

Enclosure 4

**Viewshed Study and
Impact Assessment**



Viewshed Study and Impact Assessment

*Entry Corridor Area Feasibility Study & Environmental
Assessment - Arlington National Cemetery
USACE, Norfolk District
Arlington, Virginia*

Contract No. W9123622D2005
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Section 1 Introduction

Arlington National Cemetery (ANC) is our nation's most hallowed ground. The cemetery consists of 639 acres and is the final resting place of over 400,000 eligible veterans, active-duty service members, and their families located in Arlington County, Virginia. The cemetery receives millions of visitors each year - including visits from the President of the United States, other dignitaries, family members of the deceased, and millions of visitors from around the world. More than 6,500 funerals are conducted yearly at ANC. Additionally, up to 3,000 other ceremonies occur regularly, such as: commemorations, dedication/wreath ceremonies, and dignitary visits¹. These ceremonies and funerals often receive the intense focus of the press and other media. ANC's mission is to honor the sacrifices of American service members and their families for generations to come.

One of the ways ANC honors its mission is by continuously identifying ways to increase the burial capacity of the cemetery while also improving the visitor experience. To achieve these goals, ANC is undertaking a series of enhancements aimed at improving transportation and pedestrian circulation, security, operational efficiency and visitor experience, particularly in the critical location described in the ANC Real Property Master Plan (RPMP) as Area Development Plan 1 (ADP1). ADP1, or "Entry Corridor Area", is located in the northeast section of the cemetery and serves as the primary visitor and ceremonial entrance to ANC. It includes significant facilities such as the Welcome Center, POV and Bus Parking Garage, Administration Building, Military Women's Memorial, and various support areas. Covering approximately 35 acres, this area is pivotal for managing the high volume of visitors and ceremonial activities. The proposed improvements would address various operational challenges and enhance the experience for visitors, funeral attendees, and staff.

The proposed action includes the redevelopment of the ANC entry corridor, to include improvements to Memorial Avenue, parking garage reconfiguration, a pedestrian screening facility and arrivals plaza, a new Welcome Center and central plaza, interpretive gardens, amphitheater, gathering space, and new columbaria. The new Welcome Center would be roughly the same size as the existing Welcome Center (approximately 33,200 square feet). The proposed 33,200 square foot Welcome Center will be constructed adjacent to the existing Welcome Center, which is proposed for demolition. The Welcome Center will be constructed to a height of approximately 38 feet and developed to generally match the surrounding architecture and style consistent with ANC. As the tallest structure proposed for the proposed redevelopment project, the Welcome Center is the focal point of this viewshed analysis.

An Environmental Assessment (EA) is being prepared to evaluate alternatives for expansion and to consider potential effects of the expansion. One of the considerations is the effect of the expansion on historic resources which are protected under Section 106 of the National Historic Preservation Act of 1966 (NHPA). Section 106 of the NHPA outlines a historic preservation review process and requires Federal agencies to consider the effects of their projects on historic resources. Both direct and indirect effects to historic resources must be considered. The potential for the proposed project to affect the views to and from numerous historic resources prompted the need for a viewshed study and impact assessment.

The primary purpose of this study was to identify a Preliminary Visual Area of Potential Effect (APE) for Visual Effects. In general, the APE is defined in the regulations implementing the Section 106 review process as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking" [36 CFR Part 800.16(d)].

¹ The Department of The Army. (n.d.). History of Arlington National Cemetery. Arlington National Cemetery. <https://www.arlingtoncemetery.mil/Explore/History-of-Arlington-National-Cemetery>

This document describes the methods used to develop the APE, the resources that were identified within the APE, the visibility between the existing resources and the proposed Welcome Center, and the impact of the proposed Welcome Center on the identified historic resources through photographs and professional renderings of the proposed project. The project location is within the area studied for the Southern Expansion of ANC therefore, the Viewshed Study and Impact Assessment completed to support that undertaking was used as a reference. Other guidance that contributed to the development of this document includes the ANC Integrated Cultural Resources Management Plan (ICRMP) and the Programmatic Agreement (PA) between ANC, Virginia State Historic Preservation Officer (VDHR), and the Advisory Council on Historic Preservation (ACHP) dated 2014. Information for the specific historic resources identified as potentially effected was gathered from Virginia Cultural Resource Inventory System (VCRIS).

1.1 Study Purpose

A new Welcome Center is proposed in the entry corridor of ANC as part of entry corridor redevelopment project associated with the RPMP. In accordance with Section 106 of the NHPA, the potential direct and indirect effects on historic resources must be evaluated.

As defined by 36CFR800.16(d), an APE is: “the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking”. The APE identifies all historic properties within a radius of the project location. This APE not only considers potential direct effects on resources, but also indirect effects such as impacts to viewsheds and vistas. Additionally, this report identifies all resources within the APE that are listed in or are eligible for listing in the National Register of Historic Places (NRHP) and therefore have the potential to be impacted by the construction of the Welcome Center. The Benham-Stanley Joint Venture and its teaming partners (JV) completed on-site documentation with digital photography on April 16, 2024, and December 17, 2024. The result of the digital photography provided insight that allowed JV to assess the potential visual impacts of the proposed Welcome Center on the historic resources.

The APE and viewshed information gathered in this report will support the findings of the EA as well as the completion of the Section 106 process, which will fully evaluate potential effects of the proposed undertaking on surrounding resources in accordance with the NHPA of 1966 as amended.

1.2 Proposed Action

The proposed action includes the redevelopment of the ANC entry corridor, to include improvements to Memorial Avenue, parking garage reconfiguration, a pedestrian screening facility and arrivals plaza, a new Welcome Center and central plaza, interpretive gardens, amphitheater, gathering space, and new columbaria. The new Welcome Center would be roughly the same size as the existing Welcome Center (approximately 33,200 square feet). The proposed 33,200 square foot Welcome Center will be constructed adjacent to the existing Welcome Center, which is proposed for demolition. The Welcome Center will be constructed to a height of 38 feet and developed to generally match the surrounding architecture and style consistent with ANC. As the tallest structure proposed for the proposed redevelopment project, the Welcome Center is the focal point of this viewshed analysis.

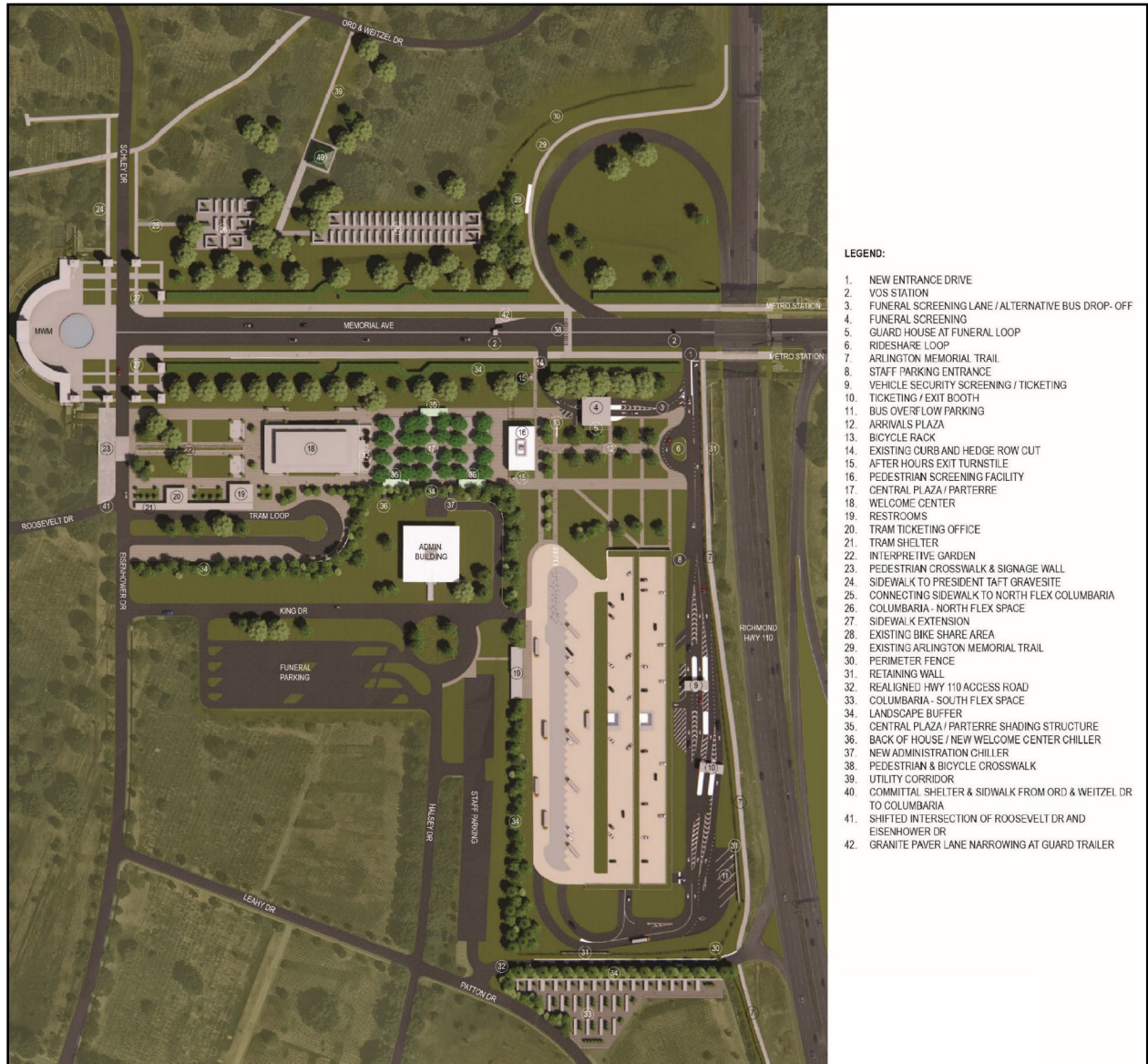


Figure 1-1: Proposed Action Site Plan



Figure 1-2: Rendering of the Proposed Welcome Center and Associated Gardens

Section 2 Methods for Establishing an APE

The APE established by the report was developed using a combination of findings from the 2016 Viewshed Study and Impact Assessment completed by EAC/A, Inc. for the Southern Expansion project, ArcGIS (to create initial Digital Elevation Model (DEM) and Digital Surface Model (DSM) data) and to evaluate line-of-sight to and from the project location, and on-site field survey data and renderings. The APE was established to encompass all areas with the potential to be directly or indirectly affected by the proposed undertaking.

2.1 The Digital Elevation Model (DEM) and Digital Surface Model (DSM)

The DEM is a projection that gathers information about the topographic surroundings of the project location. DEMs can be derived from topographic maps as well as high resolution Light Detection and Ranging (LiDAR) data. The Benham-Stanley JV (JV) developed the DEM using 2-foot contour data as the LiDAR data for Arlington County was not publicly accessible. The gathered contour data was transformed with ArcGIS Pro using the spatial analyst tool. With the DEM developed, the JV then utilized the ArcGIS Pro Viewshed spatial analyst tool after a focal point, generally in the center of the proposed Welcome Center site, at a height of the proposed 38-foot building.

According to the United States Geological Survey (USGS) website, a DEM “represents the bare ground topographic surface of the earth excluding trees, buildings, and any other surface objects.” These omissions therefore result in the capture of a larger viewshed than what would be visible in reality. The result of this DEM projected visibility of the proposed site reaching as far as three miles away. Similarly, the DEM for the Southern Expansion returned a viewshed which included resources as far away as four miles. Given this information and the findings of both the Welcome Center and Southern Expansion DEMs, it was determined that further evaluation and refinement was required to determine the distance from which the Welcome Center will be seen from nearby resources and vice versa.

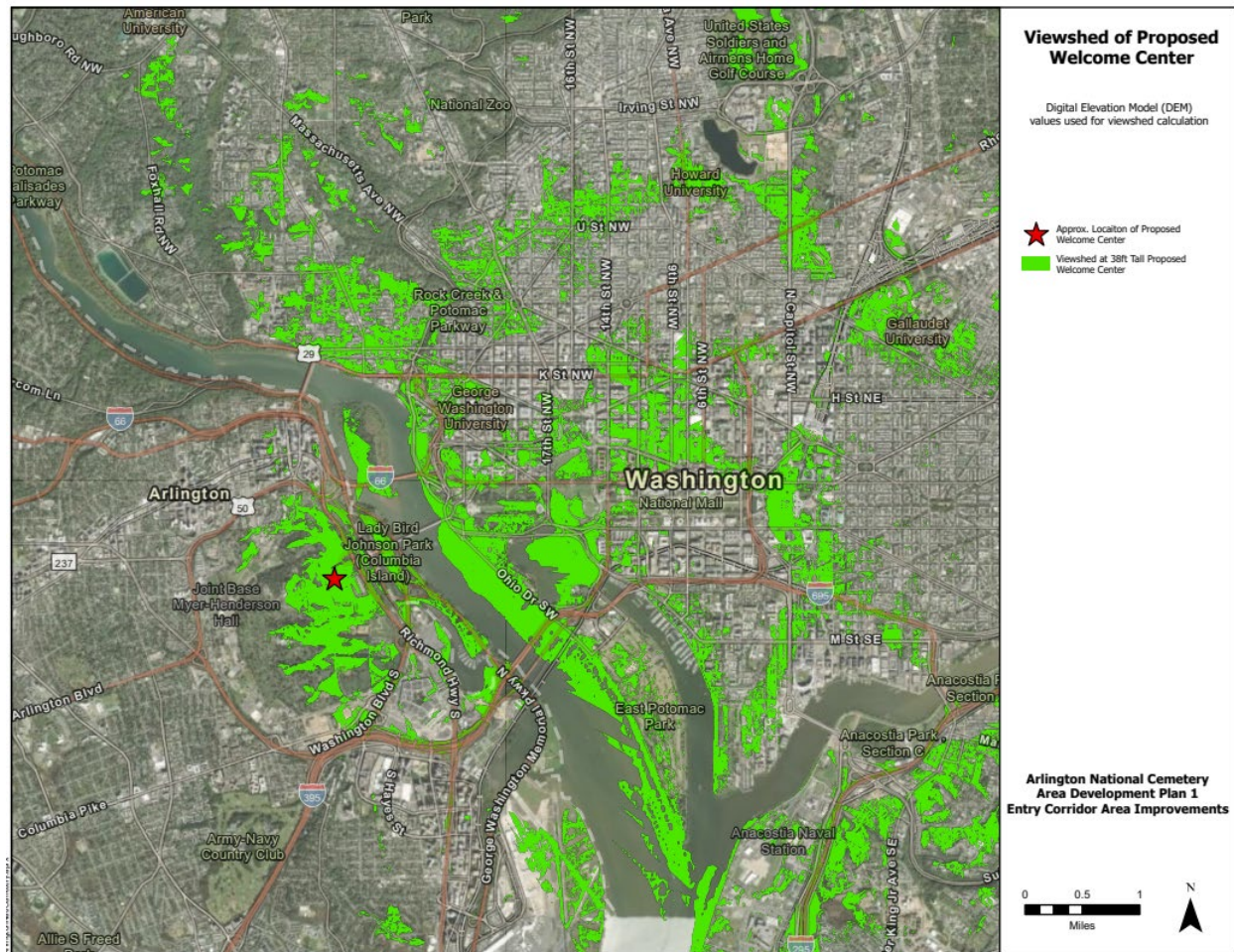


Figure 2-1: Digital Elevation Model (DEM) Viewshed Model Results

Similar to the DEM, a digital surface model (DSM) is a 3D computer model of the Earth's surface that includes both natural and human-made features. DSM models take into account things like vegetation and the built environment as opposed to the DEM 'bare-earth' model. Results of the DSM model are depicted below and show a much smaller area of potential visibility when additional surface features are taken into account.

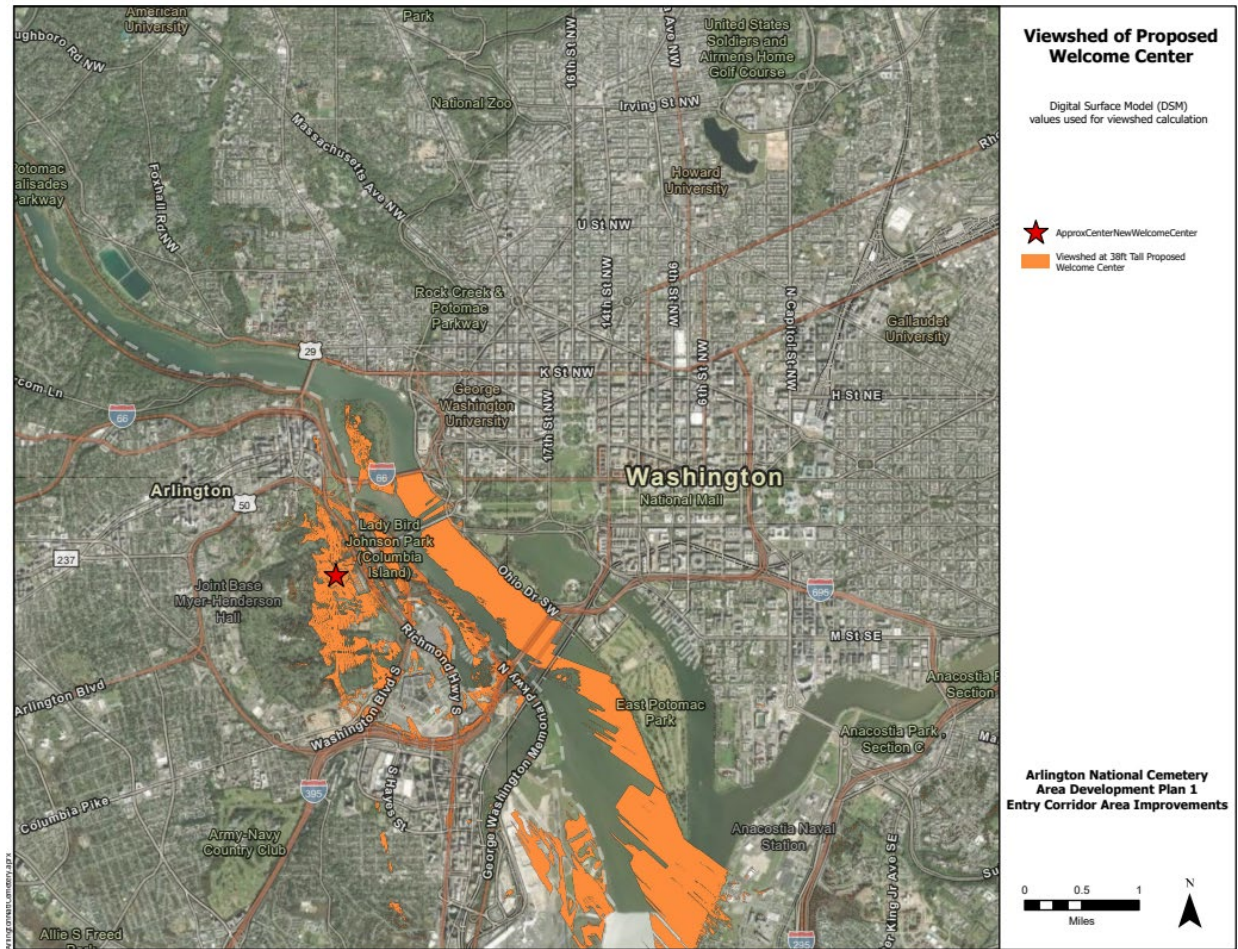


Figure 2-2: Digital Surface Model (DSM) Viewshed Model Results

Figure 2-3 combines the two viewshed model results together in a single image. To augment data from the combined models, line-of-sight assessments using ArcGIS were developed using vantage points identified and are further discussed in the following sections.

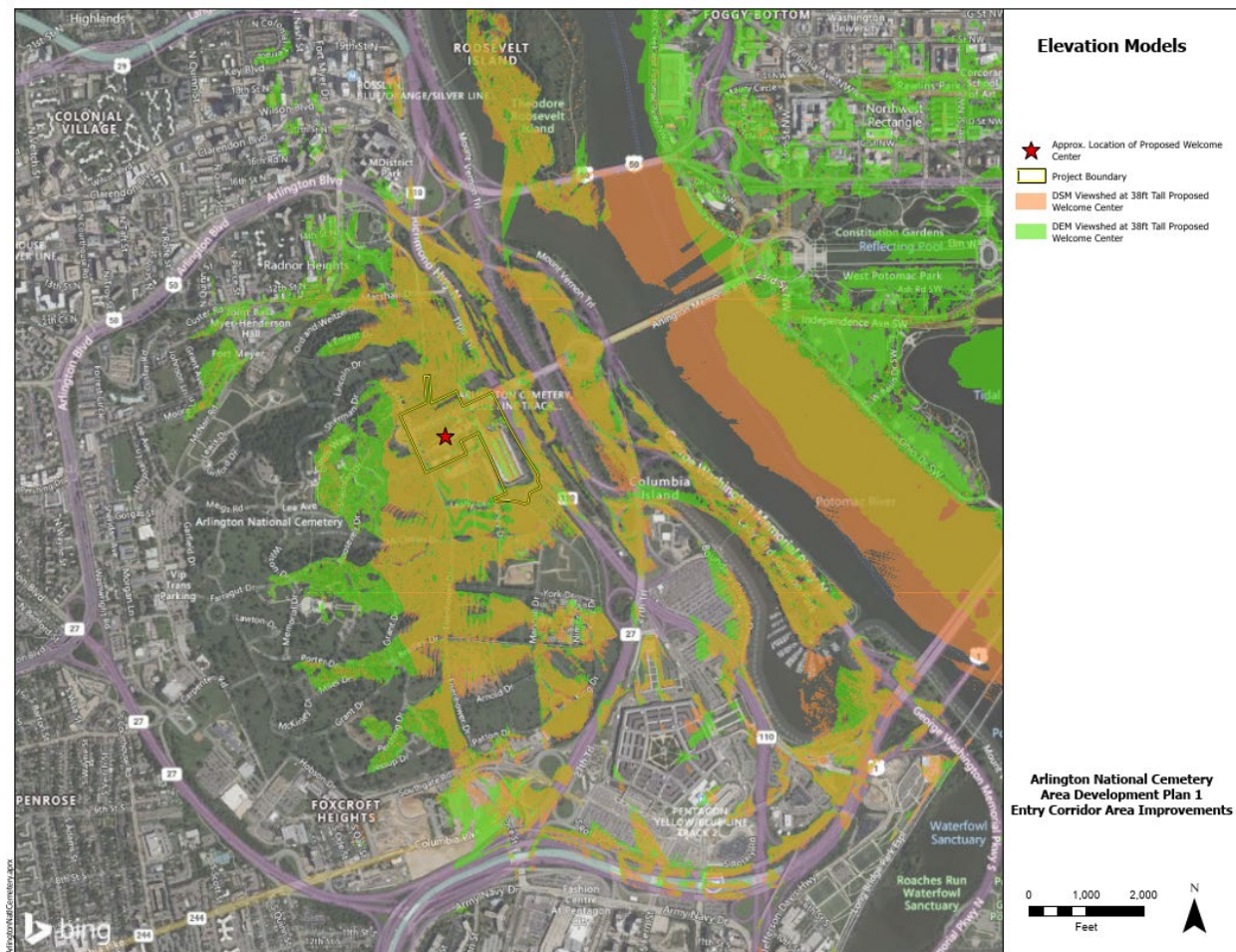


Figure 2-3: DSM And DEM Viewshed Results Combined

2.2 Line of Site Assessments

When the omitted flora and built environment were considered in concert with the DEM, lines-of-sight would frequently be impacted, ultimately decreasing the distance from which potential effects needed to be considered. The dense development of buildings and infrastructure throughout downtown Washington, D.C. and surrounding neighborhoods, and Arlington, Virginia, blocks visibility of the proposed Welcome Center site. The areas to the north, west, and south of Arlington National Cemetery are characterized by an extensive infrastructure system including raised roadways and dense building development of varying heights. Additionally, the mature landscaping that characterizes the cemetery further obscures line-of-sight to and from the Welcome Center site and historic resources.

The JV assessed line-of-sight visibility using the elevation profile tools in ArcGIS supported by on-site photography. This tool provides a visual interpretation of the elevation changes between two points. If there is a point between the two locations with a higher elevation, the line-of-sight will be obscured.

While the DEM projected the project would be visible well beyond a mile of the project site, the JV assessed the DSM and line-of-sight between the proposed Welcome Center and various points throughout Washington, D.C. were blocked from view based on the presence of visual obstructions. As a result, it was determined that many historic resources would not have visibility of the Welcome Center site therefore, the JV was able to further shrink the viewshed.

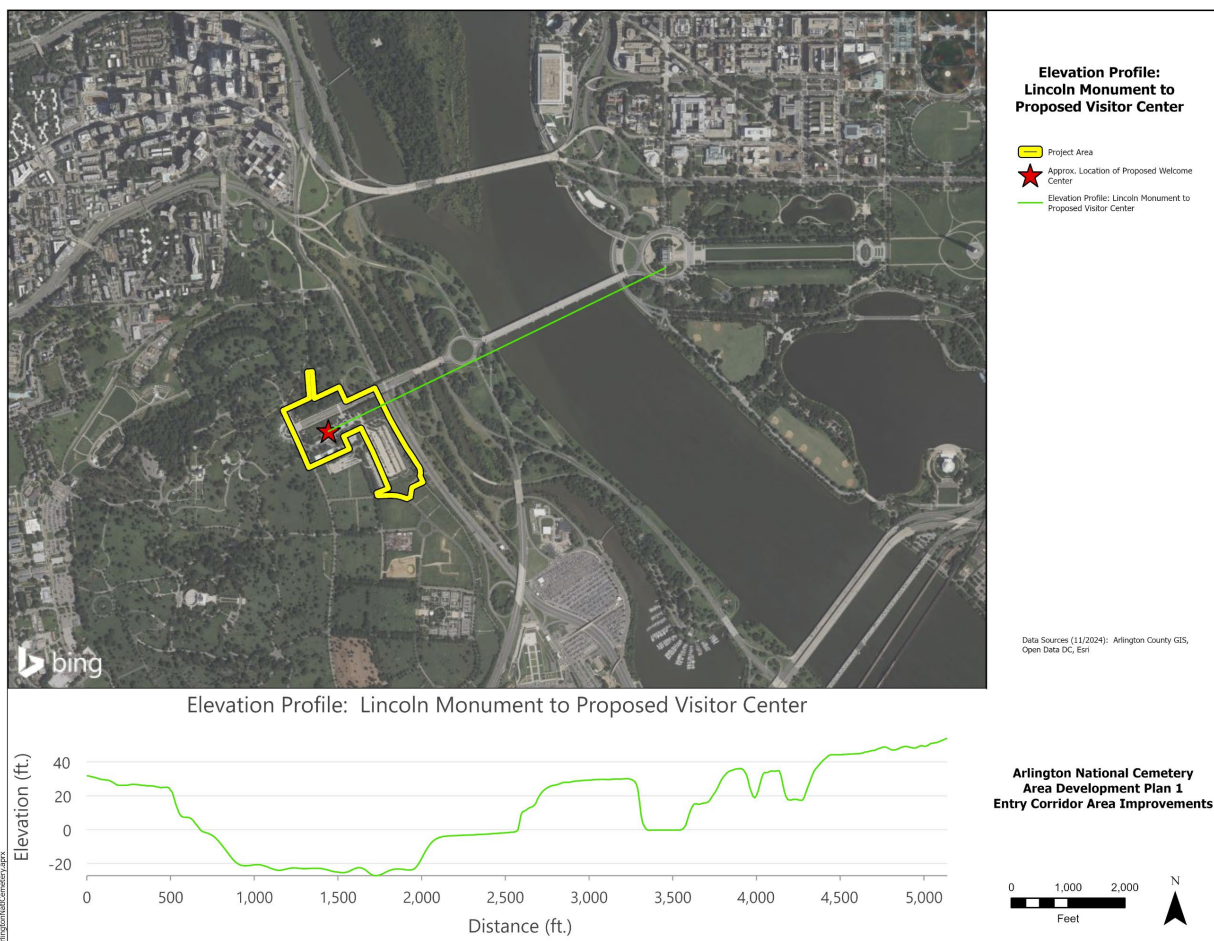


Figure 2-4: Elevation Profile / Line of Site from Lincoln Memorial

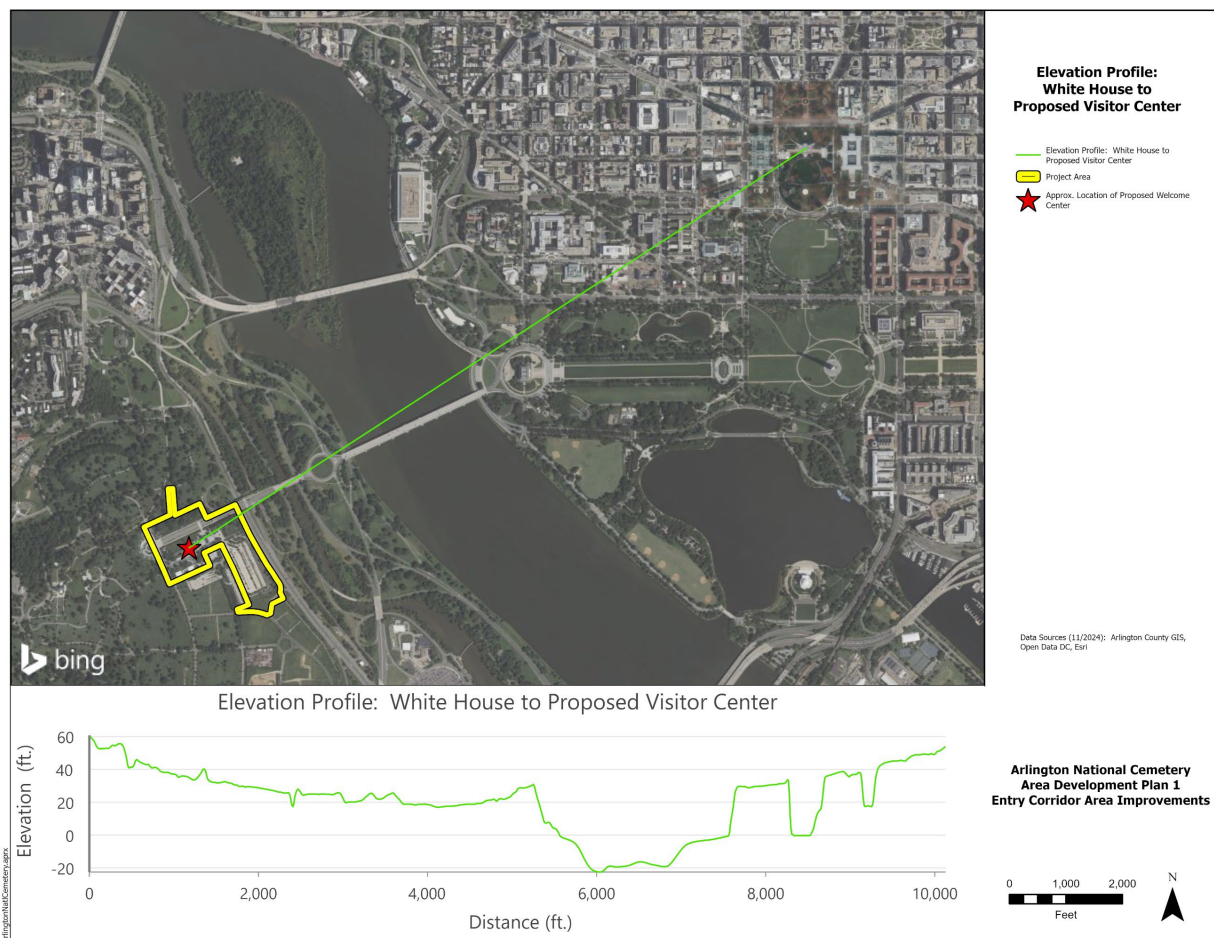


Figure 2-5: Elevation Profile / Line of Site from the White House

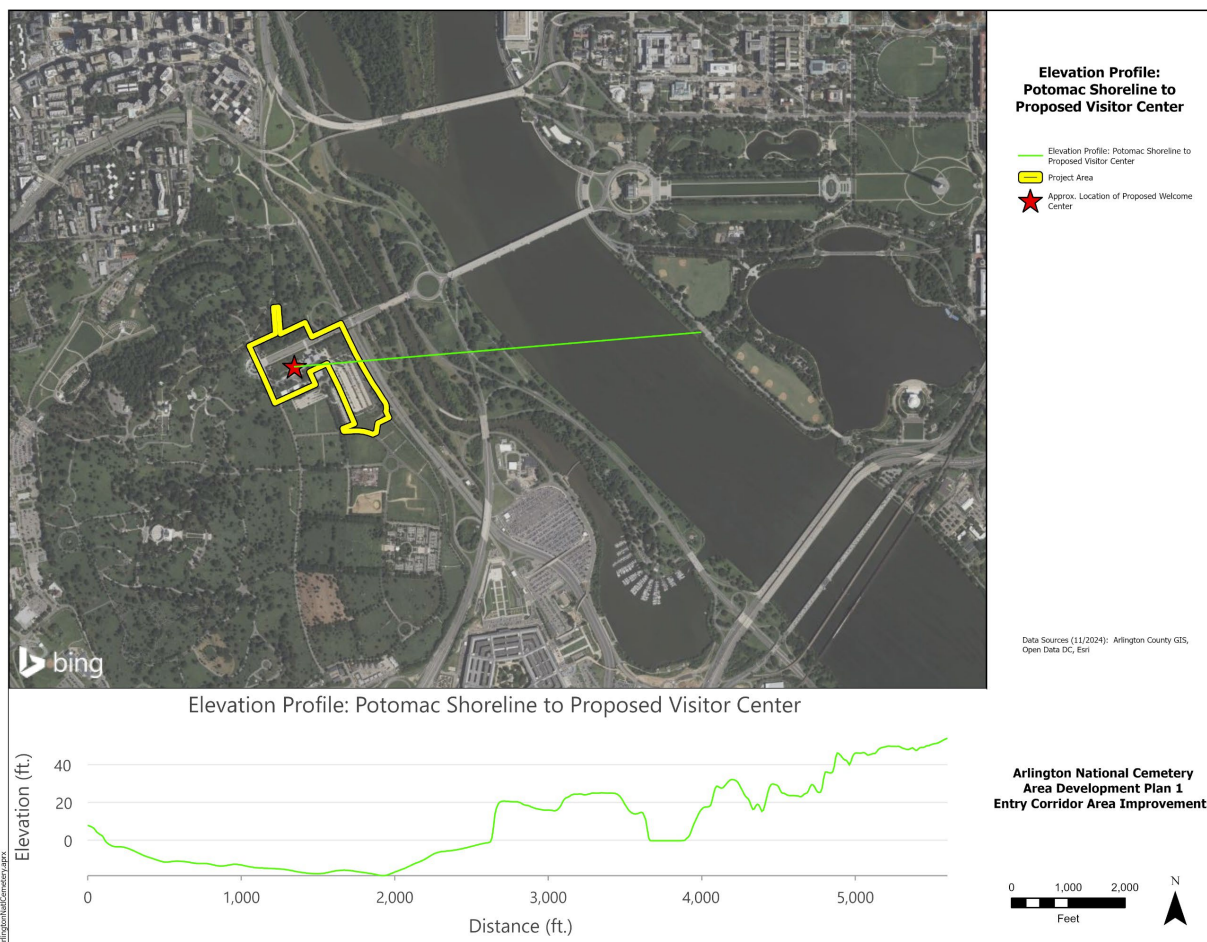


Figure 2-6: Elevation Profile / Line of Site from the Potomac Shoreline

2.3 Field Photographs and Evaluation

The line-of-sight data from the ArcGIS evaluation was further augmented with data collected in the field and through photographs taken at various vantage points. Field reconnaissance and photographs confirmed that the existing Welcome Center, next to which the proposed Welcome Center will be placed, is not largely visible or discernable to the human eye at a distance greater than 0.25 miles. The lack of visibility is primarily due to distance, vegetative screening, existing infrastructure, and elevation. Even in the areas immediately adjacent to the Welcome Center, the existing trees along Memorial Avenue generally cover the location of the Welcome Center from view. Based on the above methods, it was determined a 0.25-mile visual APE is appropriate for the proposed Welcome Center.



Figure 2-7: View Toward the Welcome Center Across the River from the Other Side of Arlington Memorial Bridge



Figure 2-8: View Toward the Welcome Center Across the Potomac River



Figure 2-9: View Toward the Welcome Center from Potomac Park, West of Memorial Bridge and East of Memorial Avenue



Figure 2-10: View Toward the Welcome Center from Potomac Park, West of Memorial Bridge and Further Along Memorial Avenue

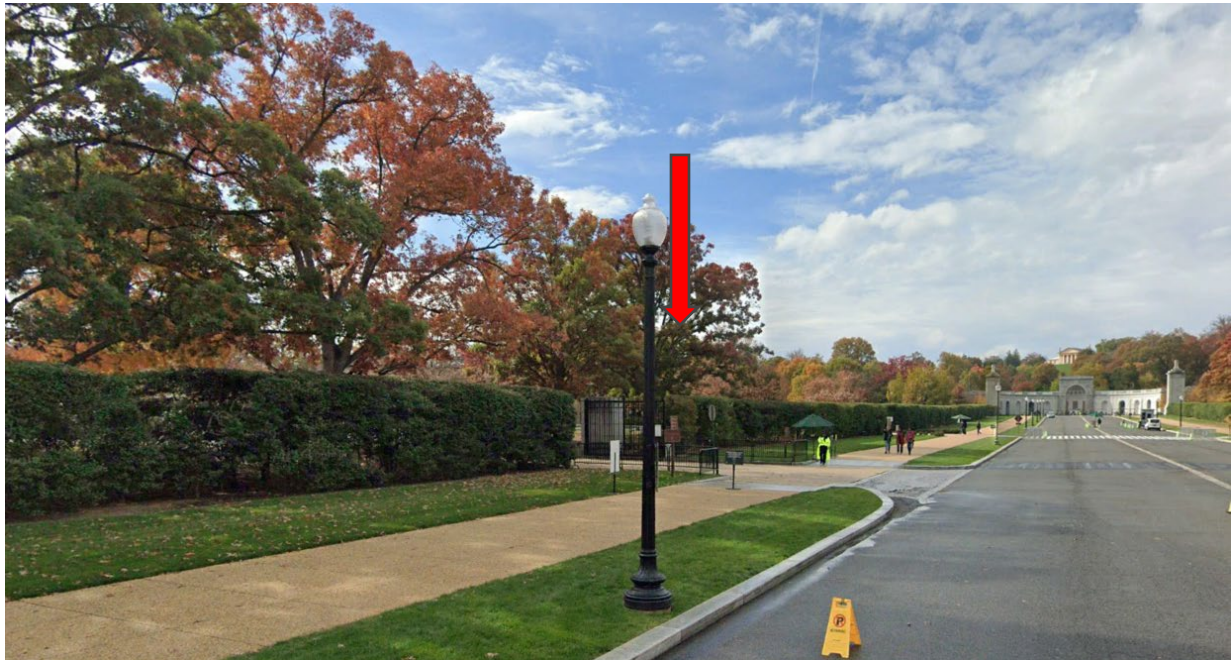


Figure 2-11: Close View Toward the Existing and Proposed Welcome Center Along Memorial Avenue in the Fall



Figure 2-12: Close View Toward the Existing and Proposed Welcome Center Along Memorial Avenue in the Winter



Figure 2-13: View Along Memorial Avenue Toward the Welcome Center in the Winter



Figure 2-14: View Toward the Existing and Proposed Welcome Center from the Netherlands Carillon

Section 3 Historic Resources within the Visual APE

The ANC was listed on the National Register under Criteria A, B, and C: under Criterion A for the “commemoration of our nation’s military;” under Criterion B for graves of important people that relate to the history of the country or region; and under Criterion C as a cemetery that reflects the “design characteristics associated with the picturesque/rural cemetery movements or the establishment of national cemeteries” and more specifically, design elements that reflect the influence of the McMillan Plan, the Commission of Fine Arts, and/or the City Beautiful Movement.

The project location is within the area studied for the Southern Expansion of ANC therefore, the Viewshed Study and Impact Assessment completed to support that undertaking was used as a reference. Other sources reviewed for the consideration of potential viewshed impacts to Historic Properties include ANC Integrated Cultural Resources Management Plan (ICRMP) and the Programmatic Agreement (PA) between ANC, Virginia State Historic Preservation Officer (VDHR), and the Advisory Council on Historic Preservation (ACHP) dated 2014. Information for the specific historic resources identified as potentially affected was gathered from Virginia Cultural Resource Inventory System (VCRIS) as well as Washington, D.C. planning websites. Maps from each of these source documents are provided in the following figures.



Figure 3-1: Arlington National Cemetery Historic District and Properties Map (source: ICRMP and PA)

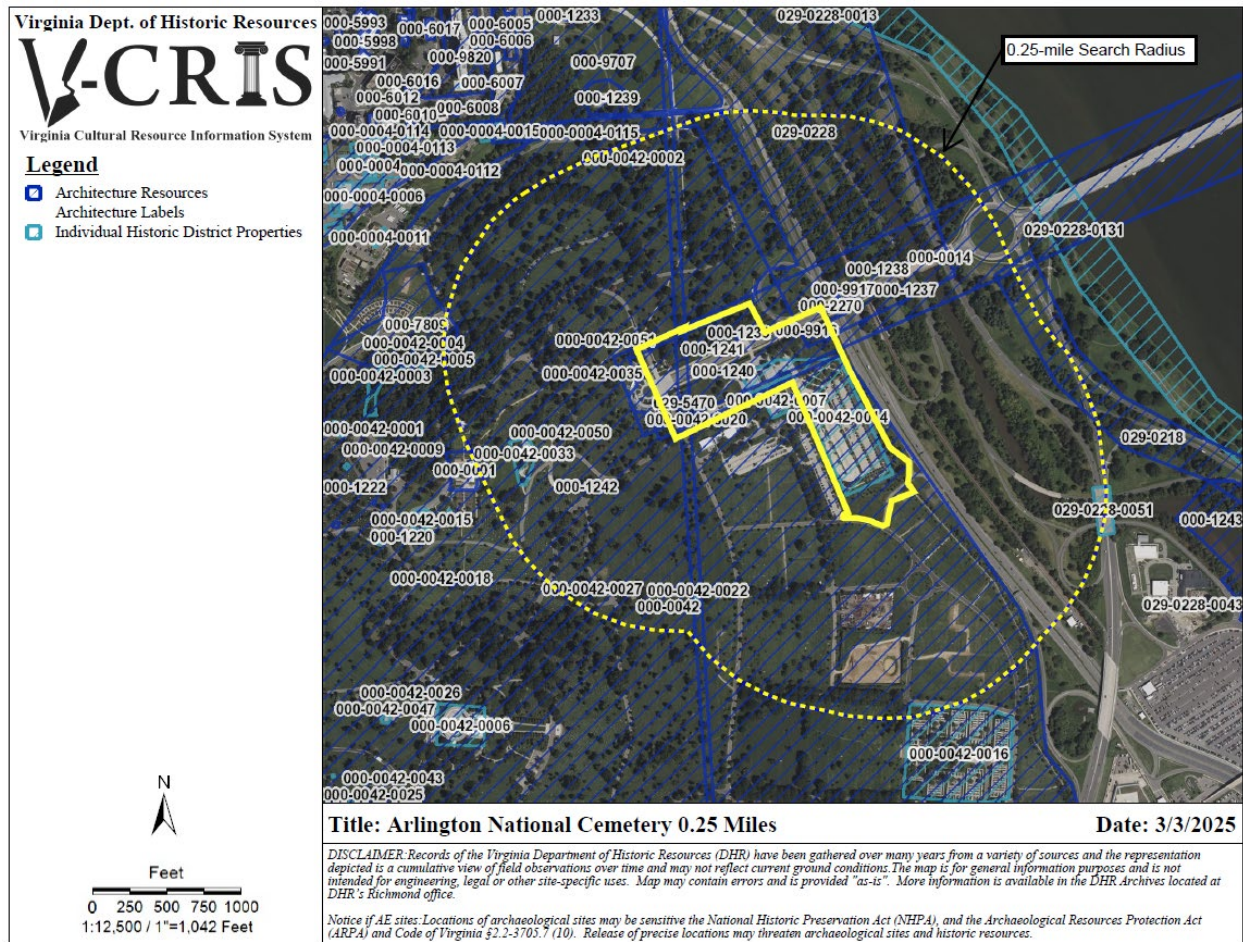


Figure 3-2: VCRIS Website Data for Arlington National Cemetery Welcome Center and Associated 0.25 Mile APE

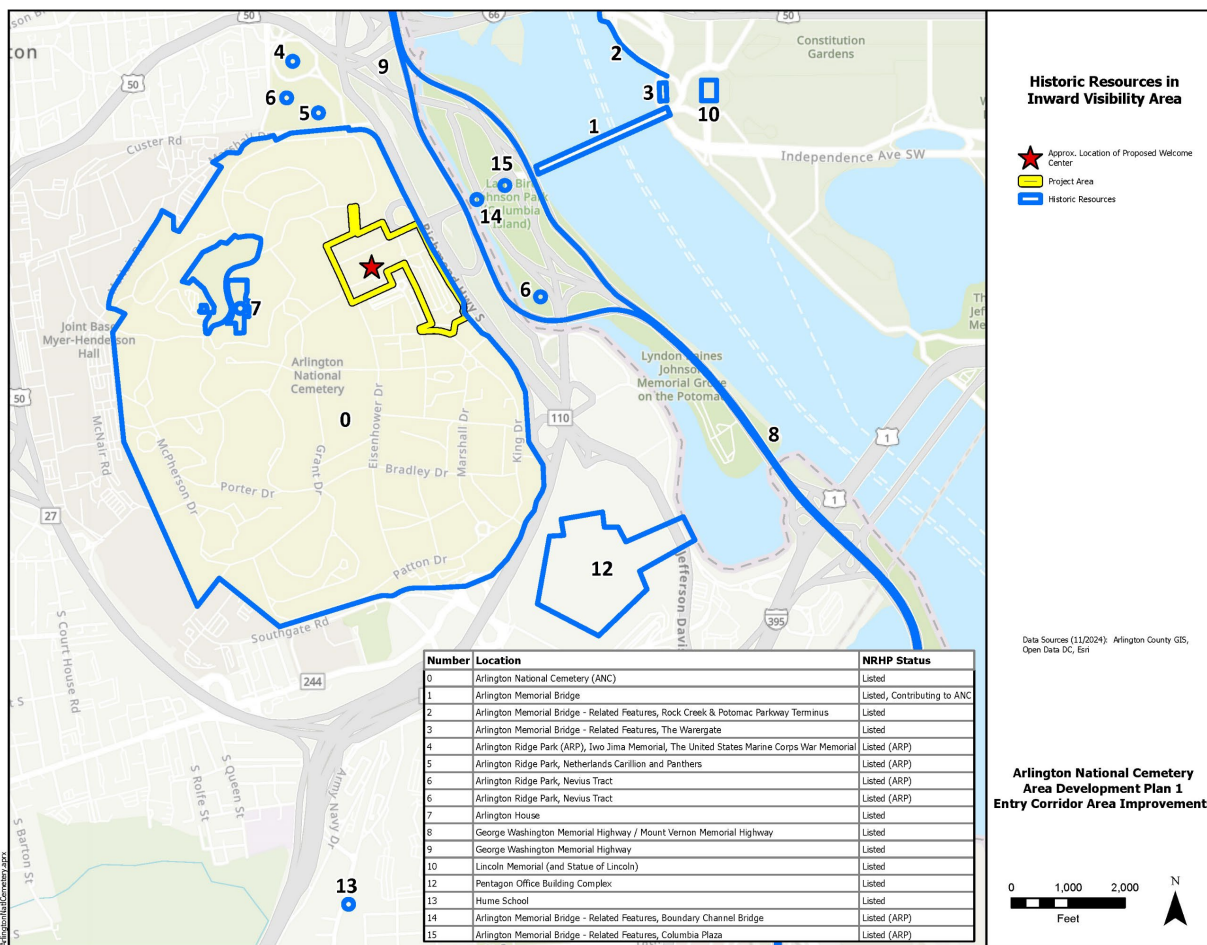


Figure 3-3: Relevant Historic Resources Documented Within the Inward Visibility Area of The Southern Expansion EA

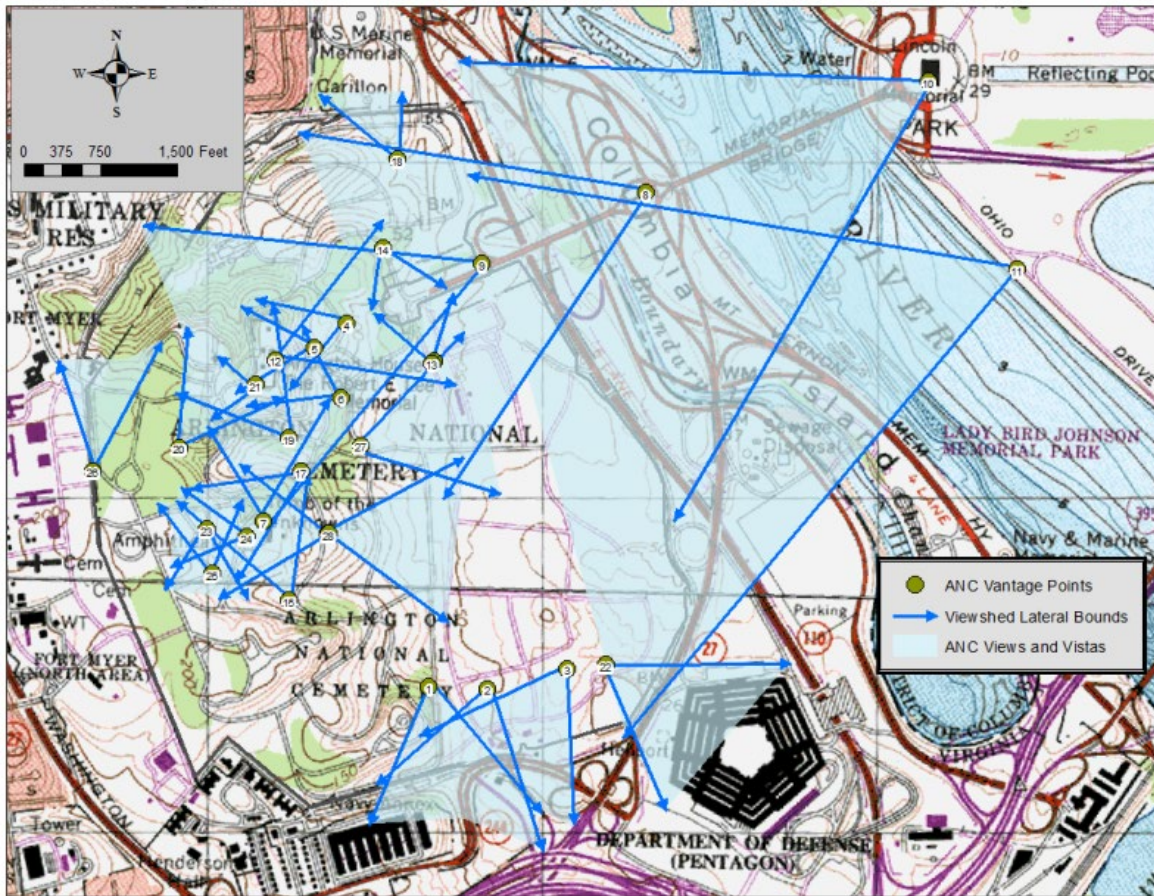


Figure 3-4: Arlington National Cemetery Views and Vistas (source: ICRMP and PA)

Viewsheds and Historic Properties identified contribute to the Cemetery's status on the NRHP. Other project-selected views displaying contributing historic resources were also reviewed with ANC preservation staff as part of Benham-Stanley JV's Feasibility Study, prepared for the project in September of 2024. The historic viewsheds and contributing resources described in the sections below are limited to those within or potentially impacted by the proposed work indicated elsewhere in this report. The keyed locations on the map below correspond to the items listed in the table that follows. Of the seven contributing historic viewsheds (A – G) and the eight additional views (H – O), twelve were identified for further analysis. To address these considerations, photographs and renderings of the proposed project are provided in Section 4.

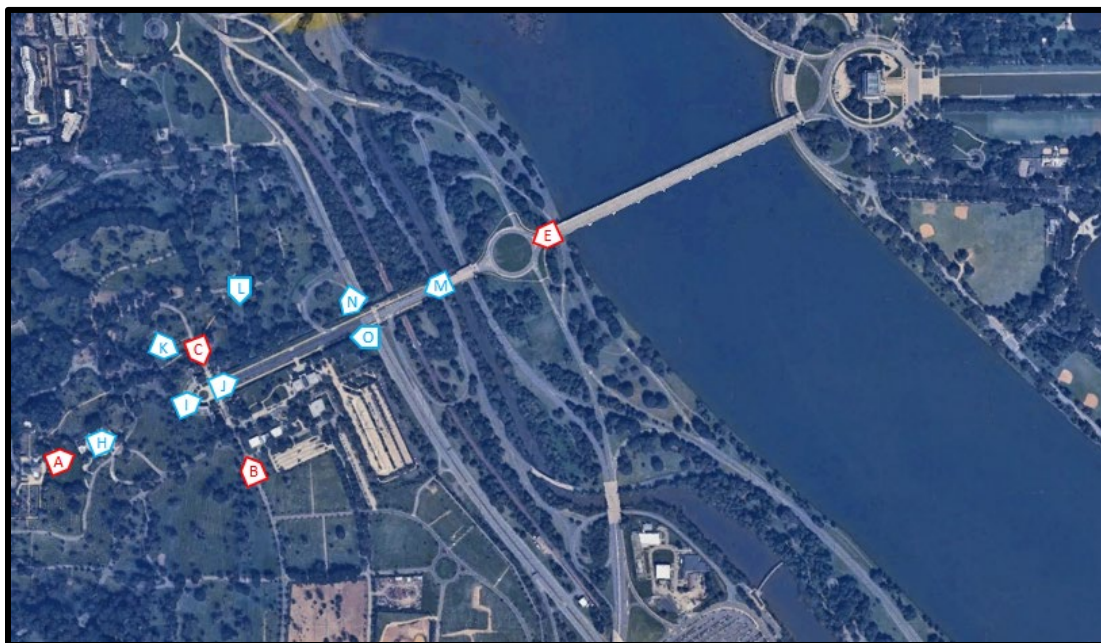


Contributing Historic Viewsheds			
Tag	Resource	Justification	Future Study
A	View of Lincoln Memorial from Arlington House	Criterion A, C	Y
B	View of Memorial Ave Gates from Eisenhower Dr	Criterion C	Y
C	View of Memorial Ave Gates from Schley Dr	Criterion C	Y
D	View of ANC from Memorial Ave	Criterion A, C	N
E	View of ANC from Memorial Bridge	Criterion A, C	Y
F	View of ANC from Lincoln Memorial	Criterion A, C	N
G	View of ANC from Washington D.C. Potomac Shoreline	Criterion A, C	N
Project-Selected Views with Contributing Resources			
Tag	Resource	Justification	Future Study
H	View from John F. Kennedy Memorial looking NE along Memorial Ave	Criterion A	Y
I	View from Hemicycle at Military Women's Memorial looking NE along Memorial Ave	Criterion A	Y
J	View from Memorial Ave gates looking NE along Memorial Ave	National Cemetery Policy (NCP)	Y
K	View SE toward Memorial Ave from Taft Gravesite	Criterion A	Y
L	View south down original Georgetown-Alexandra Road/Custis Walk	NCP	Y
M	View of ANC from Memorial Ave	Criterion A, C	Y
N	View of ANC from Memorial Ave	Criterion A, C	Y
O	View of ANC from Memorial Ave	Criterion A, C	Y
Other Contributing Resources within ADP1			
Tag	Resource	Justification	Future Study
P	Welcome Center	NCP	N
Q	Administration Building	Criterion A	N
R	Tram Shelter	NCP	N

Figure 3-5: Contributing Historic Viewsheds as Determined in the Feasibility Study

Section 4 Photographs and Renderings within Visual APE

A total of twelve vantage points within the 0.25-mile visual APE were identified for further evaluation as part of the viewshed study (six were eliminated from further review, as indicated in the map and table below). Photographs and associated project renderings have been provided for each of these locations in the following pages.



Contributing Historic Viewsheds			
Tag	Resource	Justification	Future Study
A	View of Lincoln Memorial from Arlington House	Criterion A, C	Y
B	View of Memorial Ave Gates from Eisenhower Dr	Criterion C	Y
C	View of Memorial Ave Gates from Schley Dr	Criterion C	Y
D	View of ANC from Memorial Ave	Criterion A, C	N
E	View of ANC from Memorial Bridge	Criterion A, C	Y
F	View of ANC from Lincoln Memorial	Criterion A, C	N
G	View of ANC from Washington D.C. Potomac Shoreline	Criterion A, C	N
Project-Selected Views with Contributing Resources			
Tag	Resource	Justification	Future Study
H	View from John F. Kennedy Memorial looking NE along Memorial Ave	Criterion A	Y
I	View from Hemicycle at Military Women's Memorial looking NE along Memorial Ave	Criterion A	Y
J	View from Memorial Ave gates looking NE along Memorial Ave	National Cemetery Policy (NCP)	Y
K	View SE toward Memorial Ave from Taft Gravesite	Criterion A	Y
L	View south down original Georgetown-Alexandra Road/Custis Walk	NCP	Y
M	View of ANC from Memorial Ave	Criterion A, C	Y
N	View of ANC from Memorial Ave	Criterion A, C	Y
O	View of ANC from Memorial Ave	Criterion A, C	Y
Other Contributing Resources within ADP1			
Tag	Resource	Justification	Future Study
P	Welcome Center	NCP	N
Q	Administration Building	Criterion A	N
R	Tram Shelter	NCP	N

Figure 4-1: Viewsheds with Associated Photos and Renderings



Figure 4-2: View of Lincoln Memorial from Arlington House (Current Viewshed)



Figure 4-3: View of Lincoln Memorial from Arlington House (Proposed Action Rendering)



Figure 4-4: View of Memorial Avenue Gates from Eisenhower Drive (Current Viewshed)



Figure 4-5: View of Memorial Avenue Gates from Eisenhower Drive (Proposed Action Rendering)



Figure 4-6: View of Memorial Avenue Gates from Schley Drive (Current Viewshed)



Figure 4-7: View of Memorial Avenue Gates from Schley Drive (Proposed Action Rendering)



Figure 4-8: View from Potomac Park Roundabout (Current Viewshed)



Figure 4-9: View from Potomac Park Roundabout (Proposed Action Rendering – No Change)



Figure 4-10: View from John F. Kennedy Memorial Looking NE Along Memorial Avenue (Current Viewshed)



Figure 4-11: View from John F. Kennedy Memorial Looking NE Along Memorial Avenue (Proposed Action Rendering– No Change)



Figure 4-12: View of Hemicycle at Military Women's Memorial Looking NE (Current Viewshed)



Figure 4-13: View of Hemicycle at Military Women's Memorial Looking NE (Proposed Action Rendering)



Figure 4-14: View of Memorial Avenue Gates Looking NE Along Memorial Avenue (Current Viewshed)



Figure 4-15: View of Memorial Avenue Gates Looking NE Along Memorial Avenue (Proposed Action Rendering)



Figure 4-16: View SE Toward Memorial Avenue from Taft Gravesite (Current Viewshed)



Figure 4-17: View SE Toward Memorial Avenue from Taft Gravesite (Proposed Action Rendering – No Change)



Figure 4-18: View South Down Original Georgetown-Alexandria Road/Custis Walk (Current Viewshed)



Figure 4-19: View South Down Original Georgetown-Alexandria Road/Custis Walk (Proposed Action Rendering)



Figure 4-20: View of ANC Along Memorial Avenue (Current Viewshed)



Figure 4-21: View of ANC Along Memorial Avenue (Proposed Action Rendering)



Figure 4-22: View of ANC Along Memorial Avenue (Current Viewshed)



Figure 4-23: View of ANC Along Memorial Avenue (Proposed Action Rendering)



Figure 4-24: View of ANC Along Memorial Avenue (Current Viewshed)



Figure 4-25: View of ANC Along Memorial Avenue (Proposed Action Rendering)



Figure 4-26: View of Welcome Center Area from Administrative Building – SW Corner, Looking NW (Current Viewshed)



Figure 4-27: View of Welcome Center Area from Administrative Building – SW Corner, Looking NW (Proposed Action Rendering)



Figure 4-28: View of Welcome Center Area from Administrative Building – North Entrance, Looking NW (Current Viewshed)



Figure 4-29: View of Welcome Center Area from Administrative Building – North Entrance, Looking NW (Proposed Action Rendering)



Figure 4-30: View of Welcome Center Area from Administrative Building – North Entrance, Looking North (Current Viewshed)



Figure 4-31: View of Welcome Center Area from Administrative Building – North Entrance, Looking North (Proposed Action Rendering)



Figure 4-32: View of Welcome Center Area from Administrative Building – North Entrance, Looking NE (Current Viewshed)



Figure 4-33: View of Welcome Center Area from Administrative Building – North Entrance, Looking NE (Proposed Action Rendering)

Section 5 Summary and Conclusion

This viewshed study has been developed to assist ANC Cultural Resources staff in their completion of a review under Section 106 of the NHPA.

This viewshed study was prepared in order to assess potential visual effects and determine the appropriate visual APE for a new Welcome Center proposed as part of Entry Area Improvements proposed under ADP1. In order to develop an appropriate visual APE, effects were first considered through the creation DEM and DSM models, fine-tuned using line-of-sight assessments, and finalized with on-site photography. Topography, infrastructure, buildings, and foliage serve to minimize or block views in many instances, justifying the 0.25-mile APE.

Within the established 0.25-mile APE, VCRIS, the ANC ICRMP, PA, prior viewshed studies, and the JV's ADP1 Feasibility Study were consulted to determine vantage points of concern with the visual APE. Site visits took place at multiple times during the year to include pictures with and without foliage on the leaves. Visual renderings of the proposed project have been created at twelve select vantage points within the 0.25-mile APE to demonstrate the project's visual impacts on these potential viewshed of concern. These renderings demonstrate the project's lack of visual impact on the majority of these locations within the APE. In addition, the project and building's architectural design has been developed in coordination with ANC Cultural Resources staff and consulting parties to ensure design standards fit the character of the surrounding entry corridor. These considerations were made to minimize any potential impacts to the historic integrity of the of the ANC. The project is anticipated to have a minimal impact on viewshed.

