New England Wind

AVANGRID RENEWABLES

Construction and Operations Plan

Lease Area OCS-A 0534

Volume III Appendices

February 2024

Submitted by
Park City Wind LLC

Submitted to
Bureau of Ocean Energy Management
45600 Woodland Rd
Sterling, VA 20166

Prepared by
Epsilon Associates, Inc.

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Submitted to:
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Submitted by:
Park City Wind LLC

Prepared by:
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February 2024

On April 29, 2022, modifications were made to the project design Envelope that involved changing the maximum wind turbine generator (WTG) and electrical service platform (ESP) topside parameters for Phase 1 (Park City Wind) to match those of Phase 2 (Commonwealth Wind) (see Table 1). As a result of this change, the potential minimum footprint of Phase 1 decreased, and correspondingly the potential maximum footprint of Phase 2 increased (see Table 2). Additionally, the maximum capacity in megawatts for both phases was eliminated to accommodate the rapid advancement in commercially available wind turbine generator size and technology.

Table 1 Modifications to the Phase 1 WTG and ESP Parameters[1]

Maximum WTG Parameters	Previous Dimension	New Dimension[2]
Tip Height	319 m (1,047 ft)	357 (1,171 ft)
Top of the Nacelle Height	199 m (653 ft)	221 m (725 ft)
Hub Height	192 m (630 ft)	214 m (702 ft)
Rotor Diameter	255 m (837 ft)	285 m (935 ft)
Minimum Tip Clearance[3]	27 m (89 ft)	27 m (89 ft)
Blade Chord	8 m (26 ft)	9 m (30 ft)
Tower Diameter	9 m (30 ft)	10 m (33 ft)[4]
Maximum ESP Parameters	**Previous Dimension**	**New Dimension[2]**
Width	45 m (148 ft)	60 m (197 ft)
Length	70 m (230 ft)	100 m (328 ft)
Height	38 m (125 ft)	No change
Height of Topside (above MLLW[5])	70 m (230 ft)	No change

1. Maximum WTG dimensions are included in Table 3.2-1 and maximum ESP dimensions are included in Table 3.2-3 of COP Volume I
2. The new Phase 1 WTG and ESP maximum parameters were revised to match those of Phase 2
3. All parameters are maximum values except tip clearance, where the minimum tip clearance represents the maximum potential impact
4. To accommodate the slight increase in tower diameter, the maximum transition piece diameter/width for Phase 1 monopile foundations was also increased from 9 m (30 ft) to 10 m (33 ft) (see Table 3.2-2 of COP Volume I)
5. MLLW: Mean Lower Low Water

To accommodate the larger Phase 1 WTG dimensions and greater capacity range, the minimum footprint of Phase 1 decreased and the maximum footprint of Phase 2 increased, thus also adjusting the potential number of WTG/ESP positions within each Phase (see Table 2).

Table 2 Modifications to the Phase 1 and Phase 2 Layout and Size

		Previous Layout and Size	New Layout and Size
Phase 1	Number of WTGs	50-62	41-62
	Area	182-231 km^2 (44,973-57,081 acres)	150-231 km^2 (37,066-57,081 acres)
Phase 2	Number of WTGs	64-79	64-88
	Area	222-271 km^2 (54,857-66,966 acres)	222–303 km^2 (54,857–74,873 acres)

These revisions remain within the maximum design scenario considered for this report and the maximum potential impacts are still representative considering these modifications. Therefore, this report was not updated to reflect these minor modifications, as the findings are not affected.

New England Wind

Epsilon Associates, Inc.

Offshore near Martha's Vineyard and Nantucket, Massachusetts

Aircraft Detection Lighting System (ADLS) Efficacy Analysis

August 5, 2021

Capitol Airspace Group
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Summary

Capitol Airspace conducted an Aircraft Detection Lighting System (ADLS) efficacy analysis for the proposed New England Wind energy development (New England Wind), which is located in Lease Area OCS-A 0534 and the southwest portion of Lease Area OCS-A 0501 (referred to as the Southern Wind Development Area [SWDA]) (blue area, ***Figure 1***). New England Wind is located off the coast of Martha's Vineyard and Nantucket, Massachusetts. New England Wind will be developed in two Phases. The Phase 1 wind turbine generators (WTGs) will have a maximum height of 1,047 feet (ft) and the Phase 2 WTGs will have a maximum height of 1,171 ft.

This analysis utilized historic air traffic data obtained from the Federal Aviation Administration (FAA) in order to determine the total duration that an ADLS-controlled obstruction lighting system would have been activated. The results of this analysis can be used to predict an ADLS's effectiveness in reducing the total amount of time that an obstruction lighting system would be activated.

An ADLS utilizes surveillance radar to track aircraft operating in proximity to the SWDA. The ADLS will activate the obstruction lighting system when aircraft enter the light activation volume and will deactivate the system when all aircraft depart. As a result, the ADLS provides nighttime conspicuity on an as-needed basis thereby reducing the amount of time that obstruction lights will be illuminated. Depending on the volume of nighttime flights transiting a wind project's light activation volume, an ADLS could result in a significant reduction in the amount of time obstruction lights are illuminated.

Historical air traffic data for flights passing through the light activation volume indicates that ADLS-controlled obstruction lights would have been activated for a total of 9 minutes and 53 seconds over a one-year period for 1,047- ft above mean sea level (AMSL) WTGs. Light activation duration increases slightly for 1,171-ft AMSL WTGs to 12 minutes and 2 seconds over a one-year period. Considering the local sunrise and sunset times, an ADLS-controlled obstruction lighting system could result in over a 99% reduction in system activated duration as compared to a traditional always-on obstruction lighting system.

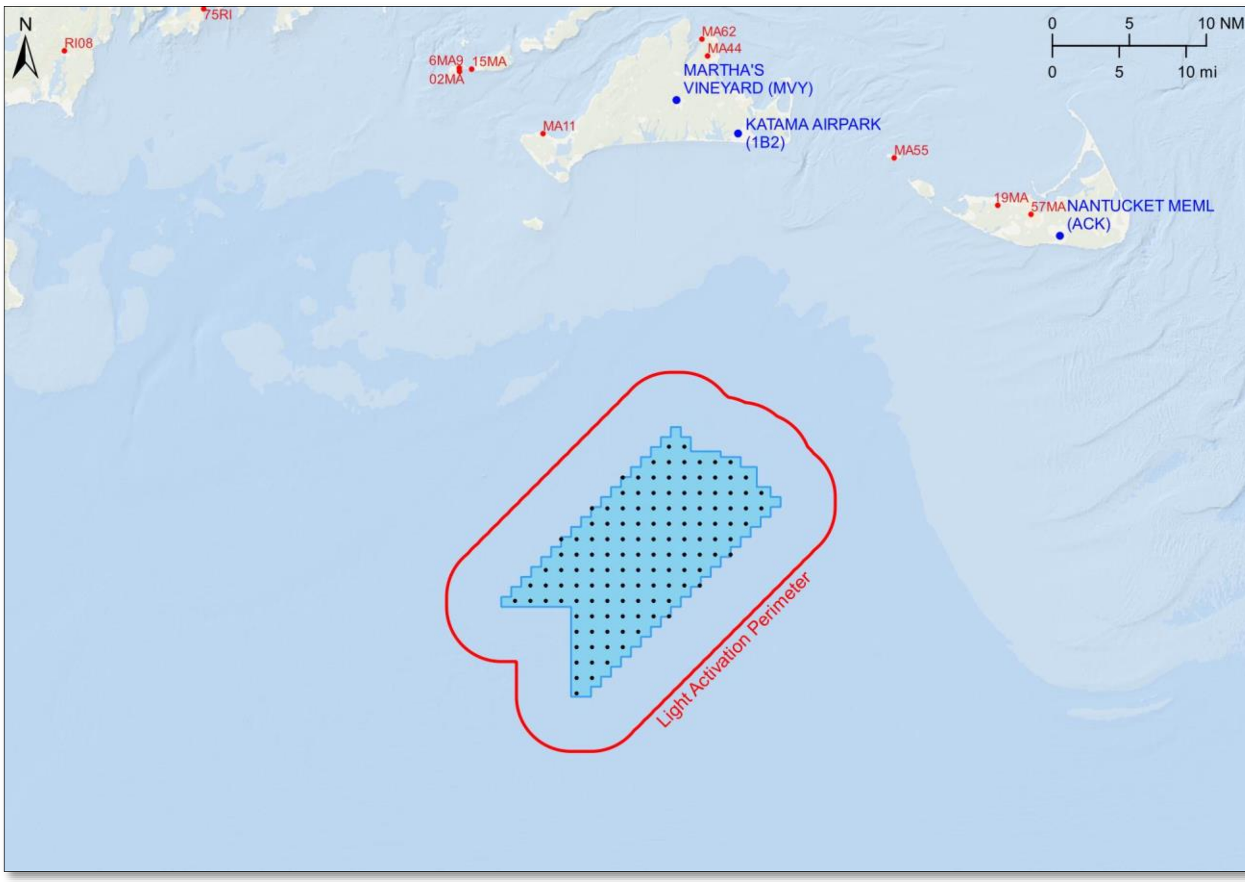

Figure 1: Public-use (blue) and private-use (red) airports in proximity to the SWDA (blue area)

Methodology

Capitol Airspace analyzed FAA National Offload Program (NOP) radar returns in proximity to the SWDA for the period between September 1, 2018 and August 31, 2019. FAA NOP data only include secondary radar returns which are created if the identified aircraft is equipped with a transponder. Aircraft operations without an active transponder were not captured as part of this dataset. Within 60 nautical miles of the SWDA, the NOP data contained 173,989,522 different radar returns from eight different air traffic control facilities.[1] These radar returns were associated with 1,504,200 unique flight tracks.

The following process was used to determine the frequency of nighttime aviation operations in proximity to New England Wind:

1. **Define Three-Dimensional Light Activation Volume** – In accordance with FAA Advisory Circular 70/7460-1M, obstruction lights controlled by an ADLS must be activated and illuminated prior to an aircraft reaching three nautical miles from, and 1,000 ft above, any obstruction. However, the actual light activation volume will vary depending on the specific ADLS selected for use. At the time of this analysis, a specific ADLS had not been selected for New England Wind. In order to account for varying radar systems as well as aircraft speeds and descent rates, Capitol Airspace conservatively assessed a 3.55-nautical mile buffer (solid red outline, ***Figure 2***) around the SWDA at altitudes up to 3,500 ft above the highest WTG (4,600 and 4,700 ft AMSL based on 1,047 and 1,171-ft AMSL WTGs, respectively).
2. **Calculate Sunrise and Sunset** – Sunrise and sunset times were calculated for each day of the year based on the United States (US) Naval Observatory definition of sunrise and sunset. Sunrise time was calculated at the westernmost edge of the light activation perimeter. Sunset time was calculated at the easternmost edge of the light activation perimeter. The data was validated through comparison to the US Naval Oceanography Portal.[2]
3. **Select Nighttime Radar Returns** – Since traditional obstruction lights can rely on ambient light sensors to identify darkness, nighttime was considered to occur between 30 minutes prior to sunset until 30 minutes after sunrise. This represents the time during which a traditional obstruction lighting system would likely be activated. All radar returns within the light activation volume that occurred during this period were evaluated. In accordance with guidance provided by the FAA, if an ADLS loses track of an aircraft, a 30-minute timer should be initiated to keep the obstruction lights activated while the aircraft can clear the wind project area. Since the application of ADLS requires site specific radar surveillance systems that will be focused on the SWDA, Capitol Airspace does not anticipate a likelihood of dropped tracks.
4. **Remove Time Overlap** – To remove the duration of overlap occurring when more than one flight transits the light activation volume at the same time, each nighttime flight was compared to every other nighttime flight. Where overlapping flights were found, the overlapping flight's duration within the light activation volume was removed from the total obstruction lighting system activation time.

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[1] Source facilities included Boston (A90) Terminal Radar Approach Control (TRACON), Providence (G90) TRACON, New York (N90) TRACON, Philadelphia (PHL) TRACON, Yankee (Y90) TRACON, Boston (ZBW) Air Route Traffic Control Center (ARTCC), Washington (ZDC) ARTCC, and New York (ZNY) ARTCC.

[2] http://www.usno.navy.mil/USNO/astronomical-applications

Results

FAA NOP data indicates that as many as 312 flights had at least one radar return within the light activation volume (red outline, ***Figure 2***). However, most of these flights occurred during daytime. Using local sunrise and sunset times, Capitol Airspace determined that as many as 12 flights (purple tracks, ***Figure 3***) had at least one radar return within the light activation volume during the nighttime period when a traditional obstruction lighting system would be activated. Each of the 12 flights was further evaluated to determine the amount of time it remained within the light activation volume. Over a one-year period, these flights would have resulted in a total obstruction light system activated duration of 9 minutes and 53 seconds for 1,047-ft AMSL WTGs. Total obstruction light system activated duration increases slightly to 12 minutes and 34 seconds for 1,171-ft AMSL WTGs.

Considering that the New England Wind ADLS light activation perimeter observes approximately 4,728 hours of nighttime each year, an ADLS-controlled obstruction lighting system could result in over a 99% reduction in system activated duration as compared to a traditional always-on obstruction lighting system (***Table 1***).

Table 1: Typical duration of light system activation time during each month

Month	Nighttime Observed (HH:MM:SS)	Light System Activated Duration (HH:MM:SS)	
		1,047-ft AMSL WTG	1,171-ft AMSL WTG
January	482:06:21	00:00:00 (0.00%)	00:00:00 (0.00%)
February	406:30:51	00:00:24 (0.00%)	00:00:24 (0.00%)
March	409:24:52	00:00:00 (0.00%)	00:00:00 (0.00%)
April	355:02:43	00:00:19 (0.00%)	00:00:23 (0.00%)
May	330:42:12	00:00:00 (0.00%)	00:00:00 (0.00%)
June	302:11:03	00:00:48 (0.00%)	00:01:02 (0.01%)
July	321:18:15	00:01:06 (0.01%)	00:01:07 (0.01%)
August	352:52:08	00:03:08 (0.01%)	00:03:13 (0.02%)
September	381:08:46	00:00:00 (0.00%)	00:01:37 (0.01%)
October	436:05:20	00:01:13 (0.00%)	00:01:13 (0.00%)
November	457:56:16	00:01:02 (0.00%)	00:01:05 (0.00%)
December	492:28:28	00:01:53 (0.01%)	00:01:58 (0.01%)
Total	**4727:47:15**	**00:09:53 (0.00%)**	**00:12:02 (0.00%)**

Please contact ***Dan Underwood*** or ***Candace Childress*** at (703) 256-2485 with any questions regarding the findings of this analysis.

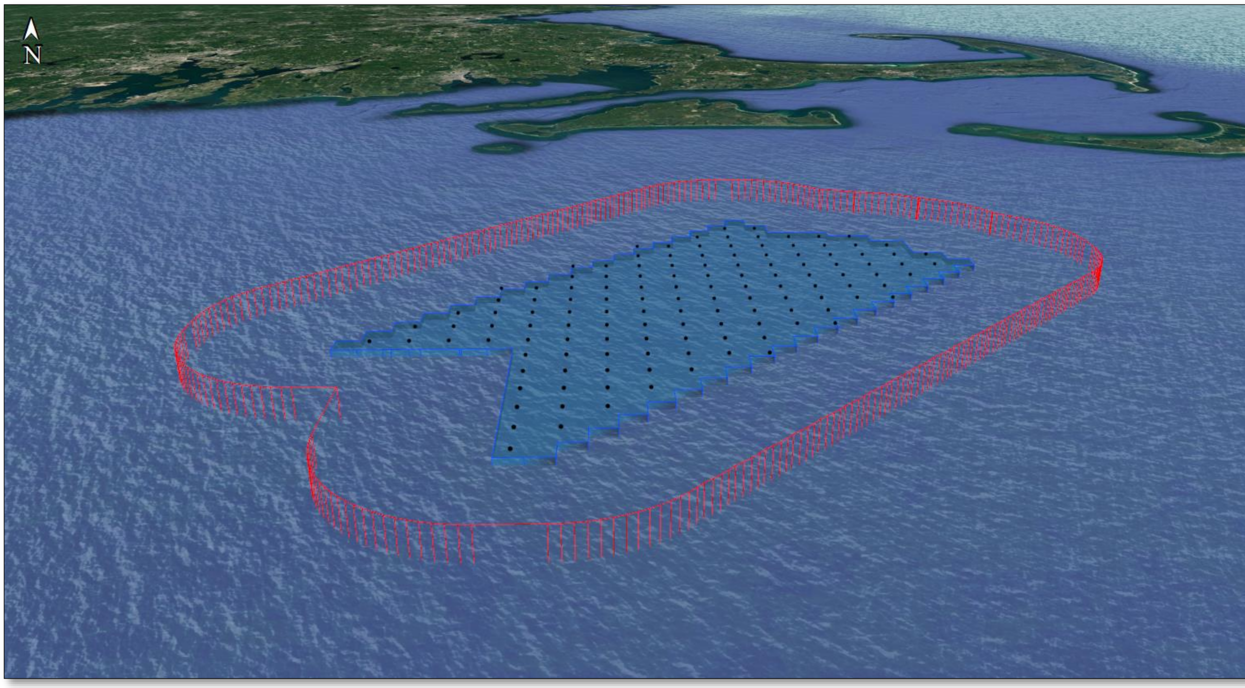

Figure 2: SWDA (blue) and light activation volume (red outline)

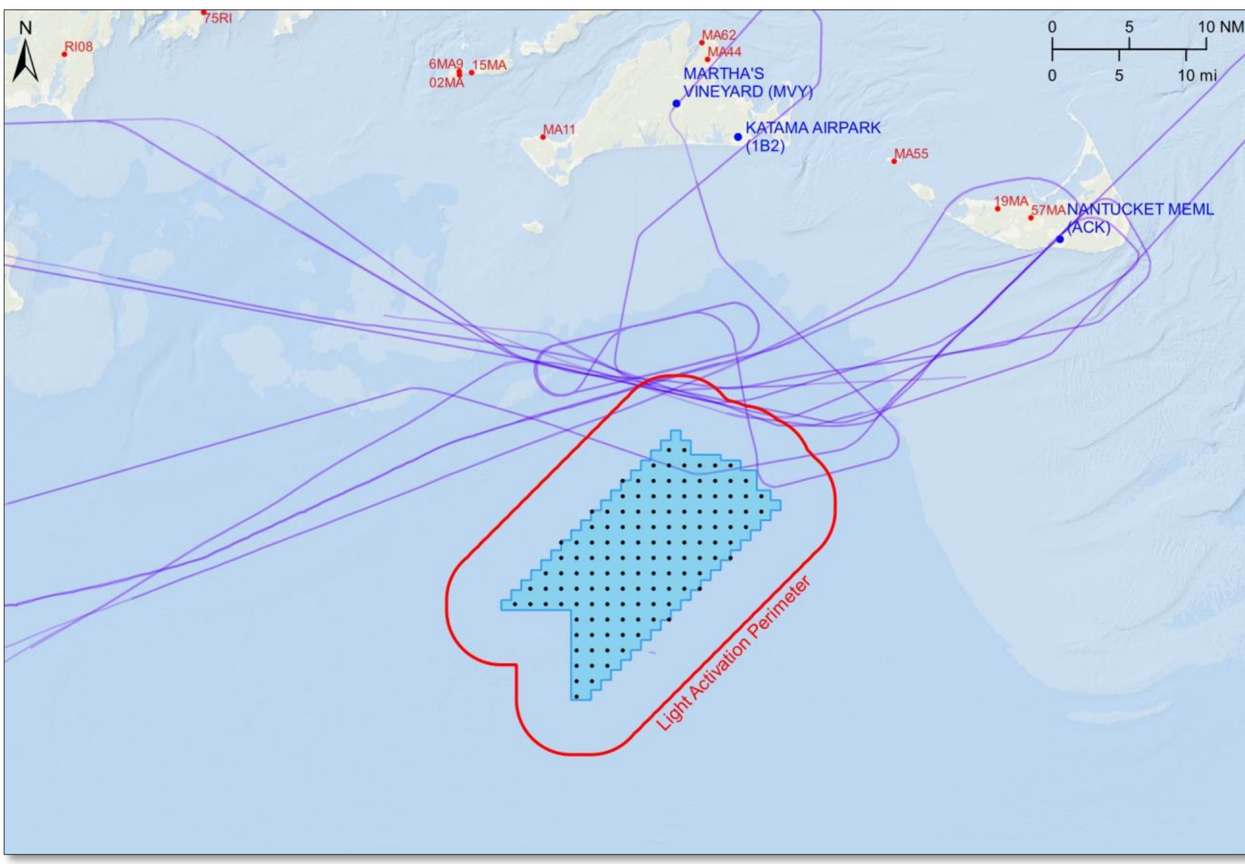

Figure 3: Flight tracks (purple) that would have activated ADLS obstruction lights (based on 1,171-ft AMSL WTGs)