project's contribution to the renewable energy and sustainability goals of the San Diego region; and

7. The San Diego County General Plan.

**Section 20.** Section 1380 of the Zoning Ordinance is repealed.

**Section 21.** Section 2990 (page 1 of 6) of the Zoning Ordinance is amended to read as follows:

**Section 22.** Effective Date. This Ordinance shall take effect and be in force 30 days after the date of its passage, and before the expiration of 15 days after its passage, a summary shall be published once with the names of the members voting for and against the same in the \_\_\_\_\_ a newspaper of general circulation published in the County of San Diego.



**Attachment B**  
**Form of Ordinance**  
**Approving (POD10-007)**  
**Strikeout/Underline**

ORDINANCE NO. \_\_\_\_\_ (NEW SERIES)

**AN ORDINANCE AMENDING THE  
SAN DIEGO COUNTY ZONING ORDINANCE  
RELATED TO WIND ENERGY SYSTEMS**

The Board of Supervisors of the County of San Diego ordains as follows:

**Section 1.** The Board of Supervisors finds and determines that wind power is an important renewable source of energy, and the Zoning Ordinance should be amended to update and streamline the provisions that regulate wind energy systems. This ordinance is consistent with State laws that encourage the construction of wind energy systems. The amendments made by this ordinance are intended to set forth reasonable standards and procedures for the installation and operation of Wind Turbine Systems to improve and enhance public welfare and safety, and to implement the Energy Element of the San Diego County General Plan.

**Section 2.** Section 11110, DEFINITIONS (A), of the Zoning Ordinance is amended to add a definition for A-Weighted Sound Level (dBA), to read as follows:

A-Weighted Sound Level (dBA). The sound level in decibels as measured on a sound level meter using the A-weighted network. The A-weighted network is the network for measuring sound that most closely resembles what the human ear hears. Sound measured using the A-weighted network is designated dBA.

**Section 3.** Section 11110, DEFINITIONS (B), of the Zoning Ordinance is amended to add a definition for Background Sound ( $L_{90}$ ), to read as follows:

Background Sound Level ( $L_{90}$ ). The sound level that is exceeded for 90 percent of the total measurement period as described by the current edition of the American National Standard Institution. Background Sound Level may be measured relative to A-weighting or C-weighting, in which case it would be denoted as  $L_{A90}$  and  $L_{C90}$ , respectively.

**Section 4.** Section 11110, DEFINITIONS (C), of the Zoning Ordinance is amended to add a definition for C-Weighted Sound Level (dBC), to read as follows:

C-Weighted Sound Level ( $L_{Ceq}$ ). The sound level in decibels as measured on a sound level meter using the C-weighting network. The C-weighting network measures sound that contains large low-frequency components. Sound measured using the C-weighting network is designated dBC.

**Section 5.** Section 11110, DEFINITIONS (M), of the Zoning Ordinance is amended to add a definition for Military Operating Area, to read as follows:

Military Operating Area. A three dimensional airspace designated for military training and transport activities that has a defined floor (minimum altitude) and ceiling (maximum altitude) above mean sea level.

**Section 6.** Section 1110, DEFINITIONS (N) of the Zoning Ordinance is amended to add a definition for Nacelle to read as follows:

Nacelle. Wind turbine component which typically houses internal mechanical and electrical parts, such as generators, gearboxes, drive trains, and brake assembly.

**Section 7.** Section 1110, DEFINITIONS (R), of the Zoning Ordinance is amended to add a definition for Residual Background Sound Criterion, and Ridgeline, to read as follows:

Residual Background Sound Criterion (RBSC<sub>L90</sub>) for Wind Energy Facilities. Background Sound Level measured relative to A-weighting (L<sub>A90</sub>) plus 5 dBA.

Ridgeline. The plateau or maximum elevation which extends along the top of Steep Slope Lands.

**Section 8.** Section 1110, DEFINITIONS (T), of the Zoning Ordinance is amended to add a definition for Trellis Tower, to read as follows:

Trellis Tower: A structure made of interwoven pieces of wood, metal or synthetic material to support an object, such as a wind turbine or antenna array.

**Section 9.** Section 1110, DEFINITIONS (W), of the Zoning Ordinance is amended to delete the definition of Wind Turbine System, Medium, add definitions for Wind Turbine Height, and Wind Turbine Tower Height, and to revise the definitions of Wind Turbine System, Small; Wind Turbine System, Large; and Wind Turbine, Non Operational to read as follows:

Wind Turbine: A device which converts the kinetic energy of wind into a usable form of electric energy. A wind turbine may consist of a tower, turbine, support structures, electrical wires, guy wires and other related equipment.

Wind Turbine Height: The distance from existing grade at the base of the tower to the highest point of the turbine blade when in use

Wind Turbine Tower Height: The distance from existing grade at the base of the wind turbine tower to the top of the tower excluding the nacelle and turbine blades.

Small Wind Turbine System, Small: An installation consisting of no more than one wind turbine with a maximum blade swept area of 220 square feet. This area shall be measured in the vertical plan perpendicular to the wind direction. (A 220 square foot blade swept area corresponds approximately with a blade diameter of 16.5 feet for a conventional horizontal axis wind turbine). A wind turbine with or without a tower, which has a rated capacity of not more than 50 kilowatts that generates electricity primarily for use on the same lot on which the wind turbine is located.

Wind Turbine System, Medium: An installation consisting of one to five wind turbines in which the sum of the blade swept area of the turbines is no more than 850 square feet. This area shall be measured in the vertical plane perpendicular to the wind direction. (A

~~850 square foot blade swept area corresponds approximately with a blade diameter of 33 feet for one conventional horizontal axis wind turbine).~~

~~Large Wind Turbine System, Large: An installation consisting of one or more wind turbines in which the sum of the blade swept area of all turbines is greater than 850 square feet. This area shall be measured in the vertical plane perpendicular to wind direction. No individual wind turbine shall have a blade swept area greater than 6400 square feet. A wind turbine with or without a tower, which has a rated capacity of more than 50 kilowatts, that generates electricity for use on or off the same lot on which the turbine is located. The "Large Wind Turbine System, Large" shall be classified as a Major Impact Services and Utilities use type.~~

~~Wind Turbine, Non-Operational: Any wind turbine(s) whose a power output (in kilowatt hours) for any consecutive 12 months is that is mechanically inoperable or otherwise no longer converting the kinetic energy of wind into a usable form of electric energy less than 10% of the expected power output. The expected power output for a commercial wind turbine(s) shall be the amount claimed in the company's~~

**Section 10.** Section 1110, DEFINITIONS (Z), of the Zoning Ordinance is amended to add a definition for Zoning Verification, to read as follows:

Zoning Verification Permit. A ministerial permit issued by the Department of Planning and Land Use for purposes of verifying that a particular use or structure complies with all applicable Zoning Ordinance regulations.

**Section 11.** Section 6123 of the Zoning Ordinance is amended to read as follows:

6123 METEOROLOGICAL TESTING FACILITY

~~The temporary use of a~~ Meteorological Testing (MET) Facility is permitted as a temporary use if the following requirements are met:

- a. An Administrative Permit must be obtained in accordance with the Administrative Permit Procedure commencing at Section 7050. The following findings must be made prior to approval of an Administrative Permit:
  - 1. ~~That~~ The location, size, design, and operating characteristics of the proposed use will be compatible with adjacent uses, residents, buildings, or structures, with consideration given to:
    - i. Harmony in scale, bulk, coverage and density;
    - ii. The availability of public facilities, services and utilities;
    - iii. The harmful effect, if any, upon desirable neighborhood character;
    - iv. The generation of traffic and the capacity and physical character of surrounding streets;
    - v. The suitability of the site for the type and intensity of use or development which is proposed; and to

- vi. Any other relevant impact of the proposed use; and
- 2. ~~That~~The impacts, as described in paragraph "a.1" of this section, and the location of the proposed use will be consistent with the San Diego County General Plan; and
- 3. ~~That~~The requirements of the California Environmental Quality Act have been complied with.

~~The applicant has provided the County with an owner consent letter demonstrating, to the satisfaction of the Director, that the operator of the MET Facility is authorized to use the property for a MET Facility, unless the operator owns the land upon which the MET Facility will be located.~~

- b. Location. A MET Facility is prohibited on property subject to the S81 Use Regulations.
- c. Notification. Notice shall be provided pursuant to Section 7060c.
- d. Setback. The MET Facility shall be set back from all property lines and roads by a minimum of the distance equal to the height of the tower or other tallest piece of equipment structure (tower, equipment, etc.) extended above the ground. The MET Facility shall meet or the applicable setback requirements of the zone, whichever is greater. The setback requirements of the zone shall apply to all components of the MET Facility including, but not limited to, a tower, guy wires, guy wire anchors and any other ~~necessary~~ related equipment.
- e. Minimum Spacing. The MET Facility shall be ~~spaced~~located at least 500 feet ~~apart~~ from any other MET Facility.
- f. Area of Disturbance. The MET Facility shall not disturb an area more than is necessary for the base of a tower, the guy wire anchors, other authorized equipment for the Facility and/or an access road. The equipment may include sonar equipment. ~~It is preferred that the Facility be located as close as possible to an existing access road. The entire area of disturbance shall be clearly shown on the plans.~~
- g. Size. The MET Facility ~~is allowed~~may include one temporary structure other than a tower or a sonar equipment trailer. The temporary structure is limited to ~~a size of~~ 120 square feet in size including fencing and noise attenuation walls and may be used ~~for to~~ storage of equipment for the MET Facility.
- h. Illumination. ~~There shall be n~~No outdoor exterior lights emissions associated are allowed with on a MET Facility except as required by ~~law the Director, the Federal Aviation Administration or other government agency.~~
- i. Height. The MET Facility shall be less than 200 feet in height.

- j. ~~Duration. The period of operation of the MET Facility shall not operate for more than exceed three years from the date of approval of the Administrative Permit unless the Director grants an extension. The Director may grant an extension of time upon the applicant submitting written justification for the continued use of the facility and filing for a modification of the Administrative Permit pursuant to Section 7072. A time extension is not longer needed if the~~ A MET Facility is approved by a Use Permit may operate for the time period specified in the Use Permit. ~~Once the MET Facility is a part of an approved Use Permit it is no longer considered a Temporary Use.~~ The MET Facility shall be removed within 30 days of the expiration ~~date of the permit~~ three-year period specified in the Administrative Permit or the time period specified in the Use Permit.
- k. Security. The operator shall provide a security in the form and amount determined by the Director to ensure removal of the MET Facility. The security shall be provided to DPLU prior to building permit issuance. Once the MET Facility has been removed from the property pursuant to a demolition permit to the satisfaction of the Director, the security may be released to the operator of the MET Facility.
- l. A MET Facility that complies with the height designator in the height schedule of the zone in which the facility is located, is allowed with a Zoning Verification Permit if the facility meets the requirements of subsections b, d, e, f, g, h, and k of this section. The MET Facility shall be removed within three years of the Zoning Verification Permit approval date.

**Section 12.** Subsection z of Section 6156 of the Zoning Ordinance is amended to read as follows:

- z. ~~Small Wind Turbine Systems, Small.~~ A small wind turbine system, shall be permitted on a parcel of at least one acre and in compliance with the following conditions:
  1. ~~Setback. The system shall be set back from property lines and roads at least two times the height of the wind system (to the top of the blade in vertical position) and shall meet the applicable setback requirements of the zone. No part of the system, including guy wire anchors, shall extend closer than 30 feet to the property boundary. The system must also meet fire setback requirements. See Subsection 7 for the exception to this setback requirement.~~
  2. ~~Fencing. Public access to the wind turbines shall be restricted through the use of a fence with locked gates, non-climbable towers or other suitable methods.~~
  3. ~~Signs. Suitable warning signs containing a telephone number for emergency calls shall face all approaches to the system. Individual signs shall be between 5 and 16 square feet.~~
  4. ~~Noise. The wind turbine shall be operated in such manner that it does not exceed the sound level limits of Title 3, Division 6, Chapter 4 of the San Diego County Code (Noise Abatement and Control). See Subsection 7 for the exception to this noise standard.~~

5. ~~Height. For the purposes of calculating height, the height of the wind turbines shall mean the distance from ground to the top of the blade in vertical position. Height of a small wind turbine system shall not exceed 60 feet. See Subsection 7 for the exception to this height standard.~~
6. ~~Any non-operational wind turbines shall be removed within 12 months after becoming non-operational.~~
7. ~~For any Wind Turbine System that meets the definition of "Small Wind Energy System" as defined by Government Code Section 65892.13 (c)(1), the requirements for setbacks, noise and height are reduced as follows:~~
  - (a) ~~The system shall be set back from property lines at least the height of the wind system. The system must also comply with any applicable fire setback requirements pursuant to Section 4290 of the Public Resources Code~~
  - (b) ~~Decibel levels for the system shall not exceed the lesser of 60 decibels or the sound limits of the Noise Element of the San Diego County General Plan, as measured at the closest neighboring inhabited dwelling, except during short term events such as utility outages and severe wind storms.~~
  - (c) ~~Height. Height of a small wind turbine system shall not exceed either of the following:~~
    - (1) ~~Up to 65 feet on parcels less than 5 acres in size, and up to 80 feet on parcels 5 acres or more.~~
    - (2) ~~Height cannot exceed manufacturer's recommendations.~~

~~Any waiver or modification of the above requirements shall be allowed only in accordance with the Variance Procedure commencing at Section 7100.~~

~~allowed in accordance with the Renewable Energy Regulations commencing at Section 6951~~

**Section 13.** Subsection b of Section 6158 of the Zoning Ordinance is amended to read as follows:

- b. ~~Small Wind Turbine System, Small. A small wind turbine system, small shall be permitted as an accessory use in all zones where the Civic, Commercial, Industrial or Extractive use types are permitted allowed provided the system complies with the conditions specified in Section 6156z in accordance with the Renewable Energy Regulations commencing at Section 6951.~~

**Section 14.** Section 6861 of the Zoning Ordinance is repealed.

~~6861—NONCONFORMING LARGE WIND TURBINE SYSTEMS.~~

~~Notwithstanding other provisions of the nonconformity regulations, no large wind turbine system large, which is nonconforming due to the lack of permit shall be allowed to add~~

~~additional wind turbine structures or increase size of existing wind turbines without obtaining a permit as specified in Section 6951.~~

**Section 15.** Section 6862 of the Zoning Ordinance is amended to read as follows:

6862 ~~ABANDONED~~ NONCONFORMING WIND TURBINES.

~~a. A nonconforming wind turbine shall be considered to be abandoned if its energy output (in kilowatt-hours) for any consecutive twelve months is less than 10% of the expected energy output. (See Definitions "Wind Turbine, Non-Operational")~~

ba. A nonconforming wind turbine, or a series of wind turbines, which meets the definition of "Wind Turbine, Non-Operational" in Section 1110 has been abandoned shall be removed within 60 days of becoming non-operational. The foundation for the wind turbine(s) need not be removed if it does not present a safety hazard, and the top of the foundation is no higher than six inches above ground level. at the property owner's expense, and the site shall be restored to a condition compatible with surrounding properties as determined by the Director of Planning and Land Use. Upon written request by the Department of Planning and Land Use, the owner of a property on which a nonconforming wind turbine is located shall provide documentation to the satisfaction of the Director of Planning and Land Use that the Director may use to determine the operational status of the wind turbine.

**Section 16.** Section 6950 of the Zoning Ordinance is amended to read as follows:

~~6950~~ ~~WIND TURBINE SYSTEM, MEDIUM.~~

~~A medium wind turbine system, shall be permitted on a parcel of at least one acre and require an Administrative Permit approved in accordance with the Administrative Permit Procedure commencing at Section 7050 and the following requirements:~~

- ~~a. Notification. Notification shall be in accordance with paragraph c of Section 7060.~~
- ~~b. Setback. The wind turbines shall be set back from property lines and roads at least three times the height of the wind turbine (to the top of blade in vertical position) and shall meet the applicable setback requirements of the zone. The system must also meet fire setback requirements. See paragraph i below for the exception to this setback requirement.~~
- ~~c. Fencing. Public access shall be restricted through the use of a fence with locked gates, non-climbable towers or other suitable methods.~~
- ~~d. Signs. Suitable warning signs containing a telephone number and an address for emergency calls and informational inquiries shall face all approaches to the project. Individual signs shall be between 5 and 16 square feet.~~
- ~~e. Review. Review shall include an assessment of the impact on adjacent property with regard to:~~



- ~~1. Location of installation in its relation to topographic features which would constitute an unusual safety hazard.~~
- ~~2. Sensitivity of adjacent uses to noise and electrical interference and visual impact.~~
- ~~f. Noise. The system shall meet the sound level limits of Title 3, Division 6, Chapter 4 of the San Diego County Code (Noise Abatement and Control). See paragraph i below for the exception to this noise standard.~~
- ~~g. Height. For the purpose of calculating height, the height of the wind turbines shall mean the distance from ground to the top of the blade in vertical position. The system shall not exceed 60 feet. See paragraph i below for the exception to this height standard.~~
- ~~h. It shall be a condition of the permit that non-operational wind turbines shall be removed within 12 months after becoming non-operational.~~
- ~~i. For any Wind Turbine System that meets the definition of "Small Wind Energy System" as defined by Government Code Section 65892.13(c)(1), the requirements for setbacks, noise and height are reduced as follows:
 
  - ~~1. The system shall be set back from property lines at least the height of the wind system. The system must also comply with any applicable fire setback requirements pursuant to Section 4290 of the Public Resources Code.~~
  - ~~2. Decibel levels for the system shall not exceed the lesser of 60 decibels or the sound limits of the Noise Element of the San Diego County General Plan, as measured at the closest neighboring inhabited dwelling, except during short-term events such as utility outages and severe windstorms.~~
  - ~~3. Height of a small wind turbine system shall not exceed either of the following:
 
    - ~~(a) Up to 65 feet on parcels less than 5 acres in size, and up to 80 feet on parcels 5 acres or more.~~
    - ~~(b) Height cannot exceed manufacturer's recommendations.~~~~~~

~~Any waiver of modification of the above requirements shall be allowed only in accordance with the Variance Procedure commencing at Section 7100.~~

6950 RENEWABLE ENERGY

The provisions of Section 6950 thru 6959 shall be known as the Renewable Energy Regulations. The purpose of these provisions is to prescribe reasonable standards and procedures for the installation and operation of Solar Energy Systems and Wind Turbines.

**Section 17.** Section 6951 of the Zoning Ordinance is amended to read as follows:

6951 SMALL WIND TURBINE SYSTEM, LARGE.

Small wind turbines shall comply with the following provisions:

- a. A maximum of three small wind turbines is allowed on a legal lot as an accessory use to the primary use of the lot in accordance with the following requirements:
1. Setbacks.
    - i. A wind turbine that meets the height limit of the zone shall comply with the main building setbacks and may be mounted on a permitted structure, such as an accessory structure allowed pursuant to the accessory use regulations in section 6150.
    - ii. A wind turbine that exceeds the height limit of the zone shall be setback from all property lines, open space easements, conservation easements, private road easements and public roads by a minimum of the distance equal to the wind turbine height or the applicable setback requirements of the zone, whichever is greater.
    - iii. No part of the wind turbine shall be closer than 30 feet to any property line. No part of the wind turbine when installed at grade shall be closer than 10 feet to any existing structure. The wind turbine shall also meet fire code setback requirements.
    - iv. No part of the wind turbine shall be closer than 300 feet or five times the turbine height, whichever is greater, from the following:
      - a. Electric power transmission towers and lines.
      - b. Blue line watercourses or water bodies as identified on the current United States Geological Survey Topographic Map.
      - c. Significant roost sites for sensitive bat species as mapped on the California Natural Diversity Database.
      - d. Recorded open space easement and designated preserve areas
      - e. Riparian vegetation as identified on the County Wetland Vegetation Map dated xx-xx-xxxx.
    - v. No part of a wind turbine shall be closer than 4,000 feet from a known golden eagle nest site.
  2. Area of Disturbance. A small wind turbine shall not result in an area of ground disturbance (including grading, clearing, brushing, or grubbing) that is larger than a 25 foot radius around the base of a tower, and an access path to the tower that is a maximum of four feet wide. The entire area of disturbance shall be clearly defined on the plans submitted for Zoning Verification Permit review.
  3. Barriers. Public access to a small wind turbine shall be restricted through the use of a fence with locked gates or non-climbable towers.

4. Noise. A small wind turbine shall comply with the applicable sound level limits in the Noise Ordinance, County Code section 36.401 et seq.
5. Height. The small wind turbine height may exceed the height limit of the zone in accordance with section 4620.i, but shall not exceed 80 feet.
6. Lighting. The small wind turbine shall not include any exterior lights unless required by law.
7. Turbine Certification. The small wind turbine shall be certified by the California Energy Commission.
8. Historic Resources. A small wind turbine shall not be located on a parcel listed in the National Register of Historic Places or the California Register of Historical Resources.
9. Ridgelines. Small wind turbines towers shall not be located on ridgelines.
10. Design. The small wind turbine shall meet the following design criteria:
  - i. Trellis. Use of trellis style towers is prohibited.
  - ii. Guy -Wires. Use of guy-wires is prohibited; turbine towers shall be self supporting.
  - iii. Tower Base. The entire area within 10 feet of the base of a turbine tower shall be cleared of all vegetation and shall be covered with gravel, mulch or other similar material to prevent the growth of vegetation.
  - iv. Power lines. All power lines connecting turbine towers and/or generators to a structure(s) shall be installed underground.
  - v. Safety. The small wind turbine shall be equipped with manual and automatic over speed controls.
  - vi. Non-Operational. Except for periods of maintenance, a small wind turbine that which meets the definition of "Wind Turbine, Non-Operational" in Section 1110 shall be removed from the site within 180 days of becoming non-operational Upon written request by the Department of Planning and Land Use, the owner of the property on which a turbine is located shall provide documentation to the satisfaction of the Director of Planning and Land Use that that the Director may use to determine the operational status of the small turbine.
11. Military Operating Areas. The Department of Planning and Land Use shall provide written notice to the appropriate branch of the United States military prior to the issuance of a Zoning Verification Permit for a small wind turbine located in a Military Operating Area. The notice shall include a description of the location and height of the proposed small wind turbine.

12. Pre-Approved Mitigation Area. No more than one small turbine is allowed on a legal lot designated as Pre-Approved Mitigation Area within the boundaries of the Multiple Species Conservation Program Subarea Plan. An Administrative Permit may be approved for more than one turbine if all of the requirements of subsection "a" of this section are met and the cumulative rated capacity of the turbines does not exceed 50 kilowatts
- b. Up to two additional small wind turbines (five total) are allowed when all wind turbines comply with the requirements of subsection "a" above and all turbines:
1. Meet the height limit of the zone; and
  2. Are mounted on an existing permitted structure, such as an accessory structure, allowed pursuant to the Accessory Use Regulations in section 6150.
- c. An Administrative Permit may be approved for more than three tower-mounted small wind turbines or more than five roof-mounted small wind turbines if all of the requirements of subsection "a" of this section are met and the cumulative rated capacity of all of the turbines does not exceed 50 kilowatts.
- d. The cumulative rated capacity of all small wind turbines on single legal lot shall not exceed 50 kilowatts.
- e. Before a building permit is issued for a small wind turbine, the applicant shall obtain a Zoning Verification Permit to verify that each small wind turbine complies with the requirements listed in Section 6951.

**Section 18.** Section 6952 of the Zoning Ordinance is amended to read as follows:

**6952. LARGE WIND TURBINE**

~~Large wind turbine systems~~ Any number of large wind turbines shall ~~may be allowed on a parcel of at least five acres identified on the and considered as a Major Impact Services and Utilities use type requiring with a mMajor uUse pPermit approved in accordance with the Use Permit Procedure commencing at Section 7350 and subject to the following requirements:~~

- a. Lot size and status. The lot on which the large wind turbine(s) is to be located shall be at least five acres in size and shall be a legal lot.
- b. Location. The lot shall be located in a wind resources area shown on the Wind Resources Map approved by the Board of Supervisors on \_\_\_\_\_ and on file at the Clerk of the Board of Supervisors as document number \_\_\_\_\_.
- ac. Setbacks. The ~~wind turbines shall observe the following~~ minimum setbacks listed below shall apply. All setbacks shall be measured from the property line to the closest point on the base or support structure of each tower. ~~For purposes of calculating setbacks, height of the wind turbines shall mean the distance from ground to the top of blade in vertical position:~~

# 1 - 45

1. ~~From property lines private road easements, open space easements, conservation easements or and public roads, the minimum setback 4 times shall be a distance equal to 1.1 times the wind turbine height.~~
2. From all property lines and existing residences or buildings occupied by civic use types, the minimum setback shall be a distance equal to 1.1 times 8 times the wind turbine height.
3. ~~From the furthestmost property line of adjacent parcels which are vacant setback 9 times the total height. Additional setbacks may be required to meet the Noise Ordinance, County Code section 36.401 et seq., and/or the noise requirements in subsection "f" below.~~
4. Setback Reduction. If the noise levels resulting from a proposed large turbine exceed the requirements of Noise Ordinance, County Code section 36.401 et seq., and or the noise requirements in subsection "f" below, the setback requirements in subsections 6952.c.2 and 3 shall be reduced if the following provisions are met:
  - i. A minimum setback equal to 1.1 times the wind turbine height shall be maintained from all existing residences or buildings occupied by civic use types, private road easements, open space easements, conservation easements and public roads; and
  - ii. The applicant has submitted to the Department of Planning and Land Use a document titled, "Consent to Reduce Setbacks" from the owner of each property affected by the proposed setback reduction. The Consent to Reduce Setbacks shall identify the affected property, the owner of the affected property, the property line(s) to which the reduced setback would apply, the reduced setback distance to which the property owner consents and shall include any other information specified by the Director. The property owner's signature shall be acknowledged. The Consent to Reduce Setbacks shall meet the requirements of state law for a recordable document and will be recorded by the Department of Planning and Land Use with the San Diego County Recorder's Office if the provisions of section 6952c.4 are met.
  - iii. If the adjoining property that would be affected by a setback reduction is not subject to the County's land use regulations, the applicant shall submit documentation to the satisfaction of the Director that the adjoining property owner does not object to the setback reduction. Section 6952.c.4.i shall apply, but section 6952c.4.ii shall not apply.
5. ~~Setbacks for experimental wind turbines (those which are not produced by an established wind turbine manufacturer on a production basis) may be greater than those specified above based on the discretion of the permit granting authority.~~

6. ~~Setbacks may be reduced up to a maximum of 50% with the written consent to the granting of a setback reduction signed by the owner or owners of each lot or parcel affected by the proposed setback reduction.~~

————— See paragraph k below for the exception to this setback requirement.

- bd. Fencing Barriers. Public access to a large wind turbine shall be restricted through the use of a fence with locked gates, non-climbable towers or other suitable ~~methods~~ measures.
- ee. Signs. ~~Suitable~~ A warning signs containing only a telephone number and an address for emergency calls and informational inquiries shall face ~~all approaches~~ each vehicular access point to the project ~~turbine~~. Individual signs shall be between ~~5~~ five and 16 square feet in size.
- df. Noise. ~~The project shall meet the sound level limits of Title 3, Division 6, Chapter 4 of the San Diego County Code (Noise Abatement and Control).~~ The following noise provisions shall apply:
  1. Acoustical Study. The applicant shall prepare and submit an acoustical study. The study shall be conducted by a County-approved acoustical consultant and shall demonstrate that (a) each large wind turbine complies with all applicable sound level limits in the Noise Ordinance, County Code section 36.401 et seq.; and (b) the C-weighted sound level from each large wind turbine while operating does not exceed the Residual Background Sound Criterion for Wind Energy Facilities by more than 20 decibels as both sound levels are measured at each property line of the lot on which the large turbine is located.
  2. Noise Waiver. An increase in the C-weighted sound level limit specified in section 6259.f.1 for one or more turbines may be approved in accordance with the following provisions:
    - a) The large wind turbine complies with all other applicable sound level limits in the Noise Ordinance, County Code section 36.401 et seq.; and
    - b) The higher C-weighted sound limit is acceptable due to specific economic, social, technological or other benefits that will result from approval of the Major Use Permit and implementation of the Proposed Project.
  3. Pure Tone. If the sound from a large wind turbine while operating contains a steady pure tone, such as a whine, screech or hum, the applicable standards for noise set forth in County Code section 36.404 shall be reduced by five dBA. A "pure tone" exists if one-third of the octave band sound pressure level in the band, including the tone, exceeds the arithmetic average of sound pressure levels of the two contiguous one-third octave bands by five dBA for center frequencies of 500 Hz or more, by eight dBA for center frequencies between 160 Hz and 400 Hz, or by 15 dBA for center frequencies less than or equal to 125 Hz.
  4. Compliance Review. A Major Use Permit for a large turbine shall be

conditioned to require the submittal of a compliance report to the Department of Planning and Development Services once every two years (from the date of approval of the Use Permit) that demonstrates, to the satisfaction of the Director, that the use meets the requirements of this section and all applicable noise related conditions of the Major Use Permit. The compliance report shall describe any complaints filed with the County during the previous two year period and all corrective actions taken if the use was found to be out of compliance with the requirements of this section and/or the applicable noise related Major Use Permit conditions. As a result of this review, the Director shall determine that the use is in compliance with the requirements of this section and the applicable noise related Major Use Permit conditions or that the Major Use Permit shall be subject to review by the Approving Authority. If the Approving Authority finds that the use no longer complies with the requirements of this section and/or the applicable noise related conditions of the Major Use Permit, the Approving Authority may modify or revoke the permit after giving proper notice and holding a hearing.

eg. Height. For the purposes of calculating height, the height of the wind turbines shall mean the distance from ground to the top of the blade in vertical position. The system shall not exceed 80 feet. A large wind turbine shall comply with Federal Aviation Administration height requirements and day and night marking requirements and shall not create an airport hazard or interfere with military or emergency services aviation operations, such as aerial firefighting.

f. Visual. The following measures should be followed whenever possible in order to minimize the visual impact of the project:

1. Removal of existing vegetation should be minimized.
2. Internal roads should be graded for minimal size and disruption.
3. Any accessory buildings should be painted or otherwise visually treated to blend with the surroundings.
4. The turbines and towers should be painted with non-reflective paint to blend with the surroundings.

gh. Turbine Description. The Major Use Permit shall include the following information shall be specified as part of the permit:

1. The wind turbine manufacturer(s), model(s), power rating(s) and blade dimensions.
2. The tower manufacturer and model.

hi. Manufacture Specifications. An application for one or more large wind turbine(s), shall include a copy of the manufacturer's specifications for each proposed wind turbine. The applicant may submit multiple manufactures specifications.

- ii. ~~Nonoperational Wind Turbines. It shall be a condition of the permit that non-operational wind turbines shall be removed. Except for periods of maintenance, a large wind turbine that is non-operational for 180 consecutive days shall be decommissioned as specified in subsection 2 below.~~
- ~~1. The project owner shall insure that a copy of all prospectuses shall be placed in the County's permit file.~~
  - ~~2. County staff may at any time in the future, compare the amount of power stated (in kilowatt hours) in the appropriate prospectus with the actual power sold to the utility (as reported in the California Energy Commissions' "Wind Project Performance Reporting System") and determine if any wind turbine systems meets the definition for "wind turbine non-operational wind turbine."~~
  - ~~3. County staff may collect other data as necessary to determine if any wind turbine systems meet the definition for wind turbine non-operational~~
  - ~~4.1. Upon written request by the Department of Planning and Land Use, the Applicant Permittee of a Major Use Permit for a large wind turbine may propose alternative methods to monitor shall provide data to the satisfaction of the Director to allow the Director to determine the "non-operational" status of the wind turbines-large wind turbine.~~
- i. ~~Removal Surety. The project owner shall post a bond, lien contract agreement, cash deposit, or other form of surety acceptable to the Director of Planning and Land Use, sufficient to allow for the removal of non-operational wind turbines. If a bond surety is provided, such bond shall comply with Section 7612, and shall be for a minimum of 10 years (unless the permit is for a shorter period of time). Posting of bond(s) and/or other surety may be phased with the installation of wind turbines.~~
- ~~2. Decommissioning Plan. The applicant shall prepare and submit a decommissioning plan to the Director for his review and approval. The plan shall provide for the removal of all components of each large wind turbine and the restoration of the site to a condition compatible with surrounding properties within 180 days of the wind turbine becoming non-operational.~~
  - ~~3. Secured Agreement. The applicant shall also enter into a secured agreement with the County that requires the decommissioning plan to be implemented and completed. The terms and conditions of the agreement shall be to the satisfaction of the Director. The Director is authorized to sign the agreement on behalf of the County. The security provided with the agreement shall be in an amount sufficient to cover the County's costs, as determined by the Director, to implement and complete the decommissioning plan in case the owner or operator fails to implement and/or complete the plan. The security shall be in a form approved by the Director. Typical forms of security include a surety bond, irrevocable letter of credit or trust funds. The security shall remain in effect for the entire time that the large wind turbine is operational and for any additional time until the decommissioning has been completed in accordance with the decommissioning plan.~~



- 4. Building Permit. No building permit for any component of a large wind turbine may be issued until the Director approves the decommissioning plan, signs the secured agreement and accepts the security.
- jk. Existing Administrative Permits for Wind Turbine Projects - Modification or Revocation. Administrative permits for wind turbine projects granted pursuant to Section 7060 prior to January 1, 1986, shall be treated for all purposes as if they are Major Use Permits and shall be subject to all the provisions of the Zoning Ordinance which apply to Major Use Permits for purpose of modification or revocation.
- l. Design. When a Major Use Permit authorizes more than one large wind turbine, all of the large wind turbines subject to the Major Use Permit shall be uniform in color and tower and turbine design (pole, nacelle, etc.). In addition if there are existing large wind turbines on a lot that abuts the lot on which proposed large wind turbines would be located, the color and tower and turbine design of the proposed large wind turbines shall be uniform with that of the existing large wind turbines. Tower and turbine design does not include turbine height which may vary.

**Section 19.** Section 7359 of the Zoning Ordinance is amended to read as follows:

7359 FINDINGS REQUIRED FOR PARTICULAR USE PERMITS.

Before a use permit may be granted or modified for a "Specific Hazardous Waste Facility Project" as defined in Health and Safety Code Section 25199.1 or a "Large Wind Turbine" as defined in Section 1110, the following provisions shall be met:

~~a. Before any use permit for a "Specific Hazardous Waste Facility Project," as defined in Health and Safety Code Section 25199.1, may be granted or an existing facility modified,~~ In addition to the findings required by Section 7358, it shall be found that the proposed facility complies with the following siting criteria documents of the County of San Diego Hazardous Waste Management Plan 1989-2000, all of which documents are on file with the Clerk of the Board of Supervisors as Exhibit A to Ordinance No. 8093 (N.S.):

- a1. Section E, entitled "Local and Regional Facility Needs", of Chapter IX, entitled "Siting and Permitting of Hazardous Waste Facilities" (Pages IX-35 through IX-37);
- b2. Appendix IX-A, entitled "Siting Criteria For Evaluating Hazardous Waste Management Facility Siting Proposals in San Diego County", and
- c3. Appendix IX-B, entitled "'General Areas' For Siting Hazardous Waste Management Facilities."

b. Large Wind Turbine. In lieu of the findings required by Section 7358, it shall be found that the location, size and design of the proposed large wind turbine project will not

adversely affect or be materially detrimental to the surrounding community with consideration given to:

1. The physical suitability of the site for the type and intensity of the wind turbine project which is proposed;
2. Any harmful effect from the wind turbine project on desirable neighborhood character;
3. The availability of public facilities, services and utilities to serve the wind turbine project;
4. The generation of traffic and the capacity and physical character of surrounding streets;
5. The requirements of the California Environmental Quality Act;
6. The wind turbine project's contribution to the renewable energy and sustainability goals of the San Diego region; and
7. The San Diego County General Plan.

**Section 20.** Section 1380 of the Zoning Ordinance is repealed.

~~1380 ——— WIND TURBINE SYSTEM, MEDIUM.~~

~~The wind turbine system (medium sized) use type refers to the production of electric power by up to five wind turbines, or systems in which the total blade swept area is no more than 850 square feet. The blade swept area shall be measured in the vertical plane perpendicular to the wind direction. This use type is permitted in all zones (except those having the S81 Ecological Resource Area Use Regulations) upon issuance of an administrative permit. This use type does not include uses classified as Major Impact Services and Utilities. Typical uses include wind turbine installation of medium size for residential or small scale commercial use.~~

**Section 21.** Section 2990 (page 1 of 6) of the Zoning Ordinance is amended to read as follows:

**Section 22.** Effective Date. This Ordinance shall take effect and be in force 30 days after the date of its passage, and before the expiration of 15 days after its passage, a summary shall be published once with the names of the members voting for and against the same in the \_\_\_\_\_ a newspaper of general circulation published in the County of San Diego.

# **Attachment C**

## **Public Health Policy Statement**



# County of San Diego

HEALTH AND HUMAN SERVICES AGENCY

PUBLIC HEALTH SERVICES  
HEALTH SERVICES COMPLEX

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HIV, STD and Hepatitis  
Maternal, Child and Family Health Services  
Public Health Laboratory  
PH Nursing  
Border Health  
TB Control & Refugee Health  
Vital Records

July 10, 2012

## PUBLIC HEALTH POSITION STATEMENT

### Human Health Effects of Wind Turbines

The purpose of this position statement is to summarize findings of evidence documented in the current literature on the issue of wind turbines and potential impacts on human health. In particular, this statement seeks to ascertain if the evidence supports the view that there are no direct human pathological effects from wind farms and that any potential impact on humans can be minimized by following existing planning guidelines.

### BACKGROUND

With the development of electric power, wind power found new applications in lighting buildings remote from centrally-generated power. Throughout the 20th century, parallel paths developed distributed small wind plants suitable for farms or residences, and larger utility-scale wind generators that could be connected to electricity grids for remote use of power. Since the early 1970's the United States has worked with private industry to advance the technology and enable large commercial wind turbines. This research and development program pioneered many of the multi-megawatt turbine technologies in use today, including steel tube towers, variable-speed generators, composite blade materials, and partial-span pitch control, as well as aerodynamic, structural, and acoustic engineering design capabilities. With today's emphasis on "green" energy technology and the willingness to pay a premium for a renewable energy source, wind turbines have continued to gain prominence as a viable sustainable alternative to more traditional forms of energy production. However, as with any shift in technology, the emergence of the wind farms is not without controversy.

### WIND TURBINE FEATURES ASSOCIATED WITH HEALTH CONCERNS

Concerns regarding the adverse health impact of wind turbines focus on the effects of noise, infrasound, electromagnetic interference, shadow flicker, blade glint, and land surface temperature produced by a wind turbine. This document will comment on the evidence for adverse side effects related to each of these wind turbine features.

## **Sounds and Noise**

The health and well-being effects of noise on people have been classified into three categories:

- Subjective effects including annoyance, nuisance and dissatisfaction.
- Interference with activities such as speech, sleep and learning.
- Physiological effects such as anxiety, tinnitus or hearing loss.(1)

There is some evidence that noise is an underestimated cause of stress, which in turn may lead to a number of short- and long-term health problems. Examples of these conditions include sleep disturbance, hypertension and other cardiovascular effects, poorer work and school performance, and hearing impairment.(2) However, there is no evidence that wind turbines pose a unique noise threat compared to other sources of noise. One study of wind turbine and noise found that no adverse health effects other than annoyance could be directly correlated with noise from wind turbines. The authors concluded that reported sleep difficulties and feelings of uneasiness noted by individuals could either be an effect of noise exposure or could be due to respondents with sleeping difficulties more easily appraising noise as annoying. The study also found that being able to see wind turbines from one's residence increased not just the odds of perceiving the sound, but also the odds of being annoyed, suggesting a multimodal effect of the audible and visual exposure from the same source leading to an enhancement of the negative appraisal of the noise by the visual stimuli.(3)

Another issue of concern that has been raised is about infrasound from wind farms. It has been noted that the effects of low frequency infrasound (less than 20Hz) on humans are not well understood. However several authors have suggested that low level frequency noise emitted by wind turbines is minimal and of no consequence; and have concluded that there is no evidence of health effects arising from infrasound generated by wind turbines.(4-7)

An opposing view in regards to noise is put forth by a pediatrician, Dr. Pierpont who states that noise from wind turbines produces a cluster of symptoms which she terms Wind Turbine Syndrome (WTS). She has released a book entitled *Wind Turbine Syndrome: A Report on a Natural Experiment*, presenting case studies explaining WTS symptoms in relation to infrasound and low frequency noise.(8) However, Dr. Pierpont's assertions are yet to be published in a peer-review journal.

## **Electromagnetic Radiation (EMR) and Interference**

Electromagnetic radiation (EMR) is a wavelike pattern of electric and magnetic energy moving together. Types of EMR include X-rays, ultraviolet, visible light, infrared, and radio waves. Electromagnetic interference from wind turbines may affect electromagnetic or radiocommunication signals including broadcasting radio and television, cell phones and radar.

The emanations of electromagnetic fields (EMF) are due to generation and export of electricity from the wind farms. EMFs routinely emanate from wires that carry electricity and individuals are constantly exposed to these fields in their everyday lives. The closeness of the electrical cables between wind turbine generators to each other, and shielding with metal armor effectively eliminate any EMF and therefore, wind farms do not pose a threat to public health.(9)

## **Shadow Flicker and Blade Glint**

Shadow flicker occurs when the sun is located behind a wind turbine casting a shadow that appears to flicker on and off as the wind turbine blades rotate. Shadow flickers that interrupts sunlight at flash frequencies greater than 3Hz has the potential to provoke photosensitive seizures.(10) Therefore, it is recommended that wind turbines should only be installed if flicker frequency remains below 2.5Hz under all conditions.

According to numerous research papers there is negligible risk of seizures being caused by modern wind turbines for the following reasons:

- Less than 0.5% of the populations are subject to epilepsy at any one time, and of these, approximately 5% are susceptible to strobing light.
- Most commonly (~96% of the time), those that are susceptible to strobe lighting are affected by frequencies in excess of 8Hz and the remainder are affected by frequencies in excess of 2.5Hz.
- Alignment of three or more conventional horizontal axis wind turbines could cause shadow flicker frequencies in excess of 2.5Hz; however, this would require a particularly unlikely turbine configuration.

In summary, the evidence from shadow flicker does not support a health concern as the chance of conventional horizontal axis wind turbines causing an epileptic seizure for an individual experiencing shadow flicker is less than 1 in 10 million.(5)

In regards to blade glint, the information is promising. Manufacturers of all major wind turbine blades coat their blades with a low reflective treatment which prevents reflective glint from the surface of the blade.

## **Land Surface Temperatures**

A recent study by researchers using NASA satellites that analyzed the surface temperature of wind farms located in Texas found that temperatures rose an average of 0.72 Celsius between 2003 and 2011. This temperature effect was most prominent at night and the research team speculated that this localized trend could be an effect of the turbines pulling down warm air from higher altitudes at night, when the air above the land would otherwise be cooler.(11)

The researchers stated that the estimated warming trends only apply to the study area region and to the study period, and thus should not be interpolated linearly into other regions or over longer periods. They warned that further science is needed to determine any possible link between the spinning of turbine blades and the increase in ground temperature.

## Summary of Evidence Regarding Health Impacts

Based on the findings provided above the evidence related adverse health concerns associated with wind turbines is summarized as follows:

- While the sound and noise associated with a wind turbine may cause annoyance, low frequency infrasound (less than 20Hz) on humans is not well understood and researchers have concluded that there is no evidence of health effects arising from infrasound generated by wind turbines.
- The closeness of the electrical cables between wind turbine generators to each other, and shielding with metal armor effectively eliminate any EMF and therefore, wind farms do not pose a threat to public health.
- There is negligible risk of seizures being caused by modern wind turbines.
- Lastly, further science is needed to determine any possible link between the spinning of turbine blades and the increase in ground temperature.

## CONCLUSION

The health effects of many forms of renewable energy generation, such as wind turbines, have not been assessed to the same extent as those from traditional energy sources (e.g., fossil fuel, radiation, etc.). The pathological effects on humans due to wind farms have only recently begun to be studied. This review of the available evidence, including journal articles, surveys, literature review and government reports, supports the statement: *There are no direct pathological effects from wind turbines and that any potential impact on humans can be minimized by following existing planning guidelines.*

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# **Attachment D**

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