ENVIRONMENTAL ASSESSMENT

Nimmo Parkway Phase VII-B

Virginia Beach, Virginia
CIP 2-110, PWCN-17-0121
UPC 114154

Prepared for:
Federal Highway Administration

Prepared by:
Virginia Department of Transportation

and

City of Virginia Beach, Virginia
Department of Public Works

Municipal Center
2405 Courthouse Drive
Virginia Beach, Virginia 23456

May 2022

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

AND

VIRGINIA DEPARTMENT OF TRANSPORTATION

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Submitted Pursuant to 42 U.S.C 4332(2)(C)

Approved for Public Availability

May 5, 2022

Date

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Division Administrator
Federal Highway Administration

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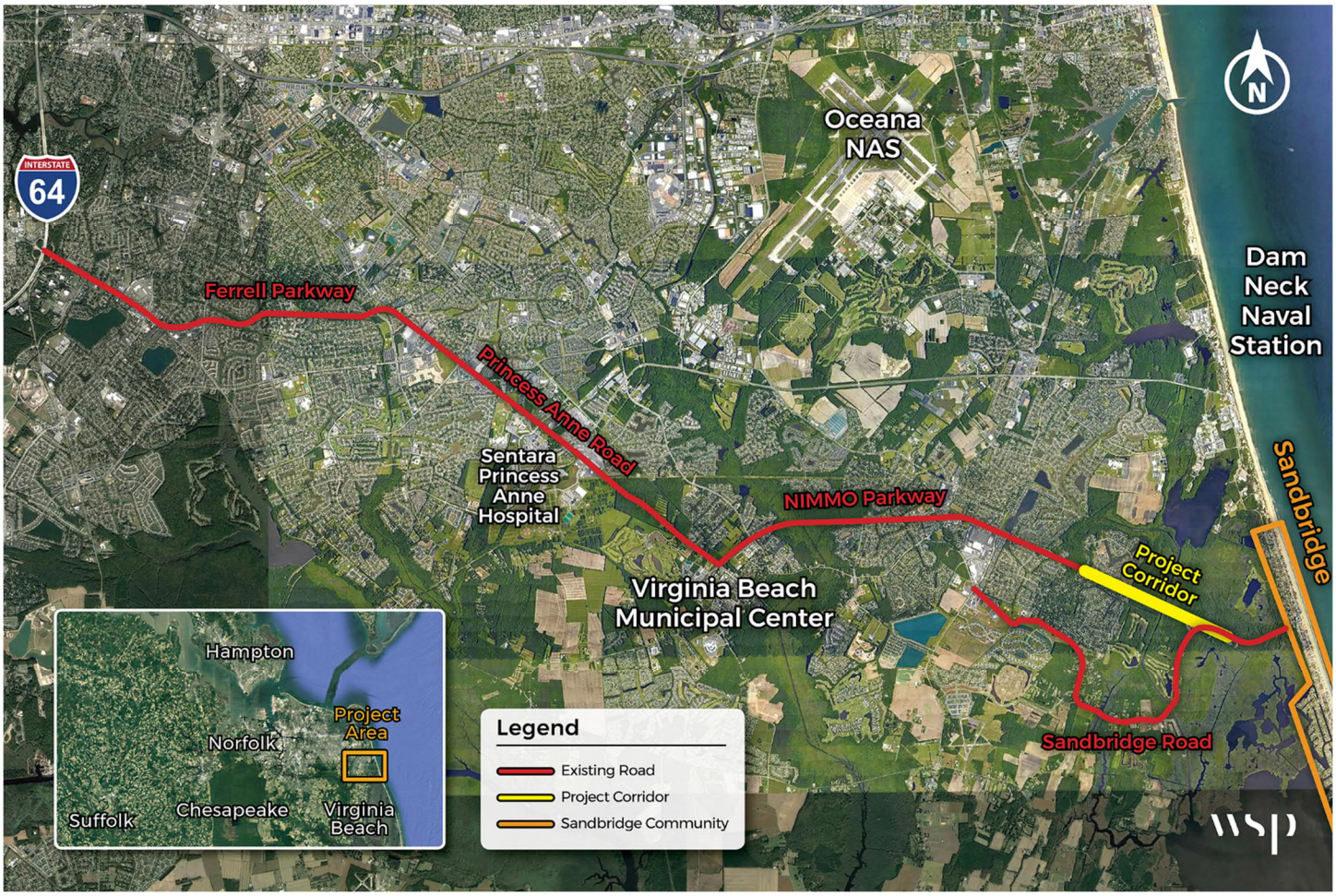
1 PURPOSE AND NEED

1.1 Introduction

The City of Virginia Beach, in coordination with the Virginia Department of Transportation (VDOT) and the Federal Highway Administration (FHWA) as the lead federal agency, has initiated an Environmental Assessment (EA) for the Nimmo Parkway Phase VII-B project. This study evaluates potential transportation improvements to the Nimmo Parkway Corridor to provide a continuous connection from the southern reaches of Virginia Beach to Interstate 64 (**Figure 1**). Pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended, and in accordance with FHWA regulations, this EA has been prepared to analyze the social, economic, and environmental effects associated with the proposed project.

Figure 1: Project Location Map



1.2 Study Area

The study area for the Nimmo Parkway Phase VII-B ("Project"), located in the City of Virginia Beach, Virginia, is adjacent to the community of Lago Mar and the community of Sandbridge. The study area includes an east-west corridor of approximately 1.85 miles, between the end of existing Nimmo Parkway to the west at Albuquerque Drive and Sandbridge Road approximately 0.2 miles past McClanan's Curve, as well as the Sandbridge Road corridor, approximately 3.4 miles, from Entrada Drive to approximately 0.2 miles past McClanan's Curve. (**Figure 2**).

Figure 2: Study Area Map

The east-west corridor between Albuquerque Drive and Sandbridge Road is entirely within the City of Virginia Beach owned right-of-way, which varies between 140 feet wide and 200 feet wide, and crosses Ashville Bridge Creek. The corridor currently contains public and private utilities as well as a small unpaved walking trail. Dominion Energy has overhead power lines and Virginia Natural Gas has underground utilities located within the corridor. The City of Virginia Beach also has two existing water lines and an existing sanitary force main within the corridor.

The Sandbridge Road corridor was previously studied by the City of Virginia Beach in 1999 and again in 2003. The existing right-of-way is typically between 30 feet wide and 60 feet wide but is as wide as 128 feet in some places and as narrow as 26 feet wide in some places. The corridor crosses over Ashville Bridge Creek with two (2) culvert pipes. Existing utilities include overhead power, telecommunications, and sanitary sewer. There are access points on both sides of the corridor to homes, businesses, the Back Bay National Wildlife Refuge (BBNWR), graveyards, and churches. The study area is adjacent to the residential neighborhood of Lago Mar, BBNWR, commercial realty offices, which serve the vacation rental market for the Sandbridge Community, residents and a small farm. The Sandbridge Community includes residential homes and vacation rental units, as well as shops, restaurants and community facilities, including the City of Virginia Beach Fire Station 17 which serves the residential and tourist communities. Naval Air Station Oceana-Dam Neck Annex is located north of the Sandbridge Community and currently serves as the

community's sole emergency egress when Sandbridge Road is impassable; however, this facility is a high-security military facility and is restricted from use by the public.

The limits of the study area for the project were developed to identify and address environmental concerns resulting from the project. The study area boundary is logical because it connects two adjacent roadways (Sandbridge Road and Nimmo Parkway) and provides a linear connection between the two of them within the existing City of Virginia Beach owned right-of-way and utility corridor. The study area boundary also includes the Sandbridge Road corridor which was previously studied by the City of Virginia Beach. The logical study area boundary begins at Entrada Drive because Entrada Drive connects to Camino Real and Camino Real connects to Nimmo Parkway less than 0.1 miles west of the east-west corridor study boundary. This connection is the nearest connection of Sandbridge Road to Nimmo Parkway in the vicinity of the study areas.

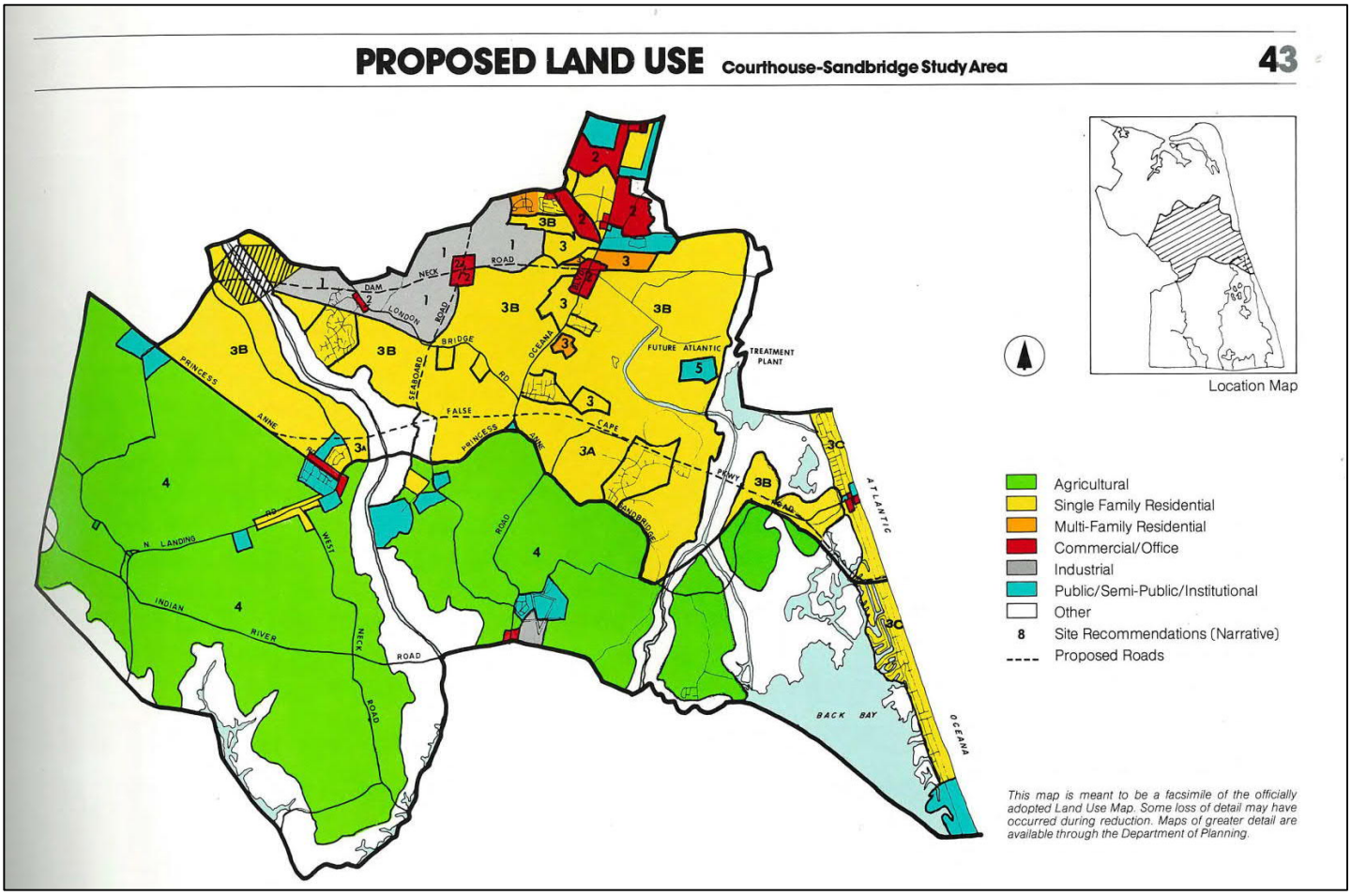
1.3 Background

Historically, the only public access to the coastal community of Sandbridge has been Sandbridge Road. Sandbridge Road is an approximately 5.4-mile long, two-lane roadway, with no breakdown lanes or shoulders that drop off on both sides into a roadside ditch. Approximately 60 percent of Sandbridge Road is within the 100-year base flood elevation (ranges from 3 feet to 5 feet) and floods regularly from the surrounding tributaries of Back Bay, making the road impassable. In 1968, the City of Virginia Beach first proposed a direct connection to the Sandbridge Community in an east-west corridor (previously known as False Cape Parkway and Ferrell Parkway). This was approved in the 1971 Master Transportation Plan. The corridor was then included in the City of Virginia Beach's 1979 (**Figure 3**) and 1985 Comprehensive Plans. The project (Ferrell Parkway Phase VI & VII) was included in the City of Virginia Beach's Fiscal Year (FY) 1990-1994 Capital Improvements Program (CIP) and was added to VDOT's Six-Year Improvement Program (SYIP) in 1991. However, the project was deferred and dropped from the CIP in 1993 during the City of Virginia Beach's CIP review process.

An improvements corridor study was completed by the City of Virginia Beach in 1999 which included an alternative analysis of multiple variations of improvements, alignments, and hybrid alternatives within the existing Sandbridge Road Corridor, as well as construction within the Ferrell Parkway Corridor from General Booth Boulevard to a point along the existing Sandbridge Road about one mile west of the oceanfront near a 90-degree bend in the road known as 'McClannan's Curve' (Wiley & Wilson 1999). The study addressed both short-term improvements and long-term improvements with a purpose and need of addressing future traffic demands in addition to safety concerns on the existing Sandbridge Road. Specifically, the study sought alternatives to address deficient geometry along the existing Sandbridge Road, improve traffic level of service at existing intersections and for projected traffic volumes resulting from proposed development within the corridor, and reduce accidents which result from the combination of deficient roadway geometry and the increased number of travelers on Sandbridge Road.

Six general alignment alternatives were evaluated linking General Booth Boulevard/Princess Anne Road with the Sandbridge community, each with two lane scenarios. The study recommended the Nimmo Parkway Corridor, including an 800 foot long bridge over Ashville Bridge Creek, as the preferred alignment. This alternative was determined to have the least impacts for acquisitions of additional right-of-way from private citizens; acquisition of right-of-way from BBNWR; and residential and business displacements, while providing the lowest cost. The study also recommended short-term safety improvements to Sandbridge Road, including Transportation Systems Management (TSM) improvements such as shoulder enhancement and intersection reconfiguration, as well as curve realignment for substandard curves not meeting VDOT criteria. Short-term safety improvements were added to the City of Virginia Beach CIP and funded in 1999; while the preferred long-term improvement to construct Nimmo Parkway was not included in the CIP budget.

Figure 3: Proposed Land Use for the Courthouse-Sandbridge Area-1979



In 2001, City Council established the "Sandbridge Road Corridor Improvements" in its CIP and in 2002 prepared a preliminary engineering study of improvements to Sandbridge Road and Princess Anne Road, which was solely focused on existing or new alignments along the corridor of Princess Anne Road from General Booth Boulevard to Upton Drive, and along Sandbridge Road from Upton Drive to Sandfiddler Road (Vanasse Hangen Brustlin [VHB]). A Citizen Advisory Committee (CAC) was created to help select a preferred alternative. The 2002 project purpose and need included traffic and safety concerns including increased capacity and traffic congestion, sharp curves in the road, adequate drainage, and road width. Following analysis of six alternative alignments (four alternatives and two hybrids), the CAC selected a preferred alternative, known as Hybrid 1. This alignment generally followed the existing Sandbridge Road Corridor, with the exception of a deviation into an undeveloped parcel containing forested wetlands needed to ease sharp curves and other hazards. This selection was based on considerations including impacts to natural resources, cultural resources, private and public property, and public opinion.

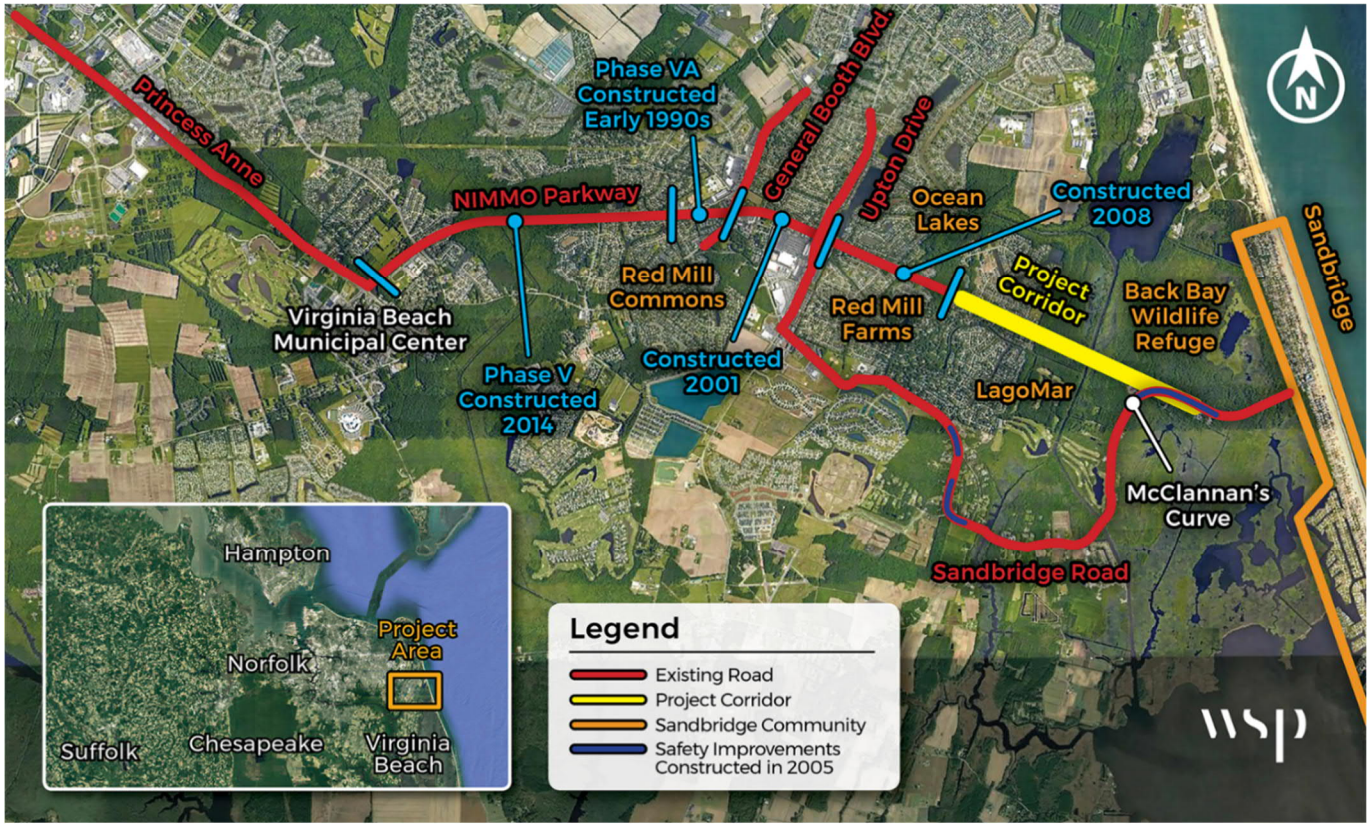
In late 2002, the initial findings of the study and the CAC preferred alternative were presented to the City Council. At that time, the City Council requested additional information regarding the comparison of the Sandbridge Road Corridor Improvement Project alternative alignments to the Nimmo Parkway Corridor. The 2002 comparison summary determined that the Nimmo Parkway Corridor alternative would have a lower estimated cost and impact less private property and federally owned property. Further studies were conducted on the Nimmo Parkway Corridor in 2003, including a wetland delineation and cultural resource survey to more accurately compare alternatives. A subsequent

2003 comparison report determined that the Nimmo Parkway Corridor alternative would have a lower overall cost, lower wetland impacts, and fewer encroachments as noted in the 1999 corridor study (VHB).

In subsequent years, additional, independent improvements have been made to the transportation system in this section of the City of Virginia Beach. These improvements have "independent utility" and thus could be built separately. The result has been construction of elements along both the Nimmo Parkway right-of-way and Sandbridge Road. These improvements served to meet some of the needs which were raised in the 1999 and 2002 studies which focused on traffic and safety issues. Improvements include construction of Nimmo Parkway in phases from Princess Anne Road near the Virginia Beach municipal center to its current terminus at Albuquerque Drive and spot improvements along Sandbridge Road to improve roadway geometry for safety. Currently, three additional improvements have been permitted and/or completed along Sandbridge Road. The Sandbridge Road Bridge Replacement over Hell Point Creek was completed in February 2021 to replace the bridge that was built in 1961. Sandbridge Road-Nimmo Parkway Phase VII-A received a permit in January of 2017 with the purpose and need to improve vehicle and pedestrian safety. It is in final design with construction anticipated to begin in Fall 2021. The Sandbridge Road/Newbridge Road culvert upgrade was completed to make spot improvements to the intersection of Sandbridge Road and Newbridge Road to reduce flooding within the intersection.

Construction of Nimmo Parkway has occurred in phases over a thirty-year period (**Figure 4**), as various sections became necessary to serve specific needs within the area. The first phase of Nimmo Parkway was constructed in the early 1990's as an access road to the Princess Anne recreation center, library, and fire station (Phase V-A). As the southeastern area of Virginia Beach developed, Nimmo Parkway was extended to the east as a collector road to the newly constructed Red Mill Commons shopping center. Nimmo Parkway was extended eastward

Figure 4. Nimmo Parkway Phase Construction



again in 2008 to Albuquerque Drive. This extension allowed for access into the neighborhoods of Red Mill Farms, Lago Mar, and Ocean Lakes from the growing General Booth corridor. In 2014, construction was completed on Nimmo Parkway Phase V, connecting the existing Nimmo Parkway with the Virginia Beach Courthouse and the Princess Anne Corridor to the west, making Nimmo Parkway a major transportation corridor.

1.4 Project Needs

Based upon the unreliable conditions of Sandbridge Road and the increasing risk of flooding, the need identified for the proposed project is:

- Provide reliable access and connectivity to the Sandbridge Community.

1.4.1 Provide Reliable Access and Connectivity to the Sandbridge Community

Sandbridge is a seaside community of approximately 900 residents (2018). Sandbridge Road is currently the only public access in and out of the Sandbridge Community connecting it to the rest of the City of Virginia Beach. However, the existing conditions of Sandbridge Road cause the roadway to be impassable due to frequent flooding, severe accidents and/or other obstructions.

Sandbridge Road is a curvy, two-lane roadway with no breakdown lane or shoulders and drops off on both sides into roadside ditches and forested land. The typical lane width varies between 10 feet and 12 feet with graded shoulders varying from 0 feet to 4 feet, with no suitable recovery area or emergency pull-off area. When traffic flow on this road is restricted, access in and out of the community is directly affected.

1.4.1.1 Reasons for Unreliability

Typical obstructions that restrict or inhibit traffic flow include road flooding, vehicle crashes, construction, fallen trees, and increased congestion during summer tourist season.

1.4.1.2 Impacts from Unreliability

In the event of an obstruction, such as road flooding, vehicle crashes, construction, or fallen trees, in the roadway that blocks one travel lane, traffic must be controlled by police or flaggers to allow for two-way traffic to continue while the obstruction is being removed. Traffic operating in this manner impedes regular traffic operations and diverts City of Virginia Beach resources away from other areas. In the event of an obstruction that blocks the road completely making Sandbridge Road impassable, the only detour is through the high-security military facility of Naval Air Station Oceana-Dam Neck Annex (U.S. Navy).

The City of Virginia Beach and the U.S. Navy have a General Order detailing the procedures to open this secondary route as a detour (**Appendix A**). The purpose of this General Order is to communicate the agreement between the U.S. Navy and the City of Virginia Beach Public Safety Departments regarding the opening of the back Gate of Naval Air Station Oceana-Dam Neck Annex. Due to increased security concerns, the 2013 General Order between the U.S. Navy and the City of Virginia Beach specifically stipulates that access through Naval Air Station Oceana-Dam Neck Annex is no longer an option except for "incidents/events" that result in Sandbridge Road being impassable or a "mass evacuation order." Notable in this General Order is that Fire, EMS, and Police can no longer use this route for regular emergency access to the Sandbridge Community, whereas they previously had such access (**Appendix A**).

More recent correspondence summarizes the current procedures for the City of Virginia Beach to request access to the Naval Air Station Oceana-Dam Neck Annex back gate (City of Virginia Beach, Letter to Captain Chad Vincelette, NAS Oceana, March 14, 2018) (**Appendix A**). This letter reiterates that access through the back gate at Naval Air Station Oceana-Dam Neck Annex would only be requested during periods necessary to coordinate vehicle travel from the Sandbridge Community. Furthermore, the City of Virginia Beach specifies that this request will only be made after it

has determined that Sandbridge Road is impassible and anticipated to be closed for an extended period of time (generally two hours or more). Approval has historically taken several hours. In addition, at any point in the future, the U.S. Navy has the right to restrict access thru the gate.

When the secondary route through the Annex is open, the travel could take up to 30 additional minutes versus the existing Sandbridge Road.

Police records, in the form of After Action Reports (AARs) (**Appendix A)**, between 2015 and 2017 provide detailed reports of the condition of Sandbridge Road during events that resulted in its closure. In addition to summarizing the incident, the AARs provide an evaluation from the reporting officer as to ways to improve response during subsequent events. In a number of AARs, the reporting officer's comments specifically reflect on or imply how vulnerable Sandbridge Road is to flooding, how labor-intensive rerouting traffic through Naval Air Station Oceana-Dam Neck Annex is, and how the community would benefit from an improved transportation corridor.

A Citizen Information Meeting (CIM) was held by the City of Virginia Beach in September 2018 to provide citizens with information regarding the proposed Nimmo Parkway Phase VII-B project and to provide an opportunity to participate in the design development process speaking with city staff, design engineers and by offering comments. The City of Virginia Beach conducted a survey during the CIM and citizens were asked how often in the last year that their travel along Sandbridge Road has been impacted by flooding, accidents, construction, safety concerns, and/or fallen trees. The online survey received 603 responses and the results from this survey question are summarized in **Table 1**-.

Based on the responses from the citizens, the following statistics were identified:

- Approximately 84 percent of citizens polled have been impacted by flooding
- Approximately 78 percent of citizens polled have been impacted by accidents
- Approximately 64 percent of citizens polled have been impacted by construction
- Approximately 64 percent of citizens polled have been impacted for safety concerns
- Approximately 44 percent of citizen polled have been impacted from fallen trees

Table 1: CIM Results for Impacts to Local Traffic During 2018

In the past year, how often has your local travel been impacted due to the following issues on Sandbridge Road:
603 Responses

	1-5 trips	6-10 trips	11-15 trips	16+ trips	Never
Flooding	**265** *(43.80%)*	**114** *(18.84%)*	**61** *(10.08%)*	**66** *(10.91%)*	**99** *(16.36%)*
Accident	**279** *(46.12%)*	**93** *(15.37%)*	**50** *(8.26%)*	**50** *(8.26%)*	**133** *(21.98%)*
Construction	**235** *(38.84%)*	**75** *(12.40%)*	**39** *(6.45%)*	**40** *(6.61%)*	**216** *(35.70%)*
Safety Concerns	**200** *(33.06%)*	**61** *(10.08%)*	**34** *(5.62%)*	**87** *(14.38%)*	**223** *(36.86%)*
Fallen Trees	**211** *(34.88%)*	**35** *(5.79%)*	**7** *(1.16%)*	**13** *(2.15%)*	**339** *(56.03%)*

Source: City of Virginia Beach CIM, 2018

1.4.1.3 Existing Flooding on Sandbridge Road

Of the citizens surveyed at the September 2018 CIM, 364 (60 percent) of the total 603 responses travel Sandbridge Road three or more times a week. For these citizens that travel Sandbridge Road frequently, 92% of them have been impacted by flooding in 2018 and 57 percent have had travel impacted 6 or more times in 2018 by flooding (**Table 2**).

Table 2: Impacts to Travel for Citizens Who Travel Sandbridge Road

Impacts to Travel for Citizens Who Travel Sandbridge Road Three or More Times a Week (364 Responses)					
	Flooding	Accidents	Construction	Fallen Trees	Safety Concerns
Never	(30) 8%	(39) 11%	(81) 22%	(154) 42%	(104) 29%
1-5 Trips	(126) 35%	(150) 41%	(152) 42%	(164) 45%	(112) 31%
6-10 Trips	(92) 25%	(84) 23%	(57) 16%	(27) 7%	(41) 11%
11-15 Trips	(54) 15%	(42) 12%	(35) 10%	(7) 2%	(28) 8%
16+ Trips	(62) 17%	(49) 13%	(39) 10%	(12) 3%	(79) 21%

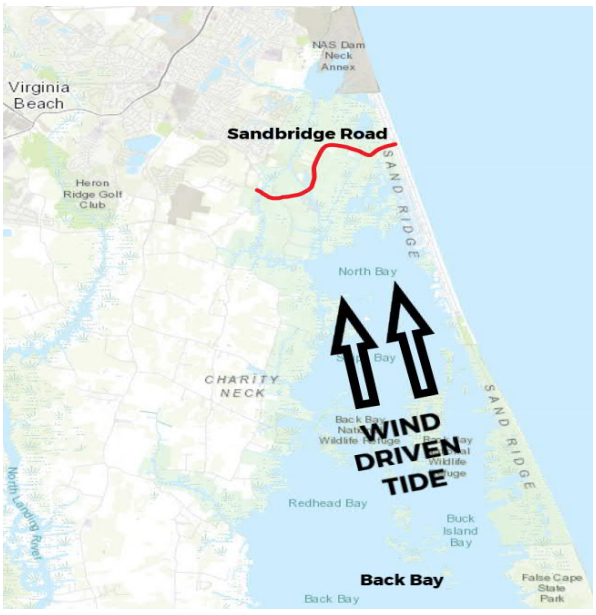
Source: City of Virginia Beach CIM, 2018

With approximately 60 percent of existing Sandbridge Road falling within the 100-year base flood elevation (varies between 3-5 feet), and its' adjacency to Back Bay, Sandbridge Road is often blocked by flood waters. This flooding can result from wind driven tides, rain events and/or larger storms (i.e. tropical storms or hurricanes). Back Bay has a surface area of 25,600 acres that is susceptible to wind driven tides. South winds blow water to the north directly into the Sandbridge Road area, as shown in **Figure 5**, causing inland flooding that can last for several days until the wind changes directions. The rising waters often overtop the roadway causing the roadway to become impassible. When a storm is present, the effects of the wind driven tide are exacerbated, often closing Sandbridge Road entirely.

The City partnered with WAZE to receive data on traffic alerts. Based on the traffic data from WAZE, from April 2019 to Spring 2021, Sandbridge Road has received 42 alerts for roadway flooding. These 42 alerts occurred on 15 different days throughout this period. Additionally, 41 alerts on seven different days were received for road closures (WAZE 2021). In 2018, two such major flooding events occurred that closed Sandbridge Road from July 24th to July 26th (**Figure 6**) and then again from September 16th to September 19th.

The City of Virginia Beach is susceptible to hurricanes during the Atlantic Hurricane season from June 1st to November 30th. In the event of a hurricane, the Sandbridge Community is located within evacuation Zone A (**Figure 7**). Zone A is considered the area most at risk of flooding and storm surge. Zone A is the first, and most likely, to be issued an evacuation notice. In the event of an evacuation, Sandbridge Road is currently the only route out of Sandbridge for residents and visitors.

Figure 5: Wind Driven Tide from Back Bay



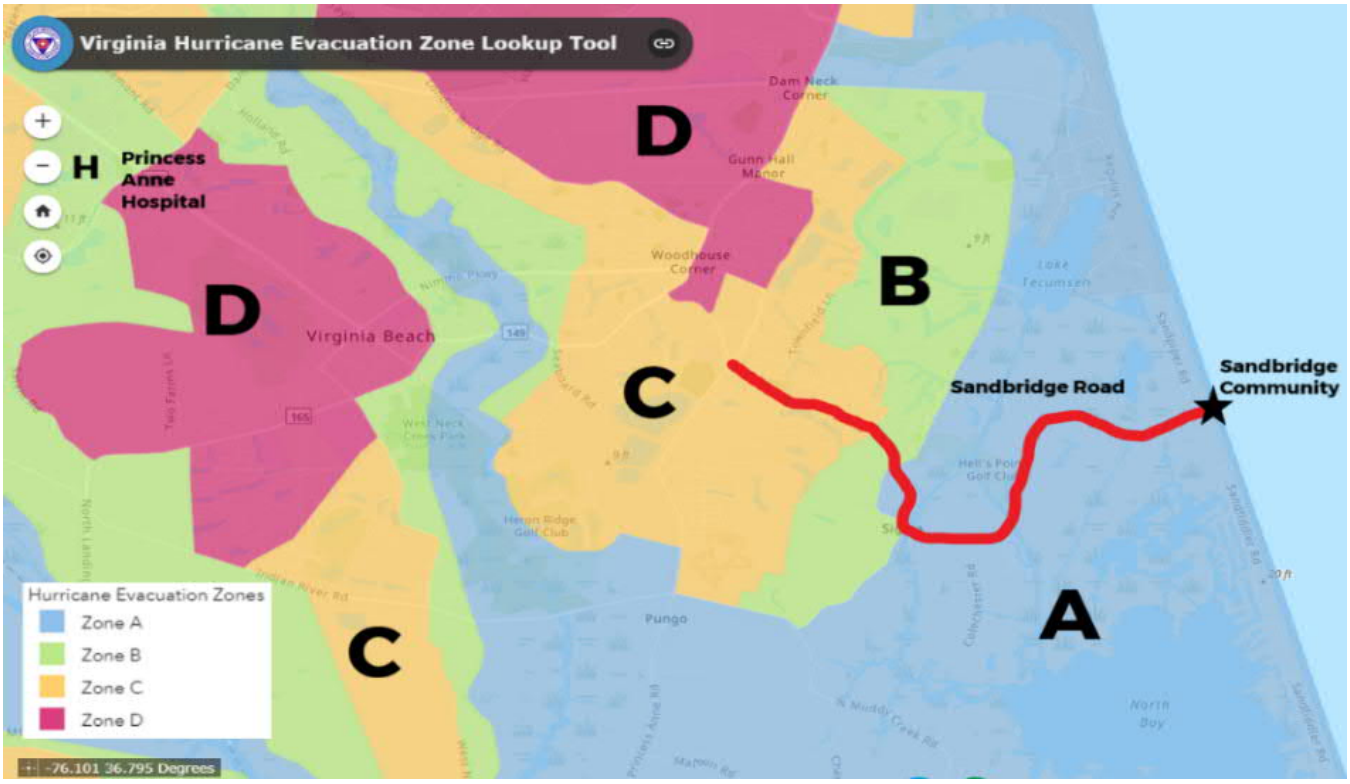
1.4.1.4 Existing Emergency Services Access

Currently, Fire Station 17 is located within the Sandbridge Community and houses the Virginia Beach Department of Emergency Medical Services (EMS) and the Sandbridge Volunteer Rescue Squad. Even if a first responder from Fire Station 17 gets to the scene of a medical emergency, there are no medical facilities located within the Sandbridge Community. Ambulances use Sandbridge Road to take patients to the nearest hospital, Sentara Princess Anne Hospital, which is located approximately 12 miles west of the Sandbridge Community. If Sandbridge Road is blocked, there is no alternative, public route for supporting emergency personnel to get into the community and medical emergencies to get to the hospital, thus impacting emergency response times.

Figure 6: Flooding Along Sandbridge Road at Belanga Fish Co. - July 2018

Source: @MerrisBadcock WTKR

Figure 7: Virginia Emergency Evacuation Map for Hampton Roads



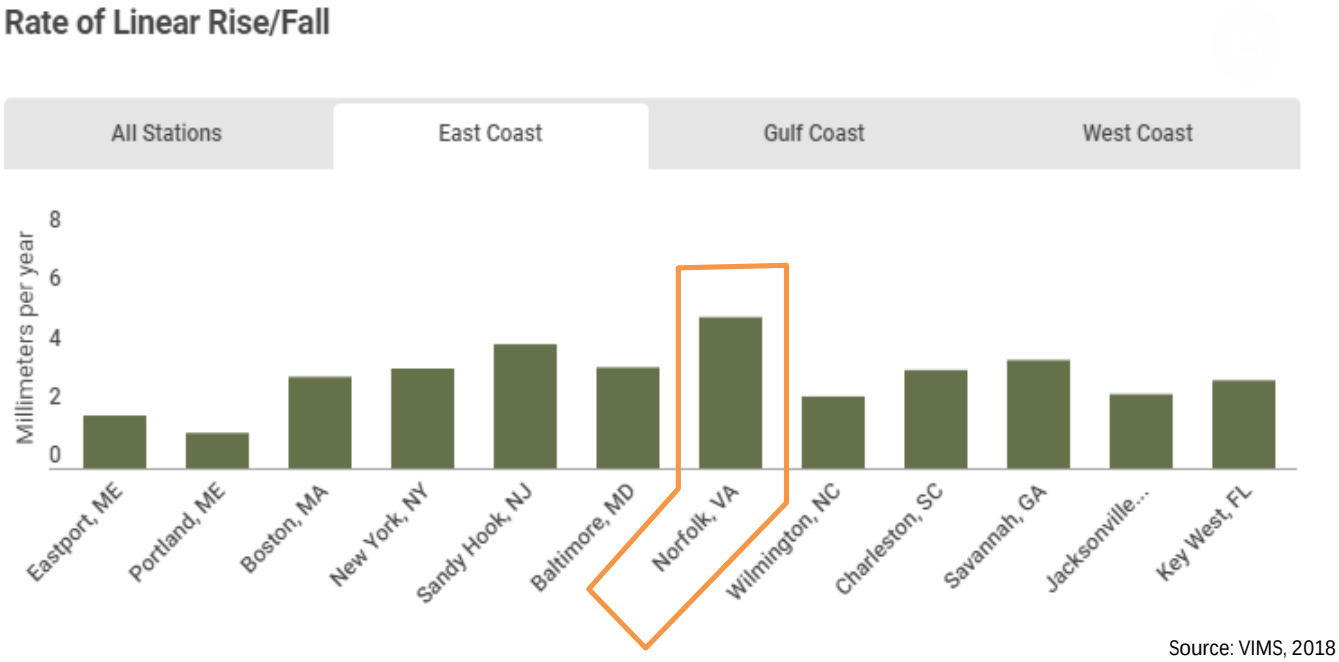
Source: Virginia Department of Emergency Management

1.4.1.5 Increased Flooding in the Future Due to Sea Level Rise

With Sandbridge Road currently prone to frequent flooding, sea level rise (SLR) coupled with wind driven tides only exacerbate the threat of flooding in the future. The sea level in Hampton Roads has increased by almost 1 foot since the 1960s and the rate SLR is within the top 10 percent of the nation according to the Virginia Institute of Marine Science (VIMS). The rate of SLR in the Hampton Roads region, measured at the National Oceanic and Atmospheric Administration (NOAA) Sewell's Point tide gauge in Norfolk, VA, is the highest on the east coast as shown in Figure 8. The Sewell's Point tide gauge is commonly used to describe the tides in the Hampton Roads region due to its central location. The tide gauge is located in the mouth of the James River and is approximately 23 miles from the project study area.

According to the VIMS, the Hampton Roads area can expect approximately 1.5 feet of SLR by year 2050 (measured from sea level in 1992). This number is projected to double to approximately 3 feet by year 2100.

Figure 8: Rate of Linear Rise/Fall of Relative SLR for the East Coast



Source: VIMS, 2018

1.5 Purpose and Need Summary

Sandbridge Road is located at a low elevation, with approximately 60 percent of the roadway within the 100-year base flood elevation. In recent years, flooding from wind driven tides, SLR, and intense rainstorms has caused Sandbridge Road to be closed multiple times a year. In addition, accidents, construction, fallen trees, and congestion during the summer tourist season contribute to the unreliability of the road. With Sandbridge Road as the only public access to the Sandbridge Community, roadway closures cut off the citizens in the Sandbridge Community unless the high-security Naval Air Station Oceana-Dam Neck Annex can be opened. The General Order establishes criteria and procedures to open the high-security naval facility for access, but at any point due to national security or other reasons, the Navy has the right to restrict access.

Based on the existing and future conditions described above, the purpose and need for the proposed project is to provide reliable access and connectivity to the Sandbridge Community.

2 ALTERNATIVES

Regulations for the implementation of the NEPA require the consideration of a reasonable range of alternatives prior to making any decisions to proceed with a particular course of action (*40 CFR §1505.1*). The City of Virginia Beach considered a range of alternatives during the planning of the Nimmo Parkway Phase VII-B project over the multi-decade long history of project consideration (**Appendix B**).

2.1 Introduction

This chapter discusses previous transportation planning studies in addition to the Build/No Build Alternatives retained for detailed study in this EA in accordance with *40 CFR §1502.14* and the Federal Highway Administration (FHWA)'s *Technical Advisory T 6640.8A Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (FHWA 1987). While the No Build Alternative does not meet the Purpose and Need for the project, it was retained to serve as a baseline for comparison. A Build Alternative has been identified for further analysis and is described in the following sections. The Build Alternative was formulated based on a comprehensive evaluation process that incorporated input from the public as well as coordination with local, state, and federal agencies.

2.2 Alternatives Development and Screening Process

2.2.1 Previous Planning Studies

The alternatives development and screening process was informed by two previous planning studies conducted in 1999 and 2002-2003. These studies are summarized in Sections 2.2.1.1 and 2.2.1.2 and discussed in detail in the *Project History and Previous Studies Technical Report* (WSSI 2020) **(Appendix B).**

2.2.1.1 1999 Sandbridge Road Corridor Study

An improvements corridor study was completed by the City of Virginia Beach in 1999 (Wiley & Wilson 1999), which included multiple variations of improvements and alignments within the existing Sandbridge Road corridor (from General Booth Boulevard to the intersection of Sandfiddler Road), as well as construction within the Ferrell Parkway corridor (current Nimmo Parkway corridor). The 1999 planning study recommended the Ferrell Parkway corridor, including an 800-foot long bridge over Ashville Bridge Creek, as the "recommended alternative" at that time. This study is described further in the *Project History and Previous Studies Technical Report* (WSSI 2020) **(Appendix B)**.

2.2.1.2 2002-2003 Sandbridge Road Corridor Improvements Study

In July 2001, Virginia Beach City Council established the 'Sandbridge Road Corridor Improvements' project in its Capital Improvements Program (CIP) and in 2002 had a preliminary engineering study completed of improvements to Sandbridge Road and Princess Anne Road (VHB 2002). This study was solely focused on improvements to the existing alignment, portions thereof, and/or new alignments along the corridor of Princess Anne Road from General Booth Boulevard to Upton Drive, and along Sandbridge Road from Upton Drive to Sandfiddler Road. Following analysis of six alignments, the study identified a "preferred alternative". This alignment generally followed the existing Sandbridge Road corridor, with the exception of a deviation into an undeveloped parcel containing forested wetlands needed to ease sharp curves and other hazards. In September 2002, the initial findings of the study and the "preferred alternative" were presented to the Virginia Beach City Council. At that time, the Virginia Beach City Council requested additional information regarding comparison of the 'Sandbridge Road Corridor Improvement Project' alignments to the Nimmo Parkway corridor (the preferred alignment from the 1999 Sandbridge Road Corridor Study). An October 2002 comparison study and 2003 comparison study (COVB 2003) identified the Nimmo Parkway corridor as the preferred option. These studies are described further in the *Project History and Previous Studies Technical Report* **(Appendix B).**

2.2.1.3 Additional Screening Criteria

Under the NEPA process, both the Sandbridge Road corridor and Nimmo Parkway corridor potentially meet the project Purpose and Need of providing reliable access and connectivity for the Sandbridge Community; therefore, additional screening criteria including potential wetland impacts, right-of-way impacts, and cost have been considered in this alternative analysis.

Table 3 shows the comparison of the Nimmo Parkway corridor and the previously studied Sandbridge Road corridor (from Atwoodtown Road to McClanan's curve). This shows that the Nimmo Parkway corridor would potentially result in fewer impacts to private and federal property, fewer homes and businesses displaced, and would cost less to construct than the Sandbridge Road corridor as studied in 2003.

Table 3: Abbreviated Impact Summary Comparison of Sandbridge Road and Nimmo Parkway Corridors

	Estimated length (miles)	Wetland Impacts (acres)	Private Property Impacted (acres)	Federal Property Impacted (acres)	Homes Displaced	Businesses Displaced	Construction Cost
Sandbridge Road (Previously Studied)*	2.7	8.8†	13-23‡	9-11‡	0-2‡	1‡	$36,442,500§
Nimmo Parkway Corridor**	1.8	9.7¶	0	0	0	0	$32,295,000§

* Atwoodtown Road to McClanan's Curve
**Albuquerque Drive to McClanan's Curve

† Comparison Report Sandbridge Road and Nimmo Parkway, January 14, 2003 (VHB)
‡ Sandbridge Road Corridor Improvements & Nimmo Parkway Comparison Summary October 1, 2002 (VHB)
§ Current estimate based on cost per linear foot to build Nimmo Parkway as described in Section 2.3.3
¶ Current planning level estimate for permanent impacts

To be feasible, Sandbridge Road would have to meet current design standards required by The City of Virginia Beach. The City of Virginia Beach has adopted new design standards since 2003 that would require the road to be raised to a higher elevation to account for SLR that is being observed in the area. Sandbridge Road would need to be raised approximately 1.5- 4.0 feet higher than the elevation considered in the previous studies. This would extend the lateral impacts of the roadway and would require a new off-line roadway alignment. Off-line construction (construction on new or partially new alignment that is parallel to the current alignment) is expected because traffic would need to be maintained along Sandbridge Road, which cannot be safely completed with the increased elevation to accommodate SLR. Driveways of adjoining homes and business would need to be reconstructed and would slope upward at increased slopes that may cause drainage concerns for adjacent properties. Due to the increased roadway elevation and construction off-line of the existing Sandbridge Road, reconstructing Sandbridge Road to current standards would further increase impacts to private and federal property and potentially lead to additional displaced homes, impacts to wetlands, and impacts to cultural resources in addition to the impacts identified in the previous studies. Because Nimmo Parkway is within an undeveloped corridor and right-of-way owned by the City of Virginia Beach, this corridor will not have direct impacts to public, private or federal properties.

For comparison purposes, the cost to improve Sandbridge Road presented in **Table 3** is based upon the 2021 cost per linear foot to build Nimmo Parkway from Albuquerque Drive to McClanan's Curve, excluding the cost of the Ashville Bridge Creek crossing. The 2003 version of Sandbridge Road would cost 13 percent more to construct than Nimmo Parkway in 2021 dollars. This cost does not include private utility relocations, replacing existing culverts, or maintenance of traffic costs to maintain traffic on Sandbridge Road, nor does it include secondary costs associated

with right-of-way, wetland impacts or utilities associated with building the roadway to meet current standards which may require that the roadway be built off-line. These additional items would further increase the cost of Sandbridge Road thus increasing the cost difference relative to Nimmo Parkway.

Based on the additional screening criteria and the above comparison, the Sandbridge Road corridor is estimated to have substantially higher right-of-way and environmental impacts and costs than the Nimmo Parkway corridor. Therefore, the Sandbridge Road corridor has been eliminated from further evaluation.

2.2.2 Transportation System Management

Transportation System Management (TSM) strategies consist of actions that increase the efficiency of existing facilities. They are actions that increase the number of vehicle trips a facility can carry without increasing the number of through lanes. Examples of TSM strategies include ramp metering, auxiliary lanes, turning lanes, reversible lanes, and traffic signal coordination. TSM also encourages automobile, public, and private transit, ridesharing programs, and bicycle and pedestrian improvements as elements of a unified urban transportation system. **As a stand-alone option, TSM would not provide reliable access and connectivity for the Sandbridge Community and would therefore not meet the project Purpose and Need and was eliminated as a stand-alone alternative. However, some of these strategies can be implemented as part of the project. The proposed Nimmo Parkway corridor includes pedestrian and bicycle transportation components.**

2.2.3 Mass Transit Alternative

Mass transit improvements could include additional bus services, such as new buses, stops or lines to supplement the existing Hampton Roads Transit (HRT) system which services the City of Virginia Beach. Per the City of Virginia Beach Master Transportation Plan, an HRT line currently accesses as far as Upton Drive on Nimmo Parkway; there is no existing service to the Sandbridge Community (COVB 2016). HRT performs market analysis reviews to assess the demand for transit services by evaluating areas with high concentrations of potential transit users, commuters, jobs, and non-work destinations, along with travel flow analysis. Per the HRT Fiscal Year 2018-2027 Transit Development Plan (HRT 2018) the project vicinity falls within an area of low potential transit utilization and there are no plans to expand service in this area of the City. **As a stand-alone option, a mass transit alternative would not be practicable nor meet the project Purpose and Need**. However, some of these strategies can be implemented as part of the project.

2.2.4 Summary of Alternatives Eliminated from Detailed Study

Table 4 lists the corridors and alternatives that were eliminated from further study and the basis for their elimination.

Table 4: Alternatives Eliminated from Detailed Study

Alternative	Previously Studied	Basis for Elimination
Sandbridge Road Corridor	Wiley & Wilson 1999: Sandbridge Road Corridor Study VHB 2002: Sandbridge Corridor Improvements (CIP 2-151); City of Virginia Beach 2003	• Greater right-of-way impacts for roadway and construction • Greater environmental impacts • Higher cost • Displacement of homes and businesses See *Project History and Previous Study Technical Report* **(Appendix B).**
Transportation System Management (TSM)	City of Virginia Beach 2015 (Shared-use path)	• Does not meet project Purpose and Need as stand-alone option.
Mass Transit Alternative	Not Previously Studied	• Does not meet project Purpose and Need as stand-alone option.

2.3 Alternatives Carried Forward

Based on the preceding information, a Build Alternative (Nimmo Parkway Phase VII-B corridor) and the No Build Alternative have been carried forward for further evaluation.

2.3.1 No Build (No-Action) Alternative

In accordance with the regulations on implementing NEPA (*40 CFR § 1502.14(d)),* the No Build Alternative has been included for evaluation in this EA to serve as a benchmark for the comparison of conditions and impacts. The No Build Alternative would maintain roadways in the current configuration and includes existing planned improvements. The No Build Alternative includes existing maintenance and any currently fiscally-constrained projects. This alternative would not affect any natural, ecological, built or scenic resources. **However, the No Build Alternative would not address the Purpose and Need of the project as it would not provide reliable access and connectivity to the Sandbridge Community. Sandbridge Road would remain the sole public access to the Sandbridge Community.** Sandbridge Road is a two-lane roadway with no breakdown lane or shoulders, with a steep drop off on both sides into roadside ditches. The existing roadway is subject to frequent flooding due to its low elevation causing serious access and reliability issues.

The No Build Alternative does not provide an additional route for alternate access in cases where the roadway is impassable and/or during mandatory evacuation due to hurricanes. The community would be required to continue to rely on the high-security facility of Naval Air Station Oceana- Dam Neck Annex for alternate access via the facility's south gate. Due to increased security concerns, access via this route is subject to a 2013 General Order from the U.S. Navy which stipulates that access through Dam Neck Naval Station is restricted to "incidents/events" which result in Sandbridge Road being impassable or a "mass evacuation order". Emergency services such as fire, EMS, and police can no longer use this route for regular access to the Sandbridge Community as they historically had. The No Build Alternative would also not provide the Navy an alternate route of egress from Naval Air Station Oceana-Dam Neck Annex if the primary gate, located on Dam Neck Road, is impassable due to flooding as a result of SLR, a need identified in a 2019 Joint Land Use Study completed in consultation with the City of Virginia Beach, the City of Norfolk, the Commonwealth of Virginia and military installations including Naval Air Station Oceana-Dam Neck Annex (HRPDC 2019).

2.3.2 Build Alternative

The conceptual design of the Build Alternative was guided by input received from a September 2018 citizen information meeting as well as coordination with interested agencies and was designed to minimize, to the greatest extent practicable, impacts to environmental resources within the corridor. The Build Alternative includes components of various design options that were evaluated in the *Draft Preliminary Engineering Report* (WSP USA 2018, **Table 5**).

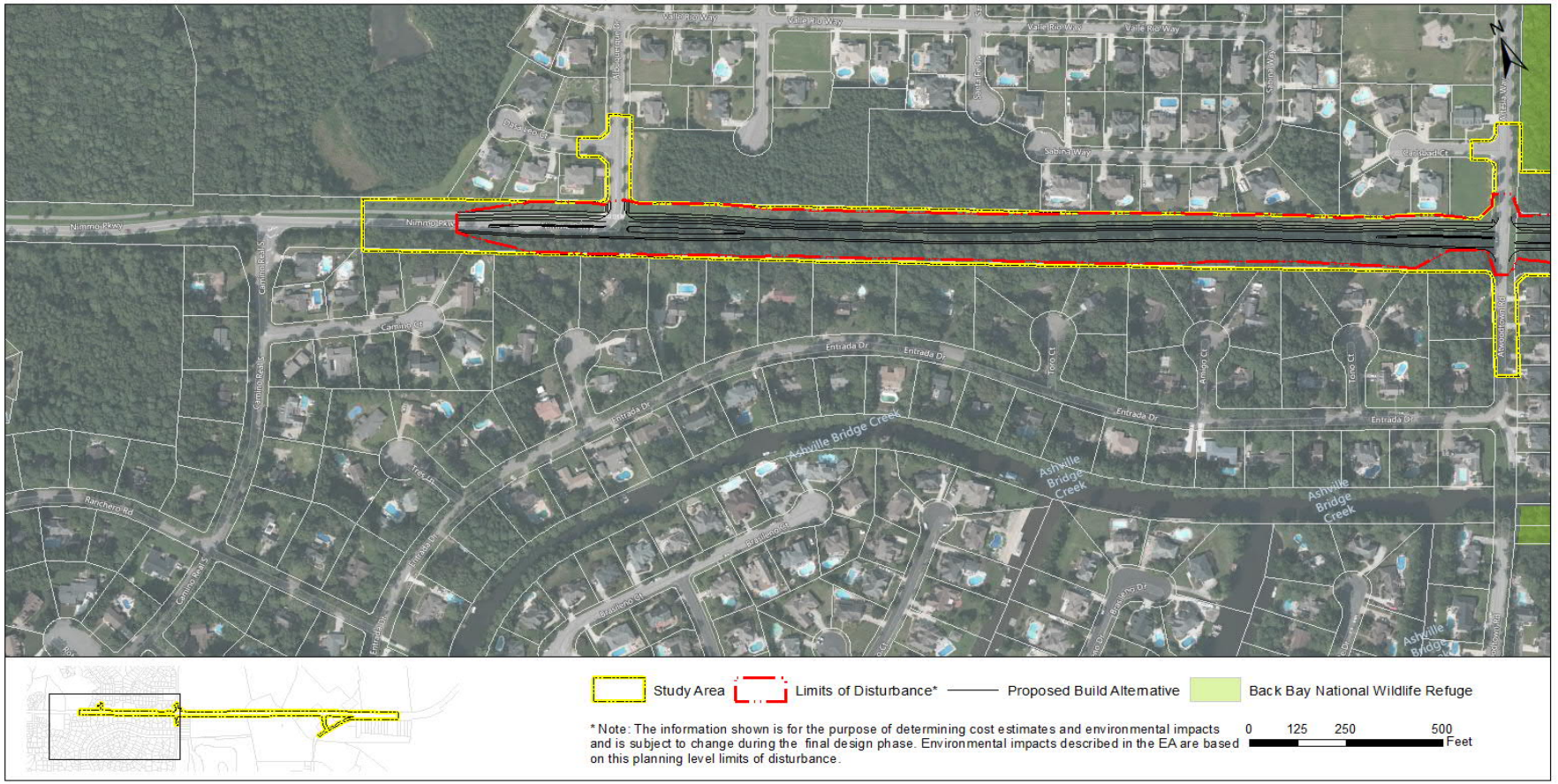
The approximately 1.8 mile long Build Alternative consists of a two-lane undivided roadway, with bicycle lanes and a shared-use path, extending from Albuquerque Drive to Sandbridge Road at a point approximately 0.8 miles west of its terminus at the Atlantic Ocean, and proposes to bridge Ashville Bridge Creek via an 800-foot bridge to minimize impacts to bald cypress habitat adjacent to Ashville Bridge Creek. The Study Area, planning-level Limits of Disturbance (LOD), and proposed Build Alternative are shown on **Figure 9**. This Build Alternative is being advanced for further analysis as it meets the project Purpose and Need.

Current design guidelines and structural design parameters include: the American Association of State Highway and Transportation Officials (AASHTO) *LRFD Bridge Design Specifications* (2014) and *A Policy on the Geometric Design of Highways and Streets (2018)*; the VDOT *Road Design Manual* (2019), *Road and Bridge Specifications* (2016), and *Road and Bridge Standards* (2008); and applicable locality specifications.

Table 5: Build Alternative Design Components Considered

Design Components Considered	Build Alternative
Typical section - curb and gutter (Albuquerque Drive to Atwoodtown Road)	X
Typical section - paved shoulder (Atwoodtown Road to Sandbridge Road)	
Traditional T-intersection (Nimmo Parkway and Sandbridge Road)	
Roundabout intersection (Nimmo Parkway and Sandbridge Road)	X
Shared-use path parallels alongside the roadway alignment	
Shared-use path meanders alongside the roadway alignment	X
Short bridge	
Long bridge	X
Shared-use path on a separate bridge structure	X
Shared-use path on the same bridge structure	
Open stormwater system (Albuquerque Drive to Atwoodtown Road)	
Closed stormwater system (Albuquerque Drive to Atwoodtown Road)	X
Utility corridor to the north of the road	TBD
Utility corridor to the south of the road	
Pedestrian lighting	X
No pedestrian lighting	
Adaptive lighting	X

Figure 9a: Build Alternative

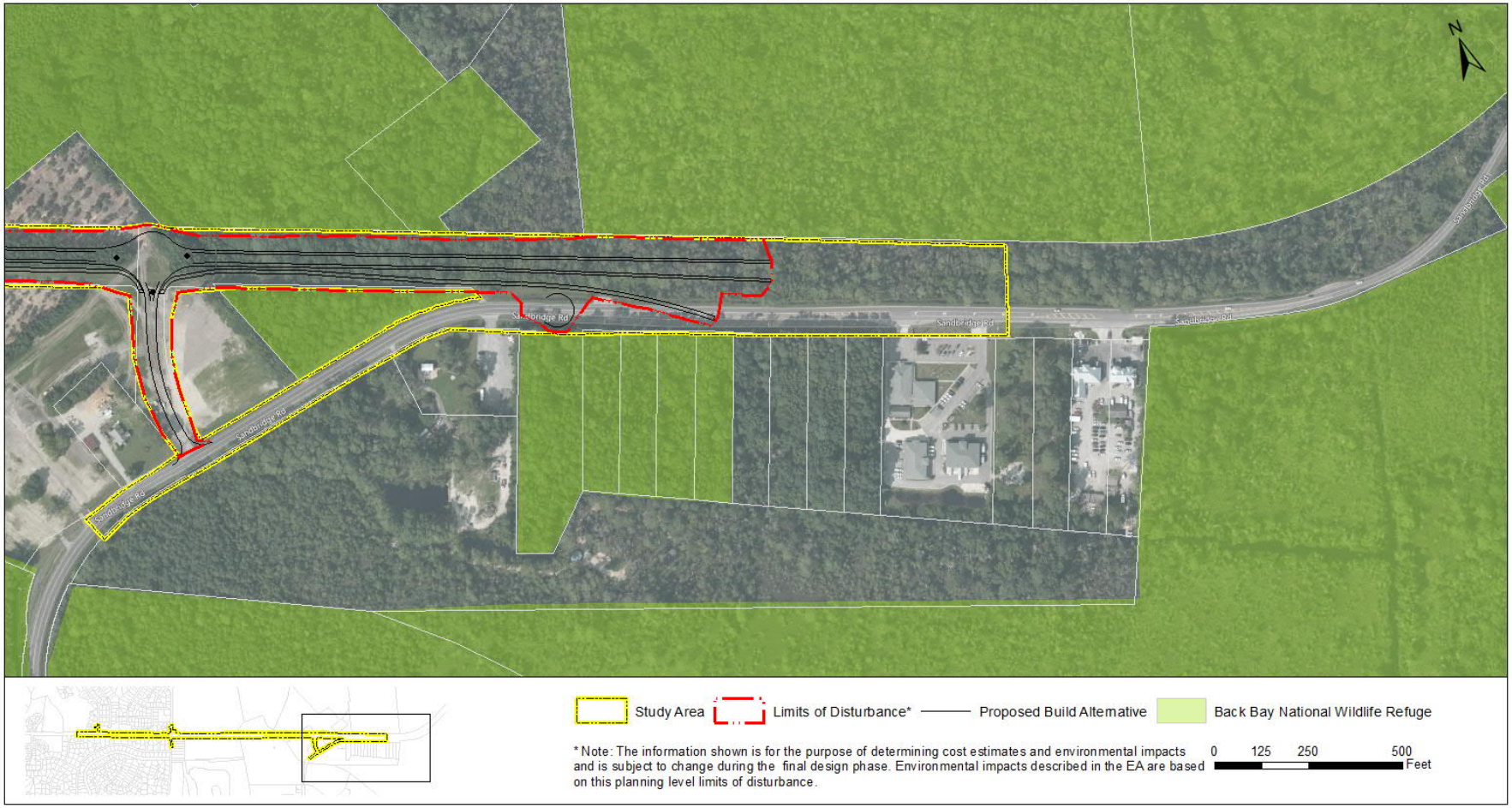


(1 of 3)

Figure 9b: Build Alternative (continued)

(2 of 3)

Figure 9c: Build Alternative (continued)



(3 of 3)

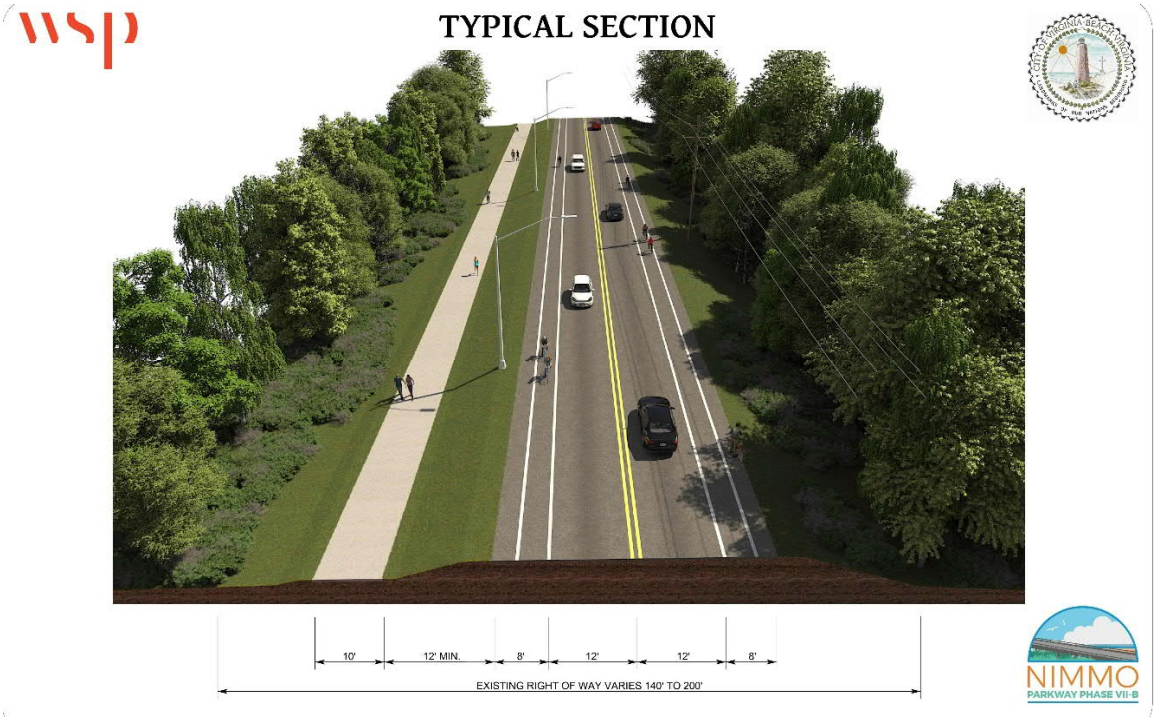
Current regulatory requirements and design standards dictate that new roadways are elevated to accommodate anticipated SLR or flooding. Per the *City of Virginia Beach Department of Public Works Draft Design Standards* (COVB 2019), the City of Virginia Beach is currently anticipating SLR of 1.5 to 3.0 feet over the next 50 years. These values are consistent with the analysis and recommendations described in the report submitted to the Virginia General Assembly by the Virginia Institute of Marine Science (VIMS 2013) titled '*Recurrent Flooding Study for Tidewater Virginia*'. As described in that report, recurrent flooding in the Tidewater region continues to increase in both frequency and severity and is partially attributable to documented SLR of more than 1 foot over the past 80 years. SLR is currently projected to continue at a similar or increasing rate over the coming decades. The *City of Virginia Beach Department of Public Works Draft Design Standards* require that development of critical infrastructure within the City of Virginia Beach shall increase the design tidal elevations in the City of Virginia Beach by 3.0 feet over the respective base (existing condition) values in order to address the impacts of the maximum projected SLR. Per City of Virginia Beach Public Works documentation, critical infrastructure is determined by the City Department of Emergency Management. Transportation systems are generally considered critical based on access to other critical infrastructure as well as emergency ingress/egress routes. Per the City of Virginia Beach Emergency Operations Plan (COVB 2020a), the existing Sandbridge Road corridor is designated as an evacuation route, and thereby considered critical infrastructure. The Nimmo Parkway corridor would similarly be considered critical infrastructure. The base elevation values are generally taken from the FEMA Flood Insurance Study (FIS) for the City of Virginia Beach and from studies undertaken by the City of Virginia Beach to assess tidal elevation frequencies particular to the City's southern receiving water bodies.

The Build Alternative would maintain a minimum elevation of 7.6 feet at the edge of the travel way. The proposed roadway is classified as an urban minor arterial (VDOT GS-6) with a maximum cross slope of 4 percent. The typical section includes two 12-foot lanes, two paved shoulders incorporating 4-foot bike lanes (one in each direction) with a 10-foot wide shared-use path (**Figure 10**). The shared-used path meanders from the roadway where possible, to separate pedestrians and motorists, providing a safer experience for pedestrian users. Left turn lanes are provided at the intersections of Nimmo Parkway/Albuquerque Drive and at Nimmo Parkway/Atwoodtown Road. The fill slopes for the roadway are designed to be 3:1 maximum to prevent the need for guard rail in accordance with the *VDOT Road Design Manual* (VDOT 2019). Steeper slopes and retaining walls are to be used at the bridge abutments to reduce impacts as the roadway elevates to cross Ashville Bridge Creek and the bald cypress swamp.

At the west end of the project, a curb and gutter section is utilized through the residential neighborhood, from Albuquerque Drive to Atwoodtown Road. The curb and gutter reduces the required lateral offset of the roadway and provides a separation between pedestrians and vehicles. The shared-use path is located on the north side of the roadway, tying into the existing shared-use path west of the project limits, along Nimmo Parkway. The shared-use path parallels the roadway to the north through this section of the project to minimize impacts and proximity to the existing homes.

After crossing Atwoodtown Road, the curb and gutter is discontinued and an open shoulder is provided. This includes an 8-foot paved shoulder and a 4-foot graded shoulder. To minimize the overall width of the roadway, the bicycle lanes would be discontinued and a shared shoulder would be used for bicycle traffic. The shared-use path meanders away from the roadway to provide separation between pedestrians and vehicles. The shared-use path is designed to a speed of 18 mph with a minimum curve radius of 60 feet.

Figure 10: Typical Section



Source: WSP 2018

The Ashville Bridge Creek crossing proposed for the Build Alternative is an 800-foot bridge with a separate structure for the shared-use path. The length of the bridge was determined to minimize impacts to the bald cypress swamp located east of Ashville Bridge Creek; the bridge would span the bald cypress swamp. Preliminary hydrologic and hydraulic analysis showed no significant impact to hydrology in the vicinity. The shared-use path is placed on a separate structure to safely cross pedestrians underneath the roadway from the north to the south side of the road, where it would later meet the shared-use path to be constructed as part of the Sandbridge Road - Nimmo Parkway Phase VII-A project east of the project limits. The pedestrian bridge crossing would eliminate the need for pedestrians to cross traffic in a crosswalk on Nimmo Parkway, reducing the exposure of pedestrians to on-coming traffic. The pedestrian bridge would be built with the bottom chord at elevation 5.5 feet at the Ashville Bridge Creek crossing, matching the vertical clearance for boaters at the Sandbridge Road Bridge downstream. The roadway bridge is designed to provide 8-foot of vertical clearance to the pedestrian bridge at the crossing underneath. The roadway bridge and pedestrian bridge substructure would utilize materials that are non-corrosive. The bridge design would meet the VDOT design specifications and would have a design life of 75 years.

On the east side of Ashville Bridge Creek, a roundabout would be used to connect the proposed Nimmo Parkway VII-B to Sandbridge Road-Nimmo Parkway VII-A and the connector road. A connector road would be created through existing right-of-way to provide access to the remaining western portion of Sandbridge Road. Sandbridge Road would dead end at a cul-de-sac just east of the connector road.

Stormwater management would be achieved through a combination of Best Management Practices (BMPs) within the project right-of-way and off-site nutrient credits to supplement remaining water quality requirements. In the western section of the project between the western terminus and Atwoodtown Road, the roadway is piped to proposed wet swale BMPs on the south side of the road. These BMPs manage the roadway runoff and intercept offsite sheet flow from the neighborhood properties bordering the right-of-way to the south. Stormwater BMPs have been included within the planning-level LOD. Neighborhood drainage would ultimately tie back into the existing storm system

located on the north side of the right-of-way and outfall into the existing ponds located within the Lago Mar subdivision. In the eastern section of the project between Atwoodtown Road and the proposed connector road, the road cross slope would allow drainage to uniformly sheet flow across a conserved open space buffer, and ultimately into the wetlands surrounding the project corridor and Ashville Bridge Creek in accordance with the Virginia Stormwater Design Specifications. This configuration is accompanied by pretreatment for runoff into the conserved open space with a gravel diaphragm adjacent to the shoulder. Areas of concentrated flow are spread by a level spreader into the conserved open space, including bridge deck runoff where possible. The conserved open space buffer for stormwater use within the study area shall remain in a natural, vegetated state. The right-of-way around the proposed connector road and to the eastern terminus of the project would drain into proposed adjacent wet swales and run parallel to the proposed road. These wet swales would either outfall with a level spreader into conserved open space, or tie into the Sandbridge Road-Nimmo Parkway VII-A drainage conveyance systems.

2.3.3 Ability of Build Alternative to Meet Project Need

The Build Alternative would provide a resilient access route to the Sandbridge Community and would make Sandbridge Road a secondary access route from the Connector Road west. This would meet the Purpose and Need of the project, as set forth in Section 1.0, by providing reliable access and connectivity for the Sandbridge Community. The Build Alternative would be constructed to an elevation to resist frequent flooding and to accommodate future SLR, thus providing reliable access and connectivity to the Sandbridge Community. The Build Alternative would provide an additional route for alternate access in cases where Sandbridge Road is impassable and/or during mandatory evacuation due to hurricanes. The community would no longer be required to continue to rely on the high-security facility of Naval Air Station Oceana- Dam Neck Annex for alternate access via the facility's south gate. The Build Alternative would also provide the Navy an alternate route of egress from Naval Air Station Oceana-Dam Neck Annex if the primary gate, located on Dam Neck Road, is impassable due to flooding as a result of SLR. As such, it is being advanced in this EA as the Build Alternative under consideration.

2.3.4 Preliminary Cost Estimate

A preliminary cost estimate was developed for the Build Alternative based upon VDOT bid tabulations from 2017. Similar projects were identified in the VDOT Hampton Roads District and used to develop unit costs. Preliminary quantities were taken from the design software (Open Roads) model and applied to the unit costs. A summary of the project cost is included in **Table 6**.

Table 6: Preliminary Cost Estimate

Cost Estimate Element	Build Alternative
Preliminary Engineering	$4,000,000
Construction Cost[1]	$32,295,000
Private Utilities / Right-of-Way	$6,800,000
Total Project Cost (2020)	$43,095,000

1. The construction cost includes acquiring offsite stormwater credits and purchasing wetland credits for wetland mitigation.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Overview of Environmental Issues

This section summarizes the existing human and natural environments within the study area and provides analyses of the No Build and Build Alternative. The narratives for each resource area describe existing environmental conditions and assess environmental impacts of the alternative. Both beneficial and adverse impacts are discussed as appropriate for each resource.

The environmental issues and their relevance to the project are summarized in **Table 7**. Key issues requiring further discussion are addressed following the table. A discussion of construction effects, indirect effects, and cumulative effects are also discussed.

Table 7: Summary of Environmental Issues and Impacts

Resource	Resource Summary/Inventory	No Build Alternative	Build Alternative
Land Use	The majority of the study area is partially within and surrounded by residential uses and wooded and open space. The majority of the study area is also surround by Back Bay National Wildlife Refuge (BBNWR). The project is listed in the City of Virginia Beach Master Transportation Plan, as part of the City of Virginia Beach Comprehensive Plan, as well as the City's Capital Improvement Program.	No change to existing land use or future land use plans.	The Build Alternative is within existing right-of-way. Easements may be required for access during construction, drainage, and private utility relocations. The project's limits of construction would be within existing right-of-way; therefore no land is to be acquired and no changes in land use.
Communities and Community Facilities	The study area includes two neighborhoods: Lago Mar and Lago Mar Back Bay subdivisions. The existing Nimmo Trail is located within the study area and Lago Mar Back Bay Neighborhood Park is adjacent to the study area. The existing right-of-way (owned by the City of Virginia Beach) and surrounded by the BBNWR, which also includes recreational facilities, is within the study area. No other community facilities are located within the study area. A bicycle and pedestrian trail, developed by a private citizen, is located within the existing right-of-way within the study area. The soft trail is between Albuquerque Drive and Atwoodtown Road. The soft trail is unpaved in this section and connects to the existing paved Nimmo Trail that runs along the northside of the existing Nimmo Parkway.	No land would be acquired. No displacements or relocation of residents or businesses would occur. No impact to community resources. No changes to the existing private trail in study area or to the existing Nimmo Trail.	The Build Alternative would not directly impact community facilities. The Build Alternative is located within the existing right-of-way. No adverse impacts would occur to community connectivity and cohesion to existing neighborhoods. Access to roadways would remain to existing neighborhoods with the Build Alternative. Refer to **Section 3.4** for detailed information. The existing Nimmo Trail would connect to the bicycle and pedestrian facilities included as part of the Build Alternative. The Lago Mar at Back Bay Neighborhood Park is approximately 400 feet north of the study area and would not be impacted. The soft trail within the existing right-of-way would be replaced with a shared use path as part of the Build Alternative. The Build Alternative would connect with the existing

Resource	Resource Summary/Inventory	No Build Alternative	Build Alternative
	The City of Virginia Beach Fire/EMS Station 17 is located within Sandbridge at 305 Sandbridge Road.		Nimmo Trail at Albuquerque Drive. No direct impacts would occur to the BBNWR. Refer to **Section 3.15** for a discussion related to Section 4(f) resources.
Socioeconomics and Environmental Justice	The block groups within the project's study area have both a minority and low-income population percentage that is below the City's overall percentage.	No impact to population, income or housing. No impact to environmental justice populations.	There will be no relocations with the Build Alternative. No impact to population, income or housing would occur with the Build Alternative. No disproportionate or adverse effects would occur with the Build Alternative. Refer to **Section 3.5 and Section 3.6** for detailed information.
Cultural Resources	The architectural survey analyzed three potential historic resources and identified two new historic dwellings and the archaeological survey identified one potential archaeological location within the project APE.	No impacts to cultural resources.	The historic resources and archaeological location are recommended not eligible for listing in the National Register of Historic Places (NRHP). The Build Alternative would not result in an adverse effect to historic resources. Refer to **Section 3.7** for detailed information.
Waters of the U.S., including Wetlands	Ashville Bridge Creek intersects the study area and is considered navigable water at the project location. Jurisdictional wetlands and maintained ditches are also located within the study area.	No impacts to waters or wetlands.	The Build Alternative would result in approximately 9.7 acres of wetlands impacts. Sensitive bald cypress swamp plant community would be avoided to the extent possible. Refer to **Section 3.8** for detailed information.
Water Quality	Ashville Bridge Creek at the project location is listed as Category 3A. Lower Ashville Bridge Creek approximately 0.7 miles south of the project location at the convergence of Hell's Point Creek, is listed as impaired for aquatic life and recreation.	No impacts to waters or wetlands.	The No Build conditions would be consistent with existing conditions. Minor long-term water quality impacts resulting from the Build Alternative could occur as a result of increases in impervious surfaces, increases in traffic volumes, and consequent increases in

Resource	Resource Summary/Inventory	No Build Alternative	Build Alternative
	There are no surface waters in the Study Area that are categorized as Exceptional State Waters.		pollutants washed from the road and bridge surface into receiving water bodies, both on-site and downstream. The Build Alternative could also result in temporary impacts to water quality during roadway construction through increased sedimentation from land disturbing activities. Refer to **Section 3.8** for detailed information.
Floodplains	The Study Area is located within the Federal Emergency Management Agency (FEMA) 100-year floodplain (Zone AE).	No impact to floodplains.	The Build Alternative would impact approximately 17.29 acres within the 100-year floodplain (Zone AE) and an additional 2.26 acres in the 500-year flood plain (0.2 percent annual chance of flooding). The Build Alternative would not pose a substantial flooding risk, nor would the Build Alternative substantially increase flood elevations, the probability of flooding, or the potential for property loss or hazard to life. Refer to **Section 3.8** for detailed information.
Terrestrial Habitat and Wildlife	Terrestrial wildlife within the Study Area include common woodland mammals; birds such as passerines, waterfowl and shorebirds; and common reptile and amphibian species.	No impacts other than ongoing usage and maintenance activities.	The Build Alternative would result in some effects to the terrestrial habitat and wildlife through conversion of existing undeveloped land to maintained transportation right-of-way. This conversion would result in some loss of wildlife habitat, could affect existing wildlife movement patterns as a result of a new east-west barrier, inhibiting movement north-south, and could impact wildlife through mortality (e.g. wildlife-vehicle

Resource	Resource Summary/Inventory	No Build Alternative	Build Alternative
			collisions), or behavior modification (e.g. roosting, breeding and feeding) from roadway avoidance. Refer to **Section 3.8** for detailed information.
Aquatic Habitat and Wildlife	Aquatic and aquatic dependent species including fish, reptiles, amphibians, benthic invertebrates and aquatic birds inhabit in Ashville Bridge Creek.	No impacts	The Build Alternative would introduce impervious surface to an otherwise undeveloped area increasing stormwater runoff to receiving waterbodies. Refer to **Section 3.8** for detailed information.
Threatened and Endangered Species	According to the USFWS IPaC database, there is no critical habitat within the project area. Species of concern in the project area include the federally threatened NLEB *(Myotis septentrionalis);* state endangered canebrake rattlesnake (*Crotalus horridu);* state threatened peregrine falcon (*Falco peregrinus);* and the bald eagle (*Haliateetus leucocephalus).* There are no known nests for the peregrine falcon (*Falco peregrinus)* within or near the study area.	No impacts	Build Alternative proposed activities are anticipated to be excepted from take prohibitions per the *Biological Opinion.* Virginia Department of Wildlife Resources (VA DWR) guidance (VDGIF 2011) indicates the site should be evaluated for potential canebrake rattlesnake occurrence. Refer to **Section 3.8** for detailed information.
Agricultural and Forestal Districts, Prime Farmland and Soils	The study area does not contain farmland and is not located within an agricultural or forestal district.	No impacts	No impacts
Hazardous Materials	No facilities were identified in State or Federal database records that are adjacent or in the project corridor. A Tier 1 Vapor Encroachment Screening indicated that a potential Vapor Encroachment Condition does not exist or is not likely to exist in the project corridor.	No impacts	There is no evidence of recognized environmental conditions within or adjacent to the Build Alternative. No additional investigation is recommended. Refer to the Phase I Environmental Site

Resource	Resource Summary/Inventory	No Build Alternative	Build Alternative
			Assessment (**Appendix C**) for detailed information.
Air Quality	Federal air quality conformity requirements do not apply because the project is located in a region that is designated as in attainment for all National Ambient Air Quality Standards (NAAQS) criteria pollutants. This project has been categorized as one with low potential MSAT effects, based primarily on the forecast traffic volumes for this project.	No changes to existing air quality.	The air quality assessment indicates that the Build Alternative would meet all applicable air quality requirements of NEPA and federal and state transportation conformity regulations. The project will not cause or contribute to a new violation of the NAAQS established by EPA. Refer to **Section 3.9** for detailed information.
Noise	The study area includes exterior residential (Category B) and exterior recreational (Category C) land uses. The preliminary noise evaluation predicted noise impacts for the 2018 Existing conditions and 2042 Build Alternative.	No change in noise levels.	Two noise barriers were found to feasible and reasonable for the Build Alternative during preliminary noise evaluation. Construction activity may cause intermittent fluctuations in noise levels. Refer to **Section 3.10** for detailed information.
Visual and Aesthetics	The following visual resources or land-uses were identified as present within the area of visual effect: suburban residential, two-lane suburban roads, two-lane rural road, maintained utility corridor, undeveloped forest, logged forest, Nimmo Trail, unpaved pedestrian path within the western portion of the proposed project corridor/utility easement, small-scale commercial development, a historic family cemetery (Stone Family Cemetery), BBNWR, and Ashville Bridge Creek.	No change to existing views in the area.	Some adverse impacts to visual quality can be expected to the residential neighbor group to the north and south of the utility corridor between Albuquerque Road and Artesia Way, and the non-motorized travelers that currently use the unpaved pedestrian path through this same corridor, and the recreational neighbor group using small watercraft on Ashville Bridge Creek. However, the project will provide benefits to visual quality to the greater number of users in the traveler group (motorized and non-motorized) as they cross through the forested portions of the project that

Resource	Resource Summary/Inventory	No Build Alternative	Build Alternative
			bridges over Ashville Bridge Creek as well as the enhanced views of the Stone Family Cemetery. Refer to **Section 3.11** for detailed information.
Energy	Transportation energy is the energy required to move people and goods from place to place and is a function of traffic characteristics such as volume, speed, distance traveled, vehicle mix and the heat value of the fuel being used.	The No Build Alternative could result in continued increases in direct energy consumption, as local traffic congestion on Sandbridge Road continues to worsen.	The No Build Alternative could result in continued increases in direct energy consumption, as local traffic congestion on Sandbridge Road continues to worsen. Refer to **Section 3.13** for detailed information.
Section 4(f) and 6(f) Properties	Three Section 4(f) resources are within or adjacent to the study area. These include one park, one trail, and one wildlife refuge. Land and Water Conservation Funds (LWCF) were used for expansion of the original BBNWR.	No use of Section 4(f) resources. Since no new right-of-way will be required for the Build Alternative, no direct impacts are to Special Lands/Section 6(f) that were developed with LWCF funds in the study area.	Since no new right-of-way would be required for the Build Alternative, no direct impacts would occur to Special Lands that were developed with LWCF funds in the study area. Refer to **Section 3.14** for detailed information. No impacts would occur to the Lago Mar at Back Bay Neighborhood Park. The Build Alternative would connect to the existing Nimmo Trail through the proposed shared use path. Access to the trail at Albuquerque Drive would be closed during construction, but users would be able to access Nimmo Trail at Camino Real during construction. No new right-of-way would be required from the BBNWR as a result of construction of the project. However, due to the location of the Build Alternative in relation to BBNWR there is potential for some loss of wildlife

Resource	Resource Summary/Inventory	No Build Alternative	Build Alternative
			habitat (including birds, mammals, reptiles, and amphibians) representing less than 1 percent of contiguous habitat at BBNWR. The Build Alternative would affect existing wildlife movement patterns. New lighting may affect birds, reptiles, amphibians, and small and large mammals. The proposed project will not produce noise-related impacts that would result in the interference of the intended use of the Section 4(f) resource. Refer to **Section 3.15** for detailed information.

3.2 Traffic/Transportation

3.2.1 Existing Conditions

Data for the project traffic analysis was collected from a continuous count station located on Sandbridge Road approximately 200 feet east of the study area. This data was available from the City of Virginia Beach's Traffic County Data web page. Details of data collection methodology are provided in the *Nimmo Parkway Phase VII-B Traffic Analysis memorandum* (**Appendix C**). Raw data for weekday and weekend summer volumes are also provided in **Appendix C**.

Table 8 provides a summary of the 2018 existing traffic volumes, which is the basis for the volume and diversion projections.

Table 8: 2018 Traffic Volumes for Weekdays and Weekends

Weekday and Weekend Volumes	Vehicles Per Day	2018 Sandbridge Road
Eastbound and Westbound Weekday Analysis Volumes	**Summer** Daily vpd (85th percentile)	12,290
	Summer Daily vpd (average)	10,580
	Off-season Daily vpd (average)	10,500
	Summer PM Peak vph (both directions) (85th percentile)	980
Eastbound and Westbound Weekend Analysis Volumes	**Summer** Daily vpd (85th percentile)	17,860
	Summer Daily vpd (average)	15,050
	Off-season Daily vpd (average)	14,550
	Summer PM Peak vph (both directions) (85th percentile)	1,540

3.2.2 Project Impacts

3.2.2.1 Projected Trip Diversion

Once constructed, Nimmo Parkway will provide a parallel route to existing Sandbridge Road between Upton Drive and the Sandbridge Beach area. As a result, there will be a diversion and balancing of traffic between Sandbridge Road and Nimmo Parkway as drivers make their way to and from the Sandbridge Beach area from Upton Drive. Virginia Beach's 2040 Travel Demand Model, which includes the Nimmo Parkway extension, was used to estimate the diversion/split between Nimmo Parkway and Sandbridge Road. A "select link analysis" was performed for the segment of Sandbridge Road just east of the study area, which shows the origin and route of traffic that ultimately travels the selected link. The select link analysis is useful in determining the likely distribution of traffic between Nimmo Parkway and Sandbridge Road. Based on the select link analysis, if the proposed Nimmo Parkway extension is constructed, the future distribution would be:

- Nimmo Parkway – 76 percent of traffic
- Sandbridge Road – 24 percent of traffic

This indicates that 76 percent of traffic to and from the Sandbridge Beach area would use the proposed Nimmo Parkway extension.

3.2.2.2 Projected 2048 Volumes

Projected design year 2048 volumes were determined by analyzing both historical and projected growth rates for the area. Historical background growth is based on historical traffic volumes from City of Virginia Beach's Traffic Count Data web page. Projected future volumes are obtained from the approved 2040 Hampton Roads Long Range Transportation Plan (LRTP).

Historical data obtained from the City of Virginia Beach's web page dates back to 2001 (**Table 9**). ADT was used to determine the growth trend over the available years. The published ADT is an average of all the daily available data for each year, which averages the seasonal and day of week variations. A linear trendline was used to project volumes to 2040 based on the historical growth trendline.

Table 9: Historical and Projected Average Daily Traffic

Year	ADT (All Data)	ADT (All Data Trendline)
2048	-	10,042
2040	9,150	9,516
2017	7,902	8,004
2016	8,141	7,939
2015	7,990	7,873
2014	8,723	7,807
2013	8,159	7,742
2012	7,066	7,676
2011	7,795	7,610
2010	7,360	7,544
2007	7,556	7,347
2004	7,050	7,150
2001	6,277	6,953
2000	-	6,887

The traffic analysis assumed an advertisement date of 2026 and a projected future horizon design year of 2048 (advertisement date plus 22 years), based on the Linear Trend (All Data) line, the ADT is expected to grow 24.4 percent between 2017 and 2048 (or 0.9 percent per year).

3.2.2.3 Traffic Operations Analysis

A traffic operational analysis model was developed following the Highway Capacity Model (HCM) methodology using Highway Capacity Software (HCS) 2010 Two-Lane Roadway model procedures. The scenarios are as follows:

1. 2018 Existing: Sandbridge Road Only
2. 2018 Build Sandbridge Road and proposed Nimmo Parkway extension

If the Nimmo Parkway extension were in place using 2018 volumes:

1. 2048 No Build: Sandbridge Road Only
2. 2048 Build: Sandbridge Road and proposed Nimmo Parkway extension

Table 10 outlines the 2018 and 2048 traffic volume data used as operational model inputs. The input volumes are based on the 2018 85th percentile summer volumes as described earlier in this memo and projected to the 2048 horizon year.

Table 10: 2018 and 2048 Traffic Analysis Volumes

		No Build	Build	
		Existing Sandbridge Road	Nimmo Parkway	Sandbridge Road
	Select Link Volume (EB+WB)	1,682	1,273	409
	% Diversion		76%	24%
Eastbound and Westbound Weekday Analysis Volumes	2018 Summer Daily vpd (85th percentile)	12,290	9,300	2,990
	2048 Summer Daily vpd (85th percentile)	15,300	11,580	3,720
	% of Daily Volume in PM Peak Hour = (K factor)	7.95%		
	% Directional Distribution = (Peak Direction D factor)	54%		
	2018 Summer PM Peak vph / Peak Directional Volume (85th percentile) =	530	400	130
	2048 Summer PM Peak vph / Peak Directional Volume (85th percentile) =	660	500	160
Eastbound and Westbound Weekend Analysis Volumes	2018 Summer Daily vpd (85th percentile) =	17,860	13,510	4,350
	2048 Summer Daily vpd (85th percentile) =	22,200	16,800	,5400
	% of Daily Volume in PM Peak Hour = (K factor)	8.62%		
	% Directional Distribution = (Peak Direction D factor)	51%		
	2018 Summer PM Peak vph / Peak Directional Volume (85th percentile)	790	600	190
	2048 Summer PM Peak vph / Peak Directional Volume (85th percentile)	980	740	240

Using the projected traffic volumes and roadway geometric data (such as shoulder & lane width, passing zones, number of access points), the operational analysis provides operational Measures of Effectiveness (MOE's) to provide an operational comparison between the scenarios. The MOEs identified for the two-lane highway segment HCM methodology include Level of Service (LOS), volume-to-capacity ratio (v/c), and average travel speed (in mph). The overall roadway segment LOS is based on the calculated v/c and average travel speed for the segment. A better LOS indicates that there is less congestion, a greater average speed, and lower volumes, which translates into an operationally more reliable roadway. A lower LOS indicates more congestion, which is an indicator of slower travel speeds, higher volumes, and decreased operational reliability.

Table 11 shows the MOE's for each scenario for existing 2018 and future year 2048 traffic volumes for both summer weekday and summer weekend traffic conditions.

Table 11: HCS Traffic Analysis Model Output Summary

		Weekday					Weekend				
		Modeled Volume		LOS	v/c	Ave Travel Speed (mph)	Modeled Volume		LOS	v/c	Ave Travel Speed (mph)
		Peak Analysis Direction	Opposing Direction				Peak Analysis Direction	Opposing Direction			
2018											
No Build	Existing Sandbridge Road	530	450	D	0.34	38.2	790	750	D	0.51	34.5
Build	Sandbridge Road	130	110	B	0.08	44.0	190	180	B	0.12	41.7
	Nimmo Parkway	400	340	C	0.26	39.5	600	560	D	0.38	37.0
2048											
No Build	Existing Sandbridge Road	660	560	D	0.42	36.7	980	930	E	0.67	31.6
Build	Sandbridge Road	160	140	B	0.10	43	240	230	C	0.16	41.2
	Nimmo Parkway	500	420	D	0.32	38.4	740	710	D	0.50	35.1

3.3 Land Use and Zoning

3.3.1 Existing Conditions

The study area includes existing right-of-way that is adjacent to the single-family residential neighborhood of Lago Mar and Lago Mar at Back Bay, the Back Bay National Wildlife Refuge, commercial realty offices, which serve the vacation rental market for the Sandbridge Community, a popular vacation destination with public beach access, residents and a small farm (**Figure 11**). Future land use is planned to remain the same as existing land uses outside of the planned completion of the Nimmo Parkway corridor. The majority of the study area is surrounded by wooded and open space in the form of the wildlife refuge, Back Bay National Wildlife Refuge.

The City of Virginia Beach Master Transportation Plan, as part of the City of Virginia Beach Comprehensive Plan, lists this project. The project is also listed in the City's Capital Improvement Program.

3.3.2 Environmental Consequences

3.3.2.1 No Build Alternative

The No Build Alternative would not impact existing or future land use since there would not be a change in land use.

3.3.2.2 Build Alternative

No right-of-way acquisition or relocations are to occur by the Build Alternative since work will be within existing right-of-way. Therefore, no changes to land use would occur as a result of the project.

3.3.3 Minimization and Mitigation Measures

Since no right-of-way is required and no displacements would occur, no mitigation is required.

3.4 Community Resources

3.4.1 Existing Conditions

The study area is served by various community facilities in the area (**Figure 11**). The Sandbridge Community houses residential homes and vacation rental units, as well as shops, restaurants and community facilities, including the City of Virginia Beach Fire Station 17, serving the resident and tourist community. Naval Air Station Oceana-Dam Neck Annex is located north of the Sandbridge Community and currently serves as the community's sole emergency egress when Sandbridge Road is impassable; however, this facility is a high-security military facility and is restricted from use by the public.

The City of Virginia Beach Fire/EMS Station 17 is located within Sandbridge at 305 Sandbridge Road. The station is manned by four Virginia Beach Fire Department personnel (one Captain and three firefighters). The Sandbridge Volunteer Rescue Squad is housed at Station 17 and provides emergency medical service. The Virginia Beach Police Department also has a satellite office located within the station.

The project corridor is located within the Red Mill Attendance Zone for elementary schools; Princess Anne Attendance Zone for middle schools; and both Ocean Lakes and Kellam Attendance Zones for high schools. These zones include the Lago Mar neighborhood and the Sandbridge community.

No rail or bus routes are located within 500 feet of the study area.

3.4.2 Parks and Recreation

Three recreational facilities are located within or adjacent to the study area: Nimmo Trail, Lago Mar at Back Bay Neighborhood Park, and Back Bay National Wildlife Refuge. While there is an unpaved path running along the study area east of the existing Nimmo Trail, the path is not designated for recreational use or public access.

Nimmo Trail

Nimmo Trail is a public bicycle and pedestrian trail located within the existing public right-of-way where the proposed project is located. The paved, off-road shared use trail starts has a contiguous connection from Albuquerque Drive to West Neck Road along the north side of existing Nimmo Parkway. The connection is a combination of a variable width (8 feet to 12 feet) concrete widened sidewalk and an asphalt shared use path. Permitted uses on the paved portion include bicycling, walking, and wheelchair access. The shared use path is owned and operated by the City of Virginia Beach.

Lago Mar at Back Bay Neighborhood Park

Lago Mar at Back Bay Neighborhood Park is a city-owned resource located on Artesia Way in a residential setting. The park is approximately 400 feet north of the proposed study area. Amenities include playground equipment, picnic shelter and table, and open space. The park is open to the public between sunrise and sunset.

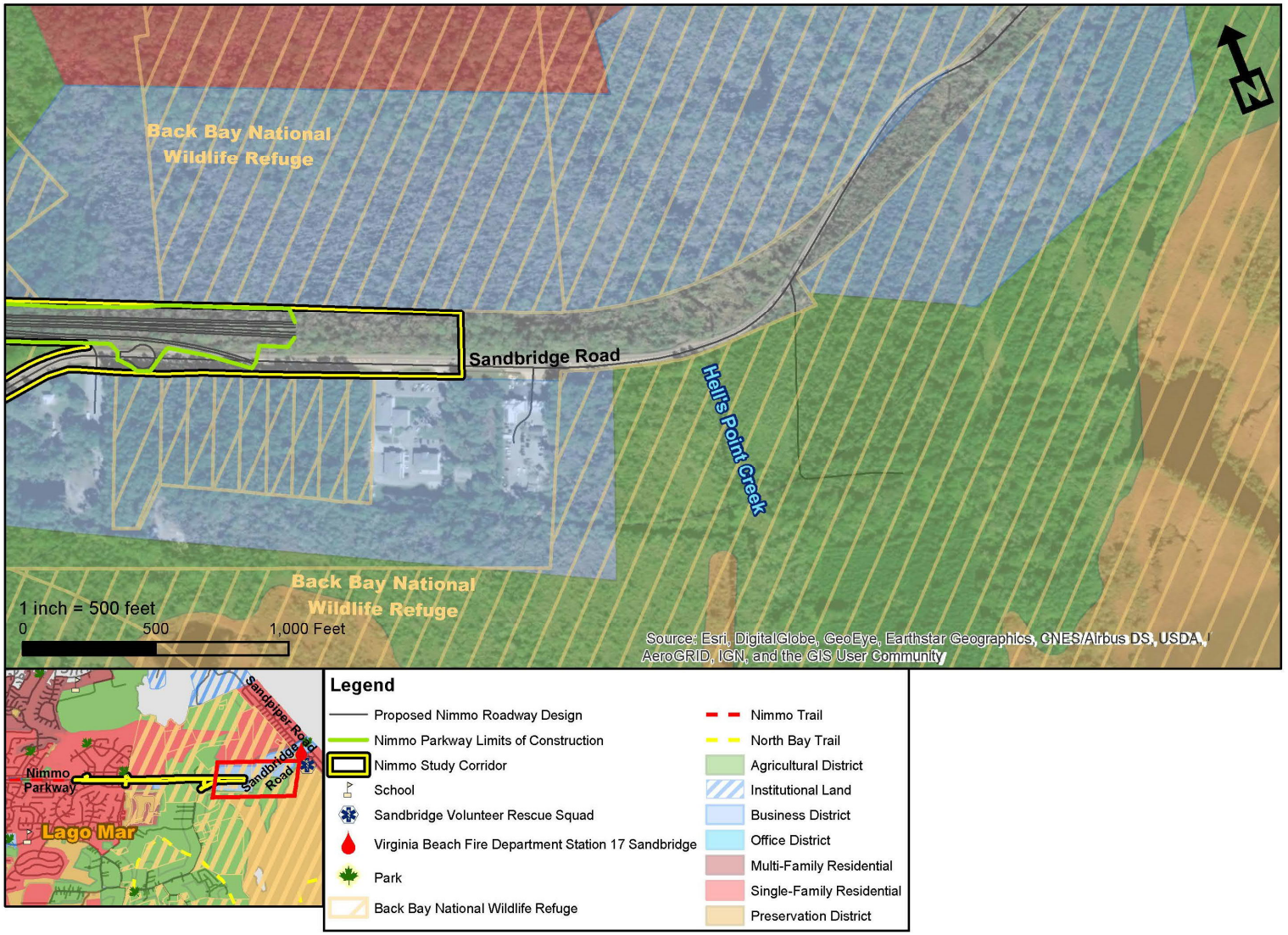
Back Bay National Wildlife Refuge

The BBNWR is owned and operated by the US Fish and Wildlife Service and was established in 1938 (USFWS 2010). It is part of the National Wildlife Refuge System. The wildlife refuge was established at 4,589 acres and has grown to 9,250 acres (USFWS 2010). The refuge includes a number of features throughout the refuge including beach, dunes, woodlands, agricultural fields, and emergent freshwater marshes. Recreational facilities include scenic trails, a visitor station, interpretive programming, and group education. The study area is on existing public right-of-way that is surrounded by the refuge on both sides.

Figure 11a: Land Use and Community Resources

Figure 11b: Land Use and Community Resources (continued)

Figure 11c: Land Use and Community Resources (continued)



3.4.3 Environmental Consequences

3.4.3.1 No Build Alternative

The No Build Alternative would not impact community facilities or community cohesion in the study area. It also would not provide an alternative route for emergency response or emergency egress for the Sandbridge community.

3.4.3.2 Build Alternative

No right-of-way will be required from any facility by the Build Alternative. Access to community facilities in the area will be improved with the construction of Nimmo Parkway Phase VII-B by providing an additional access point to the Sandbridge community.

The Nimmo Trail will be extended to connect with the new shared use path included as part of the Build Alternative. The existing Nimmo Trail would remain in its existing location, but access could be limited during construction. No direct impacts to Lago Mar at Back Bay Neighborhood Park will occur. No new right-of-way will be required from Back Bay National Wildlife Refuge by the Build Alternative since all proposed work is to be conducted within the existing right-of-way. Indirect effects related to wildlife habitat, including noise, lighting, and movement patterns, within BBNWR were evaluated to determine if a constructive use may result from the Build Alternative. These potential indirect effects are discussed in the Section 4(f) evaluation in **Section 3.15**.

3.4.4 Minimization and Mitigation Measures

Access to the Nimmo Trail would be closed during construction to tie the proposed shared use path into the existing Nimmo Trail at Albuquerque Drive. Users of the Nimmo Trail would be able to access the trail at Camino Real during construction.

Possible mitigation measures for BBNWR were developed to minimize impacts to wildlife as a result of the Build Alternative. These measures, including landscaping, wildlife crossings, and lighting concepts, are discussed further in **Section 3.15**.

3.5 Socioeconomic Characteristics

3.5.1 Existing Conditions

The study area for environmental justice included US Census tracts and block groups within or adjacent to the project's study area. Unless otherwise noted, American Community Survey (ACS) 5-year estimates were used for population and housing characteristics of the study area. Based on availability, data were collected for the following census tracts and block groups: Tract 454.20 – Block group 3; Tract 454.26 – Block group 3; and Tract 454.12 – Block group 1.

Population

Census block groups that are wholly or partially within the environmental study area for the project is considered for population characteristics. According to the VBgov City Map data (2019), the population of the Census block groups in the study area is 5,615 (**Table 12**).

Table 12. Population Characteristics

Tract and Block Group	Total Population	Total Housing Units	Median Household Income
454.26 BG 3	2,097	649	$113,143
454.20 BG 3	1,860	612	$132,578
454.12 BG 1	1,658	1,727	$97,778
Virginia Beach City	450,201	184,794	$76,610
State of Virginia	8,454,463	3,562,143	$74,222

Source: City of Virginia Beach, VBgov City Map, 2019 and U.S. Census Bureau, 2019 ACS 5-Year

Housing

Housing characteristics are summarized based on the available ACS 2014-2019 five-year data at the Census tract level (**Table 13**). The total housing units within the census tracts in the study area is 6,052 units. The study area census tracts all have higher percentages of owner-occupied housing units.

Table 13. Housing Characteristics

Census Tracts	Housing Units	Occupied Units	Owner-occupied	Owner-occupied (%)	Renter Occupied (%)
454.26	2,265	2,226	1,937	87.0%	13.0%
454.20	2,041	1,977	1,398	70.7%	29.3%
454.12	1,746	611	548	89.7%	9.3%
Virginia Beach City	184,794	175,029	108,919	62.4%	37.6%

Source: U.S. Census Bureau, 2014-2019 ACS 5-Year

Income

The income data is based on VBgov City Map median household income data of persons residing in the study area block groups (**Table 12**). The median household income in the study area was $132, 578. Census block group 454.20 BG 3 in Lago Mar had the highest median household income. And block group BG 454.12 BG 1 had the lowest. In comparison to the City of Virginia Beach and the State of Virginia, the study area's median household income is higher than both.

3.5.2 Environmental Consequences

3.5.2.1 No Build Alternative

The No Build Alternative would not result in displacements or relocations in the study area. Therefore, no impacts to population or housing would result from the No Build.

The No Build Alternative would not make improvements to Nimmo Parkway or extend the roadway to Sandbridge, and thus no direct impact to income or employment would occur.

3.5.2.2 Build Alternative

The Build Alternative will be within existing right-of-way. Therefore, no displacements or relocations will occur and no changes to population would occur as a result of the Build Alternative.

3.6 Environmental Justice

This analysis was developed in accordance with Title VI of the Civil Rights Act of 1964 as amended in 1968, and Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Executive Order 12898 directs Federal agencies to identify and address disproportionately high and adverse human health or environmental effects that its programs, policies, and activities may have on minority and

low-income populations. The VDOT definition of Environmental Justice states "Environmental Justice assures that services and benefits allow for meaningful participation and are fairly distributed to avoid discrimination."

According to VDOT Order 6640.23, FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, minority and/low-income populations are defined as "any readily identifiable groups of minority and/or low-income persons who live in geographic proximity…"(FHWA, 1998).

3.6.1 Existing Conditions

The study area for environmental justice included US Census tracts and block groups within or adjacent to the project's study area (**Figure 12**). The American Community Survey (ACS) 5-Year 2013-2017 estimates were used for US Census Data by block group (**Table 14 and Figure 12**).

The City of Virginia Beach's total population was 450,057 according to the 2017 ACS 5-year estimates. The city's White population accounts for 67.2 percent leaving 32.8 percent as minority population. Based on this, the block groups within the study area have a minority population percentage that is below the city's overall percentage. Therefore, a concentration of minority populations is not expected within or adjacent to the study area.

The fiscal year 2021 income requirements by federal poverty level for Virginia are $12,880 for a single person and $26,500 for a family of four (VDH, January 2021). The percentage of people whose income is below the poverty level of 7.3 percent in the City of Virginia Beach, according to the 2017 ACS 5-year estimates. For low-income populations, 10.95 percent was used as a benchmark since it is meaningfully greater (50 percent greater) than the City percentage of 7.3 percent. None of the block groups in the study area have a higher meaningful percentage than the city for population below poverty.

Table 14. Environmental Justice – Minority and Low-Income Population

Census Tract and Block Group	Total Population	Minority Percentage	Hispanic Percentage	Total Households	Percent Households Below Poverty
454.20 BG 3	1,960	15.56	5.35	616	5.19
454.26 BG 3	2,028	14.00	7.45	1,656	2.54
454.12 BG 1	1,668	13.07	0.72	630	0.0
Virginia Beach	450,057	32.8	8.2	170,798	7.3

Source: American Community Survey 2013-2017, U.S. Census Bureau, accessed 2019

3.6.2 Environmental Consequences

3.6.2.1 No Build Alternative

No disproportionate and adverse effects to environmental justice populations would occur as a result of the No Build Alternative since concentrations of environmental justice populations were not found to be present in the study area.

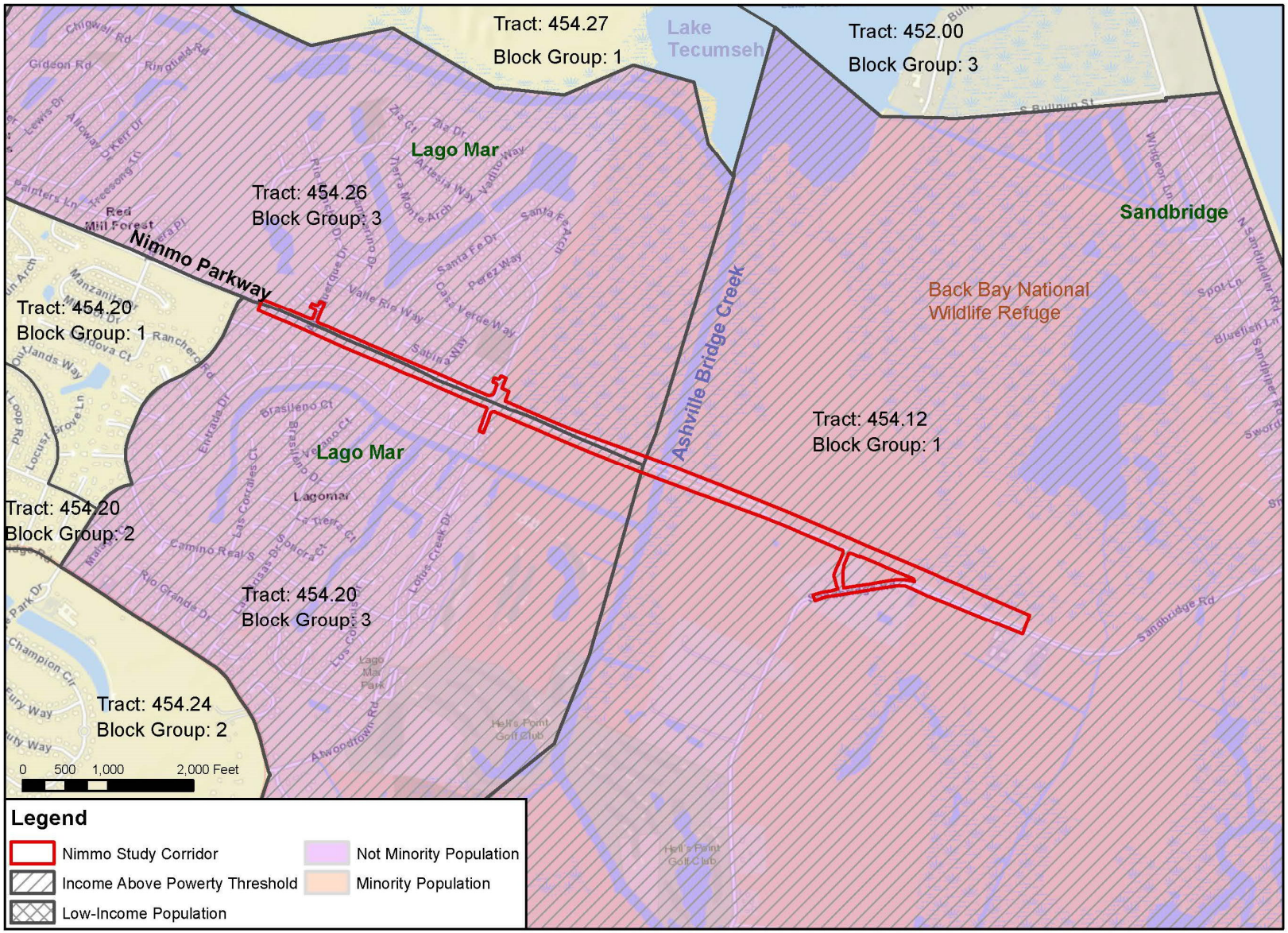
3.6.2.2 Build Alternative

No disproportionate and adverse effects to environmental justice populations would occur as a result of the Build Alternative since concentrations of environmental justice populations were not found to be present in the study area.

3.6.3 Minimization and Mitigation Measures

Since no disproportionate and adverse effects to environmental justice populations would occur as a result of the Build Alternative, no mitigation measures are required. The project will benefit all populations by providing an additional route.

Figure 12: Minority and Low-Income Populations



3.7 Cultural Resources

3.7.1 Existing Conditions

In May 2019, a cultural resources survey was completed for the project (**Appendix C**). To address direct and indirect effects to historic resources, the project's Area of Potential Effects (APE) includes the study area and above-ground/historic architectural resources visible from the study area. The purpose of the survey was to determine if sites that are on, eligible for, or potentially eligible for listing in the National Register of Historic Places (NRHP) are included in the APE. Survey for archaeological resources did not extend past the study area limits.

The survey was conducted in compliance with Section 106 of the National Historic Preservation Act of 1966 and in accordance with the Advisory Council on Historic Preservation's regulation for compliance with Section 106, codified as 36 CFR Part 800. The survey was consistent with expectations set forth in *Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines* and the *Guidelines for Conducting Historic Resources Survey* in Virginia issued by the Virginia Department of Historic Resources (VDHR).

3.7.1.1 Architectural Resources

Three architectural resources were documented in the APE. The Stone Family Cemetery (VDHR# 134-5329 and 44VB0380) was previously documented but had not been evaluated. Based on review for the project, it is recommended as not eligible for listing in the NRHP. Two previously unrecorded resources (VDHR# 134-5681 and VDHR# 134-5682), both twentieth-century dwellings, were evaluated and are also recommended not eligible for listing in the NRHP.

3.7.1.2 Archaeological Resources

Aside from the Stone Family Cemetery recorded under both VDHR# 134-5329 and site number 44VB0380, no previously recorded archaeological sites are located in the study area, and no sites were recorded in the APE based on field survey. Two early twentieth-century glass fragments recovered during survey were recorded as a location and do not meet the definition of an archaeological site, thus they are not eligible for listing in the NRHP.

3.7.2 Environmental Consequences

3.7.2.1 No Build Alternative

The No Build Alternative would be consistent with existing conditions and would not result in impacts to architectural resources or archaeological sites.

3.7.2.2 Build Alternative

No above-ground historic architectural resources or archaeological sites that are listed in the NRHP or are eligible or potentially eligible for listing in the NRHP are located within the project's APE. It is therefore recommended that the project will have no effect on historic properties. The VDHR concurred with this recommendation in a letter dated March 19, 2021 (**Appendix D**).

Coordination with the Nansemond Indian Nation tribe and FHWA occurred in a letter dated March 7, 2022 (**Appendix D**). The tribe requested consulting party status on the project and to review the cultural resources survey completed for the project. Following this coordination, the Nansemond Indian Nation tribe did not have comments on the Section 106 documentation and did not request a meeting with FHWA.

3.7.3 Minimization and Mitigation Measures

The City of Virginia Beach does not plan to relocate the graves identified within the Stone Family Cemetery (VDHR# 134-5329 and 44VB0380) and is developing an avoidance plan for this resource. Preliminary plans have shifted the roadway to the north of the known graves, but detailed avoidance measures have yet to be determined. As

engineering plans progress, it will be possible to determine if an adequate buffer can be provided to allow for avoidance of possible unmarked graves or if encroachment suggests the need for delineation work to provide a more precise cemetery boundary. VDHR recommendations for avoidance will be an important consideration.

3.8 Natural Resources

Natural resources were identified based on review of available literature; data obtained from federal, state, and local agency databases; Geographic Information System (GIS) data; agency input through the scoping process; and field reconnaissance which occurred in February 2018, May 2018, May 2019, and June 2019. The following discussion provides a summary of existing conditions and No Build and Build impacts. The Natural Resources Technical Report (**Appendix C**) provides further detail.

3.8.1 Waters & Wetlands

3.8.1.1 Existing Conditions

Tidally influenced Ashville Bridge Creek intersects the Study Area 0.75 miles downstream of Lake Tecumseh and 2.58 miles upstream of North Bay. At the project location, Ashville Bridge Creek is a man-made connection of Lake Tecumseh to the naturally occurring western channel of Ashville Bridge Creek. Jurisdictional wetlands and maintained ditches are also located within the Study Area.

There are a total of 21.8 acres of jurisdictional Waters of the US (WOUS) including wetlands within the Nimmo Parkway Phase VII-B Study Area, including 0.6 acre of estuarine open water (EOW) associated with Ashville Bridge Creek, 3.5 acres of palustrine emergent wetlands (PEM), 16.6 acres of palustrine forested wetlands (PFO), 0.1 acre of palustrine scrub/shrub wetlands (PSS), 0.2 acre of palustrine open water (POW), and 0.8 acre of maintained ditch.

The United States Army Corp of Engineers (USACE) Norfolk District has confirmed that it has considered Ashville Bridge Creek in the project location a navigable water subject to *Section 10 of the Rivers and Harbors Act*. There are no designated Wild and Scenic Rivers, Nationwide River Inventory (NRI) listed rivers, or Virginia designated scenic rivers in the project vicinity

The Natural Resources Technical Report (**Appendix C**) provides further detail on existing water resources in the study area.

3.8.1.2 Environmental Consequences

3.8.1.2.1 No Build Alternative

The No Build Alternative would be consistent with the existing conditions. No project related construction or changes to the natural environment, other than those from continued maintenance of the roadways within the Study Area, would occur under the No Build Alternative. Thus, project related impacts to waters and wetlands would not occur.

3.8.1.2.2 Build Alternative

Impacts to waters and wetlands resulting from roadway construction for the Build Alternative would likely include discharges of fill material for roadway cut/fill slopes; bridge approaches and abutments; and shading impacts for the Ashville Bridge Creek crossing. Impacts to waters and wetlands have been avoided to the greatest extent practicable through the alternatives screening and preliminary design process.

The Build Alternative would result in planning level estimated permanent impacts to 9.7 acres of jurisdictional WOUS and wetlands including 2.3 acres of PEM wetlands, 7.2 acres of PFO wetlands, 0.1 acre of POW, and 0.1 acre of jurisdictional ditches (**Table 15**).

Table 15: Estimated Permanent Wetland Impacts in the Planning Level LOD

	Acres
Palustrine Emergent Wetlands (PEM)	2.3
Palustrine Forested Wetlands (PFO)	7.2
Palustrine Open Water (POW)	0.1
Jurisdictional Ditch	0.1
Total	**9.7**

Final impact quantification would be determined during the permitting process for impacts to wetlands and waters. Impacts, potential avoidance and minimization measures, and applicable mitigation, including for navigable waters as applicable, would be considered during the permitting process. Permitting pathways for impacts to jurisdictional waters are discussed further in **(Appendix C - *Natural Resources Technical Report [Section 8.1*]).**

Preliminary hydrologic and hydraulic analysis showed no significant impact to hydrology (0.01 foot increase for the 10, 25, 50, and 100-year storms and 0.02 foot increase for the 500-year storm) in the vicinity associated with the Build Alternative. Three circular culverts are proposed, starting at approximately 1,200 feet east of the Atwoodtown Road and Nimmo Parkway intersection, to maintain an opening for the existing man-made ditches that are crossed by the roadway section.

3.8.1.3 Minimization and Mitigation Measures

Because the project will incorporate a bridge through the portion of the Study Area where the bald cypress is present and it will be constructed primarily within the emergent/phragmites-dominated area, impacts to the bald cypress swamp located east of the Ashville Bridge Creek will be avoided and minimized to the maximum extent practicable. Based on the wetland functions and values assessment, this area provides the most ecosystem functions and values. A tree count of individual bald cypress trees with a diameter at breast height (DBH) of three inches or greater within this swamp will be performed during project design to facilitate avoidance and minimization measures. The 800-foot long bridge proposed for the Build Alternative is designed to span the bald cypress swamp area (**Appendix C - *Natural Resources Technical Report [Figure 2-3 in Appendix A]***).

3.8.2 Water Quality

Per the Virginia Department of Environmental Quality (VDEQ) Final 2016 305(b)/303(d) Virginia Water Quality Assessment Integrated Report (DEQ 2018a), Ashville Bridge Creek at the project location is listed as Category 3A, indicating that there is inadequate data to determine if any designated use is attained. There are no designated Exceptional State Waters in the study area.

The study area lies within the City of Virginia Beach community water system service area. There are four community water systems within the City of Virginia Beach that serve military installations: Dam Neck, Little Creek Amphibious Base, Naval Air Station Oceana, and Fort Story.

The Natural Resources Technical Report (**Appendix C**) provides further detail on existing water quality conditions in the study area.

3.8.2.1 Environmental Consequences

3.8.2.1.1 No Build Alternative

The No Build Alternative would be consistent with the existing conditions. There would be no additional impacts to water quality or water supply other than those from continued maintenance of roadways within the Study Area. Existing surface water impairments are expected to continue under the No Build Alternative.

3.8.2.1.2 Build Alternative

Implementation of the Build Alternative would introduce impervious surfaces in the eastern portion of the proposed roadway corridor to an otherwise undeveloped area. Minor long-term water quality impacts could occur as a result of increases in impervious surfaces, increases in traffic volumes, and consequent increases in pollutants washed from the road and bridge surface into receiving water bodies, both on-site and downstream. Pollutants could include oil, metals, nutrients, deicing salts, roadside vegetation management chemicals, and suspended solids.

3.8.2.2 Minimization and Mitigation Measures

Stormwater management measures, including linear BMPs, pretreatment for sheet flow through conserved open space, and other measures, as applicable, would be implemented to minimize water quality impacts and thereby minimize secondary impacts to wetlands adjacent to the roadway corridor. These measures would reduce or detain discharge volumes and remove pollutants. Stormwater management would be performed in accordance with *Virginia's State Water Control Law* (*COV Title 62.1, Chapter 3.1)* and implementing Virginia Stormwater Management Program (VSMP) regulations (*9 VAC 25-870*). The project proposes to treat stormwater with BMPs to the highest extent practicable, with the remaining required pollutant removal being obtained from water quality credits off-site within the same HUC. Projected post-development pollutant loads are provided in **-** *Natural Resources Technical Report* **(Appendix C).**

Adequate stormwater conveyance systems and wet swale BMPs are proposed in the western project area and around the connector road and connection to the Sandbridge Road - Nimmo Parkway Phase VII-A project. To preserve the natural storage of surface waters and the chemical reduction and assimilation of pollutants in wetland areas, proposed runoff from the Build Alternative would sheet flow through conserved open space in the right-of-way and into the surrounding wetlands, where applicable. Standard DEQ and VDOT practices and design measures would be utilized in the design of the storm conveyance systems, level spreaders, and BMPs (wet swales and sheet flow to conserved open space).

3.8.3 Floodplains

Executive Order 11988 - Floodplain Management and FHWA policy as set forth in *23 CFR § 650*, requires federal activities to avoid impacts to floodplains and to avoid direct and indirect support of floodplain development to the extent practicable. The 100-year flood, or base flood, is the area covered by a flood that has a one percent chance of occurring in any given year (100-year floodplain). The 500-year floodplain is the area covered by a flood that has a 0.2 percent chance of occurring in any given year.

3.8.3.1 Existing Conditions

The study area is located within the FEMA Flood Zone AE with a flood elevation of +3.0 NAVD88, on the western portion of the corridor, and +4.0 NAVD88 on the eastern portion of the corridor, per the Flood Insurance Rate Map (FIRM) revised January 16, 2015. Ashville Bridge Creek is not affected by wave velocity coming from North Bay, as indicated on the FIRM. The floodplains occurring within the Study Area are associated with the Atlantic Ocean and its coastal and estuarine waters.

3.8.3.2 Environmental Consequences

3.8.3.2.1 No Build Alternative

The No Build Alternative is consistent with the existing pre-development conditions. No project related construction or changes to the natural environment would occur. Thus, project-related environmental effects to floodplains would not occur.

3.8.3.2.2 Build Alternative

The proposed project would impact approximately 17.29 acres within the 100-year floodplain (Zone AE) and an additional 2.26 acres in the 500-year flood plain (0.2% annual chance of flooding). Coordination with the local floodplain administrator will occur prior to construction. Final design will ensure proper conveyance of floodwaters to minimize impacts to the floodplain. The Build Alternative would not pose a substantial flooding risk, would not substantially increase flood elevations, the probability of flooding, or the potential for property loss or hazard to life.

3.8.3.3 Minimization and Mitigation Measures

Encroachments into the floodplain would conform with all applicable state and local floodplain protection requirements.

3.8.4 Terrestrial Habitat and Wildlife

3.8.4.1 Existing Conditions

Terrestrial wildlife within the study area include common woodland mammals; birds such as passerines, waterfowl and shorebirds; and common reptile and amphibian species. The Natural Resources Technical Report (**Appendix C**) provides further detail on terrestrial wildlife in the study area.

3.8.4.2 Environmental Consequences

3.8.4.2.1 No Build Alternative

The No Build Alternative would be consistent with the existing conditions. No project related construction or changes to the natural environment, other than those from continued maintenance of the roadways and utility lines within the Study Area, would occur. There would be no impacts to terrestrial habitat or wildlife other than ongoing usage and maintenance activities.

3.8.4.2.2 Build Alternative

No direct impacts to BBNWR would occur as a result of the Build Alternative since the limits of disturbance are fully within the existing right-of-way. During the scoping process, the Virginia Department of Conservation and Recreation (DCR) confirmed that due to the scope of the activity and distance to the resources, adverse impacts to natural heritage resources, including Black Gut and Back Bay Conservation Sites, are not expected. Impacts to the land cover types based on the Virginia Land Cover Dataset (VGIN 2016) within the limits of disturbance are provided in **Table 16**.

Table 16: Estimated Impacts by Land Cover Type

Land Cover Type	Acres
Wooded Wetlands	11.8
Turf Grass	4.1
Impervious	2.1
Tree	3.3
Scrub/Shrub	3.9
Forest	3.0
Pasture	1.2
Water	0.4
Total	**29.9**

Source: Virginia Land Cover Dataset (VGIN 2016)

Implementation of the Build Alternative could result in some effects to the general ecology of the study area's surroundings through conversion of existing naturally vegetated areas to maintained transportation right-of-way. This conversion would result in some loss of wildlife habitat, could affect existing wildlife movement patterns as a result of a new east-west barrier, and could impact wildlife through mortality (e.g. wildlife-vehicle collisions), or behavior modification (e.g. roosting, breeding and feeding) from roadway avoidance.

Loss of wildlife habitat types may include forested uplands, forested wetlands, *Phragmites* dominant emergent wetlands, wet meadow, and turf. Individuals, including birds, mammals, reptiles, and amphibians, may be displaced and lose nesting, breeding, hibernation, or foraging habitat. However, loss of these habitats would not result in substantial population level impacts to wildlife due to widespread availability of such habitats in the project vicinity. There are currently approximately 1,200 acres of contiguous undeveloped land north of the City of Virginia Beach right-of-way comprised of BBNWR, Naval Air Station Oceana Dam Neck, Hampton Roads Sanitation District property and private holdings, and approximately 1,700 acres of BBNWR habitat south of the City of Virginia Beach right-of-way and east of Sandbridge Road, consisting of wooded, marsh, and open water habitats. The acreage of potential loss of habitat represents approximately 1 percent of the contiguous habitat surrounding the project.

The study area has an existing utility easement bisecting the corridor which serves to limit forested habitat connectivity; construction of the proposed roadway would act as a barrier furthering fragmentation of the habitats north and south of the corridor. Fragmentation could affect nesting songbirds who require large tracts of land and could affect movement of reptiles, amphibians, and small and large mammals by both creating a barrier and through roadway avoidance. The roadway would also introduce noise and light which may affect birds, reptiles, amphibians, and small and large mammals through avoidance and increases in stress which may affect fitness. Individuals may adjust behavior to avoid human disturbance, including roadway noise and light (Coffin 2007).

Road noise has a variable effect on animals. The most significantly impacted by road noise are those species that incorporate sound into their basic behavior, such as some bird species (Coffin 2007). For example, research has shown that traffic noise can impact reproductive success of the great tit, a passerine songbird, by masking signals important to territory defense and mate attraction (Halfwerk et al. 2011). Similar impacts may occur to songbirds in the study area. The *Preliminary Noise Analysis Technical Report Nimmo Parkway Phase VII-B* (**Appendix C**), determined that noise levels in the study area adjacent to BBNWR would not approach or exceed 67 decibels during the loudest hour of the day, which falls within the levels not requiring noise abatement for adjacent Section 4(f) or park land uses per FHWA Noise Abatement Criteria (NAC) per *23 CFR Part 772*.

3.8.4.3 Minimization and Mitigation Measures

Loss of high value habitats, such as the bald cypress swamp east of Ashville Bridge Creek would be minimized to the maximum extent practicable. Additionally, the project proposes to incorporate landscape maintenance measures to minimize loss of habitat. Beyond approximately 10 feet from the shared-use path, within which maintenance would occur on a standard roadside basis, disturbed area would be seeded with a native, riparian mix and mowed/maintained on a limited seasonal basis to allow for a more robust habitat for wildlife, including pollinators, birds, and small and large mammals. Landscaping shrubs and trees would include native species such as willow oak (*Quercus phellos*), water oak, highbush blueberry (*Vaccinium corymbosum*) and wax myrtle, which would provide both habitat and food sources for wildlife and minimize invasive species encroachment.

The City of Virginia Beach is considering the installation of wildlife crossings using small diameter concrete pipe (approximately 24 inch) to accommodate movement of small mammals and amphibians. These crossings would be placed solely for wildlife and would not be used for hydraulic conveyance. Location and design of these features would be developed during the final design stage. Such wildlife crossings are being utilized for the Sandbridge Road-Nimmo Parkway Phase VII-A project immediately east of the proposed project. These crossings would minimize the impact of fragmentation and limit roadway mortality of amphibians and small mammals. These types of dry culverts have been reported as effective, primarily for small mammals, in states utilizing these structures (NCHRP 2002).

The project proposes to use adaptive lighting which could serve to minimize lighting impacts through the ability to dim or turn off lighting during non-peak periods.

3.8.5 Aquatic Habitat and Wildlife

3.8.5.1 Existing Conditions

Tidally influenced Ashville Bridge Creek intersects the Study Area 0.75 miles downstream of Lake Tecumseh and 2.58 miles upstream of North Bay. In the study area, Ashville Bridge Creek is a man-made connection of Lake Tecumseh to the naturally occurring western channel of Ashville Bridge Creek. Aquatic and aquatic dependent species including a variety of fish, reptiles, amphibians, benthic invertebrates and birds may use this resource. The *Virginia Coastal Zone Coastal GEMS GIS System* (DEQ 2018b) indicates that the Study Area contains no submerged aquatic vegetation (SAV) or shellfish aquaculture sites.

3.8.5.2 Environmental Consequences

3.8.5.2.1 No Build Alternative

The No Build Alternative would be consistent with the existing conditions. No project related construction or changes to the natural environment, other than those from continued maintenance of the roadways within the Study Area, would occur. There would be no impacts to aquatic habitat or wildlife.

3.8.5.2.2 Build Alternative

Implementation of the Build Alternative would introduce impervious surface to an otherwise undeveloped area increasing stormwater runoff to receiving waterbodies. Stormwater management measures, as discussed in Section 3.8.2.2. would be implemented to minimize water quality impacts. These measures would reduce or detain discharge volumes and remove pollutants. Stormwater management would be performed in accordance with *Virginia's State Water Control Law* (*COV Title 62.1, Chapter 3.1*) and implementing VSMP regulations (*9 VAC 25-870*).

Implementation of the Build Alternative could also result in temporary impacts to water quality during roadway construction through increased sedimentation from land disturbing activities. During construction, the contractor would be required to adhere to erosion and sediment control and stormwater measures as discussed in the Natural Resources Technical Report (Section 3.2.2). Studies of the effects of turbid water on fish suggest that concentrations of suspended solids can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton 1993). If individuals are present in the action area, they may either avoid areas of temporary and localized increased turbidity or swim through them and continue normal behaviors utilizing other areas of the waterway.

Implementation of the Build Alternative would involve disturbance of benthic communities; however, no significant permanent or long-term impacts on these communities would occur because of the limited footprint of the bridge piers. Although some benthic habitat would be permanently lost for structure placement and/or reduced due to shading, this area is small relative to the size of the waterway and would not cause population level effects. Some suspended solids may be deposited within benthic communities downstream of construction. Implementation of best management practices, including compliance with the *Virginia Erosion and Sediment Control Handbook* (DEQ 1992), would minimize increases in turbidity downstream.

3.8.6 Threatened, Endangered and other Protected Species

3.8.6.1 Existing Conditions

Threatened and endangered species are federally protected pursuant to the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. § 1531 et seq.). Under Section 7 of the ESA, the federal government and each of its agencies must ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of a federally listed protected species or adversely modify its critical habitat. Reviews of the United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation System (IPaC) (USFWS 2019), VA DWR, Fish and Wildlife

Information Service database (VaFWIS) (VDGIF 2018), DCR Virginia Natural Heritage database (DCR 2019), and Center for Conservation Biology (CCB) VaEagles Nest Locator database (CCB 2019) were conducted to determine the potential for federally and/or state listed threatened and/or endangered or otherwise protected species in the project vicinity.

The USFWS IPaC database, which identifies federally threatened and endangered species within, or affected by, the subject site indicates that there is no critical habitat within the study area, but that there is potential for the federally threatened northern long-eared bat (NLEB) *(Myotis septentrionalis)* and federally endangered roseate tern (*Sterna dougallii)*. The VaFWIS database identified confirmed presence of the federally endangered Kemp's ridley sea turtle (*Lepidochelys kempii)*, federally threatened loggerhead sea turtle (*Caretta caretta)*, and state threatened peregrine falcon (*Falco peregrinus);* as well as presence of federally endangered roseate tern, and state endangered canebrake rattlesnake within two miles of the Nimmo Parkway Phase VII-B corridor. The DCR Natural Heritage database, which is aggregated by subwatershed, identified no federal or state threatened or endangered species within the Ashville Bridge Creek watershed. As of October 2018, the USFWS published a proposed rule announcing a petition finding to list the black rail (*Laterallus jamaicensis)* as a federally threatened species. No occurrence records for this species were identified by the VaFWIS database or IPaC database. As the project would not impact ocean or ocean-front habitat, roseate tern, Kemp's ridley sea turtle and loggerhead sea turtle have been excluded from further evaluation. According to GIS data maintained by the National Oceanic Atmospheric Administration (NOAA) (NOAA Fisheries 2018), the study area does not fall within the Section 7 consultation area for protected species under the jurisdiction of the National Marine Fisheries Service (NMFS).

Additionally, the bald eagle (*Haliaeetus leucocephalus)* was removed from the federal list of threatened and endangered species in 2007 and removed from the Virginia list of threatened and endangered species in 2013 but still receives protection under the federal Bald and Golden Eagle Protection Act (Eagle Act) (16 USC Sec 668) and federal Migratory Bird Treaty Act (MBTA) (16 USC Sec 703-712) as well as Virginia DWR regulations (4 VAC 15-30-10) regarding native wildlife species. Federal regulations pursuant to the Eagle Act prohibit disturbance of eagles, which may include human activities or alteration of habitat surrounding a nest. There are no known bald eagle nests within the Study Area. CCB VaEagles Nest Locator database identified known bald eagle nests in BBNWR approximately 0.7 miles north of the proposed roadway corridor and 0.3 miles south of the corridor. According to data maintained by CCB, both nests were last checked and occupied in 2019.

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (USC Ch. 38 § 1801 et seq.), as amended by the Sustainable Fisheries Act of 1996, established a requirement to describe and identify Essential Fish Habitat (EFH) and requires all federal agencies to consult with the NMFS on actions or proposed actions that may impact EFH designated by NMFS and Regional Fisheries Management Councils. EFH includes "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 USC 1802(10)). Per an email dated May 25, 2017 from the NMFS, there is no EFH located in the study area.

Database records and agency correspondence can be found in **Appendix C (*Natural Resources Technical Report [Appendix C]*)**. Species of concern for the study area are summarized in **Table 17** and discussed in detail in the Natural Resources Technical Report.

Table 17: Threatened, Endangered, and Protected Species

Common Name	Scientific Name	Status
NLEB	*Myotis septentrionalis*	Federally Threatened
Canebrake rattlesnake	*Crotalus horridus*	State Endangered
Peregrine falcon	*Falco peregrinus*	State Threatened
Bald eagle	*Haliateetus leucocephalus*	Protected

3.8.6.2 Environmental Consequences

3.8.6.2.1 No Build Alternative

The No Build Alternative would be consistent with the existing conditions. The No Build Alternative would not involve any construction or changes to the natural environment. Project related environmental effects to threatened, endangered or protected species would not occur.

3.8.6.2.2 Build Alternative

The following impacts would occur as a result of the Build Alternative:

- NLEB - Per the 'NLEB Winter Habitat and Roost Trees' database maintained by the VADWR (VDGIF 2019), the project site is not located within 0.25 miles of a known hibernaculum or within 150 feet of a known occupied maternity roost tree (**Appendix C - *Natural Resources Technical Report [Appendix D]***). As such, the Build Alternative's proposed activities are anticipated to be excepted from take prohibitions per the *January 5, 2016 Intra-Service Programmatic Biological Opinion on the Issuance of the Final 4(d) Rule for the Northern Long-Ear Bat and Activities Excepted from Take Prohibitions* (USFWS 2016) that provided a mechanism for achieving Section 7 compliance for many federal actions.

- Canebrake rattlesnake - Because the suitable habitat on the project site is contiguous with more than 50 acres of habitat, VADWR guidance indicates the site should be evaluated for canebrake rattlesnake occurrence. To do so, a habitat assessment by a qualified biologist would be performed during the permitting process. Should the VADWR review of the habitat assessment find that suitable habitat exists on site, mitigation may be required which would be determined during the permitting process.

- Peregrine falcon - As there are no known nests within or near the study area, nor would the Build Alternative impact suitable nesting structures, the Build Alternative is not anticipated to impact this species.

- Bald eagle - Documented bald eagle nests are greater than 0.3 mile from the project location and are not to be impacted by the Build Alternative.

3.8.6.3 Minimization and Mitigation Measures'

Coordination with the USFWS will occur during a subsequent permitting phase regarding the NLEB.

Canebrake rattlesnake mitigation may be required from mitigation banks known to support canebrake rattlesnake habitat at a ratio of 1:1 to 10:1 depending upon site specific impacts, habitat quality, size of project and proximity to known species occurrence. Final mitigation requirements would be at the discretion of the permitting agencies in consultation with VA DWR.

3.8.7 Permits and Reviews

3.8.7.1 Waters of the US

Regulatory agencies can issue permits after the NEPA process is concluded, a decision document is issued, and preliminary design has been completed. Impacts to WOUS are regulated through permits issued by the USACE, DEQ, and Virginia Marine Resource Commission (VMRC), as described in Section 2.0 of the Natural Resources Technical Report (**Appendix C**). Individual Permits from the USACE and the DEQ are to be required for the project. Impacts to WOUS exceed threshold limits set for State Programmatic General Permit (17-SPGP-01) and the DEQ Virginia Water Protection General Permit for Linear Transportation Projects (WP3). The VMRC, which regulates impacts over, under, or through state-owned subaqueous bottoms up to an elevation equivalent to 1.5 times the tide range above mean low water (MLW), has provided documentation stating that it does not claim jurisdiction over this project because this section of Ashville Bridge Creek is man-made. Applicable permits and required mitigation would be coordinated with appropriate regulatory agencies during the permitting process.

Applicable permits require that a Joint Permit Application (JPA) be submitted to the VMRC to be distributed to regulating agencies, that disturbances to wetlands and waters be avoided and minimized to the maximum extent practicable, and that mitigation measures are employed for unavoidable impacts. Individual Permits require a formal description of 'purpose and need' as well as an evaluation to verify wetlands and waters are avoided to the maximum extent practicable. 'Purpose and need' requires the documentation of the specific transportation problems being encountered and how the proposed project resolves those issues. The regulatory agencies must evaluate whether there are other alternative projects that could solve the 'purpose and need' with fewer impacts. The analysis can require consideration of alternative alignments, design modifications, financial analyses, and coordination with advisory agencies (e.g. EPA, USFWS, VDHR and VADWR). Individual Permits also require a Coastal Zone Management (CZM) Federal Consistency Certification from the DEQ and assessment of wetland functions and values.

Mitigation is generally required for all permanent impacts for linear transportation projects that are funded in part or in total by local, state or federal funds. Mitigation may also be required for temporary impacts not restored to preconstruction conditions within one year. Compensatory mitigation for unavoidable impacts to streams and wetlands would be developed, as required, during the Section 404/401 permitting process in coordination with the appropriate state and federal agencies consistent with the *Compensatory Mitigation for Losses of Aquatic Resources Final Rule (33 CFR §325 and 332; 40 CFR §230)*. This *Final Rule* emphasizes a watershed approach to compensatory mitigation and outlines the following preference hierarchy for compensatory mitigation (in order of preference):

1.) Purchase of compensatory mitigation credits (mitigation banking);
2.) Purchase of approved in-lieu fee fund credits (in-lieu fee program);
3.) On- or off-site mitigation by the permittee (permittee-responsible mitigation).

In accordance with the *Final Rule, w*etland mitigation credits would be the preferred method of compensation for the project. Mitigation ratios are *typically* 2:1 for impacts to PFO wetlands, 1.5:1 for impacts to PSS wetlands, 1:1 for PEM wetlands and 0-1:1 for open water impacts; however final mitigation ratios would be determined during the permitting process.

The "service area" of available wetland mitigation banks must contain the location of the permitted project for that bank to be applicable to the project. As of June 2019, the following commercial mitigation banks had available credits that service the Albemarle watershed (HUC 03010205), per the Regulatory In-lieu Fee and Bank Tracking System (RIBITS):

- City of Virginia Beach Creeds Bank (bank established to provide mitigation for projects sponsored by the City of Virginia Beach)- approximately 6 non-tidal credits available

- Davis Mitigation Bank- approximately 154 non-tidal credits available
- Dover Farm Mitigation Bank- approximately 481 non-tidal credits available
- Greenway Farm Mitigation Bank- approximately 14 non-tidal credits available

Credit pricing at private banks is based on open market pricing and fluctuates. Pricing in recent years in this watershed has been approximately $12,000- $13,000/acre for non-tidal credits. In cases where there are no commercial bank credits available the preferred method of compensation is the purchase of Advance/In-lieu fee credits from the Virginia Aquatic Resources Trust Fund (VARTF). Wetland credits from the VARTF are currently $40,000/acre for non-tidal credits and $550,000/acre for tidal credits for the Albemarle watershed. In accordance with existing regulations and standard permit conditions, all areas with temporary impacts, if any, would be required to be restored to original contours and re-vegetated with the same or similar species.

3.8.7.2 Chesapeake Bay Preservation Act

The *Chesapeake Bay Preservation Act* (CBPA), administered by the DEQ, regulates development in the Chesapeake Bay Watershed. The CBPA provides protections for riparian habitats that buffer wetlands and streams through the designation of Resource Protection Areas (RPA) and Resource Management Areas (RMA). In Virginia, administration and enforcement of the CBPA is carried out by the localities subject to the CBPA. Through the scoping process, the DEQ has confirmed that as the project is located in the Southern Rivers Watershed outside the Chesapeake Bay Watershed it is not subject to provisions of the CBPA.

3.8.7.3 Coastal Barriers and Coastal Zones

Pursuant to the *Coastal Zone Management Act* (CZMA) of 1972 and federal consistency regulations (*15 CFR Sec Part 930*), all federal actions that have reasonably foreseeable effects on any land or water use or natural resources in Virginia's Coastal Management Area (CMA) must be consistent with the enforceable policies of Virginia's Coastal Zone Management Program (CZMP). As the proposed project is located in Virginia's Coastal Management Area per *COV § 28.2-100*, the project must be consistent with the applicable enforceable regulatory programs that comprise Virginia's CZMP.

During the permitting process, the applicant would submit a Coastal Zone Management Act Federal Consistency Certification pursuant to *15 CFR, part 930, subpart D* for federal permit approvals, to the DEQ for dissemination to reviewing agencies. Applicable permits or approvals would be obtained prior to the implementation of the project. This submittal would address consistencies with each of the Enforceable Policies of the CZMP as summarized below and in The Natural Resources Technical Report (**Appendix C**).

- Fisheries Management (*COV § 28.2-200 thru 28.2-713, § 29.1-100 thru 29.1-570, § 3.2-3936)* - The project will be in compliance with this enforceable policy.
- Subaqueous Lands Management (*COV § 28.2-1200 thru 28.2-1213*) – The project will be in compliance with this enforceable policy.
- Wetlands Management (COV § 28.2-1301 thru § 28.2-1320, § 62.1-44.15.5) – The USACE has issued a Preliminary Jurisdictional Determination encompassing the study area dated September 14, 2018 (Nimmo Parkway Phase VIIB, NAO-2015-00151). The project would permanently impact 9.7 acres of jurisdictional WOUS including 2.3 acres of PEM wetlands, 7.2 acres of PFO wetlands, 0.1 acre of POW, and 0.1 acre of jurisdictional ditch. Final impact quantification would occur during the permitting process. Impacts would be minimized to the extent practicable. The applicant would obtain Individual Permits for unavoidable impacts to wetlands and waters as required by the USACE and DEQ. Therefore, the project will be in compliance with this enforceable policy.

- Dunes Management (*COV § 28.2-1400 thru 28.2-1420*) – This enforceable policy is not applicable to this project.
- Non-point Source Pollution Control (*COV§ 62.1-44.15.51 et seq.)*– The project will be in compliance with this enforceable policy.
- Point Source Pollution Control (*COV § 62.1-44.15*) – No point sources are present. Therefore, this enforceable policy is not applicable to this project.
- Shoreline Sanitation (*COV § 32.1-164 thru § 32.1-165*) – No septic tanks will be installed or used for this project. Therefore, this enforceable policy is not applicable to this project.
- Air Pollution Control (*COV § 10-1.1300 thru §10.1-1320*) – The project will be in compliance with this enforceable policy.
- Coastal Lands Management (*COV § 62.1-44.15:67 thru § 62.1-44.15:79, Virginia Administrative Code 9 VAC 25-830 et seq.)*– This enforceable policy is not applicable to this project.

3.9 Air Quality

Federal requirements for air quality analyses for transportation projects derive from the NEPA and, where applicable, the federal transportation conformity rule (40 CFR Parts 51 and 93). NEPA guidance for air quality analyses for transportation projects may be found on or via the FHWA website for planning and the environment[1].

3.9.1 Existing Conditions

At the time of preparation of the *Air Quality Technical Report* (January 2021) (**Appendix C**), the EPA Green Book shows the City of Virginia Beach to be designated as an attainment area for all criteria pollutants. Notwithstanding that listing in the EPA Green Book, federal conformity requirements, including specifically 40 CFR 93.114 and 40 CFR 93.115, apply for the project as the area in which it is located is one affected by a recent court decision that reinstates conformity requirements nationwide associated with the 1997 ozone National Ambient Air Quality standards (NAAQS) that had previously been eliminated with the revocation by EPA of that NAAQS in 2015. Accordingly, there must be a currently conforming transportation plan and program at the time of project approval, and the project must come from a conforming plan and program (or otherwise meet criteria specified in 40 CFR 93.109(b)).

CARBON MONOXIDE (CO)

As the project is located in a region that is in attainment of the CO NAAQS, EPA project-level ("hot-spot") transportation conformity requirements do not apply. As only NEPA applies, a project-specific analysis and/or assessment for carbon monoxide (CO) is not needed under the terms of the programmatic agreement between FHWA and VDOT for project-level air quality analyses for CO. As documented in that agreement, which is based on the analysis and information presented in the template Programmatic Agreement and Technical Support Document (TSD) developed in the National Cooperative Highway Research Program (NCHRP) 25-25 Task 104 study (2020), the weight-of-evidence shows that it may reasonably be concluded that the national ambient quality standard (NAAQS) for CO will be met.

MOBILE SOURCE AIR TOXICS (MSATS)

FHWA guidance[2] (2016) states that "EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-cancer hazard

[1] See: http://www.fhwa.dot.gov/environment/index.cfm

[2] FHWA, "*INFORMATION: Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*", October 18, 2016. See: http://www.fhwa.dot.gov/environment/air_quality/air_toxics/

contributors from the 2011 National Air Toxics Assessment (NATA)[3]. These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter." The FHWA guidance specifies three possible tiers of MSAT analysis and associated traffic volume and other criteria. This project has been categorized as one with low potential MSAT effects, based primarily on the forecast traffic volumes for this project. A qualitative assessment was therefore conducted for the project, following FHWA guidance for projects with low potential impacts.

3.9.2 Environmental Consequences

3.9.2.1 No Build Alternative

The No Build Alternative would not cause or contribute to a new violation of the NAAQS established by the EPA.

3.9.2.2 Build Alternative

The project was assessed for air quality impacts and conformity consistent with all applicable air quality regulations and guidance. All models, methods and assumptions applied in modeling and analyses were made consistent with those provided or specified in the VDOT Resource Document[4]. The assessment indicates that the project would meet all applicable federal and state transportation conformity regulatory requirements as well as air quality guidance under the NEPA. As such, the project will not cause or contribute to a new violation of the NAAQS established by the EPA.

MOBILE SOURCE AIR TOXICS (MSATS)

Overall, best available information indicates that, nationwide, regional levels of MSATs are expected to decrease in the future due to ongoing fleet turnover and the continued implementation of increasingly more stringent emission and fuel quality regulations. Nonetheless, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects effectively limit meaningful or reliable estimates of MSAT emissions and effects of this project at this time. While it is possible that localized increases in MSAT emissions may occur as a result of this project, emissions will likely be lower than present levels in the design year of this project as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 80 percent between 2010 and 2050. Although local conditions may differ from these national projections in terms of fleet mix and turnover, vehicle-miles-travelled (VMT) growth rates, and local control measures, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

INDIRECT EFFECTS AND CUMULATIVE IMPACTS

A qualitative assessment of the potential for indirect effects and cumulative impacts attributable to this project was conducted. It concluded that the potential effects or impacts are not expected to be significant given available information from pollutant-specific analyses (CO and MSATs) and regional conformity analyses.

More specifically, the quantitative assessments conducted for project-specific CO and the qualitative analyses for MSAT impacts can be considered indirect effects analyses because they look at air quality impacts attributable to the

[3] See: https://www.epa.gov/national-air-toxics-assessment

[4] In 2016, in order to facilitate and streamline the preparation of project-level air quality analyses, and maintain high quality standards for modeling and documentation, the Department created a new resource for modeling. Titled the "Resource Document", it includes a general reference document as well as an associated online data repository (DR) for all modeling inputs needed for project-level air quality analyses in Virginia. The VDOT Resource Document and DR address in a comprehensive fashion the models, methods and assumptions (including data and data sources as well as protocols) needed for the preparation of air quality analyses for transportation projects by or on behalf of the Department. The latest version of the VDOT Resource Document and DR along with air quality-related programmatic agreements are available on or via the Department website (http://www.virginiadot.org/projects/environmental_air_section.asp).

project that occur in the future. These analyses demonstrate that, in the future: 1) air quality impacts from CO will not cause or contribute to violations of the CO NAAQS, and 2) MSAT emissions will be significantly lower than they are today.

Regarding the potential for cumulative impacts, EPA's air quality designations for the region reflect, in part, the accumulated mobile source emissions from past and present actions. Since EPA has designated the region to be in attainment for all of the NAAQS, the potential for cumulative impacts associated with the project is not expected to be significant.

3.9.3 Minimization and Mitigation Measures

During construction of this project, emissions may be produced from heavy equipment and vehicle travel to and from the site, as well as from fugitive sources. Construction emissions are short term or temporary in nature. To mitigate these emissions, all construction activities are to be performed in accordance with VDOT *Road and Bridge Specifications*[5].

The Virginia Department of Environmental Quality (VDEQ) provides general comments for projects by jurisdiction. Their comments in part address mitigation. For the City of Virginia Beach, VDEQ comments relating to mitigation are[6] *"…all reasonable precautions should be taken to limit the emissions of VOC and NOx. In addition, the following VDEQ air pollution regulations must be adhered to during the construction of this project: 9 VAC 5-130, Open Burning restrictions*[7]*; 9 VAC 5-45, Article 7, Cutback Asphalt restrictions*[8]*; and 9 VAC 5-50, Article 1, Fugitive Dust precautions*[9]*."*

3.10 Noise

FHWA regulations for mitigation of highway traffic noise in the planning and design of federally aided highway projects are contained in Title 23 of the United States Code of Federal Regulations Part 772 (23 CFR 772). These regulations state that a roadway being constructed in a new location is considered "Type I" project, requiring a traffic noise impact analysis. The methods and procedures used in this preliminary noise impact evaluation are consistent with the latest noise assessment policies issued by FHWA and the Virginia Department of Transportation (VDOT); VDOT's Highway Traffic Noise Impact Analysis Guidance Manual was updated most recently on February 20, 2018. The results of the *Preliminary Noise Analysis Technical Report* are detailed in **Appendix C**.

3.10.1 Existing Conditions

This preliminary study involved monitoring of existing noise conditions and modeling of existing (2018) and an assumed design year (2042) noise conditions in the study area with the FHWA-approved computerized Traffic Noise Model (TNM) version 2.5. Modeling accounted for the existing terrain and buildings, and for existing and proposed roadways with projected loudest-hour traffic. Since the time the preliminary noise study was completed, the advertisement date was identified as 2026 with a design year of 2048. Since the design year is typically set as the advertisement date plus 22 years, the noise study would typically reflect a design year of 2048. Results presented are based on traffic data developed for the original design year of 2042, under the assumption that traffic noise and any potential noise barriers will be reevaluated during the Project's final design. See the *Preliminary Noise Analysis Technical Report* (**Appendix C**) for further details.

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5 See: http://www.virginiadot.org/business/const/spec-default.asp

6 Spreadsheet entitled: "DEQ SERP Comments rev8b", March 2017, downloaded from the online data repository for the VDOT Resource Document. http://www.virginiadot.org/projects/environmental_air_section.asp

7 See: http://leg1.state.va.us/000/reg/TOC09005.HTM#C0130

8 See: http://leg1.state.va.us/cgi-bin/legp504.exe?000+reg+9VAC5-45-760

9 See: http://leg1.state.va.us/cgi-bin/legp504.exe?000+reg+9VAC5-50-60

Noise monitoring for the purpose of model validation was conducted at three short-term sites (30 minutes in duration) on November 19 and 20, 2018. The Total L_{eq} ranged from a low of 52 dBA at 809 Dasa Leo Court (ST-1) to a high of 59 dBA at 700 Sandbridge Road (ST-3). For Sites ST-3 and ST-4, values of the Subset L_{eq} were the same as the measured Total L_{eq}s at each measurement site, which is an indication that roadway traffic was the dominant source of noise in spite of the presence of other sporadic and occasional noise events due to human-related activity. Other sources of noise in the existing environment included, but were not limited to aircraft overflights, wind in the trees, periods of heavy rain, and other human-related activity.

Noise monitoring for the purpose of estimating existing noise levels in areas away from major roadways was conducted at one short-term site (30 minutes in duration) and one long-term site (24 hours in duration) on November 19 and 20, 2018. The short-term site, ST-2, was located at the Lago Mar at Back Bay Neighborhood Park, a noise-sensitive recreation area along Artesia Way. The total L_{eq} was 51 dBA, which included aircraft events. When aircraft events are excluded, the Subset L_{eq} was 48 dBA. Long-term noise monitoring (24 hours in duration) was performed at one site (LT-1), located north of existing Entrada Drive at 2401 Toro Court, just south of the proposed Nimmo Parkway right-of-way. The measured total L_{eq} for the worst traffic noise hour (5:00pm to 6:00pm) was 56 dBA. Aircraft events were present during that hour, but many other hours did not have aircraft events. The aircraft events were excluded from the 5:00 PM to 6:00 PM data set to calculate a subset L_{eq} of 37 dBA. Therefore, 37 dBA, L_{eq} was used as the existing noise level in the study to represent noise-sensitive receptors in the areas well away from existing Nimmo Parkway, Albuquerque Drive, and Atwoodtown Road.

3.10.2 Environmental Consequences

3.10.2.1 No Build Alternative

The No Build Alternative would not result in noise impacts in the study area.

3.10.2.2 Build Alternative

Noise impacts resulting from the Build Alternative would occur wherever project noise levels are expected to approach within one decibel or exceed 67 dBA L_{eq} at noise-sensitive land uses in Activity Categories B (exterior residential) during the loudest hour of the day. Noise impact also would occur wherever Project noise levels cause a substantial increase over existing noise levels—an increase of 10 dB or more is considered substantial by VDOT.

All of the predicted noise impact due to the proposed Project would be the result of a substantial increase of 2042 Build noise levels over 2018 Existing noise levels (**Table 18**). Traffic noise projections are preliminary and will be reevaluated during the final design noise analysis.

Table 18: Noise Impact Summary

		Number of Impacted Receptors by Land Use and FHWA Activity Category[2]				
Alternative	**Impact Type[1]**	**Residential Exterior (B)**	**Recreational Exterior (C)**	**Institutional Interior (D)**	**Commercial Exterior (E)**	**Total**
2018 Existing	NAC	0	0	0	0	0
2042 Build[3]	SI	63	0	0	0	63

Notes:
1.) "NAC" = traffic noise levels approach or exceed the relevant FHWA Noise Abatement Criteria (67 dBA for residential and recreational); "SI" = 2042 Build noise levels cause a Substantial Increase (10 dBA, or more) over 2018 Existing noise levels.
2.) The FHWA Activity Category is shown in parenthesis.
3.) Traffic noise and any potential noise barriers will be reevaluated during the Project's final design based on current design year and advertisement date.

3.10.3 Minimization and Mitigation Measures

Noise abatement must be considered where noise impact is predicted to occur with the 2042 Build alternative. Certain noise abatement measures that may be incorporated in projects to reduce traffic noise impact. In general, mitigation measures can include alternative measures such as traffic management, the alteration of horizontal and vertical alignment, acoustical insulation, acquisition of buffer land, construction of earth berms, and low-noise pavement, in addition to the construction of noise barriers. These alternative abatement measures were determined not feasible for the proposed project.

Noise abatement is evaluated to determine if it is warranted, feasible and reasonable. The following table summarizes the total length, estimated cost and benefits that would be provided by the potential noise barriers evaluated in this study that were found to be feasible and reasonable.

Table 19: Summary of Potential Noise Barriers Found to be Feasible and Reasonable

Barrier ID	Number of Impacted Receptors	Impacted & Benefited Receptors	Non-Impacted & Benefited Receptors	Noise Barrier Parameters				Surface Area/ Benefited Receptor (SF/BR)
				Length (feet)	Height (feet)	Surface Area (sq feet)	Cost at $42/sq ft	
Barrier 1	33	28	3	3,077	10-14	36,521	1,544,882	1,178
Barrier 2	30	18	4	2,667	12	31,979	1,343,118	1,454

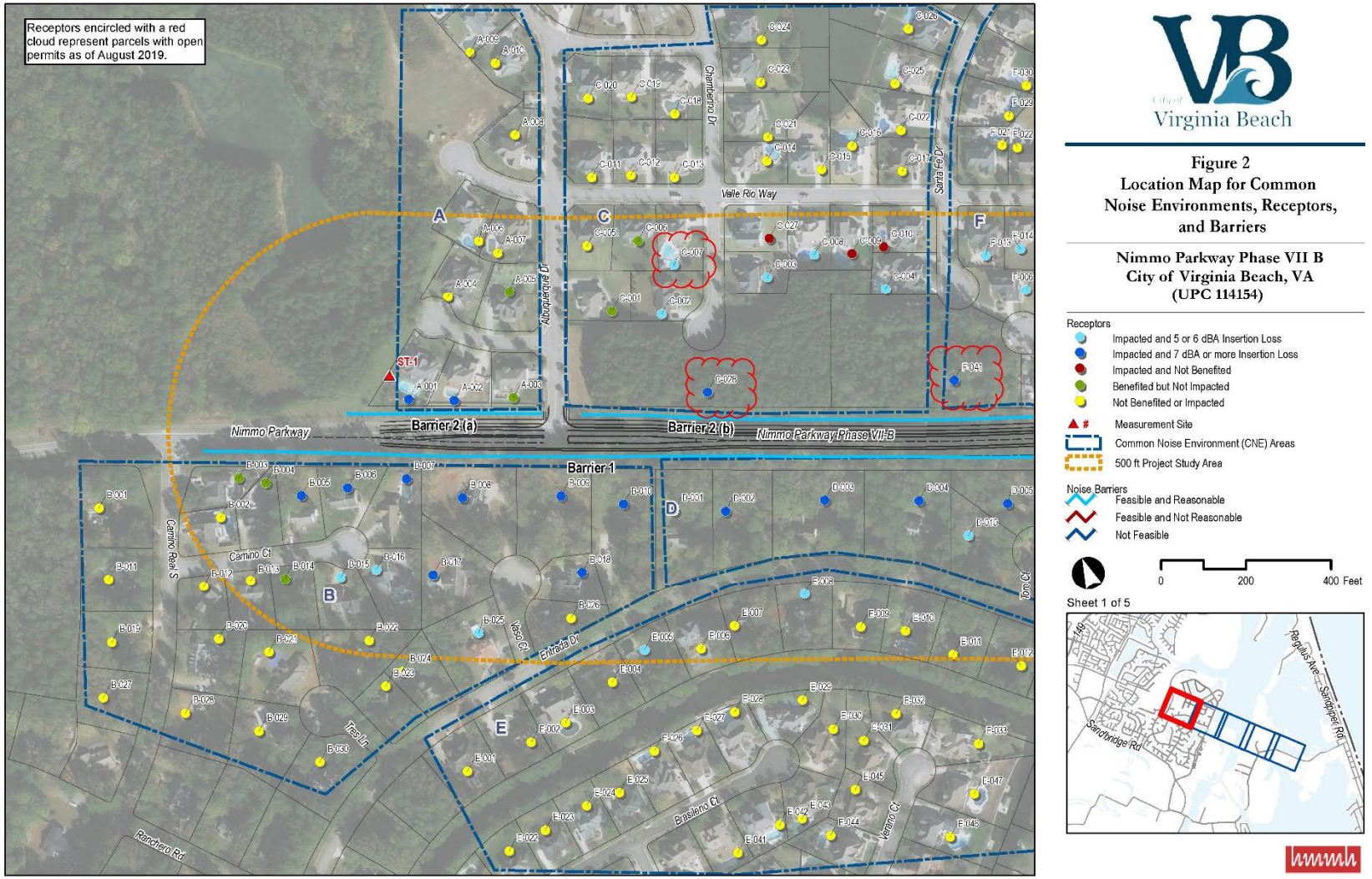
Barriers 1 and 2, shown in the **Table 19** and **Figure 13**, would likely be found to be feasible and reasonable during the final design evaluation. If so, the viewpoints of the residents and property owners benefited by the barriers would be surveyed. Majority approval is required for the barrier to receive final approval.

3.11 Visual Resources

An *Abbreviated Visual Impact Assessment* (VIA) (**Appendix C**) was prepared in accordance with FHWA's *Guidelines for the Visual Impact Assessment of Highway Projects*, referred to as "FHWA VIA Guidelines" (FHWA 2015), to document visual characteristics of the study area and analyze impacts to visual and aesthetic quality that could result from implementation of the Build Alternative. Visual resources were characterized based on review of available local planning documents; satellite imagery; U.S. Geological Survey (USGS) topographic maps, GIS data; and field reconnaissance which occurred in December 2018.

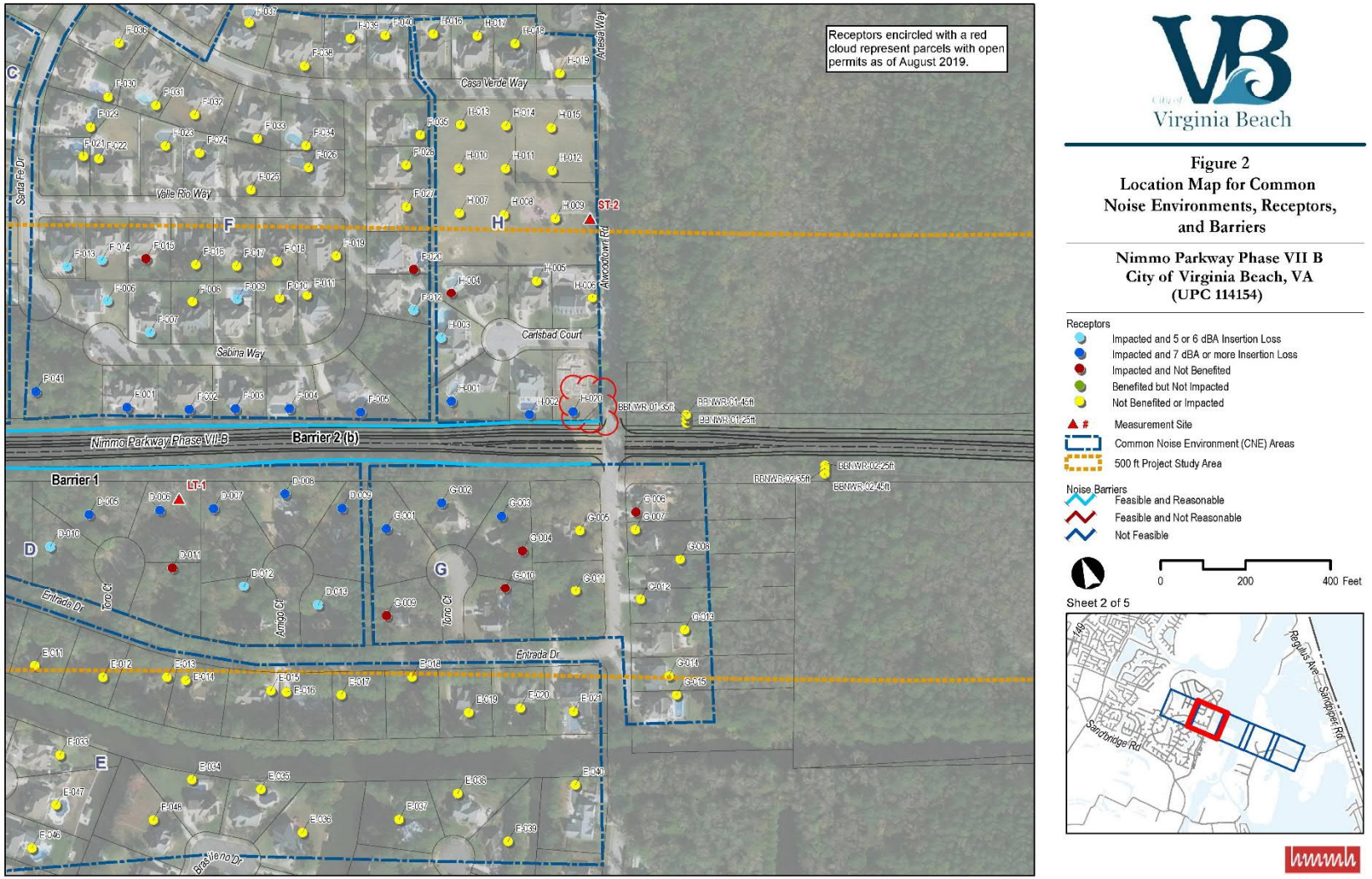
The methodology utilized for the VIA is described in **Appendix C**. Per the FHWA VIA Guidelines, the assessment summarizes and closely follows the VIA process that is carried out in four phases: Establishment, Inventory, Analysis, and Mitigation.

Figure 13a. Common Noise Environments, Receptors, and Barriers



Source: Preliminary Noise Analysis Technical Report (HMMH, 2021)

Figure 13b. Common Noise Environments, Receptors, and Barriers (continued)



Source: Preliminary Noise Analysis Technical Report (HMMH, 2021)

3.11.1 Existing Conditions

The "Establishment Phase" identified the project's Area of Visual Effect (AVE) by assessing a project's visual character, regulatory context, and visibility. The AVE used for this analysis is shown in **Appendix C** (*Abbreviated Visual Impact Assessment* [**Appendix C**, **Figure 4-1**]).

The "Inventory Phase" determines the current condition of the environment and population that will be affected by the project and record the existing and preferred quality of visual characteristics. The following visual resources or land-uses were identified as present within the AVE: suburban residential, two-lane suburban roads, two-lane rural road, maintained utility corridor, undeveloped forest, logged forest, Nimmo Trail shared-use paved path, unpaved pedestrian path within the western portion of the project/utility easement, small-scale commercial development, a historic family cemetery (Stone Family Cemetery), BBNWR, and Ashville Bridge Creek. The visual character along the project corridor was captured in 13 points of assessment. Photos and surrounding land uses of each point of assessment is included in the *Abbreviated Visual Impact Assessment* (**Appendix C)**.

3.11.2 Environmental Consequences

3.11.2.1 No Build Alternative

The No Build Alternative would not change the existing viewshed in the study area.

3.11.2.2 Build Alternative

The final element of the inventory phase of the VIA is to define visual quality by defining the viewing preferences associated with the visual character of the AVE, or "what viewers like and dislike about the visual character of the AVE". For this assessment, two viewer groups were considered, neighbors and travelers. Neighbors are defined as individuals viewing the project corridor from an external, nearby location. The neighbors group was further subdivided into (a) residential neighbors and (b) recreational neighbors. Residential neighbors are individuals living adjacent to the project in the AVE. Recreational neighbors are generally limited to any small craft uses on Ashville Bridge Creek. The neighbors viewer group is expected to be composed primarily of residential neighbors residing in single family homes within the AVE, these viewers are assumed to prefer to maintain the existing views and value cultural order and natural harmony more than project coherence. The values of recreational neighbor viewers are similar to the residential viewer, though more emphasis is assumed to be placed on project coherence. As a whole, neighbors are assumed to prefer the status quo and are leery of visual encroachments that may cause adverse effects on the setting of their activity. However, they may show willingness to entertain improvements that enhance their recreational or other (e.g. transportation) experience. Travelers are defined as individuals traveling the existing and proposed roadway/trail that are experiencing views from the proposed road project. The traveler group was subdivided into two main categories: (a) motorized vehicle travelers and (b) non-motorized travelers, via bike or on foot on the proposed shared-use path (including the user group currently using unpaved pedestrian path in utility corridor), generally for recreation. Motorized travelers are expected to be comprised of commuting travelers, who would be expected to predominantly value project coherence, and touring travelers, who are likely to value project coherence, cultural order, and natural harmony. Non-motorized travelers, specifically pedestrians and bikers using the existing and proposed shared-use path running parallel to Nimmo Parkway, are assumed to have a slight preference for cultural order over natural harmony and project coherence. This is because, given the suburban setting, this viewer would not have high expectations for natural order and their preference for a pleasant visual blend of the manmade elements would likely exceed that of how the project fit into the surroundings (project coherence) as the project is expected to generally be similar to the surroundings.

Some adverse impacts to visual quality would occur to the residential neighbor group to the north and south of the utility corridor between Albuquerque Road and Artesia Way, and the non-motorized travelers that currently use the unpaved pedestrian path through this same corridor, and the recreational neighbor group using small watercraft on

Ashville Bridge Creek. However, the project will provide benefits to visual quality to the greater number of users in the of traveler group (motorized and non-motorized) as they cross through the forested portions of the project that bridges over Ashville Bridge Creek as well as the enhanced views of the Stone Family Cemetery.

3.11.3 Minimization and Mitigation Measures

The mitigation phase of the VIA is an evaluation of the avoidance and minimization measures that are critical components of the design of the project. This phase also includes identification of possible measures to compensate for adverse impacts to the visual quality caused by the project within the AVE. Efforts to enhance viewer experiences are also considered in this phase of the VIA.

In order to avoid and minimize adverse impacts to visual quality, including direct impacts to the Stone Family Cemetery, the LOD was minimized to the extent practicable **Appendix C** (*Abbreviated Visual Impact Assessment **[Appendix A, Figure 1-2]***). The project design utilized the previously disturbed maintained utility corridor to minimize impacts to forested lands. In addition, beneficial impacts associated with the incorporation of a paved shared-use path as part of the Build Alternative offer beneficial impacts to non-motorized travelers in many areas of the project corridor, offering access to views of BBNWR and Stone Family Cemetery that were previously unavailable.

In consideration of mitigation, the design team will consider the use of the following mitigation strategies, as practicable:

- Locate new transmission lines and access routes to minimize the removal of trees and shrubs and pruning needed to accommodate new or relocated transmission lines.
- Minimize the removal of trees and shrubs and pruning needed to accommodate new or reconstructed noise barriers.
- Replace landscaping, fencing, privacy walls, and other similar features for private properties.
- Design ground contours to mimic natural terrain.
- Use native grass and wildflower species in erosion control and permanent grassland seed mixes.
- Utilize native species for roadside (or project) landscaping.
- Apply aesthetic treatments to the design of bridges and grade-separated crossings over roadways.
- Construct walls and barriers with aesthetic treatments and low-sheen and non-reflective surface materials.
- Implement retaining wall aesthetics.
- Use low intensity lighting.

3.12 Utilities

3.12.1 Existing Conditions

3.12.1.1 Public Utility

Within the project limits there are two existing parallel water mains located along the public right-of-way. The cast iron line to the north was installed in 1971 and is the original water main which served the Sandbridge area of the City. The line enters the project limits within the right-of-way at Albuquerque Drive as a 16-inch pipe and reduces to a 12-inch at Atwoodtown Road/Artesia Way. From there, it continues as a 12-inch pipe to the end of project limits on the east. The second water line is a 12-inch ductile iron pipe installed in 1988 that runs parallel to the cast iron main 10 feet to the south. Both mains cross sub-aqueously below the Ashville Bridge Creek.

Domestic water demand for the Sandbridge Beach area is provided exclusively by the two water mains along the project corridor. It is critical that service is not interrupted at any time. During a line failure, the parallel water mains provide redundancy in the system to ensure there are no disruptions. Furthermore, between the two water lines at intermittent intervals, there are cross-connections which allow for portions of each waterline to be isolated with

minimal disruptions in service.

There is an existing 16-inch ductile iron sewer force main installed in 1984 located 8 feet south of the centerline of the 110-foot right-of-way. The sewer force main enters the project limits at Albuquerque Drive and terminates at Atwoodtown Road/Artesia Way where two additional City owned 12-inch ductile iron force mains tie-in via a tee connection. The 16-inch force main conveys sanitary sewer flows to the 42-inch Hampton Roads Sanitation District (HRSD) interceptor located to the southeast of the Townfield Lane and Nimmo Parkway intersection.

3.12.1.2 Private Utilities

The project corridor contains existing infrastructure for Dominion Energy, Virginia Natural Gas, Cox Communications, and Verizon Communications. The existing corridor is defined by overhead utility poles owned by Dominion Energy. The utility poles are within a 20-foot private utility easement within the public right-of-way. The utility poles contain both Dominion Energy and Verizon Communications wiring. Additionally, an underground fiber optic cable and underground telephone line run between Albuquerque Drive and Atwoodtown Road/Artesia Way. Verizon Communications has determined they do not have any underground lines, so the existing underground lines are assumed to belong to Cox Communications. Between Albuquerque Drive and Atwoodtown Road, Virginia Natural Gas has an 8-inch steel gas line. The City has been made aware of interest in wind power utility projects in various locations including one along the existing right-of-way within this project's study area. This project is considered to only be in the planning stages at this time.

3.12.2 Environmental Consequences

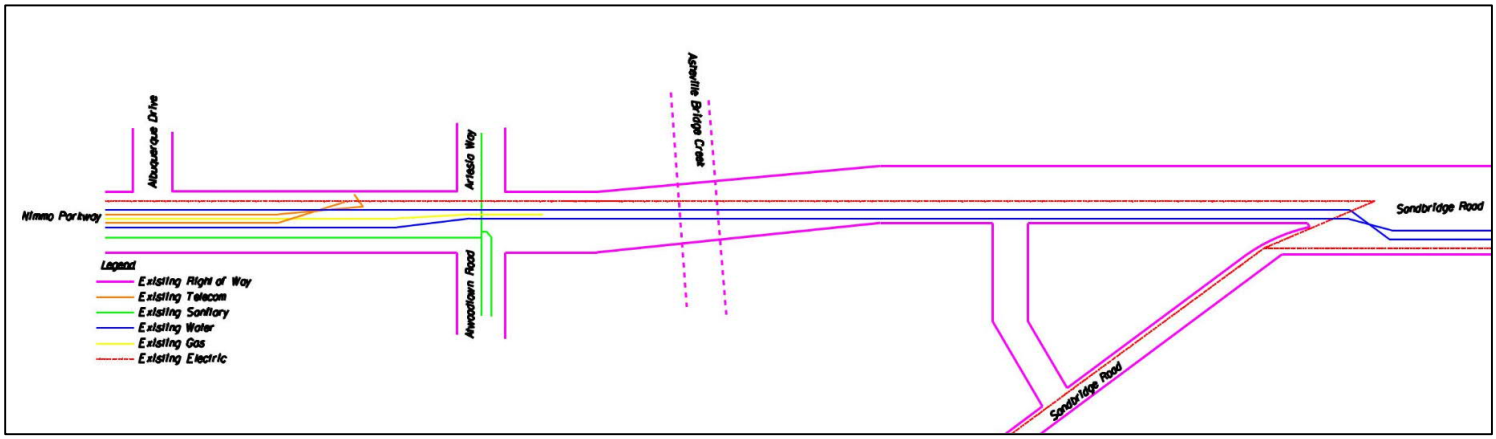
3.12.2.1 No Build Alternative

The No Build Alternative would not require use of any land and therefore would not require utilities to be impacted or relocated.

3.12.2.2 Build Alternative

Figure 14 shows location of existing utilities in the study area. **Table 20** presents utility impacts for the Build Alternative. All of the described utility relocations would be performed "in contract" with impacts accounted for in the disturbance footprint for wetlands impacts.

Figure 14. Existing Utilities



Source: WSP, 2021

Table 20: Utility Impacts

Utilities	Impacts
16-inch ductile iron force main	The existing ductile iron force main is not to be impacted. The force main will be protected during construction and remain in place.
16-inch / 12-inch cast iron water main	The City of Virginia Beach has a preference to replace all cast iron water pipes within their system and replace them with ductile iron. The cast iron water main will be replaced for the length of the project. The new water main will be located within the limits of disturbance of the roadway corridor.
12-inch ductile iron water main	The 12-inch ductile iron water main will need to be replaced for maintenance purposes due to the excessive fill (six to eight feet above existing) in the area between Atwoodtown Road and the eastern terminus of the project. The new water main will be located within the limits of disturbance of the roadway corridor.
Dominion Energy overhead power lines	The Dominion Energy power poles will conflict with the project. Dominion Energy will relocate its existing facilities that are in conflict within the project limits of disturbance. Dominion Energy has not determined whether they will remain overhead or relocate underground.
Verizon Communication overhead fiber optic lines	The existing Verizon Communication reside on the Dominion Energy power poles that are in conflict. Verizon Communication lines will be relocated and will follow the same path as Dominion Energy.
Underground communication lines	The existing underground communication lines are not to be impacted. The underground communication lines will be protected during construction and remain in place.
8-inch steel Virginia Natural Gas line	The existing 8-inch steel gas line is not to be impacted. The gas line will be protected during construction and remain in place.

3.13 Energy

3.13.1 Existing Conditions

Transportation energy is the energy required to move people and goods from place to place and is generally discussed in terms of operational and construction energy consumption.

Operational energy consumption, also known as “direct” energy, involves all energy consumed by vehicle propulsion. This energy is a function of traffic characteristics such as volume, speed, distance traveled, vehicle mix and the heat value of the fuel being used. Construction energy consumption, also known as “indirect” energy, involves the non-recoverable, one-time energy expenditure involved in constructing the physical infrastructure associated with a project.

3.13.2 Environmental Consequences

3.13.2.1 No Build Alternative

The No-Build Alternative is the baseline against which the Build Alternative is compared. It consists of the existing road network, as well as planned and programmed improvements in the approved regional plan. The No-Build Alternative represents the future conditions of transportation facilities and services in 2042 if the Nimmo Parkway is not built. Under the No-Build Alternative, travelers in the area would continue to rely on existing roadways as they are currently configured with no substantial changes.

The No Build Alternative would not require construction. Therefore, no changes in indirect energy consumption would result related to construction. The No Build Alternative could result in continued increases in direct energy consumption, as local traffic congestion on Sandbridge Road continues to worsen.

3.13.2.2 Build Alternative

The Build Alternative includes construction and implementation of the Nimmo Parkway Phase VII-B project.

Indirect Energy

Construction of the project would require consumption of indirect energy for processing materials, construction activities, and maintenance of the new roadway.

Direct Energy

The Build Alternative would not impact regional traffic volumes, as traffic from Sandbridge Road would be diverted to Nimmo Parkway. This diversion of traffic is expected to decrease congestion in the area, which would result in less direct vehicular energy consumption, as compared to the No Build Alternative. Thus, in the long term, post-construction operational energy improvements have the potential to offset construction and maintenance energy requirements and result in a net savings in energy usage.

3.14 Special Lands/Section 6(f)

Section 6(f) of the Land and Water Conservation Fund Act of 1965 (LWCF) (Public Law 88-578) states that properties purchased with LWCF funds cannot, "without the approval of the Secretary [of the Department of Interior], be converted to other than public outdoor recreation uses." Properties purchased using LWCF funds (Section 6(f) lands) are protected in addition to Section 4(f) of the USDOT Act of 1966 (49 U.S.C. 303), as discussed in the Section 4(f) Evaluation.

The Migratory Bird Conservation Fund (MBCF) assists the US Fish and Wildlife Service to acquire migratory bird habitat by fee purchase, easement, or lease. These funds are allocated by the Secretary of the Interior as delegated to the director of the Fish and Wildlife Service. The MBCF was created by the Migratory Bird Hunting and Conservation Stamp Act of March 18, 1934 (Duck Stamp Act).

3.14.1 Existing Conditions

Special lands include forest preserves, nature preserves, local publicly and privately-owned parks, and recreational areas. The specific locations are shown in **Figure 11**. There are two parks and recreational areas within or adjacent to the Study Area. These areas include the Nimmo Trail and Back Bay National Wildlife Refuge. Descriptions of these properties are provided in **Section 3.4**.

No privately-owned parks or recreational areas are within the Build Alternative Study Area. No rivers or creeks within the corridors are listed as Wild and Scenic Rivers.

According to the National Park Service (NPS), several parcels within the Back Bay National Wildlife Refuge adjacent to the Study Area has been developed or acquired through the LWCF. Therefore, one Section 6(f) property is located within the Build Alternative. The Back Bay National Wildlife Refuge development has involved the use of LWCF in areas adjacent to the Build Alternative as shown in data collected from the BBNWR (**Appendix A**).

3.14.2 Environmental Consequences

Since no new right-of-way will be required for the No Build or Build Alternative, no direct impacts to Section 6(f) lands would occur in the study area.

3.14.3 Minimization and Mitigation Measures

Since no direct impacts would occur to lands purchased with LWCF funds, no mitigation is required.

3.15 Section 4(f) Evaluation

Section 4(f) of the US Department of Transportation (USDOT) Act of 1966, as amended in 1983 (49 U.S.C. Section 303 and 23 U.S.C 138), was enacted to preserve publicly owned land used for recreation, wildlife, and waterfowl refuges. Section 4(f) properties also include public and private historic resources that are listed in or eligible for inclusion in the National Register of Historic Places (NRHP) as well as archaeological sites that are listed in or eligible for inclusion in the NRHP and warrant preservation in place.

Section 4(f) stipulated that FHWA and other USDOT agencies cannot approve the use of land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites unless the following conditions apply:

- There is no feasible and prudent alternative to the use of the land.
- The action includes all possible planning to minimize harm to the property resulting from use.

In August 2005, Section 6009(a) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), made the first substantive revision to Section 4(f) since the 1966 US Department of Transportation Act. Section 6009, which amended existing Section 4(f) legislation at both Title 49 U.S.C Section 303 and Title 23 U.S.C. Section 138, simplified the process and approval of projects that have only *de minimis* impacts on lands impacted as defined in Section 4(f). As defined in 23 CFR 774.17, *de minimis* means 1) for historic sites that there is no historic property affected or no adverse effect, and 2) for parks, recreation areas, and wildlife and waterfowl refuges that there is no adverse effect on the features, attributes, or activities that qualify the property for protection under Section 4(f). Under the current provisions, once the US DOT determines that a transportation use of Section 4(f) property results in a *de minimis* impact, analysis of avoidance alternatives is not required and the Section 4(f) evaluation process is complete. Section 6009 also required the US DOT to issue regulations that clarify the factors to be considered and the standards to be applied when determining if an alternative for avoiding the use of a Section 4(f) property is feasible and prudent. On March 12, 2008 FHWA issued a Final Rule on Section 4(f), which clarifies the Section 4(f) approval process and simplifies its regulatory requirements. In addition, the Final Rule moves the Section 4(f) regulation to 23 CFR 774.

Types of "uses" include:

- When land is permanently incorporated into a transportation facility.
- When there is a temporary occupancy of land that is adverse in terms of the statute's preservation purpose as determined by the criteria in 23 CFR 774.13(d).
- When there is a constructive use of a Section 4(f) property, as determined by the criteria in 23 CFR 774.15, meaning a transportation project does not incorporate land from a Section 4(f) property but the proximity of the project's impacts are so severe that the protected activities, features, or attributes that qualify the resource for protection are substantially impaired. Substantial impairment occurs only when the protected activities, features or attributes of the resource are substantially diminished. Constructive use may include impacts such as noise, access restrictions, vibration, ecological intrusions or visual impacts.

If no prudent and feasible avoidance alternative exists, only the alternative that causes the least overall harm and includes all possible planning to minimize harm to Section 4(f) properties may be selected (23 CFR 774.3(c)(1). The following factors are to be considered when conducting the least harm analysis:

- Ability to mitigate adverse impacts to each Section 4(f) property.

- Relative severity of remaining harm, after mitigation, to the protected activities that qualify each property for Section 4(f) protection.
- Relative significance of each Section 4(f) property.
- Views of the officials with jurisdiction over each Section 4(f) property.
- Degree to which each alternative meets the Purpose and Need.
- After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f).
- Substantial differences in costs between the alternatives.

Based on the seven factors above, in cases where all alternatives would cause substantially the same harm, FHWA may select any of the alternatives.

3.15.1 Description of Section 4(f) Resources

Secondary source information was used to identify publicly owned parks, recreational areas, wildlife refuges, and eligible or listed NRHP sites within 500 feet of the study area that may require evaluation according to the Section 4(f) of the USDOT Act of 1966 and criteria determined in 23 CFR 774. Available GIS databases, City parks website, management plans, and related project technical studies were used to determine the location of Section 4(f) properties within 500 feet of the proposed project.

3.15.1.1 Public Parks, Recreation Areas, and Wildlife Refuges

A total of three Section 4(f) resources are within the Study Area. **Figure 15** shows the location of park and recreation facilities and wildlife refuge properties. **Table 21** presents characteristics of the park and recreation facilities and wildlife refuge present in and adjacent to the Study Area.

Table 21: Section 4(f) Properties

Section 4(f) Resource	Location	Description	Ownership
Nimmo Trail	Parallel to Nimmo Parkway, between Albuquerque Drive and West Neck Road.	4.9 miles Paved, shared use path and sidewalk for bicycles, pedestrians, and wheelchair access	City of Virginia Beach
Lago Mar at Back Bay Neighborhood Park	817 Artesia Way	3.4 acres Neighborhood park with playground equipment, picnic shelter, and open space	City of Virginia Beach
Back Bay National Wildlife Refuge	4005 Sandpiper Road	9,250 acres Habitat for migratory birds and other wildlife; part of Atlantic Flyway; Recreational facilities include scenic trails, visitor station, interpretive programming, group education	US Fish and Wildlife Service, National Park Service

Figure 15a: Section 4(f) Properties

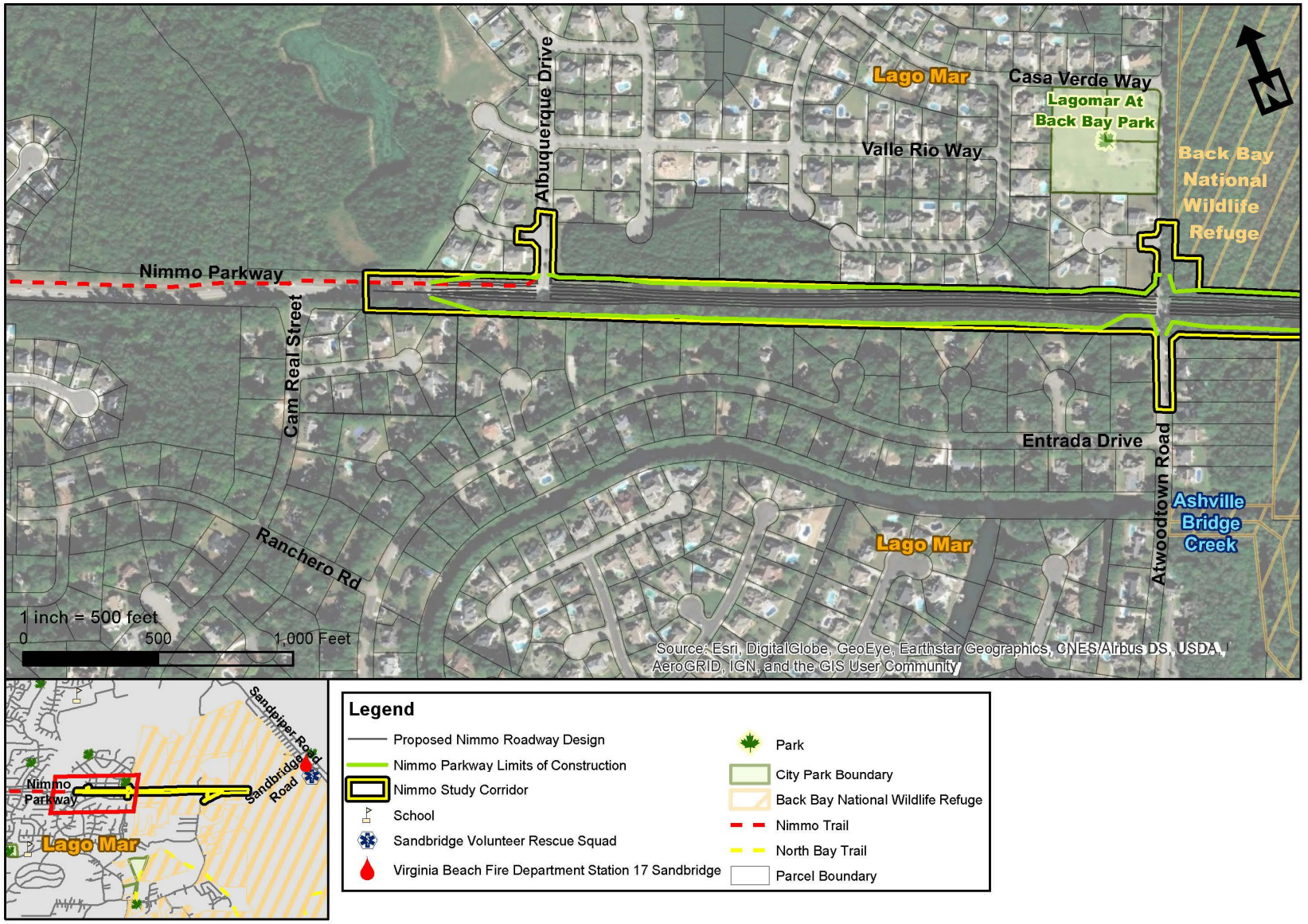


Figure 15b: Section 4(f) Properties (continued)

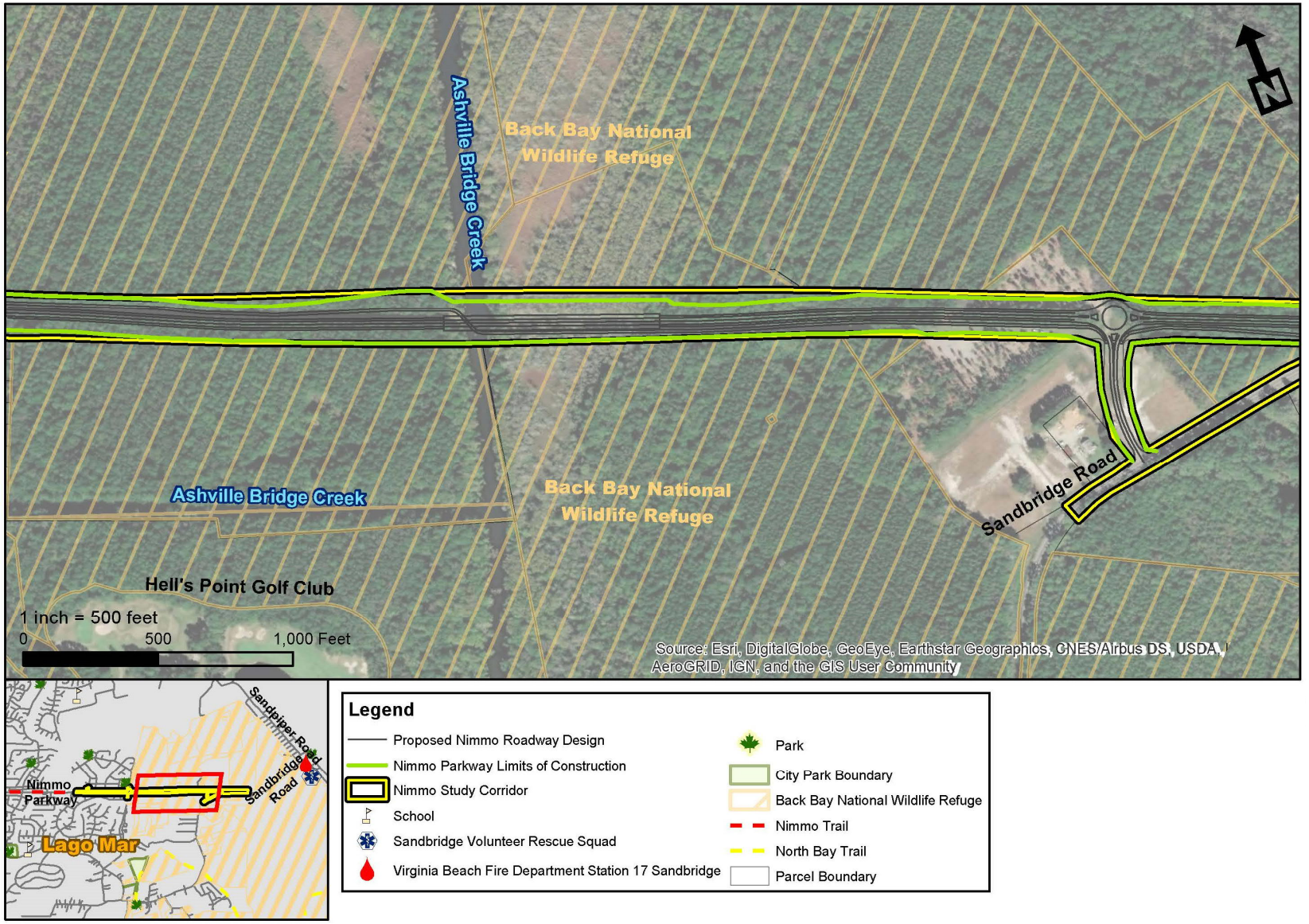
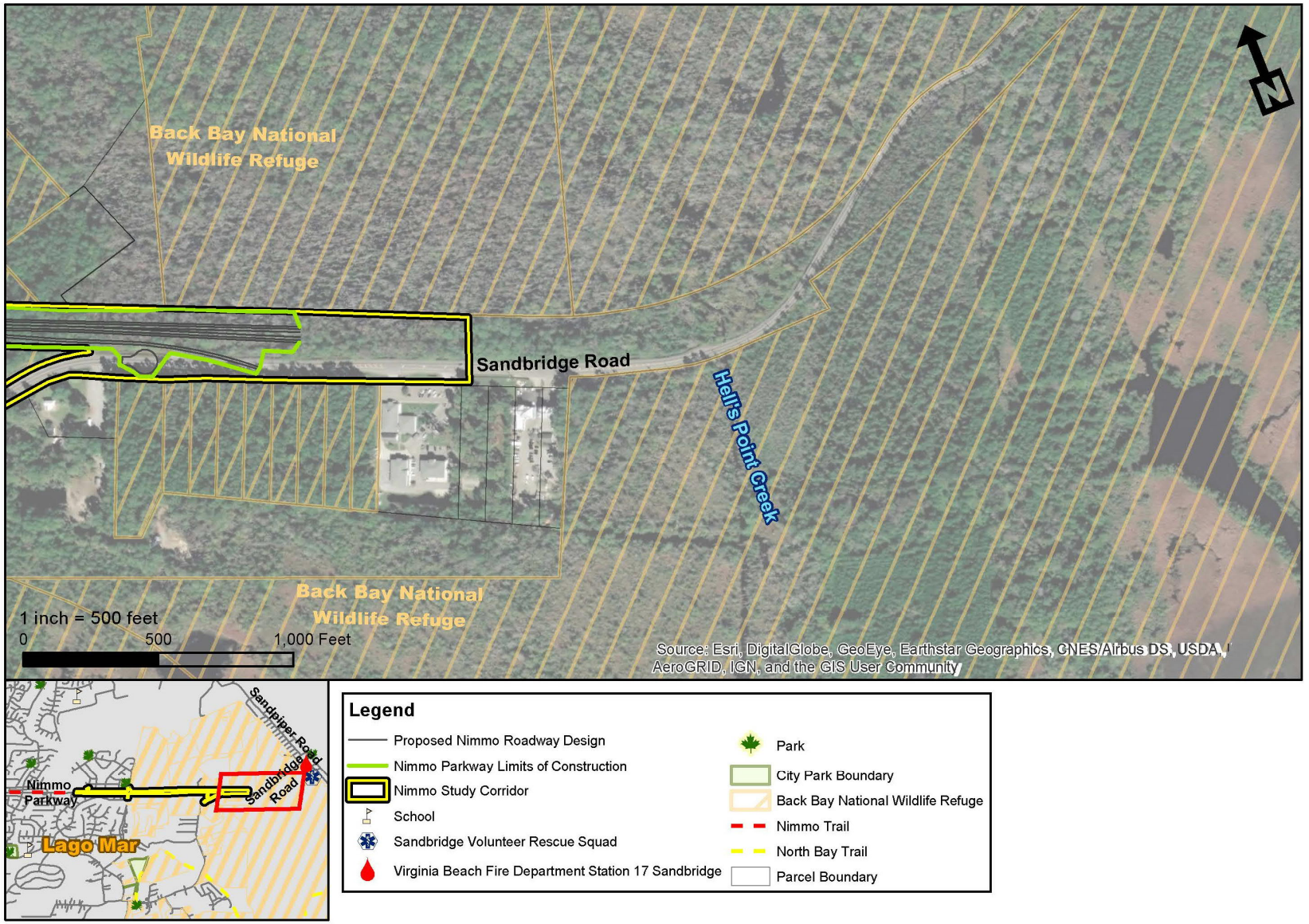


Figure 15c: Section 4(f) Properties (continued)



3.15.1.1.1 Nimmo Trail

Nimmo Trail is a public bicycle and pedestrian trail located within the existing public right-of-way where the proposed project is located. The paved, off-road shared use trail has a contiguous connection from Albuquerque Drive to West Neck Road along the north side of existing Nimmo Parkway. The connection is a combination of a variable width (8 feet to 12 feet) concrete widened sidewalk and an asphalt shared use path. Permitted uses on the paved portion include bicycling, walking, and wheelchair access. The shared use path is owned and operated by the City of Virginia Beach.

3.15.1.1.2 LagoMar at Back Bay Neighborhood Park

LagoMar at Back Bay Neighborhood Park is a city-owned resource located on Artesia Way in a residential setting. The park is approximately 400 feet north of the proposed study area. Amenities include playground equipment, picnic shelter and table, and open space. The park is open to the public between sunrise and sunset.

3.15.1.1.3 Back Bay National Wildlife Refuge

BBNWR is owned and operated by the US Fish and Wildlife Service. It is part of the National Wildlife Refuge System. The wildlife refuge was established at 4,589 acres and has grown to approximately 9,250 acres (USFWS 2021). The refuge includes a number of features throughout the property as noted in **Table 22**. The refuge also provides habitat for other wildlife, including such threatened and endangered species as the loggerhead sea turtle, piping plover and recently recovered species like the brown pelican and bald eagle. As described on USFWS website, BBNWR recreational amenities are located south of Sandbridge Beach at the southern end of Sandpiper Road (USFWS 2021). The project study area goes through the refuge on existing public right-of-way.

3.15.1.2 Historic and Archaeological Sites

There are no known NRHP eligible and listed sites within the Nimmo Parkway Phase VII-B corridor (Commonwealth, 2019). No resources are recommended eligible for listing in the NRHP. One archaeological location was identified during shovel testing is not recommended eligible for listing in the NRHP. As noted previously, Section 4(f) applies to public and private historic resources that are listed in or eligible for inclusion in the NRHP as well as archaeological sites that are listed in or eligible for inclusion in the NRHP and warrant preservation in place. Therefore, Section 4(f) does not apply to any historic architectural or archaeological sites in the study area.

3.15.2 Section 4(f) Impacts

The No Build Alternative would not impact Section 4(f) resources in the study area. Section 4(f) impacts by the Build Alternative are presented in **Table 22** for properties within and adjacent to the study area.

Table 22: Section 4(f) Impacts by Resource

Section 4(f) Resource	Acreage of Use (Right-of-Way Impacts)	Build Alternative Impact	Impact/Use
Nimmo Trail	0	Trail to remain in existing location and connect to proposed project	Temporary occupancy
Lago Mar at Back Bay Neighborhood Park	0	No direct impacts or noise impacts	No use
Back Bay National Wildlife Refuge	0	Some loss of wildlife habitat (including birds, mammals, reptiles, and amphibians) representing less than 1 percent of overall habitat; affect existing wildlife movement patterns; light affects to birds, reptiles, amphibians, and small and large mammals	No direct or constructive use

3.15.2.1 Nimmo Trail

The Nimmo Trail would have a temporary occupancy due to the shared use path, proposed as part of the Build Alternative, connecting back to the existing trail. The existing Nimmo Trail would remain in its existing location, but access could be limited during construction. Access to the trail would be closed during construction to tie the proposed shared use path into the existing Nimmo Trail at Albuquerque Drive. Users of the Nimmo Trail would be able to access the trail at Camino Real during construction.

3.15.2.2 Lago Mar at Back Bay Neighborhood Park

The Lago Mar at Back Bay neighborhood park will not have a direct use as a result of the Build Alternative or No Build Alternative. The park is 400 feet north of the project's limits of construction. No land will be required from the park and access will not be removed and altered to the park. No noise impacts would occur to the park as a result of the Build Alternative since noise levels are not predicted to approach 67dBA, therefore a constructive use would not occur.

3.15.2.3 Back Bay National Wildlife Refuge

No new right-of-way will be required from the BBNWR as a result of construction of the project. No direct use of the property would occur since no new land would be permanently incorporated into or temporarily incorporated into a transportation use; however, a constructive use was evaluated due to the indirect effects related to the wildlife nature of the property and presence of wildlife habitat adjacent to the study area.

None of the recreational activities within BBNWR would be impacted as a result of the Build Alternative. The area of the property that is adjacent to the proposed project is used for wildlife refuge. Recreational activities are over four miles (in a straight line) from the Build Alternative.

The air quality analysis determined that the project would not cause or contribute to new violations of the NAAQS. Indirect air quality impacts would not be significant and would not result in a constructive use to the BBNWR.

No direct impacts would occur to BBNWR since all work is to be completed within existing right-of-way. Temporary impacts are also not to occur to BBNWR for the Build Alternative during construction. Indirect effects related to wildlife habitat, including noise, lighting, and movement patterns, within BBNWR were evaluated to determine if a constructive use may result from the Build Alternative. The analysis of impacts with wildlife habitat is presented in the project's *Natural Resources Technical Report Nimmo Parkway Phase VII-B* (**Appendix C**). The Build Alternative could result in some effects to the proposed roadway corridor's surroundings through conversion of existing undeveloped right-of-way to paved road surfaces and conversion of forested land to maintained right-of-way. As a result, some loss of wildlife habitat could affect existing wildlife movement patterns as a result of a new east-west barrier, inhibiting movement north-south, and could impact wildlife through mortality (e.g. wildlife-vehicle collisions), or behavior modification (e.g. roosting, breeding and feeding) from roadway avoidance.

Loss of wildlife habitat types may include forested uplands, forested wetlands, *Phragmites* dominant emergent wetlands, wet meadow, and turf. Loss of high value habitats, such as the bald cypress swamp east of Ashville Bridge Creek would be minimized to the maximum extent practicable. Individuals, including birds, mammals, reptiles, and amphibians, may be displaced and lose nesting, breeding, hibernation, or foraging habitat. However, loss of these habitats would not result in substantial population level impacts to wildlife due to widespread availability of such habitats in the project vicinity. There is currently approximately 1,200 acres of contiguous undeveloped land north of the City of Virginia Beach right-of-way comprised of BBNWR, Naval Air Station Oceana Dam Neck, Hampton Roads Sanitation District property and private holdings, and approximately

1,700 acres of BBNWR habitat south of the City of Virginia Beach right-or-way and east of Sandbridge Road, consisting of wooded, marsh, and open water habitats. The acreage of potential loss of habitat as a result of the Build Alternative represents approximately 1 percent of the contiguous habitat surrounding the project.

The study area has an existing utility easement bisecting the corridor which serves to limit forested habitat connectivity. Construction of the proposed roadway would act as a barrier furthering fragmentation of the habitats north and south of the corridor. Fragmentation could affect nesting songbirds who require large tracts of land and could affect movement of reptiles, amphibians, and small and large mammals by both creating a barrier and through roadway avoidance.

Noise-sensitive Section 4(f) resources are evaluated under the appropriate Noise Abatement Criteria activity category in 23 CFR 772 (usually Activity Category C). In order for FHWA to begin considering whether or not a highway traffic noise increase may constitute a constructive use under Section 4(f), there must be:

- a future highway traffic noise level that approaches or exceeds 67 dBA, or
- existing noise levels which approach or exceed 67 dBA and a predicted increase with the future Build Alternative greater than 3 dBA or more above the predicted No-build alternative noise level.

The *Preliminary Noise Analysis Technical Report Nimmo Parkway Phase VII-B* (HMMH 2019), determined that noise levels in the study area adjacent to BBNWR would not approach or exceed 67 decibels during the loudest hour of the day. The predicted sound levels in the refuge range from 53 dBA to a high of 64 dBA Leq, depending on distance from the roadway and terrain elevation. This falls within the levels not requiring noise abatement for adjacent Section 4(f) or park land uses per FHWA Noise Abatement Criteria (NAC) per 23 CFR Part 772. Future 2042 No Build Alternative sound levels were not predicted for preliminary noise analysis but will be analyzed if a constructive use determination is made for BBNWR. The proposed project would not produce noise-related impacts that would result in the interference of the intended use of the Section 4(f) resource. Road noise has a variable effect on animals. The most significantly impacted by road noise are those species that incorporate sound into their basic behavior, such as some bird species (Coffin 2007).

The roadway would also introduce light which may affect birds, reptiles, amphibians, and small and large mammals through avoidance and increases in stress which may affect fitness. Individuals may adjust behavior to avoid human disturbance, including roadway light (Coffin 2007).

3.15.3 Avoidance Alternatives

The No Build Alternative would not impact Section 4(f) properties since no additional right-of-way would be required. However, the No Build Alternative does not meet the project's Purpose and Need. Because the No Build Alternative does not meet the Purpose and Need, it is not considered to be a prudent and feasible alternative.

Due to the size of BBNWR, the east-west orientation of the study area and project termini, a Build Alternative outside of the Nimmo Parkway corridor would also cross the BBNWR and require additional right-of-way. Dam Neck Naval Base is adjacent to the northern border of BBNWR. The closest opening to the south that would not cross BBNWR property is approximately four miles south (in a straight line) of the Nimmo Parkway study area and would need to bridge over North Bay and Ships Bay to connect to the southern end of the Sandbridge community. There is also a potential for indirect impacts to BBNWR as well with a Build Alternative outside of the Nimmo Parkway. Additionally, a Build Alternative along the existing Sandbridge Road would require right-of-way from BBNWR. Therefore, an additional Build Alternative that would be feasible would not avoid direct impacts to BBNWR.

3.15.4 Measures to Minimize Harm and Mitigation

Possible mitigation measures for BBNWR were developed to minimize impacts to wildlife as a result of the Build Alternative. The project proposes to incorporate landscape maintenance measures to minimize loss of wildlife habitat. Beyond approximately 10 feet from the shared-use path, within which maintenance would occur on a standard roadside basis, disturbed area would be seeded with a native, riparian mix and mowed/maintained on a limited, seasonal basis to allow for a more robust habitat for wildlife, including pollinators, birds, and small and large mammals. Landscaping shrubs and trees would include native species such as willow oak (*Quercus phellos*), water oak *(Quercus nigra)*, highbush blueberry (*Vaccinium corymbosum*) and wax myrtle (*Myrica cerifera)*, which would provide both habitat and food sources for wildlife and minimize invasive species encroachment.

The City of Virginia Beach is considering the installation of wildlife crossings using small diameter concrete pipe (approximately 24 inch) to accommodate movement of small mammals and amphibians. These crossings would be placed solely for wildlife and would not be used for hydraulic conveyance. Location and design of these features would be developed during the final design stage. Such wildlife crossings are being utilized for the Sandbridge Road-Nimmo Parkway Phase VII-A project immediately east of the proposed project. These crossings would minimize the impact of fragmentation and limit roadway mortality of amphibians and small mammals. These types of dry culverts have been reported as effective, primarily for small mammals, in states utilizing these structures (NCHRP 2002).

Several lighting concepts have been evaluated for the proposed project. The project proposes to use adaptive lighting which could serve to minimize lighting impacts to wildlife habitat in BBNWR through the ability to dim or turn off lighting during non-peak periods. Different lighting levels may be used in the middle of the Build Alternative compared to the west and east ends of the project due to the nature preserve land use.

3.15.5 Future Section 4(f) Properties

The City of Virginia Beach Bikeways and Trails Plan (2011) identified the extension of Nimmo Trail west from Albuquerque Road. A future shared use path is noted along the same corridor of the Build Alternative between Albuquerque Road and Sandbridge Road. A combination of on and off roadway path was noted just east of the study area along Sandbridge Road to Sandpiper Road in the Sandbridge community. The plan noted that the extension of Nimmo Trail from Albuquerque Road to Sandfiddler Road is a top priority infrastructure project. The City of Virginia Beach Active Transportation Plan (2021) also identifies this proposed extension of the existing Nimmo Trail. The Active Transportation Plan is the bikeways and trails component of the Comprehensive Master Plan.

The Build Alternative would incorporate a shared use path as part of the project. This path will connect to the existing Nimmo Trail and therefore provide the planned extension as shown in the Active Transportation Plan.

3.15.6 Section 4(f) Conclusions

The Nimmo Trail would only have a temporary occupancy due to the shared use path, proposed as part of the Build Alternative, connecting back to the existing trail. The existing trail will remain in its location.

The Lago Mar at Back Bay neighborhood park will not have a use as a result of the Build Alternative or No Build Alternative, as no land will be required from the park and access will not be removed and altered to the park.

Per 23 CFR 774.15(e)(5), and the analysis presented above, there would not be an ecological intrusion that substantially diminishes the value of wildlife habitat, substantially interferes with the access, or substantially reduces the wildlife use of the BBNWR. Through minimization and mitigation measures, the Build Alternative would result in indirect impacts that are not adverse and not result in a constructive use. FHWA will make the final determination for impacts to Section 4(f) properties.

3.15.7 Coordination

The public will have the opportunity to review and comment on the Section 4(f) Evaluation concurrently with the EA. Comments from the public related to the Section 4(f) analysis will be addressed in a Final Section 4(f) Evaluation. Coordination with the Official with Jurisdiction of each Section 4(f) property will also be completed to incorporate comments and input from public involvement meetings for the EA.

There are two officials with jurisdiction over the recreational and wildlife refuge properties in the study area: The City of Virginia Beach and the Department of Interior, US Fish and Wildlife Service Back Bay National Wildlife Refuge.

The Planning, Design and Development Division of the Virginia Beach Parks & Recreation was contacted via email and personal communication in September 2019 to confirm the length, use, and ownership of Nimmo Trail.

Preliminary coordination with BBNWR has occurred with the following:

- Representatives from BBNWR participated in project scoping, in accordance with NEPA. BBNWR provided preliminary comments on the proposed project following an Agency Scoping meeting in April 2019. BBNWR noted their opposition to the project within the given corridor.
- Contacted via email in April 2019 regarding parcels within the property that were developed or acquired through Land and Water Conservation Funds. A map of parcels and listing of funding authority are available in **Appendix A** Background Data.

3.16 Construction Impacts

Construction activities that may result in erosion and sediment discharge are regulated by the *Virginia Erosion and Sediment Control Law*. This *Law* is primarily administered by localities, which issue land disturbance permits for construction activities (*9 VAC 25-840)*. DEQ regulates water resources and water pollution through the Virginia Pollutant Discharge Elimination System (VPDES) and the VSMP and is responsible for regulating stormwater discharges from construction activities. Coverage under the General VPDES Permit for Discharges of Stormwater from Construction Activities (e.g. Construction General Permit), administered by DEQ, would be required to discharge stormwater from construction activities associated with the Build Alternative. The general permit requires the development of a project specific stormwater pollution prevention plan (SWPPP) including an approved erosion and sediment control plan developed in accordance with erosion and sediment control and stormwater regulations as well as VDOT standards and specifications.

3.16.1 Community Resources

The existing Nimmo Trail would remain in its existing location, but access could be limited during construction. Access to the trail would be closed during construction to tie the proposed shared use path into the existing Nimmo Trail at Albuquerque Drive. Users of the Nimmo Trail would be able to access the trail at Camino Real during construction.

3.16.2 Natural Resources

In accordance with *Executive Order 13112 Invasive Species*, the potential for the establishment of invasive terrestrial invasive species during construction of the project would be minimized by following provisions in the VDOT's *Road and Bridge Specifications* (VDOT 2016). These provisions require prompt seeding of disturbed areas with mixes that are tested in accordance with the Virginia Seed Law and VDOT standards and specifications to ensure that seed mixes are free of noxious species. Additionally, the project proposes that all areas would be landscaped and seeded using species native to Virginia. These provisions would reduce the potential for the establishment and proliferation of invasive species.

3.16.3 Noise

Construction noise provisions are contained in Section 107.16(b)3 Noise of the 2016 VDOT Road and Bridge Specifications. The specifications have been reproduced below:

- The Contractor's operations shall be performed so that exterior noise levels measured during a noise-sensitive activity shall not exceed 80 decibels. Such noise level measurements shall be taken at a point on the perimeter of the construction limit that is closest to the adjoining property on which a noise-sensitive activity is occurring. A noise-sensitive activity is any activity for which lowered noise levels are essential if the activity is to serve its intended purpose and not present an unreasonable public nuisance. Such activities include, but are not limited to, those associated with residences, hospitals, nursing homes, churches, schools, libraries, parks, and recreational areas.
- The City of Virginia Beach may monitor construction-related noise. If construction noise levels exceed 80 decibels during noise sensitive activities, the Contractor shall take corrective action before proceeding with operations. The Contractor shall be responsible for costs associated with the abatement of construction noise and the delay of operations attributable to noncompliance with these requirements.
- The City of Virginia Beach may prohibit or restrict to certain portions of the Project any work that produces objectionable noise between 10 P.M. and 6 A.M. If other hours are established by local ordinance, the local ordinance shall govern.
- Equipment shall in no way be altered so as to result in noise levels that are greater than those produced by the original equipment.
- When feasible, the Contractor shall establish haul routes that direct their vehicles away from developed areas and ensure that noise from hauling operations is kept to a minimum.
- These requirements shall not be applicable if the noise produced by sources other than the Contractor's operation at the point of reception is greater than the noise from the Contractor's operation at the same point.

3.16.4 Air

Emissions may be produced in the construction of this project from heavy equipment and vehicle travel to and from the site, as well as from fugitive sources. Construction emissions are short term or temporary in nature. To mitigate these emissions, all construction activities are to be performed in accordance with VDOT Road and Bridge Specifications.

Construction of this project would cause only temporary increases in emissions. A quantitative assessment of construction emissions is not required, as the project location is not in an area subject to project-level conformity requirements for CO. Additionally, even if conformity did apply, the primary criterion for conducting construction emission analyses for conformity purposes (five years, per 40 CFR 93.123(c)(5))[10] would not be expected to be exceeded for the construction of this project.

3.17 Indirect Effects

The Council on Environmental Quality (CEQ) defines indirect effects (or impacts) as "… effects which are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable" (40 CFR § 1508.8(b)). Indirect effects may include "growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including

[10] See: https://www.gpo.gov/fdsys/pkg/CFR-2014-title40-vol20/xml/CFR-2014-title40-vol20-sec93-123.xml

ecosystems" (40 CFR § 1508.8(b)). These induced actions are those that would or could not occur without the implementation of the proposed project.

The analysis of potential indirect effects associated with the No Build and Build Alternatives is discussed in detail in the Indirect and Cumulative Effects (ICE) Technical Report (**Appendix C)**. A summary of the analysis of indirect effects is discussed below. Effects were analyzed in accordance with NCHRP *Report 466, Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects* (TRB 2002).

The evaluation process recommended in TRB 2002 for assessing indirect effects consists of the seven steps:

- Step 1: Scoping;
- Step 2: Identify Study Direction and Goals;
- Step 3: Inventory Notable and Sensitive Features in the Study Area;
- Step 4: Identify Impact-Causing Activities of the Build Alternative;
- Step 5: Identify Potentially Significant Indirect Effects for Analysis;
- Step 6: Analyze Indirect Effects and Evaluate Analysis Results;
- Step 7: Assess Consequences and Develop Mitigation.

3.17.1 Indirect Effects

The following sections summarize the indirect impacts resulting from the No Build and Build Alternatives as analyzed in the Indirect and Cumulative Effects Technical Report (**Appendix C**).

3.17.1.1 No Build Alternative

The No Build Alternative would not result in substantial indirect impacts to any resource.

3.17.1.2 Build Alternative

3.17.1.2.1 Socioeconomic Resources

The Build Alternative would result in improved access and connectivity for the Sandbridge Beach Community, which includes improved recreational opportunities and access to Sandbridge Beach for recreational users, including the proposed shared use path. Though some indirect effects to community cohesion of the Lago Mar neighborhood may occur; impacts would be minor and no mitigation is proposed.

No Environmental Justice populations are found within the Socioeconomic Resources ICE Study Area. No relocations are proposed as part of the Build Alternative. Alteration of travel patterns and accessibility may, over time, result in changes to community composition and cohesion. Residential areas can become more or less attractive to residents depending upon the perceived benefits or detriments of living in proximity to a new road. The proposed roadway will further bisect the Lago Mar neighborhood impacting community cohesion. Homeowners adjoining the existing undeveloped right-of-way may experience negative perceived impacts due to traffic, increased noise, and/or pedestrian safety. This may cause some residents to relocate. Conversely, new homeowners may be attracted to the neighborhoods adjoining the proposed roadway due to the improved access to Sandbridge Beach and the proposed shared-use-path. Such changes may take years before they are manifested or recognized. Additional on-street parking may occur in the adjoining neighborhoods (Lago Mar, Red Mill, etc.) with citizens utilizing the shared use path to travel to Sandbridge. This can be controlled by the City of Virginia Beach with parking enforcement.

Access improvements to the Sandbridge Beach neighborhood may increase the numbers of recreational users visiting the beach. Because the Sandbridge Beach neighborhood is in near built-out condition, induced growth would not occur. The Virginia Beach City Council is required to approve any zoning changes, which will prevent any unintended

development in the community. Parking availability will also limit the numbers of additional recreational users visiting Sandbridge Beach. The Sandbridge Community has limited parking. Improved access would benefit Sandbridge Beach residents due to more reliable connectivity with the rest of the City of Virginia Beach, including for emergency vehicles.

During construction, travel patterns for the Lago Mar neighborhood may be impacted by temporary detours and maintenance of traffic. The indirect effects to socioeconomic resources from changed travel patterns would be minimized by providing clear signage and appropriate maintenance of traffic.

3.17.1.2.2 Natural Resources

Water Resources

An increase in the amount of impervious surface could indirectly increase the total volume and duration of runoff discharged to streams located in and downstream of the direct impact areas, thus, indirectly impacting water quality and human and wildlife uses. Stormwater management measures, including linear BMPs, pretreatment for sheet flow through conserved open space, and other measures, as applicable, would be implemented to minimize water quality, velocity and quantity impacts and thereby minimize secondary impacts to wetlands and waterbodies within the Natural Resources ICE Study Area. These measures would reduce or detain discharge volumes and remove pollutants to comply with State and federal laws and regulations. Stormwater management would be performed in accordance with *Virginia's State Water Control Law* (*COV Title 62.1, Chapter 3.1)* and implementing Virginia Stormwater Management Program (VSMP) regulations (*9 VAC 25-870*). The project proposes to treat stormwater with BMPs to the highest extent practicable, with the remaining required pollutant removal being obtained from water quality credits off-site within the same Hydrologic Unit Code (HUC). Implementation of the Build Alternative could also result in temporary impacts to water quality during roadway construction through increased sedimentation from land disturbing activities. During construction, the contractor would be required to adhere to erosion and sediment control and stormwater measures and the associated required monitoring protocols, as specified in the *State Water Control Law*. A project specific SWPPP and erosion and sediment control plan would be developed as required under the DEQ General Permit for Discharges of Stormwater from Construction Activities. *VDOT Road and Bridge Specifications* (VDOT 2016) prohibit contractors from discharging any contaminant that may impact water quality. In the event of accidental spills, the contractor is required to immediately notify all appropriate local, state, and federal agencies and to take immediate action to contain and remove the contaminant. As such, indirect effects to waterbodies and water quality are to be minor. Stormwater management is discussed in more detail in the *Natural Resources Technical Report* (**Appendix C)**.

Indirect effects to wetlands may include impacts to floodwater storage capacity and retention times, vegetative community composition and structure, nutrient cycling, and aquatic life movement. To preserve the natural storage of surface waters and the chemical reduction and assimilation of pollutants in wetland areas, proposed runoff from the Build Alternative would sheet flow through conserved open space in the right-of-way and into the surrounding wetlands, where applicable. Standard DEQ and VDOT practices and design measures would be utilized in the design of the stormwater conveyance systems, level spreaders, and BMPs (wet swales and sheet flow to conserved open space). As such, indirect impacts to wetlands are to be minor. These approaches were included in the stormwater design, erosion and sediment control design and wetland permitting of the abutting Nimmo Parkway Phase VII-A.

Floodplains

Preliminary hydrologic and hydraulic analysis showed no significant impact to hydrology (0.01' increase for the 10, 25, 50, and 100- year storms and 0.02' increase for the 500- year storm) in the vicinity associated with the Build Alternative. Final design will ensure proper conveyance of floodwaters to minimize impacts to the floodplain. The Build Alternative would not pose a substantial flooding risk, nor would the Build Alternative substantially increase flood elevations, the probability of flooding, or the potential for property loss or hazard to life. Encroachments into the

floodplain would conform with all applicable state and local floodplain protection requirements. As such, no indirect effects to the floodplain elevation are to occur.

Wildlife Habitat
No direct impacts to BBNWR would occur since the limits of disturbance are fully within the existing right-of-way owned by the City of Virginia Beach. There would not be an ecological intrusion that substantially diminishes the value of wildlife habitat, substantially interferes with the access, or substantially reduces the wildlife use of BBNWR. As such, any indirect impacts would not be adverse and not result in a constructive use.

As discussed in the *Natural Resources Technical Report* (**Appendix C**), the Build Alternative could indirectly impact wildlife through impacts to wildlife movement patterns as a result of a new east-west barrier, or behavior modification (e.g. roosting, breeding and feeding) from roadway avoidance. Individuals, including birds, mammals, reptiles, and amphibians, may be displaced and lose nesting, breeding, hibernation, or foraging habitat. However, loss of these habitats would not result in substantial population level impacts to wildlife due to widespread availability of such habitats in the project vicinity.

Habitat fragmentation is indirectly associated with habitat loss and can have wide-ranging indirect effects to sensitive wildlife including changes in species, lower diversity, separation of populations, disruption to wildlife movements and reduced biological diversity. The Build Alternative would be built within an existing utility easement that already bisects or fragments existing forested habitat. Construction of the proposed roadway would function as a more significant physical barrier, thus, furthering fragmentation of the habitats north and south of the corridor. Fragmentation could affect nesting songbirds who require large tracts of land and could affect movement of reptiles, amphibians, and small and large mammals by both creating a barrier and through roadway avoidance. The roadway would also introduce noise and light which may indirectly affect birds, reptiles, amphibians, and small and large mammals through avoidance and increases in stress which may affect fitness.

The City of Virginia Beach is considering the installation of wildlife crossings using small diameter concrete pipe (approximately 24 inch) to accommodate movement of small mammals and amphibians. These crossings would be placed solely for wildlife and would not be used for hydraulic conveyance. Location and design of these features would be developed during the final design stage. Such wildlife crossings are being utilized for the Sandbridge Road-Nimmo Parkway Phase VII-A project immediately east of the proposed project. These crossings would minimize the impact of fragmentation and limit roadway mortality of amphibians and small mammals. These types of dry culverts have been reported as effective, primarily for small mammals, in states utilizing these structures (NCHRP 2002). The project proposes to use adaptive lighting, which could serve to minimize lighting impacts through the ability to dim or turn off lighting during non-peak periods.

Threatened and Endangered Species
Per the DWR Wildlife Environmental Review Map Service (WERMS) database (VDGIF 2018b), there are no confirmed observations of the protected NLEB and canebrake rattlesnake within the Natural Resources ICE Study Area. As such, indirect impacts are unlikely. However, habitat loss could indirectly impact the protected NLEB and canebrake rattlesnake through the fragmentation of suitable forage and summer roost habitat should these species be present.

3.18 Cumulative Effects

CEQ defines cumulative effects (or impacts) as, "… the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR § 1508.7). Cumulative

effects include the total of all impacts, direct and indirect, that have occurred, are occurring, and/or would likely occur as a result of any action or influence, including effects of a federal activity (EPA 1999).

The analysis of cumulative effects associated with the No Build and Build Alternatives is discussed in detail in the *Indirect and Cumulative Effects Technical Report* in **Appendix C**.

3.18.1 Geographic Area & Temporal Boundaries

The geographic limits for the cumulative effects analysis are the same as the ICE Study Areas. The analysis of cumulative effects must consider past, present, and reasonably foreseeable future actions. The temporal boundary that was used for the cumulative effects assessment spans from late 1960s, when planning for a corridor linking the Sandbridge Community was first considered by the City of Virginia Beach.

3.18.2 Affected Resources

During the indirect effects analysis, an inventory of notable features was performed. These resources were also reviewed for cumulative effects.

3.18.3 Past, Present, Reasonably Foreseeable and Other Actions

Major past actions occurring since the late 1960s that have contributed to existing conditions within the Natural Resources and Socioeconomic Resources ICE Study Areas include the following:

- 1960's-2000's: Private residential development
- 1982: Hell's Point Golf Club constructed
- 1992-2001: BBNWR Expansion
- 2001: Red Mill Commons- community shopping center constructed at intersection of Nimmo Parkway and Upton Drive
- 2001: Nimmo Parkway from General Booth Boulevard to Upton Drive constructed
- 2007: Nimmo Parkway extended by private developer, with City of Virginia Beach cost sharing, from its terminus at Upton Road eastward to Albuquerque Drive
- 2012: Sandpiper Road expanded with by-pass lane at Little Island Park at southern end of Sandbridge Beach Neighborhood
- 2020: Ashville Bridge Creek Drainage Improvements completed
- 2020: Sandbridge Road/Newbridge Road culvert upgrade was completed at the intersection of Sandbridge Road and Newbridge Road to reduce flooding within the intersection
- 2021: Sandbridge Road Bridge Replacement over Hell Point Creek completed

Currently, a number of transportation improvement projects are occurring and/or are planned to occur that could contribute to cumulative effects on resources affected by the project. **Table 23** lists the present and reasonably foreseeable future transportation projects that could contribute to cumulative effects and that are either identified in VDOT's Final 2020-2025 Six-Year Improvement Program (SYIP) (VDOT 2019b), City of Virginia Beach Capital Improvement Program (COVB 2019b), HRTPO FY 2018-2021 Transportation Improvement Program (TIP) or the 2040 Long Range Transportation Plan (LRTP) (HRTPO 2017a, 2017b). These projects are described further in *Indirect and Cumulative Effects Technical Report* (**Appendix C**). VDOT and FHWA consider 'reasonably foreseeable future actions' to be those actions that are fiscally constrained in the region's transportation plans. Projects included in these documents, plans, or lists are treated as reasonably foreseeable actions because future construction funds have been set aside for them in the planning process.

Other local non-transportation projects or projects under construction or planned by private entities as listed in City of Virginia Beach Capital Improvement Program (COVB 2019b) or the City of Virginia Beach Accela Citizen Action planning database (COVB 2019c) are listed in **Table 23**.

Table 23: Present and Reasonably Foreseeable Actions

Project	Status	Type
Sandbridge Road-Nimmo Parkway Phase VII-A From Sandpiper Road to McClanan's Curve	Preliminary Engineering	Transportation
Princess Anne Road Phase VII From General Booth Boulevard to east of Upton Drive	Construction	Transportation
Sandbridge Road Bridge Replacement	Construction Complete	Transportation
Ashville Park Drainage Improvements Phase I	Construction Complete	Non-transportation
Sandbridge Beach Access Improvements- Phase II	Construction	Non-transportation
2313 Treesong Trail Subdivision	Plan Revisions	Non-transportation

In 2015, the City of Virginia Beach initiated a Comprehensive Sea Level Rise and Recurrent Flooding Study in recognition of increased flood risk and the need for a strategic plan to protect the City with the goal of producing strategies to enable the City to establish long-term resilience to SLR and associated recurrent flooding (COVB 2019d). The final report evaluating structural alternatives for flood protection in light of SLR issues (Dewberry 2020) recommends raising Sandbridge Road and the construction of a network of seawalls, levees, and gates along the Back Bay shoreline of Sandbridge and a potential structural alternative. While not considered 'reasonably foreseeable', as the project is not funded or imminent, this project is provided here as a potential major project on the horizon within the Natural Resources ICE Study Area. The project, if constructed, would provide flood protection to developed areas within the Natural Resource ICE Study Area while allowing Back Bay to respond naturally to storm events.

Additionally, there is future potential that the Nimmo Parkway VII corridor right-of-way may be utilized as a transmission corridor for electric utility lines associated with the Kitty Hawk Offshore Wind Project. While not considered 'reasonably foreseeable', as the project is not funded or imminent, this project is provided here as a potential major project on the horizon within the Natural Resources ICE Study Area (**Table 24**).

Table 24: Additional Potential Future Projects

Project	Type
City of Virginia Beach SLR projects	Transportation & Non-Transportation
Kitty Hawk Offshore Wind Project	Non-Transportation

3.18.4 Impacts on Resources from Reasonably Foreseeable Actions

Cumulative effects consist of the impacts of the alternatives under consideration for the project and the impacts of the past, present, and reasonably foreseeable future actions. Impacts can be described in various levels of severity (**Table 25**). The significance or importance of impacts is determined by evaluating the proposed action against existing environmental standards, thresholds, guidelines, or objectives established by federal, state, and local agencies. All three significance factors do not need to apply to make a significance assessment, but they are taken into consideration along with planning judgement to assess cumulative impacts.

Table 25: Cumulative Effects Determination Matrix

Severity	Extent	Duration	Likelihood
Major	Large	Long	Probably
Moderate	Medium	Medium	Possible
Minor	Small	Short	Unlikely

The following discusses the cumulative effects to socioeconomic resources, natural resources, and historic resources.

4.4.1 Socioeconomic Resources

The past and present actions included above have contributed to the development discussed under Historic Land Use. These actions have been both beneficial and adverse to socioeconomic resources and land use, and it is expected that reasonably foreseeable future actions could be as well. Past and present growth and development has increased community cohesion and provided community facilities and recreational resources. Such growth has benefited local economies by improving access to markets and customers. Past growth and development have also led to widespread land use changes as the Socioeconomic Resources ICE Study Area has transitioned from primarily dispersed agricultural use to suburban residential use, particularly in the northern Socioeconomic Resources ICE Study Area.

No Build Alternative: There are no Environmental Justice populations within the Socioeconomic Resources ICE Study Area. Under the No Build Alternative, a connection to the Sandbridge Beach community would not be built. The No Build Alternative would contribute to moderate (small extent, long duration, possible likelihood) adverse effects to community cohesion, community facilities and recreation resources, by limiting connectivity to the Sandbridge Beach neighborhood and not building the proposed shared use path.

Build Alternative: There are no Environmental Justice populations within the Socioeconomic Resources ICE Study Area. Cumulatively, present, and reasonably foreseeable transportation projects along with the Build Alternative have the potential to alter travel patterns within the Socioeconomic Resources ICE Study Area. The 'Sandbridge Road-Nimmo Parkway Phase VII-A' and 'Sandbridge Road Bridge Replacement' projects, in conjunction with the Build Alternative would improve access to Sandbridge Beach neighborhood for both residents and visitors. However, this may increase the numbers of recreational users visiting the beach. As discussed above, because the Sandbridge Beach neighborhood is in near built-out condition, induced growth would be limited. Parking availability will also limit the numbers of additional recreational users visiting Sandbridge Beach. The Sandbridge Community has limited parking. Improved access would benefit Sandbridge Beach residents due to more reliable connectivity with the rest of the city, including for emergency vehicles.

Impacts to community cohesion would be similar to those discussed under indirect effects as the Build Alternative would further bisect the Lago Mar neighborhood**.** Other present and reasonably foreseeable transportation projects would occur within existing transportation corridors and would be expected to have limited impact on community cohesion. The Build Alternative is to have moderate impacts because of the small extent, long duration, and probable likelihood. Beneficial impacts associated with the improved access to the Sandbridge Beach Neighborhood would occur. Adverse incremental impacts to community cohesion and connectivity would occur because of the fragmentation of Lago Mar Neighborhood. Reasonably foreseeable transportation and other development projects may contribute to land use changes, including increased residential and commercial development. The incremental contribution of the Build Alternative to cumulative land use changes would be minor, as it should have a small extent, long duration, and are unlikely, because development is limited along the Build Alternative corridor and induced growth would be limited**.**

4.4.2 Natural Resources

Intensification of land use within the Natural Resources ICE Study Area since the 1960s, particularly from low density agricultural use to residential uses, has contributed to loss of wetlands, loss and degradation of wildlife habitat, and habitat fragmentation. Historic topographic maps and aerial photographs (**Appendix C** - *Indirect and Cumulative Effects Technical Report* **[Appendix A]**) illustrate the pace and extent of growth in the ICE Study Areas since the mid-twentieth century. Starting in the 1960s, increasing development appears to have impacted the extent of both riparian wetland and forested habitats. It is generally assumed that development occurring earlier in the region had a greater impact than more recent projects, given advances in environmental protection regulations, which require avoidance and minimization of adverse impacts to natural resources. Future growth and development in the Natural Resources ICE Study Area would be subject to the same or similar environmental regulations that would serve to minimize impacts to natural resources. Protection of the 9,250-acre BBNWR has contributed to protection of natural resources in the Natural Resources ICE Study Area.

No Build Alternative: The No Build Alternative would not result in any incremental effect to natural resources.

Build Alternative: Impact to water resources, floodplains, and wildlife habitat, would contribute to the cumulative effects that have occurred in the past to natural resources within the Natural Resource ICE Study Area. However, these impacts will be minimized to the extent practicable by adherence to regulations, implementation of best management practices, and compensatory mitigation. Reasonably foreseeable future actions would also contribute to cumulative effects. The Build Alternative would contribute to moderate (small extent, long duration, probable likelihood) adverse incremental impacts for water resources and wildlife habitat, as impacts would have a small extent, long duration and probably likelihood).

4.4.3 Historic Resources

Prior to the NHPA and local protective measures, the impact to historic resources through development of the area was much higher than impacts today. Some historic properties may continue to fall into disrepair or be impacted by development in the area. On federal undertakings, implementation of mitigation strategies would be coordinated with the Virginia State Historic Preservation Office (SHPO) via the NHPA Section 106 process.

No Build Alternative: No direct or indirect effects to historic resources would occur under the No Build Alternative. No cumulative incremental effects to historic resources would occur.

Build Alternative: No direct or indirect effects to historic resources would under the Build Alternative. No cumulative incremental effects to historic resources would occur.

4 COORDINATION AND COMMENTS

4.1 Agency Coordination

4.1.1 Agency Scoping

As part of the EA process, the City of Virginia Beach held a scoping meeting and mailed scoping letters in Spring 2019 to the following state and federal agencies to obtain pertinent information, as well as identify key issues regarding the environmental impacts for the study:

- National Marine Fisheries Service
- National Park Service
- U.S. Army Corps of Engineers
- U.S. Department of Agriculture
- U.S. Department of the Interior
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service-Back Bay National Wildlife Refuge
- U.S. Fish and Wildlife Service- Ecological Services
- U.S. Navy
- Virginia Department of Environmental Quality
- Virginia Department of Agriculture and Consumer Services
- Virginia Department of Conservation and Recreation Natural Heritage Program
- Virginia Department of Environmental Quality, Virginia Wetland Program
- Virginia Department of Environmental Quality, Office of Environmental Impact Review
- Virginia Department of Game and Inland Fisheries
- Virginia Department of Health
- Virginia Department of Historic Resources
- Virginia Marine Resources Commission

4.1.2 Summary of Issues Identified

Several comments from resource agencies were made in reference to indirect and cumulative effects (**Appendix D**). The USACE recommended consideration of potential indirect impacts to wetlands on adjoining properties which could change the character of these wetlands, as well as potential for increased traffic to the Sandbridge Beach neighborhood. VADWR recommended consideration of new demand for visitor facilities in the Sandbridge Beach neighborhood such as increased parking facilities or park and ride facilities. The USFWS-BBNWR expressed concern regarding indirect impacts to Ashville Bridge Creek and Black Gut Natural Areas due to loss of unique habitats including the bald cypress swamp, forest fragmentation, loss of an existing wildlife corridor, and local flooding issues. The EPA indicated that indirect and cumulative effects should be addressed.

4.2 Stakeholder Coordination

The project team met with and contacted local organizations, local government officials, and agencies throughout the project development process. The purpose of these meetings was to discuss elements of the Nimmo Parkway Phase VII-B project, provide updates, and discuss questions and concerns.

4.2.1 City of Virginia Beach Parks & Recreation

The Planning, Design and Development Division of the Virginia Beach Parks & Recreation was contacted via email and personal communication in September 2019 to confirm the length, use, and ownership of Nimmo Trail.

4.2.2 U.S. Army Corps of Engineers

The City of Virginia Beach and the project consultants met with the U.S. Army Corps of Engineers in February 2019 to discuss initial environmental permitting. The meeting also included an overview of the project and proposed improvements.

4.2.3 Back Bay National Wildlife Refuge

The Department of Interior, US Fish and Wildlife Service Back Bay National Wildlife Refuge representatives have provided feedback on the project on multiple occasions. Preliminary coordination with BBNWR has occurred with the following:

- Project representatives met with BBNWR representatives to discuss an overview and history of the project and to get initial comments from the stakeholder.
- The BBNWR was contacted via email in April 2019 regarding parcel information within the property.
- Representatives from BBNWR participated in project scoping, in accordance with NEPA. BBNWR provided preliminary comments on the proposed project following an Agency Scoping meeting in April 2019. BBNWR noted their opposition to the project within the given corridor.

4.3 Public Involvement

4.3.1 Citizen Information Meeting

A Citizen Information Meeting (CIM) was held by the City of Virginia Beach on September 26, 2018 to provide citizens with information regarding the project's preliminary design and preliminary schedule and solicited feedback from citizens on the extension of Nimmo Parkway. The CIM was advertised in the newspaper and was also distributed via email to civic leagues adjacent to the project corridor. One hundred and four (104) citizens signed in at the CIM. Citizen feedback was collected via individual polling conducted at CIM information stations and through a survey questionnaire that was available online and in hard copy formats. A total of 603 online surveys were fully completed and 35 hard-copy surveys were completed.

Several comments indicated concern for indirect impacts to the quality of life and character of the nearby Lago Mar, Ocean Lakes, and Red Mill neighborhoods as well as pedestrian and vehicle safety concerns caused by potential increased traffic and noise caused by the project. Several comments also expressed concern regarding indirect impacts to BBNWR, wetland areas, and flooding issues. Concerns were also raised regarding induced commercial growth in the Sandbridge Beach neighborhood, and indirect impacts to the quaint character of Sandbridge Beach. A summary report of the CIM, including full results and meeting materials, is provided in **Appendix E**.

4.3.2 Other Public Comments

The Southern Environmental Law Center and Back Bay Restoration Foundation submitted comments on the proposed project in a letter dated October 23, 2020 (**Appendix E**). The City of Virginia Beach provided a response in January 2021 acknowledging the receipt of the letter.

4.3.3 Public Hearing

A public hearing will be held to present the preliminary project design and the findings of the EA and to obtain input and comments from the public and interested parties. The EA will be available for public review prior to and at the

hearing. There will be a 30-day public comment period following notice of availability of the EA. Any comment received during the public hearing or comment period will be become part of the public hearing record and will be taken into consideration as the project develops.

The public will have the opportunity to review and comment on the Draft Section 4(f) Evaluation concurrently with the Draft EA. Comments from the public related to the Section 4(f) analysis will be addressed in a Final Section 4(f) Evaluation. Coordination with the Official with Jurisdiction of each Section 4(f) property will also be completed to incorporate comments and input from public involvement meetings for the Final EA.

5 SUMMARY AND CONCLUSION

A comparison of impacts for the No Build and Build Alternatives is listed in **Table 26**. The No Build Alternative would not meet the Purpose and Need identified for the proposed project. The Build Alternative would provide improved access to the Sandbridge community and would not require new right-of-way. Implementation of the Build Alternative could result in some effects to the general ecology of the proposed roadway corridor's surroundings.

Table 26: Summary of Impacts

Resource	No Build Alternative	Build Alternative
Traffic	Based on the linear trend line, the ADT is expected to grow by 24.4 percent between 2018 and 2048 (or 0.9 percent per year).	Sandbridge Road is expected to experience significant diversion of traffic to Nimmo Parkway. Considering the 24.4 percent total growth, the 2048 Summer daily vehicles traveling on the Nimmo Parkway extension will be approximately 16,800 vehicles per day and approximately 5,400 vehicles per day to remain on Sandbridge Road.
Land Use	No change to existing land use or future land use plans.	The Build Alternative is within existing right-of-way. Easements may be required for access during construction, drainage, and private utility relocations. The project's limits of construction would be within existing right-of-way; therefore no land is to be acquired and no changes in land use.
Communities and Community Facilities	No land would be acquired from community facilities. No displacements or relocation of residents or businesses would occur. No impact to community resources. No changes to the existing private trail in study area or to the existing Nimmo Trail.	The Build Alternative would not directly impact community facilities. The Build Alternative is located within the existing right-of-way. No adverse impacts would occur to community connectivity and cohesion to existing neighborhoods. Access to roadways would remain to existing neighborhoods with the Build Alternative. The existing Nimmo Trail would connect to the bicycle and pedestrian facilities included as part of the Build Alternative. The Lago Mar at Back Bay Neighborhood Park is approximately 400 feet north of the study area and would not be impacted. The soft trail within the existing right-of-way would be replaced with a shared use path as part of the Build Alternative. The Build Alternative would connect with the existing Nimmo Trail at Albuquerque Drive.
Socioeconomics and Environmental Justice	No impact to population, income or housing. No impact to environmental justice populations.	There will be no relocations with the Build Alternative. No impact to population, income or housing would occur with the Build Alternative. No disproportionate or adverse effects would occur with the Build Alternative.

Resource	No Build Alternative	Build Alternative
Cultural Resources	No impacts to cultural resources.	The historic resources and archaeological location are recommended not eligible for listing in the NRHP. The Build Alternative would not result in an adverse effect to historic resources.
Waters of the U.S., including Wetlands	No impacts to waters or wetlands.	The Build Alternative will result in approximately 9.7 acres of wetlands filled. Sensitive bald cypress swamp will be avoided to the extent practicable.
Floodplains	No impact to floodplains.	The Build Alternative would impact approximately 17.29 acres within the 100-year floodplain (Zone AE) and an additional 2.26 acres in the 500-year flood plain (0.2 percent annual chance of flooding). The Build Alternative would not pose a substantial flooding risk, nor would the Build Alternative substantially increase flood elevations, the probability of flooding, or the potential for property loss or hazard to life.
Terrestrial Habitat and Wildlife	No impacts other than ongoing usage and maintenance activities.	The Build Alternative would result in some effects to the terrestrial habitat and wildlife through conversion of existing undeveloped land to maintained transportation right-of-way. This conversion would result in some loss of wildlife habitat, could affect existing wildlife movement patterns as a result of a new east-west barrier, inhibiting movement north-south, and could impact wildlife through mortality (e.g. wildlife-vehicle collisions), or behavior modification (e.g. roosting, breeding and feeding) from roadway avoidance.
Aquatic Habitat and Wildlife	No impacts	The Build Alternative would introduce impervious surface to an otherwise undeveloped area increasing stormwater runoff to receiving waterbodies.
Threatened and Endangered Species	No impacts	No impacts
Agricultural and Forestal Districts, Prime Farmland and Soils	No impacts	No impacts.
Hazardous Materials	No impacts	No impacts since no evidence of recognized environmental conditions connected with properties within and adjacent to the Build Alternative. No additional investigation is recommended.
Air Quality	No changes to existing air quality.	The Build Alternative would meet all applicable air quality requirements of NEPA and federal and state transportation conformity regulations. The project will not cause or contribute to a new violation of the NAAQS established by EPA.

Resource	No Build Alternative	Build Alternative
Noise	No change in noise levels.	Two noise barriers were found to feasible and reasonable for the Build Alternative during preliminary noise evaluation. Construction activity may cause intermittent fluctuations in noise levels.
Visual and Aesthetics	No change to existing views in the area.	Some adverse impacts to visual to the residential neighbor group to the north and south of the utility corridor between Albuquerque Road and Artesia Way, and the non-motorized travelers that currently use the unpaved pedestrian path through this same corridor, and the recreational neighbor group using small watercraft on Ashville Bridge Creek. However, the project will provide benefits to visual quality to the greater number of users in the traveler group (motorized and non-motorized) as they cross through the forested portions of the project that bridges over Ashville Bridge Creek as well as the enhanced views of the Stone Family Cemetery.
Energy	The No Build Alternative could result in continued increases in direct energy consumption, as local traffic congestion on Sandbridge Road continues to worsen.	The diversion of traffic is expected to decrease congestion in the area, which would result in less direct vehicular energy consumption.
Utilities	No utilities to be impacted or relocated.	The Build Alternative would have seven utility impacts.
Section 4(f) and 6(f) Properties	No use of Section 4(f) resources. Since no new right-of-way will be required for the Build Alternative, no direct impacts are to Special Lands/Section 6(f) that were developed with LWCF funds in the study area.	No use the Lago Mar at Back Bay Neighborhood Park since no right-of-way required and due to distance from improvements. The Build Alternative will connect to the existing Nimmo Trail through the proposed shared use path. No new right-of-way will be required from the BBNWR. However, due to the location of the Build Alternative in relation to BBNWR there is potential for some loss of wildlife habitat representing less than 1 percent of overall habitat at BBNWR. The Build Alternative would affect existing wildlife movement patterns. New lighting may affect birds, reptiles, amphibians, and small and large mammals. The proposed project is not anticipated to produce noise-related impacts that would result in the interference of the intended use of the Section 4(f) resource.

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