

Town of Greenwood
Ordinance Review Committee Meeting Minutes
November 16, 2017

(A digital recording of this meeting exists at the Greenwood Town Office)

Item 1: Call the Meeting to Order/Determine quorum – Chair Merlino called the meeting to order at 5:30pm.

Larry Merlino, Chairman
Paul Marcolini, Vice Chair
Brad Payne, Secretary
Tyler Bennett
Jessie Frederickson
Jim St. Germain
Dennis Doyon
Becky Secrest
John Maloney, AVCOG
Kim Sparks, Recording Secretary

Absent: Rob Lally

Eldon Bartlett was unable to get the microphones to work.

Item 2: Review Minutes of October 19, 2017 – Tyler motioned and Dennis seconded to accept the minutes as presented. Vote: 8-0. Motion passes and minutes approved.

Item 3: Introduce guest speaker, Mark Bergeron, Director, Bureau of Land Resources ME DEP

Discussion on technical assistance to the town, input on the DEP's experience with wind projects, and to describe DEP's permitting standards and process for reviewing wind energy projects.

Followed by questions from the Committee.

Chair Merlino introduced Mark Bergeron, Director, Bureau of Land Resources for Maine DEP.

Mark introduced himself. Mark explained that his group deals with land development activities throughout Maine which includes wetland fills, storm water permits, larger projects, including wind energy developments. Mark stated that we are probably aware that Maine has a State law since 2007 called the Wind Energy Act that specifies specific design and permitting standards for wind energy development throughout Maine. Mark stated that they have permitted a number of projects since 2007 since the Wind Energy Act was developed and are between projects right now. Mark explained that there are requests from out of State to have different projects to build clean energy projects that will provide clean energy to their State and they do not have any specific applications to those right now but anticipate some applications coming in as soon as next year. Mark thanked the Committee for having him speak tonight. They like to get out and meet with people across the State and encourage people to ask us questions as they are always

looking for public feedback, public comments, what questions do you have as some of this stuff is quite technical and there are a lot of rules and laws with things. Mark stated that they live and breathe with this stuff and they generally understand it most of the time and sometimes they have questions about things and have to go to the Attorney General's Office to ask for their interpretation. Mark stated that they understand that folks that don't live and breathe this every day that this can be very confusing so they like to come to these types of forums to help you out and to help you understand what is involved at least at the State level. Mark stated that as the regulator or the entity that could be reviewing a wind energy project that comes in they also have to remain neutral and we can't advocate for a project saying this is the best project we have ever seen and on the converse we can't say we don't like this project because we have to remain neutral and as objective as we can. Mark said he would be giving us an overview of what the DEP does for permitting a wind energy projects and to answer any questions we might have of the DEP in regards to wind and how our ordinance may play in this as well. Mark explained that they review, approve, or deny wind energy projects as they come in and they have approved 8-10 wind projects since 2007 and have denied 2 projects. Mark explained there are a number of different standards that applicants need to meet – some 30 standards everything from financial capacity, wetlands, vernal pools, storm water, and blasting that is specific to wind energy projects. Mark explained that there is decommissioning so what happens at the end of a project, are the turbines going to be reused, are they going to be taken down and who is going to pay for that. Mark explained that they also look at tangible benefits, are there benefits being offered to the host communities, and we review concerns from host communities such as noise...noise is one of them as well. Mark explained that there are State standards for wind energy projects and the nice thing that is written in the standard is if there is a Town has a noise ordinance that is similar or close to the DEP's we will actually use your noise ordinance standard when we review the project and is a nice thing that it is built into the State standards. Mark stated that Towns can develop ordinances that are stricter and more stringent than the States regulations and the DEP doesn't have any say in that or to approve or disapprove your Town ordinances that are totally up to your town control. Mark explained that if a Town has a Wind Ordinance with noise standards in them that are similar to the State's we will use your noise standards and hold the applicant to those. Mark explained that the application comes in all of the information is put up on their website so it is all available for review. Mark explained that part of the DEP process is to hold two public meetings throughout the application review process and explain the project details, get your comments, questions on the project, and your concerns because that is what DEP needs to know. Mark explained that all of the comments and concerns become part of the administrative record which is used by the Commissioner to either approve or disapprove a wind energy project. Mark stated that was their overall process and for wind energy standards are covered in their chapter 375 rules and there is a noise standard for projects in general for shopping centers, for residential subdivisions, commercial developments and those types of things but there is also a specific section for noise standards related specifically to wind energy development. He explained that in 2012 the State actually lowered the noise standards from 45 decibels down to 42 decibels at night and some folks have asked if we are going to be changing or revising those standards but there is nothing currently on the table about this. Mark explained that if folks wanted these things changed they could go to their State Legislatures to have them work on changing the law. He explained that they do not have a noise expert at DEP but some of their project managers who are very experienced with these types of projects. Mark explained that these are very technical projects and they use outside peer reviewers, an outside list of consultants that due this

for a living and have the expertise in these areas to assist the DEP. He explained that the peer reviewers help them determine if the information in the application is accurate, thorough, are there variables or something in the model that is a little off and after the review they might go back to the applicant to answer questions that came up during the peer review. Mark explained that if all of the 30 standards are met, the DEP would issue a permit for a wind energy development project. He stated that often when a project is built there is post construction noise monitoring that essentially they verify what they predicted up front – so they would say that in our model the applicant believes that in an average night time situation the noise produced by these turbines is going to be 40 decibels from a certain distance from the turbines. Mark stated that usually one to three years after project begins operation we actually go out there and measure and put some microphones on the ground when the turbines are spinning to measure the noise levels, compare it to the model and what we found over time is those models are quite accurate or a little bit conservative. Mark explained that they use this as a checks and balance. Mark said they also require as part of their application is some type of noise complaint protocol and what happens when someone files a complaint that does that go to. He explained that in recent applications, the licensee or wind developer will set up a 1-800 phone number that anyone can call into 24 hours per day and leave a message and they are asked to leave detailed specifics about the complaint – not simply that it is loud - they need to know what time of day, what did it sound like, what were the weather conditions etc. He stated that the developer is then required to notify DEP that there were complaints say over the last few weeks. He stated that DEP would take a look at that information to determine if it is credible and is there a lot of complaints and a few times DEP has had the developer go back out and study the noise levels again to show us you are in compliance with the noise standards in the application. Mark explained that they have sent developers back out to do new noise studies but all were found to be within the required noise standards. He explained that the developer then contacts the one who had the complaint to inform them of the studies and to try to work with folks and let them understand what sort of noises they may hear. Mark explained that their noise standards are such that it does not mean you are not going to hear anything and that some people think that. He asked that we understand that the legislature set these noise levels as they thought they were reasonable for wind energy development and other developments.

Chair Merlino stated that the Committee only will be asking questions and that those who wanted to ask questions of the presenter had to have their questions sent to the Town prior to the meeting.

Becky Secret – specific to noise issues, she wonders why there isn't a clearing house at DEP because a lot of these complaints end up going to the company that owns the wind facility and then they have to go back out and check things and they could turn off this wind mill and that wind mill and asked why type of protections do residents have as to why we aren't having these tested right after the filing of a complaint. So are you considering a clearing house at DEP for complaints that come. You also stated that you work with outside consultants and work with the company and how are working with what the Community has set up for a noise ordinance and is someone has applied and if their predictions are above what the noise ordinance is do they still get considered for a permit and what happens if the prediction is above the community ordinance what happens then. She asked who sets the acceptable standard for the sound in a wind energy project. Mark stated so you are asking about a clearing house for complaints and asked if that would be specific to one project or to all projects. Becky stated that this should be

for anywhere there is a project in the State. Mark said that part of the applications have that noise complaint protocol in place and what you could say is for the project here or there tell me all the complaints that were received for noise and that all of the information that DEP has is public record. He explained that someone can call and ask for all of the noise complaints on Saddleback Ridge project and DEP can pull those up for your review and it might include copies of what noise studies have been done by the licensee and the burden of proof is still on the licensee. He explained that the developer got a permit to operate this facility under the standards and levels stated and approved in their application and the burden of proof is still on the licensee to demonstrate that they are in compliance with the standards. He explained if there are regular concerns about a project from the DEP, they can contact the licensee and let them know they have been getting a lot of complaints so we did some informal noise studies ourselves and we think their might be a question and we will ask them to go out and do more studies to show that they are still in compliance. He explained if someone is operating outside of what their application allows they can take enforcement action against them and we might ask them to modify the project - we might require them to add fins to the blades to reduce noise, we can require them to modify the project to bring them back in compliance with the standards. He explained that in terms of who sets those standards and in terms of what the numbers and the rule making process for this type of rule; we have several types of rules in our department— one is a routine technical rules which are rule changes that DEP can go thru after a public process and have those go into effect and the noise rules in the Wind Energy Act - those rules are what they call major substantive rules and have to go thru the DEP, the Board of Environmental Protection, a Citizen Board that is parallel to the Department and once they approve it goes to the Maine Legislature so then your legislators will have a say in what that level is and that when they made those changes back in 2012 it went through all of those steps. Mark explained that they usually have several meetings with the applicant reviewing all of the information to determine what are the project standards, what has to be met and if there is a Town Ordinance to make sure they are aware of our Wind Energy or Noise Ordinances and if it met our parameters or was close enough to our rules we would actually defer part of our approval process and use the Greenwood numbers so for instance the Town of Greenwood says for nighttime noise level for wind energy development is 40 decibels and the State says 42 decibels we would actually hold the applicant to the 40 decibels. Becky asked how close does the Greenwood standards would have to be to the States. Mark stated that he would have to look but he recalls it says if the noise levels are no more the 5 decibels higher than what the State has then they would use the Towns. Becky asked what if they were lower. Mark stated if they were lower the Town's numbers would govern. Becky asked if they would take our lower numbers regardless of what percentage it is. Mark stated he is pretty sure they would.

Jessie Fredrickson – stated that her questions have to do with protections of the landscape around the mountain - What are vernal pool protections and do these protections apply to the streams, waterways that come down the mountain and do those areas that are only wet in the springtime have the same protection. She asked what are they and the third question is do endangered plants have the same level of protection as endangered animal species and what documentation does DEP need to show that these all exist in the area that is being planned for wind development. Mark explained that DEP looks at vernal pools, intermittent streams, and endangered plants as part of the permit review process for all wind development as part of the 30 standards that have to be met under the site development law and over and above that we also have the Natural Resources Protection

Act which is a separate law from the Legislature that protects things like river, streams, brooks, ponds, lakes, vernal pools, significant wildlife habitats, sand dunes, areas above 2700 feet in elevation, all of those sorts of things have protections around them. He explained that before the wind developer builds any roads they need to get the required permits but before they get those permits they need to complete wildlife studies that would show what there are for birds and bats in the area, what sort of plant species are up there and are there deer wintering yards and there are a large host of things they look at. He explained that beyond the State standards there is also the Federal standards and these all offer layers of protections to vernal pools, brooks, streams and the like and the applicant would have to meet both the State and Federal standards. He explained their definition of a stream doesn't mean it has to be 3 feet wide and run 365 days a year that they have intermittent streams and there are protections if you are going to be working near that stream, in that stream, or crossing that stream with a road and if there is fish habitat there you need to provide a certain type of crossing that will allow that fish passage to continue – there are many things that the DEP has to look at as part of their application process. He explained that the applicant would have to do specific studies looking for endangered plants and would need to inform DEP if any were found on the site. Jessie asked if the companies are the ones who have to get all of these studies done. Mark stated yes that the companies do have to get these studies completed before an application can be done and to remember the burden of proof falls on the applicant and it is up to the applicant to prove that they meet all of the applicable standards. He explained that is why it is important for them to have those two public meetings to get input from the public on the project. Jessie asked what documentation DEP would need from her to prove that there are endangered plants on site, full of old hardwood, and vernal pools all within ¼ of a mile from the project. She asked what she should bring when the burden of proof from the applicant is doubtful and showing what is actually going on. Mark explained that what is most helpful from the public it to be as specific as you can and asked that they take pictures of the area, provide documents from other experts or people with general knowledge of the topic, and that they aren't expecting everyone in the public to be experts but need specific information that will raise their concerns to investigate further.

Dennis Doyon – Looking at this chart which shows protected location during the day and the night and it says 55 dBA and 75 dBA at boundaries with pre-developed noises is greater than 45 dBA. Dennis stated they must have to have some pre-development data to make this determination. Mark stated that Dennis is asking about pre-development noise levels and what sort of information may be needed. Mark stated that his Department's noise rules are set up as a number so often times applicants will go out and measure before a project but this is not a requirement for DEP but I'm not saying that the Town couldn't add pre-construction noise studies to their ordinance as part of one of the requirements to demonstrate what is the current level of noise in the proposed development area. Dennis asked if the State has a model for x.y.z. area so that it can be determined by the model what the preconstruction decibel levels are. Mark explained that they don't have a model per say but thru the legislature we have developed these noise levels for wind energy projects - during the day it is 52 dBA and then it is 42 dBA at night. Dennis stated that realistically a Planning Board could ask an applicant to do a pre-construction noise level study so then you would have actual data to compare to post construction. Mark stated that was correct.

Paul Marcolini – Since we have developed our own matrix for folks to file complaints; how do we interface with DEP and push our complaints upstream and how does DEP push complaints downstream to the Town so we are aware of them. Mark stated that complaints and then enforcement after a project is built is what they deal with, and stated if there is a noise ordinance in Greenwood and if that is used by DEP to issue the permit and that project gets built who enforces that standard but his sense is both the Town and DEP would have sort of authority to enforce the standards. Paul stated that the concern is that you get a complaint and we don't find out about or vice versa. Paul asked how many projects in the State DEP have had to take enforcement against. Mark explained that they haven't done any formal enforcement actions specifically for noise nor have we done any formal actions for operator projects but there were some complaints early on associated with Spruce Mountain after construction was complete so then we asked Patriot to go out there and do some of that noise modeling to show that they were in compliance and they did. He explained that they did the monitoring and DEP had several public meetings and showed the results of the monitoring. Mark explained that if the monitoring shows that their numbers are off and the project are not meeting the requirements, DEP would require them to make modifications to bring the numbers back into compliance. Paul asked as far as your tick list for potential wind organizations coming in there is a specific OSHA standard that is established for suspension trauma and when we start to look at these towers 250' or higher there is a significant risk in construction and maintenance which is why OSHA has put this standard in place. Paul stated that local communities such as our do not have skills to respond to that type of accident or incident so the companies are required by OSHA to have a response plan in place and who verifies that response plan and is that something that DEP does as part of the permitting process. Mark stated that DEP does look at emergency action plans and these plans are a requirement in the permitting process. Mark explained that they are not safety engineers so they don't have a lot of that expertise but they know what to look for, are there fire suppression systems and what sort of systems are they using, have they worked with local departments and there is an written plan to show who is contacted in the event there is an incident. Mark explained that OSHA standards are developed, administered, and enforced by OSHA so the DEP doesn't do that on behalf of OSHA.

John Maloney – when you first started out you indicated that if the noise standards of the municipalities were similar to DEP's you would use the Town's standards and asked if similar meant using similar types of measurement and/or instrumentation. John stated that there were two denials by DEP and he asked what the reasons for the denials were and were those in the expedited locations in the State. Mark stated that under chapter 375 of the State noise rules- section 10 paragraphs B1:

This regulation applies to proposed developments within municipalities without a local quantifiable noise standard and in unorganized areas of the State. When a proposed development is located in a municipality which has duly enacted by ordinance an applicable quantifiable noise standard, which (1) contains limits that are not higher than the sound level limits contained in this regulation by more than 5 dBA, (Mark stated that we could be 5, 10, or 15 dBA lower than the State) and (2) limits or addresses the various types of noises contained in this regulation or all the types of noises generated by the development, that local standard, rather than this regulation, shall be applied by the Department within that municipality for each of the types of sounds the ordinance regulates.

Mark stated that with the two denials – one was for Passadumkeag Wind Project near Burlington and that was overturned by the Board of Environmental Protection on an appeal and that project was actually built and operating and we had denied that on scenic impacts as that is one of the standards that the wind energy act specifies that developments have to meet a specific scenic standard. Mark stated that the other denial was the Bowers wind project near the Town of Lee and that went to the Board of Environmental Protection as well as to Court and that was upheld so that project never started and that was denied for scenic impacts as well. Mark stated that all of the projects that they have approved have been located in this expedited permitting area. John asked to clarify that any Town standards would have to be approved by the Town and by DEP. John asked if Greenwood had a Commercial Wind Ordinance the applicant would have to have approval from the Town and from DEP. Mark stated yes, that on the last page of their applications/licenses it says that this permit is only good and speaks to the things that DEP does and if there are local ordinance, other State regulations, Federal regulations, or any other approval or standard that applies the applicant/licensee is responsible for getting those so our permit only speaks to the DEP standards. Mark explained that if an application is denied thru the Town process that doesn't mean it is going to be denied thru the DEP application process and if the applicant meets all of the State standards the State has to issue the permit and the State's permit does not trump the Town's permit but the project doesn't get built until all permits are issued.

Jessie Fredrickson – so if we have a comprehensive plan that protects our scenic resources, which the Town has and it lists all of these mountains that we are talking about would the DEP honor that scenic resources list. Mark explained that DEP has a list of scenic resources in the Wind Energy Act and DEP would review those and they don't have the regulation in the Wind Energy Act to go with the more stringent standard for scenic resources as its not written that way it is only for noise. Jessie asked if there is a logging road being built across streams and vernal pools who does she contact and Maine DEP. Mark explained that she would need to actually contact the Maine Forest Service as all logging operations are reviewed by that Department. Jessie asked what if it is land owned by a company who has leased land to the wind company Calpine and they are building the road right now and they are going across all of these things. Mark stated that he isn't sure of all of the forestry regulations but regardless of who owns the land, there are standards that have to be met to protect streams and vernal pools and there is erosion control and those types of things.

Becky Secret – you have mentioned several times dBA levels at 40 and 42 day and 35 night and what kind of research was done in developing your standards for infrasound which is the inaudible issue that we seem to keep hearing the most complaints about from people that it impacts their health, peace of mind, their wellbeing and their quality of life. Mark explained that he wasn't working for DEP when the standards were written but he believes that DEP worked with professionals who were experts on noise standards and thru the public comment sessions, rulemaking and legislative process there was probably opposing viewpoints from the wind industry to review, and then there is information out there from both sides to back up their points and many other studies, other States, other Countries, so much information to review and boil down to what the State has today. Becky asked if he could find out who their experts were that assisted the State could he let them know who they are.

Tyler Bennett – what is the average time from when someone applies for a Wind Project permit to when it is deemed complete and a permit is issued. Mark stated that the average time from when an application is submitted to when we issue a permit has been averaging eight to ten months.

Becky Secrest – asked Chair Merlino if the Committee is required to ask these questions that were submitted by residents prior to the meeting. Chair Merlino stated that these would be for the sound guy.

Chair Merlino – we have learned thru all of deliberations here that there are sensors and technology that is available today to put on the perimeter of these projects and you put in the decibel levels and these things will automatically control what happens with the turbines – do you require that – should you require that. Chair Merlino stated that DEP frequently goes thru a process of updating their rules which is happening right now and should that be considered as we are talking regulation and enforcement and we can do this. Mark stated that it is a good question as there is technology out there that you can set at the property line or the limits of the development of the project that would detect noise levels from the turbine or turbines and if it hits a certain threshold it would shut the turbine down, it could feather the blades, it could modify the operation and that might be more of a question for Acentech to get into the feasibility of that and the cost of that and it is not something that the DEP requires. Mark explained that what they are finding is that developers are laying out their facilities so that they are further and further away from houses, from churches, from buildings and protected locations, because they have learned over time the closer that we get to people the more potential for noise issues so we are saying you should really put those turbines away from people to avoid those types of impacts. Mark stated as technology develops that may be a possibility for us to consider. Chair Merlino stated he understood that the technology is here now. Mark stated that there is a rulemaking process going on right now with the DEP and are working on rules for the Wind Energy Act and invited everyone to go to their website and look up Chapter 382 and please send in any public comment you might have and the closing date for comments is Dec. 18th. Chair Merlino stated that relating to the scenic issue and our Comprehensive Plan – the State requires us to have a Comprehensive Plan and then once the Community adopted the plan it had to enforce the plan with an ordinance and if that hasn't been done and does the DEP enforce the scenic view sheds that are in the Comprehensive Plan when the Community does not have that enforcement component – do you require an ordinance or will you just use the Comprehensive Plan. Mark explained that if Towns don't have ordinance or comprehensive plans the DEP doesn't step in and say we are going to enforce these rules for you as we feel very strongly that Communities have home rule and local control. Mark stated if the Town of Greenwood said they didn't want an ordinance that they just wanted to ban wind you could do that – but don't get him wrong he is not advocating for that he must remain neutral. Mark explained that is the power that the Town has that you could write an ordinance that outright banned wind in Greenwood or severely limiting them so that it is practically impossible for any to be developed – that is Greenwood's purview. Mark stated that as part of the Wind Energy Act the developer does have to meet certain scenic standards.

Paul Marcolini – asked if there is anything that prevents the Committee from pulling language from the Comprehensive Plan and put it into this ordinance as it relates to wind or does this need to remain separate. Mark stated that they don't deal a lot with

comprehensive plans and Town ordinances that is probably a question for the Maine Municipal Legal Assistance program.

Dennis Doyon – parts of the Comprehensive Plan is already incorporated in the Site Plan Review process.

Paul Marcolini – understands that it is part of the Site Plan but is concerned that there isn't a specific ordinance for scenic and isn't it worth visiting it at this time and to fold it into this ordinance so we can protect these places.

Chair Merlino thanked Mark for coming to our meeting tonight. Mark said if anyone had any further questions to please send him an email or give him a call and that Kim had his contact information.

Item 4: Introduce guest speaker, Michael Bahtiarian, Principal Consultant – ACENTECH Acoustical Consulting Services

Power Point Presentation: “Facts and Myths of Wind Turbine Noise” (Copies attached)

Mike explained that he is currently employed by Acentech who is one of the oldest acoustical consulting firms in the country and he joined them back in August and previous to that he worked for a firm called Noise Control Engineering and was there for about 24 years. Mike explained that he worked on several sound projects and wind turbine noise assessments.

Mike stated that he and his staff has done work for one or two wind developers completing noise studies that were needed to get permits. He stated that he worked for 4 to 6 Community groups in the Cape Cod and Falmouth Massachusetts area. He explained that some of his slides he will be showing tonight are from Falmouth which is a case study of what not to do. Mike stated that he applauds the Town of Greenwood for their diligence to this issue and the work of the Ordinance Review Committee and he appreciates the opportunity to talk with us about what we might do or not do. Mike explained that he has a presentation and after listening to the beginning of this meeting he feels that this group is passed acoustics 101 and they should be able to get thru this quite easily. Mike stated that he was happy to answer questions as he went thru the presentation.

Slide 2. Summary – 7 topics to cover

Slide 3 & Slide 4 - Sound vs. Noise – certainly a tree falling in the woods makes a sound a pressure pulse but if no one is there to hear it is there noise – as noise is an unwanted sound.

Slide 5. Technical details: Sound Metrics – everyone thinks decibels is a measurement of sound and actually decibels is just a fancy percent and just remember that a decibel is not a measurement of anything

Slide 6: Sound metrics – measurements are done in 10 minute increments and during that time sound is going to vary and it's not clear as to which one of these metrics will be

used. Mike stated if he had to pick one it would be the Leq as it is the average. L10 and L90 are statistical samples and one measures the minimum and the other the maximum and all of these are used in Massachusetts. Mike asked Mark what measurements DEP uses for a compliance measurement. Mark explained that they require a minimum of 12 ten minutes noise studies to be taken and then averaged and end averaged result must meet the decibel requirement for whatever ordinance/regulation pertains to that area. Mike stated that Maine is doing so much better than the State of Massachusetts when it comes to Commercial Wind regulations. Mike explained that the Ldn metric should not be used for Wind measurements.

Slides 8 & 9: A vs. C Weighting – Mike explained the when you see a sound measurement that says dBA – that means it is an “a” rating or a weighted or you might see a noise requirement that is db(c) – c- rating would be used for like a night club or large entertainment venues where the a weighted didn’t give us a good measurement. Jessie asked if we should be using the C- weighting to help measure the infrasound from the windmills. Mike answered not exactly as it really needs to be A-weighted as it is code and c-weighted would throw a lot of things off.

Slides 10 -16: Frequency and Frequency ranges– Mike stated that frequency is the number of cycles per second that a sound will repeat in a regular pattern and measured in octave bands and understand that there are two parts of sound - the amplitude of it and the frequency of it. Mike asked us to think of a piano – and the sound that comes from a piano depends on how hard you hit the key and which key you hit. He stated that there are low frequency sounds from the keys on the left and high frequency sounds from the keys on the right and all sounds are frequency dependent.

Slides 17 –20: Advanced Metrics – Mike explained that a tone is like brakes squealing, like the fingernail on the chalk board, and single frequency and very noticeable and irritating. He explained that broadband sounds are masking sounds like the water fountain in the mall and generally considered pleasant sounds. He explained that Aerodynamic Amplitude Modulation (AAM) is an artifact from a wind turbine more than any other device. (Rotational speed of the hub multiplied by the number of blades). Mike stated that the State of Maine calls this short repetitive duration sound – these are the same things. Mike asked everyone to look at slide 20 as this is a fingerprint of a wind turbine in Falmouth Massachusetts.

Slides 21-24: Noise from wind turbines – Mike explained that he spent a lot of time with the ones in Falmouth and they were 1.65MW which was quite big for being inland. Jessie asked if they were around 400’ in height. Mike answered they were 360’ +/- . Mike explained that his experience has shown that noise issue start being seen when these turbines are at one MW or above and the sounds are coming from different components of the turbine, the blades, gearbox, generator, and yaw drives.

Slides 25-27: Types of Noise – Mike stated you can get all of these from a wind turbine but most of the noise comes from the blades/aerodynamic and the gearbox. Mike stated a vendor might say they can make the generator quieter which is really nothing special as the generator isn’t one of the major noise contributors.

Slide 28: Downwind vs. Upwind – Mike explained that today all of the turbines are downwind so that the wind hits the turbine first and then goes up over the cell and

minimizing infrasound and that upwind turbines produced a lot of infrasound and he doesn't think the industry uses upwind turbines any longer as they were phased out in the 70's and 80's.

Slides 29- 31: Understanding Infrasound – Mike stated if it is below 20 Hz pressure - he has measured it and it is measurable. Mike stated that he and Steve Ambrose communicate a lot and he knows that Steve also did a presentation for us on sound. Mike showed a graph of infrasound that he took in a home in Falmouth Massachusetts. He explained that he uses special microphones and a spectrum analyzer to measure the infrasound. Chair Merlino asked where this was measured. Mike stated the measurement was taken inside the house on Blacksmith Shop Road, Falmouth Mass about a ¼ mile from the turbine and that they would get better readings inside the house than outside the house. Mike stated that he doesn't know of any other consultants that are measuring infrasound. Mike explained that he went to court on a case and the other side won on the whole infrasound argument and it was all thrown out as there weren't any standards and regulations on these things. Mike explained that he was on a wind turbine panel in Massachusetts several years ago and they didn't allow infrasound to be talked about. Mike reiterated that infrasound is measurable, it is detectable and it does provide a fingerprint. Mike asked everyone to look at slide 31 and he gets excited about this that this graph is of a wind turbine - its fingerprint. Tyler asked if the only thing Mike picked up infrasound from inside the home in Falmouth was from the wind turbine. Mike answered yes. Jessie asked if there was any way that low frequency sound could be louder if people's home because of the acoustics of the house and it makes it louder. Mike said that was a possibility. Chair Merlino asked if they did any studies from different distances to that tower. Mike answered that they didn't. Becky asked when this study was done. Mike stated it was done in 2014.

Slides 32-37: Prediction Methodology – Mike explained that there are three different types of software to use when predicting noise modeling and he uses Cadna/A. Mike stated that they model the Wind Turbine as a point source. Mike explained that this software doesn't give you infrasound.

Slides 39-46: Noise regulations – Mike explained that sheet 40 is for general noise regulation levels by Country and is not noise specific to wind turbines and we are thinking about limits we don't have to look at anything on the Federal level. Mike stated that Mark did an excellent job earlier discussing the State regulations and that Maine is far ahead of Massachusetts on these regulations. Mike stated that the Maine daytime limit is 55 dBA and nighttime is 42 dBA and he thinks that is pretty good statewide but he has a different opinion for right here. He stated that Maine also has a couple of penalties. Mark explained that DEP has issued one penalty under the Short Duration Repetitive Sound but no applications have they done both penalties. Mike stated kudos to Maine DEP for having these great regulations and are so far ahead of Massachusetts. Mike stated that Maine wind regulations are 10 pages as compared to Massachusetts regulations which are one page. Mike stated that we should feel good that we have a pretty good set of rules in the Maine regulations but would ask that we reserve section 2 – sound limits and everything else is really good. Becky asked how many industrial wind farms are there in Massachusetts. Mike answered there are about a dozen with a half dozen on the Cape and the rest in Western Massachusetts. Becky asked if there were any more proposed. Mike said that they are seeing less and less and doesn't know of any new wind projects in Mass and see a lot of solar going up. Becky stated that was a good

thing. Becky asked when and where does the background get measured. Mike explained that in Falmouth the background is measured at the property line or the nearest resident and as far as when it is measured background varies dependent on what time of day it is and what season you are in. Mike explained at a minimum the background would be measured at a time of when the equipment will run so if you are running it 24/7 you need to do the measurement during the quietest point of day which is typically 3am. Becky stated that wind turbines are constant and some of the things that Mike measures are only there for short periods of time and don't impact people the same way. Mike explained that there is no real noise masking of wind turbines.

Slides 48-56: Noise Measurement – Falmouth Massachusetts

Mike explained that there are three industrial wind turbines in Falmouth, two were owned by the Town of Falmouth referred to as Wind 1 and Wind 2 and the third one is privately owned. Mike explained that the two owned by Falmouth had a shortened review process and the Town of Falmouth made a few mistakes. Mike stated in his opinion Falmouth ended up putting things up a little too close to people and he and his staff were hired regularly to take readings of Wind 1 & 2 from the years 2010 to 2015. Mike stated that when he has been asked on record what distance to use I would refer to this data (slide 50) and have it a mile away. Becky asked how tall the tower is. Mike stated it is about 300'. Becky asked what if you had 18 towers at 600'. Mike stated that the Falmouth towers were meant to go to New Orleans and they didn't want them so they sat in a warehouse for quite some time and were quite old before arriving in Falmouth. Mike stated that he believes that newer turbines are built a little bit quieter but there are some physics here that don't change. Chair Merlino asked if the physics included infrasound. Mike stated the physics are that you have a huge blade passing thru the air. Someone from the audience stated 13 towers vs. one is a big difference. Mike stated yes, it should be more but it won't be 13 times more maybe 3 times the sound level. Mike stated that the Falmouth wind turbines were ordered shut down this past spring. Mike asked us to look at slide 54 background vs wind speed and stated that this shows that the wind does not mask the noise from the wind turbine and there was more noise from the turbine with the higher speeds of wind. Jessie asked if they were more bothered by the higher speeds. Mike answered yes.

Slides 57-59: Why are there problems – Mike stated that a developer will say this will be fine there won't be any problems and then these are installed and there are problems. Mike stated with slide 58 a spec sheet from GE - they are at 40 dBA but this one number doesn't really represent what is really happening. Mike stated he terms this as the Grammy award factor and he came up with that by saying it is really more complex than one number and if anyone here were to ask the Judge at the Grammy Awards who gets the best song of the year and he said tell me what the sound level of that sound was and whomever has the highest level we will give them the Grammy and that would be a pretty bad way to judge the Grammy Award winning song. Mike stated that it is a pretty sophisticated audible thing that you hear and this piece of equipment this wind turbine has a striking pattern that's not like any other piece of equipment and that is why we are in this dilemma as this piece of equipment will produce sound all day and all night and at 1200' it envelopes a house and there is really nothing else a person can do who owns that house but move somewhere else. Jim St. Germain asked if there is an equation that shows how sound decays over distance. Mike stated yes it was on one of his previous slides – $20 \log$ the distance so every doubling of the distance the sound will drop 6 dB.

Becky asked how it would be off of a body of water. Mike explained that water is an interesting thing - Ground absorbs sound and water will deflect sound and not absorb sound so you are not going to get an increase but you also are not losing as much as you were when it is over the ground. Mike stated he noticed all of the lakes in Greenwood and said that we would need to do models for bodies of water but the water won't increase the sound so if water is 60 on one shore when you get to the other shore it can't be 61. Mike stated that for a bigger turbine there is a greater chance of a larger amount of wind shear. Mike stated that normally the bigger the tower the bigger the sound unless the vendor is going to use technology to help lessen the sound. Mike explained that a lot of his clients complain about the constant drip drip drip noise the repetitive noise sounds and found that most of the negative comments come at night when you try to sleep in a house near a wind turbine for quite a while. Mike said there needs to be better planning and developers need to understand that it is hard to fix problems once these are installed.

Slide 64 – Considerations for Greenwood

Mike said he likes the Maine DEP regulations - it has a good backbone in general. Mike stated that the night limit of 42 dBA for Greenwood having spent 4 hours here - he would say that is too high from what he could see and for the Town to decide on what that number should be you should do some background noise testing to understand how quiet it is here at night. Mike stated for setbacks definitely the greater would be for safety at least a half a mile and he thinks a mile setback we wouldn't have problems. Mike stated that he thinks that a infrasound noise limit should be considered but the concern is if we set it and the level ends up being too high what do we do then as once it is in someone's house there is no fixing it and frankly the infrasound is still a bit of a hot potato that could be challenged legally.

Chair Merlino asked the Committee if they would like to table the rest of the agenda until the next meeting on Dec. 7th. Becky asked if Kim got John Maloney the items to work on. John said that Kim had forwarded him several items. Chair Merlino stated that could be tabled until the next meeting. Becky asked if the Code Officer if they checked on the roads and asked if we would discuss this at our next meeting. Chair Merlino stated that the property owner has filed the required intent to harvest paperwork with the State of Maine. Becky asked if they could discuss what Mr. Zagata had submitted. Paul Marcolini stated that he felt that item had nothing to do with writing an ordinance and should not be on the agenda.

Item 5: Discussion on Audible Noise Levels & Infrasound - Tabled

Item 6: Discussion on preparing findings and rationale on Setbacks, Tower Heights, and Decibel Levels. – Tabled

Item 7: Discussion on wording in Ordinance for John Maloney - Tabled

Item 8: Set next meeting date - December 7th- 5:30pm at the Greenwood Town Office

Review wording from John Maloney

Item 9: Adjourn - Having no further item to discuss the meeting adjourned at 8:35pm.