

Appendix II-M2

Aircraft Detection Lighting System (ADLS) Efficacy Analysis

March 2024

Atlantic Shores Offshore Wind Project - Lease Area OCS-A 0549

Offshore Ocean County, New Jersey

Aircraft Detection Lighting System (ADLS) Efficacy Analysis

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Summary

Capitol Airspace conducted an Aircraft Detection Lighting System (ADLS) efficacy analysis for the Atlantic Shores Offshore Wind LLC (Atlantic Shores) Project for Lease Area OCS-A 0549 located off the coast of Ocean County, New Jersey. At the time of this analysis, 157 wind turbine locations had been identified (black points, **Figure 1**) within the 127-square mile study area (blue area, **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 Lease Area. 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 20 hours 25 minutes and 15 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.

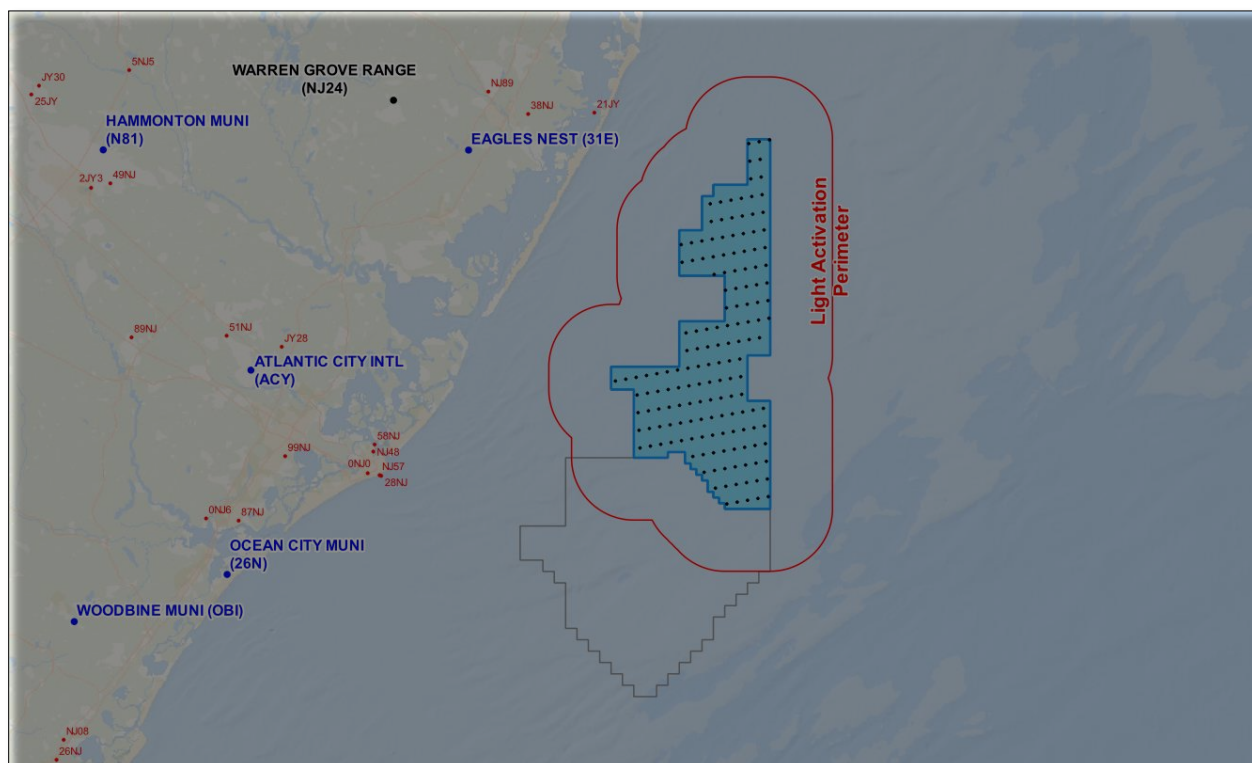


Figure 1: Public-use (blue), private-use (red), and military (black) airports in proximity to the Atlantic Shores Lease Area (blue area) with Lease Area OCS-A 0499 (grey outline)



Methodology

Capitol Airspace analyzed FAA National Offload Program (NOP) radar returns in proximity to the Atlantic Shores Lease Area 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 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 the Atlantic Shores COP North Offshore wind project:

- 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 the Atlantic Shores Lease Area. 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 the Atlantic Shores COP North Offshore wind project at altitudes up to 3,500 ft above the highest wind turbine location (4,600 above mean sea level [AMSL] based on 1,047-foot-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 the Atlantic Shores Lease Area, 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/astromical-applications>



Results

FAA NOP data indicates that as many as 4,843 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 290 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 290 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 20 hours 25 minutes and 15 seconds.

Considering that the Atlantic Shores Project ADLS light activation perimeter observes approximately 4,695 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	473:40:57	02:36:17 (0.55%)
February	414:26:32	01:45:29 (0.42%)
March	403:58:49	00:27:17 (0.11%)
April	352:08:54	00:15:30 (0.07%)
May	330:05:35	00:14:24 (0.07%)
June	303:15:42	00:34:55 (0.19%)
July	322:29:13	02:48:01 (0.87%)
August	352:33:13	02:50:43 (0.81%)
September	378:23:15	03:02:58 (0.81%)
October	430:51:13	02:26:43 (0.57%)
November	450:37:11	01:54:11 (0.42%)
December	483:19:07	01:28:47 (0.31%)
Total	4695:49:41	20:25:15 (0.43%)

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

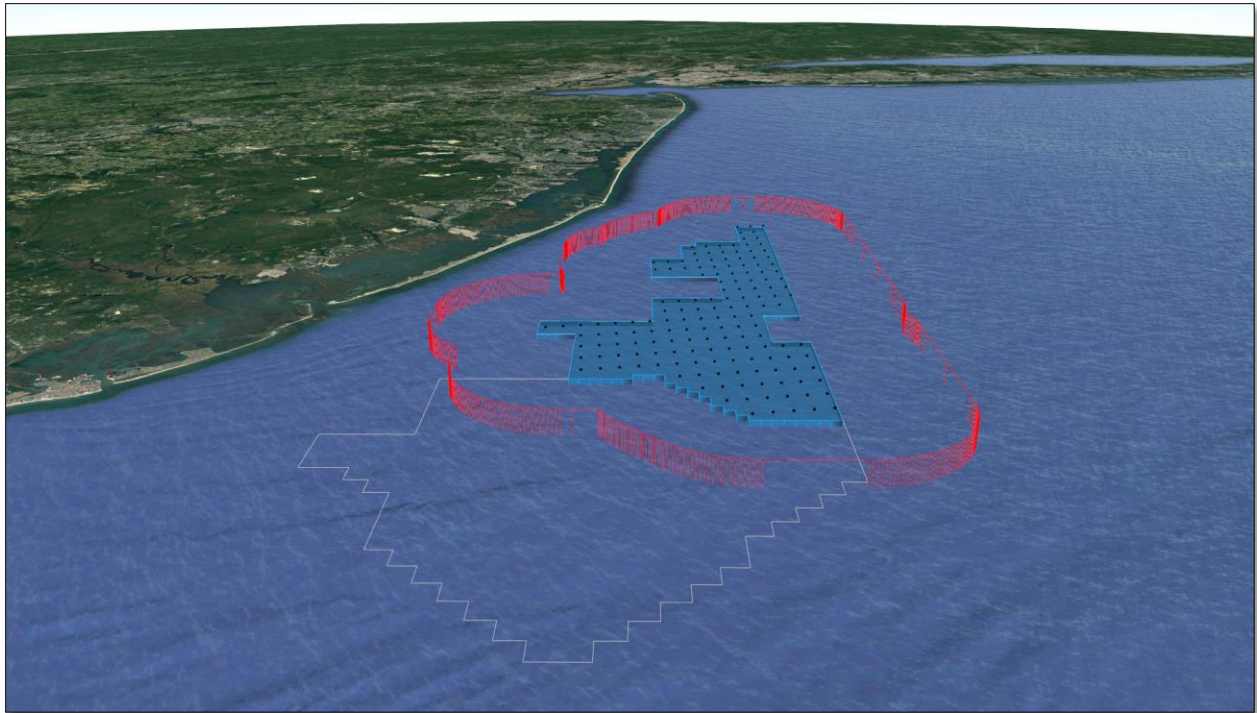


Figure 2: Atlantic Shores Lease Area (blue) and light activation volume (red outline)

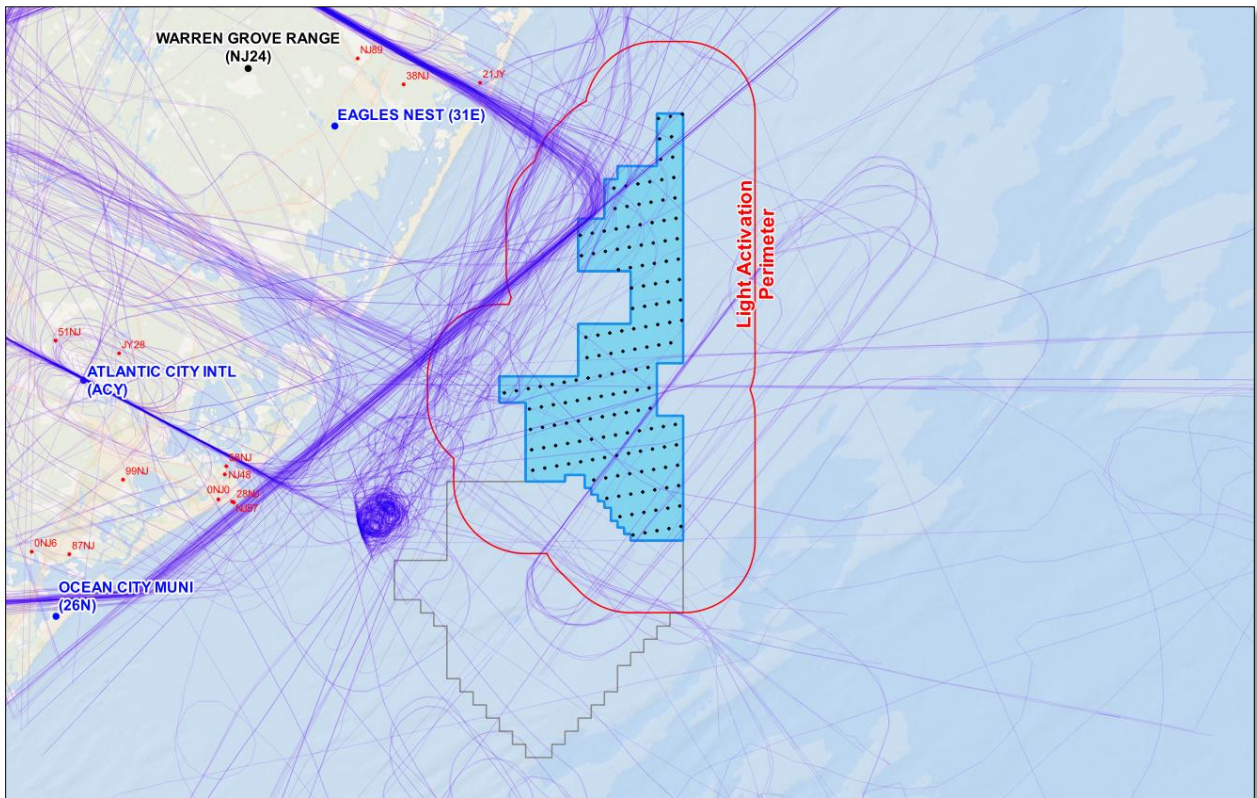


Figure 3: Flight tracks (purple) that would have activated ADLS obstruction lights