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BEFORE  
THE OHIO POWER SITING BOARD

In the Matter of the Application of Republic )  
Wind, LLC for a Certificate to Site Wind )  
Powered Electric Generating Facilities in ) Case No. 17-2295-EL-BGN  
Seneca and Sandusky Counties, Ohio )

**DIRECT TESTIMONY OF MARK SHIELDCASTLE ON  
BEHALF OF THE LOCAL RESIDENT INTERVENORS**

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**Q.1. Please state your name and work address.**

A.1. Mark C. Shieldcastle, 13551 West State Route 2, Oak Harbor, Ohio 43449.

**Q.2. On whose behalf are you submitting this testimony?**

A.2. I am offering testimony on behalf of Intervenors Joseph & Diane Anderson, Denise Bell, Aaron & Carrie Boes, Richard & Linda Bollenbacher, Rob & Mary Chappell, Thomas & Kathleen Fries, Leslie & Dennis Hackenburg, Jeffrey & DeeAnne Hamilton, Allen & Mary Hassellbach, Duane & Deb Hay, Ethan & Crystal Hoepf, Gary & Dawn Hoepf, Jason & Michelle Hoepf, Taylor Hoepf, David P. Hoover, Jeffrey A. Hoover, Kenneth & Debra Hossler, Greg & Laura Jess, Mike & Tiffany Kessler, Leonard & Beverly Kubitz, Gary & Michelle Miller, Steven & Kelley Miller, Kim Mitchell, Charles & Linda Morsher, Patricia Motry, Steven & Linda Mulligan, Doug & Jennifer Myers, Linda Niederkohr, Kevin & Jennifer Oney, Nicholas & Michelle Reiter, Tom & Lori Scheele, Elaine Schultz, James & Victoria Seliga, Eugene & JoAnn Smith, James & Elaine Steinmetz, Herman & Patricia Studer, Christine Vogt, Mark Weber & Cindra Riley, Charles & Rhonda Weyer, Ann Wright, and Chris & Danielle Zeman (together, the "Local Residents").

**Q.3. What is the purpose of your testimony?**

1 A.3 On behalf of the Local Residents, I have evaluated all wildlife information in Republic  
2 Wind's Application to render expert opinions as to whether the Application sets forth  
3 scientifically valid data based on validated methodologies sufficient to determine the probable  
4 environmental impact and the adverse environmental impact of the proposed Republic Wind  
5 project (the "Project") on birds and bats. I also have reviewed the Staff Report and Republic  
6 Wind's pre-filed testimony.

7 **Q.4. Please summarize your education background.**

8 A.4. I obtained a Bachelor of Science degree in Wildlife Management from The Ohio State  
9 University in 1974. I participated in various statistical and study design workshops through my  
10 employment with the Ohio Division of Wildlife of the Ohio Department of Natural Resources  
11 ("DNR"). My educational background is described in more detail in my resume, which is  
12 attached as Exhibit A.

13 **Q.5. Please summarize your professional work experience.**

14 A.5. I began my professional employment as staff at The Ohio State University at the  
15 Cooperative Wildlife Research Unit. There I worked on various graduate research projects in  
16 wildlife. I accepted a post with the Ohio Division of Wildlife in 1976 at the Crane Creek Wildlife  
17 Research Unit, the wetland wildlife station. Here I advanced from entry level to Project Leader  
18 of Wetland Wildlife Research for the state of Ohio. I had responsibilities for a wide range of  
19 projects on birds and furbearers. Most notable for this testimony was study design of multiple  
20 projects, leader of Ohio's Bald Eagle recovery plan, waterfowl biologist and Tech Representative  
21 for Ohio to the Mississippi Flyway Council, and design of recovery plans for the Trumpeter  
22 Swan, River Otter, Osprey, Common Tern, and Sandhill Crane. I developed the original Avian

1 Concern Zones for the DNR relating to wind power initiatives and associated risk to wildlife. My  
2 resume contains a more detailed summary of my professional experience.

3 **Q.6. What are your primary findings, conclusions, and opinions in this case?**

4 A.6. My opinion, to a reasonable degree of scientific certainty, is that neither the Application  
5 and its supporting documents nor Republic Wind's Pre-Filed Testimony sets forth scientifically  
6 valid data or identifies validated methodologies sufficient to determine the probable  
7 environmental impact and the adverse environmental impact of the Project on birds and bats. All  
8 of the wildlife studies in the Application are merely attempts to "check off the boxes" to conduct  
9 the minimum amount of study requested by state and federal agencies. These studies do not  
10 provide scientifically valid analyses of the Project's environmental impact.

11 **Q.7 What studies provided by Republic Wind have you reviewed to prepare your**  
12 **opinions?**

13 A.7 I have reviewed the narrative and exhibits of Republic Wind's Application pertaining to  
14 birds and bats, including but not limited to (1) the wildlife discussions in the Application's  
15 narrative, 2) Appendix L, Raptor Nest Survey, (3) Appendix M, Bald Eagle Survey, (4)  
16 Appendix N, Passerine Migration Survey, (5) Appendix O, Breeding Bird Survey, (6) Exhibit J,  
17 Appendix E, Raptor Nest Survey, Passerine Migration, and Breeding Bird Survey from Emerson  
18 West Wind Project, and (7), Exhibit J, Ecological Assessment. I also have reviewed the prefiled  
19 testimony by Republic Wind's experts on avian and bat studies as well as technical memos from  
20 Western EcoSystems Technology, Inc. to APEX Renewables.

21 **Q.8. In general, what are the Application's deficiencies in studying the Projects'**  
22 **probable effects on birds and bats?**

1 A.8. Yes, across the board, not a single study was conducted within the entire footprint of the  
2 present project. Most studies were completed nearly a decade ago (2011-12) on a vastly different  
3 footprint and should represent nothing more than a pilot for a 2019 project. There was additional  
4 bat data acquired in 2015-16 but on a different portion of the footprint with no linkage to the  
5 older data. According to Ohio Division of Wildlife policy, each project must conduct its own  
6 field work and not utilize another project's studies in response to trade secret concerns of that  
7 facility owner. Republic has submitted four avian studies, one bat study, and two Technical  
8 memorandums from Western EcoSystems Technology, Inc.) that were conducted for the  
9 Emerson West project. None of the studies recognizes and quantifies the annual risk presented to  
10 avian species during the winter, migration, and nesting seasons, thus resulting in a hodge-podge  
11 of results without scientific support.

12 In general the surveys fail to support the conclusions made by Republic Wind's  
13 consultants included in the Ecological Assessment (Exhibit J). Inadequate sampling,  
14 inappropriate design to account for nocturnal migrants, failure of raptor nest surveys to represent  
15 all raptors, outdated Bald Eagle surveys over much of the study area, and questionable sampling  
16 procedures resulted in inadequate studies that did not evaluate the Project's probable adverse  
17 environmental impact.

18 **Q.9. What is the greatest risk to wildlife posed by the Project?**

19 A.9. The species of greatest risk from the Project's impacts are nocturnal migrating landbirds.  
20 These birds do most of their flying at night during migration. Not a single study presented for  
21 this project has addressed the risk this Project presents in the air column habitat. Without this  
22 information it is not possible to make accurate determinations of the Project's probable  
23 environmental impact.

**Q.10. What criteria must be used when designing studies of bird migration in Ohio?**

A.10. Migration is highly variable. No single year of observation can be assumed to be representative of migration in any given area. At least three years of studies are necessary to begin quantifying average migratory patterns at any location. Local research along Lake Erie demonstrates as much as 50% differences in bird volume one year to the next. Any shorter time frame for studies is substandard and will not provide scientific validity or support for any conclusions.

Migration occurs continuously during each species' migrational time frame. The start and end of migration can vary greatly by species, and for Ohio includes the time frame of February to late May (~110 days) and early August to late November (~120 days) for most species of waterfowl, shorebirds, raptors, and passerines. Daily peaks in migration activity vary by species and are dependent on weather. Many diurnal migrating passerines begin moving soon after daybreak. Some raptors are similar to passerines in that they begin moving at dawn, but others are more confined to thermal development during the heat of the day instead of migrating. The studies must be conducted during the entire periods of migration.

Migration is generally a north to south movement across the landscape in spring and the reverse in the fall. However, there are other movements that are associated with migration that are contrary to this notion. Adverse weather may reverse the direction of migration flight for a short period where birds retreat only to continue normal movement following a more favorable weather system. The studies must take these movements into consideration.

Migration flight altitude is highly variable with thermal conditions, wind direction and strength, precipitation, landscape, and species. Recent research has indicated considerable variance in flight altitude within any given night. The studies must find the birds at all elevations.

Species have various migration strategies related to calendar timing and flock size. Visual detection and species identification are greatly affected by species, flight height, flock size, weather, and distance. Study design needs to account for these differences to be representative of all birds.

To address nocturnal migration risk, studies must be conducted at night when the birds are actively moving through the air column habitat.

**Q.11. Specifically, what are the deficiencies in the studies of migrating birds included in Republic Wind's Application?**

A.11. There were two studies on migratory birds included in the Application. These studies utilized different designs to survey the same segment of the avian resource.

I will first address the Passerine Migration Survey which was reported in Appendix N. Its stated purpose was to gauge the rate at which nocturnally migrating passerines could be harmed by wind turbines as the birds fly through the study area or stop in the area to rest and feed. The study was conducted nearly a decade ago and is irrelevant to today's conditions. The study was only conducted weekly for a life cycle phenomenon that exhibits high variability on a daily basis. There were only 15 days of surveys during spring which represents less than 15% of the migration season, while in fall only 13 days of surveys were conducted representing about 10% of the migration season. Therefore, sampling volume was inadequate to address movement during migration within a year and in no way could address the variability from year-to-year that can be extreme in avian migration. In addition, the study was not conducted over the present footprint of the Project provided in the Application. The study was purposely conducted only during weather that favors migration (northerly winds in fall, southerly winds in spring), which misses many of the variations in migration. Stopover of birds in the study area would be

1 expected to be greater in unfavorable weather resulting in early shutdown of migration on a  
2 given night. Heavily studied migration along the Lake Erie coast indicates a much more complex  
3 avian reaction to weather. Unfavorable winds have been documented in the spring to cause  
4 reverse migration to escape the colder Lake Erie waters. For example, one documented migrant  
5 banded along the Lake Erie coast was captured a few days later just north of Columbus during a  
6 spring northeast wind event. Republic Wind's study ignores these behaviors and thus  
7 misrepresents risk by virtue of its poor sample design.

8         This study is not related to the present footprint of Republic Wind's facility nor was it the  
9 same footprint represented in other surveys for this application. The time frame for migration for  
10 this study was adequate but being conducted for only one year is inadequate to address migration  
11 questions, avian risk, or environmental impact. This study is not a Passerine Migration Study but  
12 rather a Diurnal Passerine Migration Survey. The survey was designed to prefer common  
13 flocking species such as blackbirds and not nocturnal migrants. This study should have  
14 concentrated on documenting migration flight and not just stopover, since the air column is the  
15 habitat at risk from wind turbines. In this case, failing to address one of the two goals (migration  
16 pathway) made the study a scientific failure. The study failed to incorporate nocturnal radar into  
17 the study design in order to evaluate nocturnal flight. This survey was 1) designed for blackbird  
18 counts and 2) should not sum or average the bird counts over the duration of the survey but  
19 rather be stratified to the migrational timing of the individual species for evaluation. This survey  
20 was not designed to address sensitive species due to its low effort (the rarer the species, the  
21 higher the sample effort required), its diurnal time frame, location of points, and seasonal time  
22 frame. Actually, 10 species out of the total of 98 reported species are significant and should have  
23 been addressed in more detail.

1           Therefore, to state that this monitoring program confirms limited avian migrant use is  
2 erroneous and misleading. No data was provided on nocturnal movement or air column risk for  
3 the species that are at the most risk of striking turbines.

4           An additional study was conducted by WEST for the Emerson West Wind Project in  
5 2017. It was conducted in the appropriate time frame and was completed similar to the 2011  
6 study with all of the same failures listed above. While 18 points were conducted there is no  
7 mention of how many of these were on Republic's footprint, and results were summarized and  
8 averaged rather than used to demonstrate actual risk. As in the previous study, this was a diurnal  
9 survey completely ignoring the target species of nocturnal migration and the habitat of risk, the  
10 air column. It is indicated that height of birds were recorded to the nearest 1m at 200 m in  
11 distance. This appears to be physically impossible for a human observer. That would equate to a  
12 six inch bird (medium sized passerine) to represent an object .01 inch in size at 200 m to the eye.  
13 The detection probability at this distance is extremely low let alone assigning an altitude. While  
14 flocking birds such as blackbirds may be detected a single small passerine would not be seen.  
15 From Ohio data on turbine strikes a large percentage of mortality are of species that would not  
16 even be seen using this design even if they were to move during diurnal hours. The consultants  
17 concluded the area is that of low risk with absolutely no data collected to support or refute that  
18 claim. Therefore, scientifically the study is useless for assessing environmental impact on the  
19 avian resource.

20           The second migration study conducted was labeled the diurnal bird/raptor migration  
21 survey and is included in Appendix K. This study addressed the same birds as the above under a  
22 different design. It utilized a modified Hawk Migration Association of North America  
23 (HMANA) protocol which is for raptors only. Results were stated as averages for the whole



1 study period, when they should be stratified to species migration time frames to not dilute the  
2 importance of the area and assess environmental impact.

3 This was a one year migration survey completed eight years ago, and was not conducted  
4 daily or over the entire Project area. Therefore, to state that this monitoring study “confirms”  
5 limited avian migrant use is erroneous and misleading. This study opines that conclusion, based  
6 on incomplete data from one partial year of field work. In addition, the Project footprint at the  
7 time of the study appears different from the one stated in the Application, which discredits the  
8 relationship between the study and the Project.

9 The objectives of this survey were to assess diurnal birds (non-raptors), raptors, and their  
10 potential risk from elevated structures. However, this migration study grossly underestimates, or  
11 completely fails to address, the potential risk to target birds because:

12 - Analysis was conducted based on only one year of data. Migration volume variability  
13 can reach as high as 50% between years. Migration surveys should always be at least three years  
14 in duration to provide a more realistic analysis of risk.

15 - Sample design utilized a modified HMANA (Hawk Migration Association of North  
16 America) design of 9 AM to 4 PM. This time window is reasonable for soaring raptors but fails  
17 to address important time of day movements of non-raptors and non-soaring raptors (primarily  
18 Accipiters). This design flaw alone turns this study into exclusively a soaring raptor survey.

19 - Only 3 point count sites were used for more than 60 square miles, and were aligned on a  
20 roughly north-south axis. This could result in count dependency, with large sections of the study  
21 area remaining un-sampled. Detectability of the largest migrants is limited to three miles of  
22 visibility, and smaller species in tens of meters, so the coverage of this survey was inadequate in  
23 design to address its purpose and should not be used to make any conclusions on risk. Given my

1 more than 40 years of raptor and diurnal bird migration survey experience, extensive  
2 detectability problems are obvious even as little as 50 meters from any observation point. This  
3 detection probability, which varies by species, needs to be established if this type of data is to be  
4 used for risk assessment.

5 - There was no mention of point count observation radius. We then must assume they  
6 used infinite point count distance. This reduces the detection of birds and makes any conclusions  
7 with this study design suspect.

8 - A pre-determined sampling criteria was established based on wind direction as the sole  
9 environmental/atmospheric variable. This assumes all species react in similar ways to other  
10 environmental/atmospheric variables, which they do not. This is a serious assumption failure.

11 - Actual field days represented in the data comprise less than 50% of the specified sample  
12 period and roughly 20% of actual migration periods.

13 - By ignoring species' individuality and by combining the entire survey results into one  
14 grouping, information about various species in availability or risk is obscured.

15 - The study did not account for detectability or variability of detecting and counting  
16 individuals of various species using visual sampling methods.

17 - Making assumptions about the presence or absence of species and risk with limited  
18 spring and fall data is scientifically irresponsible.

19 - There was no methodology listed on how altitude was determined at various distances  
20 from the point count site. This is exceedingly difficult for the finite heights that were targeted.

21 - For non-raptors this study design favors identification of birds within the blackbird  
22 family and does not effectively address the presence of other species. Blackbirds are flocking  
23 birds that allow for more distant observation than solitary or small flock species. It would be

1 much more valuable to first stratify surveys to migrational time period by species where presence  
2 is possible, and second to utilize high count or occupancy as an indicator of risk. This study does  
3 not represent the breadth of bird migration but gives indications on only blackbird migration  
4 because of study design flaws.

5         The study design does not support the conclusion that limited use was indicated. Survey  
6 timing does not address most species of concern because of daily timing, seasonal timing, or  
7 weather effects. The survey timing did not encompass the entire migration season of many  
8 species of raptors, which invalidates species comparisons. There is no mention as to how or  
9 whether migrant Red-tailed Hawks and Turkey Vultures were separated from local non-  
10 migrating breeders. The fact that the Sharp-shinned Hawk was not recorded (possibly the most  
11 common migrating raptor) raises considerable suspicion of the observers' level of expertise and  
12 the study design.

13         The report states that based on the surveys, the area is not important to migrating diurnal  
14 birds and raptors. This conclusion is not supported by sound science, given that the study was  
15 designed to count only blackbirds and large soaring raptors. Further, this is contradictory to the  
16 known fact that the area lies directly south of one of the greatest bird concentration areas in the  
17 Western Hemisphere (i.e., a Globally Important Area as designated by the National Audubon  
18 Society). Waterfowl, are most likely observed in diurnal feeding flocks near dawn and dusk.  
19 Waterfowl migration would not be expected to be observed with this study design which takes  
20 place from 9 am to 4 pm only.

21         Due to excessive flaws in study design, this study cannot be used to address avian risk  
22 from wind turbines at the proposed Project site. The study conducted in no way can confirm any  
23 conclusion on avian use, as it failed to address too many of the species in question.

**Q.12. Does the Application address winter risk to birds for an environmental impact determination?**

A.12. There were no studies conducted to assess environmental impact during the winter time frame of the annual life cycle. This region of Ohio holds considerable winter bird populations. The Ohio Winter Bird Atlas conducted 2002-2008 indicated at least 40 species seen in each of the one minute blocks included in this Project footprint. In addition, there are multiple banding records of Northern Saw-whet Owls in the study area. So the answer would be no.

The Ecological Assessment (Exhibit J) reviewed the 2017 Christmas Bird Count. There are over 100 years of data available in this dataset. At least the last decade should have been reviewed to quantify annual variation. This report failed to make a reasonable ecological assessment of the data available to inform risk from this Project.

**Q.13. Have you reviewed breeding bird surveys conducted for this project?**

A.13. Yes, I have reviewed these surveys. There were four categories of studies conducted for breeding birds. These included the raptor nest survey, breeding bird survey, Bald Eagle nesting survey, and a special breeding bird survey for sensitive species.

**Q.14. What is your assessment of the adequacy of the Breeding Bird Survey design and conclusions?**

A.14. This study was conducted in 2011 and was not conducted on the entire footprint of the present project. These facts raise considerable scientific rigor and validity concerns about any conclusions rendered by the consultant.

This study was reported in Appendix O. While not constituting a failed study design, it is interesting that while this study was called a Breeding Bird Survey it did not utilize the long standing design of the Federal breeding bird survey of 3 minutes per point. Had this standard

1 been used instead of the 10 minute count chosen, sample size could have been tripled without  
2 increasing the cost of the field work. Generally, good sample design prefers increasing points  
3 where possible and reducing individual point time. Three repetitions of each point is a good  
4 design component. The report is vague on analysis and the methodology used. As a result, it  
5 appears surveys were summed rather than maximum counts used, which would have represented  
6 risk more accurately and would be the primary purpose of multiple repetitions.

7         The Federal Vickory breeding bird survey route was reviewed but only for listed species.  
8 I conduct that survey route myself and it is of interest that Republic Wind's report does not  
9 mention species such as the Dickcissel for which they designed a special survey. I have annually  
10 recorded that species in my surveys. Instead, Republic Wind's consultant concluded the species  
11 targeted were not present in the area. If they did a literature review as reported, they appear to  
12 have chosen to ignore results unfavorable of a desired answer.

13         The Ecological Assessment (Exhibit J) used outdated data from the Federal Breeding  
14 Bird Survey. This report was completed in January 2018 and should have included breeding bird  
15 surveys beyond 2011. To ignore 2012-2017 data is to not include the most recent data available,  
16 a responsibility of this environmental assessment.

17         Utilization of the state Breeding Bird Atlas would have been very useful in assessing the  
18 validity of the Project breeding bird survey. However, Republic Wind's report only addresses  
19 listed species. This failure raises concern about the validity of this entire report. Why wasn't the  
20 Breeding Bird Atlas cross referenced with the Project survey? How did atlas blocks relate to  
21 diversity compared to the project survey? Why were only the priority blocks of the Breeding  
22 Bird Atlas I used from the Breeding Bird Atlas II? There was an opportunity to compare the  
23 entire study area (the one in 2011 would require a new analysis for 2018 application), but this

1 opportunity was not taken. The result is a failure to provide a meaningful analysis of the  
2 Project's risk to breeding birds.

3 Additional data from the neighboring Emerson West project was added to this  
4 application. This appears to contradict DNR's position that a Project must collect its own data.  
5 This survey was conducted on only a portion of the Project area. It was not compared to other  
6 work conducted and referenced in this application. The summary indicates incorrectly that it was  
7 a survey of 15 points, which gives the impression of a more robust sample design; however, only  
8 2 points were conducted in 2011, 11 points in 2012, and 2 points in 2016. None of these points  
9 was repeated in any two years. In effect, sample size was at most 11 points for one season and  
10 only 2 points in two other years to represent the entire study area. This is contrary to testimony  
11 offered by Republic witnesses and a complete fallacy. DNR recommendations were for 15 points  
12 for the acreage involved as the sample size.

13 The consultant indicates the objectives of the survey were to document the type and  
14 number of bird species observed within the Project area during the breeding season. It is not  
15 scientifically valid to assess the objectives listed based only on a sample size of 2 points in two  
16 of the three years studied. As a result, this report was very misleading, to the point of subjugating  
17 ODNR guidelines in sample design. DNR indicated that the minimum number of points to  
18 conduct the survey was 15. This is an annual survey. The actual sample sizes were 2, 11, and 2  
19 over three years, not 15 points run three years as required by the protocol. The study indicates  
20 the distance to each bird and height was estimated to within 1 meter. There is no description of  
21 how that resolution could be accomplished with the naked eye at distances up to 200 meters; this  
22 claim seems extremely unlikely if not impossible. Sample size, design, and analysis are  
23 inadequate to make any conclusions on risk to breeding birds.

**Q.15. Does the raptor nesting surveys provide adequate information for environmental impact determinations with any level of certainty?**

A15.. No, neither the surveys represent adequate time frame needs or account for the species they purport to conclude no risk.

The raptor nest survey was included in Appendix L. It was conducted during one year only and nearly a decade ago. Neither of these criteria is adequate to allow for impact determinations on the objectives of the study concerning the number of nests, where nests are located, the condition of nests, and what species of raptors nested at the Project site. The study was conducted once over a nine day period in March 2011. The study area footprint reported does not match any of the other studies and does not include the entire present footprint, which invalidates results for risk assessment. It is stated that nests were in early stages of construction; therefore, it is possible that additional nests were yet to be started or existing nests had failed, or possibly fell from the tree. This survey did not address any sensitive species outside of the Bald Eagle. It should be titled Red-tailed Hawk and Bald Eagle Nest Survey as they are the only species likely to be found using this design, since other diurnal and nocturnal species were ignored. Standard Ohio DNR protocol recommends nest searches from February 1 to March 31. Stick nests of Bald Eagles and Red-tailed Hawks would be marginally sampled with Republic Wind's design, however, owls, Cooper's Hawk, Northern Harrier, and Red-shouldered Hawks would not be adequately sampled by the survey methods. Their own results indicate some nests may have been just beginning and others (which they chose to indicate as not used) had already failed. This survey should be conducted at least twice if not three times during the time frame. Only 3 of 11 nests (27%) could be assigned ownership. This is a glaring sign that the survey was inadequate to address the purpose of the survey and should have been conducted over a larger

1 time frame. Second, it was assumed that the remaining nests were inactive. This is not supported  
2 due to inadequate observation and sample design. These may easily be nest failures or pair  
3 movements. This study was not designed to assess other listed or sensitive raptor species as they  
4 are ground or secretive nesters. The study conducted in no way promotes any conclusion on  
5 raptor use as it failed to address many diurnal and nocturnal species in question.

6 Additional results from Emerson West project were added to the application. The survey  
7 was only conducted between March 25 and April 13, 2016. This time frame is not adequate to  
8 identify all nesting activity in the study area. It was acknowledged that the survey was only for  
9 Buteo sized raptors and larger. The title of this survey is misleading to readers and their  
10 assessment of the Project's risk to raptors. This study only covers a part of the Project area, and  
11 is not comparable to 2011 work.

12 For multiple reasons in study design, analytical techniques, and timing, neither of these  
13 studies is adequate for the OPSB to assess environmental impact and require new data collection.

14 **Q.16. Were Republic Wind's surveys adequate to assess risk to Bald Eagles?**

15 A.16. No. There are many flaws in these reports that eliminate their value for the OPSB to  
16 make any determination of risk with any confidence. The original work was conducted nearly a  
17 decade ago on a species that has doubled its population in the state in that timeframe (Appendix  
18 M). Neither the 2011 study nor the 2016 study was conducted on the entire Project footprint and  
19 therefore cannot make conclusions to the entire Project. The 2016 study was pulled from another  
20 project and is not comparable to the 2011 study.

21 The 2011-2012 survey states that nests were observed twice a week during the breeding  
22 and nesting seasons when in fact only one nest was so monitored in one year. (The other nests  
23 were concluded to be inactive or abandoned.) No dates of observation were listed for the two



1 nests stated as abandoned, so I am unable to determine if there were adequate nest checks to  
2 justify such a conclusion. For 2012, nests were only checked once a month. My 40 years of eagle  
3 nest monitoring experience indicates this is inadequate to assess use. In the study of nearly 1,500  
4 nest opportunities from 1980-2009, I had only 10 situations that we concluded the nesting  
5 territory was inactive. These all occurred in the early years and may have still represented a  
6 nesting attempt. It is extremely rare for a mated pair to be inactive on any given year. They may  
7 fail early or a second nest may have been built in the territory. There was no evidence given in  
8 the report that any effort was made to locate a possible new nest.

9       A very precise protocol by the DNR Division of Wildlife was established during the  
10 recovery phase of the Ohio Bald Eagle Restoration Program which I developed and supervised.  
11 Each pair establishes a specific time frame for the nesting sequence and demonstrates little  
12 deviation under normal circumstances. Nest check protocol was at least one check a week from  
13 January to June. The earliest nest initiation has been late January and the latest the first week of  
14 April. It is impossible to conclude activity with one week of nest checks as completed in this  
15 study.

16       Additional data was pulled from surveys for the Emerson West project conducted in  
17 2016. Observations were made at three nests during the month of June. This time frame is totally  
18 inadequate to make any conclusions on eagle activity on the stated objective of gaining  
19 information on directional use from the nests and how they made use of the area. This could give  
20 insight on use of the early fledging time frame of a pair, but it fails to provide any information on  
21 11 months of the life cycle that would be extremely different then the month of June. An  
22 inappropriate assumption of unsuccessful or abandoned nests cannot be supported from June  
23 only surveys. There is no indication if any effort was made to locate a new nest for this territory.

1 June is an inappropriate time to follow eagle activity due to leaf out. In five years of telemetry  
2 study I conducted on Bald Eagles in Ohio, actual sightings of transmitter birds were few and  
3 hard to obtain due to behavior associated with young rearing. Signals provided considerable  
4 information on individuals that would never have been seen if not for the technical support of the  
5 radio. Any conclusions gleaned from Republic Wind's design would be minimum use and highly  
6 questioned on actual risk to the bird for the purpose of this study.

7 Not a single survey conducted by Republic Wind mentions or addresses the eagle nest  
8 that occurs directly in the middle of the footprint of the Project Area near the junction of TR 138  
9 and SR 18. A buffer zone between turbines and this nest, as well as any other Bald Eagle nests,  
10 must be established once a proper study is performed to identify the locations of all Bald Eagle  
11 nests in and near the Project Area. For this purpose, a complete survey, with a study design  
12 accounting for each pair's life cycle, needs to be conducted to determine primary feeding areas  
13 and areas of use. There are known multiple sightings of adult eagles about 2-3 miles to the west  
14 of the nest site and a potential feeding site to the southeast about 3 miles. It is highly likely these  
15 sighting clusters are related to this nest territory. Considerable nest study over 30 years has  
16 indicated that inland nesting Bald Eagles in Ohio have a larger territory size than their  
17 counterparts along Lake Erie. This is likely due to the fact that inland eagles need a larger area to  
18 find food. At minimum a 2.5 mile buffer radius or a 25 square mile polygon would be needed to  
19 cover most inland breeding pairs.

20 When plotting known nest and eagle activity in the area of the Project an expected pattern  
21 begins to emerge (see Exhibit B hereto; which is an adaptation of Exhibit H of Crystal Hoepf on  
22 which I have added a star to show the location of another Bald Eagle nest of which I am aware).  
23 Nest location, predicted feeding potential and observations indicate considerable risk in the core

1 of the project footprint. Additional activity in the northeast quadrant of the project area indicates  
2 an as of yet unidentified nesting territory in that area. It was the responsibility of APEX to  
3 identify existing eagle nest and that has failed to be conducted or reported.

4 Republic Wind's point count survey has little validity due to being nearly a decade old,  
5 inadequate field time, and analysis that diluted results by averaging over the entire year instead  
6 of stratifying to life cycle activities of the eagle.

7 Bald Eagle observations during the Diurnal Bird/Raptor Migration study that was  
8 conducted in 2011 are irrelevant to 2019 given the vast Bald Eagle population increases in the  
9 past decade. There is no evidence supplied to indicate these sightings are of migrating eagles and  
10 not residents. In addition, 1) this survey effort was inadequate to address this species, 2) no effort  
11 was made to separate migrant from resident eagles, and 3) that means the data from this study are  
12 an inappropriate statistic for this type of survey.

13 An additional study was pulled from the Emerson West project to assess large bird and  
14 eagle use in 2016-17. This study represents only a portion of Republic Wind's Project Area, and  
15 its findings cannot be extrapolated to the Project Area. Its objectives were to 1) provide estimates  
16 of large bird use throughout the year, and 2) estimate the potential impacts of Emerson West  
17 project construction and operations on large birds, federally and state-listed species and eagles. It  
18 is important to note that this study was not conducted for the Republic Application but was, in  
19 essence, a literature review.

20 The survey was only conducted once a month at 29 points encompassing only 30% of the  
21 Republic Wind Project footprint. Since this footprint is only a fraction of the Project footprint, it  
22 is less representative than indicated. The list of species represented as large birds are subjective  
23 and in contrast to statements of standardization, and comparisons of this study data are very

different from other WEST analyses in Ohio. It is highly unlikely that the resolution reported for bird observations (1 meter) for distance and height is possible by human observers.

Species richness should be represented by total species and not a mean. A statistical mean is inappropriate since it will dilute diversity and underestimate avian value of the study area. Diversity and richness are the same parameter. Use of means with several iterations will only serve to dampen values and point to erroneous conclusions about risk. If a statistical mean is to be used instead of maximum or medium then the confidence interval should always be included to indicate accuracy and precision of the sample.

The Emerson West study utilizes only an initial observation of a bird, regardless of changes in altitude, to infer whether the bird flies in the risk zone (the altitude in which the turbine is present) and this assumption underestimates actual risk. For example, any bird first observed above the risk zone would, in this study, not be counted as an observation of risk. But in fact, we know that the bird has already had one risk encounter by virtue of having passed through the risk zone when rising, and then will certainly encounter the risk zone again on the way down, which should count as two encounters with risk, not “none.”

The sample size and design for this Project is not robust enough to make risk conclusions for large birds. No statistical confidence has been given, and “unlikely” is not a scientific statement of risk; it is merely an unquantified opinion. The study provided the questionable conclusion that diurnal raptor use is low considering the summer and winter average (confidence interval is not provided and could put this as low to high with adequate variability) was in the low/moderate range and the project placed near the medium of sites referenced. These two concerns alone contradict a projection of “low” raptor use. The sample design was not adequate to make any conclusions on eagle use or risk, since surveying only one day a month reduces the

1 opportunity to assess important life cycle events such as fledgling dispersal from nest sites in the  
2 region.

3 Northern Harriers can be common migrants in this area and potential risk is  
4 underestimated because their unique flight behavior is not accounted for in the sample design.  
5 Sandhill Cranes can be expected to become more abundant as the eastern population continues to  
6 expand. Nowhere does this report list the species considered as sensitive.

7 This study does not have the scientific robustness to make definitive conclusions on risk  
8 to large birds or eagles or to be useful in determinations of environmental impact.

9 **Q.17. Did you review bat studies for design and the level of certainty needed for making**  
10 **determinations of environmental impact?**

11 A.17. Yes.

12 A Bat Acoustic Monitoring Survey was conducted in 2011, and therefore it is outdated.  
13 The survey could not discount Indiana Bat presence. The survey used the Met Tower as a  
14 recording site, which was not near notable bat habitat. Although the consultants acknowledged  
15 that this could have affected the surveys, they still concluded that the Project area was not an  
16 important bat activity area. The Acoustic recorder used had a measuring range of 30 meters,  
17 while the tower was 670 meters from the closest woods where bats were likely to be observed by  
18 the recorder. The study indicated an increase in migratory bat activity but did not address these  
19 results. The study indicated it did not detect the Indiana Bat; however, it did detect 44 genus  
20 Myotis bats without identifying their species, of which the Indiana bat is one species, even  
21 though it cannot be distinguished from other Myotis species by this method.

22 Bat mist-netting was conducted in 2011 and as requested by the USFWS again in 2015-  
23 2016. The 2011 data is severely outdated and of little usefulness for risk assessment. The mist

net results do not compare well with acoustic results for many potential reasons. The Indiana Bat was encountered, negating the acoustic monitoring conclusions. Combining results for all mist net sites assumes “similarity,” and uses averages when it should address variability between individual sites first before combining. This results in statistical problems that make conclusions impossible. Additional data in 2015-2016 was requested for Indiana and Long-eared Bat presence support. Studying a 9 day period one year and a 5 day period in completely different areas is insufficient to determine risk or to support the conclusions of Republic Wind’s consultant that risk to bats is low.

**Q.18. Do you have any concerns about the Staff Report and its conditions recommended to the Board?**

A.18. Yes. My greatest concern is that there is no mention of bird migration, especially nocturnal migration which is the source of greatest risk. In addition, the Staff Report does not require Republic Wind to conduct avian and bat studies necessary to evaluate the Project’s risks to these species or to identify conditions necessary to protect them.

The Staff Report fails to protect the Bald Eagles that live in and use the Project Area.

The Staff Report fails to protect other bird species and bat species that live in and use the Project Area.

The Staff Report fails to require adequate information about and provide protective conditions for Endangered and Threatened species.

In the provided Table, federal Status is listed for the Bald Eagle but the table fails to include Migratory Bird Treaty Act (MBTA) for the Northern Harrier, Loggerhead Shrike, and Upland Sandpiper. This needs to be corrected.

1           There are a host of species from the state list that could and should be added for data  
2 collection and possible conditions.

3           The study of and protections for Endangered species such as the American Bittern, King  
4 Rail, and Kirtland Warbler should be required. All of these species would be at risk as they  
5 migrate through the Project Area to the Lake Erie shore and points beyond. They are all  
6 nocturnal migrants which have not been addressed by the Staff Report.

7           Additional Threatened species have been recorded in the study area such as Black-  
8 crowned Night-Heron, Trumpeter Swan, and Sandhill Crane. Special Concern species that  
9 should be covered for impact assessment would include the Sharp-shinned Hawk, Prothonotary  
10 Warbler, Sora, Virginia Rail, Grasshopper Sparrow, Vesper Sparrow, Red-headed Woodpecker,  
11 and Black-billed Cuckoo. All have been reported from the Project area.

12           A host of Special Interest species that are nocturnal migrants have not been addressed,  
13 since Republic Wind has not conducted any nocturnal surveys to adequately assess the Project's  
14 environmental impact and risk. This would include species such as the Northern Saw-whet Owl,  
15 Golden-winged Warbler, Canada Warbler, Short-eared Owl, and American Black Duck. There  
16 have been no studies provided by the applicant to address risk or impact to these and other  
17 Special Interest species.

18 **Q.19. Does this conclude your testimony?**

19 A.19. Yes it does. However, I reserve the right to submit supplemental testimony as new  
20 information subsequently becomes available or in response to positions taken by other parties.

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/s/ Jack A. Van Kley  
Jack A. Van Kley



# EXHIBIT A

Mark Shieldcastle  
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## Background Resume

B.S. Wildlife Management, The Ohio State University 1974

Research Director, Black Swamp Bird Observatory, Oak Harbor, Ohio 1992- present  
Supervises research projects of the Observatory, their technical quality, data analysis, and publication of findings. These studies have included Passerine Migration and Breeding Bird Studies in the Lake Erie Marsh Region, Raptor Migration Studies of the Southwestern Shore of Lake Erie, Shorebird Migration and Habitat Use Studies in the Lake Erie Marsh Region, Habitat Use and Migrational Timing of Rails in the Lake Erie Marshes, Migrational Movements and Homing Tendencies of Purple Martins in East-Central Ohio, Movement and Dispersal of Ring-billed Gulls in the western basin of Lake Erie, and Migrational Movements of Colonial Waders Breeding on West Sister Island NWR, Ohio. Data from these studies have been used in acquiring Regional Shorebird Reserve Status of the western basin of Lake Erie increasing funding potential for management agencies by federal granting, improved management of agency owned and private wetlands for shorebird management, increased recognition of the business community on the contribution of wildlife and wildlife induced recreation to Ohio, and education of the general public, college wildlife classes, and special wildlife interest groups. Has worked extensively in the development of a regional migrational stopover monitoring plan. Data from all studies have been used in the development of the LaMP for Lake Erie under auspices of the Clean Water Act as well as regional avian plans. Has acted as technical lead on Bird/wind power issues along the western basin of Lake Erie for the Observatory.

Wildlife Biologist Supervisor, Ohio Division of Wildlife, DNR, Crane Creek Wildlife Research Station. 2003- 2009.

Acted as project leader for wetland wildlife research for the state of Ohio. Supervises biologist on all above projects, was Technical Representative to the Mississippi Flyway Council (MFC) (sets migratory bird regulations), provided technical advisory efforts for a variety of state operations concerning wildlife research. Represented the MFC on the Black Duck Joint Venture technical board. Represented the Association of Fish and Wildlife Agencies on the North American Banding Council. Was lead author on the Mississippi Flyway Avian Influenza Monitoring Plan. Advisory and writer positions with the statewide agency strategic plan.

Wildlife Biologist, Ohio Division of Wildlife, DNR, Crane Creek Wildlife Research Station. 1979-2003.

Supervised and implemented various projects from sample design to analysis. Projects included the restoration of the Bald Eagle, Trumpeter Swan, Osprey, common Tern, River Otter, and Sandhill Crane. Also conducted research on colonial waders, waterfowl, and furbearers. Represented the state of Ohio of various regional, national, and international projects concerning wetland wildlife. This includes development of the Lake Erie management plan under the clean water act, advisory capacity of the Maumee River remedial action plan; co-author of the Regional plan of the U.S. Shorebird Plan and The Upper Mississippi – Great Lakes Regional Waterbird Plan.

Research Technician, Ohio Division of Wildlife, DNR, Crane Creek Wildlife Research Station. 1976-1979.

Assisted biologist in various research projects including work on waterfowl and furbearer populations.

Research Technician, Ohio Wildlife Cooperative Wildlife Research Unit, OSU 1974-76

Conducted field and lab research on colonial waterbirds, heavy metal contamination, ecosystem bio magnification of contaminants in a wetland and colonial waders, ecosystem movement of a radioisotope (Tritium) in a wetland environment.

#### Skills and Positions:

Fluent in various computer programs including SAS, Excel, Word-Perfect, Word, Key Entry III, and Power Point. Working knowledge of Program MARK, Access, and ArcView. Specializes in Sample Design issues.

Has conducted or is conducting research on Bald Eagle, colonial waders, terns, wetland breeding birds, Woodcock, shorebirds, colonial passerines, waterfowl, rails, cranes, migrating raptors, migrating passerines, and wind power/bird issues. Has co-authored the Beneficial Use Impairments for Wildlife and Wildlife Habitat portion of the Lake Erie Management Plan which is part of the Clean Water Act; The Great Lakes- Upper Mississippi River Regional Plan of the National Shorebird Plan; The Great Lakes- Upper Mississippi River Regional Plan of the North American Waterbird Plan; and has contributed to several of the regional plans of the Partners-in-Flight Flight Plan. Has authored or co-authored a variety of papers on passerines, Bald Eagles, cormorants, and contaminant issues with birds. Has developed recovery plans for the Bald Eagle, Osprey, Common Tern, Black-crowned Night-heron, and Sandhill Crane in Ohio. Was lead author on the Mississippi Flyway Council Avian Influenza Surveillance Plan.

Is a Past President of the Inland Bird Banding Association, presently is Secretary of the North American Banding Council (a two term Chair as well) and sets on Council as At-Large at this time. Have conducted banding operations or been in

charge of operations totaling over 950,000 birds banded for over 41 years. Served as Treasurer for the North Central Section TWS for two years.

#### Conference Presentations

Shieldcastle, M. C. 1986. Sub-specific determination of Canada goose harvest to estimate hunting mortality of Ohio-raised geese. Ohio Fish and Wildlife Conference. Columbus.

Shieldcastle, M.C. 1995. Habitat Use of Fledgling Bald Eagles Prior to Migration. Raptor Research Annual Meeting

Shieldcastle, M.C. 1995. Dispersal Timing of Bald Eagle Fledglings from Natal Territories. Raptor Research Annual Meeting

Lake Erie LaMP Steering Committee. 2000 - Presentation on Beneficial Use Impairments to Wildlife and Wildlife Habitat in Lake Erie.

First Ohio Avian Conference. 2001 - Bank Swallow Longevity and Homing Tendencies of Colonies in Northwest Ohio.

\_\_\_\_\_ - Comparison of Bird Communities of Various Habitats of the Oak Openings, Lucas Co., Ohio.

\_\_\_\_\_ - Spring Energetic Condition of Migrating Passerines and its Role as a Possible Indicator of Breeding Success of Boreal and Temperate Nesting Species.

Ohio Wildlife Diversity Conference. 2005 - Key Note Speaker - The Bald Eagle, It's Recovery in Ohio.

Fourth Ohio Avian Conference. 2007 - Habitat Use and Migrational Timing of Sora, Virginia Rail, and King Rail in the Lake Erie Marshes, Ohio

Midwest Bird Conservation and Monitoring Conference. 2011 – Midwest Migration Monitoring: A coordinated Approach for Monitoring Landbird Migration.

Midwest Bird Conservation and Monitoring Conference. 2012 - Midwest Migration Monitoring: Current Capacity throughout the Upper Midwest.

International Bald Eagle Days Conference. 2012 – Wind Power Development and Bird Conservation – Are They Compatible.

Michigan Bird Conservation Initiative Conference. 2013 – Wind Power, Is it for the Birds? Development of Avian Concern Zones at the State and Local Levels.

Wisconsin Monitoring our Migratory Birds Workshop. 2013 – Migrational Monitoring in the Great Lakes: A regional Protocol.

Shieldcastle, M.C., August 2015. Migration Monitoring - A Coordinated Approach for Monitoring Landbird Migration. *For* Ohio Bird Banding Association

Shieldcastle, M.C. August 2015. Shorebird Migration Timing, Habitat Use and Management Implications in the Lake Erie Marsh Region. *For* BSBO Shorebird Workshop

Shieldcastle, M.C. 2015. Long-term Migration Monitoring Supports Declining Population in Golden-winged Warblers. *For* Inland Bird Banding Association

Shieldcastle, M.C. October 2016. Habitat Use and Migrational Timing of Virginia Rail and Sora *For* Ohio Ornithological Society Rally for Rails Symposium.

Shieldcastle, M.C. October 2016. Development and implementation of a Midwest Migration Network. *For* The 2016 State of Stopover Symposium, Milwaukee, Wisconsin.

Kaufman, K. and M.C. Shieldcastle. October 2016. Wind Energy and Birds: Can They Coexist? *For* Black River Audubon.

Shieldcastle, M.C. October 2017. Wind Energy and Birds: The insufficiencies of pre- and post-construction monitoring. *For* Ohio Avian and research Conference.

Shieldcastle, M.C. October 2018. Midwest Migration Network – Workshop for Banding and Ground Survey Implementation. Port Washington, Wisconsin.

Various other presentations throughout the Midwest.

### **Professional Societies & Affiliations**

The Wildlife Society

The Wildlife Society (Ohio Chapter)

The Wildlife Society (North Central Section)

The American Ornithologists' Union

The Wilson Ornithological Society

The Cooper Ornithological Society

The Association of Field Ornithologists

Raptor Research Foundation

The Waterbird Society

Inland Bird Banding Association; President - 2001 - 2004

North American Banding Council; Chair 2004-2005; 2009-2011; Secretary 2012-present

## **Publications & Conference Proceedings**

- Shieldcastle, M.C. and L. Martin. 1997. Colonial Waterbird Nesting on West Sister Island NWR and the Arrival of Double-crested Cormorants. Symposium on Double-crested Cormorants and Population Status and Management Issues in the Midwest. Milwaukee, WI.
- Shieldcastle, M.C., G.M. Tori, J.L. Weeks. 1998. Nuisance Canada Goose Management in Ohio - A Quest for Solutions. In D.H. Rusch, M.D. Samual, D.D. Humburg, and B.D. Sullivan, eds. Biology and Managment of Canada Geese. Proceedings International Canada Goose Symposium, Milwaukee, WI.
- Shieldcastle, M.C. and J.A. Shieldcastle. 1998. Evaluation of Selected Natural and Restored . Wetlands in Williams County, Ohio for Bird Use During Migration and Breeding Seasons. USFWS Contract.
- Shieldcastle, M.C. 1999. Wetland Breeding Bird Surveys for Ohio. Proceedings of the Marshbird Monitoring Workshop. Laurel, MD.
- Shieldcastle, M.C. and L. Bode. 1999. Monitoring Avian Productivity and Survivorship on Oak Openings Preserve, Progress Report 1999. Black Swamp Bird Observatory, Oak Harbor, OH.
- Shieldcastle, M.C. and J.A. Shieldcastle. 2001. Avian Conservation Plan, Oak Openings Region, Ohio. The Nature Conservancy.
- Shieldcastle, M.C. and J.A. Shieldcastle. 2001. Evaluation of Selected Natural and Restored Wetlands in Williams County, Ohio for Bird Use During Migration and Breeding Seasons. First Ohio Avian Conference. Columbus, Ohio.
- Shieldcastle, M.C. 2004. Migrational Movements and Habitat Usage of Passerines in the Great Lakes Region and Specifically the Ottawa National Wildlife Refuge, Ohio. Progress Report-2003. Black Swamp Bird Observatory, BSBO-ONWR03-1.
- Shieldcastle, M.C. and J.A. Shieldcastle. 2004. Migrational Survey and Habitat Usage of Shorebirds in the Lake Erie Marsh Region. Progress Report-2003. Black Swamp Bird Observatory, BSBO-ONWR03-3.
- Shieldcastle, M.C. and J.A. Shieldcastle. 2005. Migrational Survey and Habitat Usage of Shorebirds in the Lake Erie Marsh Region. Progress Report-2004. Black Swamp Bird Observatory, BSBO-ONWR04-3.
- Shieldcastle, M.C. and J.A. Shieldcastle. 2006. Migrational Survey and Habitat Usage of Shorebirds in the Lake Erie Marsh Region. Progress Report-2005. Black Swamp Bird Observatory, BSBO-ONWR05-3.

- Shieldcastle, M.C. and J.A. Shieldcastle. 2007. Migrational Survey and Habitat Usage of Shorebirds in the Lake Erie Marsh Region. Progress Report-2006. Black Swamp Bird Observatory, BSBO-ONWR06-3.
- Shieldcastle, M.C. 2007. Migrational Movements and Habitat Usage of Passerines in the Great Lakes Region and Specifically the Ottawa National Wildlife Refuge, Ohio. Progress Report-2006. Black Swamp Bird Observatory, BSBO-ONWR04-1.
- Shieldcastle, M.C. 2007. Standardized Surveys of Butterflies on Ottawa National Wildlife Refuge and the Surrounding Western Basin of Lake Erie Ohio. Progress Report – 2006. Black Swamp Bird Observatory, BSBO-ONWR06-5.
- Shieldcastle, M.C. 2007. Ohio Winter Bird Atlas Interim Report 2007. Black Swamp Bird Observatory. Ohio Division of Wildlife Contract NGSCW-07-35.
- Shieldcastle, M.C. 2008. Strategic Plan for Managing Ohio's Bald Eagle Population. ODNR, Division of Wildlife.
- Shieldcastle, M.C. 2008. Habitat Use of Fledgling Bald Eagles in the Lake Erie Marsh Region and Management Implications. ODNR, Division of Wildlife.
- Shieldcastle, M. C. 2008. Strategic plan for management of Ohio's Bald Eagle population. Ohio Department of Natural Resources, Division of Wildlife, Columbus, USA.
- Shieldcastle, M.C. 2008. Ohio Winter Bird Atlas Interim Report 2008. Black Swamp Bird Observatory. Ohio Division of Wildlife Contract NGSCW-08-35.
- Shieldcastle, M.C. 2008. Standardized Surveys of Butterflies on Ottawa National Wildlife Refuge and the Surrounding Western Basin of Lake Erie Ohio. Progress Report – 2007. Black Swamp Bird Observatory, BSBO-ONWR07-5.
- Shieldcastle, M.C. and K.A. Mylecraine. 2008. Spring Raptor Migration on Ottawa National Wildlife Refuge and Surrounding Lake Erie Marshes, Ohio. Progress Report- 2008. Black Swamp Bird Observatory, BSBO-ONWR08-2.
- Shieldcastle, M.C. and J.A. Shieldcastle. 2008. Migrational Survey and Habitat Usage of Shorebirds in the Lake Erie Marsh Region. Progress Report-2007. Black Swamp Bird Observatory, BSBO-ONWR07-3.
- Shieldcastle, M.C. 2009. Standardized Surveys of Butterflies on Ottawa National Wildlife Refuge and the Surrounding Western Basin of Lake Erie Ohio. Progress Report – 2008. Black Swamp Bird Observatory, BSBO-08-05.

- Shieldcastle, M.C. and J.A. Shieldcastle. 2009. Migrational Survey and Habitat Usage of Shorebirds in the Lake Erie Marsh Region. Progress Report-2008. Black Swamp Bird Observatory, BSBO-08-03.
- Shieldcastle, M.C. 2009. Migrational Movements and Habitat Usage of Passerines in the Great Lakes Region and Specifically the Ottawa National Wildlife Refuge, Ohio. Progress Report-2008. Black Swamp Bird Observatory, BSBO-ONWR 09-1.
- Shieldcastle, M.C., T. Kashmer, and K.A. Mylecraine. 2009. Migrational Movements and habitat Usage of Rails in the Lake Erie Marsh Region, Ohio. Progress Report-2008. Black Swamp Bird Observatory, BSBO-ONWR 08-6.
- Shieldcastle, M.C. 2010. Standardized Surveys of Butterflies on Ottawa National Wildlife Refuge and the Surrounding Western Basin of Lake Erie Ohio. Progress Report – 2009. Black Swamp Bird Observatory, BSBO-ONWR 09-5.
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- Shieldcastle, M.C. 2015. Monitoring Avian Productivity and Survivorship on Oak Openings Preserve, Lucas County, Ohio. Progress Report-2014. Black Swamp Bird Observatory, BSBO-15-3.
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Shieldcastle, M.C. 2017. Migrational Movements and Habitat Usage of Passerines in the Great Lakes Region and Specifically the Ottawa National Wildlife Refuge, Ohio. Progress Report-2016. Black Swamp Bird Observatory, BSBO-17-1.

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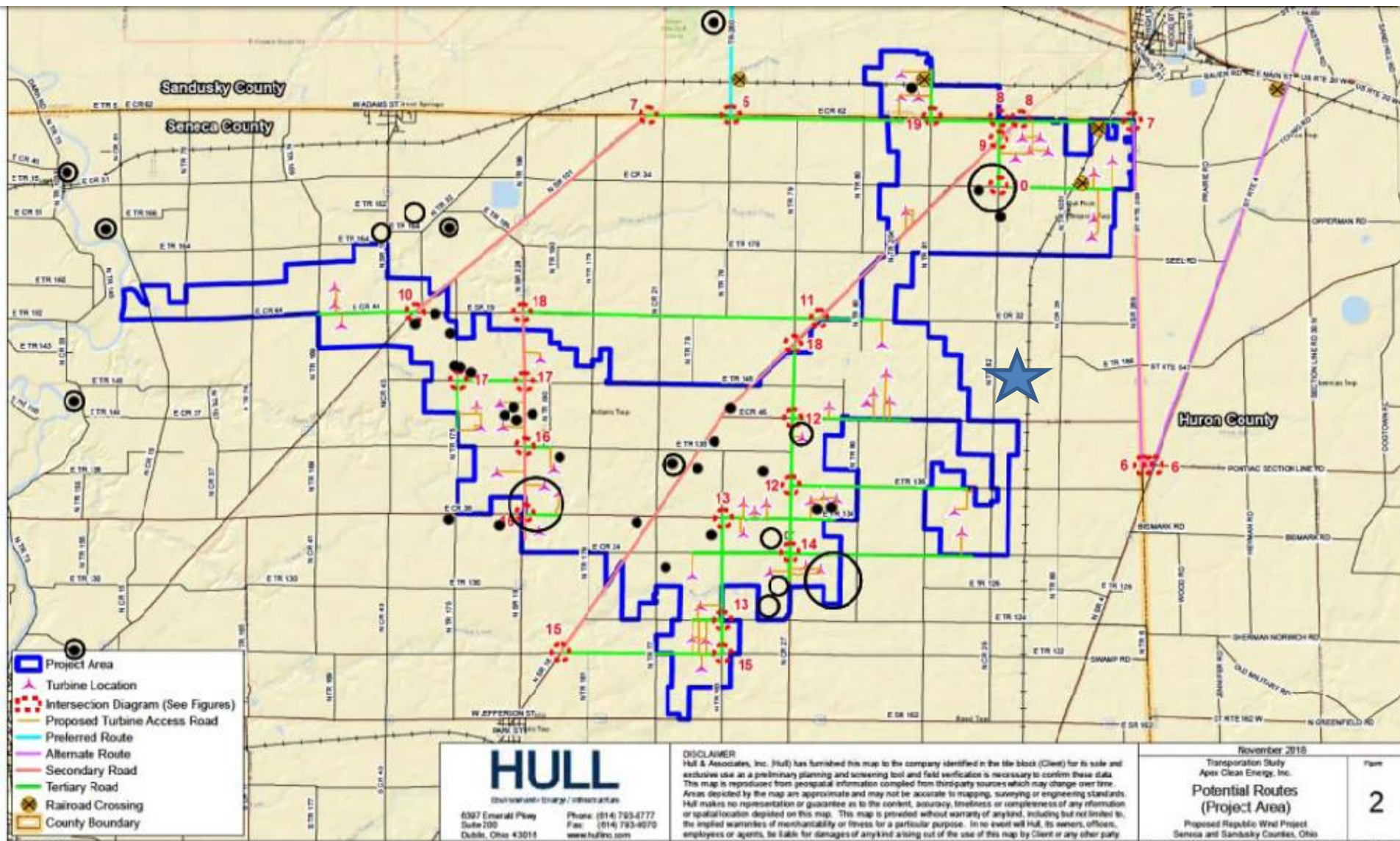
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# EXHIBIT B



**This foregoing document was electronically filed with the Public Utilities**

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**10/28/2019 4:53:40 PM**

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**Case No(s). 17-2295-EL-BGN**

Summary: Testimony Of Mark Shieldcastle electronically filed by Mr. Jack A Van Kley on behalf of Local Resident Intervenors