

MEMORANDUM

TO: Ann Rider, Supervisor, and Town of Enfield Town Board Members

FROM: Kathy Spencer, Principal Environmental Analyst

DATE: January 11, 2017

SUBJECT: Black Oak Wind Farm – Plans in Support of Wind Permit Application

On December 14, 2017, I provided comments on plans sent to me on 12/7/16 from Marguerite Wells, specifically: the Decommissioning Plan, the Fire and Emergency Preparedness Plan, and the Landscaping Plan. In this Memo, I provide further comments specifically regarding the Preliminary Blasting Plan and the Lighting Plan.

Two plans remain, including the Community Relations and Complaint Resolution Plan and the Invasive Species Plan. As stated in my December 14, 2016 Memo, as I still believe that the Invasive Species Plan should be correlated with the SWPPP and the construction plans prepared in support of the wind permit application.

Comments are as follows:

Preliminary Blasting Plan

LaBella finds the general content of the Plan acceptable, however, there are some elements and details missing that were referenced in the SEQRA Statement of Findings. In order to rectify the situation, we offer recommendations for new text and revisions. The Town and Project Sponsor may decide together whether or not to follow these suggested revisions.

LaBella's suggestions are included in the attached document entitled: "LaBella Recommended Text for Preliminary Blasting Plan." The recommendations include a slightly-revised introductory text and five new bullet points that should be added ahead of the existing list of bullet points. The existing list of bullet points should remain and be appended (and re-numbered), with one exception: *original* bullet point E (regarding pre-blast surveys) should be deleted as its content is now included under *new* bullet point C.

Lighting Plan

We acknowledge that the turbine lighting requirements are driven primarily by FAA's requirements. As such, the Lighting Plan does not need to contain a lot of detail and specific

information. However, we again have made suggested revisions to the Plan in order to clarify its content. A revised draft is attached, with the major changes summarized in the comments below.

1. Second paragraph, we recommend the addition of text to indicate that the lights required by the FAA are flashing, strobe or pulsing lights, and that the Black Oak Wind Farm anticipates the use of flashing, but not strobe, lights (see attached).
2. Second paragraph, it is stated that the applicable Chapter 13 of FAA's December 4, 2015 Advisory Circular 70/7460-1L is included in "Appendix P." It is unclear what Appendix P this is referring to, and this reference should be struck. Instead, we recommend that Chapter 13 of Advisory Circular 70/7460-1L be appended to the Lighting Plan itself (see attached).
3. Second paragraph, we recommend a paragraph break and the revision of the information regarding the Determinations of No Hazard to Air Navigation (see attached).
4. Re-organization and minor revisions are recommended to the last paragraph regarding substation lighting (see attached).

The Town and Project Sponsor may decide together whether or not to follow these suggested revisions. If there is any question about the suggested revisions or how they should be incorporated, I would be happy to answer them.

Black Oak Wind Farm

LaBella Recommended Text for Preliminary Blasting Plan

(Replace existing text up to bullet points with the following text)

Introduction

Bedrock conditions in the Black Oak Wind Farm project area were evaluated in a geotechnical study performed by Tectonic Engineering and Surveying Consultants in 2012-2013. According to this study, the type of bedrock that would be encountered at the turbine sites is considered rippable to a depth of at least 10 feet. If the bedrock is not rippable, it can be broken up by pneumatic jacking or hydraulic drilling and subsequently removed with a backhoe. According to the Tectonic analysis, none of the turbine sites should require blasting.

Nevertheless, this Preliminary Blasting Plan has been prepared in order to provide initial information regarding blasting procedures, in the event that it becomes necessary. If blasting is in fact proposed during construction, a Final Blasting Plan will be prepared in accordance with best management practices and the specific measures outlined below. (Note: if blasting is not needed during construction, no Final Blasting Plan will be required nor prepared).

Preliminary Blasting Plan

Although not anticipated, the general blasting procedure shall consist of implementing line control to full depth and then the use of controlled blasting techniques in one or more benches to create minimum breakage outside the line control but create maximum rock fragmentation within the target area. Blasted rock or boulders may be further broken into a well-graded mixture of the size recommended by the geotechnical engineer and utilized in the nearest appropriate location (e.g. access roads).

The Final Blasting Plan will include mitigation measures to limit offsite impacts. This plan will address blast size, timing, and sequencing to focus force within the area of excavation. The Final Blasting Plan shall be submitted to (and approved by) the County, in writing. Blasting shall be performed by a New York State Department of Labor licensed blasting contractor only after approval has been given for such operations and must comply with the provisions set forth below, as well as others established by the appropriate regulatory agencies.

- A. All necessary blasting will receive oversight by an Environmental Monitor.

- B. Pre-notification signs and warnings will be provided to inform affected landowners and nearby residents. The Final Blasting Plan will include a list of the names and mailing addresses of affected landowners, including the rationale used to identify "affected landowners." The Final Blasting Plan will describe the method and timing of landowner notification, as well as the number and placement of warning signage. The use of air-horns or other warning sounds before a blast is detonated will also be described in the Final Blasting Plan.

- C. Pre-Blast Surveys will be conducted to document existing conditions using both written and photographic documentation. Structures within a minimum distance of 1,500 feet from any blasting activity shall be surveyed as part of a Pre-Blast Structural Survey. The extent beyond the 1,500-foot minimum shall be determined by the contractor, the blasting subcontractor, and their insurance companies. Note that the Statement of Findings prepared for the Black Oak Wind Farm recommends that no blasting of bedrock should be performed within 1/10 mile of an existing residence and that this limitation on the use of blasting should be included in Project specifications. A Pre-Blast Well/Utility Survey will also be completed if a well/utility is located within 1,000 feet. This Pre-Blast Well/Utility Survey will include well yield and turbidity measurements. The Final Blasting Plan shall include more information on the methods for conducting the Pre-Blast Structural Survey and the Pre-Blast Well/Utility Survey.
- D. The Final Blasting Plan will address air-blast limits, ground vibrations, and maximum peak particle velocity (PPV) for ground movement, including provisions to monitor and assess compliance with the established air-blast, ground vibration and PPV requirements.
- E. The Final Blasting Plan will meet the criteria established in Chapter 3 (Control of Adverse Effects) in the Blasting Guidance Manual of the United States Department of the Interior Office of Surface Mining Reclamation and Enforcement. NYSDOT's Geotechnical Engineering Manual: Procedure for Blasting (GEM-22) will also be used as a reference.

(The original bullet points should follow after being re-numbered. There is one exception: original bullet point E about pre-blast surveys should be deleted as its content is now included under new bullet point C).

Black Oak Wind Farm Lighting Plan
(Including suggestion for revision by LaBella 1-11-17)

Turbines

Turbines shall have a safety light near the turbine door. The light shall be set on a motion detector and hooded downward. If motion detector lighting is not feasible, the light will be placed on an auto-off switch in which the light will automatically turn off after a specified period of time (i.e., period of time needed to accomplish any nighttime safety or maintenance work). The light will be the lowest intensity required to accomplish its safety purpose and will not be a sodium vapor light.

Lighting of the nacelles shall be implemented as per the requirements and determinations of the FAA. Specifically, the FAA lighting requirement is as follows:

Nighttime wind turbine obstruction lighting should consist of FAA L0864 aviation red flashing, strobe or pulsed obstruction lights. Studies have shown that red lights provide the most conspicuity to pilots.

The Black Oak Wind Farm anticipates the use of flashing lights and not strobe lights. The lighting specifications are detailed in FAA's December 4, 2015 Advisory Circular 70/7460-1L, specifically Chapter 13 (Marking and Lighting Wind Turbines). Chapter 13 of the FAA Circular is attached to this Lighting Plan.

The Determinations of No Hazard to Air Navigation which have already been received dictate the use of white paint/synchronized red lights. As a result, radar activated FAA marking lights will not be considered. Radar-activated FAA marking light systems are considerably more expensive than the traditional synchronized red light marking system, and do not have a proven track record. As an additional note: it is acknowledged that the Determinations of No Hazard to Air Navigation have expired, most having a date of 11/8/13 for completion of turbine construction to its greatest height, and will need to be resubmitted to and re-approved by FAA.

Substation

The substation is largely an outdoor facility surrounded by a chain link fence. Substation lights shall be kept to the minimum necessary for security and maintenance safety. The light will be the lowest intensity required to accomplish its safety purpose and will not be a sodium vapor light. Moreover, the lighting will be set on a motion detector or an auto-off switch, and hooded downward. Substation lighting will be replaced with low-light video and/or camera surveillance monitoring or other security methods that do not require lighting if practicable. As part of facility design, a lighting designer will be employed to design a lighting plan for the substation in order to avoid any redundant and ineffective lighting. No O&M building is planned, so no lighting of any additional structures is needed.

Chapter 13 of FAA's December 4, 2015 Advisory Circular 70/7460-1L



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: Obstruction Marking and Lighting

Date: 10/8/2016

AC No. 70/7460-1L

Initiated By: AJV-15

Change: 1

1. **Purpose.** This Advisory Circular (AC) sets forth standards for marking and lighting obstructions that have been deemed to be a hazard to air navigation. The change number and date of the change material are located at the top of the page.
2. **Effective Date.** This change is effective October 8, 2016.
3. **Explanation of Changes.**
 - a. Page 2-2. Paragraph 2.4.3 Note 2 stated NOTAMS were automatically deleted from the system after 15 days and the sponsor was responsible for calling outage reporting to extend the outage date or to report a return to service date. This paragraph has been deleted. Tower owners now have the option to select the amount of time their NOTAMS remain active.
 - b. Page A-1. Appendix A, Specifications for Obstruction Lighting Equipment Classification, Table A-1 FAA-Approved Obstruction Lighting Fixtures indicated:
 - L-885 – *Low Intensity Flashing* – RED
 - It has been changed to L-885 Flashing Obstruction Light (60 FPM) – RED
 - c. Entire publication. Additional editorial/format changes were made where necessary. Revision bars were not used because of the insignificant nature of these changes.

A handwritten signature in black ink, appearing to read 'Gary A. Norek'.

Gary A. Norek
Director, Airspace Services



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: Obstruction Marking and Lighting

Date: 10/07/2016

AC No. 70/7460-1L

Initiated By: AJV-15

Change: 1

4. **Purpose.**

This Advisory Circular (AC) sets forth standards for marking and lighting obstructions that have been deemed to be a hazard to navigable airspace. Advisory Circular 70/7460-1L is effective immediately.

5. **Cancellation.**

Advisory Circular 70/7460-1K, Obstruction Lighting and Marking, dated February 1, 2007, is cancelled.

6. **Principal Changes.**

The principal changes in this AC are:

1. The height of a structure identified as an obstruction has been lowered from 500 feet above ground level (AGL) to 499 feet above ground level, by amendment to Title 14 Code of Federal Regulations (14 CFR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace* (75 Federal Register 42303, July 21, 2010). Accordingly, all structures that are above 499 feet AGL are considered obstructions and the Federal Aviation Administration (FAA) will study them to determine their effect on the navigable airspace. This will ensure that all usable airspace at and above 500 feet AGL is addressed during an aeronautical study and that this airspace is protected from obstructions that may create a hazard to air navigation.
2. Standards for voluntary marking of meteorological evaluation towers (METs), less than 200 feet above ground level (AGL), has been added to provide recommendations towards increasing conspicuity of these structures, particularly for low-level agricultural flight operations. These standards include those for lighting and marking of the tower and associated guy wires.

3. A new Chapter 14, Aircraft Detection Lighting Systems, has been added to provide performance standards for these types of systems.
4. New lighting and marking standards are provided to reduce impact on migratory bird populations.
5. Medium-intensity white and medium-intensity dual obstruction light are now authorized on towers up to and including 700 feet AGL.
6. Editorial changes have been made.

7. **Related Reading Material.**

1. Advisory Circular 150/5345-43, Specification of Obstruction Marking and Lighting.
2. 14 CFR Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace.

8. **Application.**

The FAA recommends the guidelines and standards in this AC for determining the proper way to light and mark obstructions affecting navigable airspace. This AC does not constitute a regulation and, in general, is not mandatory. However, a sponsor proposing any type of construction or alteration of a structure that may affect the National Airspace System (NAS) is required under the provisions of Title 14 Code of Federal Regulations to notify the FAA by completing the Notice of Proposed Construction or Alteration form (FAA Form 7460-1). These guidelines may become mandatory as part of the FAA's determination and should be followed on a case-by-case basis, as required.

9. **Comments or Suggestions.**

Direct comments or suggestions regarding this AC to:

Manager, Obstruction Evaluation Group
Federal Aviation Administration
ATTN: AJV-15
800 Independence Avenue, S.W.
Washington, DC 20591

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CHAPTER 13. MARKING AND LIGHTING WIND TURBINES**13.1 Purpose.**

This chapter provides guidelines for the marking and lighting of wind turbine farms. These guidelines are applicable to single wind turbines and wind turbine farms. For the purpose of this AC, wind turbine farms are defined as a wind turbine development that contains more than three turbines. The recommended marking and lighting of these structures is intended to provide day and night conspicuity and to assist pilots in identifying and avoiding these obstacles.

13.2 General Standards.

The development of wind turbine farms is a very dynamic process, which changes based on the terrain. Each wind turbine farm is unique. Therefore, it is important that a lighting plan be developed that provides sufficient safety for air traffic. Proximity to airports and VFR routes, extreme terrain where heights may vary widely, and local flight activity should be considered when developing a lighting plan. The following guidelines are recommended for wind turbines.

13.3 Wind Turbine Configurations.

Prior to marking and lighting the wind turbine farm, the configuration and the terrain of the wind turbine farm should be determined. The following is a description of the most common configurations.

1. Linear—wind turbine farms in a direct, consecutive configuration, often located along a ridge line, the face of a mountain, or along borders of a mesa or field. The line may be ragged in shape or be periodically broken, and may vary in size from just a few turbines to many turbines forming a line that is several miles long.
2. Cluster—wind turbine farms arranged in circular configuration. A cluster is typically characterized by having a pronounced perimeter, with various turbines placed inside the circle at various, erratic distances throughout the center of the circle.
3. Grid—wind turbine farms arranged in a geographical shape, such as a square or a rectangle, in which the turbines are placed a consistent distance from each other in rows, giving the appearance that they are part of a square pattern.

13.4 Marking Standards.

- 13.4.1 Wind turbines should be painted white or light grey, as these colors have been shown to be the most effective method for providing daytime conspicuity. Wind turbine manufacturers typically use a European color-matching system that is referred to as the RAL Color Standard. Unlike the Federal Specification 595, the RAL system used a four-digit code to identify a specific color of paint. For example, an RAL 9xxx code would represent a color in the white/black range, and an RAL 6xxx code would be in

the grey range. Most wind turbines currently produced are painted light grey, RAL 7035, which is the darkest acceptable off-white paint allowed. The preferred white paint color is pure white, RAL 9010, or an equivalent. Any shade of white between these two RAL specifications is strongly recommended. See Table 13-1.

Table 13-1. Wind Turbine Paint Standard Colors

Color	RAL Number
Pure White	9010
Light Grey (Darkest Acceptable)	7035

- 13.4.2 In geographic areas that experience lengthy periods of snow cover (i.e., Alaska), and where it is deemed necessary, the mast of the turbine may be painted alternating bands of aviation orange and white to provide additional contrast against the snow. The nacelle and blades of the turbine shall remain solid white or light grey. (See Figure A-24 in Appendix A.)
- 13.4.3 Blades or blade tips shall not be painted or manufactured in colors to camouflage wind turbines with the surrounding terrain. (See Figure A-25 in Appendix A.)
- 13.4.4 For turbines that are constructed with lattice-type masts, the mast structure shall be painted with alternating bands of aviation orange and white, in accordance with Chapter 3. The turbine's nacelle and blades shall remain solid white or light grey.
- 13.5 **Lighting Standards.**
- 13.5.1 Nighttime wind turbine obstruction lighting should consist of FAA L-864 aviation red flashing, strobe, or pulsed obstruction lights. Studies have shown that red lights provide the most conspicuity to pilots.
- 13.5.2 In most cases, not all wind turbine units within a wind turbine farm need to be lighted. Obstruction lights should be placed along the perimeter of the wind turbine farm so that there are no unlit separations or gaps more than 1/2 statute mile (sm) (804 m). Wind turbines within a grid or cluster should not have an unlighted separation or gap of more than 1 sm (1.6 km) across the interior of a grid or cluster of turbines. (See Figure A-26 in Appendix A.)
- 13.5.3 Any array of flashing, strobe, or pulsed obstruction lighting should be synchronized to flash simultaneously (within $\pm 1/20$ second (0.05 second) of each other).
- 13.5.4 Should any lighting fixture or the lighting system synchronization fail, a lighting outage report should be prepared in accordance with Chapter 2 paragraph 2.4.

- 13.5.5 Light fixtures should be placed as high as possible on the turbine nacelle so they are visible by a pilot approaching from **any** direction. (See Figure A-23 in Appendix A.)
- 13.5.6 Daytime lighting of wind turbines is not required. See paragraph 13.4 for daytime marking requirements.
- 13.5.7 When developing lighting plans for wind turbine farms, it is best to use an aerial-view map or diagram of the turbine farm to plan the location of the required lighting. This way, a certain degree of strategy plan can be applied, which, in many instances, results in a minimal number of lights.
- 13.5.8 For linear turbine configurations, lights should be placed on the turbine positioned at each end of a line or string of turbines. Lights should also be placed along the line of turbines so that there is no more than a 1/2-sm (2,640-foot (805-m)) gap between the lighted turbines. In the event the gap between lights on the last segment of turbines is significantly short, it may be appropriate to move the lights on the turbine string back toward the starting point to present a well-balanced string of lights. High concentrations of lights should be avoided. (See Figure A-26 in Appendix A.)
- 13.5.9 For cluster turbine configurations, a turbine should be selected as a starting point along the outer perimeter of the cluster. The turbine should be lighted, and a light should be placed on the next turbine along the perimeter of the cluster (clockwise or counterclockwise) so that no more than a 1/2-sm (2,640-foot (805-m)) gap exists. This pattern should be continued around the perimeter of the cluster until the starting point is reached. In the event that the gap between the lights on the last segment of turbines is significantly short, it may be appropriate to move the lights along the perimeter of the cluster back toward the starting point to present a well-balanced perimeter of lights. If the distance across the cluster is greater than 1 sm, additional lights should be placed on other turbines throughout the center of the cluster so that there are no unlighted gaps across the cluster. (See Figure A-26 in Appendix A.) (Example: If the distance across a wind turbine farm is 1.8 sm (2.9 km), a light should be placed on a turbine at approximately every 0.9 sm (1.4 km).
- 13.5.10 For grid turbine configurations, turbines on the corners of the farm should be lit, and then use the same concept for selecting which turbines should be lit as outlined in paragraph 13.5.9.
- 13.5.11 Special Considerations.
- 13.5.11.1 Occasionally, some wind turbines may be located apart from the main group of turbines. If one or two wind turbines protrude from the general limits of the turbine farm, these turbines should be lighted in addition to those identified in the main group.
- 13.5.11.2 Additional lighting may be necessary on wind turbines located on the interior of a cluster or grid configuration whose height is 100 feet (30 m) or higher than the other wind turbines located within the farm.

13.6 **Wind Turbines Above 499 Feet.**

- 13.6.1 For wind turbines with a rotor tip height, while at top dead center, greater than 499 feet (153 m) AGL, but less than 699 feet AGL, the turbines should be lighted in accordance with paragraph 13.5. In addition to these requirements, the top of the turbine's nacelle should be equipped with a second L-864 flashing red light. (See Figure A-23 in Appendix A.)
- 13.6.2 The two obstruction lights should be arranged horizontally, positioned on opposite sides of the nacelle, visible to a pilot approaching from **any** direction, and flash simultaneously. (See Figure A-23 in Appendix A.) This lighting configuration ensures the turbines in this size category are always lighted.
- 13.6.3 In the event one of the two obstruction lights fails, no light failure notification is required; however, the light should be restored to service as soon as possible.
- 13.6.4 All turbines within this size category should be illuminated, regardless of their location within a wind turbine farm, and should be configured to flash simultaneously with the other turbines in the same farm. This requirement ensures the pilots operating at 500 feet AGL have sufficient warning that a wind turbine obstruction may be within their flight path.

13.7 **Wind Turbines at or Above 699 Feet (213 m).**

- 13.7.1 For wind turbines with a rotor tip height, while at top dead center, at or above 699 feet (213 m) AGL, additional lighting is required. All wind turbines of this size, regardless of number or configuration should be lighted.
- 13.7.2 In addition to the lighting identified in paragraph 13.6, an additional level of lights is required at a point midway between the top of the nacelle and ground level. The location of the additional lights may be adjusted as necessary to allow mounting at a seam within the turbine's mast.
- 13.7.2.1 The additional level of lights should consist of a minimum of three L-810 flashing red lights configured to flash in unison with the two L-864 red flashing lights located at the top of the nacelle at a rate of 30 fpm (± 3 fpm). The L-810s should be spaced at equal distances around the mast. The light should be installed to ensure a pilot approaching from **any** direction has an unobstructed view of at least two of the lights. (See Figure A-23 in Appendix A.)
- 13.7.2.2 For wind turbine structures with a mast diameter greater than 20 feet (6 m), four L-810 red lights should be used.
- 13.7.2.3 All turbines within this size category should be illuminated, regardless of their location within a turbine farm, and should be configured to flash simultaneously with the other turbines in the same farm. This requirement

ensures the pilots operating at 500 feet AGL have sufficient warning that a wind turbine obstruction may be within their flight path.

13.8 Lighting of Wind Turbines During Construction Phase.

To ensure proper conspicuity of turbines at night during construction, all turbines should be lighted with temporary lighting once they reach a height of 200 feet (61 m) or greater until the permanent lighting configuration is turned on. As the structure's height continues to increase, the temporary lighting should be relocated to the structure's uppermost height. The temporary lighting may be turned off for short periods if they interfere with construction personnel. If practical, permanent obstruction lights should be installed and operated at each level as construction progresses. An L-810 steady-burning red light shall be used to light the structure during the construction phase, if the permanent L-864 flashing-red lights are not in place. If power is not available, turbines should be lighted with a self-contained, solar-powered, LED, steady-burning red light that meets the photometric requirements of an FAA L-810 lighting system. The lights should be positioned to ensure a pilot has an unobstructed view of at least one light at each level. Using a NOTAM (D) to justify not lighting the turbines until the entire project is completed is prohibited.

13.9 Lighting and Marking of Airborne Wind Turbines.

The FAA is currently conducting research to develop special lighting and marking standards for Airborne Wind Turbines. Sponsors should consult with their respective FAA OE Specialists for updated information.

13.10 Lighting and Marking of Offshore Wind Turbines.

FAA lighting and marking recommendations apply to structures out to 12 NM from the coast of the United States, which is the extent of the territorial seas. The Bureau of Ocean Energy Management (BOEM), which maintains jurisdiction of land leases beyond the 12 NM, may also require compliance with the marking and/or lighting recommendations identified in this AC.