From:	Jesse Noell
To:	Planning Clerk; Bohn, Rex; Fennell, Estelle; Wilson, Mike; Bass, Virginia; Madrone, Steve
Subject:	FEIR response to comments I121-1, I123-1, and 08-24
Date:	Tuesday, December 3, 2019 4:46:46 PM
Attachments:	syte-pilot-study-2016-2.pdf

Dear Planning Clerk and Supervisors,

Does the FEIR or official responses to comments discuss/specify whether the easements held by the plan proponent include easements for infrasound, low frequency sound, vibrations, turbulence, and noise?

Do these easements include the 12 km turbulent wake distances in the peer reviewed literature and the 15km+ infrasound distances described Finnish Association for Environmental Health?

If so, is there a map of the areas that have been or will need to be appropriated?

Are any or are all easements across these areas to be appropriated in the manner decreed in the County General Plan Ordinance (Energy section)? If so, is the County establishing a contingency bond for this purpose?

To what extent did wind proponents assist or influence the drafting of the Energy Ordinance that appears to single out a class of persons to bear impermissible burdens?

Did the State Health Officer certify that infrasound, low frequency sound, vibrations, turbulence, and noise effects cause no known adverse conditions to manifest in humans?

The pilot study does not show any significant reduction in damage caused by infrasound until over 15 kilometers from wind farms

The pilot study carried out in Satakunta and Northern Ostrobothnia in Finland shows that the damage caused by infrasound from wind power plants will only decrease significantly more than 15 kilometers away from wind turbines. The study was carried out by the Finnish Association for Environmental Health (SYTe) in the spring 2016.

– It has been noticed from experience that after the construction of wind power plants, usually within a few months, people in the surrounding area have begun to get a wide range of symptoms, says Markku Mehtätalo, Chairman of the Finnish Association for Environmental Health.

– It is possible to study the matter quite easily and the Finnish authority responsible for the public health, the Department of Health and Welfare (THL), has tried to do this, for example, Mehtätalo continues. However, in THL's study in 2016, it was assumed that the symptoms would decrease significantly in the first 10 kilometers, with more symptoms near the wind turbines. The study did not take into account the impact of wind farms elsewhere in the environment.

– But it is known from experience that the symptoms of people do not usually decrease at this distance, says Mehtätalo. Measurements have also shown that the infrasound pulses from the wind turbines that are currently being built will not be significantly reduced at this distance. Other risk factors very close to the wind power plants are audible sound and electromagnetic fields.

The research material was collected from Satakunta and Northern Ostrobothnia

The sample of the pilot study meets the requirements of a statistical analysis. The data was collected from Satakunta and Northern Ostrobothnia, mainly from areas where wind turbines were built 0.5–1.5 years before the interview (see Figure 1 from Northern Ostrobothnia). The subject of the study was about 50 families, with symptoms of each family member found out. A total of about 200 people were involved in the study.

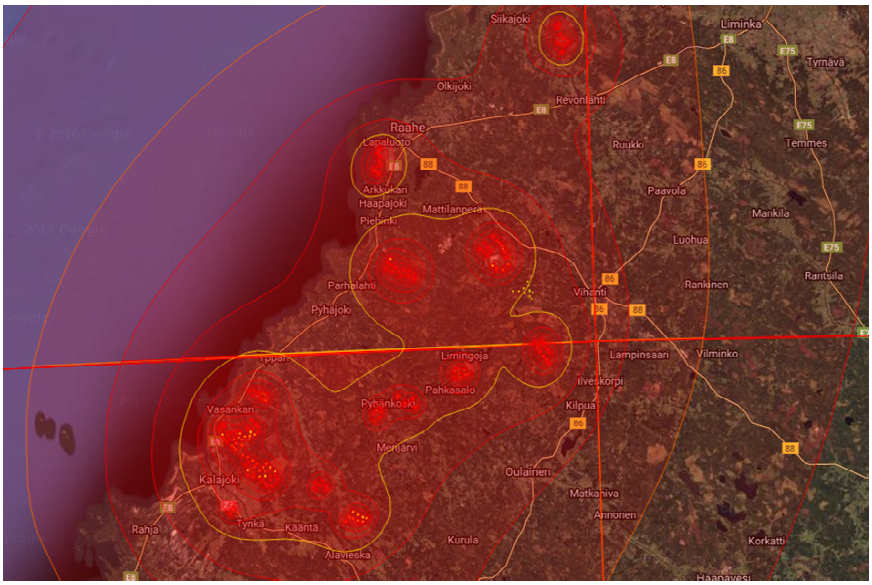

Figure 1. In the yellow-bounded area, the infrasound from wind turbines is almost continuous. The area is located in the south of Oulu Province in Finland.

– In addition, the pilot study took into account the location of all wind power plants in Finland and did not exclude beforehand the possibility that the effect of the wind farms could be greater and reach longer than the impact of a single, clearly separated area, says Mehtätalo.

Nocturnal disturbance is a typical symptom caused by infrasound

The basic research question was whether the family had noticed changes in health status in the last six months or a year within. The wording of the question regarding the time was dependent on when the impact of the nearest wind turbines could have started. The interviewees were not told in advance about the possible connection with wind turbines.

– The majority of respondents were unable to name a change in their overall health status. However, they gave many responses to separate symptomatic questions, says Mehtätalo.

– The most typical was sleep disturbance or change in the need for night's sleep, fatigue and various pains. Only very few, some respondents, considered wind power plants as a possible cause.

Harmful or severe symptoms three times more common near wind turbines

The responses were categorized according to the severity of the symptoms and subjected to a statistical analysis. There were about three times more harmful or more serious symptoms near wind turbines (less or about 15 km from wind power plants) than further away (see Figure 2).

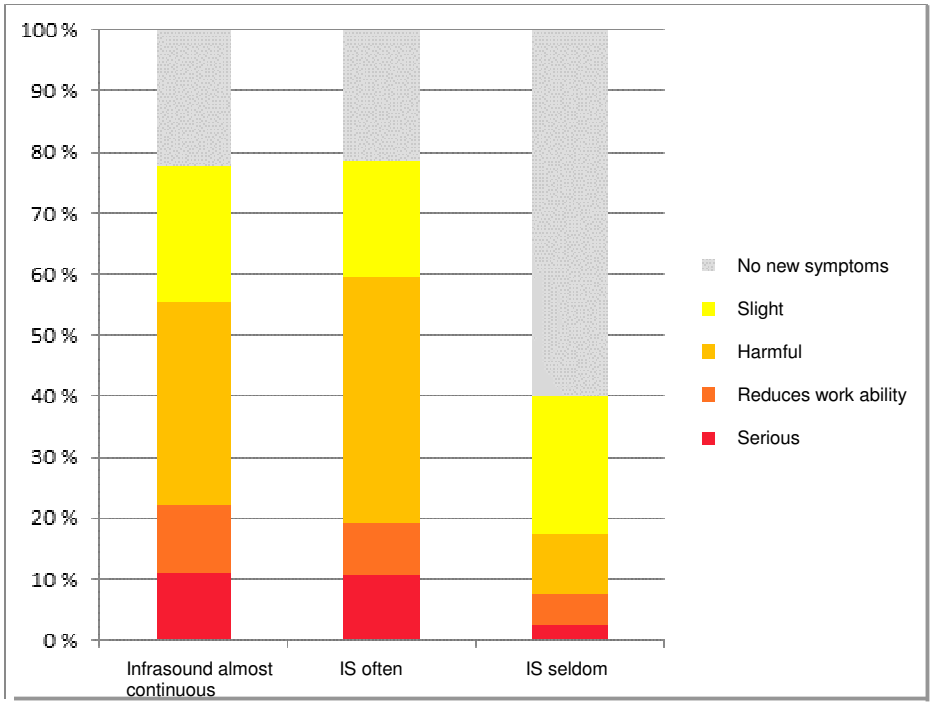

Figure 2. Symptoms of almost continuous or often persistent infrasound exposure (less or about 15 km from wind turbines) and further (over 15 km) from wind power plants.

– Based on the analysis, it seems strongly that, after the construction of wind power plants, the majority of people in the surroundings of wind turbines are having concomitant symptoms. Most of the symptoms are typical stress symptoms, says Mehtätalo.

Although some people have suspected that the symptoms are caused by wind turbines, especially if the wind power plants are visible or if they have heard beforehand about their potential harmful

health effects, people have symptoms regardless of attitude. – The pilot study shows that the symptoms are not caused by attitudes, says Mehtätalo.

The occurrence of symptoms decreased significantly only over 15–20 km from the wind power plants (see Figure 2). If there are wind turbines in different directions and a person stays a lot in the area, the risk of symptoms increases.

The harmful area caused by infrasound is assumed to be too small

– Later in 2017, based on infrasound measurements made in different parts of Finland, it has been found out that 15–20 km is a typical distance where the infrasound pulses of wind turbines can be detected by measurements to travel in almost all circumstances, says Mehtätalo [1–4]. According to an American study, infrasound travels under favorable conditions to a distance of 90 km from wind farms [5].

If the sample of the pilot study is representative, about 400,000 of the Finns suffer from symptoms due to wind turbines and only about 10,000 of them combine the symptoms with wind power plants. Because of the small amount of research data, strong conclusions must be taken with caution.

– However, the study clearly shows that in all previous studies, the harmful area has already beforehand been presumed to be too small, says Markku Mehtätalo. – Among other things, the extensive, in-depth material of another American study, used in several publications, has been gathered within a radius of 11.7 km from wind turbines. For this reason, the harmful health effects cannot be found in the studies, because the symptoms do not vary at this distance, he concludes. - syte

Completed translation of the original text: SYTe (2019). “Pilottitutkimus osoittaa infraäänihaitan vähenevän merkittävästi vasta yli 15 kilometrin päässä tuulivoimaloista.” 2016. Available: https://syte.fi/2019/01/10/pilottitutkimus-osoittaa-infraaaanihaitan-vahenevan-merkittavasti-vasta-yli-15-kilometrin-paassa-tuulivoimaloista/

References:

[1] Auniogroup (2017). The Study Starts. Available: https://www.auniogroup.com/en/2017/03/10/tutkimuksen-kaynnistyminen/

[2] Auniogroup (2017). Infrasound from Wind Turbines Is a New Signal in the Environment. Translation. KauppaSuomi 34/2017, s. 6-7. Available: https://www.auniogroup.com/en/2017/09/11/tuulivoimaloiden-infraaani-on-uusi-signaali-ymparistossa/

[3] Auniogroup (2018). Infrasound Measurements of Wind Turbines in the Ilmajoki Region. Available: https://www.auniogroup.com/en/2018/01/15/ilmajoen-alueen-tuulivoimaloiden-infraaanimittaukset/

[4] Auniogroup (2017). Start of the Wind Turbines in Kokkola. Available: https://www.auniogroup.com/en/2017/12/30/kokkolan-tuulivoimaloiden-kaynnistyminen/

[5] Marchillo et al. (2014). On infrasound generated by wind farms and its propagation in low-altitude tropospheric waveguides. *Journal of Geophysical Research: Atmospheres*. Available: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2014JD022821