

BINDER 1 Exhibits	BINDER 2 Exhibits	Author/Institution	Impacts	1=research 3=public testimony/reports 4=articles	Title/Publication	Abstracts/Summary of Findings	Impacts Measured (in feet)	Sound Levels (dBA)	Average Financial Impact	Link to Research/Citation
		Acoustic Ecology Institute	Health	4	AEI Special Report: Wind Energy Noise Impacts. Acoustic Ecology Institute Special Report: Wind Turbine Noise Impacts (2009)	Summary of the issues from earlier in the decade, analysis of the noise and sound issues and recommendations and thresholds from various countries.				<a href="http://www.acousticology.org/docs/AEI%20Wind%20Turbine%20Noise%20report%202009.pdf">http://www.acousticology.org/docs/AEI%20Wind%20Turbine%20Noise%20report%202009.pdf</a>
Exhibit A		Ambrose, Stephen and Rand, Robert, members of the Institute of Noise Control Engineering	Health	1	Wind Turbine Noise, An Independent Assessment (2010)	Currently there is no effective, reliable noise mitigation for wind turbines of this size other than shutdown. Therefore, at this time it appears appropriate that proposed wind turbine sites should position wind turbines at least one mile away from residential properties and further for sites with more than one wind turbine. Smaller wind turbines (under one megawatt power rating) produce less noise than those currently being marketed and installed for grid power in Maine; these may be an option when distance is an issue.	5,280			<a href="http://randacoustics.com/wind-turbine-sound/wind-turbines-published-articles/wind-turbine-noise-an-independent-assessment/">http://randacoustics.com/wind-turbine-sound/wind-turbines-published-articles/wind-turbine-noise-an-independent-assessment/</a>
	Exhibit BG	Ambrose, Stephen E. INCE (Brd. Cert.) Robert W. Rand, INCE Member	Health	1	The Bruce McPherson Infrasound and Low Frequency Noise Study. Falmouth Wind Farm. (2011)	This study was commissioned through a private philanthropic grant created to determine why there were so many strong complaints about the loss of well-being and hardships experienced by people living near large industrial wind turbines operating in Falmouth, Massachusetts. The purpose of this study was to investigate and confirm or deny the presence of infrasonic and low frequency noise emissions (ILFN) from the "WIND 1", a municipally-owned Vestas V82 industrial wind turbine. The dBA levels were inversely correlated to adverse health effects experienced; effects were more severe indoors where dBA levels were much lower (around 20 dBA). However the dBL (un-weighted) and dBG (infrasonic-weighting) levels were more strongly modulated indoors. This increase in modulation indoors was consistent with the stronger adverse health effects indoors. The increase in total sound pressure indoors appears related to a "whole-house" cavity response; the outside pressure pulsations exciting the interior acoustic pressure much like a stick hitting a drum. Especially, the degree of negative pressure increased significantly indoors compared to outdoors. The study confirms that large industrial wind turbines can produce real and adverse health impacts and suggests that this is due to acoustic pressure pulsations, not related to the audible frequency spectrum, by affecting the vestibular system especially at low ambient sound levels.				<a href="https://docs.wind-watch.org/BruceMcPhersonInfrasoundandLowFrequencyNoiseStudy.pdf">https://docs.wind-watch.org/BruceMcPhersonInfrasoundandLowFrequencyNoiseStudy.pdf</a>
Exhibit B		Arra, Lynn, and Barker et al. Northern Ontario Medical School- East Campus - Laurentian University, Health Sciences Education Resource Centre	Health	1	Systematic Review 2013: Association Between Wind Turbines and Human Distress. Cureus 6(5): e183. doi:10.7759/cureus.183 (2013)	Results: All 18 peer-reviewed studies captured in our review found an association between wind turbines and human distress. These studies had levels of evidence of four and five. Two studies showed a dose-response relationship between distance from wind turbines and distress, and <b>none of them concluded no association</b> .  Conclusions: In this review, we have demonstrated the presence of reasonable evidence (Level Four and Five) that an association exists between wind turbines and distress in humans. The existence of a dose-response relationship (between distance from wind turbines and distress) and the consistency of association across studies found in the scientific literature argues for the credibility of this association.				<a href="https://www.cureus.com/articles/2457-systematic-review-2013-association-between-wind-turbines-and-human-distress">https://www.cureus.com/articles/2457-systematic-review-2013-association-between-wind-turbines-and-human-distress</a>
Exhibit C		Bakker, Pederson, van den Berg, Stewart, Bouma	Health	1	Impact of wind turbine sound on annoyance, self-reported sleep disturbance and psychological distress. Sci Total Environ. 2012, 425:42-51. 0.1016/j.scitotenv.2012.03.005 (2012)	A dose-response relationship was found between immission levels of wind turbine sound and self-reported noise annoyance. Sound exposure was also related to sleep disturbance and psychological distress among those who reported that they could hear the sound, however not directly but with noise annoyance acting as a mediator. Respondents living in areas with other background sounds were less affected than respondents in quiet areas. People living in the vicinity of wind turbines are at risk of being annoyed by the noise, an adverse effect in itself. Noise annoyance in turn could lead to sleep disturbance and psychological distress.				<a href="https://www.sciencedirect.com/science/article/pii/S0048969712003373?via%3Dihub">https://www.sciencedirect.com/science/article/pii/S0048969712003373?via%3Dihub</a>
		Bakker, H.H.C., School of Engineering and Advanced Technology, Massey University; Bennett, D.J., Kea Petroleum Limited, Wellington NZ 6012; Rapley, B., Atkinson & Rapley Consulting, Palmerston North Thorne, R., Noise Measurement Services, Brisbane, bob@noisemeasurement.com.au	Health	1	Seismic Effect on Residents from 3 MW Wind Turbines (2009)	Residents on a river plain at the foot of the Tararua Ranges, New Zealand, experience ongoing noise problems, including sleep deprivation, thought to emanate from a nearby wind farm in the ranges to the east (closest V90 turbine is 3 km away). The problem is worst when wind is from the eastern quadrant. Installation of 'Hush Glass' only partly alleviated the problem indoors. Continuous time series recording of seismic noise using a buried L4 geophone and acoustic surface microphone attached to a wall inside the house, was conducted during March 2009. Use of night hours records minimised extraneous noise, and seismic noise from vegetation was also guarded against by analysis of site wind records. Early analysis of 196s seismic samples identifies noise bursts lasting 10 seconds or more, every minute or so, associated with easterly wind conditions; with broad spectral power peaks centred on approximately 10 and 28 Hz. Audio playback of the seismic records was identified by the residents as similar to the noise they experienced. We conclude that seismic energy from the turbines, most likely as Rayleigh waves, is coupled through its concrete foundations into the house, where various vibrational modes are stimulated, thus producing the effects experienced. We note that residents experience these strongest when lying down, i.e. when best aurally coupled to the foundations. These results provide an initial indication that seismic effects should be assessed in consideration of offset distances from turbines to residences.	9,842			<a href="https://waubrafoundation.org.au/wp-content/uploads/2013/06/Bakker-Thorne-Seismic-Effect-on-Residents-from-3-MW-Wind-Turbines.pdf">https://waubrafoundation.org.au/wp-content/uploads/2013/06/Bakker-Thorne-Seismic-Effect-on-Residents-from-3-MW-Wind-Turbines.pdf</a>
		Barry, Rebecca and Nancy Kreiger, University of Toronto, Ontario, Canada AND Sandra I. Sulsky, Ramboll Environ US, Amherst, Massachusetts	Health	1	Using residential proximity to wind turbines as an alternative exposure measure to investigate the association between wind turbines and human health. J. Acoust. Soc. Am. 143 (6), June 2018, 3278-3282 doi: 10.1121/1.5039840 (2018)	These results show that living closer in proximity to wind turbines is negatively correlated with self-rated environmental quality of life and physical health quality of life. These findings suggest that the mechanism of effect may not be noise, or not noise alone, and may include visual sight, vibrations, shadow flicker, sub-audible low frequency sound, or mechanisms that include individual subjective experiences and attitudes towards wind turbines. ... Our findings strengthen the argument that wind turbines are associated with annoyance, as this association is now found with both modelled A-weighted sound pressure levels and with residential distance to wind turbines. Other research has found that individuals reporting annoyance due to environmental noise also report health conditions including ischemic heart disease, depression, and migraines.				<a href="https://docs.wind-watch.org/Residential-proximity-wind-turbine-health-exposure.pdf">https://docs.wind-watch.org/Residential-proximity-wind-turbine-health-exposure.pdf</a>

		Bradley Jr., Robert. MasterResource	Health	4	Dear AWEA: There Are Wind Power Nuisance & Health Effects (complaints, studies large and growing) Master Resource (2018)	<p>The wind industry says there are no independent studies proving the turbines cause health problems. That is a factual matter that can be easily refuted. "There is a long history of acoustic and clinical research into the adverse health effects of noise on health (and sleep), including audible noise, infrasound, low frequency noise and vibration," according to the Wabra Foundation.</p> <p>This has informed documents such as the various acoustic standards (e.g. whole body vibration), World Health Organisation (WHO) documents relating to community noise, night time noise and the burden of illness from environmental noise, and Australia's own EnHealth document of 2004.</p> <p>An excellent and detailed recent history of the research into wind turbine noise and other sources of infrasound and low frequency noise can be found in Rick James article published in the Bulletin of Science and Technology in 2012, entitled "Warning signs that went unheard".</p> <p>Another very useful summary of the knowledge available with respect to what was known about low frequency noise impacts on health ten years ago was a literature review by Professor Geoffrey Leventhall in 2003. Leventhall discusses the known connections between low frequency noise and physiological stress (e.g., in sleeping children), and acknowledges that if people are removed from the noise they will improve. In the conclusions he also acknowledges the additional stress and distress caused when people affected by noise are not understood by their health care providers.</p> <p>Finally a brief literature review "Infrasound, a brief toxicological review" from the US National Institute of Environmental Health Sciences (NIEHS) in 2001 contains some useful animal and human research which clearly indicate there is animal research evidence of physiological stress effects and damage to tissue including heart muscle, with exposure to acute high 'doses' of infrasound.</p>				<a href="https://www.masterresource.org/wind-power-vs-environment/wind-power-nuisance-health-effects/">https://www.masterresource.org/wind-power-vs-environment/wind-power-nuisance-health-effects/</a>	
Exhibit D		Bronzaft, Arlene. Bulletin of Science Technology & Society	Health	1	The Noise from Wind Turbines: Potential Adverse Impacts on Children's Well-Being. Arline L. Bronzaft Bulletin of Science Technology & Society 2011 31: 256. DOI: 10.1177/0270467611412548 (2011)	The dismissal of the adverse effects of noise on residents living with wind turbine noise has largely come from the wind power industry, which has supported this claim with reports by acousticians, doctors, and engineers whom they have hired to write on the noise/health relationship. Yet there exist reports written by researchers that suggest that both the wind industry and governments in favor of wind turbine energy have erred in concluding that noise from wind turbines cannot affect physical and mental well-being. It egregiously allows our school children's education to be adversely affected by noise both inside and outside the school as well as the home. It would also be egregious to fail to consider the impacts of new sources of noise, for example, industrial wind turbines on their health.				<a href="https://stopthesethings.files.wordpress.com/2014/12/arline-bronzaft-children-and-turbines.pdf">https://stopthesethings.files.wordpress.com/2014/12/arline-bronzaft-children-and-turbines.pdf</a>	
		Bronzaft, Arline, PhD. Professor Emerita of Lehman College, City University of New York	Health	1	The Noise From Wind Turbines: Potential Adverse Impacts on Children's Well-Being. Bulltin of Science, Technology and Society. DOI: 10.1177/0270467611412548 2011 31: 291 (2011)	Discussion focuses on the harmful effects of noise on children, what has to be done to remedy the situation, and the need for action to lessen the impacts of noise from all sources. Furthermore, based on our knowledge of the harmful effects of noise on children's health and the growing body of evidence to suggest the potential harmful effects of industrial wind turbine noise, it is strongly urged that further studies be conducted on the impacts of industrial wind turbines on their health, as well as the health of their parents, before forging ahead in siting industrial wind turbines.				<a href="https://wabrafoundation.org.au/wp-content/uploads/2013/07/Bronzaft-Noise-from-wind-turbines-childrens-well-being.pdf">https://wabrafoundation.org.au/wp-content/uploads/2013/07/Bronzaft-Noise-from-wind-turbines-childrens-well-being.pdf</a>	
Exhibit E		Brown County Public Health Department	Health	3	Supporting Documents Used by the Brown County (Wisconsin) Board of Health for the DECLARAION of a HUMAN HEALTH HAZARD (2014)	Documented reports and articles presented to the Brown County Board of Health 2014. Complete report is 315 pages.					
	Exhibiti BH	Cooper, Steven, Principle Engineer and Chan, Chris. The Acoustic Group, PTY, Ltd	Health	1	Subjective perception of wind turbine noise - The stereo approach. Citation: Proc. Mtgs. Acoust. 31, 040001; doi: 10.1121/2.0000653 (2017)	<p>Testing of the response of individuals to audible wind turbine noise in recent years has typically utilised a mono noise source with a large bank of speakers in a modified reverberation room or listening environment. Other testing purporting to assess the impact of infrasound from turbines, has not actually used the infrasound signal but has used either pure tones or a synthesised signal based a result of an FFT Leq analysis of the original signal and incorrectly claimed such noise sources as being "wind farm infrasound".</p> <p>Reproducing and analysing the wind turbine signal including the audible range is an easier and simpler task to undertake and permits the essential work of identifying what creates sleep disturbance and physical impacts from wind turbine noise. Such research should be undertaken inside dwellings (in the field) and (subject to qualification of the sound field) may be undertaken in the laboratory.</p> <p>Cooper found that whilst blinded to the timing of the stimulus the noise sensitised people could tell with 100% accuracy when the sound was on or off, and they also developed some characteristic sensations they experience back in their own homes. A control group of 9 people not pre exposed to WTN, including 4 acoustic colleagues, was subject to the same test. None of the control group could detect the sound but 2 of that control group could detect pulsations.</p> <p>This small pilot double blind provocation study provides scientific evidence that when noise sensitised people describe symptoms and sensations including the sensation of "pulsing" they are not imagining their symptoms, nor are they making them up. Rather, their brain and body are reacting in a reproducible way to the WTN stimulus present in the environment. This pilot study therefore indicates evidence of direct causation.</p>				<a href="https://asa.scitation.org/doi/pdf/10.1121/2.0000653">https://asa.scitation.org/doi/pdf/10.1121/2.0000653</a>	
	Exhibit BI	Cooper, Steven. Principle Engineer. The Acoustics Group	Health	1	The results of an acoustic testing program, Cape Bridgewater Wind Farm. Prepared for Energy Pacific (2014)	The resident's observations and identification of sensation (separately to vibration and noise) indicates that the major source of complaint from the operation of the turbines would appear to be related to sensation rather than noise or vibration. This study proves that there are other pathways that affect some people, at least 6. The windfarm operator simply cannot say there are no known effects and no known people affected. One person affected is a lot more than none; the existence of just one cause-and-effect pathway is a lot more than none. It only takes one example to prove that a broad assertion is not true, and that is the case here. Windfarms will be in the position where they must say: "We may affect some people." And regulators charged with protecting the health and welfare of the citizenry will not be able to say they know of no adverse effects. Rather, if they choose to support the windfarm, they will do so knowing that they may not be protecting the health and welfare of all the citizenry.				<a href="http://www.pacifichydro.com.au/files/2015/01/Cape-Bridgewater-Acoustic-Report.pdf">http://www.pacifichydro.com.au/files/2015/01/Cape-Bridgewater-Acoustic-Report.pdf</a> <a href="http://www.pacifichydro.com.au/files/2015/02/Portland-community-meeting-Presentation-by-Steven-Cooper.pdf">http://www.pacifichydro.com.au/files/2015/02/Portland-community-meeting-Presentation-by-Steven-Cooper.pdf</a>	

	Exhibit BJ	Coussons, Herb, MD	Health		3	Sound Guidelines for Health	Based on the reports in the literature, the optimal setback to lower noise to the WHO guidelines is 1.24 miles. (over 15 publications; Invenery sound maps). Based on 40bd as the target noise level, the setback should be a minimum of 2500 feet. At this level objective sleep disturbance will be seen and over 30% will complain, but there will be minimal to no health consequences. If setbacks of 1240 is used, then approximately 80% of residents in the project area will experience disruptive noise of >40bd. 67% will complain about disruption and people will develop adverse effects.	6,562			<a href="https://www.co.brown.wi.us/iff/county_board/ch10.pdf">https://www.co.brown.wi.us/iff/county_board/ch10.pdf</a>	
Exhibit F		Coussons, Herb. Medical College of Wisconsin	Health		3	Medical testimony of Dr Herb Coussons. Brown County Board of Supervisor meeting (2017)	Vibro-acoustic disease has now been autopsy-proven to show soft tissue proliferation, particularly collagen and fibro-elastic tissue that causes heart problems, hypertension, and other physiologic proven findings. This is not isolated to wind turbines. Sleep disturbance alone is enough to cause health problems. That's why we have CPAP to treat sleep apnea patients, because they develop obesity, hypertension, right-sided heart failure, as well as other psychologic issues. I think we now have three decades of reports of adverse health effects, research has shown that infrasound and low frequency noise cause disturbances both in sleep and in physiologic direct link causal effects, the range of low frequency noise that's been proven to cause these are measured in the wind turbine developments, vibro-acoustic disease is now a proven entity, and over 90 worldwide professionals and medical researchers that aren't linked to any type of industry conflict would agree to that and have signed onto that statement. And now Shirley Wind is one of the most studied and documented industrial wind turbine developments in the United States and we have those affected individuals that we see in our own backyard.				<a href="http://en.friends-against-wind.org/health/medical-testimony-of-dr-coussons">http://en.friends-against-wind.org/health/medical-testimony-of-dr-coussons</a>	
		Coz, Emily and Sherman, Lucille, Gatehouse Media	Health		4	In the Shadow of Wind Farms (2017)	Industrial wind turbines generate countless complaints nationwide about sleep disturbances, migraines, nausea, ear pressure, blurred vision, tinnitus and heart palpitations. Rampant reports about such effects from the Shirley Wind Farm in Brown County, Wisconsin, prompted the local Board of Health to declare the turbines a human health hazard.				<a href="https://www.wind-watch.org/news/2017/12/14/in-the-shadow-of-wind-farms/">https://www.wind-watch.org/news/2017/12/14/in-the-shadow-of-wind-farms/</a>	
Exhibit G		Evans, Alun. Belfast University	Health		1	Wind Farm and Health, Principia-Scientific (2014)	In conclusion, there are serious adverse health effects associated with noise pollution generated by wind turbines. It is essential that separation distances between human habitation and wind turbines are increased. There is an international consensus emerging for a separation distance of 2 km, indeed some countries are opting for 3 km. The current guideline on separation distance is based on ETSU-R-97 and is manifestly out of date. It is only relevant to the small turbines of that era. The vastly increased scale of today's turbines means that the current recommendation on turbine separation is grossly inadequate.	6,562			<a href="http://principia-scientific.org/wind-farms-and-health.html/">principia-scientific.org/wind-farms-and-health.html/</a>	
	Exhibit BK	French Academy of Medicine	Health		3	ADVERSE HEALTH EFFECTS, DIRECT EFFECTS, HEALTH, NOISE, WHO, FRENCH ACADEMY OF MEDICINE DECLARE WIND TURBINES HEALTH NUISANCE. (2017)	The new report of the National Academy of Medicine, adopted on 9 May 2017, recommends reducing the emergence trigger level to 30 dB (A) outside dwellings and 25 dB (A) to inside.		25		<a href="https://patch.com/massachusetts/falmouth/french-academy-medicine-declare-wind-turbines-health-nuisance">https://patch.com/massachusetts/falmouth/french-academy-medicine-declare-wind-turbines-health-nuisance</a>	<a href="https://www">https://www</a>
	Exhibit BL	Frey and Hadden, University of Minnesota	Health		1	Wind Turbines and Proximity to Homes: The Impact of Wind Turbine Noise on Health. (2012)	The dBA measure noise from the wind turbine(s) should not exceed levels in the bedroom at night with the window partly open, of not more than 30dBA Lmax, nor within amenity areas around the home where the limit will be Lnight outside, 30BBA, or as prescribed by the World Health Organization's research updates on environmental noise. Wind turbine minimum setbacks for turbines greater than 300 feet should be 3km (9,843 feet).	9,842	30		<a href="http://betterplan.squarespace.com/2012-wind-turbine-noise-health/">http://betterplan.squarespace.com/2012-wind-turbine-noise-health/</a>	
		GateHouse Media	Health		4	In the shadow of wind farms. Gatehouse Media (2018)	GateHouse Media found more than 450 families who have publicly complained about the impacts of living near wind farms and who claim that industrial wind turbines have negatively impacted their homes, health and property values. What follows are short narratives from dozens of families of their personal accounts, based on those interviews. The wind industry has repeatedly disputed turbines cause health problems or reduce property value and cite several studies supporting those views.				<a href="http://gatehousenews.com/windfarms/in-your-own-words/">http://gatehousenews.com/windfarms/in-your-own-words/</a>	
Exhibit U		Hahad, et al.	Health		1	Annoyance to different noise sources is associated with atrial fibrillation in the Gutenberg Health Study. International Journal of Cardiology. DOI: <a href="https://doi.org/10.1016/j.ijcard.2018.03.126">https://doi.org/10.1016/j.ijcard.2018.03.126</a> (2018)	Cross-sectional data from 14,639 participants of the Gutenberg Health Study were collected between 2007 and 2012. The results suggest for the first time that noise annoyance is associated with AF. Further studies are warranted to gain insight in the mechanisms underlying the noise-annoyance-disease relationship. As the level of noise increases, the incidence of atrial fibrillation increases dramatically. Scientists from the Department of Cardiology at the Mainz University Medical Center were able to prove this with data from the Gutenberg Health Study. They found that the incidence of atrial fibrillation in subjects with extreme noise annoyance reactions increases to 23 percent, compared to just 15 percent without this environmental impact. "Overall, we were able to demonstrate a stronger influence of annoyance caused by nocturnal noise on the heart rhythm."				<a href="https://www.internationaljournalofcardiology.com/article/S0167-5273(17)37174-7/fulltext">https://www.internationaljournalofcardiology.com/article/S0167-5273(17)37174-7/fulltext</a>	
Exhibit H		Hanning and Evans British Medical Journal	Health		1	Wind turbine noise. British Medical Journal, BMJ 2012;344d doi: 10.1136/bmj.e1527 (8 March 2012)	The evidence for adequate sleep as a prerequisite for human health, particularly child health, is overwhelming. Governments have recently paid much attention to the effects of environmental noise on sleep duration and quality, and to how to reduce such noise. However, governments have also imposed noise from industrial wind turbines on large swathes of peaceful countryside. In a survey of people residing in the vicinity of two US wind farms, those living within 375-1400m reported worse sleep and more day time sleepiness, in addition to having lower summary scores on the mental components than those who lived 3-6.6 km from a turbine. Modelled dose-response curves of both sleep and health scores against distance from nearest turbine were significantly related after controlling for sex, age, and house hold clustering, with a sharp increase in effects between 1km and 2km. A New Zealand survey showed lower health related quality of life, especially sleep disturbance, in people who lived less than 2km from turbines.	6,562			<a href="http://betterplan.squarespace.com/todays-special/2012/3/10/31012-british-medical-journal-wind-turbine-noise.html">http://betterplan.squarespace.com/todays-special/2012/3/10/31012-british-medical-journal-wind-turbine-noise.html</a>	
Exhibit I		Hanning, BSc, MB, BS, MRCS, LRCP, FRCA, MD Christopher	Health		3	Wind Turbine Noise, Sleep, and Health. Response to: The Northumberland County Council Core Issues and Options Report Consultations (2012)	There can be no reasonable doubt that industrial wind turbines whether singly or in groups ("wind farms") generate sufficient noise to disturb the sleep and impair the health of those living nearby and this is now widely accepted. A recently published peer reviewed editorial in the British Medical Journal states: "A large body of evidence now exists to suggest that wind turbines disturb sleep and impair health at distances and external noise levels that are permitted in most jurisdictions, including the United Kingdom." "When seeking to generate renewable energy through wind, governments must ensure that the public will not suffer harm from additional ambient noise". An Ontario Environmental Review Tribunal heard evidence from over 20 expert witnesses (including the author) in 2011 and concluded "... the debate should not be simplified to one about whether wind turbines can cause harm to humans. The evidence presented to the Tribunal demonstrates that they can, if facilities are placed too close to residents. The debate has now evolved to one of degree." In reviewing potential health impacts of sustainable energy sources, three leading members of the National Institute of Environmental Health Sciences, part of the US National Institutes of Health, state: "Wind energy will undoubtedly create noise, which increases stress, which in turn increases the risk of cardiovascular disease and cancer."				<a href="https://stopthesethings.files.wordpress.com/2014/12/hanning-wind-turbine-noise-sleep-and-health-report-jul-2012.pdf">https://stopthesethings.files.wordpress.com/2014/12/hanning-wind-turbine-noise-sleep-and-health-report-jul-2012.pdf</a>	

Exhibit J		Hanning, Christopher MD, BSC, MB, BS, MRCS, LRCP, FRCA. Leicester General Hospital	Health	1	Wind Turbine Noise, Sleep And Health. Sleep disturbance and wind turbine noise. November (2010)	This paper is based on proofs of evidence produced for several UK Planning Inquiries. As such, it concentrates on the regulatory system in the UK. Other jurisdictions will have different systems. The aim is to inform those seeking to regulate the siting of wind turbines close to human habitation. Section 4 reviews the means of mitigating wind turbine noise to prevent sleep disturbance. It is concluded that external turbine noise levels of less than 35dB(A) or a setback of at least 1.5km of the turbines is necessary to prevent unacceptable levels of sleep disturbance and potential risk to health.	4,921	35	<a href="https://46640c50-a-62cb3a1a-sites.googlegroups.com/site/windvigilancecom/Wind_turbine_noise_sleep_health_November_2010.pdf?attachauth=ANoY7cGCRg9lUQsftY4c6_o3PD1ag-64YlvRbYstlUuSSDdXtwrr1N7ljqCukufSAUOPBFYrYW9SHYSYFCDegepPobuZMg_DlVpLu8xkT3d5-dCwgomug8DsMwKxapjX_xR5z1Tf0rBK0MoBrdhw5ulcK8CnM8sQtDz7lhXAPkwgEPXnr3dAilxGa3NlR8mGhEUL4PHQNYGU89ecaEndUjoW2AV_bmMkXitiinR-PKAPV8Bkp_3aBSwLArDbD_f3senSVny0z2zg8HMMMPx7L1V1T61ziBA%3D%3D&amp;atredirects=1">https://46640c50-a-62cb3a1a-sites.googlegroups.com/site/windvigilancecom/Wind_turbine_noise_sleep_health_November_2010.pdf?attachauth=ANoY7cGCRg9lUQsftY4c6_o3PD1ag-64YlvRbYstlUuSSDdXtwrr1N7ljqCukufSAUOPBFYrYW9SHYSYFCDegepPobuZMg_DlVpLu8xkT3d5-dCwgomug8DsMwKxapjX_xR5z1Tf0rBK0MoBrdhw5ulcK8CnM8sQtDz7lhXAPkwgEPXnr3dAilxGa3NlR8mGhEUL4PHQNYGU89ecaEndUjoW2AV_bmMkXitiinR-PKAPV8Bkp_3aBSwLArDbD_f3senSVny0z2zg8HMMMPx7L1V1T61ziBA%3D%3D&amp;atredirects=1</a>
Exhibit K		Harrison, John. Bulletin of Science Technology & Society	Health	1	Wind Turbine Noise. Bulletin of Science Technology & Society 2011 31: 256. DOI: 10.1177/0270467611412549 (2011)	Wind turbines are noisy and cause annoyance in about 20% of residents living within a distance considered acceptable by regulatory authorities. For many of this 20%, the annoyance and sleep disturbance leads on to adverse health effects. This is a far larger proportion than for those living with traffic and industrial noise at the same level. The annoyance and adverse health effects are attributable to the character of turbine noise and to deficiencies in noise regulations. Specifically, given the amplitude modulation, the allowed intrusion above ambient is far too high; there is no account taken of uncertainty in the prediction of noise at a home; there is no account taken for the excess noise caused by turbulent inflow, both natural and up-wind turbine wake; and the lack of compliance testing leaves the adverse health effects to compound from one completed wind farm to the next one being designed. A 35 dBA nighttime noise limit, penalties of 5 dBA for the periodic or impulsive character of turbine noise, 4 dBA for uncertainty in noise prediction, and a penalty for turbulent inflow noise the setback from homes will approach the 1.5 to 2 kilometers recommended by health authorities.	6,562	35	<a href="https://stopthesethings.files.wordpress.com/2014/12/bull-sci-technol-soc-2011-harrison-256-61.pdf">https://stopthesethings.files.wordpress.com/2014/12/bull-sci-technol-soc-2011-harrison-256-61.pdf</a>
	Exhibit BM	Hartke, Ted. prepared for: Officials of McLean County, Illinois	Health	3	HARTKE EXPERT WITNESS TESTIMONY: LIVING EXPERIENCE NEAR INVENERGY'S GE 1.6 mWIND TURBINES IN VERMILION CO. ILLINOIS (2018)	Does the ordinance respect everyone's property rights? Does it protect children in their homes? Will the wind company sign a contract which states that children will not be awakened in their beds in their bedrooms at night? If the wind company awakes the children, will they purchase the home of the family so they can escape? An ordinance needs to err on the side of CAUTION. Put in scientifically based noise limits using setbacks. THIS CANBE defended in court. Great news: SAFE setbacks with waivers works both ways! Releases the county board from being sued by wind companies and residents. The safe scientifically based setback takes care of residents.....3250' recommended by Schomer The waiver opens an avenue so wind energy companies can negotiate with all residents/neighbors.			<a href="https://www.mcleancountyil.gov/DocumentCenter/View/11385">https://www.mcleancountyil.gov/DocumentCenter/View/11385</a>
Exhibit L		Havas and Colling, Bulletin of Science Technology & Society	Health	1	Wind Turbines Make Waves: Why Some Residents Near Wind Turbines Become Ill. Bulletin of Science Technology & Society 2011 31: 414. DOI: 0.1177/0270467611417852 (2011)	People who live near wind turbines complain of symptoms that include some combination of the following: difficulty sleeping, fatigue, depression, irritability, aggressiveness, cognitive dysfunction, chest pain/pressure, headaches, joint pain, skin irritations, nausea, dizziness, tinnitus, and stress. These symptoms have been attributed to the pressure (sound) waves that wind turbines generate in the form of noise and infrasound. However, wind turbines also generate electromagnetic waves in the form of poor power quality (dirty electricity) and ground current, and these can adversely affect those who are electrically hypersensitive. Indeed, the symptoms mentioned above are consistent with electrohypersensitivity. Sensitivity to both sound and electromagnetic waves differs among individuals and may explain why not everyone in the same home experiences similar effects. Ways to mitigate the adverse health effects of wind turbines are presented. Wind turbines should be placed as far away as possible from residential areas. The French National Academy of Medicine (Chouard, 2006) recommends 1.5 km from residential areas.	4,921		<a href="https://stopthesethings.files.wordpress.com/2014/12/wind_turbines_make_waves_why_some_residents_near_w.pdf">https://stopthesethings.files.wordpress.com/2014/12/wind_turbines_make_waves_why_some_residents_near_w.pdf</a>
					Indoor noise annoyance due to 3–5 megawatt wind turbines—An exposure–response relationship. The Journal of the Acoustical Society of America 142, 2185 (2017); <a href="https://doi.org/10.1121/1.5006903">https://doi.org/10.1121/1.5006903</a> (2017)	The survey involved all households within a 2 km distance from the nearest turbine. Altogether, 429 households out of 753 participated. The main purpose of our study was to determine the exposure–response relationship between the sound level outdoors and indoor noise annoyance when the turbine size is 3–5 MW. The secondary purpose was to determine how the indoor noise annoyance depends on the distance to the nearest wind turbine. This is a cross-sectional socio-acoustic survey which was conducted in residential dwellings near wind power areas. The independent variable was the sound level, LAeq. It refers to the equivalent A-weighted sound pressure level (SPL) outdoors caused by the turbines of the wind power area during the maximum sound emission of the wind power area.			<a href="https://asa.scitation.org/doi/10.1121/1.5006903">https://asa.scitation.org/doi/10.1121/1.5006903</a>
Exhibit M		Hongisto, Valterri, Olivia	Health	1	Literature Reviews on Wind Turbines and Health : Are They Enough? Bulletin of Science Technology & Society 2011 31: 399. DOI: 10.1177/0270467611421849 (2011)	The current inventory of the peer-reviewed literature relevant to the topic of IWTs and adverse health effects is increasing. IWTs can cause harm to human health if they are sited too close to residents (Thorne, 2011; Krogh, 2011). This finding is confirmed in a July 2011 Ontario Environmental Review Tribunal Decision which also supports the value of additional research into the health impacts of IWTs. The Decision also expressed concern the precautionary principle had not been appropriately considered, noting Colby et al. (2009) and Chief Medical Officer of Health (2010a) are focused on direct health effects rather than the indirect pathway. (DeMarco & Muldoon, 2011 p. 195, p. 204, p. 205, p. 207). The authors of this article acknowledge the urgent need for original independent third party research into the adverse health effects of IWTs. In the interim, the precautionary principle must be respected and IWTs should not be built in close proximity to human habitation and where reports of adverse health effects are being reported, the facility should be decommissioned until the situation is resolved	6,562		<a href="https://stopthesethings.files.wordpress.com/2014/12/horner2011.pdf">https://stopthesethings.files.wordpress.com/2014/12/horner2011.pdf</a>
		Horner, Jeffery, and Krogh	Health	1					<a href="http://www.euro.who.int/_data/assets/pdf_file/0017/43316/E92845.pdf">http://www.euro.who.int/_data/assets/pdf_file/0017/43316/E92845.pdf</a>
		Hurtley, C. World Health Organization	Health	2	Night Noise Guidelines for Europe	The consequences of sleep disturbance can be serious. In 2009 World Health Organization released a 184 page peer reviewed summary of research regarding the risks to human health from noise induced sleep disturbance. Some of the adverse health effect documented in the report include poor performance at work, fatigue, memory difficulties, concentration problems, motor vehicle accidents, mood disorders (depression, anxiety), alcohol and other substance abuse, cardiovascular, respiratory, renal, gastrointestinal, musculoskeletal disorders, obesity, impaired immune system function and a reported increased risk of mortality.		30	
		Huson, W. Les. PE Huson	Health	1	Amplitude Modulation Case Study	Results of two channel simultaneous audio recordings outdoors in the free field and inside a bedroom are presented from the Leonards Hill wind farm that has two Repower 2MW MM82 wind turbines. The analysis demonstrates the dynamic effects of amplitude modulation on attenuation of sound between the two measurement locations and shows how outdoor to indoor attenuation is compromised at particular room resonant modes. Different measurement approaches are discussed with the conclusion that a 10Hz sampling rate of sound level is insufficient to accurately determine peak to trough amplitude modulations. Infrasound measurements are also presented to show that amplitude modulation is also observable below 20Hz and that low frequency infrasound may also be considered to be amplitude modulation.			<a href="https://docs.wind-watch.org/OA-AMpaper.pdf">https://docs.wind-watch.org/OA-AMpaper.pdf</a>

Exhibit N		James, Richard. Acoustic Health	4	Acoustician Richard James expl	<p>The purpose of the study was to collect high quality audio samples during periods when the family members were present and "feeling" the wind turbines. Wind speed and direction data at the outdoor microphones and from the wind turbine hub level anemometer was also collected. Wind turbine power production was also collected. (The data from wind turbines is under a protective order and only available to select reviewers.) The Team Report summarizes the data and protocol. It also includes a Team conclusion and separate appendices from each acoustician providing additional information about what they observed or derived from the study.</p> <p>The four investigating firms are of the opinion that enough evidence and hypotheses have been given herein to classify LFN and infrasound as a serious issue, possibly affecting the future of the industry. It should be addressed beyond the present practice of showing that wind turbine levels are magnitudes below the threshold of hearing at low frequencies. That infra and low frequency sound is a primary characteristic of wind turbine acoustic emissions was established by the team.</p>				<a href="http://www.windaction.org/posts/35934-acoustician-richard-james-explains-the-shirley-wind-farm-study#Wv4kXpf7nsY">http://www.windaction.org/posts/35934-acoustician-richard-james-explains-the-shirley-wind-farm-study#Wv4kXpf7nsY</a>	
Exhibit BN		James, Richard. Acoustic Health	1	Wind Turbine Infra and Low-Fr	<p>A review of the work of acoustical experts such as Swinbanks, Ebbing, Blazier, Hubbard, and Shepherd and others mentioned in this article shows that these problems were reported at professional conferences and in research papers.</p> <p>There is sufficient research and history to link the sensitivity of some people to inaudible amplitude-modulated infra and low-frequency noise to the type of symptoms described by those living near industrial wind turbines. <b>This information should have served as a warning sign.</b></p> <p>The acoustics profession and individual acousticians should have recognized the early reports of symptoms by people living near wind turbines as a new example of an old problem. Instead of advocating caution in locating wind turbines near people, the rush for renewable energy took precedence. The position or belief that there was little or no possibility inaudible infrasound and very low-frequency noise could be causing the reported problems has delayed further research and the safe implementation of industrial wind turbines.</p> <p>It is the author's opinion that had past experience and information, which was available prior to the widespread implementation of the modern upwind industrial-scale wind turbine, been incorporated into the government and industry guidelines and regulations used to siting wind turbine utilities, many of the complaints and adverse health effects currently reported would have been avoided.</p>				<a href="https://docs.wind-watch.org/James-wind-turbine-infrasound-low-frequency-warning-signs-not-heard.pdf">https://docs.wind-watch.org/James-wind-turbine-infrasound-low-frequency-warning-signs-not-heard.pdf</a>	
Exhibit O		Janssen SA, Vos H, Eisses	1	A comparison between exposu	<p>Surveys have shown that noise from wind turbines is perceived as annoying by a proportion of residents living in their vicinity, apparently at much lower noise levels than those inducing annoyance due to other environmental sources. The aim of the present study was to derive the exposure-response relationship between wind turbine noise exposure in Lden and the expected percentage annoyed residents and to compare it to previously established relationships for industrial noise and transportation noise. In addition, the influence of several individual and situational factors was assessed. On the basis of available data from two surveys in Sweden (N=341, N=754) and one survey in the Netherlands (N=725), a relationship was derived for annoyance indoors and for annoyance outdoors at the dwelling. In comparison to other sources of environmental noise, annoyance due to wind turbine noise was found at relatively low noise exposure levels. Furthermore, annoyance was lower among residents who received economical benefit from wind turbines and higher among residents for whom the wind turbine was visible from the dwelling. Regions with a highest allowed immission level of 45 dB(A) equivalent level [corresponding to Lden 49.7 dB(A) in this study] such as Denmark could expect less than 14% of the exposed population to be highly annoyed indoors by wind turbines and less than 29% to be highly annoyed outdoors.</p>				<a href="https://docs.wind-watch.org/janssen2011.pdf">https://docs.wind-watch.org/janssen2011.pdf</a>	
Exhibit BO		Jarosłnska MD, Ph.D. World Health Organization (WHO) Regional Office for Europe, European Centre for Environment and Health	1	Development of the WHO Environmental Noise Guidelines for the European Region: An Introduction. International Journal of Environmental Research and Public Health 2018, 15, 813 doi: 10.3390/ijerph15040813 (2018)	<p>In 1999 and 2009, WHO published guidelines to protect human health, specifically from community noise and night noise exposure [18,19]. Over the years, there have been a number of key developments and a substantial increase in the number and quality of studies on environmental noise exposure and health outcomes, with newly found associations with annoyance; cardiovascular effects; obesity and metabolic effects (such as diabetes); cognitive impairment; sleep disturbance; hearing impairment and tinnitus; adverse birth outcomes; and quality of life, mental health, and wellbeing. Another development is that whilst earlier studies focused mainly on road traffic and aircraft noise [11], newer studies also include noise from other sources such as railways and wind turbines. The evidence summarized and presented in the systematic evidence reviews is the basis for the development of recommendations in the WHO Environmental Noise Guidelines for the European Region. Aimed at decision-makers and technical experts, the new guidelines offer not only scientific, evidence-based rationale for identifying levels, at which environmental noise is related to a significant health impact, but also recommendations for actions to reduce exposure. For all who are involved in health and environmental impact assessment, such as policy makers, advocacy bodies, and researchers, these guidelines make recommendations on noise levels above which we are confident that there are health impacts for some noise sources and provide guidance for quantifying these impacts. Moreover, the guidelines highlight critical data and research gaps to be addressed in future studies. Although developed for the WHO European Region, the guidelines provide a general framework for use by a global audience.</p>				<a href="https://docs.wind-watch.org/WHO-Noise-Europe-2018.pdf">https://docs.wind-watch.org/WHO-Noise-Europe-2018.pdf</a>	
Exhibit P		Jeffery MD, Krogh, Horn	1	Adverse health effects of industrial wind turbines. Canadian Family Physician 2013;59:473-5 (2013)	<p>This case has successfully shown that the debate should not be simplified to one about whether wind turbines can cause harm to humans. The evidence presented to the Tribunal demonstrates that they can, if facilities are placed too close to residents. The debate has now evolved to one of degree. Industrial wind turbines can harm human health if sited too close to residents. Harm can be avoided if IWTs are situated at an appropriate distance from humans.</p>				<a href="https://stopthesethings.files.wordpress.com/2014/12/jeffery.pdf">https://stopthesethings.files.wordpress.com/2014/12/jeffery.pdf</a>	
Exhibit Q		Jeffery, Krogh and Horner Canadian Family Physician May 2013, 59 (5) 473-475;	1	Adverse health effects of ind	<p>Canadian family physicians can expect to see increasing numbers of rural patients reporting adverse effects from exposure to industrial wind turbines (IWTs). People who live or work in close proximity to IWTs have experienced symptoms that include decreased quality of life, annoyance, stress, sleep disturbance, headache, anxiety, depression, and cognitive dysfunction. Some have also felt anger, grief, or a sense of injustice. Suggested causes of symptoms include a combination of wind turbine noise, infrasound, dirty electricity, ground current, and shadow flicker.</p>				<a href="http://www.cfp.ca/content/59/5/473.short">http://www.cfp.ca/content/59/5/473.short</a>	

	Exhibit BP	Jones, Thomas A. BSM	Health	4	Wind Turbine Syndrome and V	Recently published peer reviewed comprehensive information prepared by medical doctors, pathologists and engineers strongly warn of major physiological consequences of living too close to industrial wind turbines. These have been classified into two categories according to two different phenomena associated with wind turbine noise. One is Wind Turbine Syndrome (WTS), Reference (1), which produces several symptoms related to the vestibular system's (balance) organs: disturbed sleep, headaches, tinnitus (ear ringing), and sense of quivering or vibration, nervousness, rapid heartbeat, nausea, difficulty with concentration, memory loss, irritability and anger. The other is Vibroacoustic Disease (VAD), Reference (2), which causes direct tissue or organ damage. WTS symptoms discontinue when the person moves away from the source; however, VAD symptoms continue long after the source of infrasound is turned off. Both WTS and VAD can be very harmful and debilitating and possibly deadly.				<a href="https://windwisema.org/about/noise/wind-turbine-syndrome-and-vibroacoustic-disease/">https://windwisema.org/about/noise/wind-turbine-syndrome-and-vibroacoustic-disease/</a>
		Krekel, Christian and Zerr	Health	1	Does the Presence of Wind Tur	we investigated the effect of the presence of wind turbines on residential well-being in Germany, combining household data from the German Socio Economic Panel (SOEP) with a unique and novel panel dataset on more than 20,000 wind turbines for the time period between 2000 and 2012. In doing so, we quantified the negative externalities caused by the presence of wind turbines, using the life satisfaction approach. Employing a difference-in-differences design, which exploits the exact geographical coordinates of households and turbines, as well as their interview and construction dates, respectively, we established causality. It remains the task of the policymaker to communicate benefits and moderate decision-making processes, and to consider distributional implications and potential compensation measures. We have <b>excluded movers from all our analyses</b> . The reason for this was twofold: assuming that individuals who move are those that are most adversely affected by wind turbines, excluding them means that our estimates can be interpreted as a lower bound.				<a href="https://docs.wind-watch.org/Krekel-Zerrahn-2016-wellbeing-wind-turbines.pdf">https://docs.wind-watch.org/Krekel-Zerrahn-2016-wellbeing-wind-turbines.pdf</a>
		Krogh, Carmen M.E. Bu	Health	1	Industrial Wind Turbine Develo	This article explores the loss of social justice reported by individuals living in the environs of industrial wind turbines (IWTs). References indicate that some individuals residing in proximity to IWT facilities experience adverse health effects. These adverse health effects are severe enough that some families have abandoned their homes. Individuals report they welcomed IWTs into their community and the negative consequences were unexpected. Expressions of grief are exacerbated by the emotional and physical toll of individuals' symptoms, loss of enjoyment of homes and property, disturbed living conditions, financial loss, and the lack of society's recognition of their situation. The author's intention is to create awareness that loss of social justice is being associated with IWT development. This loss of justice arises from a number of factors, including the lack of fair process, the loss of rights, and associated disempowerment.				<a href="https://stopthesethings.files.wordpress.com/2014/12/bull-sci-technol-soc-2011-krogh-321-33.pdf">https://stopthesethings.files.wordpress.com/2014/12/bull-sci-technol-soc-2011-krogh-321-33.pdf</a>
Exhibit R		Lange, Sherri, World He	Health	1	World Health Organization Inve	Since 2012, it has become increasingly clear that worldwide complaints are universal in nature, and accruing to the status of a pandemic. Mrs. Metcalfe indicates that "Complaints of severe sleep deprivation, severe chronic stress, and disabling vestibular dysfunction symptoms (dizziness, vertigo etc.) abound, with problems varying from site to site depending upon local topography, height and number of turbines, inter-turbine distances, and the distance between turbines and homes.  The common thread to the reported symptoms (known as "noise annoyance") is the activation of the startle reflex, which can be triggered by acoustic, vestibular, and tactile stimuli – which if activated together can have a synergistic effect, and that ...To argue that the sleep disturbance, physiological stress and vestibular dysfunction symptoms and their serious long term adverse health consequences don't exist or are caused by scaremongering is neither scientifically correct, nor morally or ethically defensible."				<a href="https://stopthesethings.com/2016/09/03/who-investigates-health-effects-of-wind-turbine-noise-infrasound/">https://stopthesethings.com/2016/09/03/who-investigates-health-effects-of-wind-turbine-noise-infrasound/</a>
Exhibit BQ	Lange, Sherri, MasterResource	Health	4	Sensing but Not Hearing: The Problem of Wind Turbine Noise (Interview with acoustician Steven Cooper, AU) (2018)	Steven Cooper has advanced our understanding of how people react to real recorded pressure pulsations from industrial wind turbines. In the last six months he has presented eight papers at Acoustic Meetings in Zurich, Boston and New Orleans. With this interview, he breaks down some of the salient points of his research discoveries. Cooper's work is expanding our knowledge about "soundscapes" near projects, which could result in new legal requirements for manufacturers and developers. "In general, wind farm applications claim that turbines do not generate any low-frequency, tonal, or impulsive characteristics, which is a matter disputed by residential receivers. The consequence of the pulsating signal generated by turbines (whether audible or inaudible) could potentially require a further adjustment to any perception or impact generated by wind turbines." "On discussing the resident's observations (with the residents) for the first two weeks I found the use of describing the impacts in terms of Noise, Vibration, and Sensation was accepted by the residents as a better concept."				<a href="https://www.masterresource.org/windpower-health-effects/sensing-not-hearing-problem-wind-turbine-noise-interview-acoustician-steven-cooper-au/">https://www.masterresource.org/windpower-health-effects/sensing-not-hearing-problem-wind-turbine-noise-interview-acoustician-steven-cooper-au/</a>	
Exhibit BR	Laurie, Sarah MD, Waubra Foundation Dr Bob Thorne, Acoustar Steven Cooper, The Acoustic Group	Health	3	'Wind Turbine Syndrome' (Science advances, Australia judiciary takes note) (2018)	"... the [Australian] Tribunal recognized that 'wind turbine noise at times exceeds 40 dB(A), (which is a recognised threshold for annoyance/sleep disturbance)'; that a significant amount of sound energy emitted by wind turbines is in the low frequency noise range, so using the dB(A) weighting system is therefore inappropriate. The Tribunal recognized that 'humans are more sensitive to low frequency sound, and it can therefore cause greater annoyance than higher frequency sound'; and that "even if it is not audible, low frequency noise and infrasound may have other effects on the human body, which are not mediated by hearing but also not fully understood. Those effects may include motion-sickness-like symptoms, vertigo, and tinnitus-like symptoms." – Dr. Laurie Sarah, note to North America Platform Against Wind Power (NA-PAW), December 17, 2017.			40	<a href="https://www.masterresource.org/windpower-health-effects/wind-noise-effects-sarah-laurie-waubra-foundation-ascending/">https://www.masterresource.org/windpower-health-effects/wind-noise-effects-sarah-laurie-waubra-foundation-ascending/</a> <a href="https://waubrafoundation.org.au/wp-content/uploads/2017/12/Decision-4-Dec-17.pdf">https://waubrafoundation.org.au/wp-content/uploads/2017/12/Decision-4-Dec-17.pdf</a>	
	Lange, Sherri, MasterResource	Health	4	'Wind Turbine Syndrome' (Science advances, Australia judiciary takes note). Master Resource. (2018)	There have been recent developments in the debate over the health effects of inaudible low frequency noise in the vicinity of industrial wind turbines for human neighbors. First, a direct causal link has been determined between exposure to pulsing inaudible low frequency noise and human responses. Second, the Australian judiciary has recognized wind noise as a plausible pathway to disease, demoting the prior standard dB(A) noise metric. (Administrative Appeals Tribunal, AU)  Laurie/Thorne/Cooper, "Startle Reflex & Sensitisation," ASA Conference, New Orleans, December 2017.				<a href="https://www.masterresource.org/windpower-health-effects/wind-noise-effects-sarah-laurie-waubra-foundation-ascending/">https://www.masterresource.org/windpower-health-effects/wind-noise-effects-sarah-laurie-waubra-foundation-ascending/</a>	

		Laurie, Sarah MD, Waubra Foundation Dr Bob Thorne, Acoustar Steven Cooper, The Acoustic Group	Health	4	Laurie, Thorne, Cooper: Startle Reflex & Sensitisation. How are these Biological Phenomena Relevant to Wind Turbine Noise Exposure? (2017)	"The startle reflex is a physiological phenomenon, originating in the caudal brainstem, which can be elicited by an unexpected stimulus. It includes two responses: the initial motor response and a second orienting response" Exaggerated Startle Reactions, Driessen et al Clin Neurophysiology, 2011 The response originating in the caudal brainstem means the SR cannot be due to a nocebo effect, which will instead originate in the cortex or "thinking" centre of the brain. The initial motor response includes the reaction of the heart as part of the neurological reflex "fight flight" component – demonstrated by a sudden rapid increase in heart rate. "The crux of the matter is that despite all the evidence that there are a whole lot of factors which affect noise sensitivity and noise annoyance; if there is an acoustic trigger which stimulates the startle reflex, and this happens repeatedly, a train of events is set in motion leading to sensitization which is a one way street to worsening health and quality of life. It is the classic biological positive feedback loop, which reinforces the harm." Dr. Bob Thorne.				<a href="https://waubrafoundation.org.au/wp-content/uploads/2018/01/Laurie-Cooper-Thorne-Final-Version-New-Orleans-2017.pdf">https://waubrafoundation.org.au/wp-content/uploads/2018/01/Laurie-Cooper-Thorne-Final-Version-New-Orleans-2017.pdf</a>
	Exhibit BT	Laurie, Sarah MD, Waubra Foundation; Dr Bob Thorne, Acoustar; Steven Cooper, The Acoustic Group	Health	4	Startle Reflex & Sensitisation How are these Biological Phenomena Relevant to Wind Turbine Noise Exposure? ASA Conference, New Orleans, December 2017	The Consequences of Noise Sensitisation  At the individual level •Will increasingly react to pulsing sounds when present which others may not •These sounds are not regulated, and the regulatory authorities currently do not act to protect residents from further harm (let alone primary prevention of sensitisation). •The consequences for the individual's health are profoundly negative if they stay exposed, and the sensitisation can affect where they work, live, study, and sleep for the rest of their lives – because of the persisting cross sensitisation For children, exposed in utero or in their childhood, this potentially means the rest of their lives.  At the family level •Once one family member is adversely affected by noise sensitisation, this inevitably affects others especially if sleep is disturbed. In addition, farming families are often multigenerational, and the elderly and the young are acknowledged to be vulnerable.  At the community level •Worsening mental and physical health in circumstances (especially in rural areas) where access to health care is often already reduced compared to the city and suburbs. •Decreased rural populations as families move away, and are not replaced by other residents in what have become newly uninhabitable homes, because of noise pollution.				<a href="https://waubrafoundation.org.au/resources/laurie-thorne-cooper-startle-reflex-sensitisation/">https://waubrafoundation.org.au/resources/laurie-thorne-cooper-startle-reflex-sensitisation/</a>
		Madigan, John. Senator. Senate Select Committee on Wind Turbines, Australia	Health	3	Senate Select Committee on Wind Turbines: Interim Report (2015)	The committee invites the public to read and consider the evidence of people who have experienced these symptoms and who attribute their anxiety and ill health to the operation of turbines.2 1.13 These health affects should not be trivialised or ignored. The committee was particularly distressed by renewable energy advocates, wind farm developers and operators, public officials and academics who publicly derided and sometimes lampooned local residents who were genuinely attempting to make known the adverse health effects they were suffering. 1.14 The committee is aware of people complaining of these impacts who have since left their family home.				<a href="https://docs.wind-watch.org/AUS-interim-report-18-June-2015.pdf">https://docs.wind-watch.org/AUS-interim-report-18-June-2015.pdf</a>
	Exhibit BU	Malgorzata Pawlaczkyk-Luszczynska, Kamil Zaborowski, Adam Dudarewicz, Malgorzata Zamojcka-Daniszevska, Department of Physical	Health	1	Response to Noise Emitted by Wind Farms in People Living in Nearby Areas. International Journal of Environmental Research and Public Health 2018, 15, 1575;	The aim of this study was to evaluate the perception and annoyance of noise from wind turbines in populated areas of Poland. A questionnaire inquiry was carried out among 517 subjects, aged 18–88, living within 204–1726 m from the nearest wind turbine. For areas where respondents lived, A-weighted sound pressure levels (SPLs) were calculated as the sum of the contributions from the wind power plants in the specific area. It has been shown that the wind turbine noise at the calculated A-weighted SPL of 33–50 dB was perceived as annoying or highly annoying by 46% and 28% of respondents, respectively. Moreover, 34% and 18% of them said that they were annoyed or highly annoyed	5,178			<a href="https://docs.wind-watch.org/jerph-responses-wind-farm-noise.pdf">https://docs.wind-watch.org/jerph-responses-wind-farm-noise.pdf</a>
		Mann, Richard University of Waterloo	Health	1	Infrasound chamber developed at U Waterloo (2018)	A significant number of people, who live in proximity to industrial Wind Turbines, complain about a variety of physical and emotional symptoms. They believe these symptoms are caused by infrasound produced by these Turbines. Some of these symptoms include, but are not limited to, nausea, tinnitus, sleep deprivation, vertigo, high blood pressure, depression, anxiety, and other ailments, which to them, have a profound impact on quality of life. Some have actually had to leave their homes and have endured financial distress as a result. Countless others continue to suffer with little hope for relief. We have successfully produced infrasound, as a mirror of that produced by Industrial Wind Turbines, in a chamber capable of accommodating a human test subject. This will permit others, with appropriate medical training and ethical oversight, to research the effects of infrasound on humans.				<a href="https://cs.uwaterloo.ca/sites/ca.computer-science/files/uploads/files/cs-2018-01.pdf">https://cs.uwaterloo.ca/sites/ca.computer-science/files/uploads/files/cs-2018-01.pdf</a>
Exhibit S		McMurtry, Robert. Bulletin of Science Technology & Society	Health	1	Toward a Case Definition of Adverse Health Effects in the Environs of Industrial Wind Turbines: Facilitating a Clinical	Internationally, there are reports of adverse health effects (AHE) in the environs of industrial wind turbines (IWT). There was multidisciplinary confirmation of the key characteristics of the AHE at the first international symposium on AHE/IWT. The symptoms being reported are consistent internationally and are characterized by crossover findings or a predictable appearance of signs and symptoms present with exposure to IWT sound energy and amelioration when				<a href="https://stopthesethings.files.wordpress.com/2014/12/case_definition_of_adverse_health_effects.pdf">https://stopthesethings.files.wordpress.com/2014/12/case_definition_of_adverse_health_effects.pdf</a>
	Exhibit BV	Michaud, David S. & McNamee, James. Non-Ionizing Radiation Health Sciences Division, Consumer and Clinical Radiation	Health	1	Derivation and application of a composite annoyance reaction construct based on multiple wind turbine features. Canadian Journal of Public Health (2018)	In the ON sample, aggregate annoyance was effectively absent in areas beyond 5 km (mean 0.12; 95% CI 0.00, 1.19), increasing significantly between 2 and 5 km (mean 2.13; 95% CI 0.92, 3.33), remaining elevated, but with no further increase until [0.550–1] km (mean 3.37; 95% CI 3.02, 3.72). At ≤ 0.550 km, the average overall annoyance was 3.36 (95% CI 2.03, 4.69). In PEI, aggregate annoyance was essentially absent beyond 1 km; i.e., [1–2] km (mean 0.21; 95% CI 0.00, 0.88); 2–5 km (mean 0.00; 95% CI 0.00, 1.37); > 5 km (mean 0.00; 95% CI 0.00, 1.58). Annoyance significantly increased in areas between [0.550 and 1] km (mean 1.59; 95% CI 1.02, 2.15) and was highest within 550 m (mean 4.25;	16,404			<a href="https://docs.wind-watch.org/Michaud-composite-annoyance.pdf">https://docs.wind-watch.org/Michaud-composite-annoyance.pdf</a>
Exhibit T		Møller, H., & Pedersen, C. S. Section of Acoustics, Aalborg University	Health	1	Low-frequency noise from large wind turbines. The Journal of the Acoustical Society of America, 129(6), 3727-3744. DOI: 10.1121/1.3543957 (2011)	The noise emission from 48 wind turbines with nominal electric power up to 3.6 MW is analyzed and discussed. The results confirm the hypothesis that the spectrum of wind turbine noise moves down in frequency with increasing turbine size. The relative amount of emitted low-frequency noise is higher for large turbines (2–3.6 MW) than for small turbines ( 2 MW). The difference is statistically significant for one-third-octave bands in the frequency range 63–250 Hz. It is thus beyond any doubt that the low-frequency part of the spectrum plays an important role in the noise at the neighbors. There is more turbine noise than expected and less wind; hence, the turbine noise will not be masked with natural wind-induced sound, as it might have been with the assumed logarithmic wind profile. <b>It must be anticipated that the problems with low-frequency noise will increase with even larger turbines.</b>	3,600	35		<a href="https://stopthesethings.files.wordpress.com/2014/12/17/21-peer-reviewed-articles-on-the-adverse-health-effects-of-wind-turbine-noise/">https://stopthesethings.files.wordpress.com/2014/12/17/21-peer-reviewed-articles-on-the-adverse-health-effects-of-wind-turbine-noise/</a>
Exhibit V		nieuwerustnoisewatch.org Oct 2014	Health	1	21 Peer Reviewed Articles On the Adverse Health Effects of Wind Turbine Noise - Wind Turbines Can Harm Humans if too Close to Residents. (2014)	The following are just a few of the articles and are available at the Bulletin of Science Technology & Society. It is important that decision makers, environmental practitioners, noise and health specialists recognize the years of work and research that professionals in the health and engineering field have been doing related to industrial wind energy issues.				<a href="https://stopthesethings.com/2014/12/17/21-peer-reviewed-articles-on-the-adverse-health-effects-of-wind-turbine-noise/">https://stopthesethings.com/2014/12/17/21-peer-reviewed-articles-on-the-adverse-health-effects-of-wind-turbine-noise/</a>

Exhibit W	Nissenbaum, Michael MD, Aramini, Jeffrey Hanning, Christopher	Health	1	Effects of Industrial Wind Turbine Noise on Sleep and Health (2012)	This investigation is a stratified cross-sectional study involving two sites: Mars Hill and Vinalhaven, Maine, USA. A questionnaire was offered to all residents meeting the participant-inclusion criteria and living within 1.5 km of an industrial wind turbine (IWT) and to a random sample of residents, meeting participant inclusion criteria, living 3 to 7 km from an IWT between March and July of 2010. The protocol was reviewed and approved by Institutional Review Board Services, of Aurora, Ontario, Canada. We conclude that the noise emissions of IWTs disturbed the sleep and caused daytime sleepiness and impaired mental health in residents living within 1.4 km of the two IWT installations studied. Industrial wind turbine noise is a further source of environmental noise, with the potential to harm human health. Our research suggests that adverse effects are observed at distances even beyond 1 km.	4,593		<a href="http://www.noiseandhealth.org/article.asp?issn=1463-1741;year=2012;volume=14;issue=60;page=237;epage=243;aulast=Nissenbaum">http://www.noiseandhealth.org/article.asp?issn=1463-1741;year=2012;volume=14;issue=60;page=237;epage=243;aulast=Nissenbaum</a>
Exhibit X	Nissenbaum, Michael, MD, University of Toronto	Health	1	Wind Turbines, Health, Ridgelines, and Valleys (2010)	In my investigation of Mars Hill, Maine, 22 out of about 30 adults ('exposed') who live within 3500 feet of a ridgeline arrangement of 28 1.5 MW wind turbines were evaluated to date, and compared with 27 people of otherwise similar age and occupation living about 3 miles away (Not Exposed). Here is what was found: 82% (18/22) of exposed subjects reported new or worsened chronic sleep deprivation, versus 4% (1 person) in the non-exposed group. 41% of exposed people reported new chronic headaches vs 4% in the control group. 59% (13/22) of the exposed reported 'stress' versus none in the control group, and 77% (17/22) persistent anger versus none in the people living 3 miles away. More than a third of the study subjects had new or worsened depression, with none in the control group. 95% (21/22) of the exposed subjects perceived reduced quality of life, versus 0% in the control group.	3,500		<a href="https://waubfoundation.org.au/resources/nissenbaum-dr-michael-2009-wind-turbines-health-ridgelines-and-valleys/">https://waubfoundation.org.au/resources/nissenbaum-dr-michael-2009-wind-turbines-health-ridgelines-and-valleys/</a>
	Nobbs, Benjamin, Con J. Doolan and Danielle J. Moreau. School of Mechanical Engineering, The University of Adelaide	Health	1	Characterisation of noise in homes affected by wind turbine noise. Proceedings of Acoustics 2012 - Fremantle (2012)	A growing need for low carbon energy production necessitates the use of renewable resources such as wind power. However, residents living near wind farms often state that annoyance due to wind farm noise is a serious problem that affects their wellbeing. This paper describes a new methodology for recording noise and annoyance within residents' homes affected by wind turbine noise. The technique records time-series noise measurements allowing complete analysis of the signal using a variety of post processing techniques. Preliminary results from the system in a single home near a wind farm are presented including overall sound pressure level with A, C and Z weighting, narrow band frequency spectrum and amplitude modulation depth correlated with resident rated annoyance level. This information provides insight into the nature of noise in homes close to wind farms. Measurements taken in a single resident's home near a wind farm show an increase in the overall mean Z (unweighted) and C weighted sound level with Annoyance rating. No increase was, however, observed in the mean A weighted sound level and this is due to the majority of the acoustic energy being contained in the lower frequencies. In particular, the energy levels within the 10-30 Hz band were observed to increase with Annoyance rating. Additionally, significant amplitude modulation was detected in the noise signals.			<a href="http://data.mecheng.adelaide.edu.au/avc/publications/public_papers/2012/BNobbs_AASConferencePaper_Manuscript.pdf">http://data.mecheng.adelaide.edu.au/avc/publications/public_papers/2012/BNobbs_AASConferencePaper_Manuscript.pdf</a>
Exhibit BW	Nuno A. A. Castelo Branco, M.D., Senior Surgical Pathologist Mariana Alves-Pereira, Ph.D., Biomedical Engineer, Lusófona University Augusto Martinho Pimenta, M.D., Senior Neurologist, Julio de Matos Hospital José Reis Ferreira, M.D., Senior Pneumologist, Clínica Doentes Pulmonares Lisbon, Portugal	Health	1	Clinical Protocol for Evaluating Pathology Induced by Low Frequency Noise Exposure EuroNoise 2015, 31 May-3 June, Maastricht, The Netherlands (2015)	Segments of the general population who complain about infrasound & low frequency noise (ILFN) in their homes or in their workplaces continue to increase. These individuals often complain about similar sets of concurrent symptoms, and frequently attribute their ailments directly to ILFN exposure. Oftentimes, however, routine clinical evaluations of these individuals reveal no apparent dysfunction, and patients with persistent complaints are subsequently referred to psychology or psychiatry health professionals. The goal herein is to present an objective clinical protocol that scientifically evaluates these complaints, leading to the elimination of malingerers, and to the proper medical assistance of those developing ILFN-induced lesions.			<a href="https://docs.wind-watch.org/Euronoise2015-000601.pdf">https://docs.wind-watch.org/Euronoise2015-000601.pdf</a>
Exhibit Y	Pedersen E:	Health	1	Health aspects associated with wind turbine noise—Results from three field studies. Noise Control Eng J. 2011, 59:47-53. (2011)	Data from three cross-sectional studies comprising A-weighted sound pressure levels of wind turbine noise, and subjectively measured responses from 1,755 people, were used to systematically explore the relationships between sound levels and aspects of health and well-being. Consistent findings, that is, where all three studies showed the same result, are presented, and possible associations between wind turbine noise and human health are discussed. A rather high number of respondents reported that their sleep was interrupted by noise, a nuisance that was found to be related to levels of wind turbine noise in two of the studies (and also to road traffic noise that was additionally measured in the Dutch study, but not discussed in this paper17). <b>The impact of noise did not increase gradually with noise levels, but rather had a sharp increase around 40 dB in the first Swedish study and around 45 dB in the Dutch study,</b> corresponding well with the recommended highest exposure levels in the two countries.		40	<a href="http://www.ingentaconnect.com/content/ince/ncej/2011/00000059/00000001/art00006">http://www.ingentaconnect.com/content/ince/ncej/2011/00000059/00000001/art00006</a> <a href="https://docs.wind-watch.org/Pedersen-2011-INCE.pdf">https://docs.wind-watch.org/Pedersen-2011-INCE.pdf</a>
Exhibit BX	Persinger, Michael A. Ph.D. Behavioural Neuroscience and Biomolecular Sciences Programs, Laurentian University, Sudbury, Ontario	Health		Infrasound, human health, and adaptation: an integrative overview of recondite hazards in a complex environment. Natural Hazards, September 2013, DOI 10.1007/s11069-013-0827-3 (2013)	Moderate strength correlations occur between the incidences of infrasound and reports of nausea, malaise, fatigue, aversion to the area, non-specific pain, and sleep disturbances when pressure levels exceed about 50 db for protracted periods. Experimental studies have verified these effects. Their validity is supported by convergent quantitative biophysical solutions. Because cells interact through the exchange of minute quanta of energy that corresponds with remarkably low levels of sound pressure produced by natural phenomena and wind turbines upon the body and its cavities, traditional standards for safety and quality of living might not be optimal. A recent review by Salt and Kaltenbach (2011) described values recorded by several researchers for infrasound levels between ~150 and 750 m from turbines with hub heights of 62 and 36 m blade lengths. The sound spectrum was dominated by frequencies below 10 Hz. Within the range of 1 Hz, the sound pressure levels were over 90 db when unweighted measurements were taken. These magnitudes were associated with the inaudible infrasound rather than the intermittent "swooshing" sounds that are more conspicuous. The authors emphasized the fact that people living near these turbines could be exposed 24 h per day for weeks that extend into years. Modern wind turbines, because of their size (height) and rotational velocity, have the capacity to generate significant intensities of infrasound with complex waveforms and harmonics. Assuming a rotation speed (that can change with the driving wind velocity) of 14 rotations per minute (0.24 Hz multiplied three blades = 0.72 Hz), the relative pressure level at about 100 m distance is about 50 db outside a typical brick house and about 45 db inside the dwelling. At certain frequencies, such as around 7-8 and 40-45 Hz, the magnitude of the vibration components inside and outside the house may not differ.			<a href="https://link.springer.com/article/10.1007%2F11069-013-0827-3">https://link.springer.com/article/10.1007%2F11069-013-0827-3</a>



Exhibit AD		Phillips, Carl V. Bulletin of Science Technology & Society	Health	1	Properly Interpreting the Epidemiologic Evidence About the Health Effects of Industrial Wind Turbines on Nearby Residents. Bulletin of Science Technology & Society 2011 31: 303, DOI: 10.1177/0270467611412554 (2011)	There is overwhelming evidence that wind turbines cause serious health problems in nearby residents, usually stress-disorder type diseases, at a nontrivial rate. The adverse event reports provide compelling evidence of the seriousness of the problems and of causation in this case because of their volume, the ease of observing exposure and outcome incidence, and case-crossover data.  Our current knowledge indicates that there are substantial health risks from the existing exposure, and we do not know how to reduce those risks other than by keeping turbines several kilometers away from homes.	6,562		<a href="https://stopthesettings.files.wordpress.com/2014/12/phillips.pdf">https://stopthesettings.files.wordpress.com/2014/12/phillips.pdf</a>
Exhibit BY		Pierpont, Nina, MD. The Johns Hopkins University School of Medicine	Health	1	Wind Turbine Syndrome and the Brain. (2010)	The latest research, as discussed below, suggests the following mechanism for Wind Turbine Syndrome: air-borne or body-borne low-frequency sound directly stimulates the inner ear, with physiologic responses of both cochlea (hearing organ) and otolith organs (sacculle and utricle—organs of balance and motion detection). Research has now proved conclusively that physiologic responses in the cochlea suppress the hearing response to low-frequency sound but still send signals to the brain, signals whose function is, at present, mostly unknown. The physiologic response of the cochlea to turbine noise is also a trigger for tinnitus and the brain-cell-level reorganization that tinnitus represents—reorganization that can have an impact on language processing and the profound learning processes related to language processing. New research also demonstrates that the “motion-detecting” otolith organs of mammals also respond to air-borne low-frequency sound. Physiologic responses and signals from the otolith organs are known to generate a wide range of brain responses, including dizziness and nausea (seasickness, even without the movement), fear and alerting (startle, wakefulness), and difficulties with visually-based problem-solving. Increased alerting in the presence of wind turbine noise disturbs sleep, even when people do not recall being awakened. A population-level survey in Maine now shows clear disturbances of sleep and mental wellbeing out to 1400 m (4600 ft) from turbines, with diminishing effects out to 5 km (3 miles).	4,600		<a href="http://windturbinesyndrome.com/img/WTSbrain-color.pdf">http://windturbinesyndrome.com/img/WTSbrain-color.pdf</a>
		Pierpont, Nina, MD. The Johns Hopkins University School of Medicine	Health	3	Wind Turbine Syndrome. Testimony before the New York State Legislature Energy Committee (2006)	Three doctors that I know of are studying the Wind Turbine Syndrome: myself, one in England, and one in Australia. We note the same sets of symptoms. The symptoms start when local turbines go into operation and resolve when the turbines are off or when the person is out of the area. The symptoms include: 1) Sleep problems: noise or physical sensations of pulsation or pressure make it hard to go to sleep and cause frequent awakening. 2) Headaches which are increased in frequency or severity. 3) Dizziness, unsteadiness, and nausea. 4) Exhaustion, anxiety, anger, irritability, and depression. 5) Problems with concentration and learning. 6) Tinnitus (ringing in the ears). Not everyone near turbines has these symptoms. This does not mean people are making them up; it means there are differences among people in susceptibility. These differences are known as risk factors. Defining risk factors and the proportion of people who get symptoms is the role of epidemiologic studies. These studies are under way. Chronic sleep disturbance is the most common symptom. Exhaustion, mood problems, and problems with concentration and learning are natural outcomes of poor sleep.			<a href="https://docs.wind-watch.org/Pierpont-WindTurbineSyndrome.pdf">https://docs.wind-watch.org/Pierpont-WindTurbineSyndrome.pdf</a>
Exhibit BZ		Pierpont, Nina, MD. The Johns Hopkins University School of Medicine	Health	1	Wind Turbine Syndrome Executive Summary (2009)	1) Wind turbines cause wind turbine syndrome. We know this because people have symptoms when they are close to turbines and the symptoms go away when they are away from turbines. The study families themselves figured out that they had to move away from turbines to be rid of their symptoms, and nine out of ten have moved. Some sold and some abandoned their homes. 2) People do not abandon their homes out of “annoyance,” and Wind Turbine Syndrome is not a subset of annoyance. 3) The symptom cluster is consistent from person to person, hence the term “syndrome.” 4) The symptoms are sleep disturbance, headache, tinnitus (ringing in ears), ear pressure, dizziness, vertigo (spinning dizziness), nausea, visual blurring, tachycardia (fast heart rate), irritability, problems with concentration and memory, and panic episodes associated with sensations of movement or quivering inside the body that arise while awake or asleep.			<a href="https://waubrafoundation.org.au/wp-content/uploads/2013/04/WIND-TURBINE-SYNDROME-Exec-Summary-docx.pdf">https://waubrafoundation.org.au/wp-content/uploads/2013/04/WIND-TURBINE-SYNDROME-Exec-Summary-docx.pdf</a>
Exhibit Z		Punch, James, Michigan State University	Health	1	Wind Turbine Noise and Human Health: A Four-Decade History of Evidence that Wind Turbines Pose Risks*	Scientists have recommended that distances separating turbines and residences be 0.5-2.5 mi., and 1.25 mi. (2 km) or more has been commonly recommended. Clearly, the short siting distances used by the industry for physical safety do not protect against AHEs. Alternatively, researchers have recommended sound levels typically ranging from 30-40 dBA for safeguarding health, which is consistent with the recommendation of nighttime noise levels by the WHO.	6,562	30	<a href="http://hearinghealthmatters.org/journalresearchposters/files/2016/09/16-10-21-Wind-Turbine-Noise-Post-Publication-Manuscript-HHTM-Punch-James.pdf">http://hearinghealthmatters.org/journalresearchposters/files/2016/09/16-10-21-Wind-Turbine-Noise-Post-Publication-Manuscript-HHTM-Punch-James.pdf</a>
Exhibit CA		Punch, Jerry, PhD, Richard James, BME, and Dan Pabst, BS, Department of Communicative Sciences and Disorders, Michigan State University, East Lansing, MI.	Health	4	Wind-Turbine Noise: What Audiologists Should Know	In considering the health and well-being of people living near wind-turbine projects, the changes recommended by Kamperman and James (2009) would abandon the 55 dBA limit in favor of the commonly accepted criteria of L90 + 5 dBA, for both A- and C-scale readings, where L90 is the preconstruction ambient level. These recommendations also include a prohibition against any wind-turbine-related sound levels exceeding 35 dBA on receiving properties that include homes or other structures in which people sleep. Additional protections against low-frequency sound are given in the right-hand column of Table 2. These recommended provisions would protect residents by limiting the difference between C-weighted Leq during turbine operation and the quietest A-weighted pre-operation background sound levels, plus 5 dB, to no more than 20 dB at the property line. This level should not exceed 55 dB Leq on the C scale, or 60 dB Leq for properties within one mile of major heavily trafficked roads, which sets a higher tolerance for communities that tend to experience slightly noisier conditions. People living within a mile of one or more wind turbines, and especially those living within a half mile, have frequent sleep disturbance leading to sleep deprivation, and sleep disturbances are common in people who live up to about 1.25 miles away. This is the setback distance at which a group of turbines would need to be in order not to be a nighttime noise disturbance (Kamperman and James, 2009). It is also the setback distance used in several other countries that have substantial experience with wind turbines, and is the distance at which Pierpont (2009) found very few people reporting AHEs.	6,562	35	<a href="http://www.howsyourhearing.org/AudiologyToday/ATwindTurbines.html">http://www.howsyourhearing.org/AudiologyToday/ATwindTurbines.html</a>

		Rand, Ambrose, and Krogh	Health	1	Occupational Health and Industrial Wind Turbines: A Case Study. <i>Journal of Science Technology &amp; Society</i> 2011 31: 359DOI: 10.1177/0270467611417849 (2011)	Industrial wind turbines (IWTs) are being installed at a fast pace globally. Researchers, medical practitioners, and media have reported adverse health effects resulting from living in the environs of IWTs. The purpose of this case study is to raise awareness about the potential for adverse health effects occurring among workers. The authors experienced severe adverse health effects during the study procedures. Overall, there was a loss of ability to perform tasks that were second nature. Simple tasks such as calibrating a meter, which were "automatic" functions due to 30 years of experience, were beyond the ability of the authors for some hours.			<a href="https://stopthesethings.files.wordpress.com/2014/12/rand.pdf">https://stopthesethings.files.wordpress.com/2014/12/rand.pdf</a>
		Salt & Kaltenbach <i>Bulletin of Science Technology &amp; Society</i>	Health	1	Infrasound From Wind Turbines Could Affect Humans. <i>Bulletin of Science Technology &amp; Society</i> 2011 31: 296, DOI: 10.1177/0270467611412555 (2011)	Wind turbines generate low-frequency sounds that affect the ear. The ear is superficially similar to a microphone, converting mechanical sound waves into electrical signals, but does this by complex physiologic processes. Based on our current knowledge of how the ear works, it is quite possible that low-frequency sounds at the levels generated by wind turbines could affect those living nearby.			<a href="http://journals.sagepub.com/doi/abs/10.1177/0270467611412555">http://journals.sagepub.com/doi/abs/10.1177/0270467611412555</a>
Exhibit AE		Salt and Hullar, Department of Otolaryngology, Washington University School of Medicine	Health	1	Responses of the ear to low frequency sounds, infrasound and wind turbines. <i>Hearing Research</i> 2010 Sep 1; 268(1-2):12-21. Epub 2010 Jun 16 (2010)	In this review, we consider possible ways that low frequency sounds, at levels that may or may not be heard, could influence the function of the ear. A-weighting wind turbine sounds underestimates the likely influence of the sound on the ear. Based on our understanding of how low frequency sound is processed in the ear, and on reports indicating that wind turbine noise causes greater annoyance than other sounds of similar level and affects the quality of life in sensitive individuals, there is an urgent need for more research directly addressing the physiologic consequences of long-term, low level infrasound exposures on humans.			<a href="https://docs.wind-watch.org/Salt-Hullar-ear-wind-turbines-nihms214369.pdf">https://docs.wind-watch.org/Salt-Hullar-ear-wind-turbines-nihms214369.pdf</a>
Exhibit AA		Salt, Alec Ph.D. Washington University in St. Louis.	Health	1	Wind Turbines can be Hazardous to Human Health. Department of Otolaryngology, Washington University School of Medicine (2014)	The amount of infrasound depends on many factors, including the turbine manufacturer, wind speed, power output, local topography, and the presence of nearby turbines (increasing when the wake from one turbine enters the blades of another). The infrasound cannot be heard and is unrelated to the loudness of the sound that you hear. Infrasound can only be measured with a sound level meter capable of detecting it (and not using the A-weighted scale).  You cannot hear the infrasound at the levels generated by wind turbines, but your ears certainly detect and respond to it. Our measurements show the ear is most sensitive to infrasound when other, audible sounds are at low levels or absent. The Wind Turbine Industry is generally dismissive of claims that wind turbines can affect human health. This dismissive statement fails to recognize a conclusion of the Chatham-Kent tribunal, specifically "This case has <del>clearly</del> shown that the debate should not be simplified to one about whether wind turbines can cause harm to			<a href="http://oto.wustl.edu/saltilab/Wind-Turbines">http://oto.wustl.edu/saltilab/Wind-Turbines</a>
		Schäffer Ph.D., Pieren, Empa, Laboratory for Acoustics/Noise Control, Swiss Federal Laboratories for Materials Science and Technology; Sabine J. Schlittmeie, HSD Hochschule	Health	1	Effects of Different Spectral Shapes and Amplitude Modulation of Broadband Noise on Annoyance Reactions in a Controlled Listening Experiment. <i>International Journal of Environmental Research and Public Health</i> 2018, 15, 1029	Environmental noise from transportation or industrial infrastructure typically has a broad frequency range. Different sources may have disparate acoustical characteristics, which may in turn affect noise annoyance. However, knowledge of the relative contribution of the different acoustical characteristics of broadband noise to annoyance is still scarce. In this study, the subjectively perceived short-term (acute) annoyance reactions to different broadband sounds (namely, realistic outdoor wind turbine and artificial, generic sounds) at 40 dBA were investigated in a controlled laboratory listening experiment. Combined with the factorial design of the experiment, the sounds allowed for separation of the effects of three acoustical characteristics on annoyance, namely, spectral shape, depth of periodic amplitude modulation (AM), and occurrence (or absence) of random AM. Fifty-two participants rated their annoyance with the sounds. Annoyance increased with increasing energy content in the low-frequency range as well			<a href="https://docs.wind-watch.org/Shaffer-AM-annoyance.pdf">https://docs.wind-watch.org/Shaffer-AM-annoyance.pdf</a>
	Exhibit CB	Schomer, Paul D., Ph.D., P.E.; Schomer and Associates, Inc.; Standards Director, Acoustical Society of America George Hessler, Hessler Associates, Inc.	Health	4	The Results of an Acoustic Testing Program, Cape Bridgewater Wind Farm (2015)	Recently [Steve Cooper, The Acoustic Group.] has completed a first of its kind test regarding the acoustical emissions of wind turbines. His is the first study of effects on people that includes a cooperating windfarm operator in conjunction with a researcher that does not work exclusively for windfarms. This study makes three very simple points: There is at least one non-visual, non-audible pathway for wind turbine emissions to reach, enter, and affect some people This is a longitudinal study wherein the subjects record in a diary regularly as a function of time the level of the effects they are experiencing at that time This periodic recording allows for responses as the wind-turbine power changes up and down, changes not known by the subject The results are presented in a 218 page report augmented by 22 appendices spread over 6 volumes so that every single detail in the study has been documented for all to see and examine. The methods and results are totally transparent. The 22 appendices and the main text exhaustively document everything involved with this study.			<a href="https://www.wind-watch.org/documents/review-of-the-cape-bridgewater-acoustic-testing-program-and-where-it-is-leading/">https://www.wind-watch.org/documents/review-of-the-cape-bridgewater-acoustic-testing-program-and-where-it-is-leading/</a>
	Exhibit CC	Schomer, Paul, Ph.D. PE, Member Board Certified Institute of Noise Control Engineering; adjunct Professor of Electrical and Computer Engineering (Acoustics) and member of the graduate faculty of the University of Illinois	Health	3	Official filing before the Public Service Commission of Wisconsin (2013)	The history of wind turbines, as young as they are, is one of ever increasing size. Current units go from 1.5 to 3.5 MW, and bigger units can be expected in the future. Larger turbines may have the advantages of greater efficiency and net profit but they create more problems for people living close by. There is strong evidence that the very low infrasound frequencies produced by large wind turbines are the sources of acoustic emission that are adversely affecting people. As the power generated by wind turbines grows, the blades grow and hence the tip's speed is reduced to avoid too high an advancing blade tip Mach number.  Ex.-Forest-Schomer-22, the increase due to a typical nighttime wind profile (the change in velocity with altitude) was 5 dB for a wind turbine with a 58 m hub height, and up to 15 dB for a turbine with a 98 m hub height. That is, the increase in low frequency energies in size and magnitude may be substantial because of this blade-loading, wind-gradient effect, much greater than what is predicted for constant blade loading. The conclusion is that unless mitigation methods and strategies can be developed and implemented, bigger turbines are not necessarily better. They may actually be much worse for people.	40		<a href="https://docs.wind-watch.org/Schomer-Highland-Testimony-130729.pdf">https://docs.wind-watch.org/Schomer-Highland-Testimony-130729.pdf</a>
		Seltenrich N.	Health	4	Wind turbines: a different breed of noise? <i>Environ Health Perspect</i> 22:A20-A25; <a href="http://dx.doi.org/10.1289/ehp.122-A20">http://dx.doi.org/10.1289/ehp.122-A20</a> (2014)	According to Jim Cummings, executive director of the nonprofit Acoustic Ecology Institute in Santa Fe, New Mexico, most of the reports to date that have concluded turbines are harmless examined "direct" effects of sound on people and tended to discount "indirect" effects moderated by annoyance, sleep disruption, and associated stress. But research that considered indirect pathways has yielded evidence strongly suggesting the potential for harm. Multiple recent studies, including one coauthored by Daniel Shepherd, senior lecturer at New Zealand's Auckland University of Technology, have demonstrated that sleep interference gets worse the nearer residents are to turbines.20,27 "Sleep is absolutely vital for an organism," he says. "When we lose a night's sleep, we become dysfunctional. The brain is an important organ, and if noise is disturbing its functioning, then that is a direct health effect."			<a href="https://ehp.niehs.nih.gov/122-A20/">https://ehp.niehs.nih.gov/122-A20/</a>
Exhibit AF		Shepherd and Billington, <i>Bulletin of Science Technology &amp; Society</i> 2011	Health	1	Evaluating the impact of wind turbine noise on health related quality of life. <i>Bulletin of Science Technology &amp; Society</i> 2011 31: 389, DOI: 10.1177/0270467611417841 (2011)	Our results suggest that utility-scale wind energy generation is not without adverse health impacts on nearby residents. Thus, nations undertaking large-scale deployment of wind turbines need to consider the impact of noise on the HRQOL of exposed individuals. Along with others,[31] we conclude that nighttime wind turbine noise limits should be set conservatively to minimize harm, and, on the basis of our data, suggest that setback distances need to be greater than 2 km in hilly terrain. Technical and health standards are not updated quickly enough and perpetually lag behind research and technological developments. In England, wind turbine noise is predicted and assessed using standards that were developed for substantially shorter wind turbines (Davis, 2007). The WHO (1999), in their publication "Guidelines for Community Noise," acknowledges that their own noise recommendations are a work in progress and that there is still much to be done.	6,562		<a href="https://stopthesethings.files.wordpress.com/2014/12/shepherd2011.pdf">https://stopthesethings.files.wordpress.com/2014/12/shepherd2011.pdf</a>

		Shepherd and Billington.	Health	1	Mitigating the Acoustic Impacts of Modern Technologies: Acoustic, Health, and Psychosocial Factors Informing Wind Farm Placement. Bulletin of Science Technology & Society DOI: 10.1177/0270467611417841 (2011)	Currently, environmental agencies, planning authorities, and policy makers in many parts of the world are demanding more information on the possible link between wind turbine noise and health in order to legislate permissible noise levels or setback distances. Concurrently, larger and noisier wind turbines are emerging, and consent is being sought for progressively larger wind turbine installations to be placed even closer to human habitats. However, the stimulus-response approach demanded by the bulk of these decision makers is misguided, and neither noise levels nor setback distances used in isolation are likely to be acceptable by society at large. We have listed a number of important considerations that need to be addressed by environmental agencies currently deciding on the location of wind turbine installations. Ultimately, however, man-made noise is rarely perceived in a social vacuum (Maris et al., 2007), and acceptable levels of wind turbine noise should be a societal, and not a technological, decision one.			<a href="https://docs.wind-watch.org/Bull-Sci-Technol-Soc-2011-Shepherd-0270467611417841.pdf">https://docs.wind-watch.org/Bull-Sci-Technol-Soc-2011-Shepherd-0270467611417841.pdf</a>
	Exhibit CD	Shepherd, Daniel PHD. Auckland University of Technology	Health	3	Statement of Evidence in Chief of Daniel Shepherd on behalf of Glenmark Community Against Wind Turbines, Inc. (2012)	Noise is a recognised environmental pollutant that degrades sleep, quality of life and general function (WHO, 1999, 2009; 2011). On the basis of data currently available in peer-reviewed scientific publications, it can only be concluded that industrial-scale wind energy generation, involving the saturation of an optimum number of wind turbines in a fixed area, is not without health impact for those residing in its proximity. Based on my experience of wind turbine noise, and my reading of the data available in the scientific literature, I recommend that all turbines displaced at least two kilometres (or more) from any dwelling be consented.	6,562		<a href="https://docs.wind-watch.org/Shepherd-Hurunui-2012.pdf">https://docs.wind-watch.org/Shepherd-Hurunui-2012.pdf</a>
		Smith, Michael et al 12th ICBen Congress on Noise as a Public Health Problem	Health	1	Wind Turbine Noise Effects on Sleep: The WITNES study	Despite the limitations of questionnaires and the study design, the present paper provides evidence that a single night of wind turbine noise at indoor levels of LAeq,8h= 31.9 dB negatively impacts self-reported sleep. This is in agreement with observations of some cross-sectional field studies [16], but contrary to studies which have found no effects [4].		32	<a href="https://docs.wind-watch.org/ICBen-2017_Smith_0515_3704.pdf">https://docs.wind-watch.org/ICBen-2017_Smith_0515_3704.pdf</a>
	Exhibit AG	Stansfeld and Matheson.	Health	1	Noise pollution: non-auditory effects on health. British Medical Bulletin, Volume 68, Issue 1, 1 December 2003, Pages 243–257	The evidence for effects of environmental noise on health is strongest for annoyance, sleep and cognitive performance in adults and children. Occupational noise exposure also shows some association with raised blood pressure. Dose-response relationships can be demonstrated for annoyance and, less consistently, for blood pressure. It is likely that children represent a group which is particularly vulnerable to the non-auditory health effects of noise. They have less cognitive capacity to understand and anticipate stressors and lack well-developed coping strategies.			<a href="https://academic.oup.com/bmb/article/68/1/243/421340">https://academic.oup.com/bmb/article/68/1/243/421340</a>
	Exhibit CE	Stelling, Keith, MA, (McMaster) MNIMH, MCPP (England) Reviewed by William K. Palmer, P. Eng. Carmen Krogh, BSc (Pharm).	Health	3	An information report prepared for the MULTIMUNICIPAL WIND TURBINE WORKING GROUP (2015)	The Multi-municipal Wind Turbine Working Group was formed by municipal councillors in Grey, Bruce, and Huron Counties in Ontario in response to the growing number of complaints they were receiving from constituents concerning the installation of industrial wind turbines throughout the area. Councillors were aware of their responsibility regarding the health, safety, and well-being of their constituents. The Multi-municipal Wind Turbine Working Group was set up to share ideas on how to fulfill that responsibility. Complaints from citizens, including reports of adverse health impacts have persisted and increased as more turbines have been installed. The reported symptoms conform to those described internationally by many people living near wind turbines.  With the proliferation of recent research and the rediscovery of earlier, until now largely ignored studies, infrasound and low frequency noise (LFN) can no longer be dismissed as irrelevant. This report shows why it must be given full consideration as a contributing cause of the distress of some of those people living near wind turbine installations. It also demonstrates why the Ontario and Canadian governments must pay attention to this research, fulfill their obligation to protect the health of our citizens and amend their wind turbine regulations and policies.			<a href="http://windvictimsontario.com/uploads/3/1/4/3/3143767/infasound_and_wind_turbines_final_version_4_august_2015.pdf">http://windvictimsontario.com/uploads/3/1/4/3/3143767/infasound_and_wind_turbines_final_version_4_august_2015.pdf</a>
	Exhibit CF	Thomas Münzel, MD,a Frank P. Schmidt, MD,a Sebastian Steven, MD,a Johannes Herzog, MD,a Andreas Dalber, PHD,a Mette Sørensen, PhDb	Health	1	Environmental Noise and the Cardiovascular System. Journal of the American College of Cardiology (2018)	With regard to understanding the pathophysiological mechanisms, a growing body of evidence finds that noise is associated with oxidative stress, vascular dysfunction, autonomic imbalance, and metabolic abnormalities, potentiating not only the adverse impact of cardiovascular risk factors, such as arterial hypertension and diabetes, but also contributing to the progression of atherosclerosis and increased susceptibility to cardiovascular events.  Thus, there is increasing rationale for studying the interaction between this novel risk factor and its collective impact			<a href="http://www.onlinejacc.org/content/accj/71/6/688.full.pdf">http://www.onlinejacc.org/content/accj/71/6/688.full.pdf</a>
	Exhibit AH	Thorne, Bulletin of Science Technology & Society 2011	Health	1	The Problems With 'Noise Numbers' for Wind Farm Noise Assessment. Bulletin of Science Technology & Society 2011 31: 262, DOI: 10.1177/0270467611412557 (2011)	The adverse effects on health of persons susceptible to noise from wind farms are examined and a hypothesis, the concept of heightened noise zones (pressure variations), as a marker for cause and effect is advanced. A sound level of LAeq 32 dB outside a residence and above an individual's threshold of hearing inside the home are identified as markers for serious adverse health effects affecting susceptible individuals. It is concluded that frequent short-term variations in air pressure (infrasound) may lead to adverse health effects in individuals. It is concluded that no large-scale wind turbine should be installed within 2,000 meters of any dwelling or noise-sensitive place unless with the approval of the landowner. "The crux of the matter is that despite all the evidence that there are a whole lot of factors which affect noise sensitivity and noise annoyance; if	6,562	32	<a href="http://journals.sagepub.com/doi/abs/10.1177/0270467611412557">http://journals.sagepub.com/doi/abs/10.1177/0270467611412557</a>
	Exhibit CG	Thorne, Robert, PhD. Principal Engineer, Noise Measurement Services Pty Ltd	Health	3	Wind Farms in a Rural Environment and Potential for Serious Harm to Human Health due to Noise. Submission to the Senate Community Affairs Committee Inquiry into the social and	My hypothesis, based on my research and assessments of rural wind farms is that an operating wind farm with no breeze or a light breeze at ground level blowing towards the residences, and with at least 3 two MW to three-MW turbines visible at distances of between 1200 metres and 2600 metres from a potentially affected population, will have: • an overall night-time residential outdoor sound level of 32dB(A) to 35 dB(A) LAeq; • a significant serious adverse effect on approximately 5% to 10% of the exposed population expressed as households; and • a significant nuisance adverse effect on approximately 20% of the exposed population expressed as households; and • a 'more than minor' effect on 50% of the exposed population expressed as households.	7,800	32	<a href="https://waubrafoundation.org.au/wp-content/uploads/2013/07/No-112-Robert-Thorne-Acoustician.pdf">https://waubrafoundation.org.au/wp-content/uploads/2013/07/No-112-Robert-Thorne-Acoustician.pdf</a>
		Thorsson, Pontus. Division of Applied Acoustics, Chalmers University of Technology and Kerstin Persson Waye,			Low-frequency outdoor-indoor noise level difference for wind turbine assessment. The Journal of the Acoustical Society of America > Volume 143, Issue 3 >	Disturbed sleep in the long term may, even without being consciously perceived, contribute toward negative health outcomes. It is therefore of interest to further objectively identify the effects of WTN on sleep. This requires increased knowledge on sound immission from wind turbines, resulting in low-frequency noise exposure in the home environment. The current paper describes a model spectrum for creating indoor wind turbine sound with the outdoor sound as input, described as an outdoor-indoor noise level difference as a function of frequency. Within the project, called Wind Turbine Noise Effects on Sleep (WITNES),4 the model is used to investigate human physiological reactions			<a href="https://asa.scitation.org/doi/10.1121/1.5027018">https://asa.scitation.org/doi/10.1121/1.5027018</a>
		Tran Ba Huy, Patrice; and French Academy of Medicine	Health	3	Health nuisances of onshore wind turbines. French Academy of Medicine (2017)	The new report of the National Academy of Medicine, adopted on 9 May 2017, recommends reducing the emergence trigger level to 30 dB (A) outside dwellings and 25 dB (A) to I inside.		25	<a href="https://patch.com/massachusetts/falmouth/french-academy-medicine-declare-wind-turbines-health-nuisance">https://patch.com/massachusetts/falmouth/french-academy-medicine-declare-wind-turbines-health-nuisance</a>
		U.S. Environmental Protection Agency	Health	3	Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with Adequate Margin of Safety (1974)	Recommends that indoor day-night-level (DNL) not exceed 45 dBA. DNL is a 24-hour average that gives 10 dB extra weight to sounds occurring between 10p.m. and 7 a.m., on the assumption that during these sleep hours, levels above 35 dBA indoors may be disruptive.		35	<a href="http://www.noise.org/library/levels74/levels74.htm">www.noise.org/library/levels74/levels74.htm</a>
		Vahl et al. Ilgemeine-Zeitung - Michael Bermeitinger - March 5, 2018	Health	1	Wind power jammers for the heart: Mainz researchers investigate the consequences of Infraschalls (2018)	German researchers have proven that the infrasound linked to the turbines can cause a decrease in the force of contraction in heart muscle up to 20 percent. In a person with a healthy heart, this would not normally be a problem, but in someone with heart failure, or a weakened heart from infection or a prior heart attack this could be potentially fatal.			<a href="http://www.allgemeine-zeitung.de/lokales/mainz/nachrichten-mainz/stoersender-fuers-herz-muskel-verliert-an-kraft-forscher-der-mainzer-herzchirurgie-untersuchen-folgen-des-infraschalls-durch-windkraftanlagen_18566513.htm">http://www.allgemeine-zeitung.de/lokales/mainz/nachrichten-mainz/stoersender-fuers-herz-muskel-verliert-an-kraft-forscher-der-mainzer-herzchirurgie-untersuchen-folgen-des-infraschalls-durch-windkraftanlagen_18566513.htm</a>

Exhibit AB		Walker, Hessler, Hessler, Rand, and Schomer.	Health	3	A Cooperative Measurement Survey and Analysis of Low Frequency and Infrasound at the Shirley Wind Farm in Brown County, Wisconsin (2012)	The Cooperative Measurement Survey confirmed the presence of high enough levels of infrasound in the homes near the Shirley wind industrial turbine to warrant the conclusion that "enough evidence and hypotheses have been given herein to classify low frequency noise and infrasound as a serious issue". With the Hessler recommendation, the long-term-average (2 week sample) design goal for sound emissions attributable to the array of wind turbines, exclusive of the background ambient, at all non-participating residences shall be 39.5 dBA or less. With the Schomer recommendation, and in the presence of a forced decision, the long-term-average (2 week sample) design goal for sound emissions attributable to the array of wind turbines, exclusive of the background ambient, at all non-participating residences shall be 33.5dBA or less.	7,000	33.5		<a href="https://apps.psc.wi.gov/vs2015/erf_view/viewdoc.aspx?docid=178263">https://apps.psc.wi.gov/vs2015/erf_view/viewdoc.aspx?docid=178263</a>
Exhibit AC		Wang, Geography, Environment and Population at the University of Adelaide	Health	1	Evaluation of Wind Farm Noise Policies in South Australia - a Case Study of Waterloo Wind Farm (2011)	The survey was made in the vicinity of the Waterloo wind farm, South Australia, which is composed of 37 Vestas V90 3 MW turbines stretching over 18 km. These mega turbines are reported to be emitting more low frequency noise (LFN) than smaller models, and this causes more people to be affected, and over greater distances, by the usual symptoms of the Wind Turbine Syndrome (WTS): insomnia, headaches, nausea, stress, poor ability to concentrate, irritability, etc., leading to poorer health and a reduced immunity to illness.	16,368			<a href="http://www.windturbinesyndrome.com/wp-content/uploads/2012/03/Evaluation-of-Wind-Farm-Noise-Policies-in-South-Australia-Waterloo-Case-Study.pdf">http://www.windturbinesyndrome.com/wp-content/uploads/2012/03/Evaluation-of-Wind-Farm-Noise-Policies-in-South-Australia-Waterloo-Case-Study.pdf</a>
	Exhibit CH	Whisson, Max MB,BS FRCPath, Pathologist	Health	4	Wind power and ecology. Nature and Society, October-November 2011, pp. 7-9. (2011)	Putting all this together, it seems obvious to me that there is a very urgent need to study disease rates and death rates in the areas near wind farms and in	6,562			<a href="https://docs.wind-watch.org/Nature-Society-Nov-2011.pdf">https://docs.wind-watch.org/Nature-Society-Nov-2011.pdf</a>
		World Health Organization	Health	3	The Burden of Disease from Environmental Noise (2011)	There is sufficient evidence from large-scale epidemiological studies linking the population's exposure to environmental noise with adverse health effects. Therefore, environmental noise should be considered not only as a cause of nuisance but also a concern for public health and environmental health.				<a href="https://wauabrafoundation.org.au/wp-content/uploads/2013/06/WHO-Environmental-Noise-Disease.pdf">https://wauabrafoundation.org.au/wp-content/uploads/2013/06/WHO-Environmental-Noise-Disease.pdf</a>
		Zou, Eric - Department of Economics, University of Illinois at Urbana-Champaign	Health	1	Wind Turbine Syndrome: The Impact of Wind Farms on Suicide	Wind farms lead to significant increases in suicide. Three indirect tests of the role of low-frequency noise exposure were evaluated. First, the suicide effect concentrates among individuals who are vulnerable to noise-induced illnesses, such as the elderly. Second, the suicide effect is driven by days when wind blows in directions that would raise residents' exposure to low-frequency noise radiation. Third, data from a large-scale health survey suggest increased sleep insufficiency as new turbines began operating. These findings point to the value of noise abatement in future				<a href="https://docs.wind-watch.org/Zou-suicide-2017-Oct.pdf">https://docs.wind-watch.org/Zou-suicide-2017-Oct.pdf</a>
		Chalmers Ph.D., James The Appraisal Journal	Property Value	1	High-Voltage Transmission Lines and Rural, Western Real Estate Values (2012)	The study looks at the impact of transmission lines on sale prices and time on the market. It reports the findings of an 11-year study of property sales across 640 miles and 15 counties in Montana. The study includes sales of rural subdivisions and agricultural, recreational and mixed-use properties; prior transmission line studies have focused on densely populated urban areas. In the study, sale prices of recreational and agricultural property were not affected by the presence of transmission lines, while some residential properties near transmission lines sold for 20 to 50 percent less than comparable residential properties. The study also finds that smaller properties are more vulnerable to transmission line impact; Chalmers observes that with "larger properties, there is a greater likelihood that the location of the lines will not interfere with the use of the property."			\$150,000	<a href="https://www.appraisalinstitute.org/power-lines-impact-on-sales-depends-on-property/">https://www.appraisalinstitute.org/power-lines-impact-on-sales-depends-on-property/</a>
		de Groot, Henri, University of Amsterdam Vor, Friso, Amsterdam School of Real Estate	Property Value	1	The Impact of Industrial Sites on Residential Property Values: A Hedonic Pricing Analysis from the Netherlands	In accordance with previous hedonic pricing studies, our results clearly show that the presence of an industrial site has a statistically significant negative effect on the value of residential properties: housing prices rise with increasing distance to its nearest industrial site. However, in contrast to previous hedonic pricing studies that we know of, we employ a logistic functional form to reveal the nature of the effect of distance-to-site on housing prices. This leads to a relationship between distance and residential property prices which is best described as "dichotomous": relatively close to a site, negative externalities have a strong hampering effect on housing prices which convexly decreases up to a certain distance. Beyond this point, in our case 1,093 metres, the hampering effect on housing prices concavely decreases till it fades out with increasing distance. Furthermore, we find that the effect of site size intervenes with the effect of distance on housing price, in the sense that this interactive effect affects the maximum variation of the distance effect: the larger the site, the larger the range of houses which are affected by the presence of the industrial site concerned.	3,279			<a href="https://www.researchgate.net/publication/227360465_The_Impact_of_Industrial_Sites_on_Residential_Property_Values_A_Hedonic_Pricing_Analysis_from_the_Netherlands">https://www.researchgate.net/publication/227360465_The_Impact_of_Industrial_Sites_on_Residential_Property_Values_A_Hedonic_Pricing_Analysis_from_the_Netherlands</a>
		Forbes	Property Value	4	Do Wind Turbines Lower Property Values?	Perhaps most importantly, wind farms flicker, make noise, cause health problems, and can be "visual intrusions," so their impact on property values, especially as wind power grows, is increasingly concerning.				<a href="https://www.forbes.com/sites/judeclemente/2015/09/23/do-wind-turbines-lower-property-values/amp/">https://www.forbes.com/sites/judeclemente/2015/09/23/do-wind-turbines-lower-property-values/amp/</a>
Exhibit AI		Gibbons, Stephen. London School of Economics	Property Value	1	Gone with the wind: valuing the local impacts of wind turbines through house prices. London School of Economics Spatial Economics Research Centre (2013)	The London School of Economics, which looked at more than a million sales of properties close to wind farm sites over a 12-year period, found that values of homes within 1.2 miles were being slashed by about 11 percent. Results based on comparison of operational sites and those refused planning permission suggest that these full impacts could be much bigger – the upper-bound estimate is about 15% within 2km of the average wind farm. Further data collection effort is required to fully address these issues.	6,562		\$45,000	<a href="http://personal.lse.ac.uk/gibbons/papers/windfarms%20and%20Houseprices%20November%202013%20v5.pdf">http://personal.lse.ac.uk/gibbons/papers/windfarms%20and%20Houseprices%20November%202013%20v5.pdf</a>
Exhibit AJ		Heintzelman & Tuttle Ph.D. School of Business, Clarkson University	Property Value	1	Values in the Wind: A Hedonic Analysis of Wind Power Facilities. School of Business, Clarkson University (2011)	From the repeat sales model we see that the construction of turbines such that for a given home the nearest turbine is now only 0.5 miles away results in a 10.87%-17.77% decline in sales price depending on the initial distance to the nearest turbine and the particular specification. For the average property in our sample that sells for \$106,864, this implies a loss in value of between \$11,616 and \$18,990. At a distance of 1 mile (about 20% of our sample), we see declines in value of between 7.73% and 14.87% resulting in losses for the average home of between \$8,261 and \$15,891. From a policy perspective, these results indicate that there remains a need to compensate local homeowners/communities for allowing wind development within their borders. This suggests that landowners, particularly those who do not have turbines on their properties and are thus not receiving direct payments from wind developers, are being harmed and have an economic case to make for more compensation.	5,280		\$44,610	<a href="http://www.iicusa.org/wp-content/uploads/2011/03/Values-in-the-Wind.pdf">http://www.iicusa.org/wp-content/uploads/2011/03/Values-in-the-Wind.pdf</a>

		Huron-Kinloss Township	Property Value	3	Case Study: Impact of a Wind Turbine Project on a Rural Community. Study Location: Suncor/Acciona Ripley Wind Project (2013)	It documents the situations and current status of 12 properties within the Ripley project area. Prior to the construction of the wind turbines, this area of Huron-Kinloss Township southwest of the village of Ripley was largely used for cash cropping but also included a large beef operation and two horse farms. Both livestock operations are now gone. Many homes had been separated from the adjoining farmland and sold as rural retreats or small hobby farms. Many of these homes are now vacant or demolished.			<a href="https://docs.wind-watch.org/ripley-case-study.pdf">https://docs.wind-watch.org/ripley-case-study.pdf</a>	
Exhibit AK		Interstate Informed Citizens Coalition, Inc.	Property Value	4	Property Values - Interstate Informed Citizens Coalition, Inc.	This summarizes research on property values and discusses the limitations of the research leveraged by energy corporations to counter property value losses. Close proximity to a cluster of industrial wind turbines has been shown to cause a severe decrease in residential property values. In other states, homes located within 2 miles of an industrial wind park have incurred a decrease in value between 20 – 45%. In fact, 12 homes located within a 36 turbine cluster in Canada have become unmarketable, forcing the owners to abandon their homes due to the noise, shadow flicker, and health related impacts of the turbines.	10,560		<a href="http://iicusa.org/key-impacts/property-values/">http://iicusa.org/key-impacts/property-values/</a>	
Exhibit AL		Lansink, Ben AAI, P.App, MRICS	Property Value	1	CASE STUDIES Diminution in Price Melancthon and Clear Creek	This study analyzes specific examples that occurred within the open real estate market in order to isolate the impact on property value caused by a wind turbine. Market evidence suggests that 'dwelling properties' will be harmed or injured by the construction, use, and maintenance of wind turbines situated in the vicinity. Real or perceived nuisances resulting from wind turbines produces buyer resistance that results in price diminution. Clear Creek with 18 turbines had an average/median decline in value of 33% - 35%, with the greatest loss being 55%. Melancthon with 133 turbines had an average/median decline in value of 37%-39% with the greatest loss being 58%.	2,531	\$174,000	<a href="http://www.lansinkappraisals.com/downloads/CaseStudy_DiminutionInValue_InjuriesAffection_WindTurbines.pdf">http://www.lansinkappraisals.com/downloads/CaseStudy_DiminutionInValue_InjuriesAffection_WindTurbines.pdf</a>	
		Maturen, David Certified General Real Estate Appraiser, Kalamazoo County Commissioner	Property Value	3	Impact of Wind Turbine Generators on Property Values - Michigan Real Estate Appraisers (2005)	Impact of Wind Turbine Generators on Property Values – A report prepared by Michigan Real Estate Appraisers on the impact of Wind Turbines on property values.			<a href="http://iicusa.org/wp-content/uploads/2011/03/Proper-Value-Report.pdf">http://iicusa.org/wp-content/uploads/2011/03/Proper-Value-Report.pdf</a>	
Exhibit AM		McCann, Michael	Property Value	1	Michael McCann Literature Review. Windwise Massachusetts (2012)	McCann Summarizes Property Value Studies. Summarizes independent studies and wind energy funded studies with impacts up to 59%.			<a href="https://windwisema.org/mccann-summarizes-property-value-studies/">https://windwisema.org/mccann-summarizes-property-value-studies/</a>	
Exhibit AN		McCann, Michael	Property Value	1	PROPERTY VALUE IMPACT & ZONING EVALUATION Industrial Scale Wind Energy Mason County, Kentucky (2014)	McCann 2012 Study - Lee & DeKalb Counties (Slide 16-18) <ul style="list-style-type: none"> <li>Detailed Paired Sales analysis</li> <li>Target &amp; Control sale data selected on basis of sales near turbines (Target) being paired with comparable sales (Control) at much greater distances</li> <li>Target sales average distance = 2,618 feet</li> <li>Control sales average distance = 10.1 miles</li> <li>Current empirical data finds 23% to 33% (avg. 26%) impact from inadequate setbacks</li> </ul> OVERALL RESEARCH CONCLUSION Setbacks of less than 2-3 miles are inadequate to avoid significant loss of value, or impaired use & enjoyment of neighboring property ü If Projects are approved as typically proposed, the most proximate residential properties will experience a range of value impact from (25%) at 2-3 miles, to (40%) typical setback ranges proposed by developers	15,840	\$120,000	<a href="http://docs.wind-watch.org/McCann-Mason-County-Kentucky-Value-Impact-May-12-2014.pdf">http://docs.wind-watch.org/McCann-Mason-County-Kentucky-Value-Impact-May-12-2014.pdf</a>	
Exhibit AO		McCann, Michael	Property Value	4	Wind turbines blow down property value (2012)	The data tends to support a range of 25% to 40% devaluation, although with so many homes abandoned after the development and operation of nearby turbines, <b>the loss of equity is sometimes total</b>	10,560	\$120,000	<a href="https://www.windturbinesyndrome.com/2012/wind-turbines-blow-down-property-value-says-expert/">https://www.windturbinesyndrome.com/2012/wind-turbines-blow-down-property-value-says-expert/</a>	<a href="http://www">http://www</a>
		McCann, Michael	Property Value	3	Public testimony to Adams County Board, Quincy IL	Real estate sale data typically reveals a range of 25% to approximately 40% of value loss, with some instances of total loss as measured by abandonment and demolition of homes, some bought out by wind energy developers and others exhibiting <b>nearly complete loss of marketability.</b>		\$120,000	<a href="http://www.windaction.org/posts/26696-testimony-of-michael-mccann-on-property-value-impacts-in-adams-county-il#.Wv1y1J7nsY">http://www.windaction.org/posts/26696-testimony-of-michael-mccann-on-property-value-impacts-in-adams-county-il#.Wv1y1J7nsY</a>	
Exhibit AP		Ontario Superior Court of Justice	Property Value	2	Court Ruling	An Ontario Superior Court of Justice has determined that landowners living near industrial wind turbine projects do suffer from diminished property values. The court accepts that 22% to 55% loss of property values is occurring today.	4,921	\$165,000	<a href="http://www.farms.com/ag-industry-news/ontario-court-says-wind-turbines-reduce-property-values-882.aspx">http://www.farms.com/ag-industry-news/ontario-court-says-wind-turbines-reduce-property-values-882.aspx</a>	
		Reardon, Peter	Property Value	1	The Impact of Wind Turbine Developments on Surrounding Rural Land Values	Wind turbines resulted in a negative impact on marketability and the value of properties to varying degrees. Discounts in value as identified of 33% & 60% in the market place cannot be ignored. Our initial findings detail that the marketability of certain properties (especially those with lifestyle appeal and/or residential improvements) to be the most severely impacted upon by wind turbine developments. This detriment appears to occur from the initial time that a proposal has been advertised within a locality. The public knowledge of the potential for this type of development appears to create some uncertainty in the market place as to the impact that these potential future developments will have.		\$180,000	<a href="http://docs.wind-watch.org/Reardon_Impact-of-Wind-Farm-Development-on-Land-Values_2013.pdf">http://docs.wind-watch.org/Reardon_Impact-of-Wind-Farm-Development-on-Land-Values_2013.pdf</a>	
Exhibit AQ		Sunak & Madlener, RWTH Aachen University	Property Value	1	The Impact of Wind Farms on Property Values: A Geographically Weighted Hedonic Pricing Model	The wind-farm-related variables showed consistent results in terms of significance and signs. Most importantly, according to the global OLS results in model 1A, the proximity to a wind farm negatively affects the property price (.209). In other words, a one percent increase in distance to the wind farm increases the price by about 0.209%, vice versa proximity decreases the price. Substituting the distance measure in model 1A by distance dummies yields comparable results. Thus, proximity to the wind farm negatively affects the property values within the first two kilometers (-.252).	6,562	\$75,000	<a href="http://puc.sd.gov/commission/dockets/electric/2017/e17-055/exhibit16.pdf">http://puc.sd.gov/commission/dockets/electric/2017/e17-055/exhibit16.pdf</a>	
Exhibit AR		Wisconsin Realtors Association	Property Value	2	New Wind Farm Regulations Could Decrease Property Values (2010)	Wisconsin Realtors Association: A study of three Wisconsin wind farms showed that prospective buyers had a negative perception of nearby wind turbines (with an) average decrease in vacant residential property values ranging from 12 percent to 40 percent. According to a survey of REALTORS® working in a wind turbine area, the impact on neighboring vacant land ranges from a 43 percent decrease if the wind turbine is located very close (within 600 feet) to 29 percent if the turbine is located in near proximity (½ mile away). With respect to the impact on improved property, the impacts are believed to be similar, but slightly lower (39 percent and 24 percent, respectively).	2,640	\$129,000	<a href="http://www.wra.org/WREM/Sept10/WindFarmRegulations/">www.wra.org/WREM/Sept10/WindFarmRegulations/</a>	
		Zarem, Kevin, MAI. President of Metropolitan Appraisal, Mequon, Wisconsin	Property Value	3	Direct Testimony to Public Service Commission of Wisconsin	In specific circumstances, negative impacts from the project due to view loss alone, may cause 17-20% land value loss. Although wind turbine noise could contribute to negative residential property values, as could the motion and shadows of the wind turbines, no consideration of potential value loss due to wind turbine noise, motion or shadows is included in the analysis. Only view loss was considered and analyzed.		\$60,000	<a href="http://www.ppdlw.org/articles/Zarem%20Amended%20Testimony%20Wisconsin%20Public%20Service%20Commission.pdf">http://www.ppdlw.org/articles/Zarem%20Amended%20Testimony%20Wisconsin%20Public%20Service%20Commission.pdf</a>	
Exhibit AS		Caithness Windfarm Information Forum 2018 www.caithnesswindfarms.co.uk	Safety	3	Summary of Wind Turbine Accident data to 31 March 2018 Caithness Windfarm Information Forum (2018)	By far the biggest number of incidents found was due to blade failure. "Blade failure" can arise from a number of possible sources, and results in either whole blades or pieces of blade being thrown from the turbine. A total of 381 separate incidences were found.  Pieces of blade are documented as travelling up to one mile. In Germany, blade pieces have gone through the roofs and walls of nearby buildings. This is why CWIF believe that there should be a minimum distance of at least 2km between turbines and occupied housing, in order to adequately address public safety and other issues including noise and shadow flicker.	6,562		<a href="http://www.caithnesswindfarms.co.uk/accidents.pdf">http://www.caithnesswindfarms.co.uk/accidents.pdf</a>	

Exhibit AT		Campbell, Shawn	Safety	4	Annual blade failures estimated at around 3,800. Wind Power Monthly (2015)	Wind turbine rotor blades are failing at a rate of around 3,800 a year, 0.54% of the 700,000 or so blades that are in operation worldwide. The figures, from research carried out by renewable energy underwriter GCube, were delivered by Andrew Bellamy, former head of Areva's BMW blade programme				<a href="https://www.windpowermonthly.com/article/1347145/annual-blade-failures-estimated-around-3800">https://www.windpowermonthly.com/article/1347145/annual-blade-failures-estimated-around-3800</a>
Exhibit AU		Peterson, Katie. Rochelle News	Safety	4	A Whirlwind of Problems. Rochelle News (2017)	Five years ago a wind turbine was erected at Eswood Elementary School with hopes to take the school off the grid and cover energy costs. The wind turbine could be seen spinning in the wind, it never fulfilled its purpose or produced any energy for the school. Instead the turbine stood behind the school and was a nuisance and danger. On Wednesday, May 17, 2017 the turbine may have been struck by lightning and the braking systems failed. The turbine began to spin very fast (out of control) and continued until Thursday, May 18, at 4:30 p.m. At least one blade was destroyed, as the braking system had failed," explained Schwartz. "On Thursday, control was gained of the turbine and the turbine was yawed out of the wind to prevent it from spinning. Rockwind Inc. had Aero Energy put in a locking pin in the turbine [on Tuesday, May 23] to prevent the turbine from spinning as the braking system does not function." After the incident Swartz had to block off part of the school and outside area to prevent someone from getting injured as chunks were falling off the blade.				<a href="https://www.wind-watch.org/news/2017/09/20/a-whirlwind-of-problems/">https://www.wind-watch.org/news/2017/09/20/a-whirlwind-of-problems/</a>
Exhibit AV		Rogers, Slegers, and Costello. School of Aerospace Engineering, Georgia Institute of Technology and School of Mechanical and Aerospace Engineering, University of Alabama	Safety	1	A Method For Determining Wind Turbine Setbacks. Wind Energy. Published online in Wiley Online Library DOI: 10.1002/we.468 (2011)	1389 feet for a 201 foot tower based on a 6 foot long segment. Author notes, "only the smallest fragment size of concern should be used in the proposed method of setback determination, since in general, the smallest fragments will fly farthest because of higher release velocities at the fragment mass center. Thus, all larger fragments will have a lower probability of impact outside the computed setback distance. It is important to note that rotor overspeed situations can lead in some cases to blade throw and are not taken into account in the setback development proposed here." IS 201 HUB HEIGHT OR TO TIP OF BLADE... WAITING FOR CONFIRMATION	1,389			<a href="http://camm.gatech.edu/images/7/7a/Wind_Turbine.pdf">http://camm.gatech.edu/images/7/7a/Wind_Turbine.pdf</a>
Exhibit AW		Sarlak, Hamid, and Sørensen, Jens Department of Wind Energy, Technical University of Denmark	Safety	1	Analysis of throw distances of detached objects from horizontal-axis wind turbines. Wind Energy 2016; 19:151–166. DOI: 10.1002/we.1828. (2016)	Maximum throw distances obtained at different tip speeds and detachment sizes were analyzed, and it was shown that the tip speed plays the most important role in the throw distance. From the full-blade throw analysis, it was shown that, when released at extreme tip speeds, throw distance picks up more rapidly with the tip speed rather than throw at lower tip speeds (looking at the absolute throw distances). The considered [thrown] full-blade pieces reached approximately 700, 900 and 2000 m at tip speeds of 70, 100 and 150 m/s, respectively. For normal tip speeds (figs 4 and 5), the potential blade throw distance for a 2.3-MW turbine was calculated to be ~500 m (1,500 ft) and for a 5-MW turbine ~900 m (2,700 ft). At "extreme" tip speeds (fig 6) the corresponding distances were 800 m (2,400 ft) and 1500 m (4,500 ft)	4,500			<a href="https://docs.wind-watch.org/Sarlak_et_al-2016-throw-distances.pdf">https://docs.wind-watch.org/Sarlak_et_al-2016-throw-distances.pdf</a> <a href="https://online.library.wiley.com/doi/abs/10.1002/we.1828">https://online.library.wiley.com/doi/abs/10.1002/we.1828</a>
		Seifert, Westerhellweg, and Kröning	Safety	1	Risk Analysis of Ice Throw from Wind Turbines (2003)	If a wind turbine operates in icing conditions which are described in [1], two types of risks may occur if the rotor blades collect ice. The fragments from the rotor are thrown off from the operating turbine due to aerodynamic and centrifugal forces or they fall down from the turbine when it is shut down or idling without power production. The experience and the results of many calculations show that during operation small fragments are hitting the ground in a larger distance than those with a big area whereas from stopped turbines the larger pieces can be transported wider than small ones.				<a href="http://citeseerx.ist.psu.edu/viewdoc/download?jessionid=C83DC23B5CACE9C7B4A E77A34C8E8FF0?doi=10.1.1.630.6816&amp;rep=rep1&amp;type=pdf">http://citeseerx.ist.psu.edu/viewdoc/download?jessionid=C83DC23B5CACE9C7B4A E77A34C8E8FF0?doi=10.1.1.630.6816&amp;rep=rep1&amp;type=pdf</a>
Exhibit AX		Stop These Things March 2018	Safety	4	New Ice Age Begins: Ice Chunks Thrown from Wind Turbines Threaten Lives, Smashing Buildings and Passing Trucks (2018)	We'd only just reported on the frozen and potentially lethal chunk lobbed at College Students in Gardner, Massachusetts, when yet another report of ice being slung from turbine blades appeared. This time it's a truck and its driver that turned into a frightening form of renewable 'targets'.				<a href="https://stopthesethings.com/2018/03/13/new-ice-age-begins-ice-chunks-thrown-from-wind-turbines-threaten-lives-smashing-buildings-and-passing-trucks/">https://stopthesethings.com/2018/03/13/new-ice-age-begins-ice-chunks-thrown-from-wind-turbines-threaten-lives-smashing-buildings-and-passing-trucks/</a>
Exhibit AY		StopTheseThings Feb 22, 2018	Safety	4	Deadly Cool: Wind Turbine Throws Ice Chunks Into US College (2018)	Placing wind turbines that close to buildings, where people congregate in numbers, was hardly sensible. But that's what happens when you sign up to the wind cult: common sense, logic and reason are soon sacrificed on the altar of eco-lunacy. Next time it might not be just a deadly chunk of ice, next time it could be a chunk of blade or the whole thing that spears through their roof, or impales a Professor in the parking lot. But at least the victims will know that they've taken one for the planet.				<a href="https://stopthesethings.com/2018/02/22/deadly-cool-wind-turbine-throws-ice-chunks-into-us-college/">https://stopthesethings.com/2018/02/22/deadly-cool-wind-turbine-throws-ice-chunks-into-us-college/</a>
Exhibit AZ		BBC News - Scotland Politics	Government	3	Planning for wind farms must be "urgently addressed" say MSPs (2014)	The Scottish government has proposed increasing the separation distance between wind farms and local communities from 2km to 2.5km though in reality the current 2km separation distance is often shamefully ignored during the planning process. "We are taking an evidence-based approach to our policy on unconventional gas and wind energy development" Scottish government spokesman	8,202			<a href="http://www.bbc.co.uk/news/uk-scotland-scotland-politics-26579733">http://www.bbc.co.uk/news/uk-scotland-scotland-politics-26579733</a>
Exhibit BA		Boone County, IL	Government	3	Boone County Votes For Increased Wind Turbine Setbacks Based On Property Lines	All wind turbines must be placed at a minimum of 2640 feet from a PROPERTY LINE. Waivers are allowed, which can reduce the turbine setback down to 1,500 feet from a residence ONLY if the host or neighbor agrees to the wind energy company's waiver. 1,500 feet from a residence is the minimum distance allowed. The waivers would be negotiated with individual neighbors and land owners. Setbacks from roads or easement are now set at twice the turbine height. The specific problems with location of wind turbines near human populations are as follows: 1.) Health of nearby residents at serious risk. 2.) Property Values: Homes situated near wind turbines are difficult to sell, take longer to sell, and sell at much lower prices than homes which are not impacted by wind turbine noise, shadow flicker, and "industrial" view of the surroundings. 3.) Turbine malfunctions, fires, sudden catastrophic blade failures: Wind turbine manuals (from 2006) detail that workers should "run upwind" a minimum distance of 500 meters (1640 feet) from a wind turbine which is on fire or in danger of blade failure to avoid the danger of flying debris.	2,640			<a href="http://edgarcountywatchdogs.com/2015/11/boone-county-votes-for-increased-wind-turbine-setbacks-based-on-property-lines/">http://edgarcountywatchdogs.com/2015/11/boone-county-votes-for-increased-wind-turbine-setbacks-based-on-property-lines/</a>
Exhibit BB		Chowan County, NC	Government	3	Chowan Wind Energy Facilities Ordinance Review	Review of County 2013 Wind Ordinance Recommendations: A property value guarantee, 5,280 foot setback from all non-participating property lines, and acoustical limit of 35 dBA at all non-participating property lines	5,280	35		<a href="http://wiseenergy.org/Energy/Timbermill/Planning_Board_Presentation.pdf">http://wiseenergy.org/Energy/Timbermill/Planning_Board_Presentation.pdf</a>
Exhibit BC		Edwards, Jonathan, Member of Parliament for Carmarthen East and Dinefwr	Government	3	Member of Parliament calls for 2km setbacks (United Kingdom)	"I am totally outraged that genuine concerns that have been brought to the attention of Statkraft have been ignored and the company are refusing to take responsibility for the distress they are causing my constituents. It is for exactly this sort of reason that Rhodri and I have been campaigning for the establishment of a 2k buffer zone to be established for wind farm developments."	6,562			<a href="https://www.windturbinesyndrome.com/2010/member-of-parliament-calls-for-2km-setbacks-united-kingdom/">https://www.windturbinesyndrome.com/2010/member-of-parliament-calls-for-2km-setbacks-united-kingdom/</a>
Exhibit BD		Gaudreault, Sylvain Minister of Municipal Affairs, Regions and Land Occupancy	Government	3	Quebec bans wind turbines within 2 km of homes and 1 km of public roads (2013)	The territory of Haut-Saint-Laurent, this revised version of RCI forbids the erection of wind turbines 2000 m (2 km) from any dwelling and 1000 m (1 km) from any public road. The new version of RCI also seeks to protect agricultural fields, cultivated floodplains, and woodlands, as well as bike lanes from the presence of wind turbines.	6,562			<a href="http://www.windturbinesyndrome.com/2013/quebec-bans-wind-turbines-within-2-km-of-homes-and-1-km-of-public-roads-canada/">http://www.windturbinesyndrome.com/2013/quebec-bans-wind-turbines-within-2-km-of-homes-and-1-km-of-public-roads-canada/</a>
		Kirby Mountain	Government	3	Wind Turbine Setbacks and Noise Regulations Since 2010	Wind Turbine Setbacks and Noise Regulations Since 2010 - all trend toward increasing setbacks and decreasing sound thresholds.				<a href="http://kirbymnt.blogspot.com/2014/10/wind-turbine-setback-and-noise.html">http://kirbymnt.blogspot.com/2014/10/wind-turbine-setback-and-noise.html</a>

	Laurie, Sarah MD Medical Director, Waubra Foundation	Government	3	Submission to the Joint Senate Committee on Australia's Clean Energy Future Legislation (2011)	On the basis of our field research, the Waubra Foundation recommends a distance of 10 kilometres, as that is the outer limit of where people are currently reliably reporting symptoms which correlate with wind turbine operation.	32,808		<a href="http://www.windturbinesyndrome.com/2011/physician-calls-for-10-km-setbacks-australia/">http://www.windturbinesyndrome.com/2011/physician-calls-for-10-km-setbacks-australia/</a>
	New South Wales. Parliament. Legislative Council. General Purpose Standing Committee No. 5	Government	3	Legislative Council - Rural Wind Farms (2009)	Recommendation 7 - That the Minister for Planning include a minimum setback distance of two kilometres between wind turbines and residences on neighbouring properties in the NSW Planning and Assessment. The guidelines should also identify that the minimum setback of two kilometres can be waived with the consent of the affected neighbouring property owner.	6,562		<a href="http://www.windturbinesyndrome.com/wp-content/uploads/2009/12/Australia-wind-farm-report-12-18-09.pdf">www.windturbinesyndrome.com/wp-content/uploads/2009/12/Australia-wind-farm-report-12-18-09.pdf</a>
Exhibit CI	Poland National Institute	Government	3	Position of the National Institute	The National Institute of Public Health – National Institute of Hygiene is of the opinion that wind farms situated too close to buildings intended for permanent human occupation may have a negative impact on the well-being and health of the people living in their proximity. The human health risk factors that the Institute has taken into consideration in its position are as follows: - the emitted noise level and its dependence on the technical specifications of turbines, wind speed as well as the topography and land use around the wind farm, - aerodynamic noise level including infrasound emissions and low-frequency noise components, - the nature of the noise emitted, taking into account its modulation/impulsive/tonal characteristics and the possibility of interference of waves emitted from multiple turbines, - the risk of ice being flung from rotors, - the risk of turbine failure with a rotor blade or its part falling, - the shadow flicker effect, - the electromagnetic radiation level (in the immediate vicinity of turbines), - the probability of sleep disruptions and noise propagation at night, - the level of nuisance and probability of stress and depression symptoms occurring (in consequence of long exposure), related both to noise emissions and to non-acceptance of the noise source. <b>The Institute recommends 2 km as the minimum distance of wind farms from buildings.</b>	6,562		<a href="http://www.pzh.gov.pl/en/position-of-the-national-institute-of-public-health-national-institute-of-hygiene-on-wind-farms/">http://www.pzh.gov.pl/en/position-of-the-national-institute-of-public-health-national-institute-of-hygiene-on-wind-farms/</a>
	Shain, Martin Bulletin of Science Technology & Society	Government	1	Public Health Ethics, Legitimacy, and the Challenges of Industrial Wind Turbines: The Case of Ontario, Canada Bulletin of Science Technology & Society, 2011 31: 256, DOI: 10.1177/0270467611412552 (2011)	This article reviews public health ethics justifications for the licensing and installation of IWTs. It concludes that the current methods used by government to evaluate licensing applications for IWTs do not meet most public health ethical criteria. Furthermore, these methods are contrary to widely held fundamental principles of administrative law and governmental legitimacy.			<a href="http://journals.sagepub.com/doi/pdf/10.1177/0270467611412552">http://journals.sagepub.com/doi/pdf/10.1177/0270467611412552</a>
Exhibit BE	Spencer, Jack Wisconsin Capital confidential	Government	3	Wisconsin Wind Turbines Declared Health Hazard (3)	The wind plant has been studied and studied. The micro barometers confirmed that the wind turbine tones propagated out about four miles and that there were complaints that could be linked to that data.  They found that there were tones of infrasound and low frequency noise as far away as 6.2 miles from the nearest wind turbine," Tibbetts said. "There were no complaints associated with the home that was 6.2 miles away, but there were complaints associated with one 4.2 miles away. We have 80 people on record who have made health complaints, including a nurse who is going deaf. We can't just ignore this.	22,176		<a href="http://www.michiganapitolconfidential.com/20690">http://www.michiganapitolconfidential.com/20690</a>
	Vermont Department of Health	Government	3	Wind Turbine Noise & Human Health: A Review of the Scientific Literature	The Vermont Department of Health recommended in its 2010 review that in order to prevent sleep disturbance (and secondary health effects associated with sleep disturbance), "nighttime sound levels from wind turbines be limited to 40 decibels or less, as measured at the exterior façade of the dwelling and averaged over 12 months of exposure." This recommendation was consistent with the World Health Organization's Guidelines for Community Noise (WHO 1999) which recommended limiting nighttime noise in the bedroom to 30dBA averaged over 8 hours and 2009 Night Noise Guidelines for Europe (WHO 2009) which recommended an annual limit of 40 dBA as measured at the façade of the dwelling.		30	<a href="https://docs.wind-watch.org/VTDH_wind_turbine_noise_May_2017.pdf">https://docs.wind-watch.org/VTDH_wind_turbine_noise_May_2017.pdf</a>
Exhibit BF	Wabash County, IN	Government	3	Commissioners Okd Wind, CFO Orginance Changes	Wabash County, Indiana, December 18, 2017: 32 dBA limit outside of primary structures; no vibrations detectable on nonparticipant property; no shadow flicker on nonparticipant property; setbacks 3/4 mi to nonparticipant residential structure, 1/2 to nonparticipant business structure, 3/8 mi to participant residence, greater of 1,000 ft or 2x height to public roads	3,960	32	<a href="https://www.wind-watch.org/news/2017/12/20/commissioners-ok-wind-cfo-ordinance-changes/">https://www.wind-watch.org/news/2017/12/20/commissioners-ok-wind-cfo-ordinance-changes/</a>
	Windburst Publishing	Government	3	Universal Rules for the Public Approval of Wind Energy Projects	Australian data from 2010 shows that individuals living up to 10 km from wind farms are suffering unacceptable health problems not experienced prior to the development. Health conditions worsen over time.	32,808		<a href="https://www.windturbinesyndrome.com/wp-content/uploads/2011/11/Universal-Rules-Nov-2011-2.pdf">https://www.windturbinesyndrome.com/wp-content/uploads/2011/11/Universal-Rules-Nov-2011-2.pdf</a>
	Ellwood Shreve, Chatham Daily News Tuesday, February 27, 2018	Environment	4	Four landowners complain of water woes in North Kent Wind farm area	The citizen group Water Wells First began sounding the alarm in June 2016 that vibration from pile driving during construction and operation of the North Kent Wind farm would stir up the Kettle Point black shale that lies at the bottom of the aquifer area residents draw water from.			<a href="http://www.chathamdailynews.ca/2018/02/27/four-landowners-complain-of-water-woes-in-north-kent-wind-farm-area">http://www.chathamdailynews.ca/2018/02/27/four-landowners-complain-of-water-woes-in-north-kent-wind-farm-area</a>
	Millon, Lara et al.	Environment	4	Wind turbines impact bat activity, leading to high losses of habitat use in a biodiversity hotspot	Bat activity was compared between wind farm sites and control sites, via ultrasound recordings at stationary points. The activity of bent winged bats (Miniopterus sp.) and wattled bats (Chalinolobus sp.) were both significantly lower at wind turbine sites. The result of the study demonstrates a large effect on bat habitat use at wind turbine sites compared to control sites. Bat activity was 20 times higher at control sites compared to wind turbine sites, which suggests that habitat loss is an important impact to consider in wind farm planning			<a href="https://www.sciencedirect.com/science/article/pii/S0925857417306572">https://www.sciencedirect.com/science/article/pii/S0925857417306572</a>
	Newman, Dr. David H., P.I., Prof. Brian L. Fisher, M.S. (State University of New York College of Environmental Science & Forestry	Environment	1	Mad River Wind Farm Impact Assessment Study Tug Hill Region of New York State. (2018)	The USDI Fish and Wildlife Service in their interim guidance on avoiding and minimizing wildlife impacts from wind turbines, recommended against: (1) locating turbines in known bird migration pathways or in areas where birds are highly concentrated, e.g., wetlands, roosts, riparian areas along streams or riverine corridors (2) locating turbines such that large, continuous tracts of wildlife habitat would be fragmented, (3) locating turbines near known bat hibernation, breeding, nursery colonies, migration corridors or in flight paths between colonies and feeding areas, and (4) spreading out widely the siting of turbines. Rather, turbines should be grouped together and parallel to known bird movement areas to avoid strikes (USFWS Interim Guidance 2003). While the Mad River project does represent a commitment to renewable energy for New York State, siting the project at the Mad River site has a series of potential drawbacks from an ecological and land use perspective.			<a href="https://docs.wind-watch.org/Mad-River-ESF-White-Paper-23Apr2018.pdf">https://docs.wind-watch.org/Mad-River-ESF-White-Paper-23Apr2018.pdf</a>
	Watson, Richard et al. Raptor Research Foundation	Environment	4	Raptor Interactions with Wind Energy: Case Studies from around the World	Wind farms have the potential to have important population-level effects on some raptor species, especially large soaring raptors that are long-lived, reach maturity at an older age, and have low reproductive rates. Where such species may be affected by wind-farm development, preconstruction analysis of their flight patterns and behaviors in the proposed site should be used to inform turbine siting to avoid frequent flight paths of soaring birds.			<a href="http://www.bioone.org/doi/full/10.3356/JRR-16-100.1">http://www.bioone.org/doi/full/10.3356/JRR-16-100.1</a>