VINEYARD MID-ATLANTIC

CONSTRUCTION AND OPERATIONS PLAN

VOLUME II APPENDIX

JANUARY 2025

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

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Capitol Airspace Group

Prepared for:
Vineyard Mid-Atlantic LLC

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Revision	Date	Description
0	January 2024	Initial submission.
1	September 2024	Updated to incorporate revisions to the Project Design Envelope.
1	January 2025	Resubmitted without revisions.

Vineyard Mid-Atlantic Offshore Wind Development

Epsilon Associates, Inc.

Offshore Nassau & Suffolk Counties, New York

Aircraft Detection Lighting System (ADLS) Efficacy Analysis

May 14, 2024

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Summary

Vineyard Mid-Atlantic 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 0544 (the "Lease Area") along with associated offshore and onshore transmission systems. This proposed development is referred to as "Vineyard Mid-Atlantic." Vineyard Mid-Atlantic includes wind turbine generator (WTG) and electrical service platform (ESP) positions within the Lease Area. One or two positions will be occupied by ESPs and the remaining positions will be occupied by WTGs. Offshore export cables installed within an Offshore Export Cable Corridor (OECC) will transmit power from the renewable wind energy facilities to onshore transmission systems on Long Island, New York.

Capitol Airspace conducted an Aircraft Detection Lighting System (ADLS) efficacy analysis for Vineyard Mid-Atlantic. At the time of this analysis, an approximately 67-square-mile (174-square-kilometer) study area (blue area, ***Figure 1***) had been identified. 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 10 minutes and 4 seconds over a one-year period for 1,165-foot (355 meter) tall wind turbines. 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.

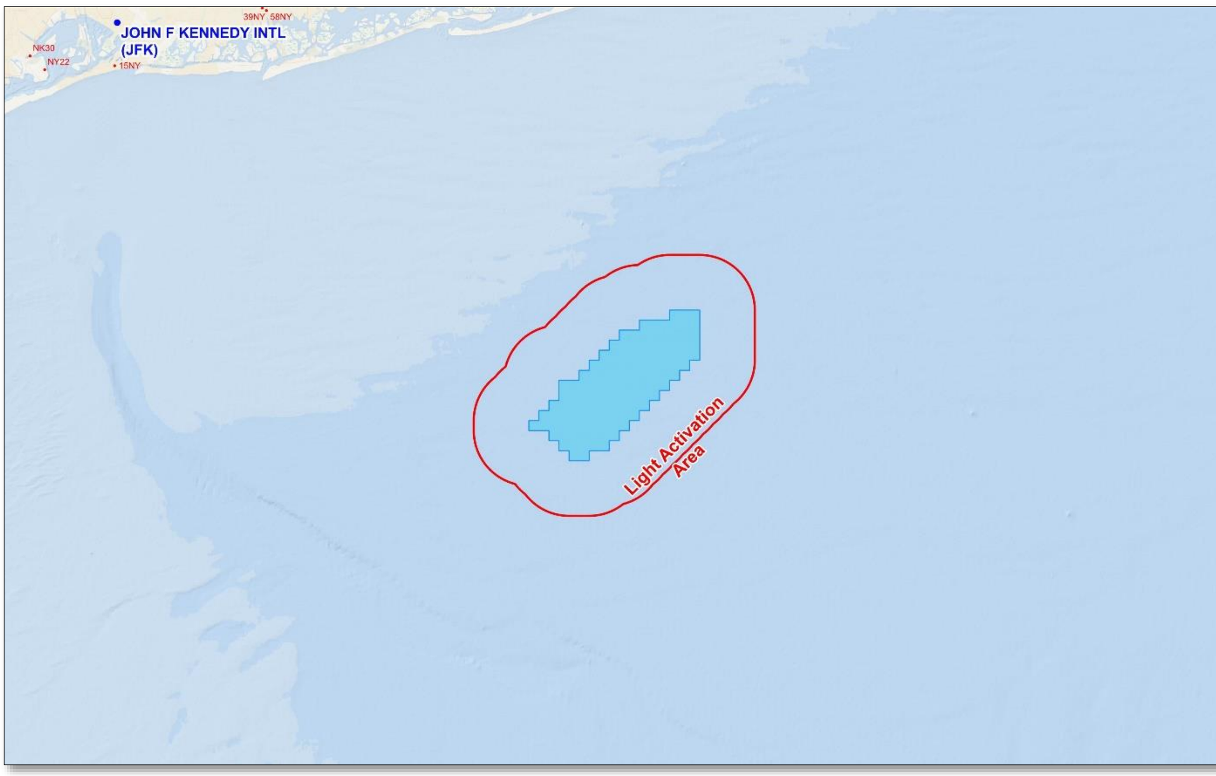

Figure 1: Public-use (blue) and private-use (red) airports in proximity to Vineyard Mid-Atlantic (blue area)

Methodology

Capitol Airspace analyzed FAA National Offload Program (NOP) radar returns in proximity to Vineyard Mid-Atlantic for the 2022 calendar year. 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.

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

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 feet (300 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 Mid-Atlantic. 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 1***) around Vineyard Mid-Atlantic at altitudes up to 3,500 feet (1,066 meters) above the highest wind turbine location (4,700 feet (1,432 meters) above mean sea level [AMSL] based on 1,165-foot (355-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 Mid-Atlantic, 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 track transits the light activation volume at the same time, each nighttime track was compared to every other nighttime track. Where overlapping tracks were found, the overlapping track'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 565 tracks had at least one radar return within the light activation volume (red outline, ***Figure 2***). However, most of these tracks occurred during daytime. Using local sunrise and sunset times, Capitol Airspace determined that as many as 48 tracks[2] (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 48 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 10 minutes and 4 seconds for 1,165-foot (355-meter) tall wind turbines.

Considering that the Vineyard Mid-Atlantic ADLS light activation perimeter observes approximately 4,680 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: Monthly nighttime observed and associated light system activation durations

Month	Nighttime Observed (HH:MM:SS)	Light System Activated Duration (HH:MM:SS)
January	475:24:04	00:00:00 (0.00%)
February	401:16:28	00:00:00 (0.00%)
March	404:49:39	00:00:26 (0.00%)
April	351:52:44	00:04:46 (0.02%)
May	328:40:42	00:00:00 (0.00%)
June	301:02:18	00:00:46 (0.00%)
July	320:03:12	00:33:03 (0.17%)
August	350:44:23	00:07:44 (0.04%)
September	377:35:05	00:00:32 (0.00%)
October	431:07:10	00:09:26 (0.04%)
November	451:58:34	00:00:24 (0.00%)
December	485:38:13	00:12:57 (0.04%)
Total	**4680:12:32**	**01:10:04 (0.02%)**

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

[2] Multiple source facilities tracking a single aircraft will result in multiple radar tracks. These tracks differ from one another slightly based on the source facility coverage. Capitol Airspace considered all radar tracks within the ADLS light activation perimeter to ensure that each flight's entire non-duplicative duration was considered.

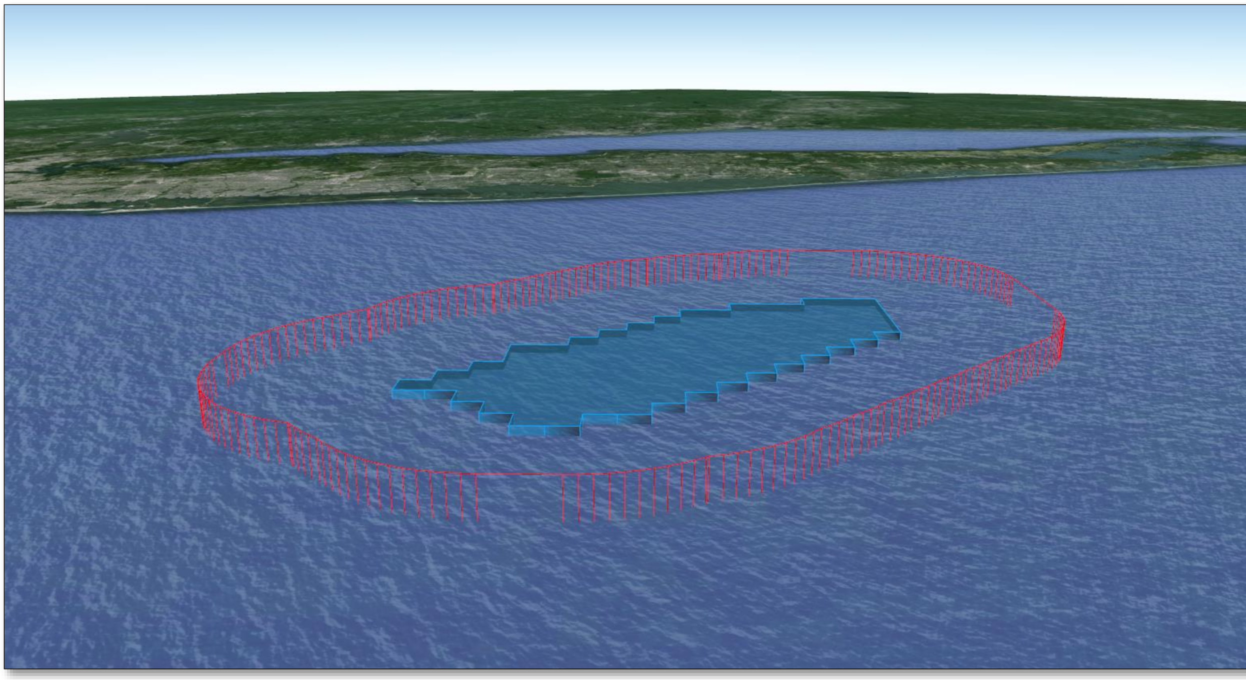

Figure 2: Vineyard Mid-Atlantic project (blue) and light activation volume (red outline)

Figure 3: Flight tracks (purple) with more than one radar return that would have activated ADLS obstruction lights (based on 1,165-foot (355-meter) tall wind turbines)