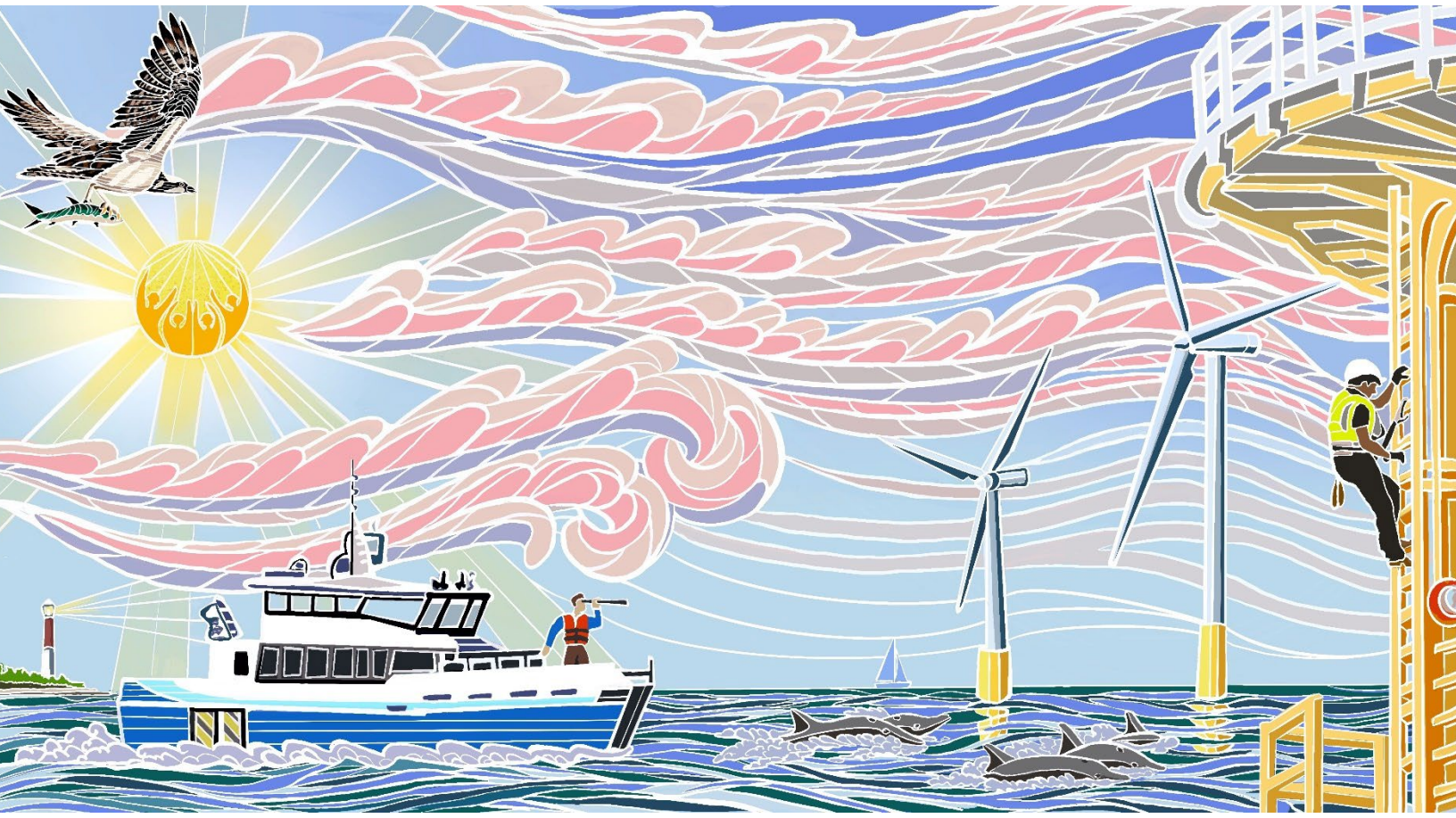

Appendix II-U2

Navigational and Radar Screening Study

March 2024

ATLANTIC SHORES OFFSHORE WIND PROJECT – LEASE AREA OCS-A 0549

RADAR AND NAVIGATIONAL AID SCREENING STUDY

MARCH 31, 2022

AMENDED: APRIL 27, 2022

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INTRODUCTION

The Atlantic Shores Offshore Wind LLC (Atlantic Shores) Project (Project) consists of 157 proposed wind turbines located in the Renewable Energy Lease Area OCS-A 0549 (Lease Area) off the coast of New Jersey.[1] Please note that Lease Area OCS-A 0549 is located north of and directly abuts Atlantic Shores Lease Area OCS-A 0499.[2] This report provides the results of a radar and navigational aid screening study conducted by Westslope Consulting, LLC (Westslope) for the Project using a blade-tip height of 1,047 feet above ground level (AGL).

This study includes the following:

- Research into radar sites and Very High Frequency Omnidirectional Range (VOR) navigational aid sites near the Project based on publicly available information or information derived from publicly available information;[3]
- An Air Route Surveillance Radar (ARSR) and Airport Surveillance Radar (ASR) line-of-sight (LOS) analysis;
- A Terminal Doppler Weather Radar (TDWR) screening analysis;
- A VOR screening analysis;
- A Next Generation Radar (NEXRAD) weather radar screening analysis; and
- A coastal High Frequency (HF) radar LOS analysis.

RESEARCH

ARSR and ASR Sites

Research conducted by Westslope identified the following eight ARSR and ASR sites near the Project:

- 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);
- McGuire AFB DASR;
- Newark ASR-9;
- New York ASR-9;
- Philadelphia ASR-9; and
- Naval Air Station (NAS) Willow Grove Airport Surveillance Radar model-11 (ASR-11).

[1] Turbines_v117_BLCOPNorthv3_B10_1x0pt6_RS0pt2_WEOS0pt225_OSS0.shp and Area_COP_North_v04.shp.
[2] Lease_Area_ASOW_z18n.shp.
[3] This report does not account for radar sites and VOR navigational aid sites that are not publicly available.

In addition to the Department of Defense (DoD) and Department of Homeland Security (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) facility and uses the McGuire AFB DASR for air traffic control at the McGuire AFB RAPCON. The Federal Aviation Administration (FAA) uses the Atlantic City ASR-9, Gibbsboro ARSR-4, Newark ASR-9, New York ASR-9, Philadelphia ASR-9, and the NAS Willow Grove ASR-11 for air traffic control at multiple facilities, including the Atlantic City Terminal Radar Approach Control (TRACON), New York Air Route Traffic Control Center, New York TRACON, and the Philadelphia TRACON.

Co-Located Secondary Surveillance Radar

Research conducted by Westslope identified the following secondary surveillance radar systems co-located with the ARSR and ASR systems:

- 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 Newark ASR-9, New York ASR-9, and the Philadelphia ASR-9; and
- A Monopulse Secondary Surveillance Radar is co-located with the Dover AFB DASR, McGuire AFB DASR, and the NAS Willow Grove ASR-11.

In general, secondary surveillance radar systems are less susceptible to interference from wind turbines than primary surveillance radar systems, such as the ARSR and ASR systems.

TDWR Sites

Research conducted by Westslope identified the following three TDWR sites near the Project:

- Floyd Bennett Field TDWR;
- Pennsauken TDWR; and
- Woodbridge TDWR.

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

NEXRAD Weather Radar Sites

Research conducted by Westslope identified the following two NEXRAD weather radar sites near the Project:

- Dover AFB Weather Surveillance Radar model-88 Doppler (WSR-88D); and
- Philadelphia WSR-88D.

Research conducted by Westslope shows that the lowest elevation angle scanned by the Dover AFB WSR-88D and the Philadelphia WSR-88D is 0.5 degrees.

The National Weather Service uses these radar sites for weather operations at multiple facilities, including the Wakefield Weather Forecast Office (WFO) and the Philadelphia/Mount Holly WFO. In addition, the DoD uses the Dover AFB WSR-88D for weather operations at Dover AFB.

HF Radar Sites

Research conducted by Westslope identified the following 15 HF radar sites near the Project:

- Assateague Island HF radar;
- Bradley Beach HF radar;
- Brant Beach HF radar;
- Brigantine Long Range HF radar;
- Brigantine Medium Range HF radar;
- Cape May Point HF radar;
- Hempstead HF radar;
- Loveladies HF radar;
- Moriches HF radar;
- North Wildwood HF radar;
- Sandy Hook HF radar;
- Sea Bright HF radar;
- Seaside Park HF radar;
- Strathmere HF radar; and
- Wildwood HF radar.

The Assateague Island HF radar is operated by Old Dominion University and the remaining 14 HF radars are operated by Rutgers University.

Various federal agencies in partnership with the National Oceanic and Atmospheric Administration's Integrated Ocean Observing System (IOOS) use the ocean surface current and wave data provided by these HF radar sites in support of multiple missions.

VOR Sites

Research conducted by Westslope identified the following seven navigational aid sites near the Project:

- Atlantic City VOR and co-located Tactical Air Navigation (VORTAC) system;
- Cedar Lake VOR and co-located Distance Measuring Equipment (VOR/DME);
- Colts Neck VOR/DME;
- Coyle VORTAC;
- Lakehurst Tactical Air Navigation (TACAN) system;
- McGuire VORTAC; and
- Sea Isle VORTAC.

Correspondence with the FAA indicates that the Atlantic City VORTAC, Cedar Lake VOR/DME, Colts Neck VOR/DME, Coyle VORTAC, and the McGuire VORTAC are conventional VORs, and the Sea Isle VORTAC is a Doppler VOR as of March 18, 2022. In general, conventional VORs are more susceptible than Doppler VORs to interference from wind turbines.

ANALYSIS

ARSR and ASR LOS Analysis

Westslope conducted an ARSR and ASR LOS analysis using United States Geological Survey (USGS) 3-Dimensional Elevation Program (3DEP) data. This analysis shows whether wind turbines at a blade-tip height of 1,047 feet AGL will be within line-of-sight of one or more ARSR or ASR sites.

Westslope conducted the LOS analysis for the following eight ARSR and ASR sites:

- Atlantic City ASR-9;
- Dover AFB DASR;
- Gibbsboro ARSR-4;
- McGuire AFB DASR;
- Newark ASR-9;
- New York ASR-9;
- Philadelphia ASR-9; and
- NAS Willow Grove ASR-11.

The Project is beyond the instrumented range of the Dover AFB DASR, Newark ASR-9, and the NAS Willow Grove ASR-11. As such, no additional analysis was considered necessary for these radar sites.

Atlantic City ASR-9

The LOS analysis results show that all 157 proposed wind turbines will be within line-of-sight of and will interfere with the Atlantic City ASR-9 at a blade-tip height of 1,047 feet AGL. See Figure 1. 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 the proposed wind turbines. Other radar effects include a partial loss of weather detection and false weather indications over and in the immediate vicinity of the proposed wind turbines.

Gibbsboro ARSR-4

The LOS analysis results show that all 157 proposed wind turbines will be within line-of-sight of and will interfere with the Gibbsboro ARSR-4 at a blade-tip height of 1,047 feet AGL. See Figure 2. 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 the proposed wind turbines.

McGuire AFB DASR

The LOS analysis results show that 81 of the 157 proposed wind turbines will be within line-of-sight of and will interfere with the McGuire AFB DASR at a blade-tip height of 1,047 feet AGL. See Figure 3. 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 the proposed wind turbines within line-of-sight. Other radar effects include a partial loss of weather detection and false weather indications over and in the immediate vicinity of the proposed wind turbines within line-of-sight.

New York ASR-9

The LOS analysis results show that the 157 proposed wind turbines will not be within line-of-sight of and will not interfere with the New York ASR-9 at a blade-tip height of 1,047 feet AGL. As a result, Westslope does not expect any radar effects at or below this blade-tip height.

Philadelphia ASR-9

The LOS analysis results show that the 157 proposed wind turbines will not be within line-of-sight of and will not interfere with the Philadelphia ASR-9 at a blade-tip height of 1,047 feet AGL. As a result, Westslope does not expect any radar effects at or below this blade-tip height.

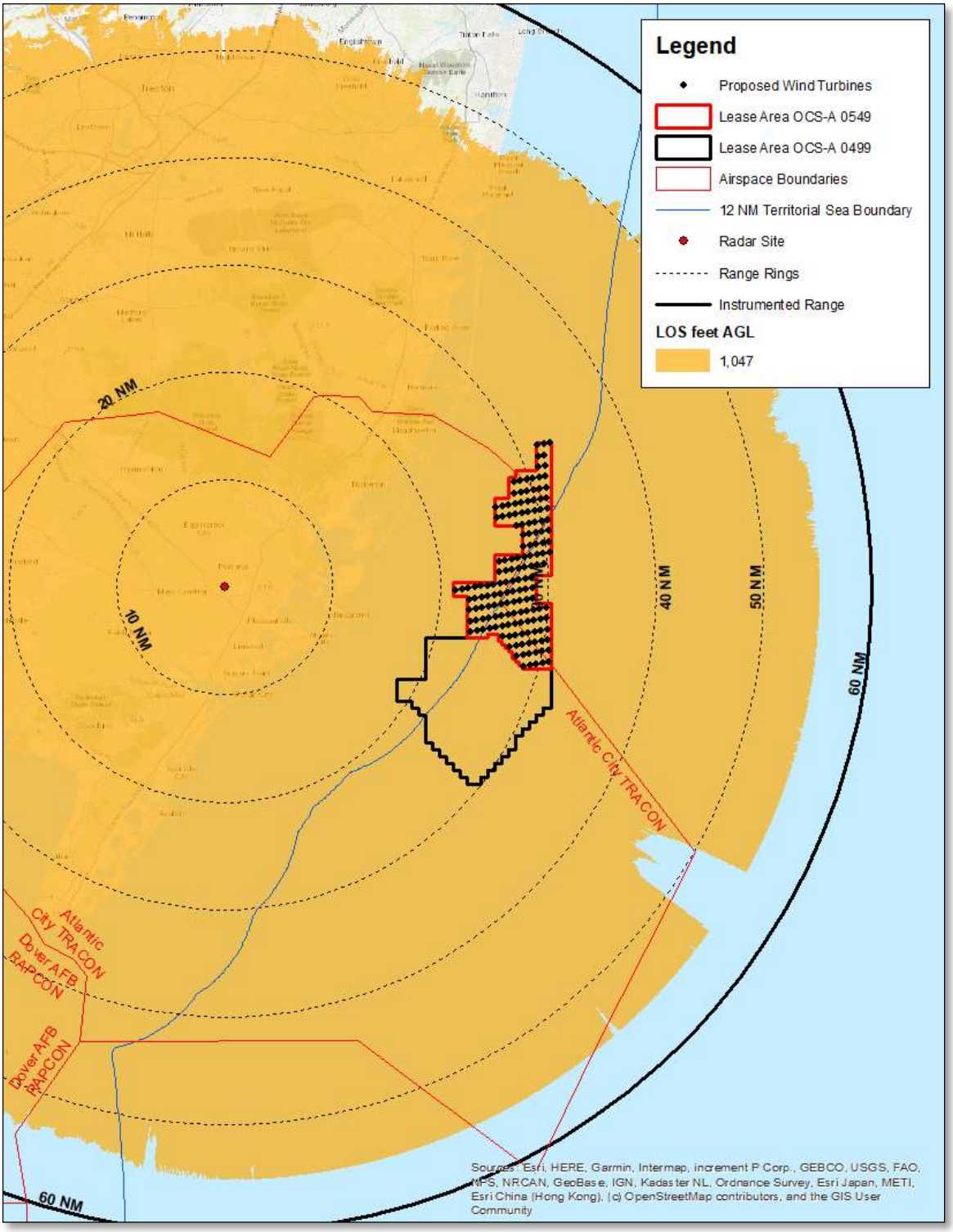

Figure 1 LOS Analysis Results for the Atlantic City ASR-9 using 3DEP Data

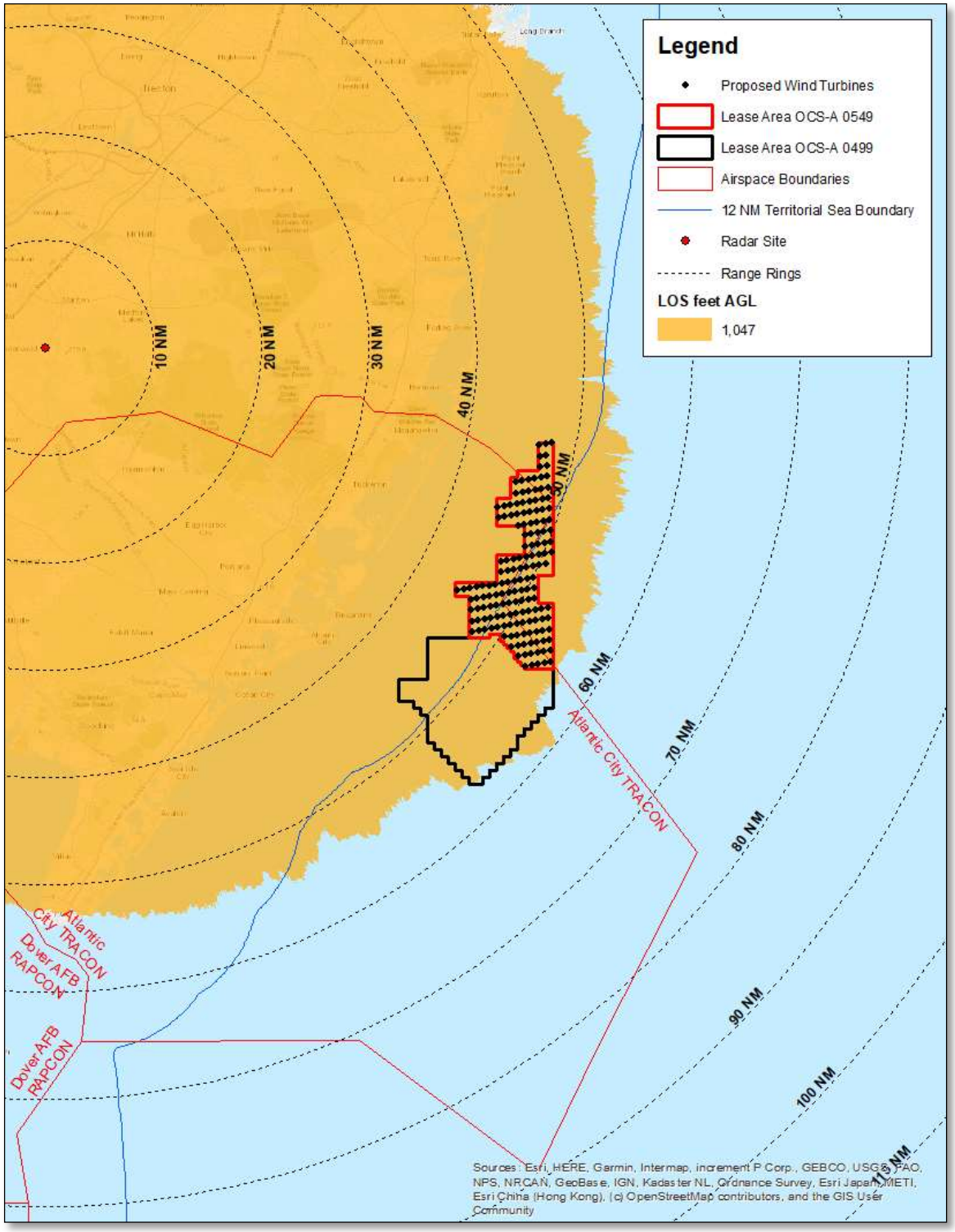

Figure 2 LOS Analysis Results for the Gibbsboro ARSR-4 using 3DEP Data

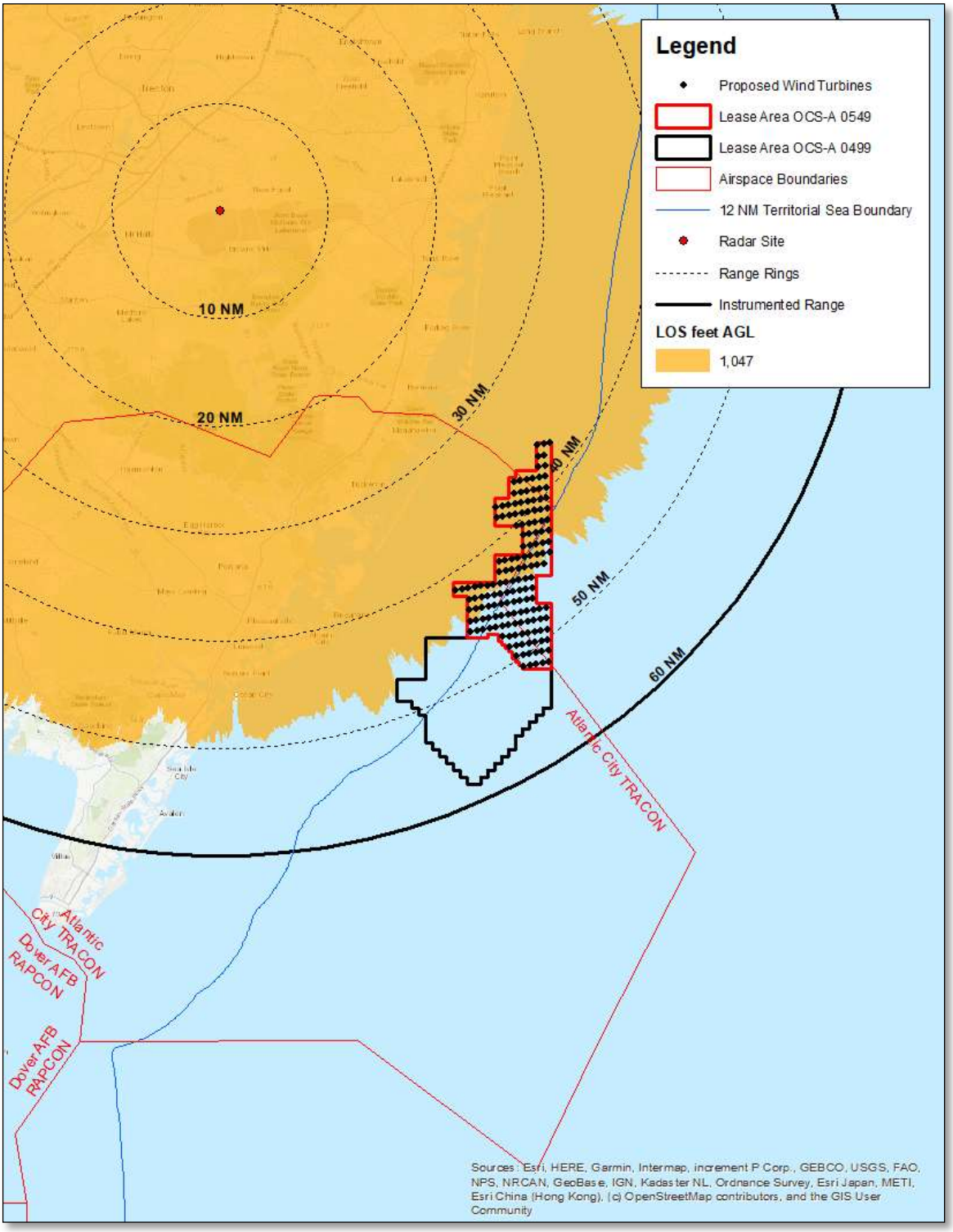

Figure 3 LOS Analysis Results for the McGuire AFB DASR using 3DEP Data

TDWR Screening Analysis

Westslope conducted a TDWR screening analysis using USGS 3DEP data. This analysis shows whether wind turbines at a blade-tip height of 1,047 feet AGL will be within line-of-sight of one or more TDWR sites and determines the number of elevation angles penetrated and potentially affected.

Westslope conducted the TDWR screening analysis for the following three radar sites:

- Floyd Bennett Field TDWR;
- Pennsauken TDWR; and
- Woodbridge TDWR.

The Project is beyond the instrumented range of the Floyd Bennett Field TDWR, Pennsauken TDWR, and the Woodbridge TDWR. As such, no additional analysis was considered necessary for these radar sites.

VOR Screening Analysis

Westslope conducted a VOR screening analysis using USGS 3DEP data. This analysis shows whether wind turbines will fall within 8 nautical miles (NM) and will be within line-of-sight of one or more VOR sites at a blade-tip height of 1,047 feet AGL. This screening analysis provides a cursory indication of whether wind turbines may affect VOR performance and is similar to the FAA's analysis approach for VOR sites. The same criteria will also protect for DMEs and TACANs.

Westslope conducted the VOR screening analysis for the following seven navigational aid sites:

- Atlantic City VORTAC;
- Cedar Lake VOR/DME;
- Colts Neck VOR/DME;
- Coyle VORTAC;
- Lakehurst TACAN;
- McGuire VORTAC; and
- Sea Isle VORTAC.

The Project is greater than 8 NM from the Atlantic City VORTAC, Cedar Lake VOR/DME, Colts Neck VOR/DME, Coyle VORTAC, Lakehurst TACAN, McGuire VORTAC, and the Sea Isle VORTAC. As such, no additional analysis was considered necessary for these navigational aid sites.

NEXRAD Weather Radar Screening Analysis

Westslope conducted a NEXRAD weather radar screening analysis using USGS 3DEP data. This analysis shows whether wind turbines at a blade-tip height of 1,047 feet AGL will be within line-of-sight of one or more WSR-88D sites and incorporates the National Oceanic and Atmospheric Administration (NOAA) Radar Operations Center (ROC) wind farm impact zone scheme.

Westslope conducted the NEXRAD weather radar screening analysis for the following two radar sites:

- Dover AFB WSR-88D; and
- Philadelphia WSR-88D.

Dover AFB WSR-88D

Westslope's NEXRAD weather radar screening analysis shows that the 157 proposed wind turbines will not be within line-of-sight of and will not interfere with the Dover AFB WSR-88D at a blade-tip height of 1,047 feet AGL. The results also show that the 157 proposed wind turbines at a blade-tip height of 1,047 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 4.

Philadelphia WSR-88D

Westslope's NEXRAD weather radar screening analysis shows that all 157 proposed wind turbines will be within line-of-sight of the Philadelphia WSR-88D at a blade-tip height of 1,047 feet AGL. See Figure 5. The results also show that, at a blade-tip height of 1,047 feet AGL, 57 of the 157 proposed wind turbines will fall within a NOAA dark green area and 100 of the 157 proposed wind turbines will fall within a NOAA green area for this radar site. A dark green area, or "Notification Zone," indicates that some impacts are possible to WSR-88D operations and that consultation with NOAA is optional. See Figure 6.

At a blade-tip height of 1,047 feet AGL, a partial loss of weather detection and false weather indications (Doppler contamination) over and in the immediate vicinity of the proposed wind turbines are possible due to clutter. As a result, some impacts to Philadelphia WSR-88D operations are possible.

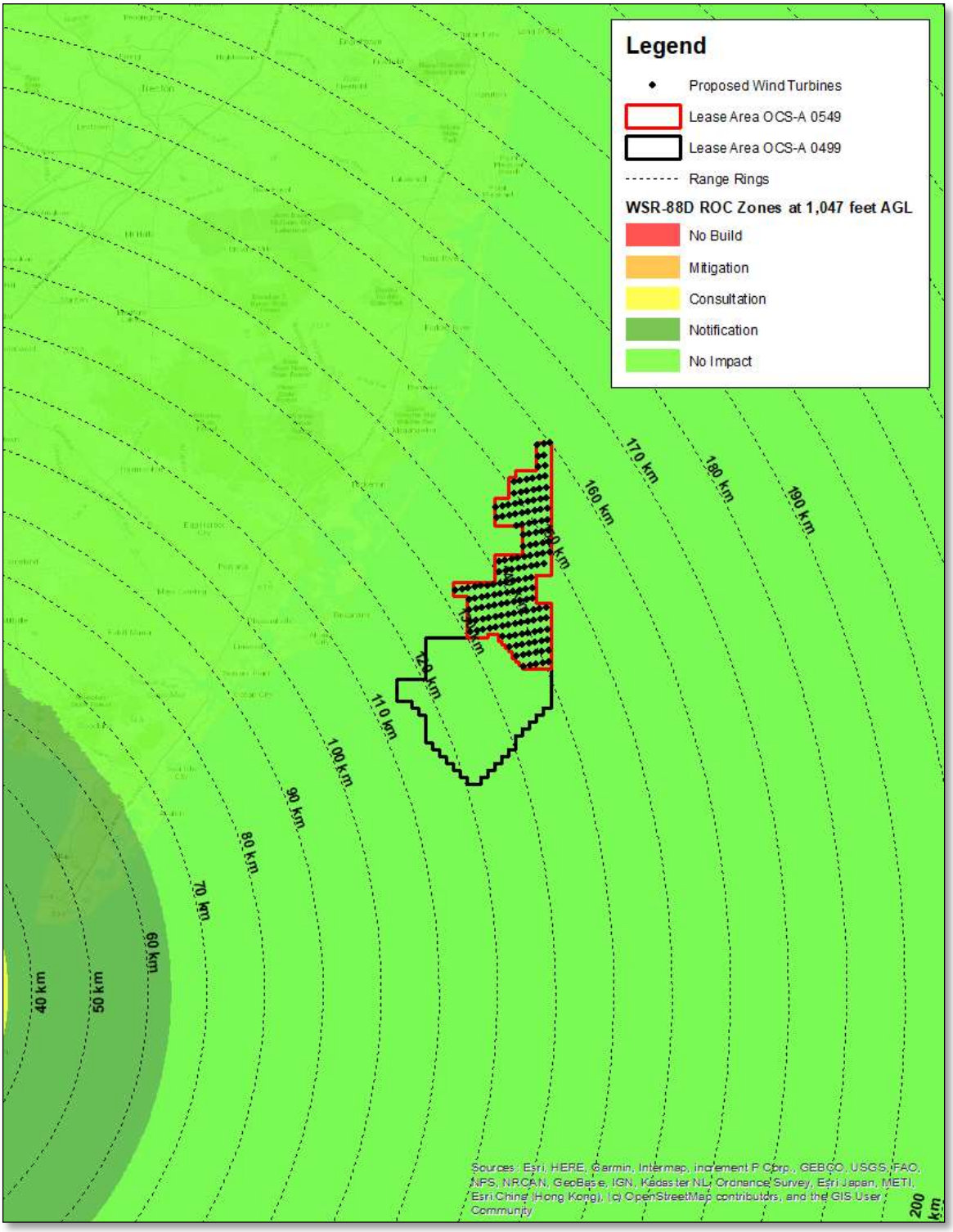

Figure 4 WSR-88D ROC Zone Results at 1,047 feet AGL for the Dover AFB WSR-88D using 3DEP Data

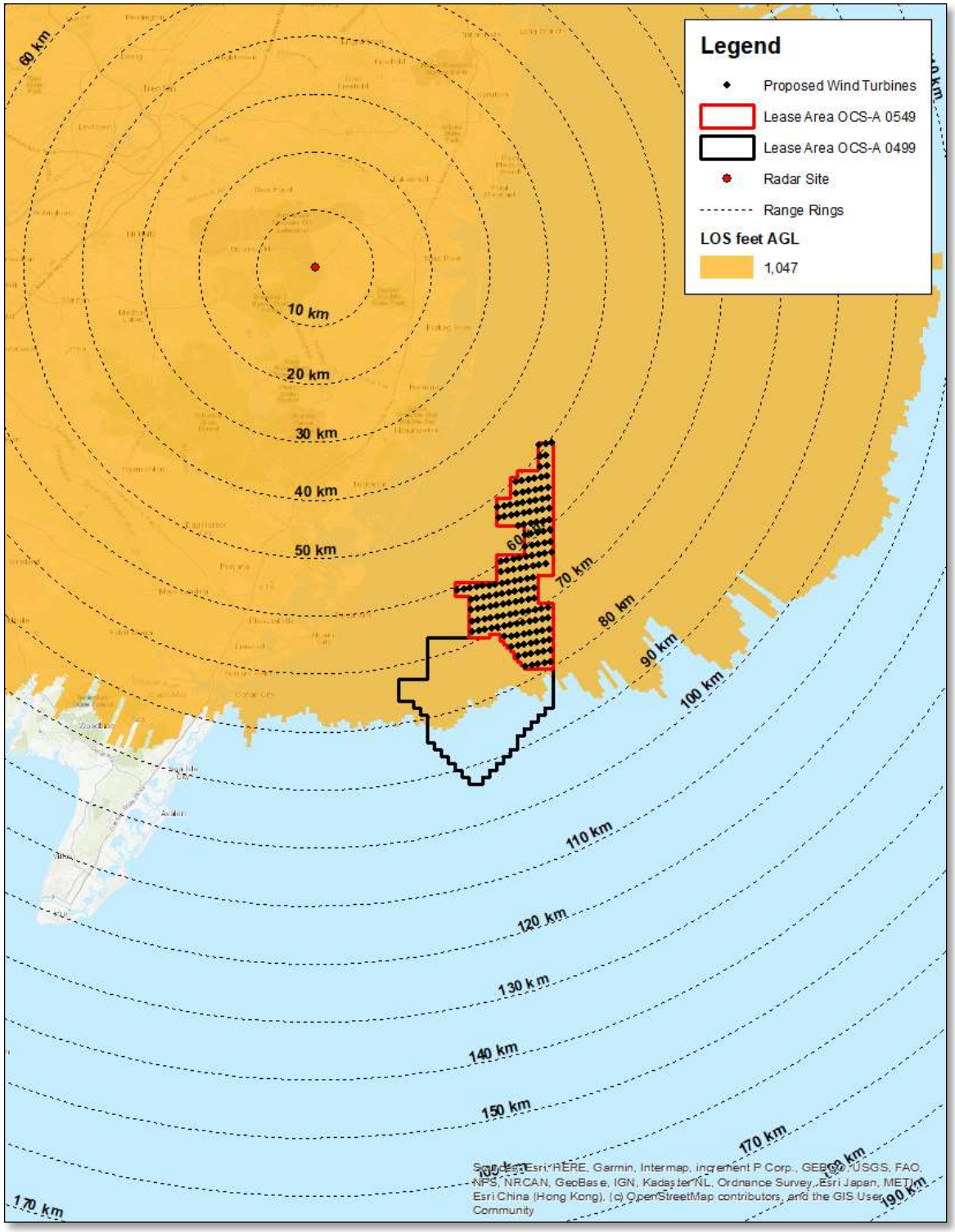

Figure 5 LOS Analysis Results for the Philadelphia WSR-88D using 3DEP Data

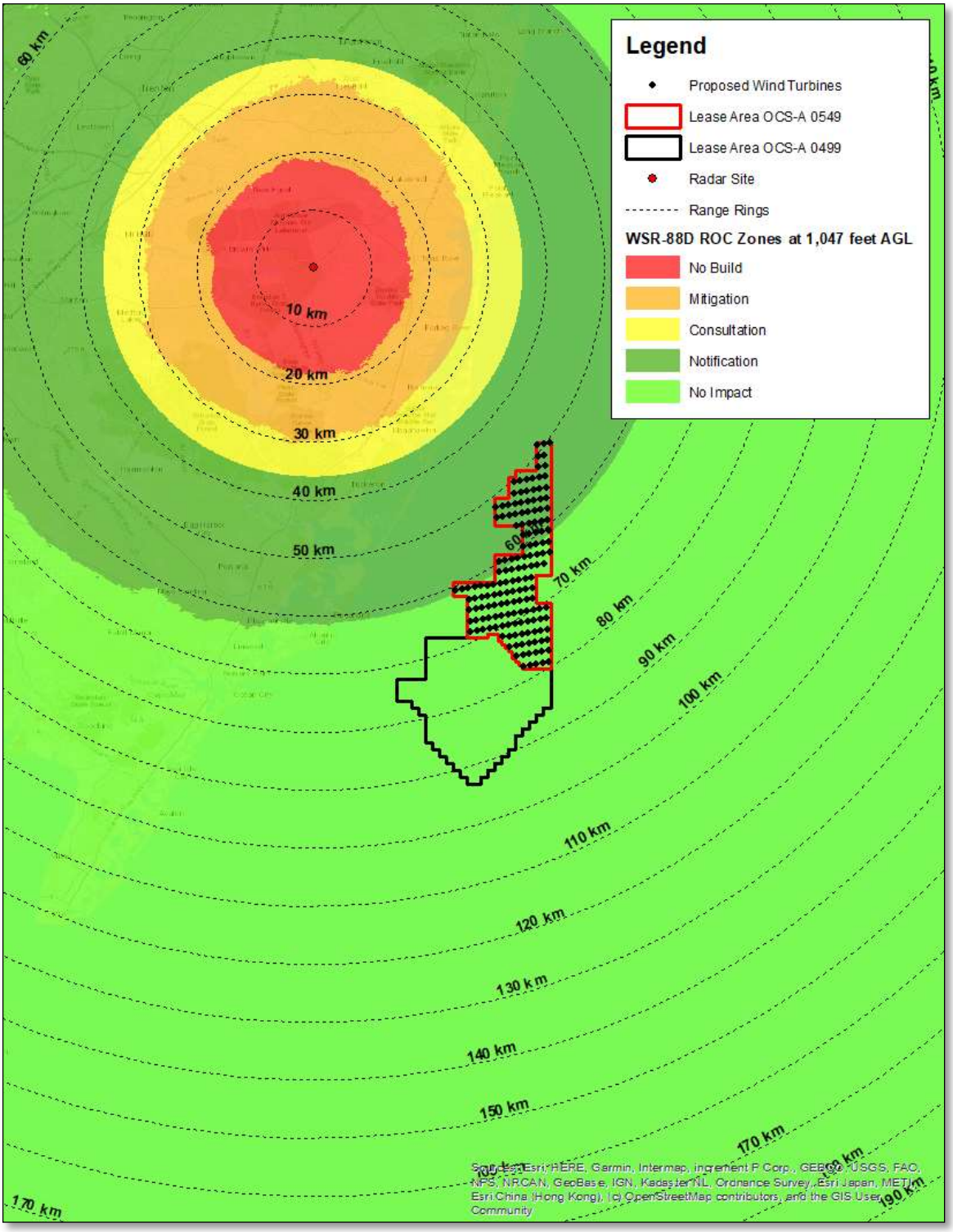

Figure 6 WSR-88D ROC Zone Results at 1,047 feet AGL for the Philadelphia WSR-88D using 3DEP Data

HF Radar LOS Analysis

Westslope conducted an HF radar LOS analysis using USGS 3DEP data. This analysis shows whether wind turbines at a blade-tip height of 1,047 feet AGL will be within line-of-sight of one or more HF radar sites.

Westslope conducted the LOS analysis for the following 15 HF radar sites:

- Assateague Island HF radar;
- Bradley Beach HF radar;
- Brant Beach HF radar;
- Brigantine Long Range HF radar;
- Brigantine Medium Range HF radar;
- Cape May Point HF radar;
- Hempstead HF radar;
- Loveladies HF radar;
- Moriches HF radar;
- North Wildwood HF radar;
- Sandy Hook HF radar;
- Sea Bright HF radar;
- Seaside Park HF radar;
- Strathmere HF radar; and
- Wildwood HF radar.

Assateague Island HF Radar

The LOS analysis results show that the 157 proposed wind turbines will not be within line-of-sight of the Assateague Island HF radar at a blade-tip height of 1,047 feet AGL. See Figure 7. Although the proposed wind turbines will not be within line-of-sight of this radar site, radar effects are still possible beyond line-of-sight due to the propagation of HF electromagnetic waves over the ocean surface.

Bradley Beach HF Radar

The LOS analysis results show that 102 of the 157 proposed wind turbines will be within line-of-sight of the Bradley Beach HF radar at a blade-tip height of 1,047 feet AGL. See Figure 8. The radar effects will include clutter in the vicinity of the proposed wind turbines within line-of-sight and possibly in the vicinity of the proposed wind turbines beyond line-of-sight due to the propagation of HF electromagnetic waves over the ocean surface. As a result, impacts to Bradley Beach HF radar operations are possible.

Brant Beach HF Radar

The LOS analysis results show that all 157 proposed wind turbines will be within line-of-sight of the Brant Beach HF radar at a blade-tip height of 1,047 feet AGL. See Figure 9. The radar effects will include clutter in the vicinity of the proposed wind turbines. As a result, impacts to Brant Beach HF radar operations are possible.

Brigantine Long Range HF Radar

The LOS analysis results show that all 157 proposed wind turbines will be within line-of-sight of the Brigantine Long Range HF radar at a blade-tip height of 1,047 feet AGL. See Figure 10. The radar effects will include clutter in the vicinity of the proposed wind turbines. As a result, impacts to Brigantine Long Range HF radar operations are possible.

Brigantine Medium Range HF Radar

The LOS analysis results show that all 157 proposed wind turbines will be within line-of-sight of the Brigantine Medium Range HF radar at a blade-tip height of 1,047 feet AGL. See Figure 11. The radar effects will include clutter in the vicinity of the proposed wind turbines. As a result, impacts to Brigantine Medium Range HF radar operations are possible.

Cape May Point HF Radar

The LOS analysis results show that the 157 proposed wind turbines will not be within line-of-sight of the Cape May Point HF radar at a blade-tip height of 1,047 feet AGL. See Figure 12. Although the proposed wind turbines will not be within line-of-sight of this radar site, radar effects are still possible beyond line-of-sight due to the propagation of HF electromagnetic waves over the ocean surface.

Hempstead HF Radar

The LOS analysis results show that the 157 proposed wind turbines will not be within line-of-sight of the Hempstead HF radar at a blade-tip height of 1,047 feet AGL. See Figure 13. Although the proposed wind turbines will not be within line-of-sight of this radar site, radar effects are still possible beyond line-of-sight due to the propagation of HF electromagnetic waves over the ocean surface.

Loveladies HF Radar

The LOS analysis results show that all 157 proposed wind turbines will be within line-of-sight of the Loveladies HF radar at a blade-tip height of 1,047 feet AGL. See Figure 14. The radar effects will include clutter in the vicinity of the proposed wind turbines. As a result, impacts to Loveladies HF radar operations are possible.

Moriches HF Radar

The LOS analysis results show that the 157 proposed wind turbines will not be within line-of-sight of the Moriches HF radar at a blade-tip height of 1,047 feet AGL. See Figure 15. Although the proposed wind turbines will not be within line-of-sight of this radar site, radar effects are still possible beyond line-of-sight due to the propagation of HF electromagnetic waves over the ocean surface.

North Wildwood HF Radar

The LOS analysis results show that 57 of the 157 proposed wind turbines will be within line-of-sight of the North Wildwood HF radar at a blade-tip height of 1,047 feet AGL. See Figure 16. The radar effects will include clutter in the vicinity of the proposed wind turbines within line-of-sight and possibly in the vicinity of the proposed wind turbines beyond line-of-sight due to the propagation of HF electromagnetic waves over the ocean surface. As a result, impacts to North Wildwood HF radar operations are possible.

Sandy Hook HF Radar

The LOS analysis results show that the 157 proposed wind turbines will not be within line-of-sight of the Sandy Hook HF radar at a blade-tip height of 1,047 feet AGL. See Figure 17. Although the proposed wind turbines will not be within line-of-sight of this radar site, radar effects are still possible beyond line-of-sight due to the propagation of HF electromagnetic waves over the ocean surface.

Sea Bright HF Radar

The LOS analysis results show that eight of the 157 proposed wind turbines will be within line-of-sight of the Sea Bright HF radar at a blade-tip height of 1,047 feet AGL. See Figure 18. The radar effects will include clutter in the vicinity of the proposed wind turbines within line-of-sight and possibly in the vicinity of the proposed wind turbines beyond line-of-sight due to the propagation of HF electromagnetic waves over the ocean surface. As a result, impacts to Sea Bright HF radar operations are possible.

Seaside Park HF Radar

The LOS analysis results show that all 157 proposed wind turbines will be within line-of-sight of the Seaside Park HF radar at a blade-tip height of 1,047 feet AGL. See Figure 19. The radar effects will include clutter in the vicinity of the proposed wind turbines. As a result, impacts to Seaside Park HF radar operations are possible.

Strathmere HF Radar

The LOS analysis results show that all 157 proposed wind turbines will be within line-of-sight of the Strathmere HF radar at a blade-tip height of 1,047 feet AGL. See Figure 20. The radar effects will include clutter in the vicinity of the proposed wind turbines. As a result, impacts to Strathmere HF radar operations are possible.

Wildwood HF Radar

The LOS analysis results show that the 157 proposed wind turbines will not be within line-of-sight of the Wildwood HF radar at a blade-tip height of 1,047 feet AGL. See Figure 21. Although the proposed wind turbines will not be within line-of-sight of this radar site, radar effects are still possible beyond line-of-sight due to the propagation of HF electromagnetic waves over the ocean surface.

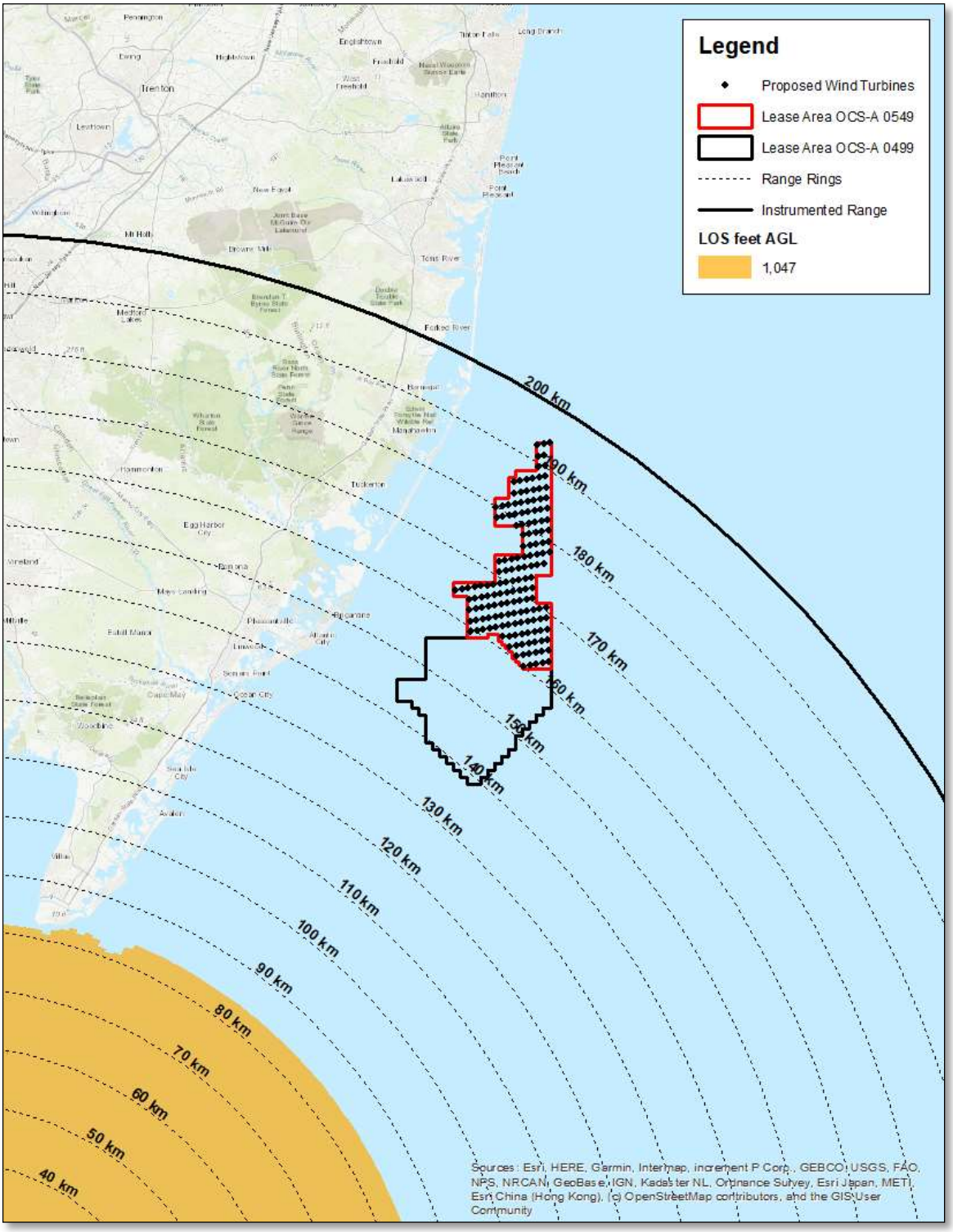

Figure 7 LOS Analysis Results for the Assateague Island HF Radar using 3DEP Data

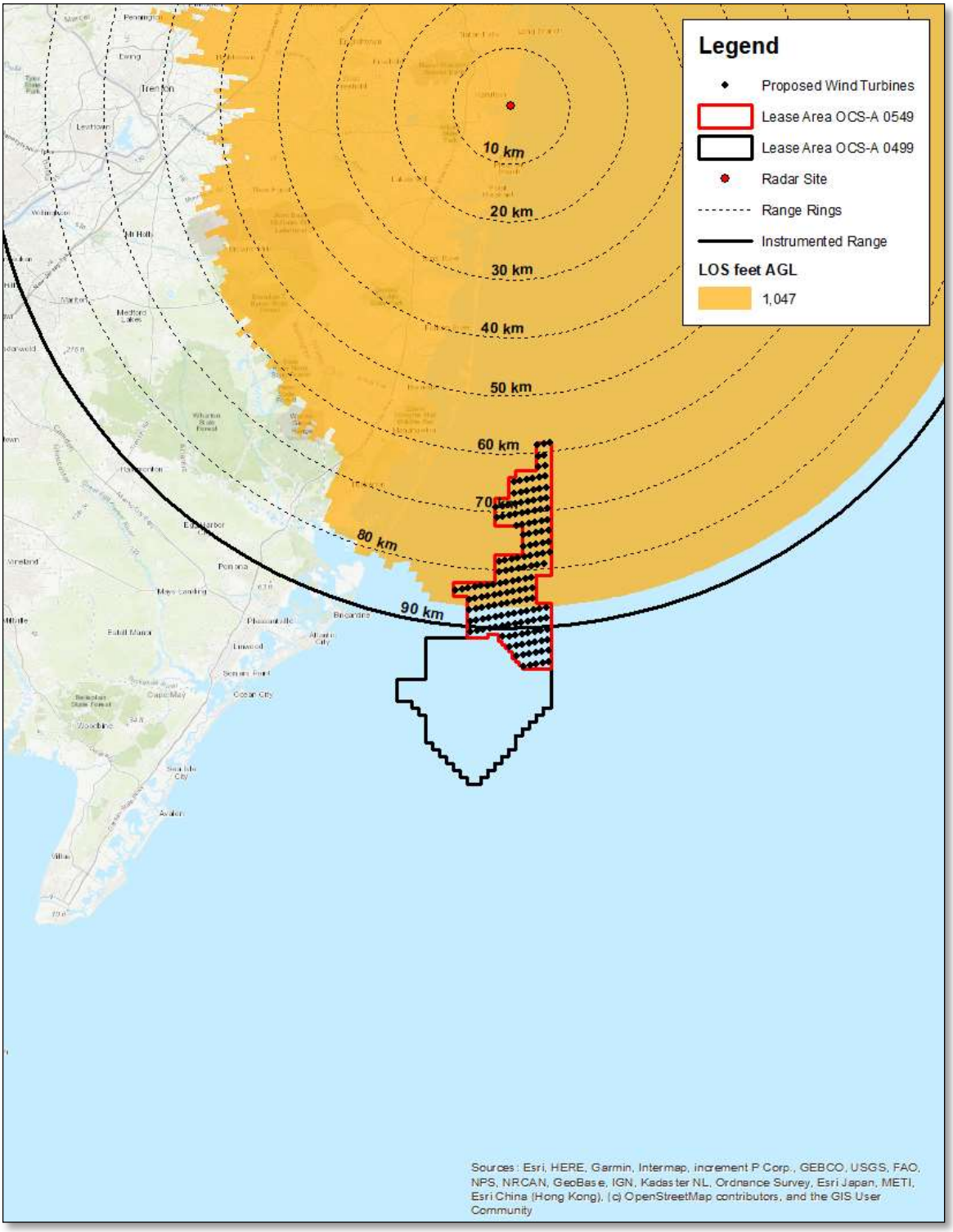

Figure 8 LOS Analysis Results for the Bradley Beach HF Radar using 3DEP Data

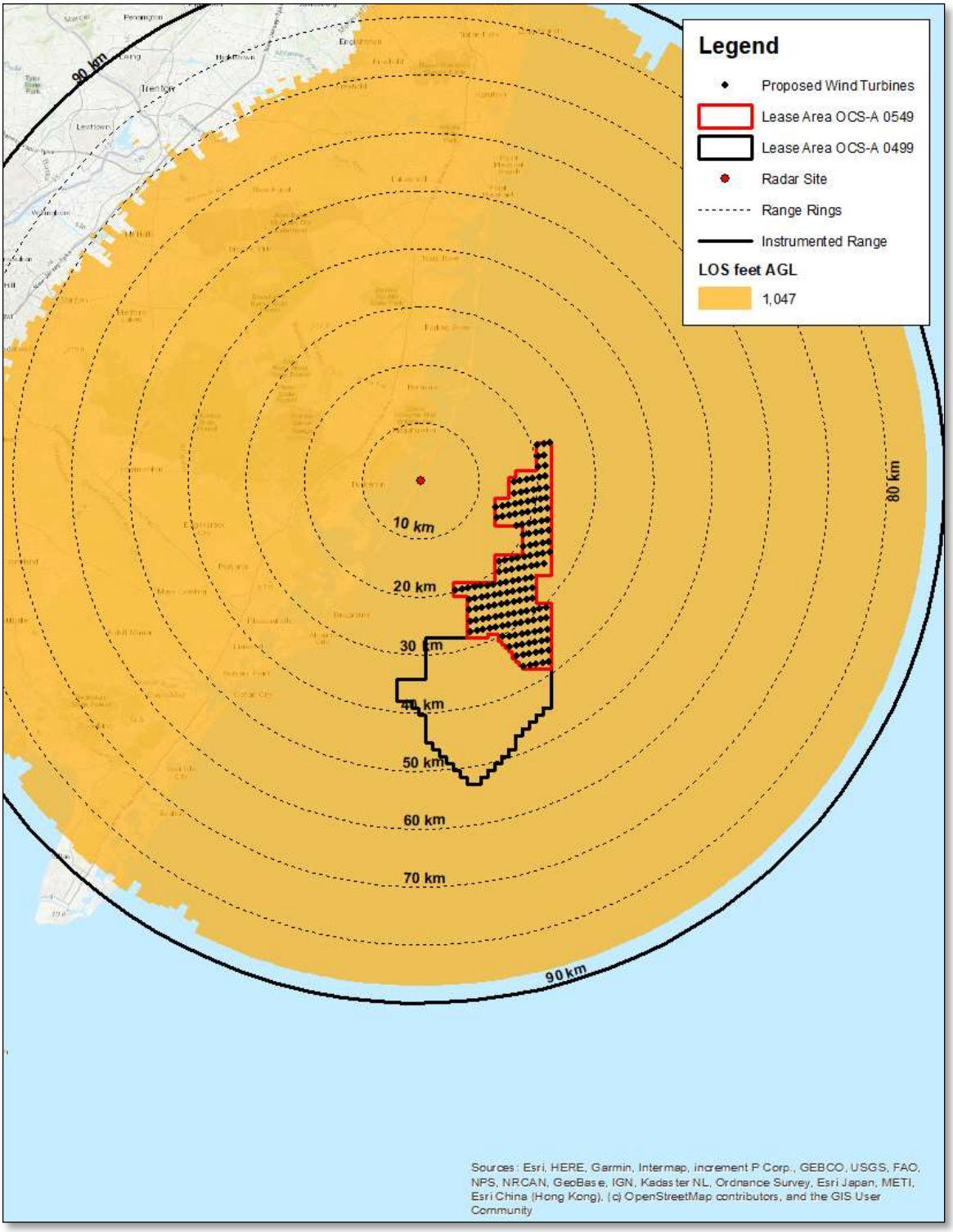

Figure 9 LOS Analysis Results for the Brant Beach HF Radar using 3DEP Data

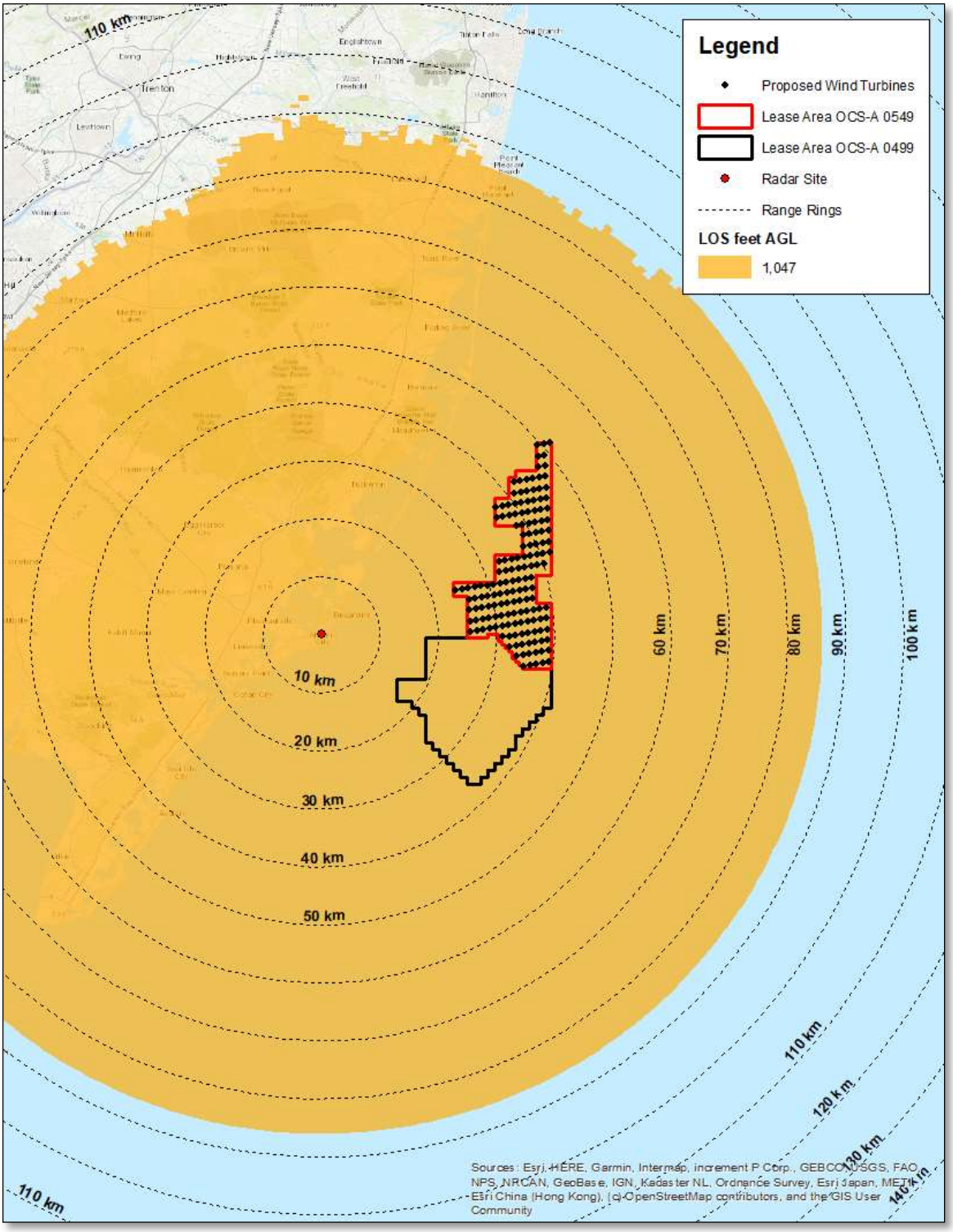

Figure 10 LOS Analysis Results for the Brigantine Long Range HF Radar using 3DEP Data

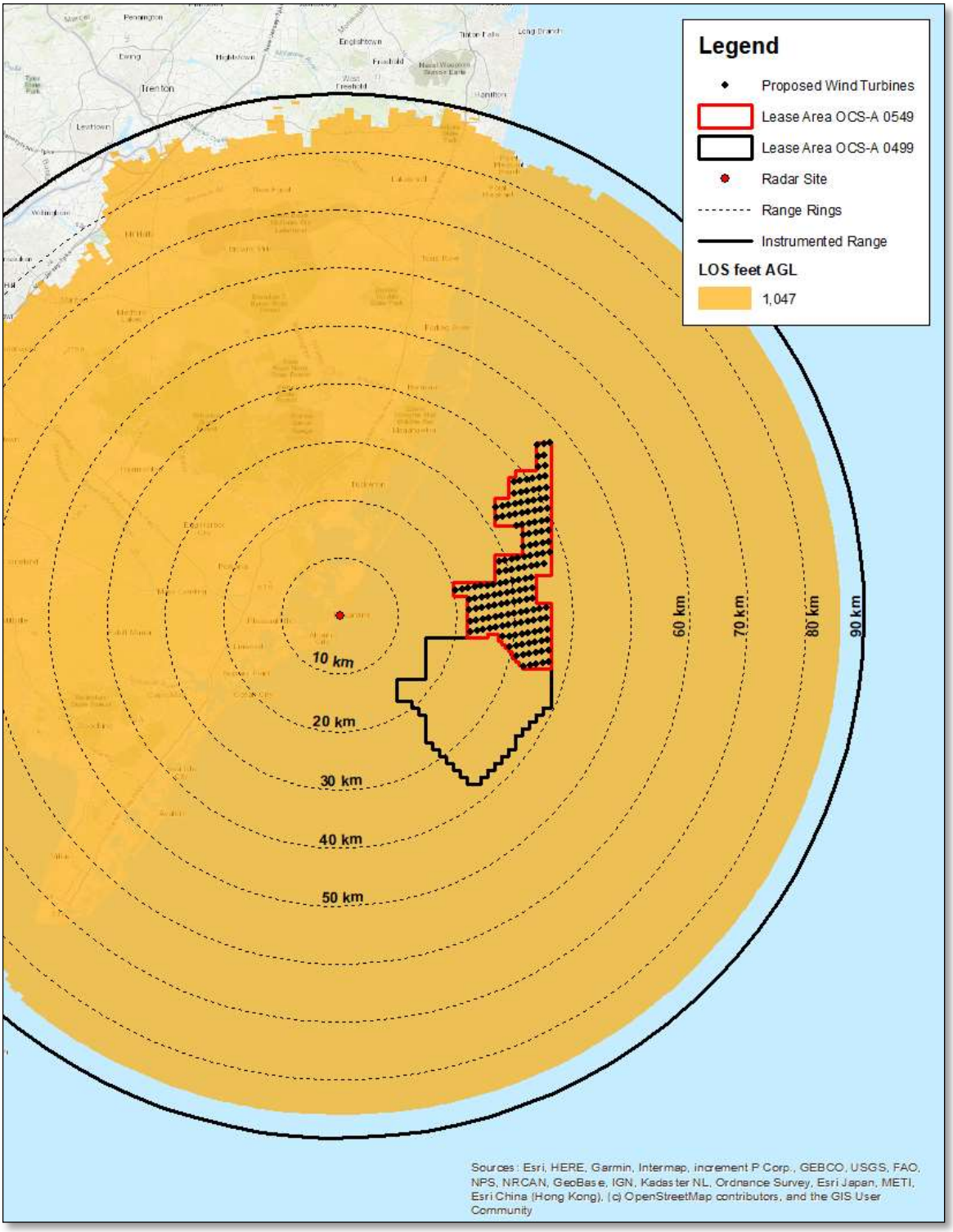

Figure 11 LOS Analysis Results for the Brigantine Medium Range HF Radar using 3DEP Data

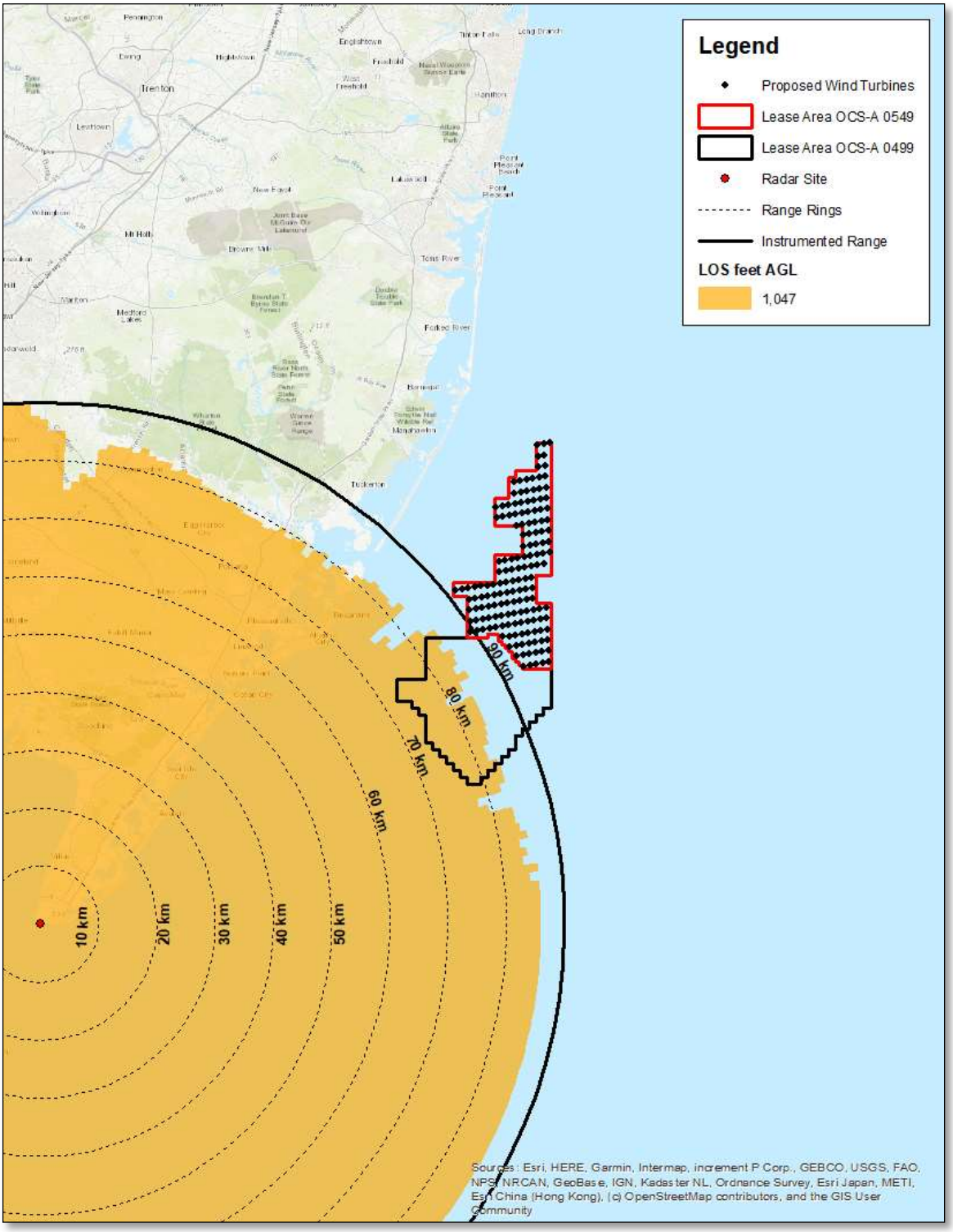

Figure 12 LOS Analysis Results for the Cape May Point HF Radar using 3DEP Data

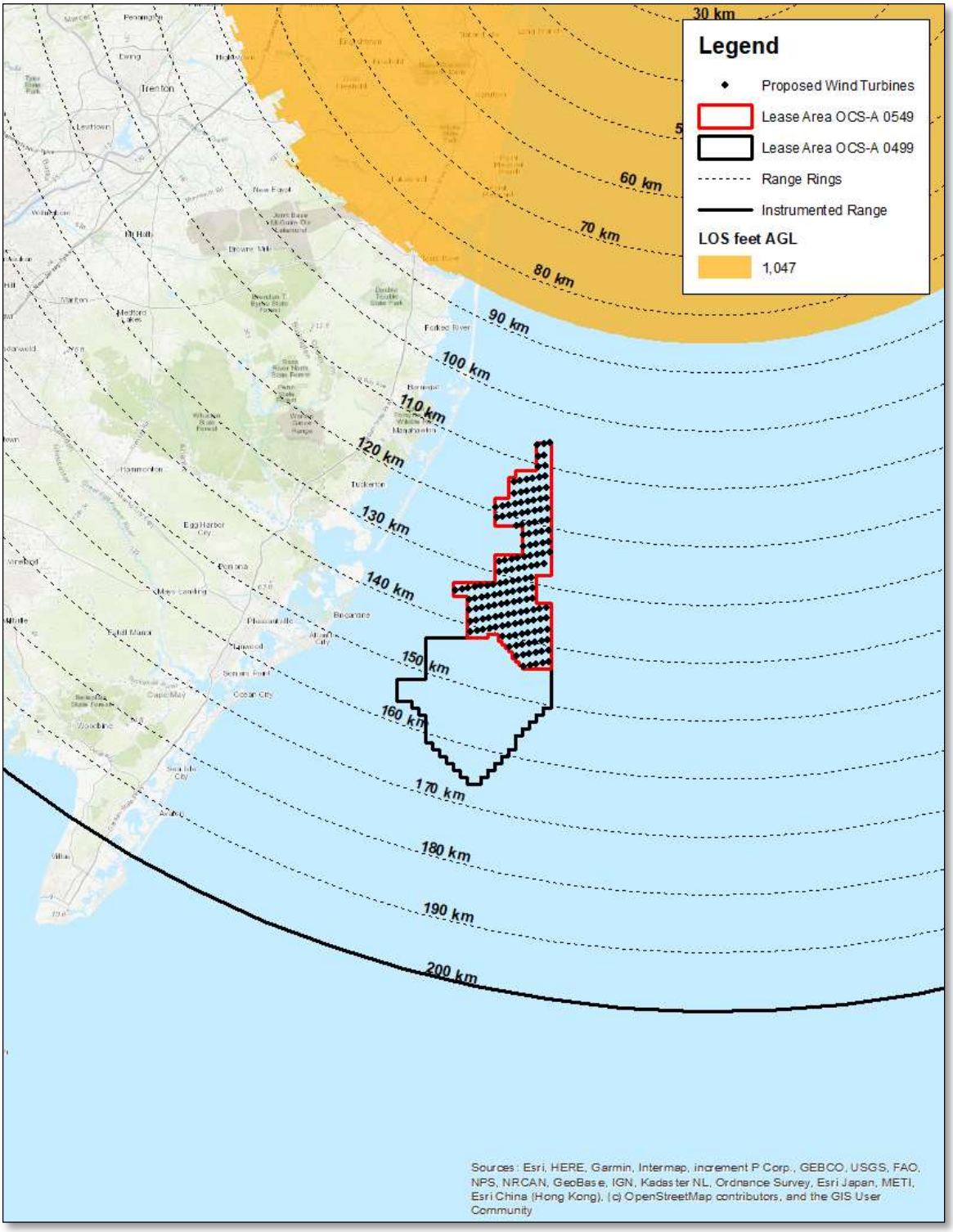

Figure 13 LOS Analysis Results for the Hempstead HF Radar using 3DEP Data

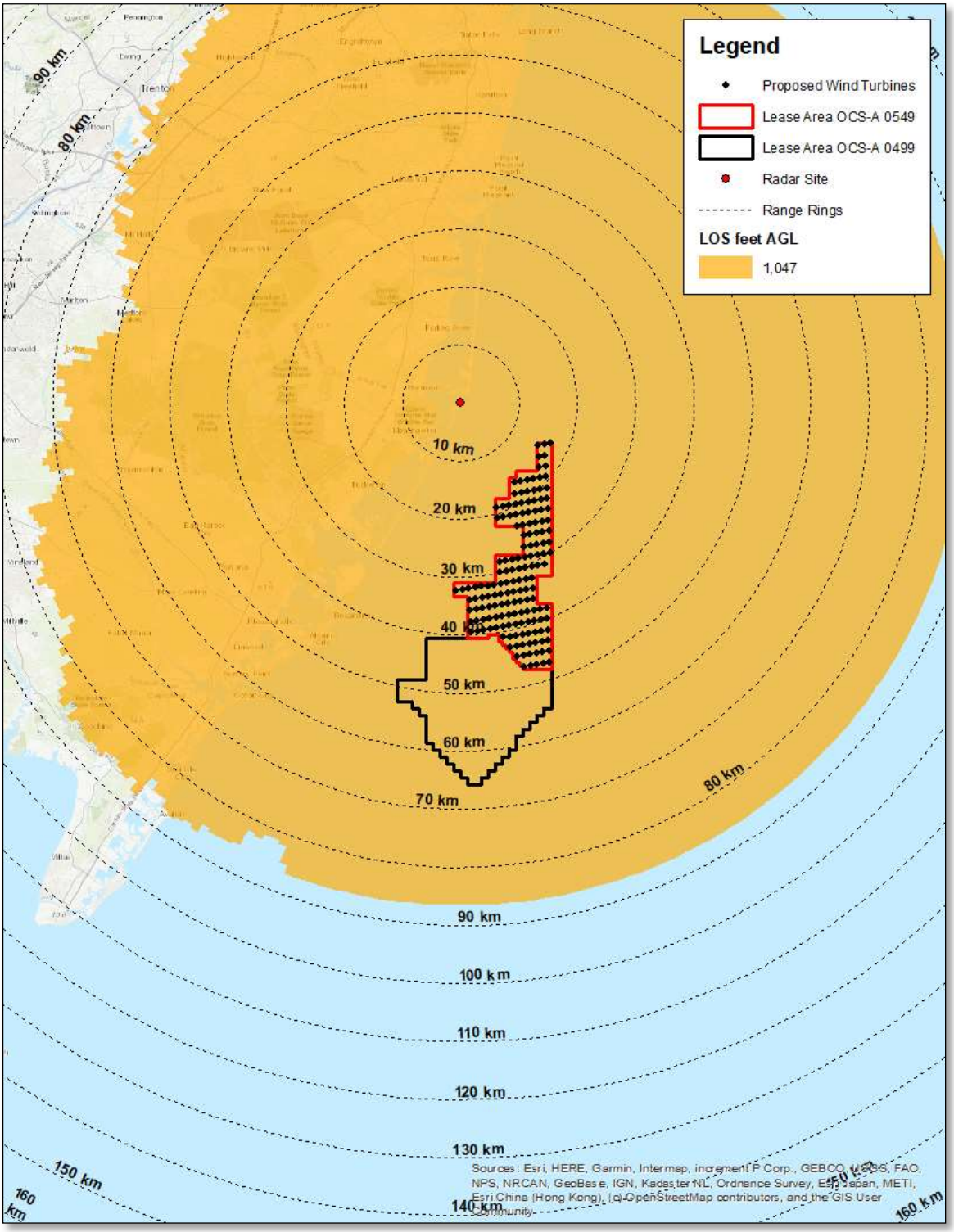

Figure 14 LOS Analysis Results for the Loveladies HF Radar using 3DEP Data

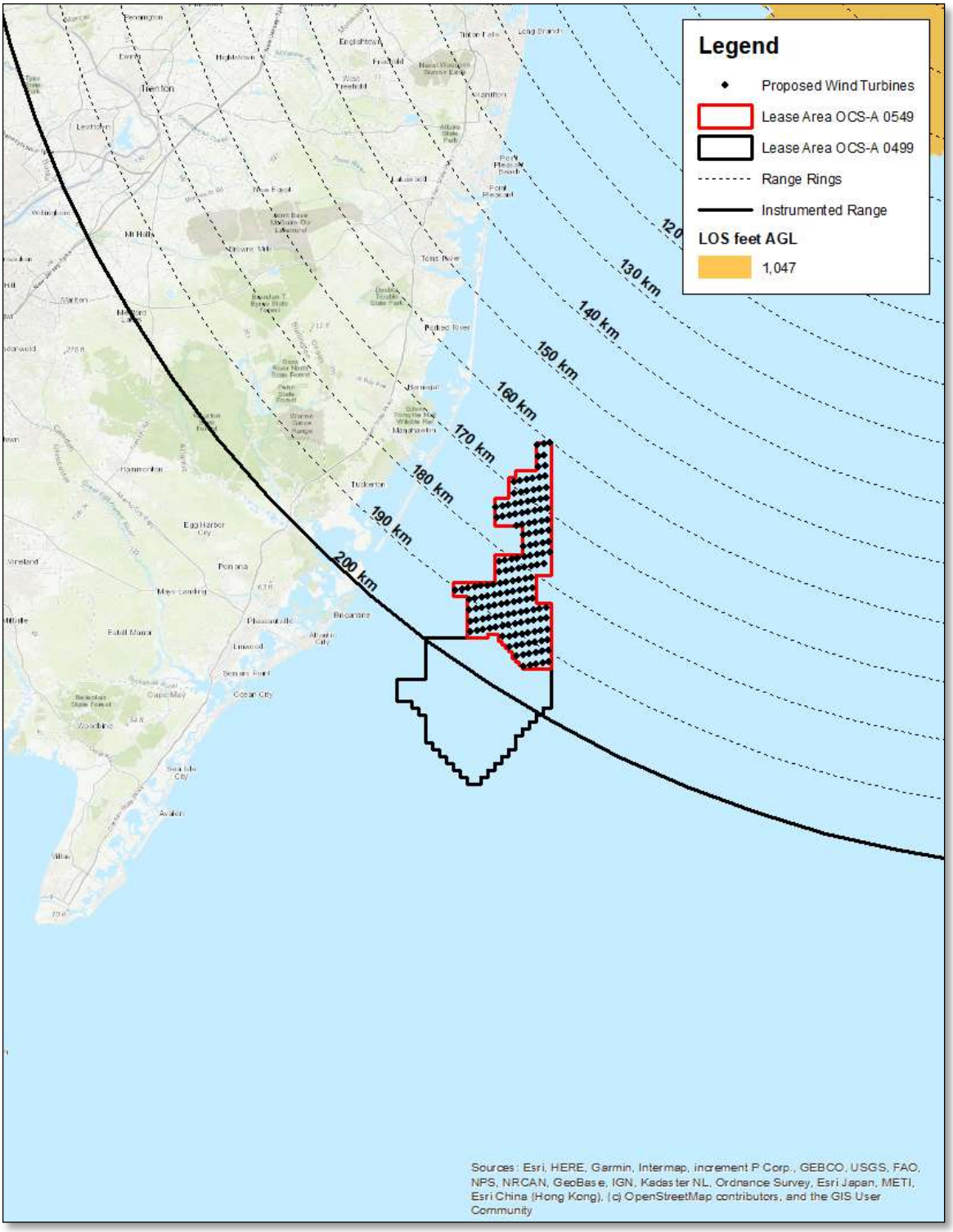

Figure 15 LOS Analysis Results for the Moriches HF Radar using 3DEP Data

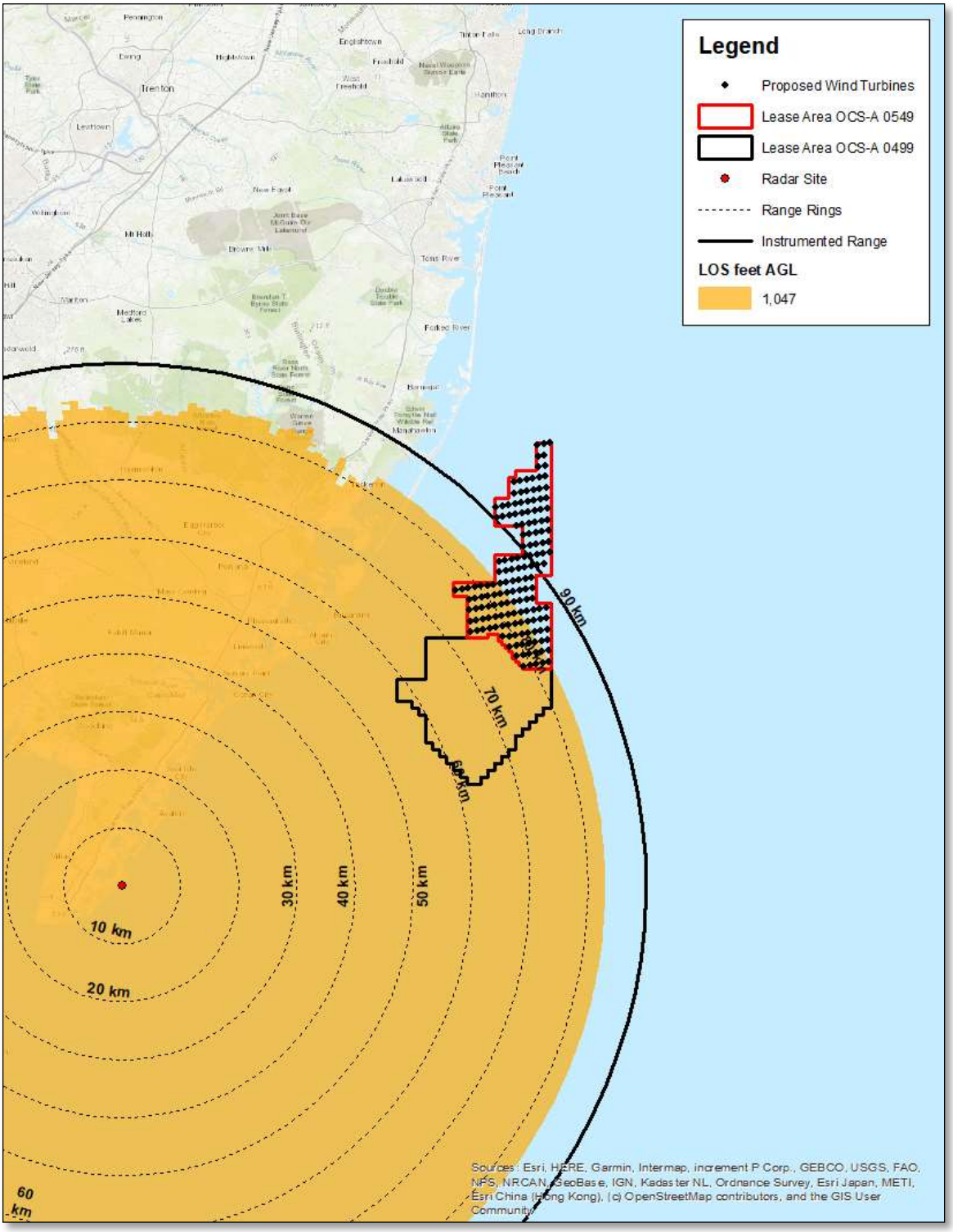

Figure 16 LOS Analysis Results for the North Wildwood HF Radar using 3DEP Data

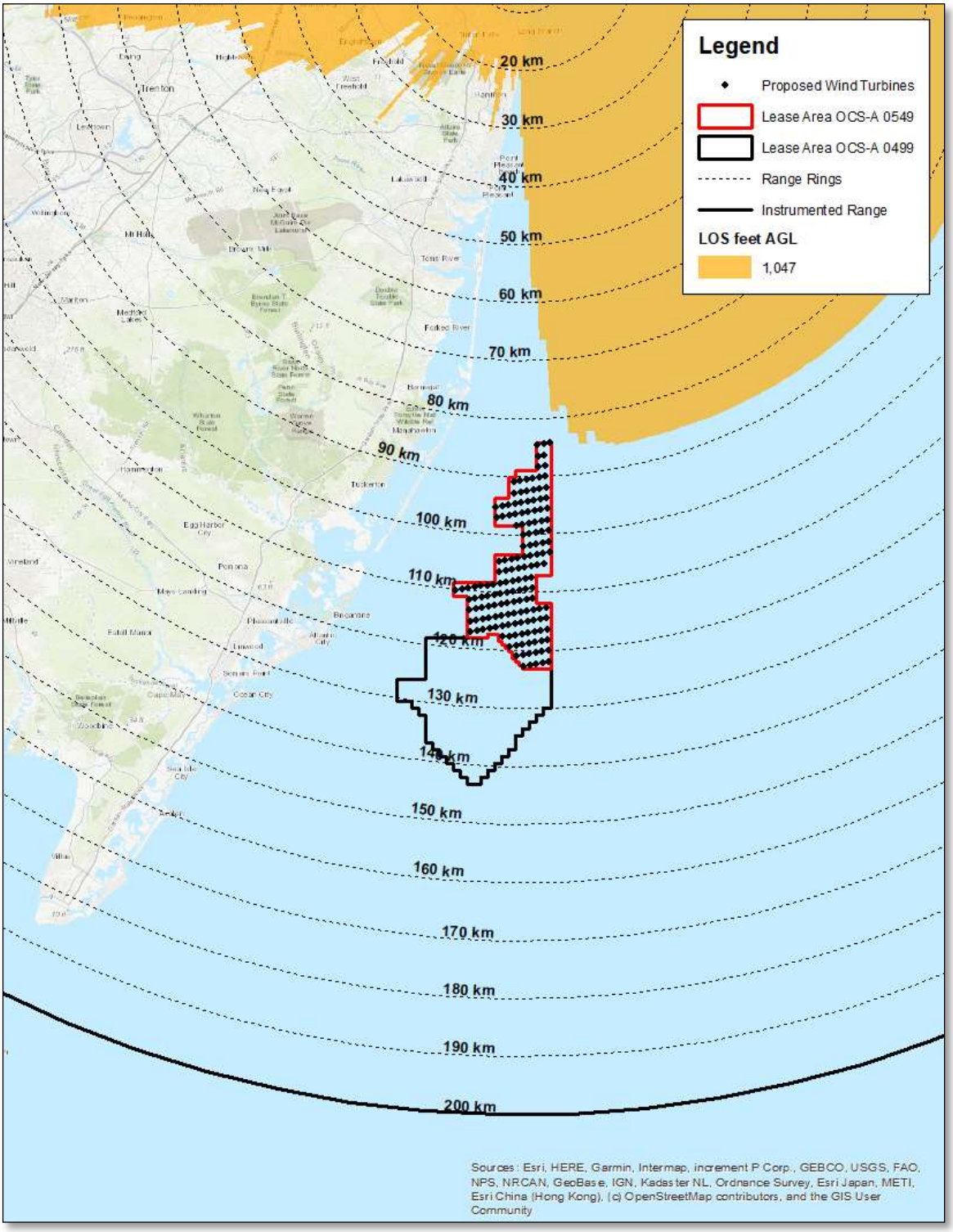

Figure 17 LOS Analysis Results for the Sandy Hook HF Radar using 3DEP Data

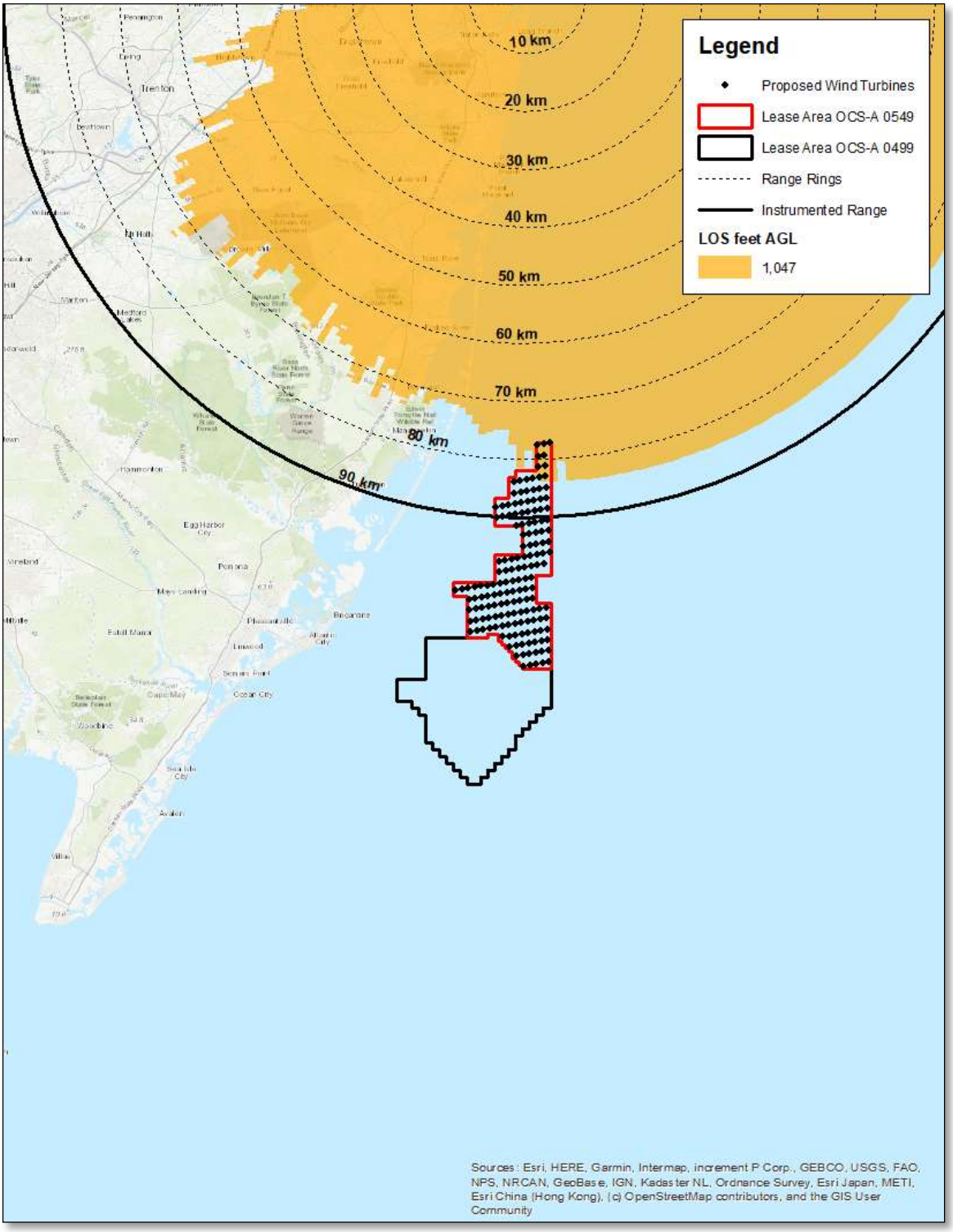

Figure 18 LOS Analysis Results for the Sea Bright HF Radar using 3DEP Data

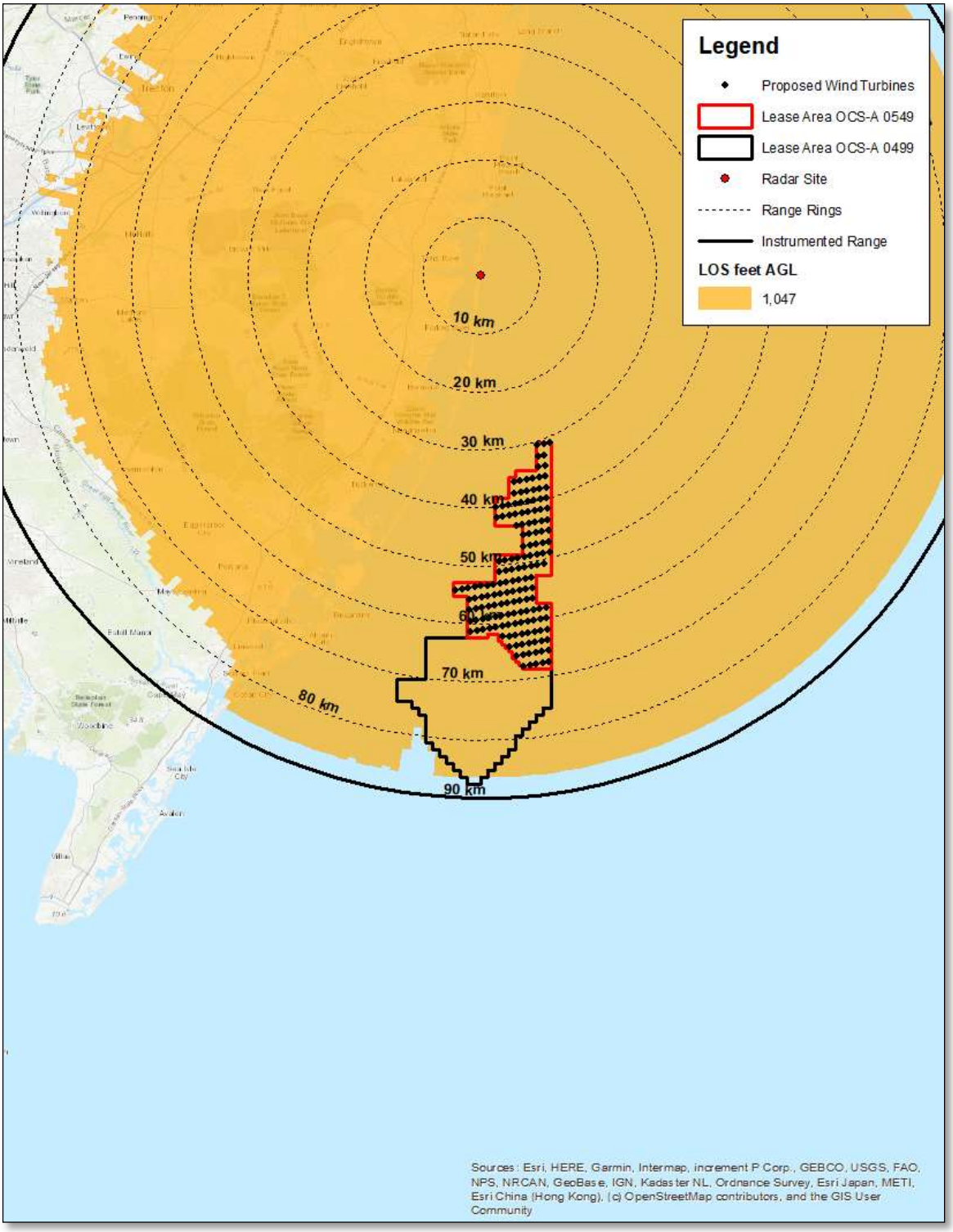

Figure 19 LOS Analysis Results for the Seaside Park HF Radar using 3DEP Data

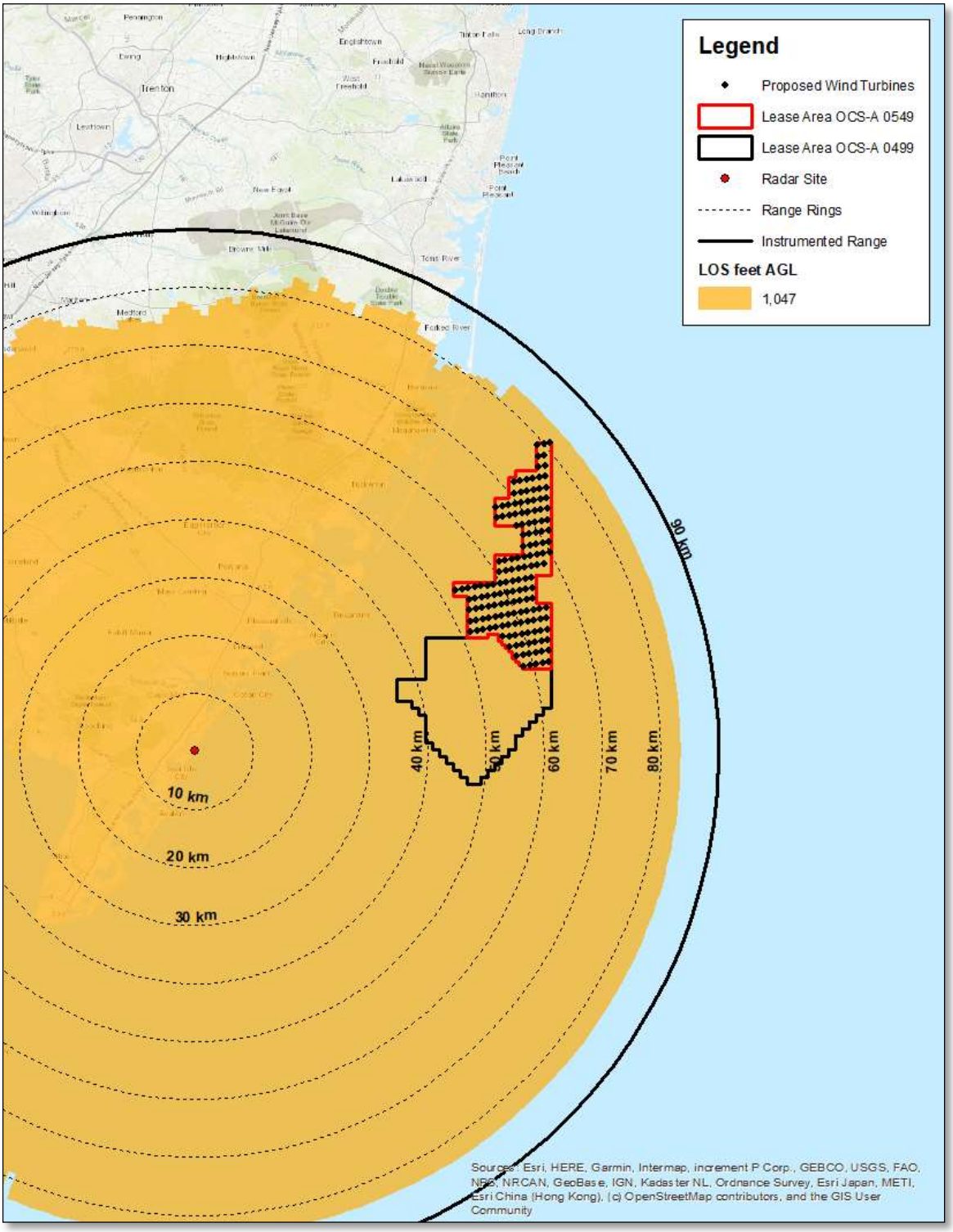

Figure 20 LOS Analysis Results for the Strathmere HF Radar using 3DEP Data

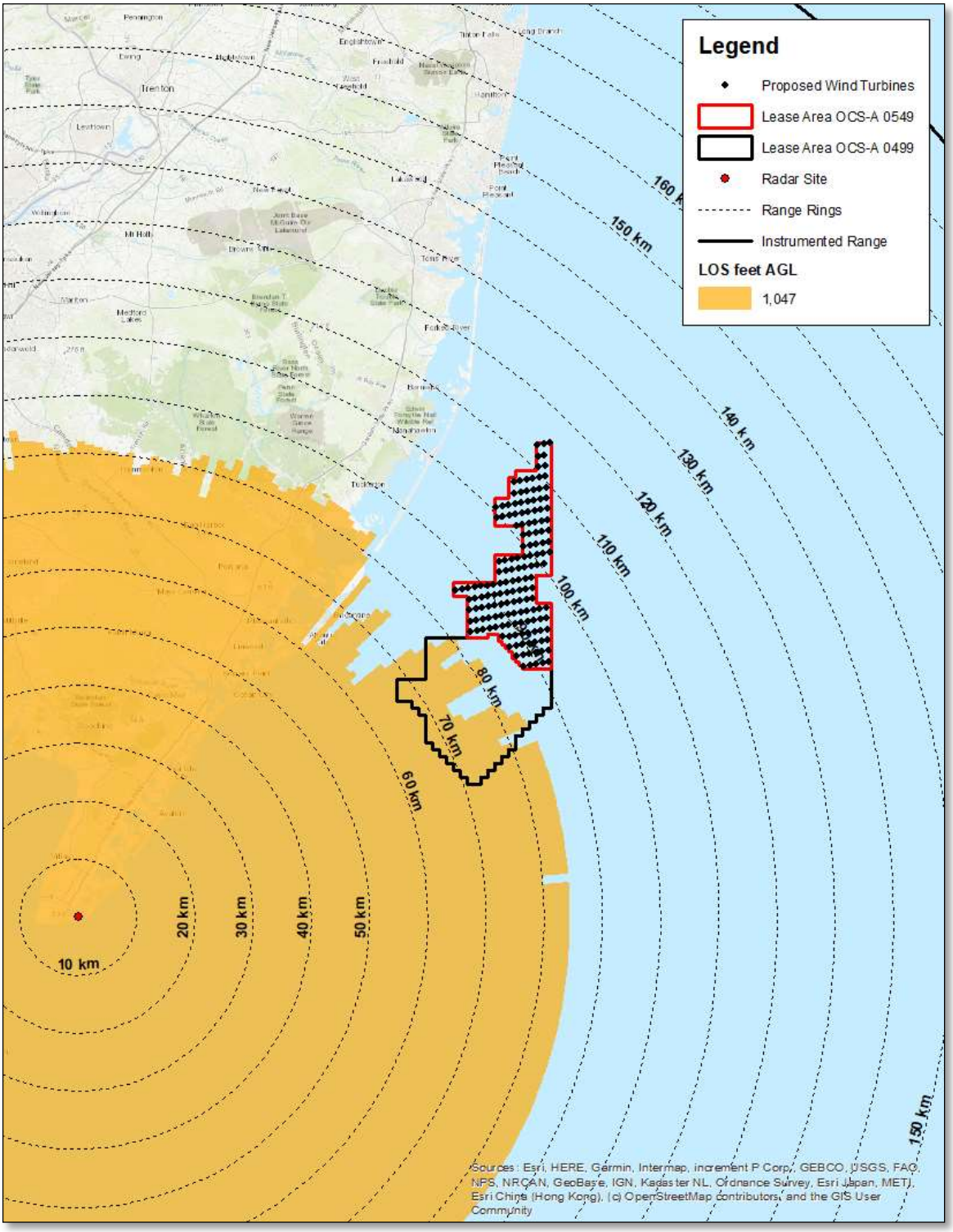

Figure 21 LOS Analysis Results for the Wildwood HF Radar using 3DEP Data

CONCLUSIONS

Westslope conducted an ARSR and ASR LOS analysis for the following eight radar sites:

- Atlantic City ASR-9;
- Dover AFB DASR;
- Gibbsboro ARSR-4;
- McGuire AFB DASR;
- Newark ASR-9;
- New York ASR-9;
- Philadelphia ASR-9; and
- NAS Willow Grove ASR-11.

The Project is beyond the instrumented range of the Dover AFB DASR, Newark ASR-9, and the NAS Willow Grove ASR-11. As such, no additional analysis was considered necessary for these radar sites.

The ARSR and ASR LOS analyses conducted by Westslope show the following:

- For the Atlantic City ASR-9 and the Gibbsboro ARSR-4, all 157 proposed wind turbines will be within line-of-sight of and will interfere with these radar sites at a blade-tip height of 1,047 feet AGL.
- For the McGuire AFB DASR, 81 of the 157 proposed wind turbines will be within line-of-sight of and will interfere with this radar site at a blade-tip height of 1,047 feet AGL.
- For the New York ASR-9 and the Philadelphia ASR-9, the 157 proposed wind turbines will not be within line-of-sight of and will not interfere with these radar sites at a blade-tip height of 1,047 feet AGL.

For the Atlantic City ASR-9 and the McGuire 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 the proposed wind turbines within line-of-sight. Other radar effects include a partial loss of weather detection and false weather indications over and in the immediate vicinity of the proposed wind turbines within line-of-sight. Please note that radar effects do not always translate into operational impacts.

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 the proposed wind turbines.

Because wind turbines will be within line-of-sight of the Atlantic City ASR-9, Gibbsboro ARSR-4, and the McGuire AFB DASR, Westslope expects that the DoD and FAA will have concerns with the proposed wind turbines within line-of-sight at a blade-tip height of 1,047 feet AGL based on electromagnetic interference to air navigation facilities. The FAA's aeronautical study process and the DoD Siting

Clearinghouse process will provide an official decision as to whether impacts are acceptable to operations. Although possible, Westslope does not expect that the DHS will have concerns with the proposed wind turbines within line-of-sight at a blade-tip height of 1,047 feet AGL based on impacts to these radar sites.

Mitigation options for the Atlantic City ASR-9, Gibbsboro ARSR-4, and the McGuire AFB DASR include, but are not limited to, the following:

- For the Atlantic City ASR-9, this radar site uses adaptive processing techniques to self-optimize the radar settings to minimize false primary targets and maximize primary target detection. As such, it is unlikely that intervention will be required by FAA personnel to address primary radar performance. For the partial loss of weather detection and false weather indications, an update to the clear day map to minimize false weather indications may be required.
- For the Gibbsboro ARSR-4, optimization, referred to as Radar Adverse-impact Mitigation (RAM) by the DoD, will be required to the radar settings to minimize false primary targets and maximize primary target detection.
- For the McGuire AFB DASR, RAM may be required to minimize false primary targets and maximize primary target detection.
- The above three radar sites provide overlapping coverage over the Lease Area.

Westslope does not expect that the 157 proposed wind turbines will affect the secondary surveillance radar co-located with the Atlantic City ASR-9, Gibbsboro ARSR-4, or the McGuire AFB DASR.

Westslope conducted a TDWR screening analysis for the following three radar sites:

- Floyd Bennett Field TDWR;
- Pennsauken TDWR; and
- Woodbridge TDWR.

Westslope's TDWR screening analysis shows that the Project is beyond the instrumented range of the Floyd Bennett Field TDWR, Pennsauken TDWR, and the Woodbridge TDWR. As such, no additional analysis was considered necessary for these radar sites.

Westslope conducted a VOR screening analysis for the following seven navigational aid sites:

- Atlantic City VORTAC;
- Cedar Lake VOR/DME;
- Colts Neck VOR/DME;
- Coyle VORTAC;
- Lakehurst TACAN;
- McGuire VORTAC; and
- Sea Isle VORTAC.

Westslope's VOR screening analysis for the Atlantic City VORTAC, Cedar Lake VOR/DME, Colts Neck VOR/DME, Coyle VORTAC, Lakehurst TACAN, McGuire VORTAC, and the Sea Isle VORTAC shows that the Project is greater than 8 NM from these navigational aid sites. Although possible, Westslope does not expect that the FAA will have concerns with the proposed wind turbines at a blade-tip height of 1,047 feet AGL based on impacts to these navigational aid sites.

Westslope conducted a NEXRAD weather radar screening analysis for the following two radar sites:

- Dover AFB WSR-88D; and
- Philadelphia WSR-88D.

Westslope's NEXRAD weather radar screening analysis for the Dover AFB WSR-88D shows that the 157 proposed wind turbines will not be within line-of-sight of and will not interfere with this radar site at a blade-tip height of 1,047 feet AGL. The results also show that the 157 proposed wind turbines at a blade-tip height of 1,047 feet AGL will fall within a NOAA green No Impact Zone for this radar site.

Westslope's NEXRAD weather radar screening analysis for the Philadelphia WSR-88D shows that all 157 proposed wind turbines will be within line-of-sight of this radar site at a blade-tip height of 1,047 feet AGL. The results also show that, at a blade-tip height of 1,047 feet AGL, 57 of the 157 proposed wind turbines will fall within a NOAA dark green Notification Zone and 100 of the 157 proposed wind turbines will fall within a NOAA green No Impact Zone for this radar site. At a blade-tip height of 1,047 feet AGL, Doppler contamination over and in the immediate vicinity of the proposed wind turbines is possible due to clutter. As a result, some impacts to Philadelphia WSR-88D operations are possible.

Westslope conducted an HF radar LOS analysis for the following 15 radar sites:

- Assateague Island HF radar;
- Bradley Beach HF radar;
- Brant Beach HF radar;
- Brigantine Long Range HF radar;
- Brigantine Medium Range HF radar;
- Cape May Point HF radar;
- Hempstead HF radar;
- Loveladies HF radar;
- Moriches HF radar;
- North Wildwood HF radar;
- Sandy Hook HF radar;
- Sea Bright HF radar;
- Seaside Park HF radar;
- Strathmere HF radar; and
- Wildwood HF radar.

The HF radar LOS analyses conducted by Westslope show the following:

- For the Bradley Beach HF radar, 102 of the 157 proposed wind turbines will be within line-of-sight of this radar site at a blade-tip height of 1,047 feet AGL.
- For the Brant Beach HF radar, Brigantine Long Range HF radar, Brigantine Medium Range HF radar, Loveladies HF radar, Seaside Park HF radar, and the Strathmere HF radar, all 157 proposed wind turbines will be within line-of-sight of these radar sites at a blade-tip height of 1,047 feet AGL.
- For the North Wildwood HF radar, 57 of the 157 proposed wind turbines will be within line-of-sight of this radar site at a blade-tip height of 1,047 feet AGL.
- For the Sea Bright HF radar, eight of the 157 proposed wind turbines will be within line-of-sight of this radar site at a blade-tip height of 1,047 feet AGL.
- For the Assateague Island HF radar, Cape May Point HF radar, Hempstead HF radar, Moriches HF radar, Sandy Hook HF radar, and the Wildwood HF radar, the 157 proposed wind turbines will not be within line-of-sight of these radar sites at a blade-tip height of 1,047 feet AGL. Although the proposed wind turbines will not be within line-of-sight of these radar sites, radar effects are still possible beyond line-of-sight due to the propagation of HF electromagnetic waves over the ocean surface.

For the Bradley Beach HF radar, Brant Beach HF radar, Brigantine Long Range HF radar, Brigantine Medium Range HF radar, Loveladies HF radar, North Wildwood HF radar, Sea Bright HF radar, Seaside Park HF radar, and the Strathmere HF radar, without mitigation, the radar effects will include clutter in the vicinity of the proposed wind turbines within line-of-sight and possibly in the vicinity of the proposed wind turbines beyond line-of-sight due to the propagation of HF electromagnetic waves over the ocean surface. Because wind turbines will be within line-of-sight of these radar sites, Westslope expects that multiple federal agencies in partnership with NOAA's IOOS may have concerns with the proposed wind turbines within line-of-sight at a blade-tip height of 1,047 feet AGL based on potential interference to these HF radar sites.

Mitigation options for HF radar include, but are not limited, to the following:

- Implementation of a software package to address interference from wind turbines in real-time, which is being researched by CODAR Ocean Sensors, Ltd. under funding from the Bureau of Ocean Energy Management; and
- Installation of other wave and current sensors in the Lease Area.

Westslope recommends that the Project be submitted to the DoD Siting Clearinghouse for an informal review and to the National Telecommunications and Information Administration (NTIA) for a detailed review. The NTIA is essentially a clearinghouse for other federal agencies, including the National Oceanic and Atmospheric Administration. Additionally, Westslope recommends consultation with NOAA's IOOS Program Office.

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