# Appendix AD – Airspace and Radar Analysis

Ocean Wind
An Ørsted & PSEG project

Aircraft Detection Lighting System (ADLS) Efficacy Analysis

# Ocean Wind Project

Ørsted

*Offshore Ocean City, New Jersey*

*Aircraft Detection Lighting System (ADLS) Efficacy Analysis*

April 16, 2020


Capitol Airspace Group

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# Summary

Capitol Airspace conducted an Aircraft Detection Lighting System (ADLS) efficacy analysis for the Ocean wind project (black points and blue area, ***Figure 1***) off the coast of Ocean City, New Jersey. 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 19 minutes and 17 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.

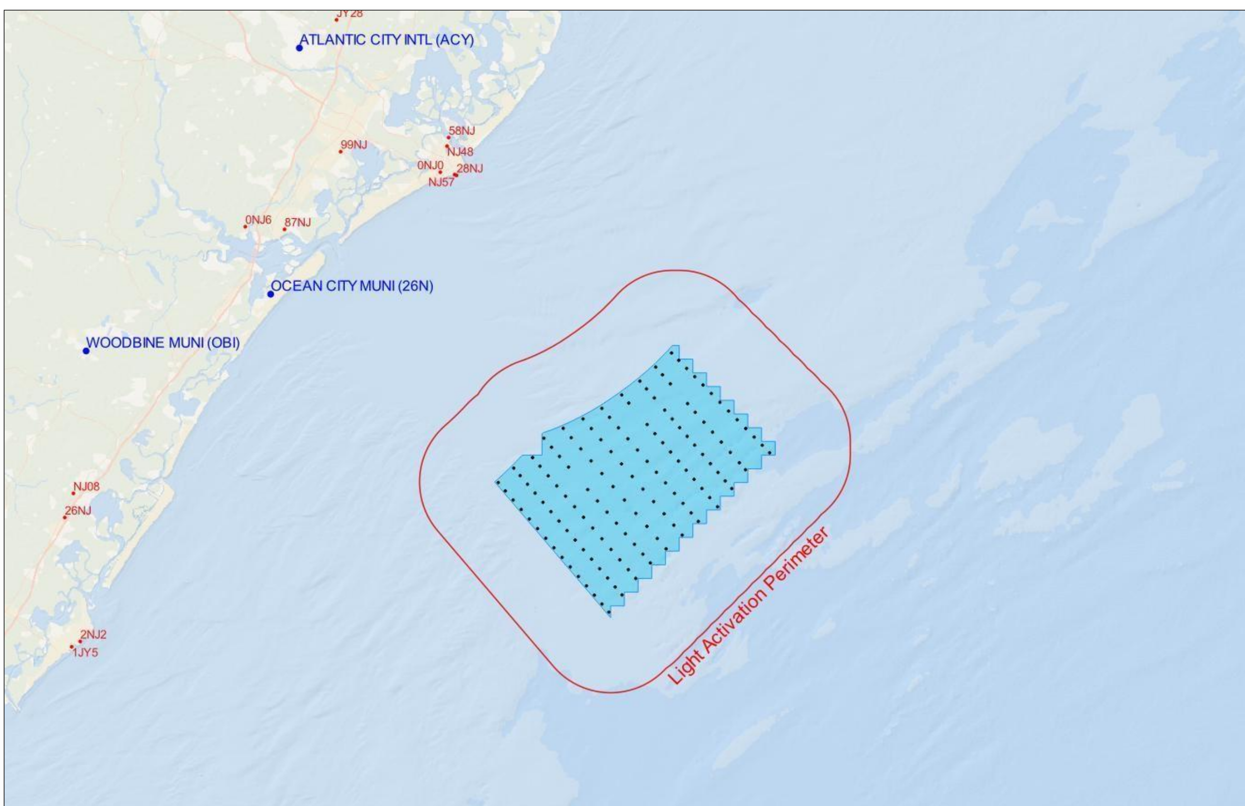


***Figure 1: Public-use (blue) and private-use (red) airports in proximity to the Ocean wind project***

# Methodology

Capitol Airspace analyzed FAA National Offload Program (NOP) radar returns in proximity to the Ocean wind project for the period between October 1, 2018 and September 30, 2019. 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. Within 65 nautical miles of the wind project, the NOP data contained 510,302,010 different radar returns from 13 different air traffic control (ATC) facilities.[1] These radar returns were associated with 4,976,443 unique flight tracks.

The following process was used to determine the frequency of nighttime aviation operations in proximity to the Ocean 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 feet above, any obstruction. However, the actual light activation volume will vary depending on the ADLS. At the time of this analysis, a specific ADLS had not been selected for the Ocean wind project. In order to account for varying radar systems as well as aircraft speeds and descent rates, Capitol Airspace assessed a 3.55 nautical mile buffer (solid red outline, ***Figure 2***) around the wind project at altitudes up to 3,500 feet above the highest wind turbine (4,500 feet above mean sea level [AMSL] based on 906-foot AMSL wind turbines).
2. **Calculate Sunrise and Sunset** – Sunrise and sunset times were calculated for each day of the year based on the United States 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 ***United States Naval Oceanography Portal***.
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 project 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] Source facilities included Allentown (ABE) Terminal Radar Approach Control (TRACON), Atlantic City (ACY) TRACON, Wilkes-Barre (AVP) TRACON, Harrisburg (MDT) TRACON, New York (N90) TRACON, Norfolk (ORF) TRACON, Potomac (PCT) TRACON, Philadelphia (PHL) TRACON, Reading (RDG) TRACON, Boston (ZBW) Air Route Traffic Control Center (ARTCC), Washington (ZDC) ARTCC, New York (ZNY) ARTCC, and Cleveland (ZOB) ARTCC.

# Results

FAA NOP data indicates that as many as 1,051 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 184 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 184 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 19 minutes and 17 seconds. Considering that the Ocean wind project ADLS light activation perimeter observes approximately 4,741 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***).

| Month | Nighttime Observed (HH:MM:SS) | Light System Activated Duration (HH:MM:SS) | Percentage |
|---|---|---|---|
| January | 477:32:37 | 00:00:40 | 0.00% |
| February | 404:29:30 | 00:23:40 | 0.10% |
| March | 409:59:10 | 00:05:39 | 0.02% |
| April | 358:25:48 | 00:01:10 | 0.01% |
| May | 336:47:19 | 00:06:06 | 0.03% |
| June | 309:26:30 | 00:04:09 | 0.02% |
| July | 328:06:49 | 00:03:04 | 0.02% |
| August | 357:22:38 | 00:01:17 | 0.01% |
| September | 382:26:56 | 00:02:05 | 0.01% |
| October | 434:51:00 | 00:07:11 | 0.03% |
| November | 454:10:49 | 00:22:42 | 0.08% |
| December | 487:08:03 | 00:01:34 | 0.01% |
| **Total** | **4740:47:23** | **01:19:17** | **0.03%** |

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

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

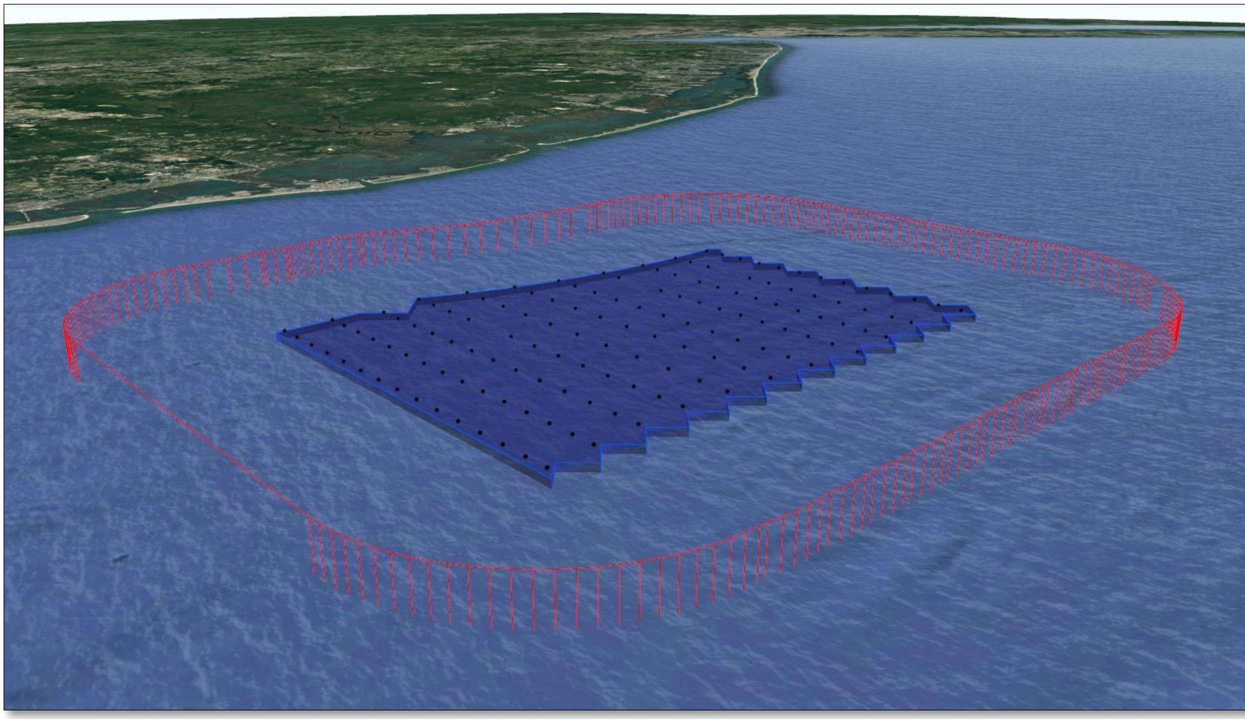

*Figure 2: Ocean wind project (blue) and light activation volume (red outline)*

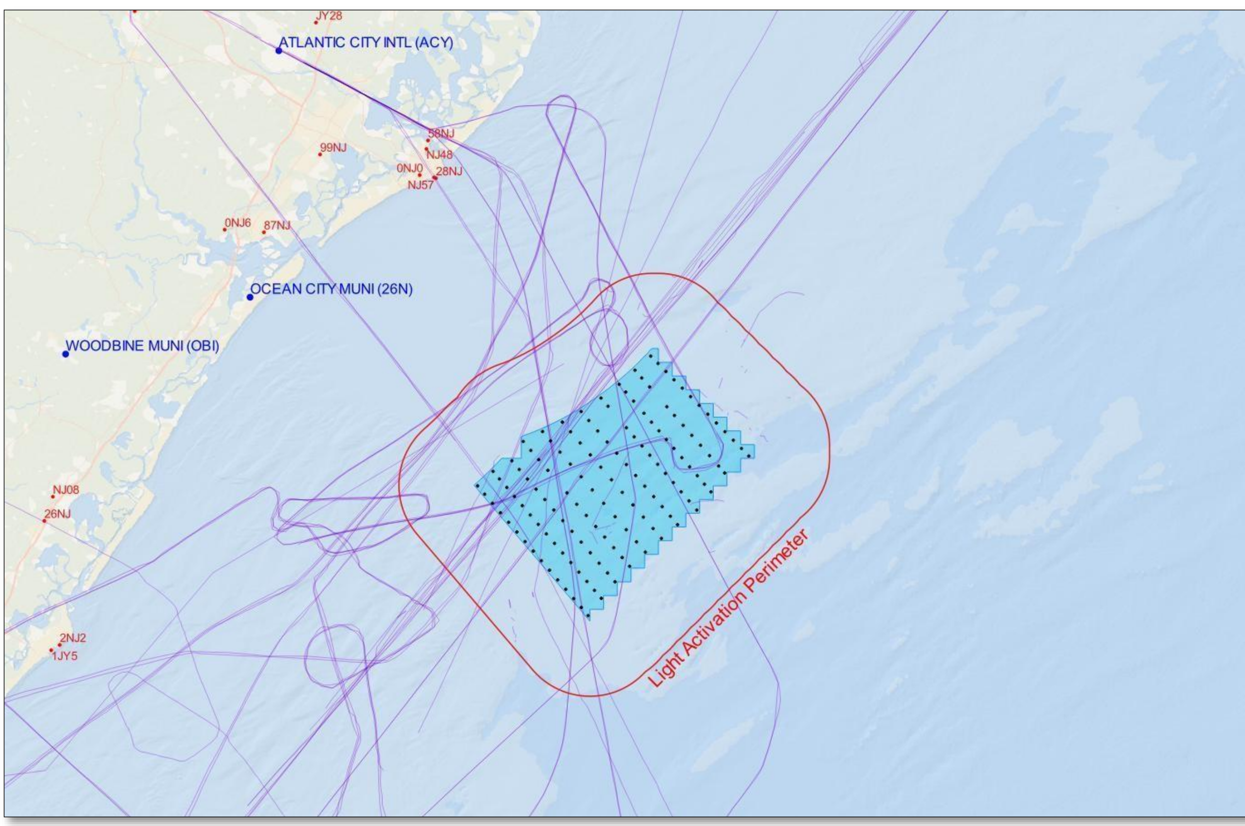


*Figure 3: Flight tracks (purple) that would have activated ADLS obstruction lights*

Ocean Wind
An Ørsted & PSEG project

Obstruction Evaluation & Airspace Analysis

# Ocean Wind Project

Ørsted

*Offshore Ocean City, New Jersey*

*Obstruction Evaluation & Airspace Analysis*

January 28, 2020

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# Summary

Capitol Airspace conducted an obstruction evaluation and airspace analysis for the Ocean wind project off the coast of Ocean City, New Jersey. The purpose for this analysis was to identify obstacle clearance surfaces established by the Federal Aviation Administration (FAA) that could limit the placement of 906-foot above ground level (AGL) wind turbines. At the time of this analysis, 138 individual wind turbine locations had been identified. This analysis assessed height constraints overlying each location (black points, ***Figure 1***) as well as an approximately 108 square mile study area (red outline, ***Figure 1***) to aid in identifying optimal wind turbine locations.

14 CFR Part 77.9 requires that all structures exceeding 200 feet AGL be submitted to the FAA so that an aeronautical study can be conducted. The FAA's objective in conducting aeronautical studies is to ensure that proposed structures do not have an effect on the safety of air navigation and the efficient utilization of navigable airspace by aircraft. The end result of an aeronautical study is the issuance of a determination of 'hazard' or 'no hazard' that can be used by the proponent to obtain necessary local construction permits. It should be noted that the FAA has no control over land use in the United States and cannot enforce the findings of its studies.

Height constraints overlying the Ocean wind project range from 649 to 1,049 feet above mean sea level (AMSL) and are associated with minimum vectoring altitude sectors. Proposed wind turbines that exceed these surfaces would require an increase to minimum vectoring altitudes.

At 906 feet AGL, 73 proposed wind turbines in the northwestern half of the study area would exceed these surfaces and require an increase to minimum vectoring altitudes. If the FAA determines that this impact would affect as few as one operation per week, it could result in determinations of hazard.

Military airspace and training routes overlie the Ocean wind project. If the military uses these segments of airspace regularly, it could result in military objections to proposed wind development.

This study did not consider electromagnetic interference on FAA communication systems. Impact on surveillance radar systems will be addressed in a separate report.

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# Methodology

Capitol Airspace studied the proposed project based on location information provided by Ørsted. Using this information, Capitol Airspace generated graphical overlays to determine proximity to airports (***Figure 1***), published instrument procedures, enroute airways, FAA minimum vectoring altitude and minimum instrument flight rules (IFR) altitude charts, as well as military airspace and military training routes.

Capitol Airspace evaluated all 14 CFR Part 77 imaginary surfaces, published instrument approach and departure procedures, visual flight rules operations, FAA minimum vectoring altitudes, minimum IFR altitudes, and enroute operations. All formulas, headings, altitudes, bearings and coordinates used during this study were derived from the following documents and data sources:

- 14 CFR Part 77 Safe, Efficient Use, and Preservation of the Navigable Airspace
- FAA Order 7400.2M Procedures for Handling Airspace Matters
- FAA Order 8260.3D United States Standard for Terminal Instrument Approach Procedures
- FAA Order 8260.58A United States Standard for Performance Based Navigational (PBN) Instrument Procedure Design
- Technical Operations Evaluation Desk Guide for Obstruction Evaluation/Airport Analysis (1.5.1)
- United States Government Flight Information Publication, US Terminal Procedures
- National Airspace System Resource Aeronautical Data
- National Oceanic and Atmospheric Administration Maritime Boundaries Data

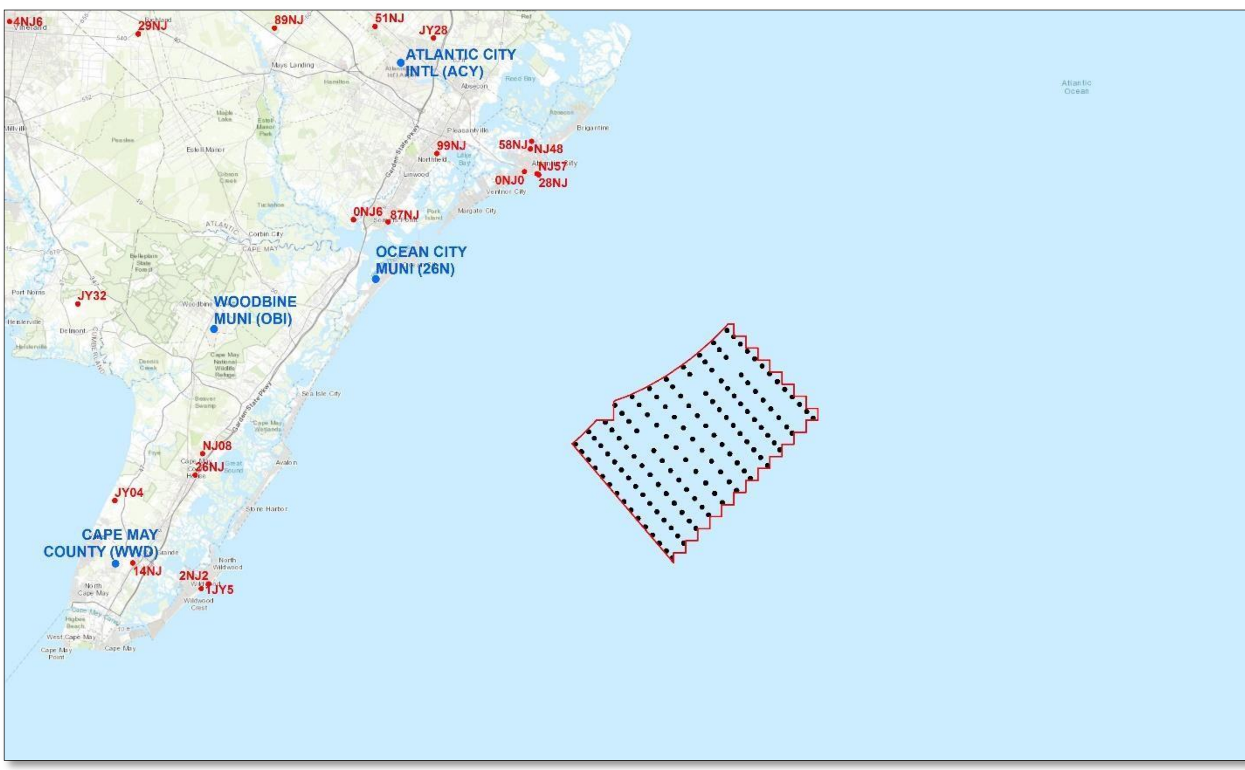


*Figure 1: Public-use (blue) and private-use (red) airports in proximity to the Ocean wind project*

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# Study Findings

## Territorial Airspace

The FAA conducts aeronautical studies for structures proposed within any state, territory, or possession of the United States, within the District of Columbia, or within territorial waters[1] surrounding the United States.[2] Although an offshore wind project may be located outside of territorial waters, the Bureau of Ocean Energy Management (BOEM) may still require an aeronautical study as part of the application process.

The Ocean wind project is not located within territorial waters (purple, ***Figure 2***). Therefore, the FAA does not have a mandate to conduct aeronautical studies for wind turbines proposed within the defined study area.

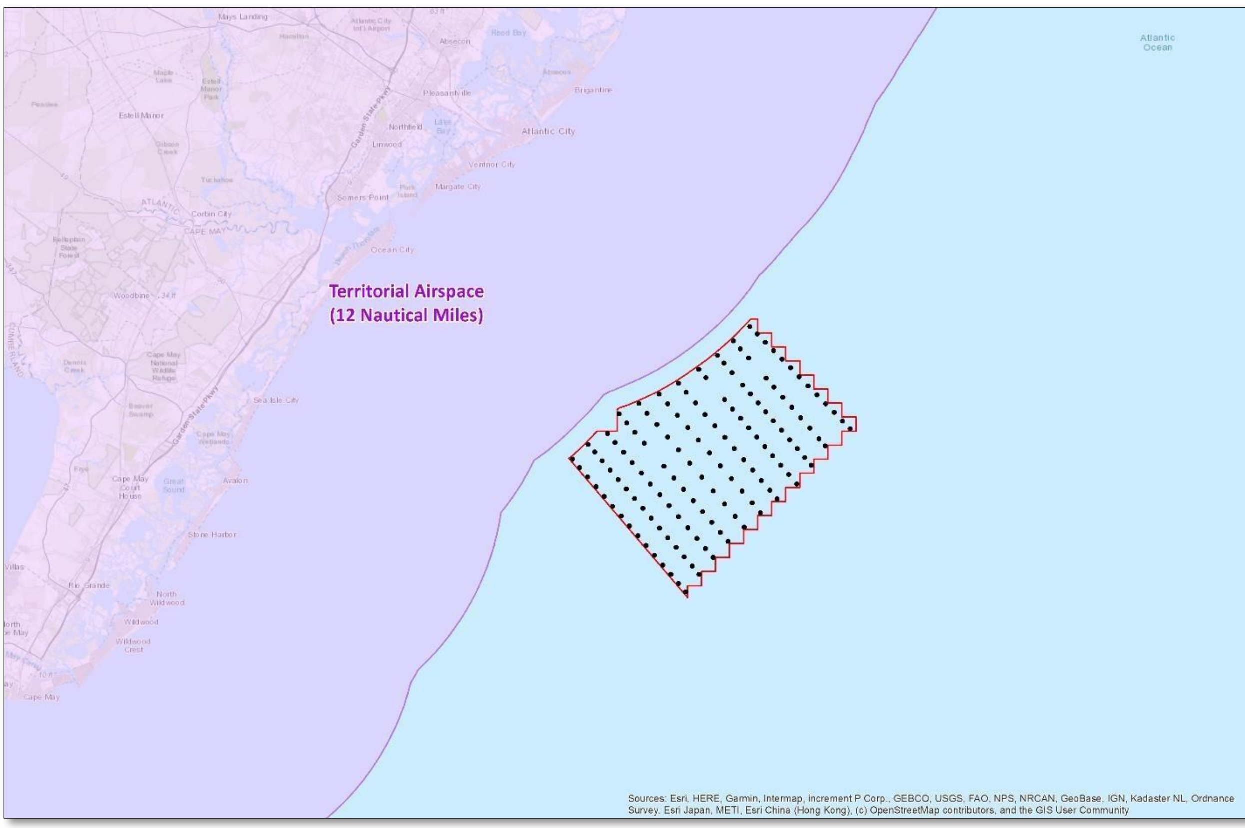



***Figure 2: Territorial Airspace in proximity to the Ocean wind project***

[1] The National Oceanic and Atmospheric Administration (NOAA) defines territorial waters as 12 nautical miles measured from the official U.S. baseline – a recognized low water line along the coast. NOAA publishes this boundary in a publicly available ***Web Map Service***.



[2] As described in FAA Order 7400.2M 5-1-4(a) "Scope."

### 14 CFR Part 77 Imaginary Surfaces

The FAA uses level and sloping imaginary surfaces to determine if a proposed structure is an obstruction to air navigation. Structures that are identified as obstructions are then subject to a full aeronautical study and increased scrutiny. However, exceeding a Part 77 imaginary surface does not automatically result in the issuance of a determination of hazard. Proposed structures must have airspace impacts that constitute a substantial adverse effect in order to warrant the issuance of determinations of hazard.

Public-use airport 14 CFR Part 77.17(a)(2) and 77.19/21/23 imaginary surfaces do not overlie the Ocean wind project (***Figure 3***). However, at 906 feet AGL, all of the proposed wind turbines will exceed 77.17(a)(1) – a height of 499 feet AGL at the site of the object – and will be identified as obstructions regardless of location.

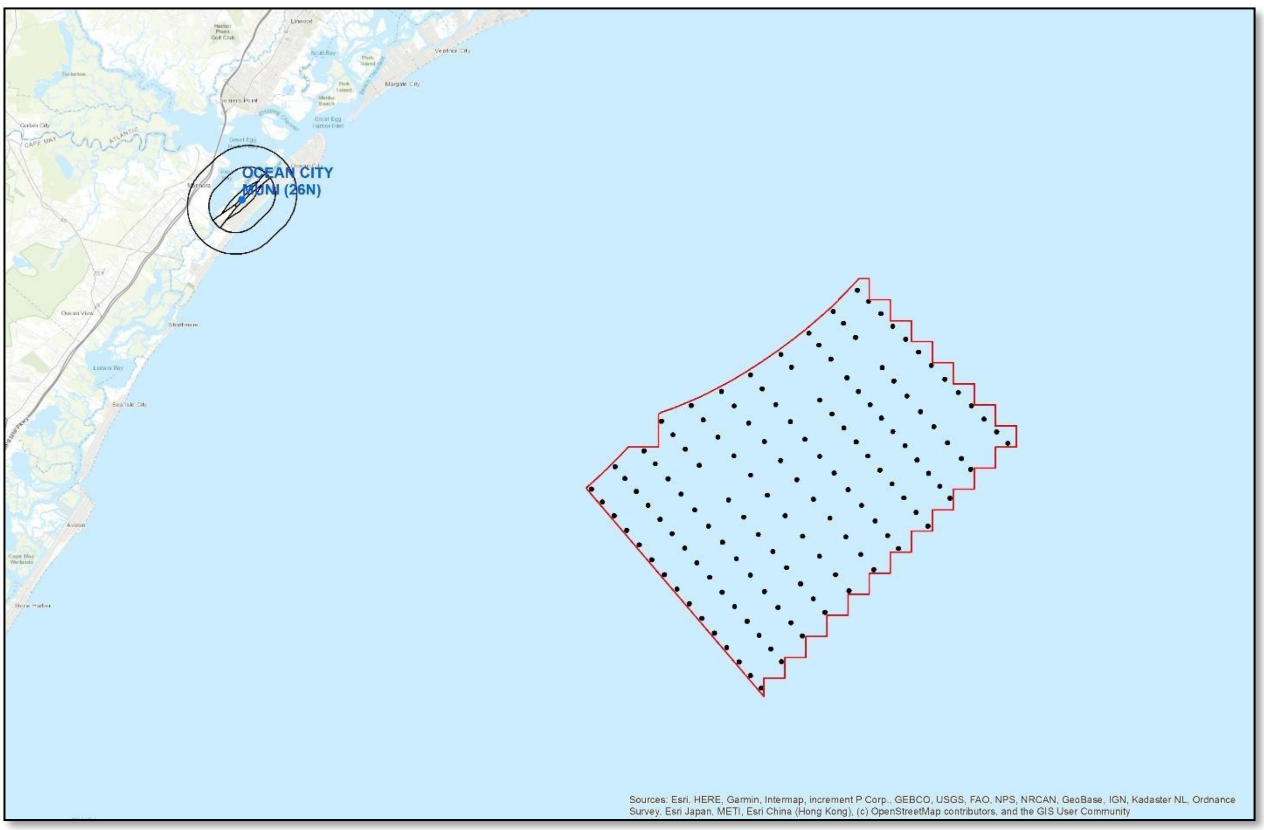



***Figure 3: 77.19 (black) imaginary surfaces in proximity to the Ocean wind project***

**Visual Flight Rules (VFR) Traffic Pattern Airspace**

VFR traffic pattern airspace is used by pilots operating during visual meteorological conditions. The airspace dimensions are based upon the category of aircraft which, in turn, is based upon the approach speed of the aircraft. 14 CFR Part 77.17(a)(2) and 77.19 (as applied to a *visual* runway) imaginary surfaces establish the obstacle clearance surface heights within VFR traffic pattern airspace.

VFR traffic pattern airspace does not overlie the Ocean wind project and should not limit 880-foot AGL wind turbines within the defined study area (***Figure 4***).

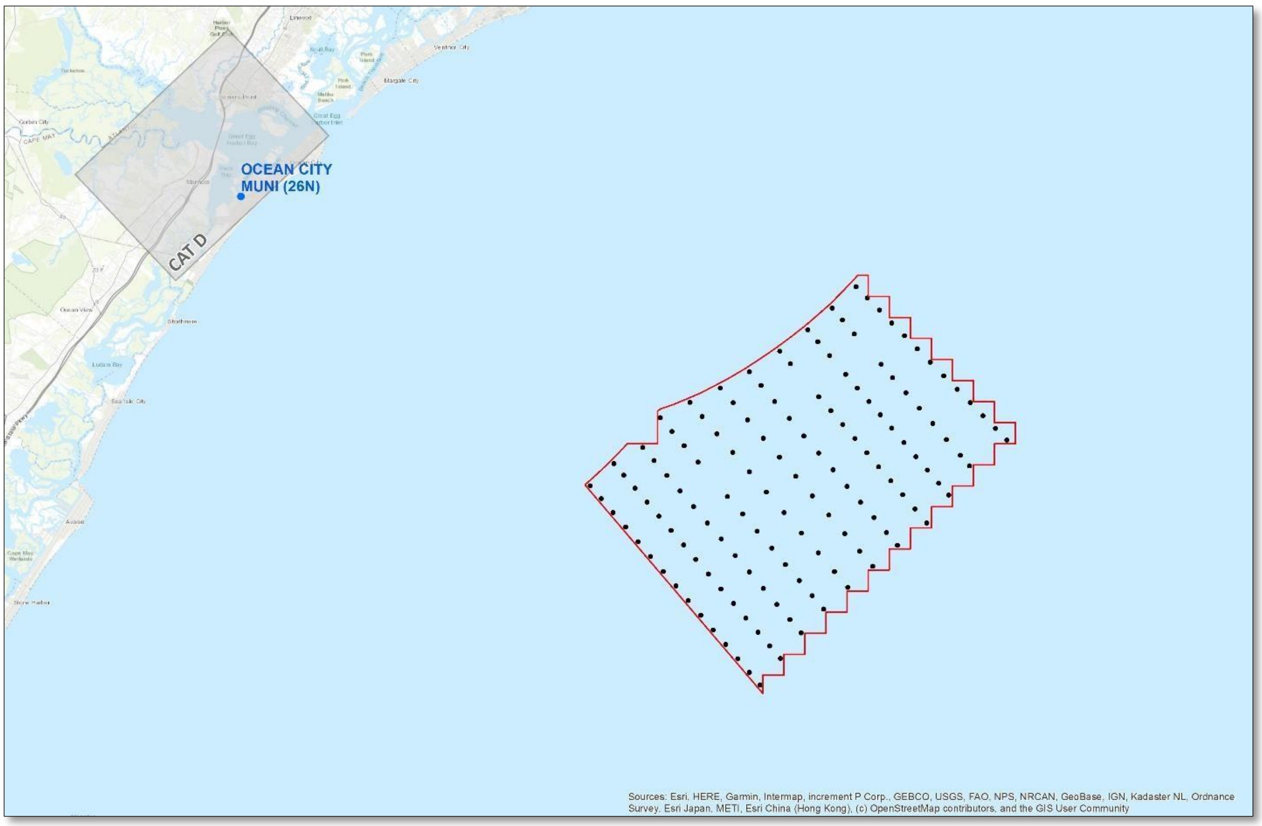



***Figure 4: VFR traffic pattern airspace in proximity to the Ocean wind project***

### Visual Flight Rules (VFR) Routes

During periods of marginal Visual Meteorological Conditions (VMC) – low cloud ceilings and one statute mile visibility – pilots often operate below the floor of controlled airspace. Operating under these weather conditions requires pilots to remain within one statute mile of recognizable land marks such as roads, rivers, and railroad tracks. The FAA protects for known and regularly used VFR routes by limiting structure heights within two statute miles of these routes to no greater than 14 CFR Part 77.17(a)(1) – a height of 499 feet AGL at the site of the object.

Operational data describing the usage of potential VFR routes is not available. If the FAA determines VFR routes overlying the Ocean wind project and determines that they are flown regularly (as few as one operation per day), they could limit wind development in excess of 499 feet AGL and within two statute miles of these landmarks (e.g., hatched purple, ***Figure 5***). However, the Vineyard Offshore wind project is not in proximity to any landmarks that could be the basis for VFR routes (***Figure 5***).

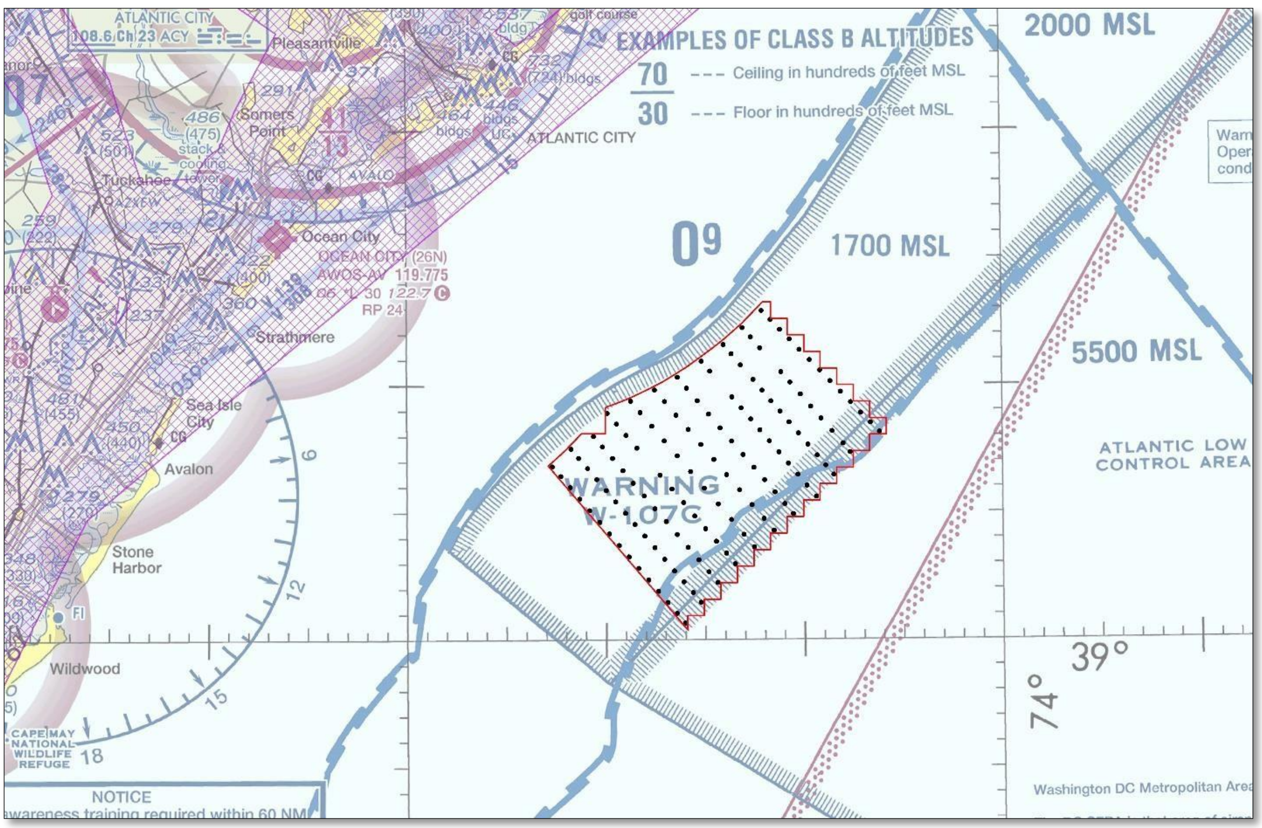



***Figure 5: Potential VFR routes in proximity to the Ocean wind project***

**Instrument Departures**

In order to ensure that aircraft departing during marginal weather conditions do not fly into terrain or obstacles, the FAA publishes instrument departure procedures that provide obstacle clearance to pilots as they transition between the terminal and enroute environments. These procedures contain specific routing and minimum climb gradients to ensure clearance from terrain and obstacles.

Proposed structures that exceed instrument departure procedure obstacle clearance surfaces would require an increase to instrument departure procedure minimum climb gradients. If the FAA determines that this impact would affect as few as one operation per week, it could be used as the basis for determinations of hazard.

Instrument departure procedure obstacle clearance surfaces (e.g., ***Figure 6***) are in excess of other lower surfaces and should not limit 906-foot AGL wind turbines within the defined study area.

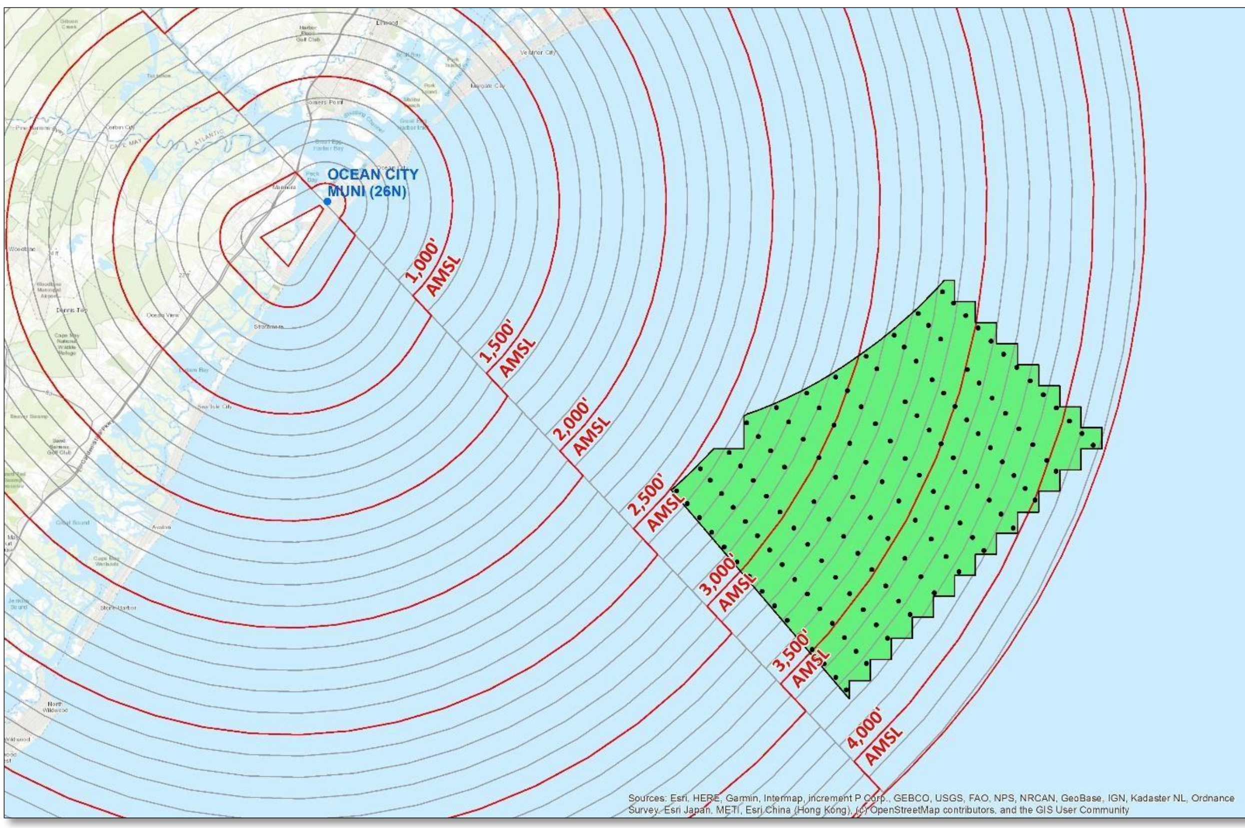



***Figure 6: Ocean City Municipal Airport (26N) Runway 24 obstacle departure procedure assessment***

## Instrument Approaches

Pilots operating during periods of reduced visibility and low cloud ceilings rely on terrestrial and satellite based navigational aids (NAVAIDS) in order to navigate from one point to another and to locate runways. The FAA publishes instrument approach procedures that provide course guidance to on-board avionics that aid the pilot in locating the runway. Capitol Airspace assessed a total of 19 published instrument approach procedures at three public-use airports in proximity to the Ocean wind project:

**Atlantic City International (ACY)**
HI-ILS or Localizer Approach to Runway 13
ILS or Localizer Approach to Runway 13
ILS or Localizer/DME Approach to Runway 31
RNAV (RNP) Z Approach to Runway 13
RNAV (RNP) Z Approach to Runway 31
RNAV (GPS) Approach to Runway 04
RNAV (GPS) Approach to Runway 22
RNAV (GPS) Y Approach to Runway 13
RNAV (GPS) Y Approach to Runway 31
HI-VOR/DME or TACAN Approach to Runway 31
VOR/DME Approach to Runway 22
VOR Approach to Runway 04
VOR Approach to Runway 13
VOR Approach to Runway 31
Copter ILS or Localizer/DME Approach to Runway 13

**Ocean City Municipal (26N)**
GPS Approach to Runway 06
VOR-A Circling Approach

**Eagles Nest (31E)**
RNAV (GPS)-A Circling Approach
RNAV (GPS)-B Circling Approach

Proposed structures that exceed instrument approach procedure obstacle clearance surfaces would require an increase to instrument approach procedure minimum altitudes. Increases to these altitudes, especially critical *decision altitudes (DA)* and *minimum descent altitudes (MDA)*, can directly impact the efficiency of an instrument approach procedure. If the FAA determines that this impact would affect as few as one operation per week, it could be used as the basis for determinations of hazard. [3]

### Minimum Safe Altitude (MSA)

Multiple instrument approach procedure MSAs overlie the Ocean wind project. The obstacle clearance surfaces (e.g. hatched purple, ***Figure 7***) would be one of the lowest height constraints overlying the southeastern section of the study area. At 906 feet AGL, wind turbines proposed in this area, including up to 133 proposed locations, will exceed these surfaces. However, MSAs are for emergency use only and cannot be used as the basis for determinations of hazard in accordance with FAA Order 7400.2M Paragraph 6-3-9(e)(5). As a result, height constraints associated with MSAs were not considered and are not included in the Composite Map (***Figure 13***).

[3] Capitol Airspace assessed instrument approach procedures within 30 nautical miles (NM) of the study area. Although approach surfaces, including Terminal Arrival Areas (TAA), feeder segments, and initial segments, from airports further than 30 NM may overlie the study area, the obstacle clearance surfaces present a lower risk to projects than the surfaces identified in this report. Therefore, height constraints associated with instrument approach surfaces for airports beyond 30 NM were not considered and are not included in the Composite Map (***Figure 13***).

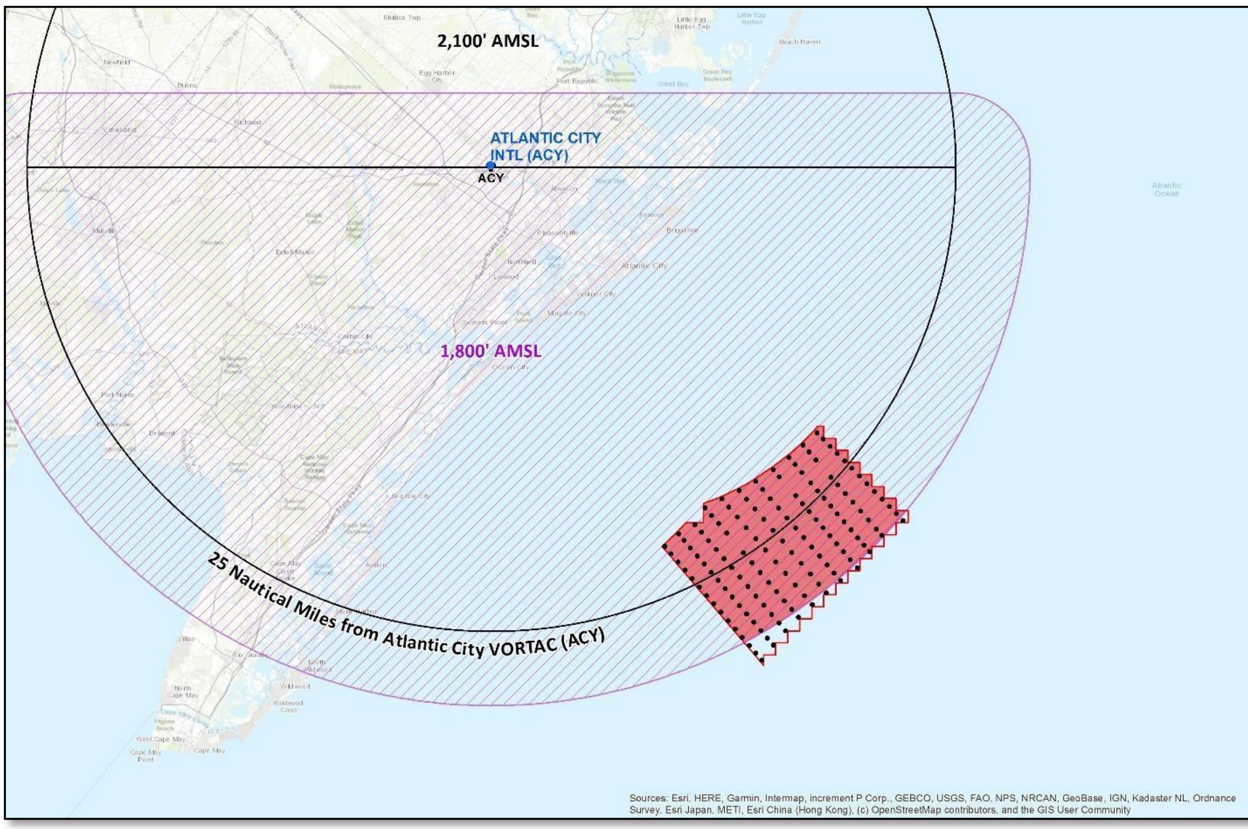



*Figure 7: Atlantic City International Airport (ACY) ILS or Localizer Approach to Runway 13 MSA*

**Enroute Airways**

Enroute airways provide pilots a means of navigation when flying from airport to airport and are defined by radials between VHF omni-directional ranges (VORs). The FAA publishes minimum altitudes for airways to ensure clearance from obstacles and terrain. The FAA requires that each airway have a minimum of 1,000 feet of obstacle clearance in non-mountainous areas and normally 2,000 feet in mountainous areas.

Proposed structures that exceed enroute airway obstacle clearance surfaces would require an increase to minimum obstruction clearance altitudes (MOCA) and/or minimum enroute altitudes (MEA). If the FAA determines that this impact would affect as few as one operation per week, it could be used as the basis for determinations of hazard.

Enroute airway obstacle clearance surfaces (e.g., ***Figure 8***) do not overlie the Ocean wind project and should not limit 906-foot AGL wind turbines within the defined study area.

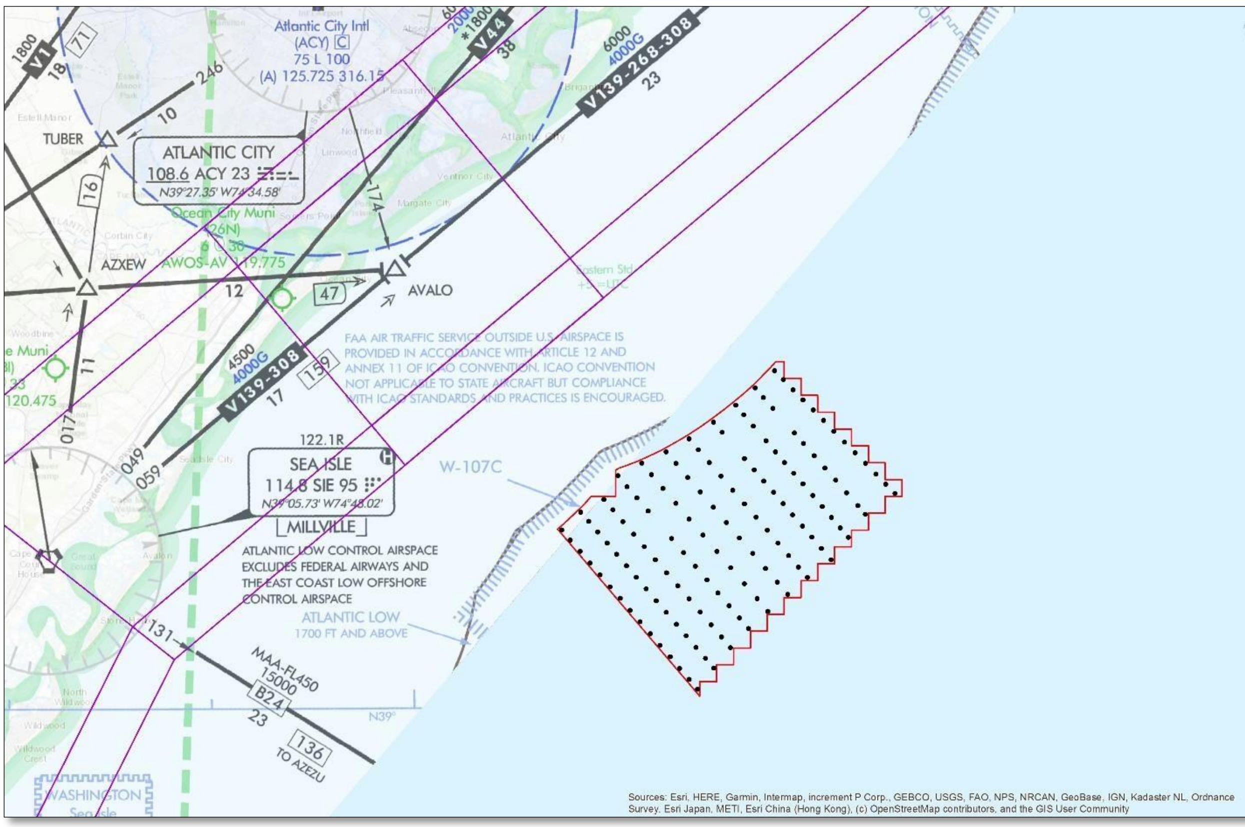



*Figure 8: Low altitude enroute chart L-34 with V139-308 obstacle evaluation areas (purple)*

### Minimum Vectoring/IFR Altitudes

The FAA publishes minimum vectoring altitude (MVA) and minimum instrument flight rules (IFR) altitude (MIA) charts that define sectors with the lowest altitudes at which air traffic controllers can issue radar vectors to aircraft based on obstacle clearance. The FAA requires that sectors have a minimum of 1,000 feet of obstacle clearance in non-mountainous areas and normally 2,000 feet in mountainous areas.

Proposed structures that exceed MVA/MIA sector obstacle clearance surfaces would require an increase to the altitudes usable by air traffic control for vectoring aircraft. If the FAA determines that this impact would affect as few as one operation per week, it could be used as the basis for determinations of hazard.

#### Atlantic City (ACY) Terminal Radar Approach Control (TRACON)

*Sector A (ACY_MVA_FUS3_2017)*

The MVA is 1,600 feet AMSL. The obstacle clearance surface is 649 feet AMSL and is one of the lowest height constraints overlying the northwestern half of the study area. At 906 feet AGL, 31 proposed wind turbines will exceed this surface and require an increase to the Sector A MVA.

*Sector A (ACY_MVA_FUS5_2017)*

The MVA is 1,600 feet AMSL. The obstacle clearance surface (hatched purple, ***Figure 9***) is 649 feet AMSL and is one of the lowest height constraints overlying the northwestern half of the study area. At 906 feet AGL, 66 proposed wind turbines (red area, ***Figure 9***) will exceed this surface and require an increase to the Sector A MVA.

*Sector B (Multiple Charts)*

The MVA is 2,000 feet AMSL. The obstacle clearance surface (***Figure 9***) is 1,049 feet AMSL and is the lowest height constraint overlying the southeastern half of the study area. However, 906-foot AGL wind turbines within the defined study area would not exceed this surface.

#### Philadelphia (PHL) TRACON

*Sector A (PHL_MVA_FUS3_2017)*

The MVA is 1,600 feet AMSL. The obstacle clearance surface is 649 feet AMSL and is one of the lowest height constraints overlying the northwestern half of the study area. At 906 feet AGL, 35 proposed wind turbines will exceed this surface and require an increase to the Sector A MVA.

*Sector A (PHL_MVA_FUS5_2017)*

The MVA is 1,600 feet AMSL. The obstacle clearance surface (hatched blue, ***Figure 10***) is 649 feet AMSL and is one of the lowest height constraints overlying the northwestern half of the study area. At 906 feet AGL, 63 proposed wind turbines will exceed this surface and require an increase to the Sector A MVA.

The Ocean wind project is located approximately 29 nautical miles outside of Philadelphia (PHL) TRACON controlled airspace. As a result, it is possible that Philadelphia (PHL) TRACON would increase the Sector A MVA in order to accommodate 906-foot AGL wind turbines within the defined study area. This mitigation option is subject to FAA approval.

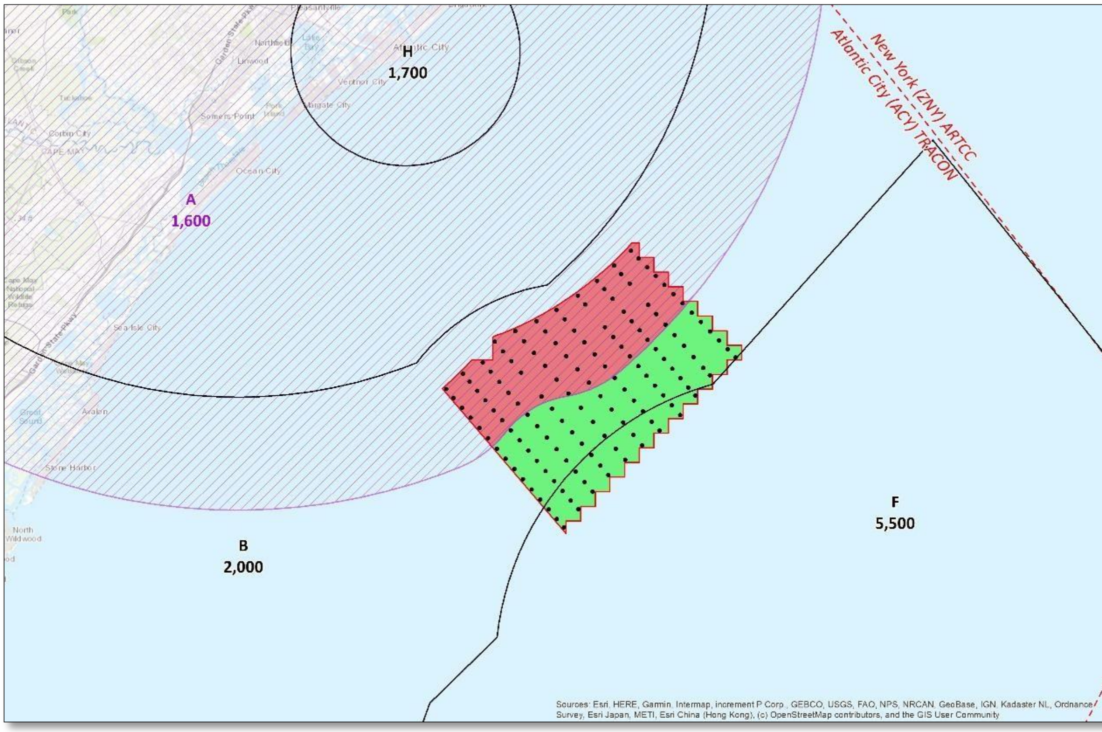



*Figure 9: Atlantic City (ACY) TRACON ACY_MVA_FUS5_2017 MVA sectors (black) with Sector A obstacle evaluation area (hatched purple)*

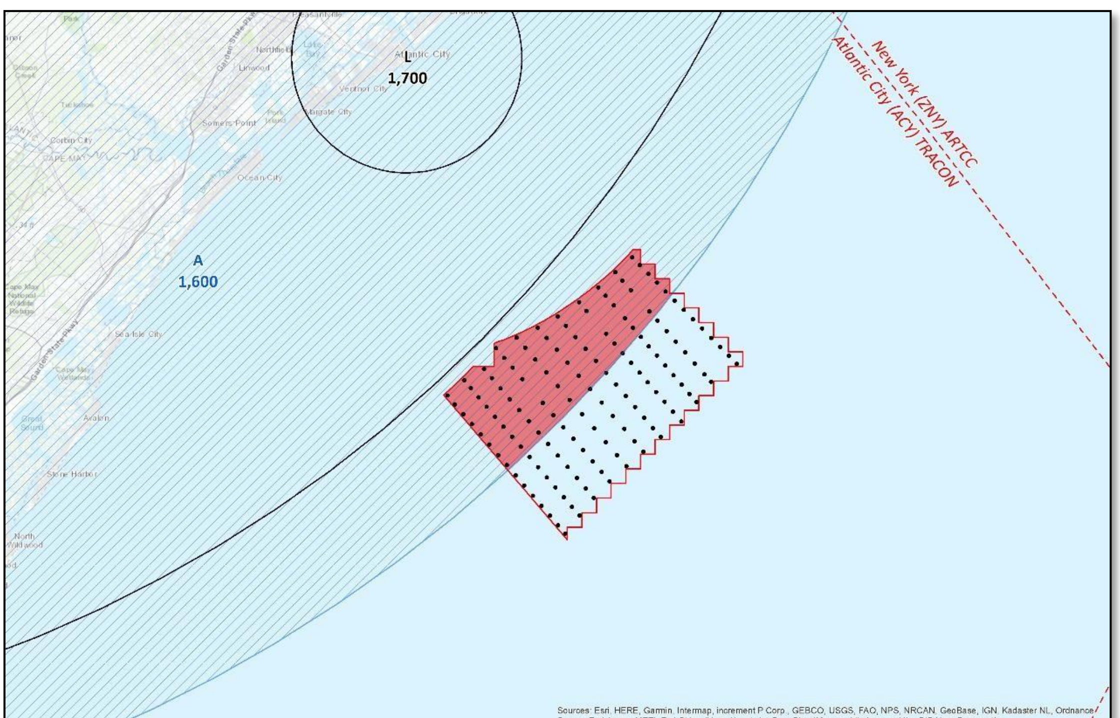



*Figure 10: Philadelphia (PHL) TRACON PHL_MVA_FUS5_2017 MVA sectors (black) with Sector A obstacle evaluation area (hatched blue)*

## Terminal and Enroute NAVAIDs

The FAA has established protection areas in order to identify proposed structures that may have a physical and/or electromagnetic effect on navigation facilities. The protection area dimensions vary based on the proposed structure type as well as the navigational facility type. Proposed structures within these protection areas may interfere with navigational facility services and will require further review by FAA Technical Operations. If further review determines that proposed structures would have a significant physical and/or electromagnetic effect on navigational facilities it could result in determinations of hazard.

NAVAID protection areas do not overlie the Ocean wind project (***Figure 11***). As a result, it is unlikely that proposed wind turbines would have a physical or electromagnetic effect on terminal or enroute NAVAIDs.

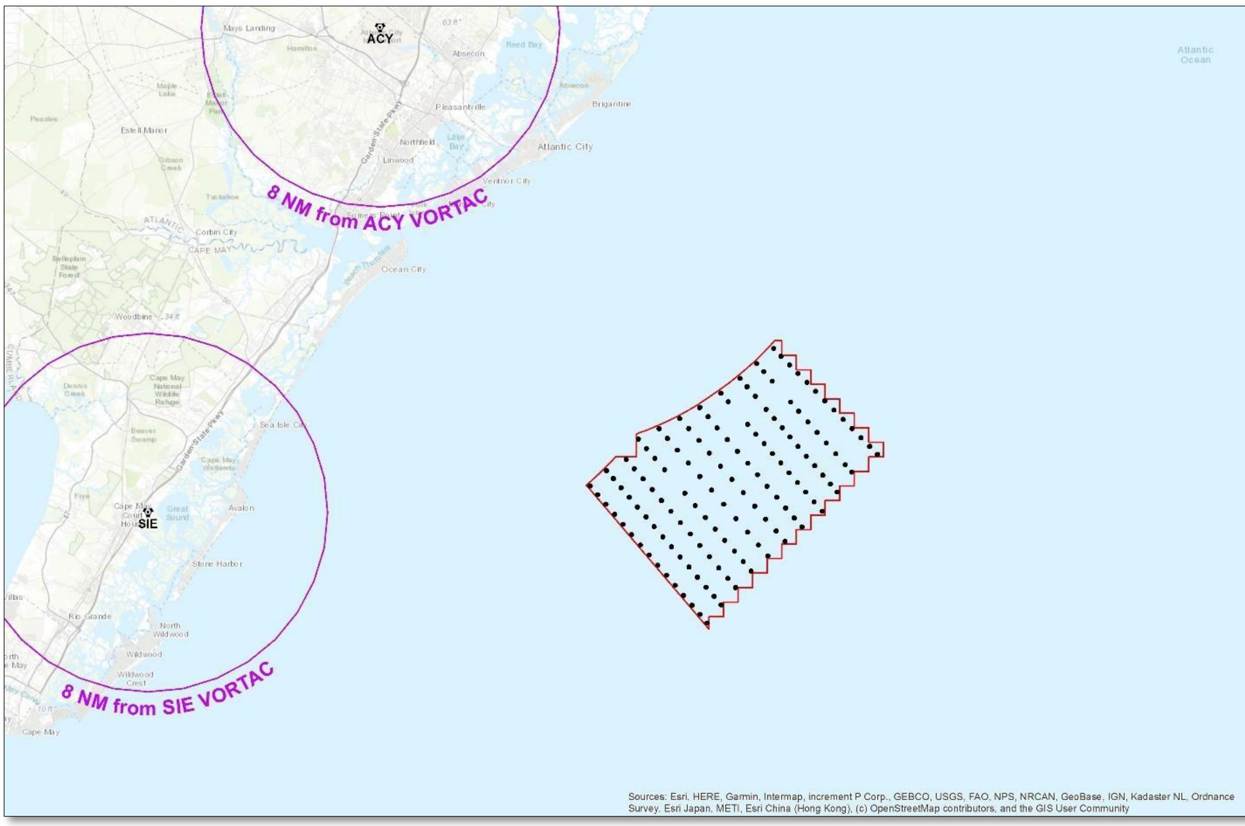



***Figure 11: NAVAID screening surfaces in proximity to the Ocean wind project***

### Military Airspace and Training Routes

Although the FAA does not consider impact on military airspace or training routes, they will notify the military of proposed structures located within these segments of airspace. Impact on these segments of airspace can result in military objections to the proposed development. If the planned development area is located on federal land, impact on military airspace or training routes may result in the denial of permits by the Bureau of Land Management.

Visual flight rules routes (VR) and warning areas (W) overlying the Ocean wind project (***Figure 12***):

**U.S. Navy, Fleet Area Control and Surveillance Facility**

| *Airspace* | *Minimum Altitude* |
|---|---|
| W-107A | Surface |
| W-107C | Surface |

**Warren Grove Gunnery Range**

| *Airspace* | *Minimum Altitude* |
|---|---|
| VR-1709 | 100 feet AGL |

Due to the low altitude associated with these segments of airspace, it is possible proposed wind turbines could have an impact on their operations. If these segments of airspace are used frequently by the U.S. Navy, Warren Grove Gunnery Range, and other nearby units, they may object to wind development within these boundaries. Under the provisions of the 2018 National Defense Authorization Act (NDAA), the Military Aviation and Installation Assurance Siting Clearinghouse (Clearinghouse) may issue a Notice of Presumed Risk to National Security (NPR) letter to initiate mitigation discussions. These discussions are facilitated through the Clearinghouse and with the affected bases or organizations with operational interests. The Clearinghouse typically attempts to notify developers shortly before the issuance of an NPR letter.

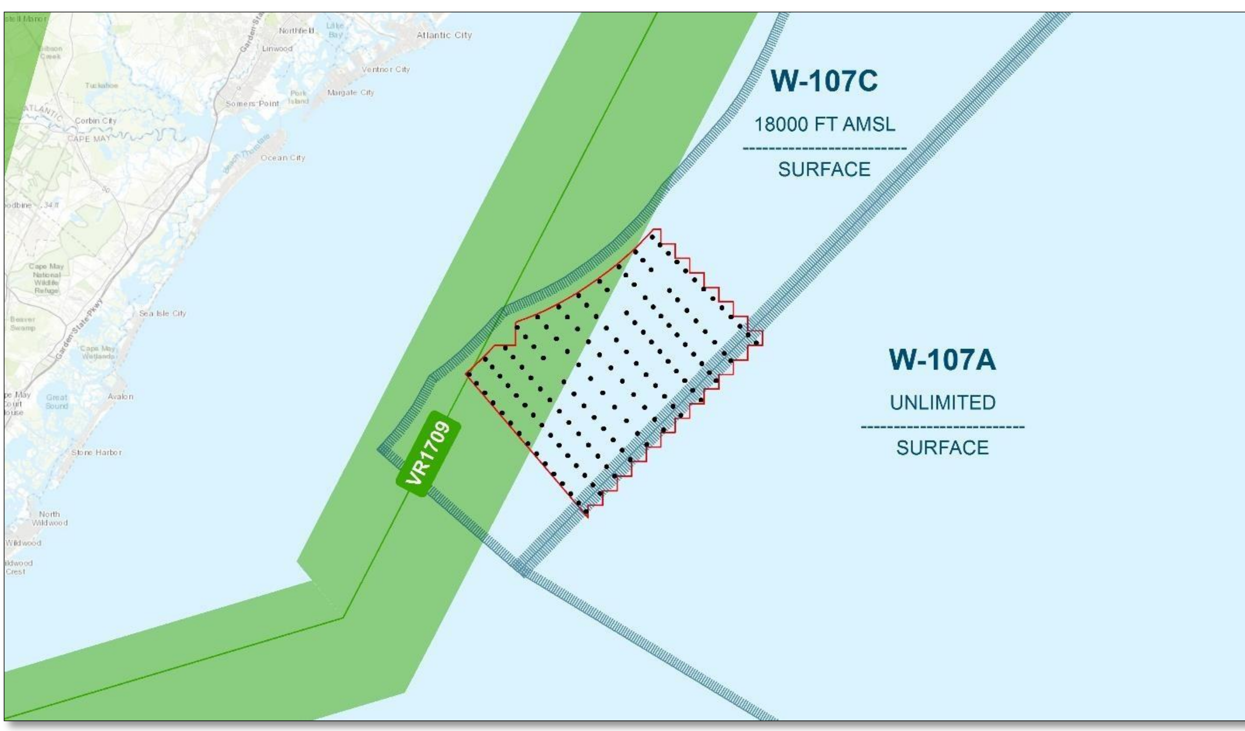



***Figure 12: Military airspace and training routes overlying the Ocean wind project***

# Conclusion

At 906 feet AGL, all of the proposed wind turbines will exceed 14 CFR Part 77.17(a)(1) – a height of 499 feet AGL at the site of the object – and will be identified as obstructions. However, heights in excess of 499 feet AGL are feasible provided proposed wind turbines do not exceed FAA obstacle clearance surfaces.

The lowest obstacle clearance surfaces overlying the Ocean wind project range from 649 to 1,049 feet AMSL (***Figure 13***) and are associated with Atlantic City (ACY) TRACON (***Figure 9***) and Philadelphia (PHL) TRACON (***Figure 10***) MVA sectors. These surfaces could limit 906-foot AGL wind turbines in the northwestern section of the study area (red area, ***Figure 14***).

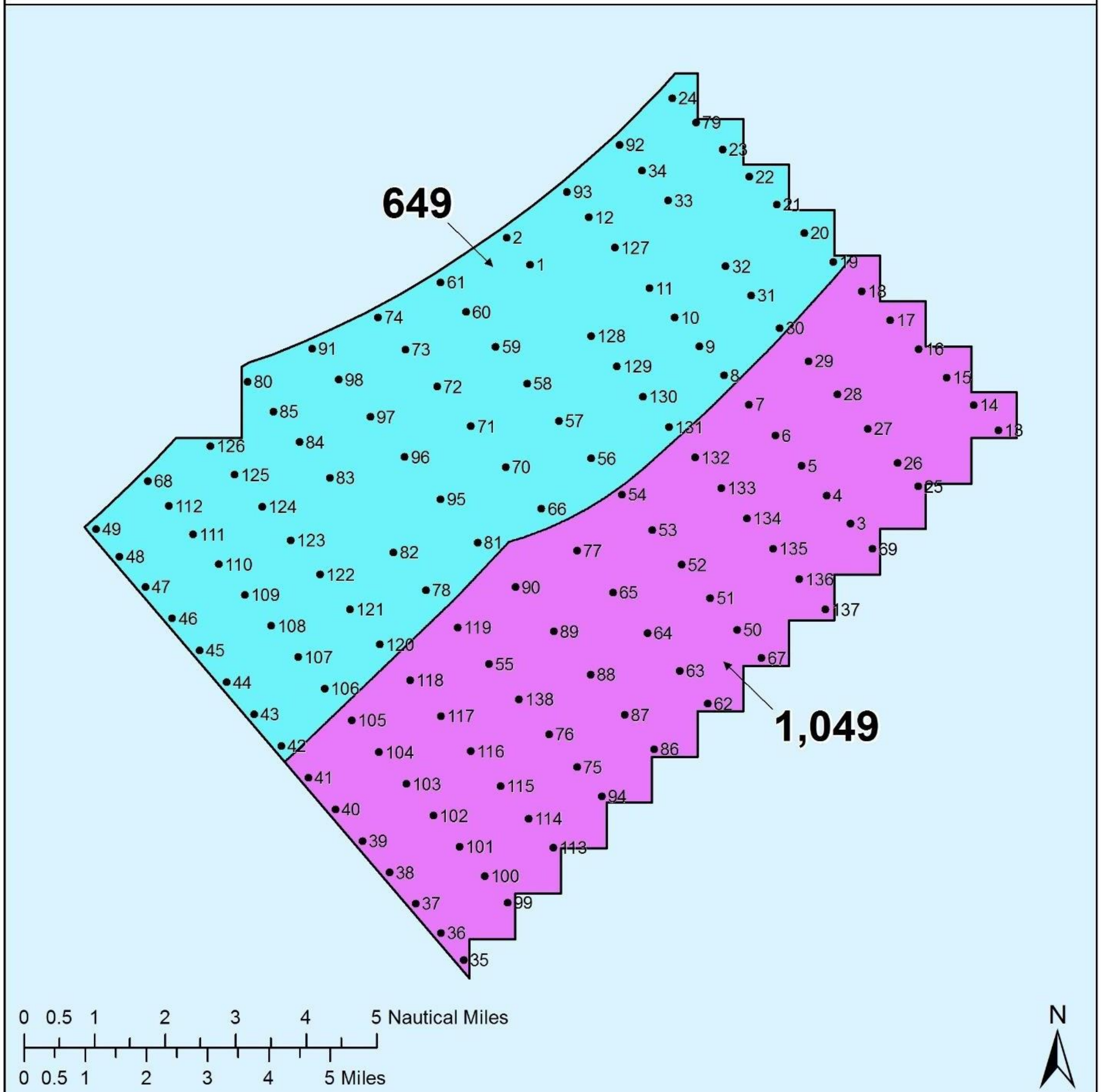
At 906 feet AGL, as many as 63 proposed wind turbines (red area, ***Figure 10***) would exceed the Philadelphia (PHL) TRACON Sector A obstacle clearance surface and require an increase to the published MVA. However, the Ocean wind project is located approximately 29 nautical miles outside of Philadelphia (PHL) TRACON controlled airspace. As a result, it is possible that Philadelphia (PHL) TRACON would increase the Sector A MVA in order to accommodate wind development up to 906 feet AGL within the defined study area. This mitigation option is subject to FAA approval.

At 906 feet AGL, as many as 66 proposed wind turbines (red area, ***Figure 9***) would exceed the Atlantic City (ACY) TRACON Sector A obstacle clearance surface and require an increase to the published MVA. If the FAA determines that this impact would affect as few as one operation per week, it could result in determinations of hazard.

Military airspace and training routes overlie the Ocean wind project (***Figure 12***). Due to the low floor altitude associated with these segments of airspace, wind development could have an impact on their operations. If the U.S. Navy and Warren Grove Gunnery Range use these areas regularly, it could result in military objections to proposed wind development.

If you have any questions regarding the findings of this study, please contact ***Dan Underwood*** or ***Nick Lee*** at (703) 256-2485.

Proposed structures that exceed 14 CFR Part 77.17(a)(1) - a height of 499 feet AGL at the site of the object - will be identified as obstructions regardless of location.




**Obstacle Clearance Surface**

**Height - AMSL Feet**

649

1,049

Proposed Wind Turbine Location (Labeled with ID)

All heights above mean sea level (AMSL)

**Ocean Wind Project**

Composite Height Constraint Map

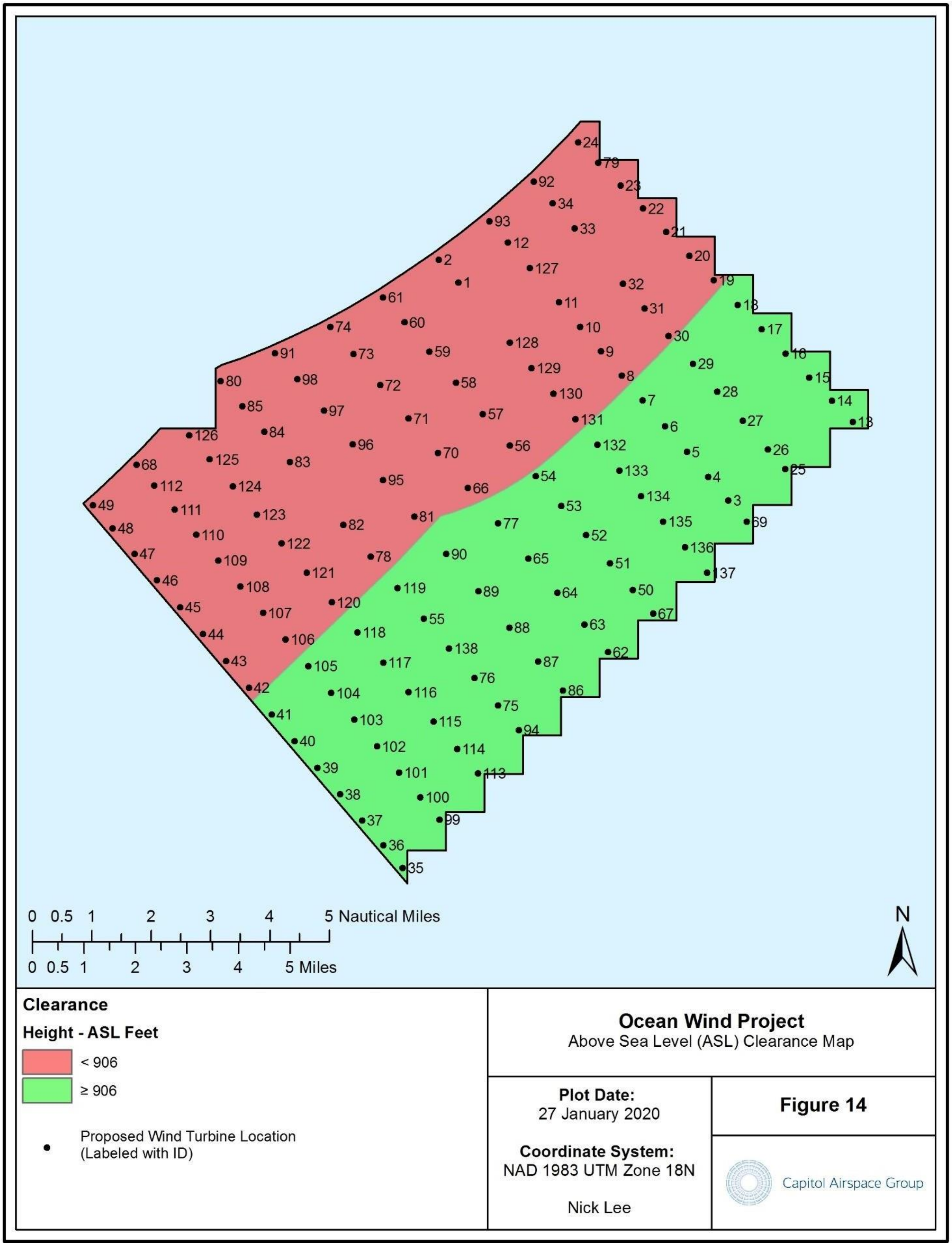
**Plot Date:** 27 January 2020

**Coordinate System:** NAD 1983 UTM Zone 18N

Nick Lee

**Figure 13**

Capitol Airspace Group


0 0.5 1 2 3 4 5 Nautical Miles
0 0.5 1 2 3 4 5 Miles
N
Clearance
Height - ASL Feet
< 906
≥ 906
Proposed Wind Turbine Location
(Labeled with ID)
Ocean Wind Project
Above Sea Level (ASL) Clearance Map
Plot Date:
27 January 2020
Coordinate System:
NAD 1983 UTM Zone 18N
Nick Lee
Figure 14
Capitol Airspace Group

Ocean Wind
An Ørsted & PSEG project

Air Traffic Flow Analysis

# Ocean Wind Project

Ørsted

*Offshore Ocean City, New Jersey*

*Air Traffic Flow Analysis*

April 13, 2020

Capitol Airspace Group

*capitolairspace.com*

*(703) 256 - 2485*

# Summary

Capitol Airspace conducted an air traffic flow analysis for the Ocean wind project located off the coast of Ocean City, New Jersey. At the time of this analysis, 138 wind turbine locations (black points, ***Figure 1***) had been identified within an approximately 108 square mile study area (red outline, ***Figure 1***). At 906 feet above mean sea level (AMSL), proposed wind turbines in the northwestern section of the study area would require an increase to Atlantic City (ACY) Terminal Radar Approach Control (TRACON) and Philadelphia (PHL) TRACON minimum vectoring altitudes (MVA). The purpose for this analysis was to determine the number of operations potentially affected by the airspace changes required to accommodate wind development up to 906 feet AMSL.

The Federal Aviation Administration (FAA) conducts aeronautical studies to ensure that proposed structures do not affect the safety of air navigation and the efficient utilization of navigable airspace by aircraft. Proposed structures undergoing aeronautical study that exceed obstacle clearance surfaces will be identified as having an adverse effect. If the FAA determines that the adverse effect would impact a significant volume of operations, it could be used as the basis for determinations of hazard. For instrument flight rules (IFR) operations the significant volume threshold is one per week; for visual flight rules (VFR) operations the threshold is one per day.

Historical air traffic data indicates that the required changes to Atlantic City (ACY) TRACON MVA sectors and Philadelphia (PHL) TRACON MVA sectors should not affect a significant volume of radar vectoring operations. As a result, it is possible that Atlantic City (ACY) TRACON and Philadelphia (PHL) TRACON would be willing to increase the affected MVAs in order to accommodate 906-foot AMSL wind turbines. Additionally, the impact on Philadelphia (PHL) TRACON MVAs is unlikely to be an issue as the Ocean wind project is located over 42 nautical miles outside of Philadelphia (PHL) TRACON airspace and is completely within Atlantic City (ACY) TRACON airspace. These mitigation options are subject to FAA approval.

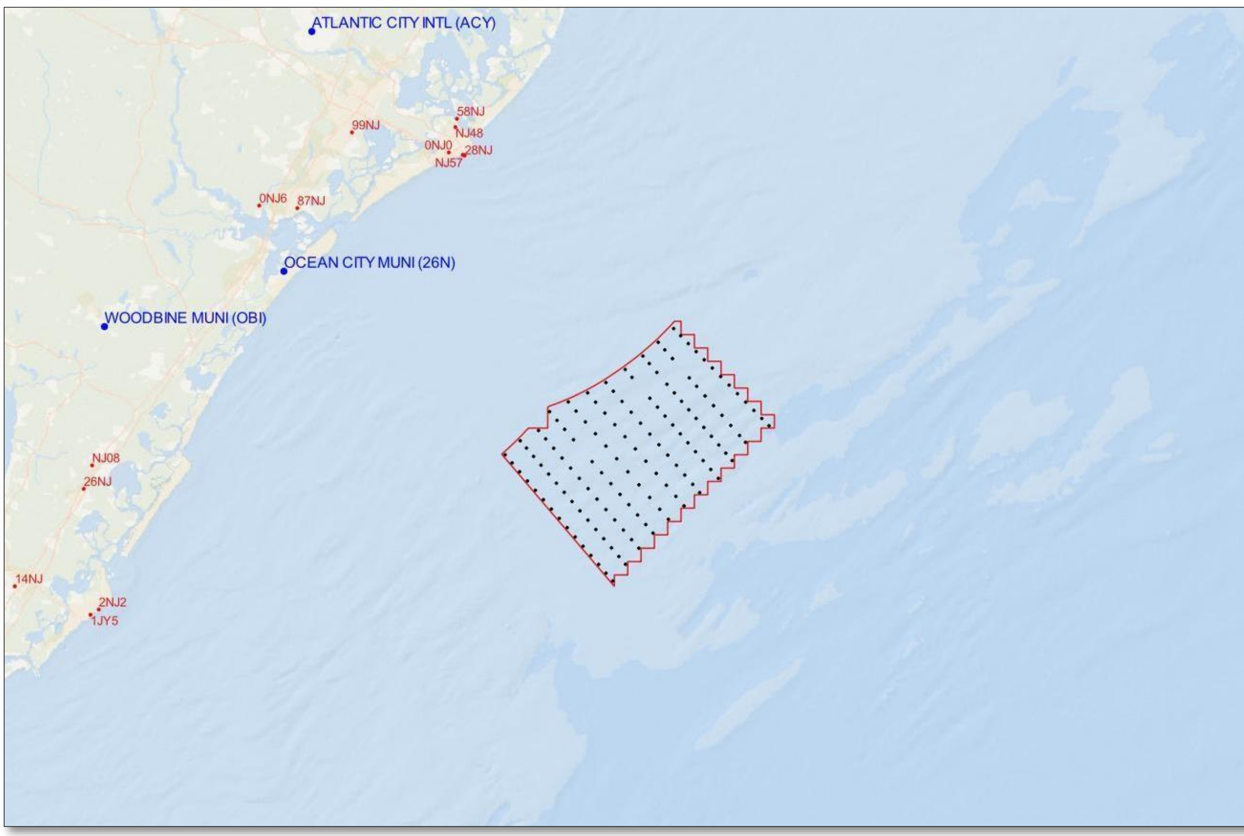



*Figure 1: Public-use (blue) and private-use (red) airports in proximity to the Ocean wind project*

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Alexandria, VA 22312
703-256-2485
capitolairspace.com

# Methodology

At 906 feet AMSL, proposed wind turbines in the northwestern section of the study area (red areas, ***Figure 2***) will exceed MVA sector obstacle clearance surfaces (e.g. hatched blue, ***Figure 2***). As a result, the FAA must modify sector boundaries or establish isolation areas with increased MVAs. These sector modifications result in a three-dimensional volume of affected airspace where radar vectoring would be unavailable. If the FAA determines that this impact would affect as few as one radar vectoring operation per week, it could result in determinations of hazard.

In order to quantify the number of radar vectoring operations potentially affected by MVA sector modifications, Capitol Airspace evaluated FAA National Offload Program (NOP) radar returns covering the period between October 1, 2018 and September 30, 2019. The FAA NOP data contained 338,183,744 radar returns associated with 1,639,097 flights receiving air traffic control services.[1] Each flight that had at least one radar return within the affected airspace was analyzed for altitude and direction trends.

Flights that maintained one or more specific headings within the affected airspace operated in a manner consistent with receiving radar vectoring services. These flights also maintained or climbed/descended to maintain an altitude within the affected airspace. The historical presence of these flights within the affected airspace is an indicator that the required MVA sector modifications could affect future air traffic control operations.

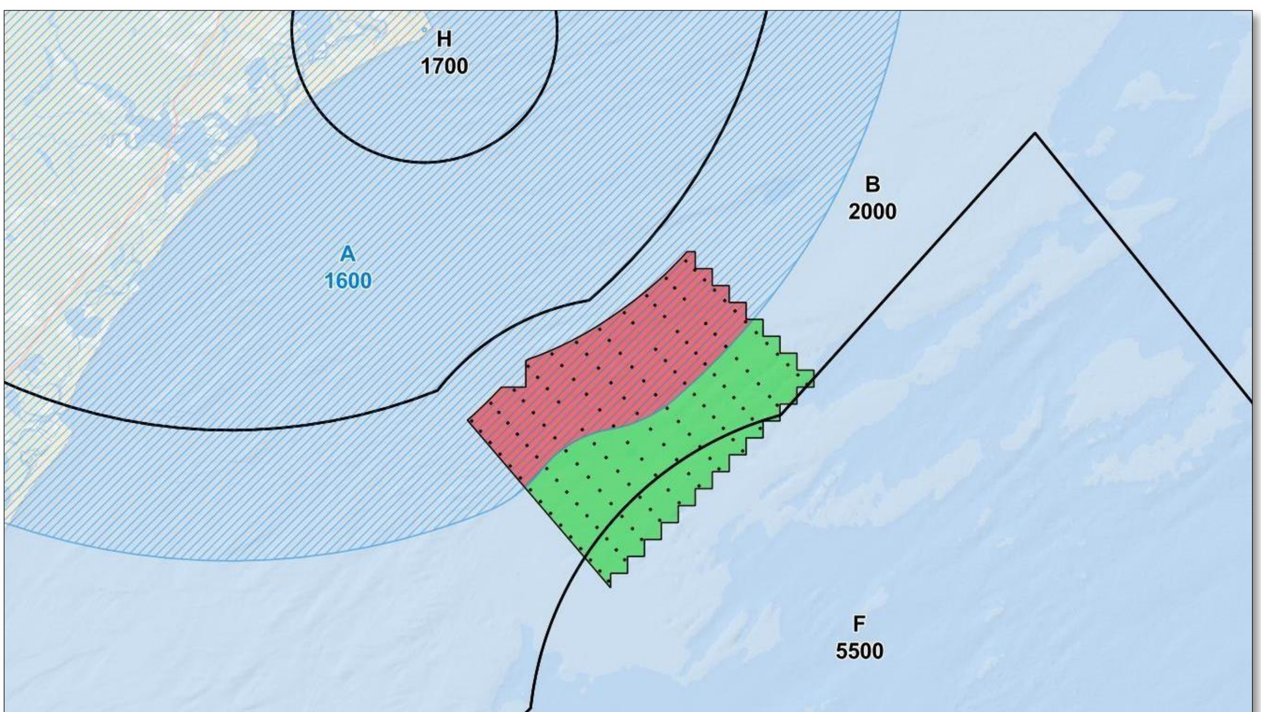


***Figure 2: Atlantic City (ACY) TRACON FUSION 5 MVA sectors (black) with Sector A obstacle evaluation area (hatched blue)***

[1] NOP data excludes certain military flights due to the sensitive nature of some operations.

# Findings

**Atlantic City (ACY) TRACON**

In order to accommodate wind development up to 906 feet AMSL, the FAA must increase existing MVAs from 1,600 feet AMSL up to 1,900 feet AMSL. This increase would affect both the FUSION 3 and FUSION 5 MVA charts.

**FUSION 3 (ACY_MVA_FUS3_2019)**

*Sector A*

Flight track data indicates that only one flight (purple track, ***Figure 3***) operated within the affected airspace. This flight total represents an average of *0.02 flights per week* which is below the FAA's threshold for a significant volume of operations. Additionally, it is not likely that this flight was receiving radar vectoring services.

**FUSION 5 (ACY_MVA_FUS5_2019)**

*Sector A*

Flight track data indicates that only one flight (purple track, ***Figure 3***) operated within the affected airspace(dashed green outline, ***Figure 3***). This flight total represents an average of *0.02 flights per week* which is below the FAA's threshold for a significant volume of operations. Additionally, it is not likely that this flight was receiving radar vectoring services.

As a result of these findings, it is possible that Atlantic City (ACY) TRACON would not object to modifying Sector A in order to accommodate 906-foot AMSL wind turbines. This mitigation option is subject to FAA approval.

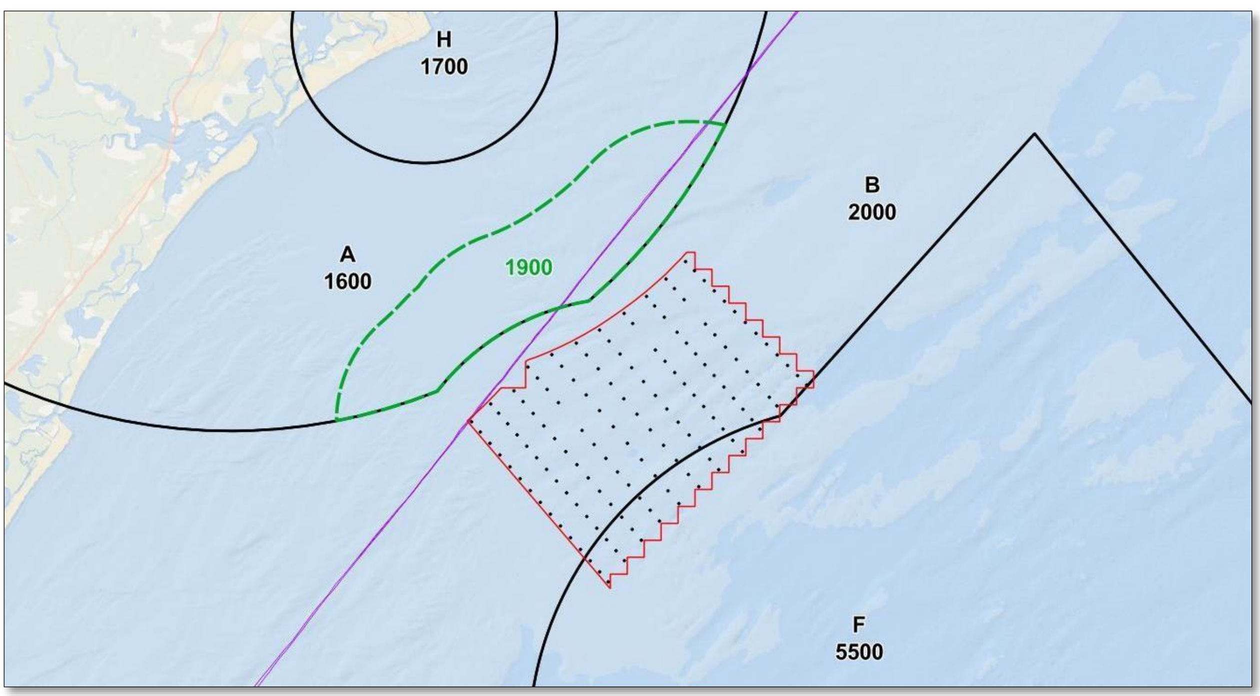


***Figure 3: Historical flight track (purple) that operated within the FUSION 5 affected airspace (dashed green outline)***

**Philadelphia (PHL) TRACON**

In order to accommodate wind development up to 906 feet AMSL, the FAA must increase existing MVAs from 1,600 feet AMSL up to 1,900 feet AMSL. This increase would affect both the FUSION 3 and FUSION 5 MVA charts.

**FUSION 3 (PHL_MVA_FUS3_2019)**

*Sector A*

Flight track data indicates that zero flights operated within the affected airspace. This flight total represents an average of *0.00 flights per week* which is below the FAA's threshold for a significant volume of operations.

**FUSION 5 (PHL_MVA_FUS5_2019)**

*Sector A*

Flight track data indicates that zero flights operated within the affected airspace (dashed blue outline, ***Figure 4***). This flight total represents an average of *0.00 flights per week* which is below the FAA's threshold for a significant volume of operations.

Additionally, the Ocean wind project is located over 42 nautical miles outside of Philadelphia (PHL) TRACON airspace. As a result of these findings, it is possible that Philadelphia (PHL) TRACON would not object to modifying Sector A in order to accommodate 906-foot AMSL wind turbines. This mitigation option is subject to FAA approval.

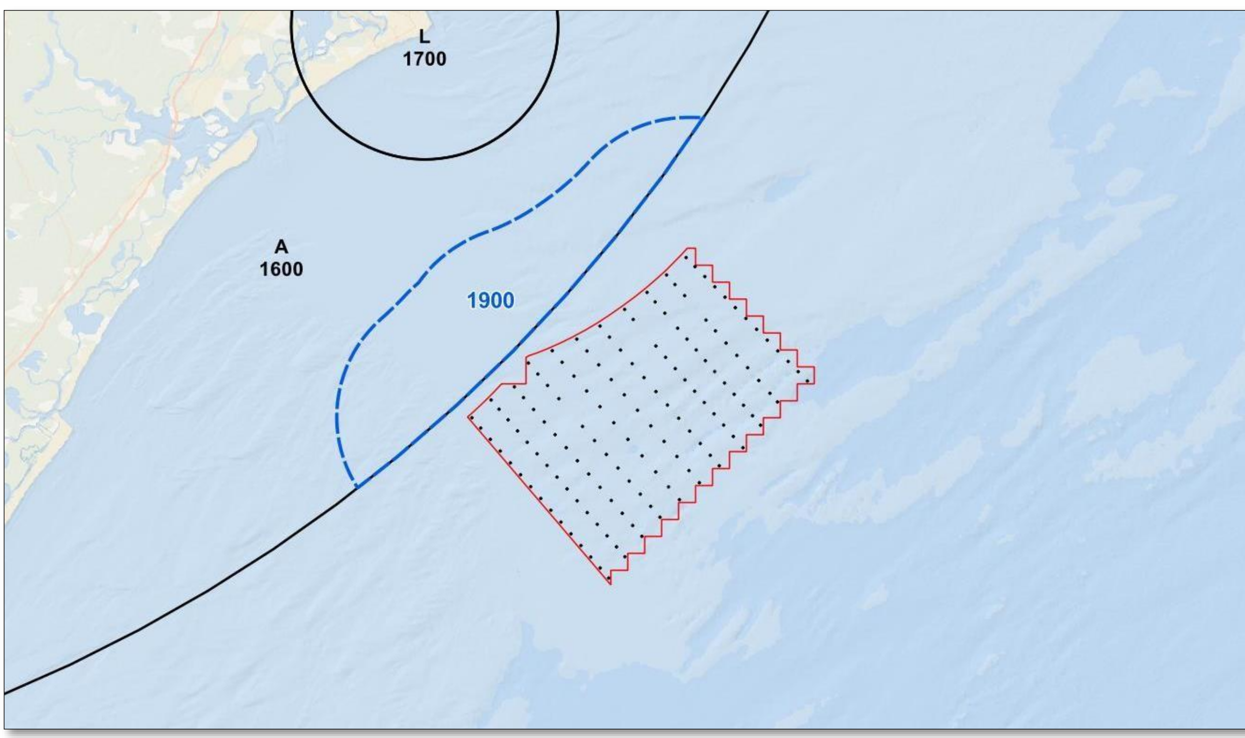


***Figure 4: Philadelphia (PHL) TRACON FUSION 5 MVA sectors (black) with the FUSION 5 affected airspace (dashed blue outline)***

## Conclusion

Capitol Airspace assessed historical FAA radar track data covering the period of one year to determine the number of operations that could be affected by increasing Atlantic City (ACY) TRACON and Philadelphia (PHL) TRACON MVAs. In order to accommodate wind development up to 906 feet AMSL, the MVAs must be increased from 1,600 to 1,900 feet AMSL.

Historical radar track data indicates that proposed wind turbines should not affect a significant volume of Atlantic City (ACY) TRACON radar vectoring operations (*0.02 flights per week* for FUSION 3 and FUSION 5 Charts) or Philadelphia (PHL) TRACON radar vectoring operations (*0 flights per week* for FUSION 3 and FUSION 5 Charts). These numbers are below the FAA threshold for a significant volume of operations. Additionally, the Ocean wind project is located over 42 nautical miles outside of Philadelphia (PHL) TRACON airspace and is completely within Atlantic City (ACY) TRACON airspace.

As a result of these findings, it is possible that Atlantic City (ACY) TRACON and Philadelphia (PHL) TRACON would not object to modifying the affected MVA sectors in order to accommodate 906-foot AMSL wind turbines. These mitigation options are subject to FAA approval prior to receiving favorable Determinations of No Hazard.

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

Ocean Wind
An Ørsted & PSEG project

Basic Radar Line-of-Sight Study

**OCEAN WIND PROJECT**

**BASIC RADAR LINE-OF-SIGHT STUDY**

**NOVEMBER 6, 2019**



Westslope Consulting, LLC
3960 West Tecumseh Road
Suite 100
Norman, Oklahoma 73072
(405) 310-6058

## INTRODUCTION

The Ocean Wind Project consists of 69,163 acres of ocean (study area) off the coast of New Jersey.[1] This report provides the results of a basic radar line-of-sight (RLOS) study conducted by Westslope Consulting, LLC (Westslope) for the study area, which includes the following:

- An initial analysis using the Department of Defense (DoD) Preliminary Screening Tool (PST);
- Research into other radar sites near the study area;
- A RLOS analysis for each radar site identified by Westslope using a blade-tip height of 880 feet above ground level (AGL);
- Research into Very High Frequency (VHF) Omnidirectional Range (VOR) navigational aid sites near the study area;
- A VOR screening analysis using a blade-tip height of 880 feet AGL; and
- A Next Generation Radar (NEXRAD) weather radar screening analysis using a blade-tip height of 880 feet AGL.

Please refer to the Capitol Airspace Group, LLC report for potential obstruction and airspace concerns.

## ANALYSIS

### Preliminary Screening Tool

Westslope conducted an initial analysis for Long Range Radar (LRR) and NEXRAD using the DoD PST on the Federal Aviation Administration (FAA) Obstruction Evaluation/Airport Airspace Analysis website.[2] This analysis provides a cursory indication whether wind turbines may be visible to, that is, within radar line-of-sight of one or more radar sites, and likely to affect radar performance.

The PST LRR analysis accounts for Air Route Surveillance Radar sites and a few select Airport Surveillance Radar sites used for air defense by the DoD at the North American Aerospace Defense Command and for homeland security by the Customs and Border Protection Air and Marine Operations Center.[3] The PST does not account for all DoD, Department of Homeland Security (DHS), and/or FAA surface-based or tethered aerostat radar sites. Further, the PST NEXRAD analysis accounts for Weather Surveillance Radar model-88 Doppler (WSR-88D) radar sites but does not account for FAA Terminal Doppler Weather Radar sites.[4]

[1] OCW01_LeaseArea_1100mw_SG_20190425.shp.
[2] See http://oeaaa.faa.gov.
[3] For LRR, the PST uses a buffered radar line-of-sight analysis at a blade-tip height of 750 feet AGL.
[4] For NEXRAD, the PST uses a blade-tip height of 160 meters AGL (525 feet AGL).

The PST is helpful for identifying potential impacts to LRR and NEXRAD; however, the results are preliminary, as suggested by the title of the PST, and do not provide an official decision as to whether impacts are acceptable to operations.

It should be noted that the PST NEXRAD analysis does not reflect the wind farm impact zone scheme updated in 2018 by the National Oceanic and Atmospheric Administration (NOAA) WSR-88D Radar Operations Center (ROC). The updated scheme expands the red area, or "No Build Zone", from three to four kilometers (km) and to areas where wind turbines penetrate the third elevation angle scanned by a WSR-88D.

Based on the study area, Westslope created a single point and a four-point polygon for PST analysis purposes.

The PST single point and the polygon analysis results for LRR show that the study area falls within a yellow area. A yellow area indicates that impacts are likely to air defense and homeland security radar. See Figure 1, where the black rotor represents the single point, the black line represents the polygon, and the red line represents the study area.

Westslope identified the closest four radar sites in the PST LRR results as the Atlantic City Airport Surveillance Radar model-9 (ASR-9), Dover Air Force Base (AFB) Digital Airport Surveillance Radar (DASR), Gibbsboro Air Route Surveillance Radar model-4 (ARSR-4), and the McGuire AFB DASR. In addition to the DoD and DHS using these radar sites for air defense and homeland security, the DoD uses the Dover AFB DASR for air traffic control at the Dover AFB Radar Approach Control (RAPCON) and the McGuire AFB DASR for air traffic control at the McGuire AFB RAPCON. The FAA uses the Atlantic City ASR-9 and the Gibbsboro ARSR-4 for air traffic control at multiple facilities including the Atlantic City Terminal Radar Approach Control (TRACON) and the New York Air Route Traffic Control Center(ARTCC).

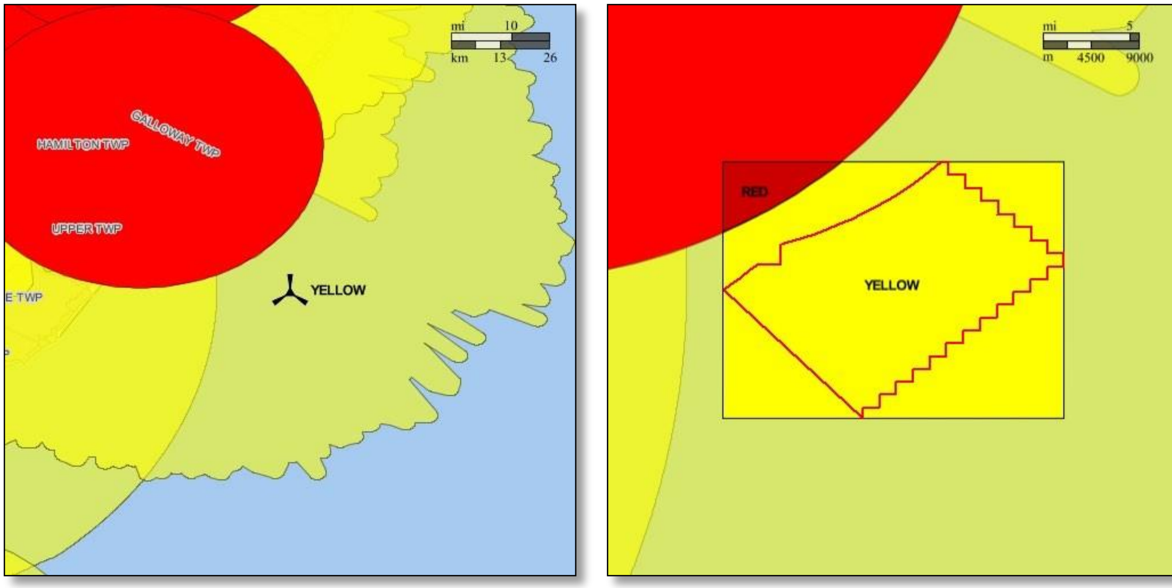


**Figure 1 Long Range Radar Results for the Single Point (left) and for the Polygon (right)**

For NEXRAD, the PST analysis results for the single point and the polygon show that the study area falls within a green area. A green area, or “No Impact Zone”, indicates that impacts are not likely to WSR-88D operations. Please note that blue and grey also represent green areas in the PST NEXRAD analysis results. See Figure 2. Westslope identified the two radar sites in the PST NEXRAD analysis as the Dover AFB WSR-88D and the Philadelphia WSR-88D.

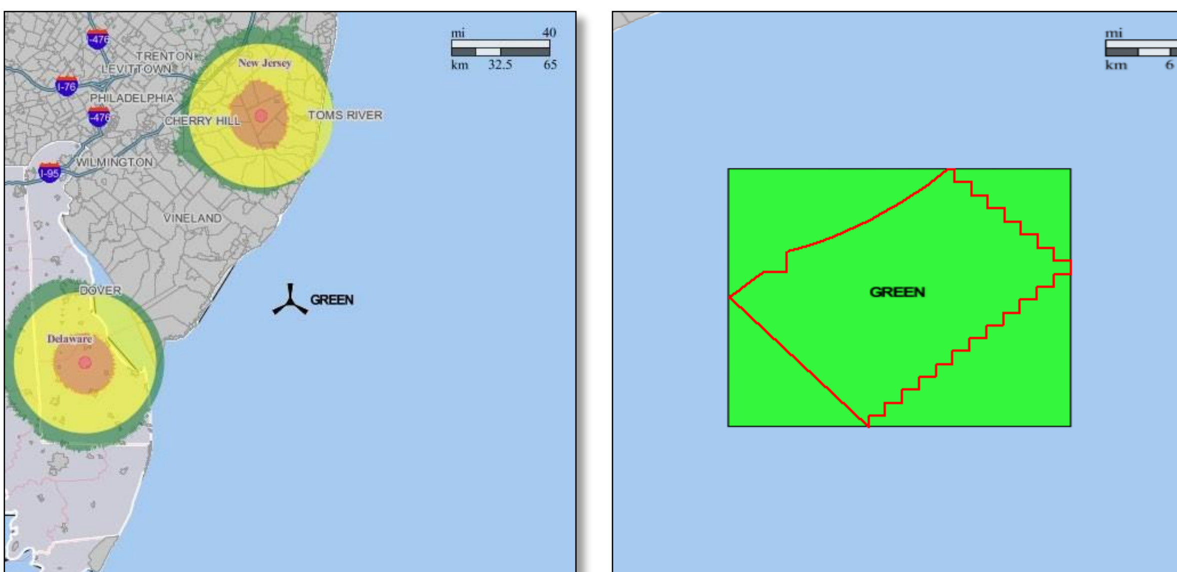


**Figure 2 NEXRAD results for the Single Point (left) and for the Polygon (right)**

**Other Radar Sites**

Research performed by Westslope shows two additional radar sites near the study area: the Philadelphia ASR-9 and the Pennsauken Terminal Doppler Weather Radar (TDWR).

The FAA uses these radar sites for air traffic control at multiple facilities including the New York TRACON and the Washington ARTCC.

**Co-Located Secondary Surveillance Radar**

A secondary surveillance radar is co-located with each primary surveillance radar. Specifically, an Air Traffic Control Beacon Interrogator model-5 is co-located with the Atlantic City ASR-9; an Air Traffic Control Beacon Interrogator model-6 is co-located with the Gibbsboro ARSR-4; a Mode S is co-located with the Philadelphia ASR-9; and a Monopulse Secondary Surveillance Radar is co-located with the Dover AFB DASR and the McGuire AFB DASR.

In general, secondary surveillance radar are less susceptible than primary surveillance radar to interference from wind turbines.

**Basic RLOS Analysis**

Westslope conducted a basic radar line-of-sight analysis using the United States Geological Survey (USGS) 10-meter National Elevation Dataset (NED). This analysis shows whether wind turbines at a blade-tip height of 880 feet AGL will be visible to one or more radar sites.

Westslope performed the RLOS analysis for the following four radar sites:

- Atlantic City ASR-9;
- Dover AFB DASR;
- Gibbsboro ARSR-4; and
- McGuire AFB DASR.

The study area is beyond the instrumented range of the Philadelphia ASR-9 and the Pennsauken TDWR. As such, no additional analysis was considered necessary for these radar sites.

<u>Atlantic City ASR-9</u>

The RLOS analysis results show that wind turbines in the entire study area will be visible to and will interfere with the Atlantic City ASR-9 at a blade-tip height of 880 feet AGL. See Figure 3. The radar effects will include unwanted radar returns (clutter) resulting in a partial loss of “primary” target detection and a number of false primary targets over and in the immediate vicinity of wind turbines in the study area. Other possible radar effects include a partial loss of weather detection and false weather indications over and in the immediate vicinity of wind turbines in the study area.

Dover AFB DASR

The RLOS analysis results show that wind turbines in a very small area in the western corner of the study area will be visible to and will interfere with the Dover AFB DASR at a blade-tip height of 880 feet AGL. See Figure 4. The radar effects will include clutter resulting in a partial loss of primary target detection and a number of false primary targets over and in the immediate vicinity of wind turbines in the study area within radar line-of-sight. Other radar effects include a partial loss of weather detection and false weather indications over and in the immediate vicinity of wind turbines in the study area within radar line-of-sight.

Gibbsboro ARSR-4

The RLOS analysis results show that wind turbines along the northwestern edges, in the northern corner, and along the northeastern edges of the study area will be visible to and will interfere with the Gibbsboro ARSR-4 at a blade-tip height of 880 feet AGL. See Figure 5. The radar effects will include clutter resulting in a partial loss of primary target detection and a number of false primary targets over and in the immediate vicinity of wind turbines in the study area within radar line-of-sight.

McGuire AFB DASR

The RLOS analysis results show that wind turbines in the study area will not be visible to and will not interfere with the McGuire AFB DASR at a blade-tip height of 880 feet AGL. As a result, Westslope does not expect any radar effects at or below this blade-tip height.

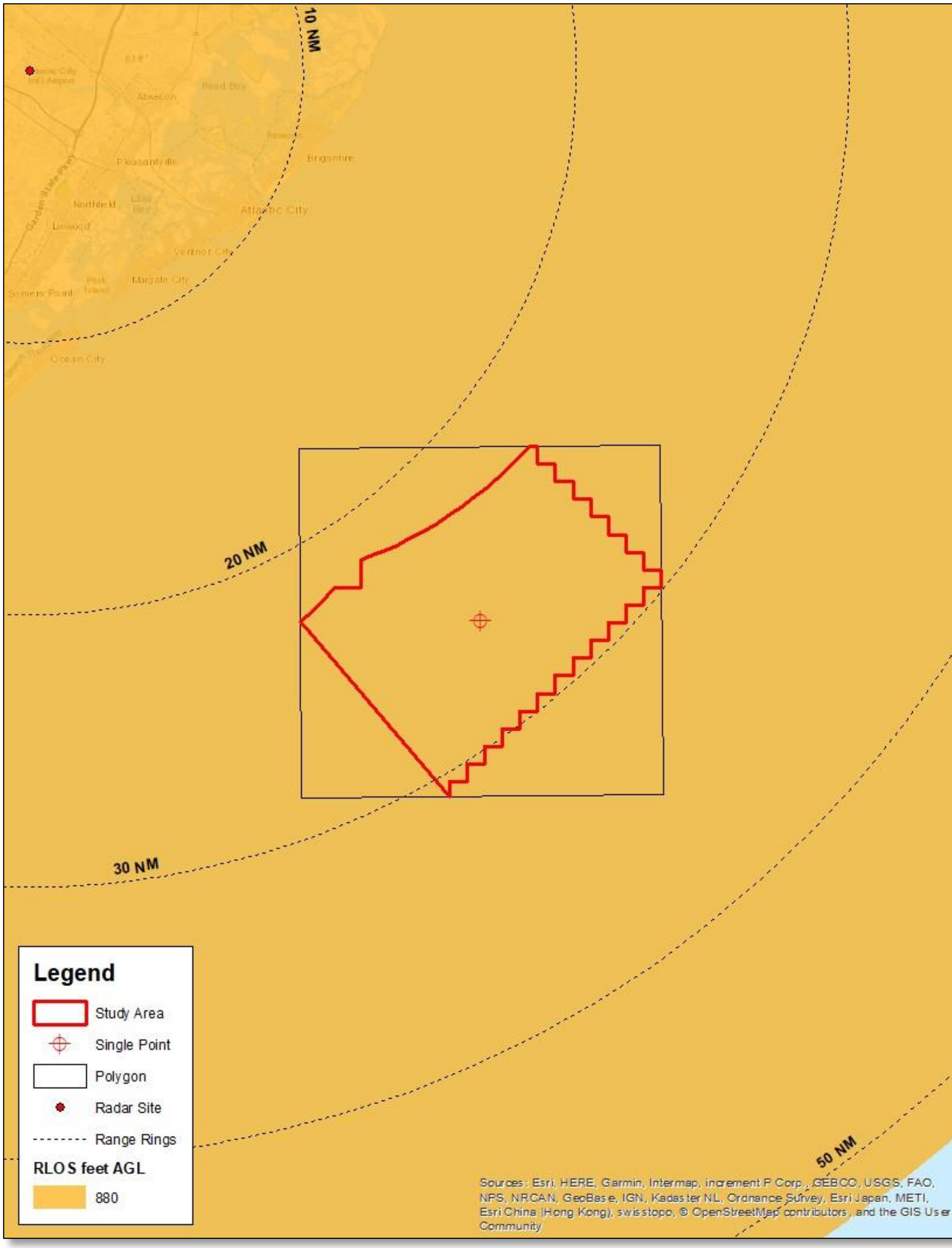


**Figure 3 RLOS Analysis Results for the Atlantic City ASR-9 using 10-meter NED**

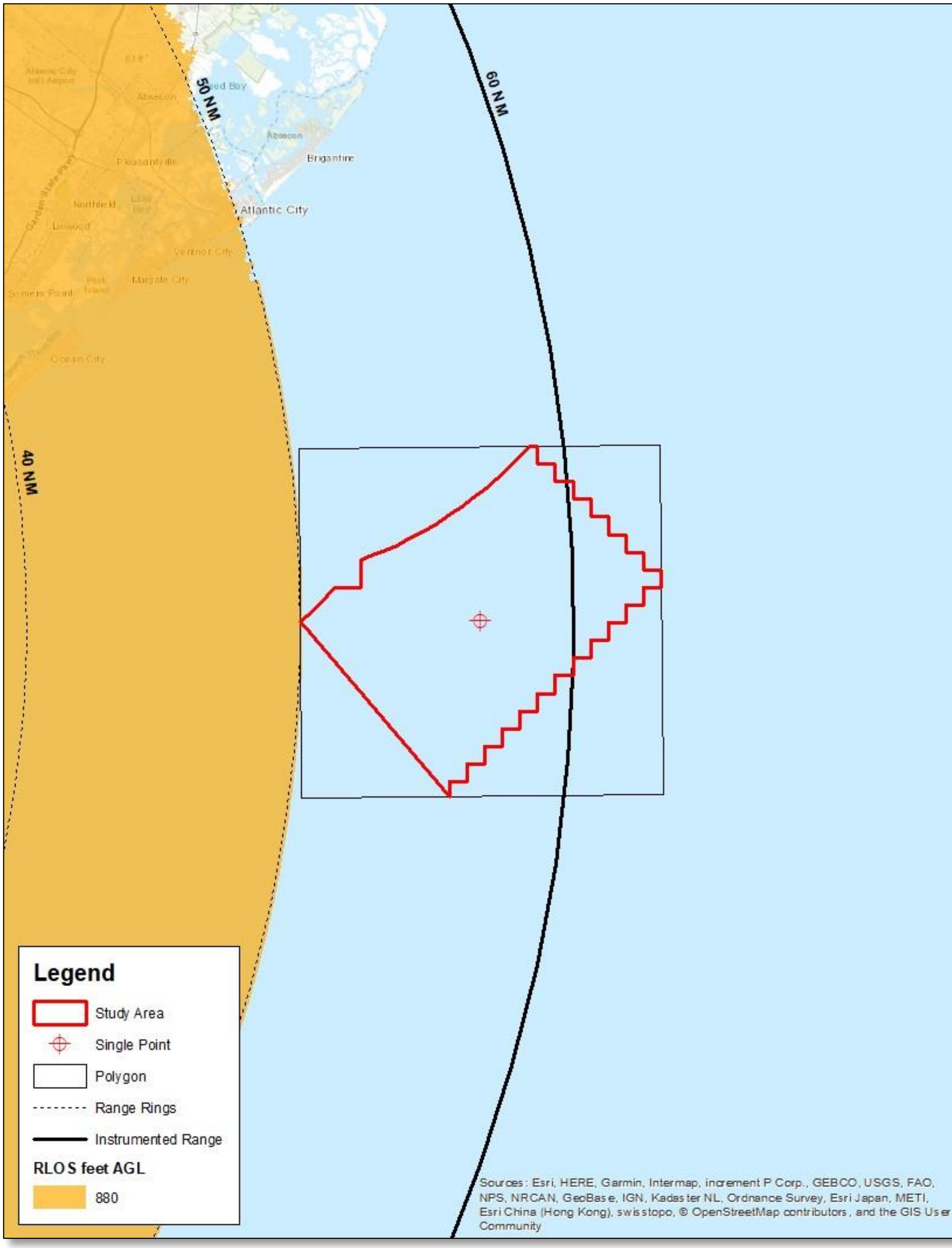


**Figure 4 RLOS Analysis Results for the Dover AFB DASR using 10-meter NED**

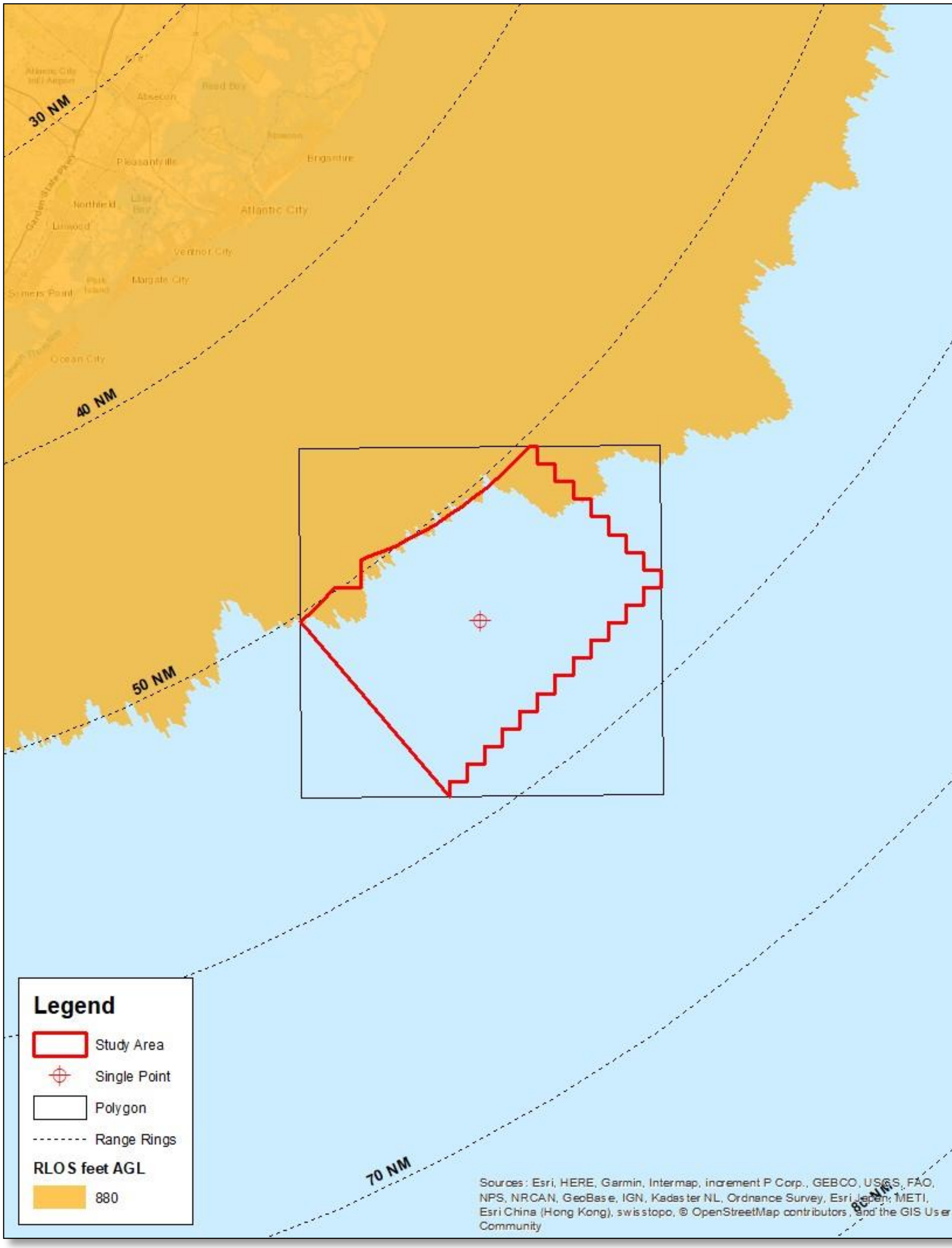


**Figure 5 RLOS Analysis Results for the Gibbsboro ARSR-4 using 10-meter NED**

**VOR Screening Analysis**

Research performed by Westslope identified two navigational aids near the study area: the Atlantic City VOR and co-located Tactical Air Navigation (VORTAC) system and the Sea Isle VORTAC.

Westslope conducted a VOR screening analysis using USGS 10-meter NED. This analysis shows whether wind turbines in the study area (1) will be located less than or equal to 8 nautical miles (NM) from a VOR site; (2) will subtend elevation angles greater than 0.60 degrees from the base elevation of a conventional VOR at a blade-tip height of 880 feet AGL, or 0.75 degrees for a Doppler VOR; and (3) will fall within line-of-sight of a VOR site. This screening analysis provides an indication whether wind turbines in the study area may affect VOR performance and is similar to the FAA's analysis approach for VOR sites.

Westslope's VOR screening analysis shows that the study area is greater than 8 NM from the Atlantic City VORTAC and the Sea Isle VORTAC. As such, no additional analysis was considered necessary for these VOR sites.

**NEXRAD Weather Radar Screening Analysis**

The PST NEXRAD analysis does not reflect the wind farm impact zone scheme updated in 2018 by the NOAA WSR-88D ROC. The updated scheme expands the red area, or "No Build Zone", from three to four kilometers and to areas where wind turbines penetrate the third elevation angle scanned by a WSR-88D.

Westslope conducted a NEXRAD weather radar screening analysis for the Dover AFB WSR-88D and the Philadelphia WSR-88D using USGS 10-meter NED. This analysis shows whether wind turbines at a blade-tip height of 880 feet AGL will be within radar line-of-sight of these WSR-88D weather radar sites and incorporates the updated wind farm impact zone scheme.

<u>Dover AFB WSR-88D</u>

Westslope's NEXRAD weather radar screening analysis shows that wind turbines in the study area will not be visible to and will not interfere with the Dover AFB WSR-88D at a blade-tip height of 880 feet AGL. The results also show that wind turbines in the study area at a blade-tip height of 880 feet AGL will fall within a NOAA green area for this radar site. A green area, or "No Impact Zone", indicates that impacts are not likely to WSR-88D operations. See Figure 6.

<u>Philadelphia WSR-88D</u>

Westslope's NEXRAD weather radar screening analysis shows that wind turbines in the study area will not be visible to and will not interfere with the Philadelphia WSR-88D at a blade-tip height of 880 feet AGL. The results also show that wind turbines in the study area at a blade-tip height of 880 feet AGL will fall within a NOAA green area for this radar site. See Figure 7.

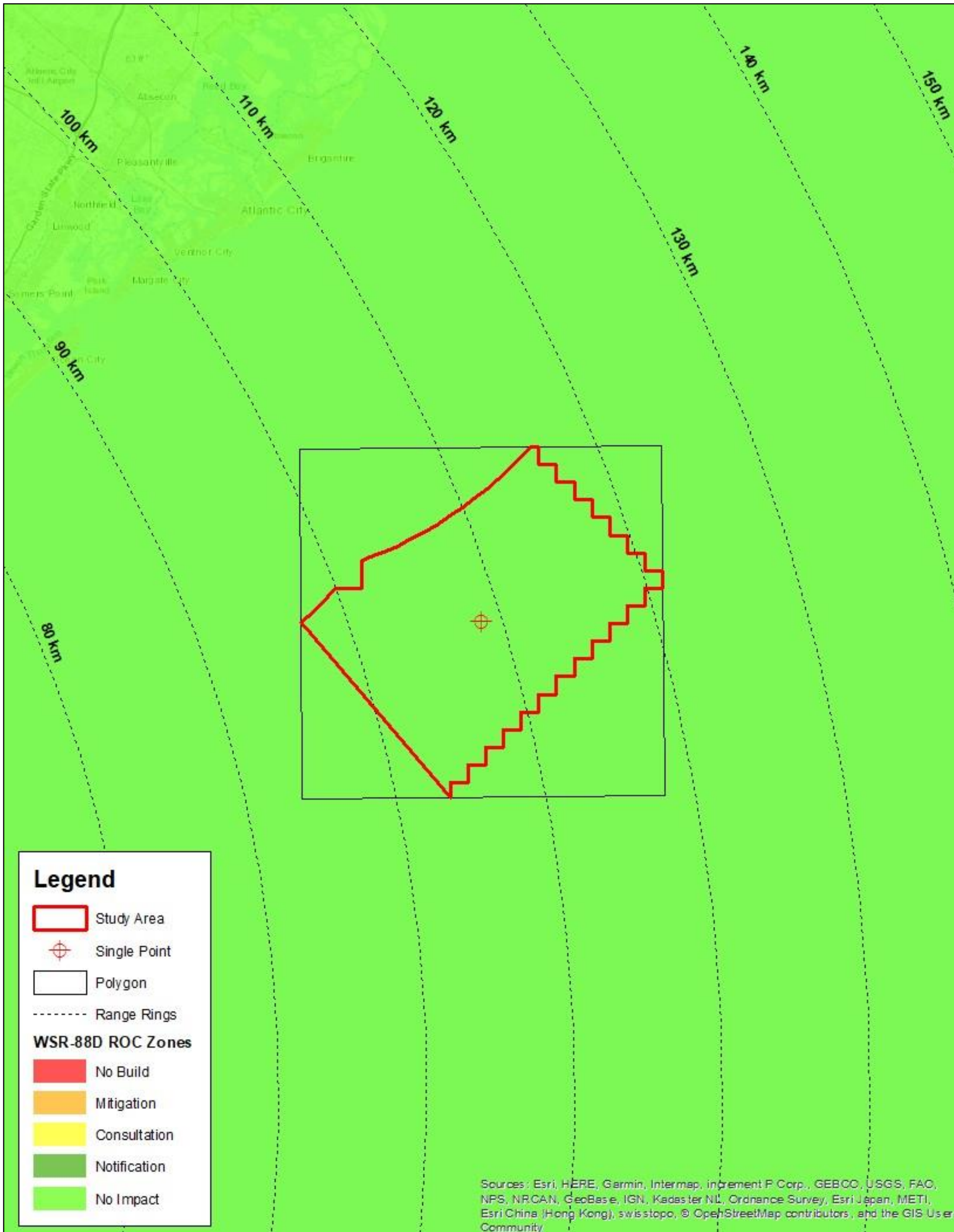


**Figure 6 WSR-88D ROC Zone Results at 880 feet AGL for the Dover AFB WSR-88D using 10-meter NED**

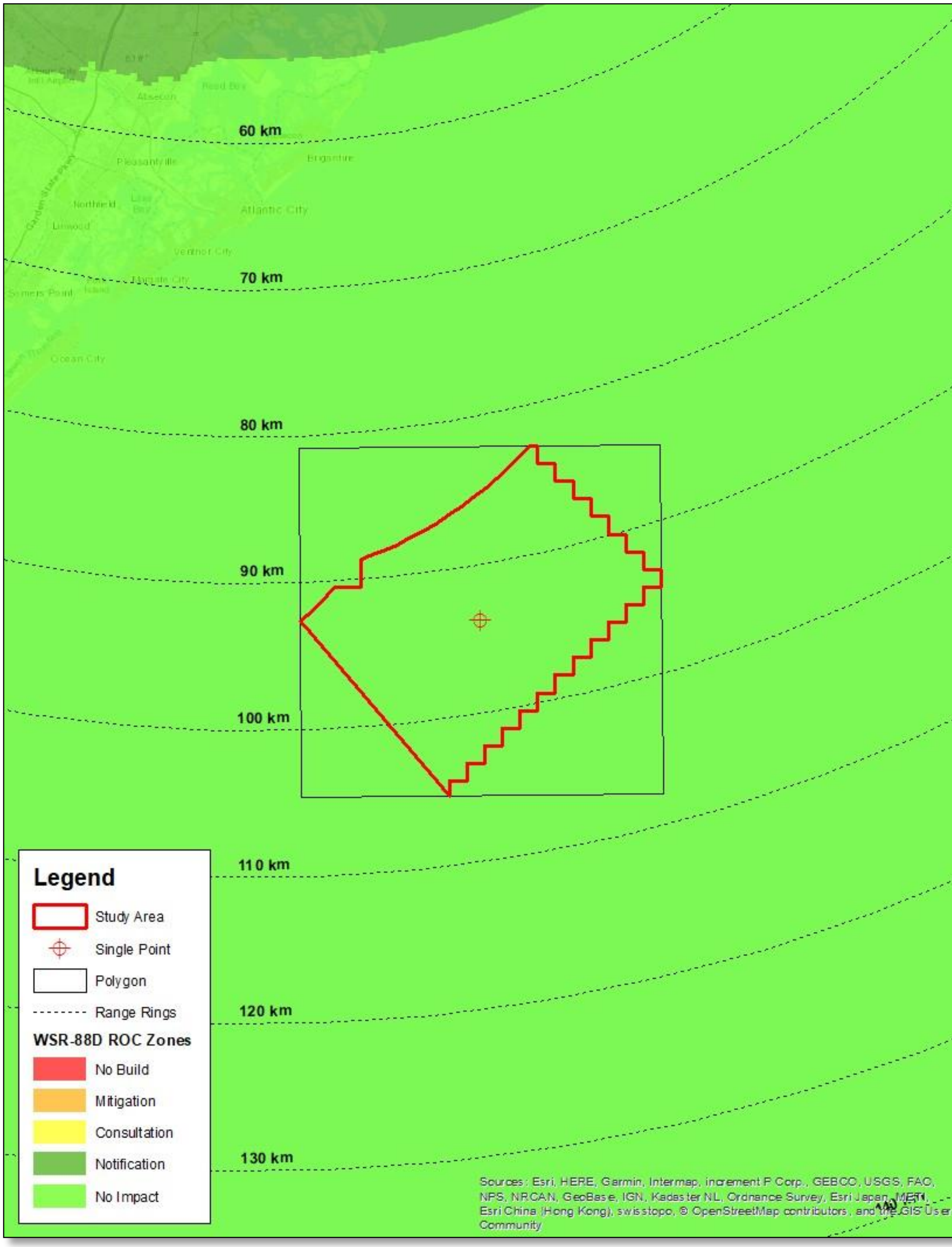


**Figure 7 WSR-88D ROC Zone Results at 880 feet AGL for the Philadelphia WSR-88D using 10-meter NED**

## CONCLUSIONS

The DoD PST analysis results for the study area indicate the following:

- Impacts to air defense and homeland security radar are likely; and
- Impacts to WSR-88D weather radar are not likely.

Westslope identified the closest four radar sites in the PST analysis results for Long Range Radar as the Atlantic City ASR-9, Dover AFB DASR, Gibbsboro ARSR-4, and the McGuire AFB DASR. In addition, Westslope identified the two radar sites in the PST analysis results for NEXRAD as the Dover AFB WSR-88D and the Philadelphia WSR-88D.

Research performed by Westslope shows two additional radar sites near the study area: the Philadelphia ASR-9 and the Pennsauken TDWR.

Westslope conducted a basic radar line-of-sight analysis for the following four radar sites:

- Atlantic City ASR-9;
- Dover AFB DASR;
- Gibbsboro ARSR-4; and
- McGuire AFB DASR.

The study area is beyond the instrumented range of the Philadelphia ASR-9 and the Pennsauken TDWR. As such, no additional analysis was considered necessary for these radar sites.

The basic RLOS analyses conducted by Westslope show the following:

- For the Atlantic City ASR-9, wind turbines in the entire study area will be visible to and will interfere with this radar site at a blade-tip height of 880 feet AGL.
- For the Dover AFB DASR, wind turbines in a very small area in the western corner of the study area will be visible to and will interfere with this radar site at a blade-tip height of 880 feet AGL.
- For the Gibbsboro ARSR-4, wind turbines along the northwestern edges, in the northern corner, and along the northeastern edges of the study area will be visible to and will interfere with this radar site at a blade-tip height of 880 feet AGL.
- For the McGuire AFB DASR, wind turbines in the study area will not be visible to and will not interfere with this radar site at a blade-tip height of 880 feet AGL.

For the Atlantic City ASR-9 and the Dover AFB DASR, without mitigation, the radar effects due to clutter will include a partial loss of primary target detection and a number of false primary targets over and in the immediate vicinity of wind turbines in the study area within radar line-of-sight. Other possible radar effects include a partial loss of weather detection and false weather indications over and in the immediate vicinity of wind turbines in the study area within radar line-of-sight.

For the Gibbsboro ARSR-4, without mitigation, the radar effects due to clutter will include a partial loss of primary target detection and a number of false primary targets over and in the immediate vicinity of wind turbines in the study area within radar line-of-sight.

Because wind turbines in the study area will be visible to the Atlantic City ASR-9, Dover AFB DASR, and the Gibbsboro ARSR-4, Westslope expects that the DoD and the FAA will object to wind turbines in the study area within radar line-of-sight at a blade-tip height of 880 feet AGL based on electromagnetic interference to air navigation facilities. It is important to note, however, that radar effects do not always translate into operational impacts. The FAA's aeronautical study process will provide an official decision as to whether impacts are acceptable to operations. Although possible, Westslope does not expect that the DHS will object to wind turbines in the study area within radar line-of-sight at a blade-tip height of 880 feet AGL based on impacts to these radar sites.

Westslope's VOR screening analysis shows that the study area is greater than 8 NM from the Atlantic City VORTAC and the Sea Isle VORTAC. Although possible, Westslope does not expect that the FAA will object to wind turbines in the study area at a blade-tip height of 880 feet AGL based on impacts to these navigational aids.

Westslope's NEXRAD weather radar screening analysis for the Dover AFB WSR-88D and the Philadelphia WSR-88D shows that wind turbines in the study area will not be visible to and will not interfere with these radar sites at a blade-tip height of 880 feet AGL. The results also show that wind turbines in the study area at a blade-tip height of 880 feet AGL will fall within a NOAA green No Impact Zone for these radar sites.

Westslope recommends that the study area be submitted to the DoD Siting Clearinghouse for an informal review and to the National Telecommunications Information Administration (NTIA) for a detailed review. The NTIA is essentially a clearinghouse for other federal agencies including the National Oceanic and Atmospheric Administration.

If you have any questions regarding this analysis, please contact Geoff Blackman at (405) 816-2604 or via email at gnblackman@westslopeconsulting.com.