EXHIBIT A17

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION OF
CROWNED RIDGE WIND II, LLC FOR A FACILITIES PERMIT TO
CONSTRUCTION 300.6 MEGAWATT WIND FACILITY

Docket No. EL19-027

SUPPLEMENTAL TESTIMONY AND EXHIBITS

OF DR. ROBERT MCCUNNEY

September 20, 2019

INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Dr. Robert McCunney. My business address is PO Box 29077, Charlestown MA 02129.

Q. **BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

A. I am employed at Brigham and Women's Hospital in Boston, Massachusetts as a Staff physician in Pulmonary, Center for Chest Diseases. In my role I perform clinical evaluations and recommend treatment of occupational and environmental illnesses. I also serve in an educational capacity on the faculty of Harvard Medical School. My curriculum vitae is attached as Exhibit RM-S-1.

Q. **WHAT ARE YOUR RESPONSIBILITIES?**

A. I was hired by Crowned Ridge Wind, II LLC ("CRW II") to submit testimony in this proceeding on health and welfare issues raised in the proceeding.

Q. **PLEASE DESCRIBE YOUR BACKGROUND AND QUALIFICATIONS.**

A. In summary, I am a licensed practicing physician. I completed training as a specialist in internal medicine and am also board certified in occupational and environmental medicine. My background in noise and health includes post graduate residency training in occupational medicine at Harvard, as an author of peer-reviewed publications, such as three book chapters on occupational noise exposure, clinical experience in reviewing audiometric tests of workers exposed to noise, and experience related to occupational hearing conservation programs. With respect to wind turbines and health, I am the lead

author of a critical review of the scientific literature on wind turbines and health sponsored by the Massachusetts Institute of Technology and published in the Journal of Occupational and Environmental Medicine in 2014; a co-author of a document entitled "Wind Turbines and Health"; (Colby et al, 2009); and lead author of a mathematical analysis of a proposed case definition related to health and living proximity to wind turbines. (Full citations are set forth in Exhibit RM-S-1). I have also been admitted as an expert to testify in wind turbine hearings in numerous jurisdictions in the USA and Canada.

Q. HAS THIS SUPPLEMENTAL TESTIMONY BEEN PREPARED BY YOU OR UNDER YOUR DIRECT SUPERVISION?

A. Yes.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION?

A. Yes, in Docket No. EL19-003.

Q. PLEASE DESCRIBE THE PURPOSE OF YOUR SUPPLEMENTAL TESTIMONY.

A. The purpose of my testimony is to address the comments made at the August 26, 2019 Public Input Meeting on whether there are any health or welfare issues associated with the proposed CRW II wind project.

HEALTH AND WELFARE

Q. AT THE AUGUST 26, 2019 PUBLIC INPUT MEETING COMMENTS WERE MADE ON THE SOUND AND SHADOW FLICKER THAT WILL BE PRODUCED BY THE PROJECT. ARE YOU FAMILIAR WITH THE CRW II WIND PROJECT AND THE PREDICTED SOUND AND SHADOW FLICKER?

A. Yes, I understand that CRW II is proposing to build up to 300.6 megawatts of wind generation and up to 132 wind turbines. I have also reviewed the Direct and Supplemental Testimony of CRW II witness Jay Haley, and the associated sound and shadow flicker studies. Based on a review of Mr. Haley's testimony, I understand that CRW II wind project will not exceed 45 dBA at a non-participant's residence and 50 dBA at a participant's residence. I also understand that the CRW II wind project will not exceed 30 hours per year of shadow and flicker at any non-participant or participant residence.

Health and Welfare

Q. AT THE AUGUST 26, 2019 PUBLIC INPUT MEETING COMMENTS WERE MADE ABOUT THE SOUND LEVELS THAT WILL BE PRODUCED BY THE PROJECT. BASED ON YOUR UNDERSTANDING THAT NON-PARTICIPANTS WILL NOT EXPERIENCE SOUND ABOVE 45 DBA AT THEIR RESIDENCE, DO YOU HAVE ANY HEALTH AND WELFARE CONCERNS?

A. No. The results of the largest epidemiology study that evaluated health issues associated with living in proximity to wind turbines noted no adverse health effects, including sleep and stress, among others, at noise levels up to 46 dB. This study is attached as Exhibit

RM-S-2. This is a cross-sectional study that was carried out in 2013 and included 1238 randomly selected participants aged 18-79, living between 0.25 and 11.22 kilometers from a wind turbine. The authors noted that, on the basis of the self-reported questionnaire results, the sound from wind turbines was not associated with:

- self-reported sleep disturbance or disorders;
- self-reported illnesses and chronic health conditions; and
- self-reported perceived stress and quality of life.

The authors also noted no association between the sound produced by wind turbines and objectively measured results such as blood pressure, resting heart rate, sleep efficiency, the rate or awakenings, duration of awakenings, total sleep time, or how long it took to fall asleep. In fact, the study concluded:

> Self-reported health effects (e.g., migraines, tinnitus, dizziness, etc.), sleep disturbance, sleep disorders, quality of life, and perceived stress were not related to wind turbine noise (WTN) levels. Visual and auditory perception of wind turbines as reported by respondents increased significantly with increasing WTN levels as did high annoyance toward several wind turbine features, including the following: noise, blinking lights, shadow flicker, visual impacts, and vibrations… Beyond annoyance, results do not support an association between exposure to WTN up to 46 dBA and the evaluated health-related endpoints.

Based on this study, I have no concern the sound produced by the CRW II turbines for non-participants will impact their health or welfare.

Q. BASED ON YOUR UNDERSTANDING OF THAT PARTICIPANTS WILL NOT EXPERIENCE SOUND ABOVE 50 DBA AT THEIR RESIDENCES, DO YOU HAVE ANY HEALTH AND WELFARE CONCERNS?

A. No. While participants may experience sound levels up to 50 dBA at their residences, there is no evidence that experiencing sound levels at 50 dBA result in health impacts.

Q. WILL THEIR BE ANY HEALTH OR WELFARE IMPACTS BECAUSE OF INFRASOUND OR LOW FREQUENCY SOUND?

A. No. First, it is not necessary to differentiate low frequency sound or infrasound from broad sound level measurements conducted in the A scale. Second, in a study I co-authored, it was shown that there is no scientific evidence to support the hypothesis that wind turbine infrasound and low-frequency sound have unique adverse health effects that other sources of noise do not have. This study is attached as Exhibit RM-S-3. Third, detectable levels of infrasound and low-frequency sound at residences are not at harmful levels based on studies near wind farms in the United States, the United Kingdom, the Netherlands, Denmark, and Australia. (Exhibit RM-S-4, Exhibit RM-S-5, Exhibit RM-S-6) To my knowledge, no peer-reviewed studies demonstrate harmful effects to humans as a result of exposure to infrasound or low-frequency sound at the sound levels measured in the vicinity of wind turbines or in experimental studies involving sound levels several orders of magnitude higher than those noted in the vicinity of wind turbines.

Q. AT THE AUGUST 26, 2019 PUBLIC INPUT MEETING THERE WERE COMMENTS ON THE SHADOW FLICKER THAT WILL BE PRODUCED BY PROJECT. BASED ON YOUR UNDERSTANDING THAT NO NON-PARTICIPANT NOR PARTICIPANT WILL EXPERIENCE SHADOW AND FLICKER ABOVE 30 HOURS A YEAR, DO YOU HAVE ANY HEALTH AND WELFARE CONCERNS?

A. No. Shadow flicker is the visual, strobe-like effect that can occur when the rotating blades of wind turbines cast shadows. The primary health concern that has been raised by

some regarding shadow flicker is the risk of seizures in individuals with photosensitive epilepsy. Studies addressing risk of this type of epilepsy have concluded, however, the absence of risk of shadow flicker inducing this type of seizure. (Exhibit RM-S-7 and Exhibit RM-S-8).

Q. AT THE AUGUST 26, 2019 PUBLIC INPUT MEETING THERE WERE COMMENTS ON ANNOYANCE THAT COULD BE PRODUCED BY THE PROJECT. IS ANNOYANCE ASSOCIATED WITH A WIND PROJECT CONSIDER A HEALTH OR WELFARE ISSUE?

A. No. Self-reported annoyance is not coded as a specific diagnosis in the International Classification of Diseases. (ICD, 10th edition). The ICD is used worldwide for diagnostic, insurance, and research purposes. Accordingly, I do not view that annoyance is as a health or welfare concern, and, therefore, should not be used to downwardly adjust the following CRW II thresholds for its project: (1) no more than 30 hours per year of shadow and flicker at the residences of all participants and non-participants; (2) no more than 45 dBA of sound at a non-participants residence and (3) not more than 50 dBA of sound at a participant's residence.

This conclusion is supported in the Health Canada study, Exhibit RM-S-2. In that study, annoyance was related to several reported measures of health and well-being, although these associations were statistically weak ($R^2 < 0.09\%$), independent of wind turbine sound levels, and not retained as a significant predictive variable in multiple regression models. A correlation coefficient (R^2) of 0.09 is extremely weak and indicates that the wind turbine sound category alone was a weak predictor of whether an individual was highly annoyed by wind turbine sound or not. The Health Canada study confirmed

earlier research in which noise from wind turbines was noted to play a minor-if any- role in people reporting annoyance, in contrast to more significant factors, such as attitudes towards wind turbines, the impact of visual factors on the landscape, and whether a person derives economic benefit from the turbines. Notably, the group that received an economic benefit is completely absent from reported annoyance, despite residing in areas with the highest wind turbine sound levels. Therefore, sound pressure levels appear to play a limited-role in the experience of annoyance associated with wind turbines.

Q. AT THE AUGUST 26, 2019 PUBLIC INPUT MEETING THERE WERE COMMENTS ON WIND TURBINES CAUSING VERTIGO AND NAUSEA. IS THERE A CORRELATION BETWEEN WIND TURBINES AND VERTIGO AND NAUSEA?

A. No. As far as I am aware, there is no credible scientific evidence to support the conclusion that living near wind turbines at appropriate setbacks causes vertigo and nausea. (See the results of the Health Canada study discussed earlier in this report.)

Q. AT THE AUGUST 26, 2019 PUBLIC INPUT MEETING, THERE WERE COMMENTS ON WIND TURBINES CAUSING DIRECT TISSUE AND ORGAN DAMAGE, INCLUDING THE THICKENING OF THE HEART WALL. IS THERE A CORRELATION BETWEEN WIND TURBINES AND DIRECT TISSUE AND ORGAN DAMAGE?

A. No. There is no credible scientific evidence to support the notion that living near wind turbines will cause thickening of the cardiac wall.

Q. AT THE AUGUST 26, 2019 PUBLIC INPUT MEETING, THERE WERE COMMENTS THAT WIND TURBINES CAUSE PEOPLE WITH HEALTH ISSUES, SUCH AS CANCER, TO HAVE THOSE HEALTH ISSUES MADE WORSE. IS THERE A CORRELATION BETWEEN WIND TURBINES AND MAKING ALREADY EXISTING HEALTH ISSUS WORSE?

A. No, there is no credible evidence in the scientific literature that supports the notion that people living near wind turbines at distances used by CRW II will aggravate any existing medical diagnosis.

Q. AT THE AUGUST 26, 2019 PUBLIC INPUT MEETING, THERE WERE COMMENTS ON WIND TURBINES VIEWSHED CAUSING PEOPLE TO BECOME DEPRESSED, OR FOR THEIR DEPRESSION TO BE COME MORE ACUTE. IS THERE A CORRELATION BETWEEN WIND TURBINES AND DEPRESSION?

A. No, there is no credible evidence in the scientific literature that supports the notion that people living near wind turbines at distances used by CRW II will become depressed or experience acute depressive episodes.

Q. AT THE AUGUST 26, 2019 PUBLIC INPUT MEETING, THERE WERE COMMENTS ON WIND TURBINES CAUSING DIRECT TISSUE AND ORGAN DAMAGE. IS THERE A CORRELATION BETWEEN WIND TURBINES AND DIRECT TISSUE AND ORGAN DAMAGE?

A. No.

Q. DOES THIS CONCLUDE YOUR SUPPLEMENTAL TESTIMONY?

A. Yes, it does.

EXHIBIT A17

Commonwealth of Massachusetts)
) ss
County of Suffolk)

I, Robert McCunney, being duly sworn on oath, depose and state that I am the witness identified in the foregoing prepared testimony and I am familiar with its contents, and that the facts set forth are true to the best of my knowledge, information and belief.

Dr. Robert McCunney

Subscribed and sworn to before me this __th day of ___, 2019.

SEAL

Notary Public

My Commission Expires 8-14-26

KATHRYN ARMATA
Notary Public
Commonwealth of Massachusetts
My Commission Expires Aug. 14, 2026