VINEYARD NORTHEAST

CONSTRUCTION AND OPERATIONS PLAN

VOLUME II APPENDIX

MARCH 2024

PREPARED BY:

Epsilon ASSOCIATES INC.

SUBMITTED BY:

VINEYARD NORTHEAST LLC

VINEYARD OFFSHORE

PUBLIC VERSION

Vineyard Northeast COP

Appendix II-I Aircraft Detection Lighting System (ADLS) Efficacy Analysis

Prepared by:
Capitol Airspace Group

Prepared for:
Vineyard Northeast LLC

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0	July 2022	Initial submission.
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Vineyard Northeast

Epsilon Associates

Offshore Nantucket, Massachusetts

Aircraft Detection Lighting System (ADLS) Efficacy Analysis

May 19, 2022

Capitol Airspace Group

capitolairspace.com

(703) 256 2485

6350 Walker Lane, Suite 450
Alexandria, VA 22310
703-256-2485
capitolairspace.com

Summary

Vineyard Northeast LLC (the "Proponent") proposes to develop, construct, and operate offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0522 (the "Lease Area") along with associated offshore and onshore transmission systems. This proposed development is referred to as "Vineyard Northeast." Vineyard Northeast includes up to 160 total wind turbine generator (WTG) and electrical service platform (ESP) positions within the Lease Area. Offshore export cables installed within offshore export cable corridors (OECCs) will connect the renewable wind energy facilities to onshore transmission systems in Massachusetts and/or Connecticut.

Capitol Airspace conducted an Aircraft Detection Lighting System (ADLS) efficacy analysis for Vineyard Northeast (blue area, ***Figure 1***) located offshore of Nantucket, Massachusetts. At the time of this analysis, 160 WTG locations had been identified (black points, ***Figure 1***). 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 wind project. 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 1 hour 14 minutes and 5 seconds over a one-year period for 1,312-foot (400-meter) tall WTG locations. 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.

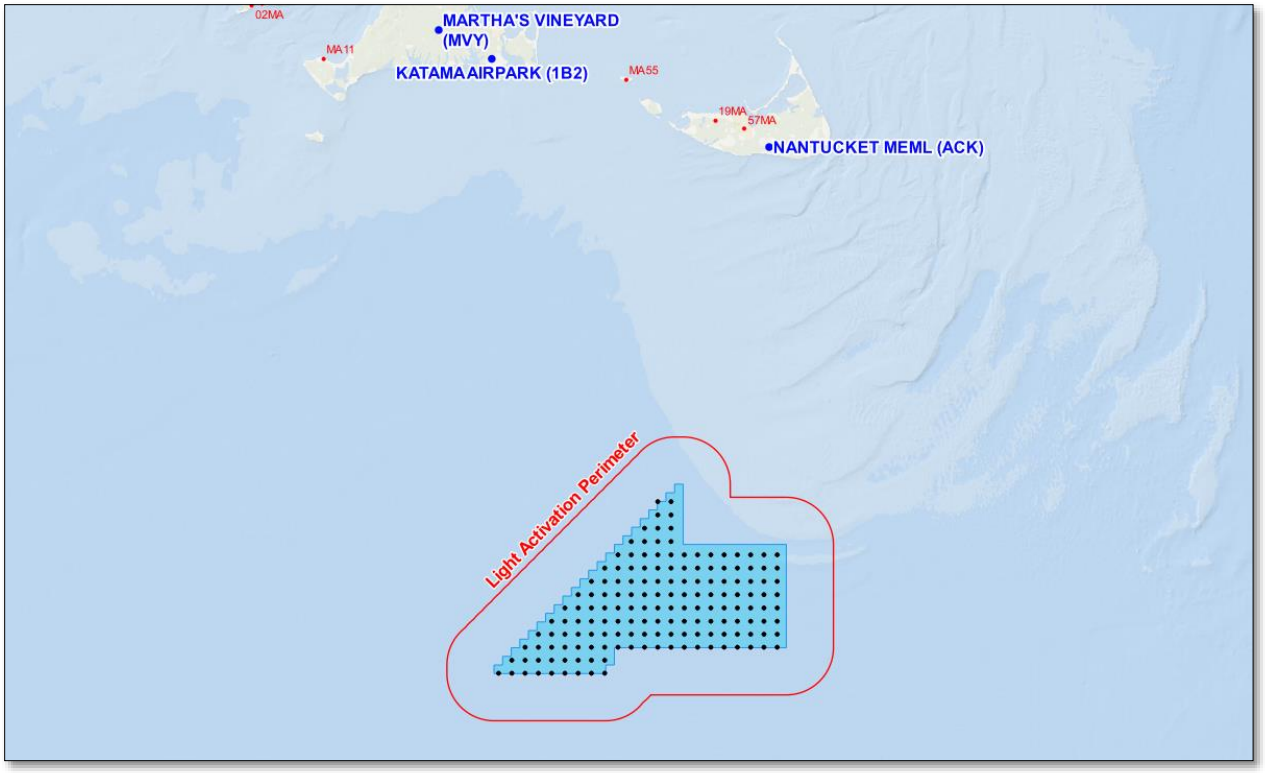

Figure 1: Public-use (blue) and private-use (red) airports in proximity to Vineyard Northeast (blue area)

Methodology

Capitol Airspace analyzed FAA National Offload Program (NOP) radar returns in proximity to Vineyard Northeast for the 2020 calendar year. Flight tracks from the 2020 dataset were assessed since it contained a greater number of flights in the affected airspace than the 2019 dataset. FAA NOP data only includes 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.

The following process was used to determine the frequency of nighttime aviation operations in proximity to Vineyard Northeast:

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 (5.6 kilometers) from, and 1,000 feet (304.8 meters) 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 Vineyard Northeast. 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 (6.6-kilometer) buffer (solid red outline, ***Figure 1***) around Vineyard Northeast at altitudes up to 3,500 feet (1,066.8 meters) above the highest WTG location (4,900 feet [1,493.5m] above mean sea level [AMSL] based on 1,312-foot [400-meter] tall wind turbines).
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.[1]
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 Vineyard Northeast, 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.

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

Results

FAA NOP data indicates that as many as 29 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 six 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 six 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 1 hour 14 minutes and 5 seconds for 1,312-foot (400-meter) tall WTGs.

Considering that the Vineyard Northeast ADLS light activation perimeter observes approximately 4,701 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)
January	477:34:05	00:35:43 (0.12%)
February	416:44:11	00:00:00 (0.00%)
March	404:41:41	00:00:00 (0.00%)
April	351:07:24	00:00:00 (0.00%)
May	327:28:04	00:00:48 (0.00%)
June	299:54:46	00:00:00 (0.00%)
July	319:29:00	00:00:00 (0.00%)
August	350:56:26	00:03:38 (0.02%)
September	378:29:50	00:00:00 (0.00%)
October	432:43:45	00:00:00 (0.00%)
November	453:59:12	00:31:31 (0.12%)
December	487:39:58	00:02:25 (0.01%)
Total	**4700:48:22**	**01:14:05 (0.03%)**

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

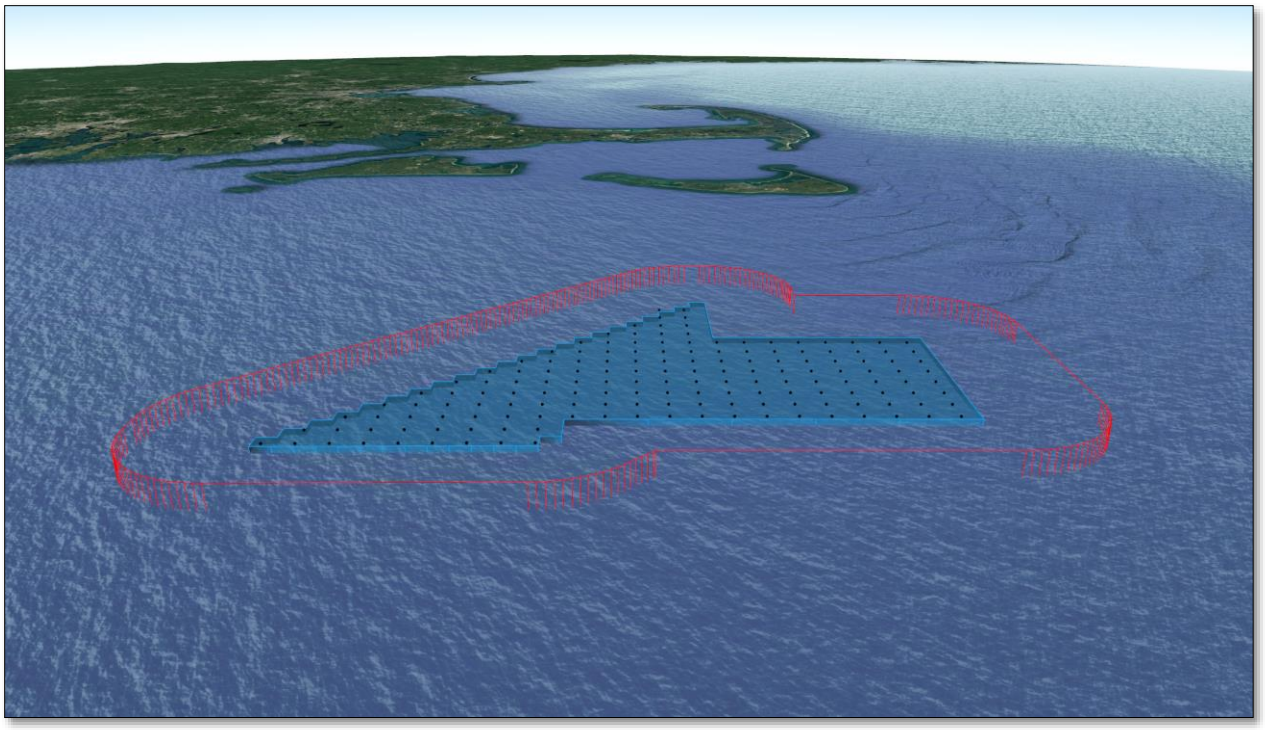

Figure 2: Vineyard Northeast (blue) and light activation volume (red outline)

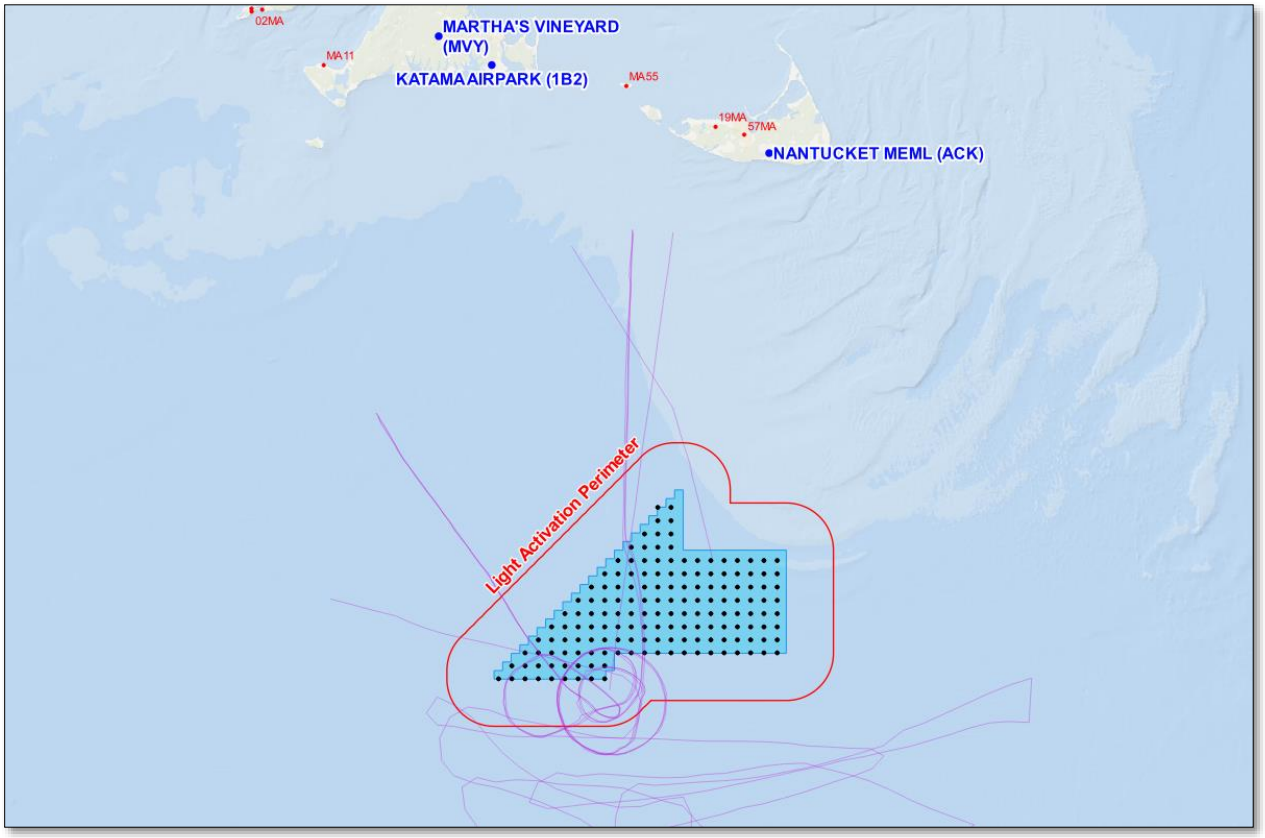

Figure 3: Flight tracks (purple) that would have activated ADLS obstruction lights (based on 1,312-foot [400-meter] tall WTGs)