
# White's Ferry Operations Alternative Study

**Prepared For:**
**Loudoun County, Virginia and**
**Montgomery County, Maryland**

**Prepared By:**

AECOM | Stantec

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# Acronyms and Abbreviations

| | |
|---|---|
| Baltimore MSA | Baltimore-Columbia-Towson MSA |
| BAU | Business as usual |
| BCA | Benefit-Cost Analysis |
| BEA | Bureau of Economic Analysis |
| BTS | Bureau of Transportation Statistics |
| C&O | Chesapeake and Ohio |
| CFR | Code of Federal Regulations |
| CR | County Road |
| CSA | Combined Statistical Area |
| DC | District of Columbia |
| DMV | District of Columbia-Maryland-Virginia |
| DO | Directly Operated |
| DOT | department of transportation |
| EB | eastbound |
| EPA | U. S. Environmental Protection Agency |
| EIR | Environmental Impact Report |
| ESA | Endangered Species Act |
| ESC | Erosion and Sediment Control |
| FAST Act | Fixing America's Surface Transportation Act |
| FCA | Forest Conservation Act |
| FEMA | Federal Emergency Management Agency |
| FHWA | Federal Highway Administration |
| FTA | Federal Transit Administration |
| GVW | vehicle gross weight |
| HBO | home-based other |
| HBW | home-based work |
| JPA | Joint Permit Application |
| LCM | Loudoun County Model |
| LEHD | Longitudinal Employer-Household Dynamics |
| MDE | Maryland Department of the Environment |
| MDOT | Maryland Department of Transportation |
| MHT | Maryland Historic Trust |
| MSAs | metropolitan statistical areas |
| MWCOG | Metropolitan Washington Council of Governments |
| NCFO | National Census of Ferry Operators |
| NHB | non-home base |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |
| NPS | National Parks Services |
| NTD | National Transit Database |
| O&M | operations and maintenance |
| OD | origin-destination |

| | |
|---|---|
| OMB | Office of Management and Budget |
| PDO | Property Damage Only |
| PT | Purchased Transportation |
| RAISE | Rebuilding American Infrastructure with Sustainability and Equity |
| RCRA | Resource Conservation and Recovery Act |
| RIMS II | Regional Input-Output Modeling System |
| SPCC | Spill Prevention, Control, and Countermeasure |
| Streetlight | Streetlight Data |
| SWM | stormwater management |
| TAZ | Traffic Analysis Zones |
| the "Ferry" | White's Ferry |
| the "Study" | White's Ferry Operations Alternative Study |
| U.S. | United States |
| U.S.C. | United States Code |
| USACE | U.S. Army Corps of Engineers |
| USCG | United States Coast Guard |
| USDOT | U.S. Department of Transportation |
| USFWS | U.S. Fish and Wildlife Service |
| VDEQ | Virginia Department of Environmental Quality |
| VDGIF | Virginia Department of Game and Inland Fisheries |
| VDHR | Virginia Department of Historic Resources |
| VDOT | Virginia Department of Transportation |
| vpd | vehicles per day |
| VMRC | Virginia Marine Resources Commission |
| VMS | variable message boards |
| VMT | vehicle miles traveled |
| WB | westbound |

# Executive Summary

## ES 1 Introduction and Background

White's Ferry (the "Ferry") is a historic cable ferry crossing the Potomac River, connecting Loudoun County, Virginia, north of Leesburg, and Montgomery County, Maryland, southwest of Poolesville. In December2020, ferry operations abruptly ceased over disputes and lawsuits related to the ownership and access to the Virginia-side landing. The owners of that property (Rockland Farm) and the owners of White's Ferry could not come to an agreement regarding compensation for the use of the landing and access road Service has been suspended throughout 2021 and is not operating as of the published date of this study, significantly impacting travel time and costs for the many regular users of the service, who raised their concerns to elected officials on both sides of the Potomac River.

During the spring of 2021, ferry assets (and later, property) on the Maryland shore were acquired by a Loudoun County businessman. His stated goal was to restore service and manage the operation to ensure that it was once again, and for years to come, available for travelers.

In response to the impasse and the suspended service, Loudoun County and Montgomery County are jointly undertaking a study to evaluate alternatives for restoring White's Ferry service across the Potomac River between the two counties. The study is intended to address both short-term and long-term operations, issues, challenges and opportunities for restoring and potentially enhancing this important regional transportation link.

### ES 1.1 Study Purpose and Goals

The purpose of this study is to collect and analyze relevant data about the Ferry's operation and similar operations elsewhere to develop actionable information for County officials to consider for the short-term and long-term. The Study goals include the following:

- Conduct an in-depth review of the existing facilities, ridership, vessels, equipment, property, financial data, ridership estimates, and operation policies and practices (prior to service suspension).
- Compare and gather lessons learned and best practices from other ferry operations; identify possible operational alternatives and facility modifications to restore and enhance ferry service; and explore organizational, financial, and regulatory commitments and economic impacts and costs associated with various ownership/operational alternatives.
- Compile the information into a report that can be used by Loudoun County and Montgomery County to guide the decisions that need to be made to provide stable, effective, and efficient service at White's Ferry.

## ES 2 Legal and Environmental Compliance

Land-disturbing activities may require approval by local, state, and federal resource agencies and compliance with environmental regulations, such as the protection of environmentally sensitive areas, historic resources preservation, and protection of water resources. Use of federal funds or need for a federal action such as permitting may trigger compliance with the National Environmental Policy Act (NEPA).

The operation of White's Ferry is under the jurisdiction of the United States Coast Guard and is therefore subject to inspection and compliance to carry passengers and vehicles.

Public ownership of the Ferry would require common business employment regulations to be followed, including federal and state employment health and safety requirements and the Fair Labor Standards Act, while private ownership would be subject to the National Labor Relations Act.

# ES 3 Transportation Operations

This review of the existing conditions highlights several issues that need to be considered in reestablishing the White's Ferry service in the short-term as well as in the long-term:

Facilities and Property Challenges:

- **Limited road widths and the lack of shoulders on the access roads** leading to White's Ferry were noted on both sides of the Potomac River. On the Virginia side, the curvature of Whites Ferry Road as it turns north towards the ferry landing is tight and rubbing along the guard rail was noted, indicating that this bend could be improved by adjusting its radius. The hairpin bend down to the ferry ramp on the Virginia side could also be reviewed for long-term changes to soften the curve so that the Ferry could potentially accommodate larger vehicles.
- The review of **existing on-site facilities on the Maryland side** noted that as there are some facilities that encroach on National Parks Services (NPS) lands, the existing barge (old ferry) **would need to be moved to a new location and a new maintenance and storage building would need to be constructed** to house fuel and parts on site.
- The **parking supply and storage of vehicles** waiting for the Ferry **could be improved in the future** with some road width and curvature enhancements on either side. The improvements on the Maryland side would be limited without NPS involvement.

Operational Challenges:

- The **former operations** delivered two round trips per hour (15-minute overall trip time by direction), which **would be insufficient to meet projected future demand**. This could be offset by improved operational changes and increased vessel size in the future.
- The **existing ferry vessel is actually comprised of two sections** (linked at a hinged transverse joint) **that operate as a single vessel. Both sections will eventually need to be replaced, likely in the next decade.**, Therefore some consideration should be given to the size of the replacement vessels or to replacement of both with a single vessel with a more sustainable (electric) propulsion system.

Ridership and Travel Challenges:

- **White's Ferry captures 80 percent of the trips** between western Montgomery County and northeast Loudoun County. Without White's Ferry these trips will add traffic to MD 28, Point of Rocks Bridge and Route 15.
- **Without the White's Ferry service, travel times and trip lengths** between the Town of Poolesville, Maryland, and the Town of Leesburg, Virginia will increase by 11 minutes and 17 miles.
- The **forecasted volume of trips between the two counties is projected to increase by 40 percent from 2019 to 2040**. The analysis assumes that opening year volumes would be similar to 2019 volumes.

Demand for White's Ferry was estimated using observed data sources from January and July of 2019. Demand estimates for 2040 were developed using the population and employment growth forecasts included in the Loudoun County travel demand model. The demand estimates by trip purpose are summarized in Table ES-1.

Table ES-1: White's Ferry Demand Estimates (Trips Per Day)

| Trip Purpose | January | | | July | | |
|---|---|---|---|---|---|---|
| | 2019 | 2040 | Growth | 2019 | 2040 | Growth |
| Work Trips | 190 | 233 | 23% | 282 | 354 | 25% |
| Social-Recreational Trips | 433 | 626 | 45% | 644 | 952 | 48% |
| Other Trips | 469 | 658 | 40% | 699 | 1,001 | 43% |
| **Total** | **1,092** | **1,516** | **39%** | **1,625** | **2,307** | **42%** |

Most of the people who used White's Ferry made trips between Poolesville and western Montgomery County and Leesburg and northeast Loudoun County. The only realistic alternative route for these travelers includes Maryland Route 28 to Point of Rocks Bridge and U.S. Route 15 in Loudoun County. This route increases the typical trip length from 25 miles to 42 miles, or by 68 percent. The typical travel time increases from 64 minutes to 75 minutes, or by 17 percent.

# ES 4 Potential Alternatives

The Study identified three potential service scenarios for the immediate, short-term, and long-term

Restart Ferry Service Scenario (Immediate):

- If agreement regarding the Virginia side access issue is reached, service could potentially restart within weeks.
- Restarting the ferry service would, at minimum, require inspecting the existing vessel to confirm its seaworthiness, hiring any staff needed and confirming valid current certification, and restringing the ferry cable.
- This scenario represents the bare bones minimum required to get the service back up and running in the shortest time.

Restore Ferry Service (Short-Term):

- Restoring the ferry service for the study purpose represents making simple repairs to the landing ramp on the Virginia would include
- It is estimated that it could take up to 12 weeks to restart the service once landing access issues in Virginia are resolved.

Enhance Ferry Service (Long-Term):

- Without improvements to infrastructure, operations and, potentially, ferry capacity, the existing daily demand would exceed the capacity of the Ferry under the most recent operating plan, resulting in untenable future crossing waits for much of the day. The crossing waits are projected to increase significantly based on the increase in traffic up to 2040.
- Long-term changes in infrastructure, including improvements in staffing, roadways, fare collection, lighting, and vessel capacity should be considered to improve the system's capacity. Several infrastructure improvements have been identified for both the Maryland and Virginia sides as well as an improvement to Whites Ferry Road in Virginia to improve the road curvature on the access road.

Independent of the service scenario, there are three potential different service delivery models that can be considered to for the ownership and operation of the Ferry:

- Privately owned and operated
- Publicly owned and operated
- Hybrid publicly owned and privately contracted operations

# ES 5 Economic Impacts and Opportunities

White's Ferry service benefits commuters, residents, tourists, businesses, and the regional economy overall. There are several attractions on both sides of the Potomac River, including wineries, restaurants, bed and breakfast hotels, historic sites (e.g., battlefields), villages, and trails, that may generate ferry recreational trips, The study conducted an analysis to quantify the economic impact of the ferry service.

For analysis purposes, the elements of the project that would enable the ferry to operate are expected to be constructed in 2022. The Restore Ferry Service Scenario would result in 8 job-years (i.e., one job year is one job for one person over 1 year) and $460,000 (2021$) in earnings in 2022 The construction of Enhanced Ferry Service Scenario would result in 47 job-years and $2.6 million (2021$) in earnings in 2022 (see Table ES-2).

The ferry is assumed to open for operations in 2023. **Annual operations and maintenance (O&M) impacts range from 4 to 25 job-years and $265,000 to $1.5 million (2021$) in earnings for opening year 2023 and future year 2040.** The results reflect a range of expected O&M costs of $100 to $600 (2021$) per hour (see Table ES-2).

The economic impacts of resuming ferry operations include travel time savings, travel cost savings, safety savings, the value of emissions avoided, and the value of trips not taken (i.e., the value of a trip no taken is equal to the miss opportunity to productivity and economic activity missed by that trip). As shown in Table ES-2, the total impacts are as follows:

- **Under the Restore Ferry Service Scenario, total impacts are estimated to be a little over $9.0 million in 2023 and $13.2 million in 2040 (2021$). Travel time savings result in between $1.0 million and $1.7 million annually.**
- **Under the Enhance Ferry Service Scenario, total impacts are estimated to be approximately $9.4 million in 2023 and $24.8 million in 2040 (2021$). Travel time savings result in between $1.2 million and $3.5 million annually.**

Table ES-2: White's Ferry Impacts Summary

| | Restore Ferry Service Scenario | | Enhance Ferry Service Scenario | |
|---|---|---|---|---|
| Year | 2022 | 2040 | 2022 | 2040 |
| **Construction Cost Impacts** | | | | |
| Total Job-Years | 8 | NA | 47 | NA |
| Total Earnings (2021$) | $460,000 | NA | $2,628,000 | NA |
| | | | | |
| Year | 2023 | 2040 | 2023 | 2040 |
| **Annual O&M Cost Impacts: Low Range** | | | | |
| Total Job-Years | 4 | 4 | 4 | 4 |
| Total Earnings (2021$) | $265,000 | $265,000 | $265,000 | $265,000 |
| **Annual O&M Cost Impacts: High Range** | | | | |
| Total Job-Years | 25 | 25 | 25 | 25 |
| Total Earnings (2021$) | $1,526,000 | $1,526,000 | $1,526,000 | $1,526,000 |
| | | | | |
| Year | 2023 | 2040 | 2023 | 2040 |
| **Economic Impacts** | | | | |
| Travel Time Savings | $1,041,000 | $1,732,000 | $1,180,000 | $3,545,000 |
| Travel Cost Savings | $631,000 | $884,000 | $650,000 | $1,657,000 |
| Safety Savings | $1,317,000 | $1,844,000 | $1,356,000 | $3,430,000 |
| Emissions Avoided | $98,000 | $144,000 | $100,000 | $267,000 |
| Trips Not Taken | $5,956,000 | $8,568,000 | $6,135,000 | $15,940,000 |
| Risk of Hazardous Materials Spill Reduction | Qualitative | | Qualitative | |
| Congestion Reduction at Point of Rocks Bridge | Qualitative | | Qualitative | |
| **Total Impacts** | $9,043,000 | $13,172,000 | $9,421,000 | $24,839,000 |

*Note: The construction year is 2022. The first full year of operations is 2023. A job-year is one job for one person for 1 year.*
*NA = not available.*
*Source: AECOM 2021. Sums may not total due to rounding.*

# ES 6 Financial Analysis

Under the financial analysis, three Service Delivery Models were analyzed for the Ferry Alternative. In addition, to the service delivery models, two scenarios were evaluated: Restore Ferry Service and Enhance Ferry Service. The service delivery models and associated scenarios are described below:

- Service Delivery Model 1 - Privately owned and operated. This is the business as usual (BAU) alternative under which ferry operations resume with an agreement between Maryland and Virginia landowners. No public investment is required, and no detailed financial analysis was performed
- Service Delivery Model 2 - Publicly owned and directly operated. This alternative considers both Restore Ferry Service and Enhance Ferry Service scenarios
- Service Delivery Model 3 - Publicly owned and contracted. This alternative considers both Restore Ferry Service and Enhance Ferry Service scenarios.

Service Delivery Model 1 requires no ongoing public expenditures, in that the private operation is projected to be self-sustaining. The analysis of the Service Delivery Models 2 and 3 considered two types of costs: Operations and maintenance (O&M) expenses as well as capital costs. In the absence of quality historical data for White's Ferry, unit O&M expenses were estimated from fully allocated operating expenses reported to the national transit database by ferry systems across the United States. The O&M unit cost estimates included labor, materials, and general administration expenses. The operating expenses include costs such as ferry operations that vary with revenue hours of service and fixed costs per ferry terminal/station.

Based on an average of 6,250 revenue hours of ferry operation per year, the analysis estimated O&M costs for the first five years for ferry service under the alternative delivery models (directly operated or contractor operated). Projections were also made for 2040 (the horizon year). To cover these expenses, operating revenue was estimated based on ferry ticket prices and conservative ridership estimates forecasted from the travel demand model.

Capital expenses were also considered in the analysis. These included costs needed for ferry enhancements, the shared-use trail, ferry replacement and renewal, minimum pavement repairs at the landing sites, and the yaw boat rehabilitation.

Although White's Ferry currently does not have other revenue sources outside earnings from ticket sales, a number of potential revenue sources were examined. They include operating and capital funds available through the federal formula programs such as the Construction of Ferry Boats and Ferry Terminal Facilities Formula Program, and the Passenger Ferry Grant Program, both available through the Federal Transit Administration (FTA). Another potential source of public assistance includes the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) discretionary grants.

Table ES-3 below provides a summary of the financial analysis for Service Delivery Models 2 and 3. It should be noted that Service Delivery Model 1, the privately owned and operated model, would not incur any ongoing cost to the public except for the cost of constructing the shared-use path in 2028. The summary table provided show the funding gap for both operating and capital costs for the Restore Ferry Service and Enhance Ferry Service scenarios.

In conclusion, both the Restore Ferry Service and Enhance Ferry Service scenarios showed a significant funding gap for the identified expenses in the first 5 years of operations. Contactor delivery of services results in lower operating expenses than direct operation by public agencies, according to national data, and the Enhance Ferry Service is projected to cover its operating costs by 2040 if it is contractor-operated. However, it should be noted that revenue projections were estimated using the most conservative estimates and costs of similar ferry systems identified in the federal database and could potentially be higher or lower than the actual costs incurred by White's Ferry.

The summary financial projections in Tables ES-3 are based on the assumptions stated above. Actual results may vary from the assumptions, and results may vary from the projections.

Table ES-3: Service Delivery Model Comparison Years 2023-2027 Total and Year 2040 Annual (in thousands)

| Delivery Model | Model 2: Publicly Owned and Operated | | | | Model 3: Publicly Owned and Contracted | | | |
|---|---|---|---|---|---|---|---|---|
| Scenario | Restore Ferry | | Enhance Ferry | | Restore Ferry | | Enhance Ferry | |
| Operating/ Capital | 2023-2027 | 2040 | 2023-2027 | 2040 | 2023-2027 | 2040 | 2023-2027 | 2040 |
| Total Operating Revenue | $8,308 | $2,056 | $8,557 | $2,117 | $8,308 | $2,056 | $8,557 | $2,117 |
| Total Operating Expenses | $21,780 | $4,356 | $21,780 | $4,356 | $8,700 | $1,740 | $8,700 | $1,740 |
| Operating Funding Gap | -$13,472 | -$2,300 | -$13,223 | -$2,239 | -$392 | $316 | -$143 | $377 |
| Total Capital Revenue | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Total Capital Expenses | $210 | $81 | $1,380 | $261 | $210 | $81 | $1,380 | $261 |
| Capital Funding Gap | -$210 | -$81 | -$1,380 | -$261 | -$210 | -$81 | -$1,380 | -$261 |

*(Constant 2021 dollars – Not including inflation or land cost)*


# 1

# Introduction

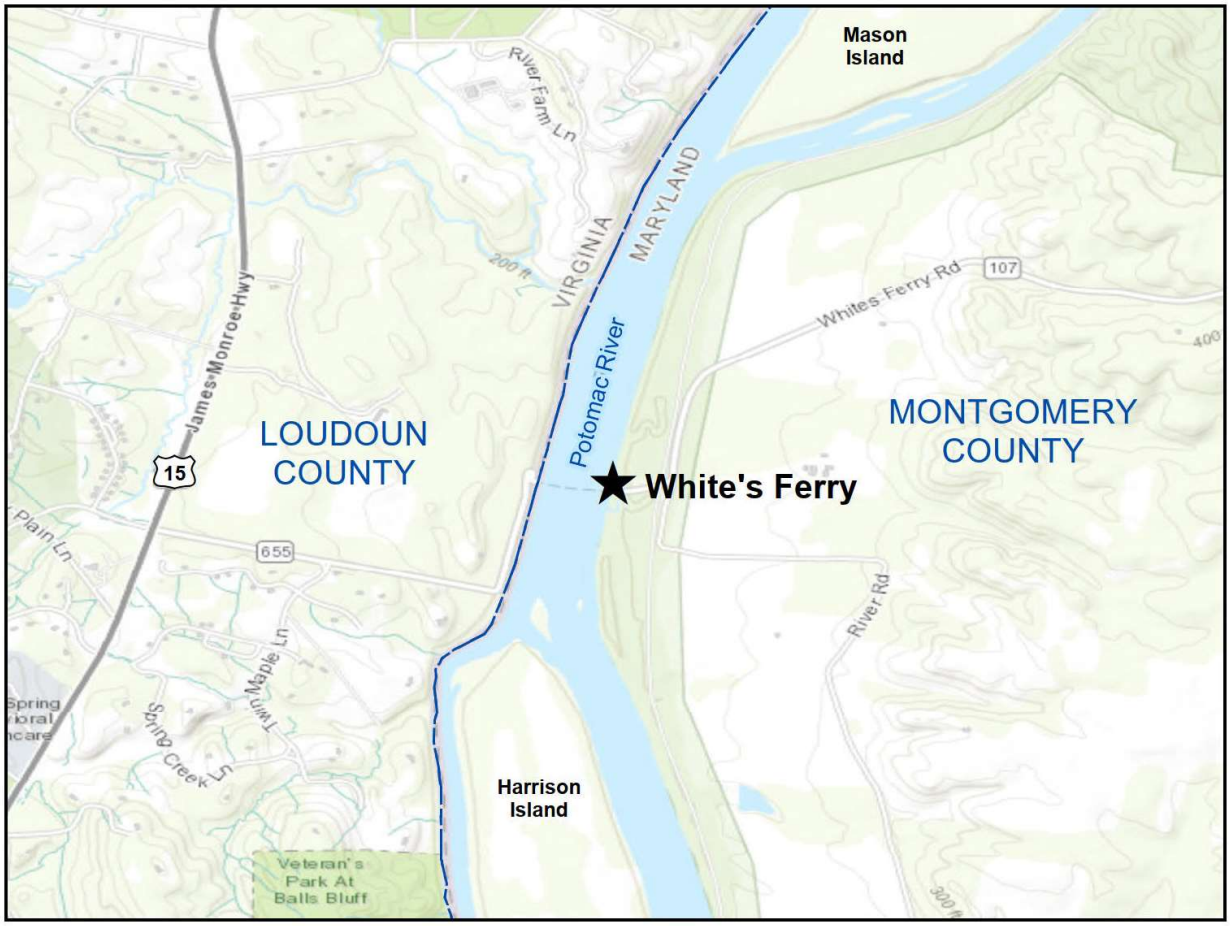
# 1 Introduction

White's Ferry (the "Ferry") is a historic cable ferry crossing the Potomac River. It connects Whites Ferry Road in Loudoun County, Virginia, and Whites Ferry Road in Montgomery County, Maryland, north of Harrison Island (Figure 1-1 and Figure 1-2). It is the only crossing of the Potomac between the Point of Rocks (U.S. Route 15) and American Legion (Interstate 495) bridges. The Maryland side features picnic areas, maintenance buildings, and the White's Ferry Store and Grill. White's Ferry property is surrounded by the Chesapeake and Ohio (C&O) Canal National Historic Park in Maryland. The Virginia landing of White's Ferry is located on Whites Ferry Road, adjacent to the historic Rockland Farm property.

Loudoun and Montgomery jointly undertook this study to evaluate alternatives to restore the White's Ferry service across the Potomac River between the two counties, which was suspended in December 2020. Both counties are pursuing paths to reestablish this ferry service. AECOM and Stantec Consulting were engaged to undertake this study on behalf of both counties. The White's Ferry Operations Alternative Study (Study) examines both the resumption of private ferry service and the creation of a new public service that would potentially be operated under a license agreement to provide reliable and stable ferry service between the counties moving forward. This Study provides information on comparative operations and operating scenarios, so that the counties will be able to determine the most appropriate actions to restore this vital transportation link and be positioned to support it in a way that results in reliable access and optimizes benefits to the traveling public.

Figure 1-1: Study Vicinity Map

Figure 1-2: Study Location Map




## 1.1 Background

Prior to service shut down, White's Ferry was the last operational ferry of the 100 ferries that used to operate on the Potomac River. In 1786 the first ferry to operate at this location was called Conrad's Ferry. Following the Civil War, the former Confederate officer Elijah V. White purchased and renamed it White's Ferry. The Ferry carried horses, wagons, and passengers across the Potomac and connected farmers to markets in Maryland, Virginia, and Washington, D.C.

The Brown Family took over ownership of White's Ferry in 1946. In recent years, the Ferry transported up to 24 cars and motorcycles, bicycles, and pedestrians across the Potomac in approximately a 3.5-minute trip from shore to shore. The Ferry typically carried approximately 600 to 800 vehicles across the river per day and was considered an essential transportation link for recreation, errands and commuting between the two states. A map view of White's Ferry existing facilities and grounds is shown in Figure 1-3.

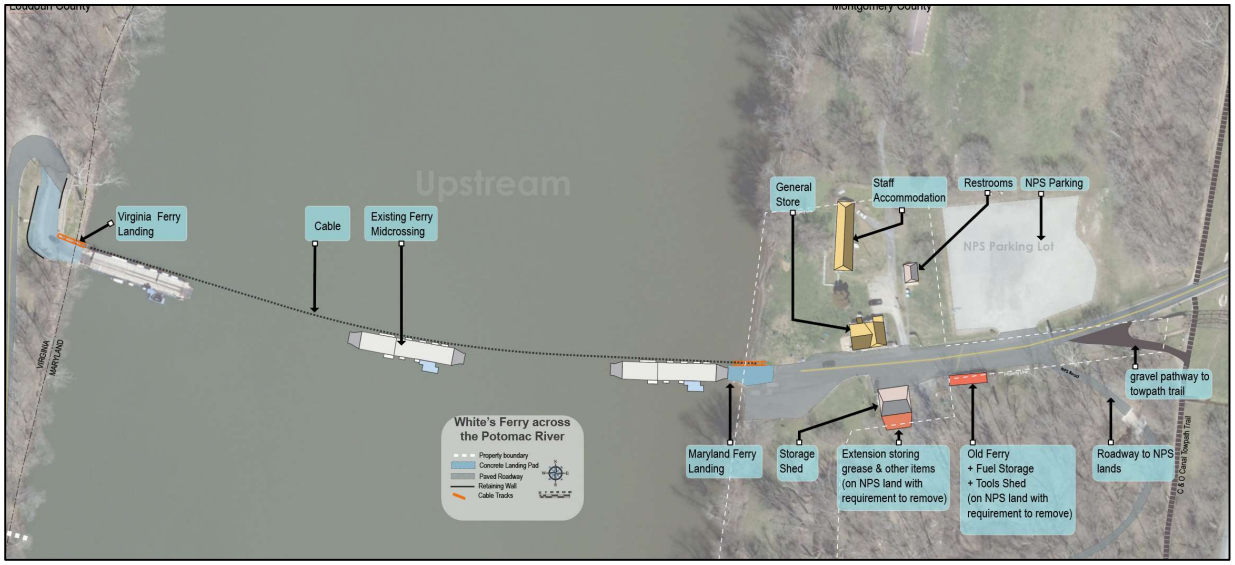
"The ferry in 1930." (photo by Marion Wolcott)
*The History of Loudoun County, Virginia*

White's Ferry abruptly ceased operations in December 2020 in the wake of a long-running legal dispute between the Brown Family, the former owners of White's Ferry Inc., and the owners of Rockland Farm, which owns the Ferry's Virginia landing site. Rockland Farm owners filed a lawsuit against the Ferry, claiming a breach in a pre-existing agreement and property damages when the Ferry constructed a concrete retaining wall on the Virginia landing site in

2004 to replace an older wall that collapsed. The lawsuit was resolved in favor of the owners of Rockland Farm. Concurrent with but separate from this Study, Loudoun County has been reviewing the history of roadway ownership and easement rights along the Whites Ferry Road approach to the ferry landing in Virginia.

Early in 2021, the Ferry's infrastructure was acquired by a new private owner who also purchased the property and buildings on the Maryland side of the river in June 2021. To date, negotiations between the new property owner and Rockland Farm's owners on the Virginia side have not been successful, and the Ferry service is still suspended.

Figure 1-3: Study Site Map




# 1.2 Purpose and Need

The need for this Study results from the impacts of the December 2020 suspension of the Ferry service due to a dispute over the ferry traffic travelling on private land on the Virginia side of the Potomac without compensation. While the dispute is between private parties, it has become a public issue because the White's Ferry service is considered an important component of the regional transportation network and the Ferry closure has impacted daily life for many living in nearby parts of Loudoun and Montgomery Counties. The suspension of service also impacts local employment, recreation, and businesses. It has increased commuter travel times, emissions, and congestion on Route 15, Route 28, and other local roads. The primary purpose of this Study is to collect and analyze relevant data about the Ferry's operation and similar operations elsewhere to develop actionable information for County officials to consider for the short-term and long-term. The Study is driven by a push for a prompt restoration of service as well as a strategic view of the challenges, opportunities, risks, and benefits associated with public, private, and concession arrangements that can ensure safe, reliable, and stable operations for decades to come.

# 1.3 Goals and Objectives

The Study has the following major goals:

- Conduct an in-depth review of the existing facilities, ridership, vessels, equipment, property, financial data, ridership estimates, and operation policies and practices prior to ferry service suspension to gain an understanding of fundamental constraints, challenges, and characteristics of the White's Ferry service.
- Compare the White's Ferry service with other ferry operations (especially cable ferries) in Maryland, Virginia, and other regions or countries to gather lessons learned and best practices that could potentially be relevant to future service scenarios.
- Identify possible operational alternatives and facility modifications to restore and enhance ferry service between the two counties. Items to be considered are ramp location/configuration, vessel upgrades/repairs/replacement,

fares and fare collection, communications and power infrastructure needs, and approach roadway configuration and conditions.

- Explore organizational, financial, and regulatory commitments and economic benefits and costs associated with various ownership/operational alternatives.
- Compile the information obtained and developed during the study into a report that can be used by Loudoun and Montgomery Counties to inform decisions on actions and investments needed to provide effective and efficient service at White's Ferry that will benefit county residents and the regional economy.

## 1.4 Stakeholder Consultation

While the White's Ferry operation is a single private entity the nature of the Ferry service impacts several other federal, state and local organizations. The study team coordinated with the following groups:

- US Coast Guard
- National Park Service
- Ferry operator in Maryland
- Ferry operator in Virginia (VDOT)

During the field visits the team had informal conversations with operators of the White's Ferry service and with the owner of Rockland Farms.


# 2

## Legal and Environmental Compliance

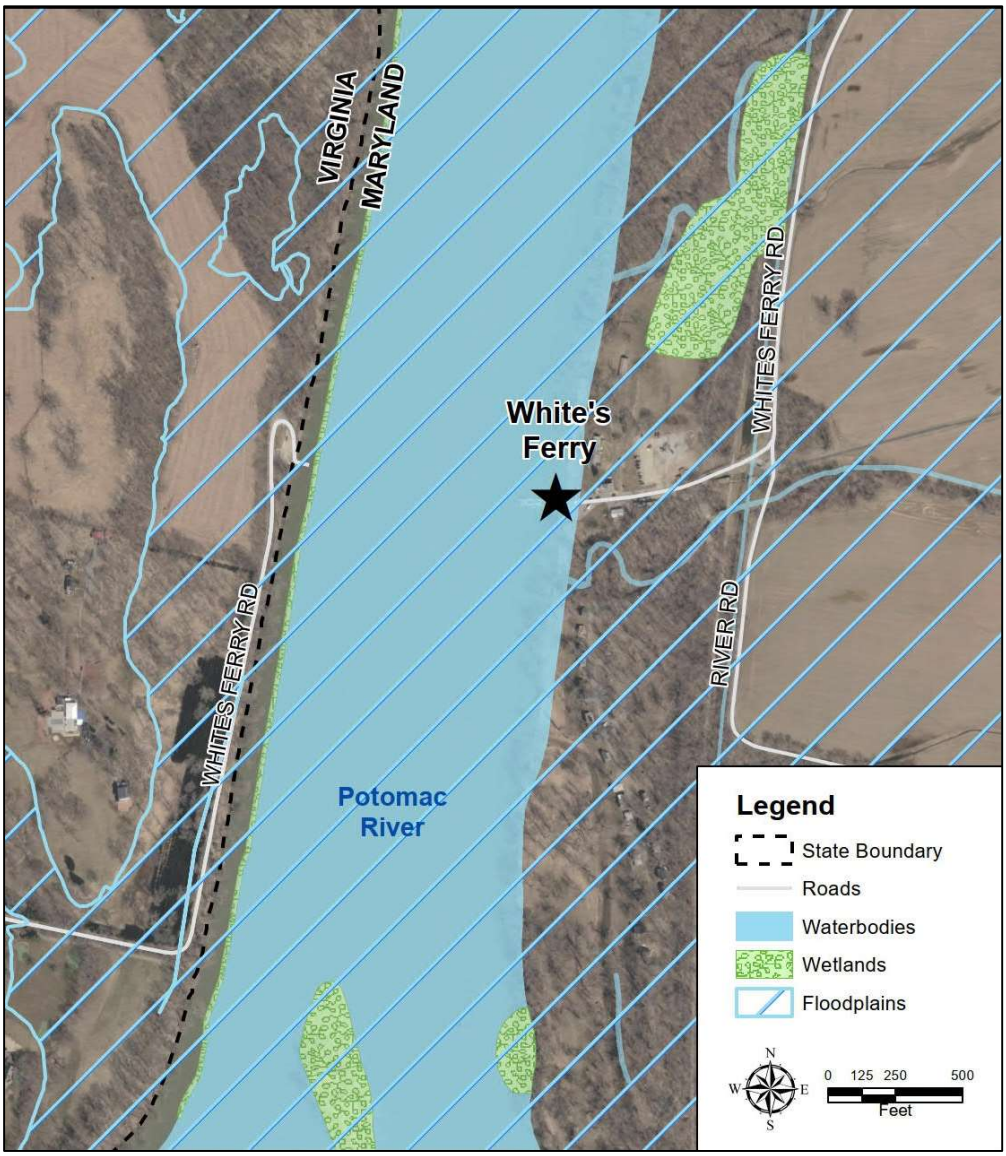
# 2 Legal and Environmental Compliance

This chapter discusses the potential regulatory requirements associated with land-disturbing activities and operation of the White's Ferry system. Local, state, and federal regulations could apply, depending on the resources affected, the proposed activity, and the funding sources.

## 2.1 Environmental Regulations

Based on a review of the existing conditions around the White's Ferry crossing, several local, state, and federal regulatory compliance actions may be required. The regulatory actions required will depend on the source of funding, whether a federal action occurs (e.g., federal funding is applied, or a federal permit is required), and the proposed activity itself. Figure 2-1 shows some of the existing environmental conditions near White's Ferry. Table 2-1 provides an overview of potential environmental regulations that could apply to White's Ferry by type of resource.

Figure 2-1: Environmental Constraints Map




*Source: National Wetlands Inventory and FEMA National Flood Hazard Layer*

## 2.1.1 Local Requirements

### 2.1.1.1 Montgomery County, Maryland

For construction activities, local Erosion and Sediment Control (ESC) and stormwater management (SWM) permits may be required, depending on the area of disturbance (5,000 square feet or greater, or exceeds 100 cubic yards of excavation). In Montgomery County, a project that requires either or both ESC and SWM permits triggers the Montgomery Forest Conservation Act (FCA). To comply with the FCA, an approved FCA exemption or a Forest Conservation Plan approval through the Maryland-National Capitol Park and Planning Commission is required. If this project qualifies as a Montgomery County Government transportation project, the site development approvals must go through the Mandatory Referral Process for approval (https://montgomeryplanning.org/development/development-applications/mandatory-referral/).

### 2.1.1.2 Loudoun County, Virginia

Prior to any land-disturbing activities in the County, all applicable local, state or federal permit requirements must be met. Local requirements to obtain a permit include an ESC plan, tree preservation plan, and a review of historic and archaeological resources and environmentally sensitive areas. In addition, a Financial Guarantee of Performance may be required to ensure that all land-disturbing activities are carried out consistent with the application (Loudoun County, Virginia Code of Ordinances, Part Twelve – Planning and Zoning Code, Title Two – Planning, Chapter 1220 Erosion Control).

## 2.1.2 State Requirements

### 2.1.2.1 Maryland

State requirements may be applicable to White's Ferry that would require coordination with state agencies. In some cases, a state agency has the authority or jurisdiction over a federal regulation. For example, the Maryland Historic Trust (MHT) enforces the identification and protection of historic (architectural and archaeological) resources. Historic resources are protected by Section 106 of the National Historic Preservation Act (NHPA) (https://www.achp.gov/protecting-historic-properties/section-106-process/introduction-section-106). White's Ferry is adjacent to the C&O Canal, which is a National Register Historic District, and the Ferry is listed on the Maryland Inventory of Historic Properties. Maryland also has a Joint Permit Application (JPA) process between the U.S. Army Corps of Engineers (USACE) and the Maryland Department of the Environment (MDE) for the alteration of any floodplain, waterway, tidal or nontidal wetland in Maryland (https://mde.maryland.gov/programs/water/wetlandsandwaterways/permitsandapplications/pages/nontidal_permits.aspx). For major capital improvement projects and public works projects funded by the state, compliance with the Maryland Environmental Protection Act may be required.

### 2.1.2.2 Virginia

Like the State of Maryland, the Commonwealth of Virginia has agencies that are responsible for carrying out federal regulations. Coordination with the Virginia Department of Historic Resources (VDHR) for compliance with Section 106 of the NHPA may be required based on the historic nature of White's Ferry, which is located within the Ball's Bluff Battlefield Historic District. The Ferry and it's Virginia landing site are also located within the Catoctin Rural Historic District. Virginia also has a JPA process administered by the Virginia Marine Resources Commission (VMRC) and the Virginia Department of Environmental Quality (VDEQ) for impacts to wetlands and waterways, and therefore permits may be required. For major capital improvement projects funded by the state, an Environmental Impact Report (EIR) may be required. The VDEQ is responsible for coordination and review of the EIR.

## 2.1.3 Federal Requirements

In addition to the federal resource regulatory requirements discussed in Table 2-1, if federal funding is used or a federal action (i.e., federal permit) is needed, compliance with the National Environmental Policy Act (NEPA) may be required. A lead federal agency would need to be identified, and their implementing rules for NEPA would be followed. An appropriate class of action (Categorical Exclusion, Environmental Assessment, or Environmental Impact Statement) would be determined. The process would follow the requirements for the identified class of action.

Table 2-1: Summary of Potentially Applicable Environmental Regulations

| Resource | Existing Conditions | Applicable Regulations/Potential Compliance Needs | Agency |
|---|---|---|---|
| Land Use/ Zoning | Rural, park/recreation, open water, agriculture, single family housing | Review ordinances to ensure consistency with local zoning ordinances | • Loudoun County<br>• Montgomery County |
| Hazardous Materials | Petroleum storage tank for ferry operations (Montgomery County) | Spill Prevention, Control, and Countermeasure (SPCC) regulation (4 CFR Part 112)<br>Resource Conservation and Recovery Act (RCRA) 43 USC, Section 6901 | • U.S. Environmental Protection Agency (EPA)<br>• Maryland Department of Environment Waste Management Administration Oil Control Program<br>• Montgomery County, Department of Environmental Protection |
| Cultural Resources | • Chesapeake and Ohio (C&O) National Historic Park<br>• Ball's Bluff Battlefield and National Cemetery (National Historic Landmark)<br>• Catoctin Rural Historic District (Virginia Historic Landmark District) | Section 106 National Historic Preservation Act (NHPA) compliance<br>Coordination with Virginia Department of Historic Resources (VDHR) and Maryland Historical Trust (MHT) | • National Park Service (NPS)<br>• VDHR<br>• MHT |
| Parks/ Recreation | • C&O Canal Towpath (Montgomery County)<br>• Potential trail corridor (based on Loudoun Comprehensive Plan) | Coordination with NPS for their property (Towpath);<br>Coordination with Loudoun County for Potential Trail Corridors; Section 4(f) of USDOT Act could apply if federal funding from USDOT is acquired | • NPS<br>• Loudoun County<br>• Montgomery County<br>• Virginia Department of Conservation and Recreation |
| Conservation Easements / Agricultural Forestal Districts | Existing data implies conservation easements are in the vicinity of White's Ferry on the Virginia side | Loudoun County Conservation Easements in Rural Policy Area: 2019 General Plan<br>Loudoun County Agricultural and Forestal District regulations | • Depends on who owns/holds the conservation easement |
| Prime Farmland | Aerial imagery implies active agriculture; review of Loudoun Comprehensive Plan indicates area is considered prime farmland | Farmland Protection Act may apply if converting active farmland/prime farmland soils to non-agricultural use | • U.S. Department of Agriculture<br>• Loudoun County |

| Resource | Existing Conditions | Applicable Regulations/Potential Compliance Needs | Agency |
|---|---|---|---|
| **Wetlands** | National Wetlands Inventory designated wetlands present | Section 404 of the Clean Water Act – Dredging or filling of wetlands requires a joint permit from either Virginia or Maryland, depending on the location of the wetland.<br>If a Section 404 permit is required, this is a federal action, which also requires compliance with Section 106 of the NHPA and Section 7 of the Endangered Species Act (ESA) | • U.S. Army Corps of Engineers (USACE)<br>• EPA<br>• Virginia Marine Resources Commission (VMRC) and the Virginia Department of Environmental Quality (VDEQ) Maryland Department of the Environment (MDE) |
| **Floodplains** | Within designated 100-year floodplain | Floodplains are regulated by localities. Development restrictions may apply in designated floodplains.<br>Federal agencies are discouraged from supporting actions in floodplains. Activities within the floodplain may require specific analysis to determine how activities could impact the natural and beneficial floodplain value. Executive Order 11988 – Floodplain Management; USDOT Order 5650.2 – Floodplain Management and Protection | • Federal Emergency Management Agency (FEMA)<br>• Loudoun County<br>• Montgomery County |
| **Chesapeake Bay – Resource Protection Areas** | Banks of Potomac River on Loudoun side are within Resource Protection Areas (RPAs) | Chesapeake Bay Act in Virginia potentially applies. Development restrictions may apply within a designated RPA. | • VDEQ<br>• Loudoun County |
| **Navigation** | Navigable waterway | Section 10 of the Rivers and Harbors Appropriation Act may apply. This regulation applies to construction of any structure in or over any navigable waterway. | • USACE |
| **Protected Species** | Federal: Northern long-eared bat (*Myotis septentrionalis*); bald eagle (*Haliaeetus leucocephalus*) – Birds of Conservation Concern<br>State-listed species | For federally listed species, Section 7 of the ESA may apply if suitable habitat is found to exist. State species may require additional coordination with the Virginia Department of Game and Inland Fisheries (VDGIF)<br>Compliance with the Bald and Golden Eagle Act may be required if eagle nesting sites are identified within the study area. Based on a review of the Center for Conservation Biology, a bald eagle's nest is approximately 1 mile from White's Ferry. Additional coordination with the VDGIF should occur to determine the status of the nest prior to any construction activity.<br>Time-of-year restrictions could apply for construction activities if certain species are present. | • U.S. Fish and Wildlife Service (USFWS)<br>• VDGIF |

## 2.2 Ferry Operation Regulations

The United States Coast Guard (USCG) has jurisdiction over the operation of White's Ferry because the Ferry crosses state lines (Maryland and Virginia), and it uses a vessel that requires inspection and compliance to carry passengers and vehicles. Operation of the White's Ferry is subject to USCG regulations as outlined in 46 Code of Federal Regulations (CFR), Subchapter T-Small Passenger Vessels. Other regulations in 46 CFR Subchapter H-Passenger Vessels and Subchapter K-Small Passenger Vessels Carrying More than 150 passengers or Overnight Accommodations for more than 49 passengers were also cross-referenced. The White's Ferry system has two different vessels, which are attached by a hinged joint to form a single ferry (see Section 3.2.4 for more details). The General Jubal A. Early vessel is the portion of the Ferry closer to the Maryland side, and the General Jubal Early vessel is the portion of the Ferry closer to the Virginia side. These vessels are rated separately. Table 2-2 summarizes the weight and capacity of each vessel.

Table 2-2: Vessel Properties

| Properties | General Jubal A. Early (Vessel facing Maryland side) | General Jubal Early (Vessel facing Virginia side) |
|---|---|---|
| **Vehicle Capacity*** | 12 | 9 |
| **Passenger Capacity** | 65 passengers<br>2 crew members<br>(1 master; 1 deckhand) | 39 passengers<br>2 crew members<br>(1 master; 1 deck hand) |
| **Weight** | R-68 tons | R-47 tons |

*Note: The combined vehicle capacity of the White's Ferry is three rows of eight passenger for a total of 24 vehicles. Individual vessel capacities are less, as it was observed that vehicles straddle the "hinges" on the combined ferry.*

Several sections of the regulation apply in regard to training and certification of the officers and deckhands, annual vessel inspections, vessel specifications, collision bulkheads, and safety devices (lifesaving and fire systems).

The vessel cannot carry more than 150 passengers and does not exceed 100 gross tons, so 46 CFR Subchapter K does not apply. In addition, 46 CFR Subchapter K does not apply if this segment of the Potomac River is not considered navigable. Great Falls and Little Falls, which are downstream, prevent vessels from reaching this point of the river. White's Ferry operates exclusively on inland waters.

## 2.3 Employment Regulations

Among the decisions that Montgomery County and Loudoun County are considering is the question of whether White's Ferry should continue as a private operation, should be publicly owned and operated by private sector employees under contract to a public agency, should be directly operated by public employees, or some combination thereof.

Common business employment regulations would continue to apply in these cases, including federal and state employment safety and health requirements and the Fair Labor Standards Act.

However, direct employees of Loudoun County would not have had collective bargaining rights in the past under *Commonwealth of Virginia v. County Board of Arlington County, et al. (217 Va. 558, 1997).* Recent legislation (Virginia Code Section 40.1 – 57.2) states that the County may extend collective bargaining to employees. Maryland has had a similar law in place, and Montgomery County engages in collective bargaining with its unions. Private contractors and private ferry business owners would be subject to the National Labor Relations Act, which would protect the collective bargaining rights of their employees.


# 3

# Transportation and Operations Challenges

# 3 Transportation Operations

This chapter reviews the operations and landing sites of White's Ferry from an operational context and examines current issues and future opportunities. The chapter includes a review of:

- Regional location and access
- Roadway type and constraints to vehicle size as well as roadway design considerations for the future
- Site context, such as existing facilities
- The existing operations, service hours, and service frequency
- Fare payment
- Existing vessel size, age, and replacement considerations
- Existing origin and destination patterns of users as well as distribution by day of week and seasonality and by month
- Parking supply and storage of vehicles waiting for the Ferry
- Flood resiliency issues
- Existing NPS land impacts

The ferry is important to the overall transportation network because of the travel time savings it provides the local residents of Loudoun and Montgomery Counties to make local trips rather than have to divert northward via Route 15. The majority of the movements along with transportation corridor via Whites Ferry are localized in nature, therefore the diversion is significant in terms of the added travel time.

## 3.1 Site Context

White's Ferry is located between Virginia and Maryland on the Potomac River between Poolesville, MD, and Leesburg, VA (Figure 3-1). The site is accessed by Whites Ferry Road (Figure 3-2) in both states and provides a direct local connection between these two towns and beyond to other areas of each county and Washington, D.C.

Figure 3-1: Regional Context

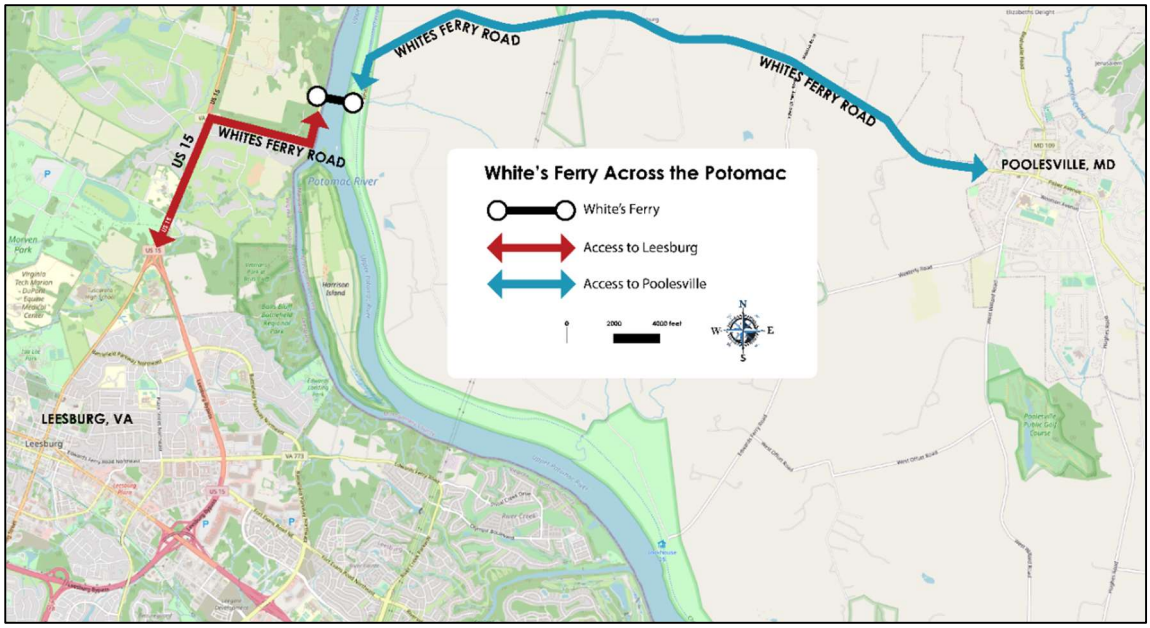
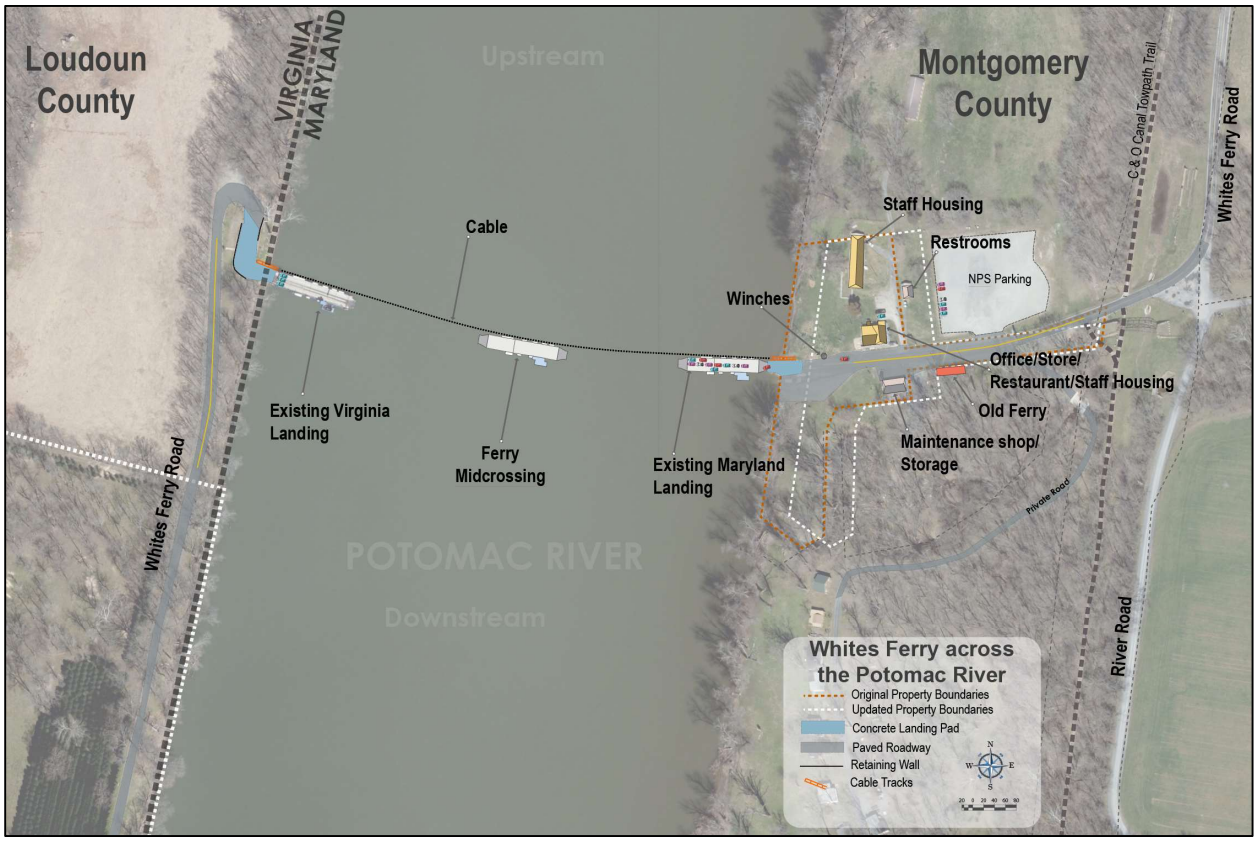


Figure 3-2: Site Context




The Maryland side serves as the base of operations for the Ferry service and has office space, staff housing, washrooms, a store, fuel storage, and a maintenance shed. The Virginia side has no additional facilities beyond the loading ramp and the cable winch.

# 3.2 Review of Existing Operations

## 3.2.1 Hours of Operation

The White's Ferry service was an on-demand service rather than a scheduled service. Crossing was based upon the operator's sense of having enough vehicles on either side to warrant a crossing. Both traffic and location-based data confirm that this service was in operation from approximately 5 a.m. to 11 p.m. daily (Figure 3-3).


Figure 3-3: Ferry Hours of Operations and Fares (2020)

## 3.2.2 Service Frequency

Based on a discussion with the former Ferry operator, typical loading and unloading of vehicles took up to 12 minutes and the river crossing time was additional 3.5 minutes. Under the current operations scenario, this equates to between four and six one-way trips per hour, depending on demand. There may be ways to improve the service frequency through improved operations on the land side. These could include electronic pre-payment and improved pre-boarding vehicle storage, given that the crossing time is the shorter portion of the overall trip time (see Chapter 4).

The previous operator sold both one-way and round-trip tickets but did not track passengers or vehicles, which makes it more difficult to gauge demand and the need for future expansion.

### 3.2.3 Annual Service Hours

Over its final 3 years of service, the Ferry was out of service for an average of 18 days each year due to weather, marine and mechanical reasons. Based on these closures and the daily hours of operation, the average annual service hours of the Ferry service were approximately 6,250 hours. This statistic is important for identifying and undertaking appropriate peer comparisons.

### 3.2.4 Vessel

Service was delivered with one vessel consisting of the following components:

- Two nearly identical barge sections joined with six horizontal pinned connections. The gap between the sections is covered by an old section of firehose and is not very evident at first. The two sections are the shorter General Jubal Early (registered in the Commonwealth of Virginia), which is 52 feet in length and entered into service in 1995, and the Jubal A. Early (registered in Maryland), which is 84 feet long and entered into service in 1988). Together they operate as a single ferry boat approximately 136 feet long and 27 feet wide.
- A separate smaller boat (called the Yaw boat), which has a diesel engine that is attached on the downstream side of the Ferry, propels it across the river with propellers on either side. A second engine serves as a spare when the other is undergoing maintenance. The diesel for the Yaw boat is currently stored on the old barge that is located on NPS property.

An average lifespan of marine vessels such as these appears to be 40 years, which means that the smaller section will need to be replaced around 2028, while the larger vessel will need to be replaced around 2035. At that time the following options will need to be considered:

1. Replace the smaller vessel with one of similar size, which will limit its capacity and potential to accommodate an increase in demand.
2. Replace the smaller vessel with one similar to the larger vessel to increase capacity.
3. Replace the entire vessel with a new (larger) cable ferry with an electric or hybrid motor.
4. Replace the entire vessel with a water jet propulsion vessel with an electric or hybrid motor.

Procurement and build times will need to be factored into these decisions, which likely means a decision on the future vessel will be required around 2024-2025. Future vessel decision may impact the existing ferry landings which may lead to improvements being required, therefore both elements (vessel and infrastructure) should be planned at the same time.

### 3.2.5 Potential Volume Increases with a Marketing Plan

Information from the former operations manager of the Ferry indicates that the service can carry passenger cars, vans, trucks, and buses. Construction vehicles or HAZMATs were not permitted, although there are no official limitations other than a gross vehicle weight (GVW) limit of 40,000 pounds. One of the challenges for longer vehicles is the series of turns in the roadway on the Virginia side of the river. High river levels can make these turns even more difficult, as was shown when a bus on the Ferry from the Maryland side of the river could not make the tight turns on the Virginia side. Another challenge involves ensuring that the GVW is not exceeded, which would mean limiting additional vehicles as well as having an accurate scale system to weigh the larger vehicles prior to loading. As this is not practical in terms of the expenditure for the scale and staffing for such limited-use trips, the default position is therefore to exclude vehicles that may exceed the GVW of the ferry and/or cannot navigate the existing hairpin turn on the Virginia side.

# 3.3 Review of 2019 Location-Based Data to Analyze Origin-Destination Patterns of Road Users

This section describes the historical demand profile for the White's Ferry service. As historical demand information is not available from the former operator, location-based data were used to understand the demand patterns for the Ferry terminal and adjacent destinations. Specific analysis items include the hourly entry and exit demand, by mode and by month, for 2019. This dataset was also calibrated by comparing anonymized smartphone-based estimates to available traffic count data from the Virginia Department of Transportation (VDOT) and the Maryland Department of Transportation (MDOT). Finally, a pre-set geography analysis was conducted to understand the origins and destinations of travelers who use the Ferry. This travel demand profile will be used as a basis for estimating future demand for the Ferry.

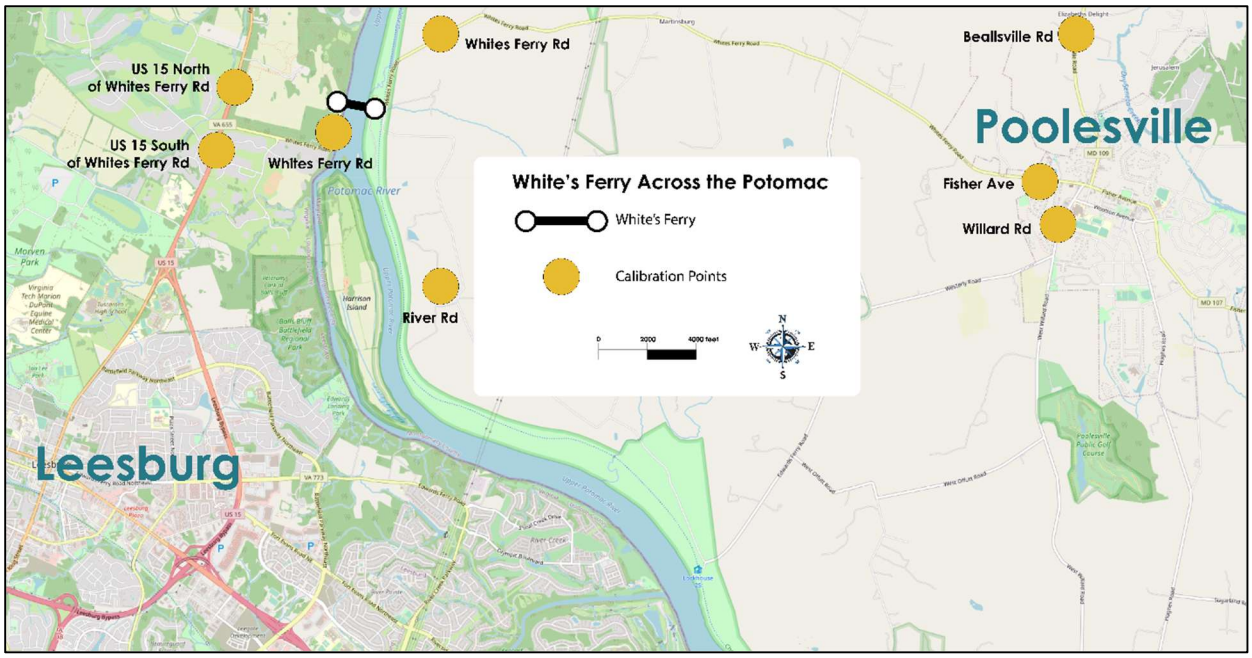
## 3.3.1 Methodology

Historical demand estimates are based on anonymized and aggregated smartphone location-based data provided by Streetlight Data (Streetlight). These data allow for a detailed understanding of mobility patterns by hour over the past 2 to 3 years. The Streetlight data are based on location data samples that are then scaled up to represent actual traffic volumes. Analyses were conducted for calendar year 2019 to depict the latest available pre-COVID condition.

## 3.3.2 Analysis Areas

Analysis zones were established on the approach roads to the White's Ferry terminal on both sides of the Potomac River, as well as at other locations near the terminal where VDOT and MDOT collected traffic count data. The analysis locations are shown in Figure 3-4.

Figure 3-4: Analysis Locations




## 3.3.3 Calibration Data

Count data were available in the vicinity of the study area at three locations on the Virginia side of the Potomac River, and at three locations on the Maryland side. Data on the approach roads to the terminal were not necessarily available, but were available on other roadways in the region and used for calibration purposes (see Table 3-1). These data were compared to 2019 Zone Activity analyses from the Streetlight platform to represent an average 2019 condition (see Figure 3-4). In general, the data from the two sources were comparable. A review of Streetlight Data outputs showed

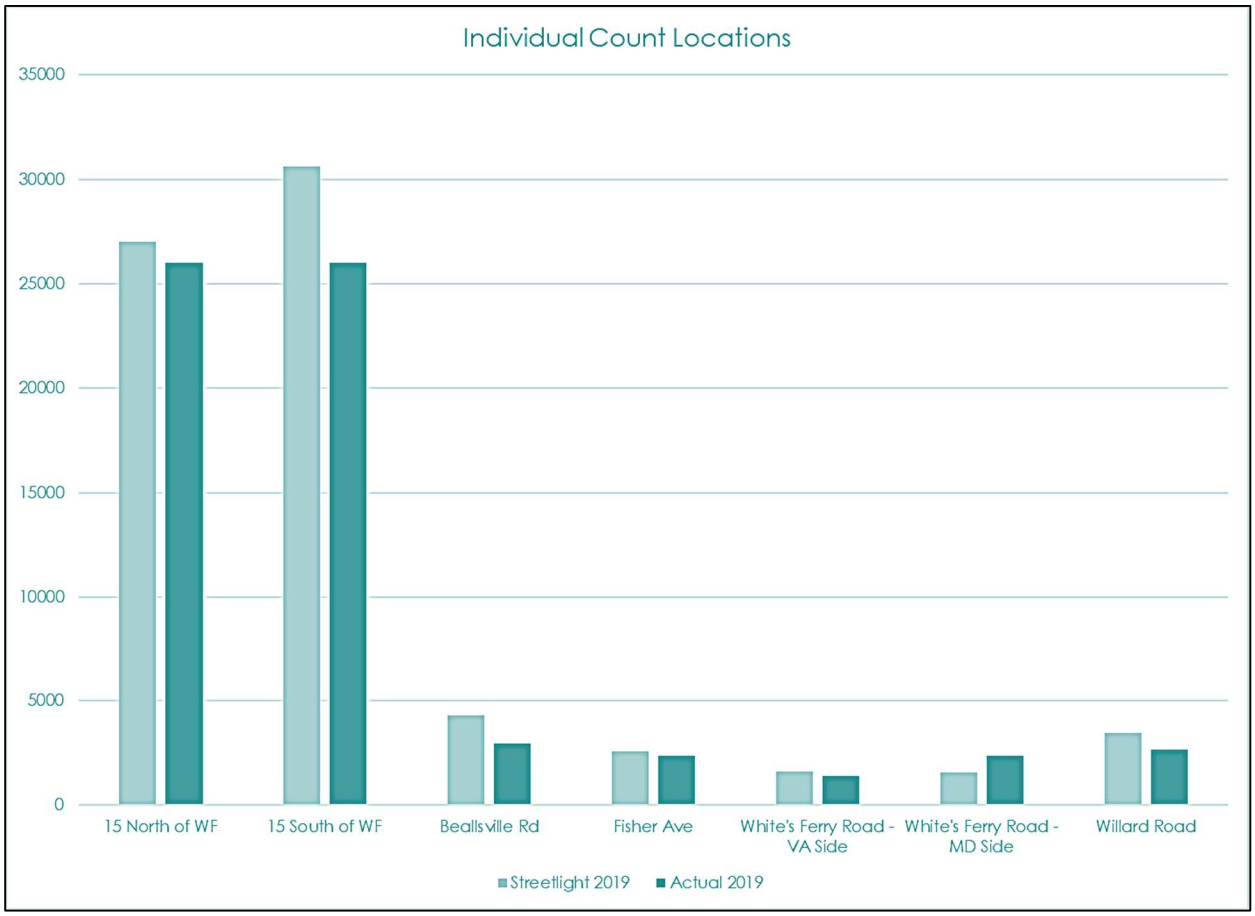
they were comparable to traffic counts. Most locations were within 10% of the actual observed volumes so no adjustment factors were used.

Table 3-1: Traffic Calibration Data

| Location Identification | Streetlight 2019 | Actual 2019 | Adj. Factor | MDOT | VDOT | Comments |
|---|---|---|---|---|---|---|
| 15 North of WF | 27,002 | 26,000 | 0.96 | | 26,000 | James Monroe Highway from Leesburg to North of Lucketts Road |
| 15 South of WF | 30,616 | 26,000 | 0.85 | | 26,000 | James Monroe Highway from Leesburg to North of Lucketts Road |
| Beallsville Road | 4,276 | 2,953 | 0.69 | 2,953 | | |
| Fisher Avenue | 2,568 | 2,375 | 0.92 | 2,375 | | Street Light Zone Location along Fisher near Poolesville |
| Whites Ferry Road -VA Side | 1,629 | 1,400 | 0.86 | | 1,400 | Street Light Zone Location near Ferry, Count Location Likely near Poolesville |
| Whites Ferry Road – MD Side | 1,587 | 2,375 | 1.50 | 2,375 | 700 | Whites Ferry Road between U.S. Route15 and the Potomac River |
| Willard Road | 3,473 | 2,675 | 0.77 | 2,675 | | |
| Total | 71,151 | 63,778 | 0.90 | ← Overall Scale Factor | | |

*Adj. = Adjusted; MDOT = Maryland Department of Transportation; VDOT = Virginia Department of Transportation; WF = White's Ferry*

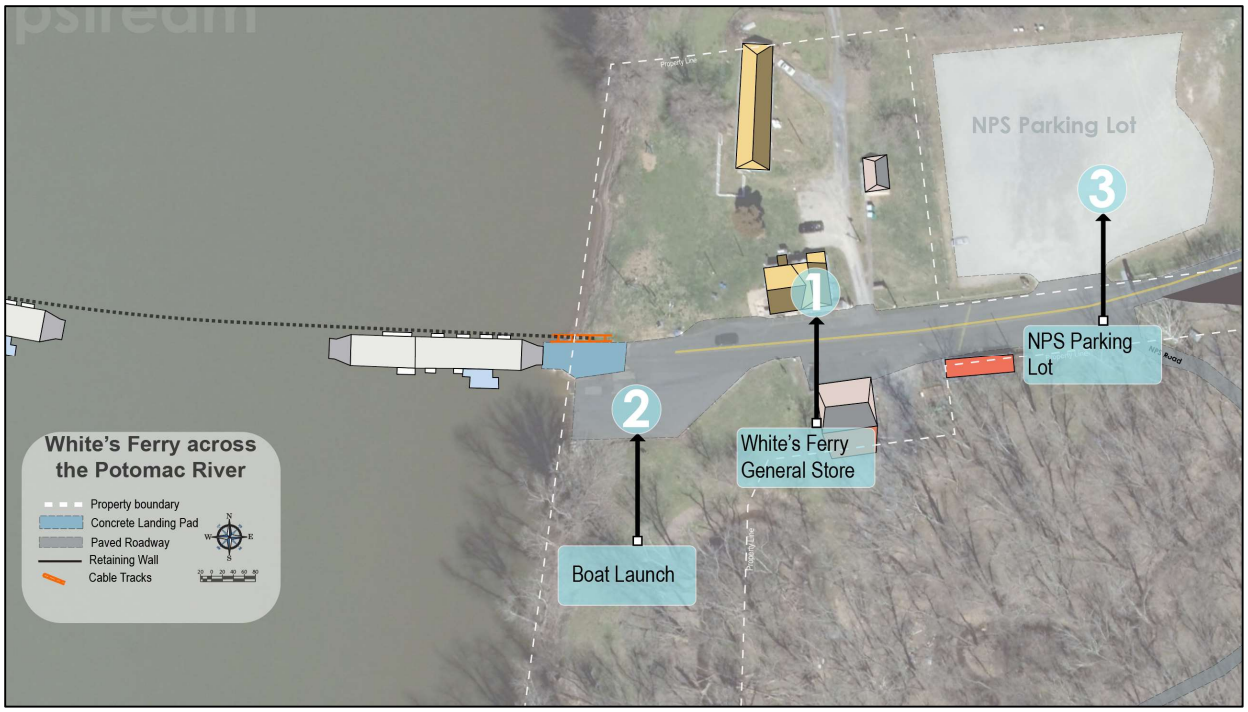
Figure 3-5: Comparison of Estimated and Observed Traffic Counts at Specific Locations



### 3.3.4 Ferry Demand

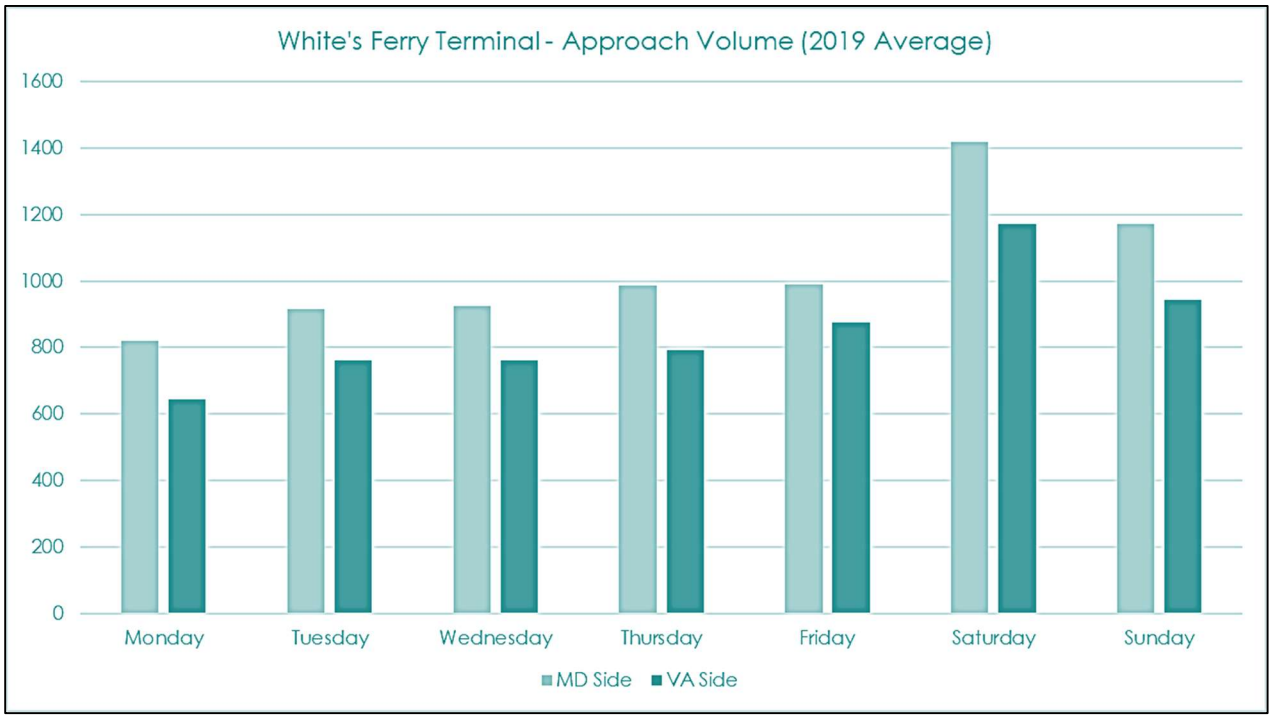
Ferry demand was estimated by examining total entry demand on Whites Ferry Road and River Road on the Maryland side and on Whites Ferry Road on the Virginia side. On the Virginia side, the only significant destination between the Ferry terminal and Route 15 is White's Ferry Manor, an events venue that typically draws traffic outside the peak period, so for the study purpose all traffic on Whites Ferry Road was assumed to be destined for the Ferry terminal. By examining the differences in roadway volumes on the two sides, it is possible to estimate the demand for other destinations on the Maryland side, including the White's Ferry Store and Grill, the Boat Ramp, and the NPS lands (see Figure 3-6).

Figure 3-6: Destinations near the Maryland Ferry Terminal I




On the Virginia side, over the course of a typical week in 2019, weekend demand was observed to be higher than weekday demand, with the highest demand occurring on Saturdays at approximately 1,200 vehicles per day (vpd), as shown in Figure 3-7. Demand on Friday and Sunday (900 vpd) was also much higher than the other weekdays (700-800 vpd), suggesting trips were for recreational purposes. On the Maryland side, trips were generally 200 vpd higher on weekdays and weekends compared to the Virginia side. This difference is attributed to the demand for the other destinations near the Ferry terminal on the Maryland side. For example, the average Saturday demand on the Virginia side was observed to be around 1,200 vpd, and it was observed to be over 1,400 vpd on the Maryland side.

Figure 3-7: Terminal Approach Volume




## 3.3.5 Modal Demand

The Streetlight platform was used to estimate demand by mode (vehicles, pedestrians, and bicycles). The pedestrian demand and the bicycle demand were observed to be minimal along Whites Ferry Road, as there were less than 10 pedestrians or bikes per hour. The highest demand was observed during the midday hours of 12 p.m. to 2 p.m. Given the low volumes observed, the amount of demand may be sensitive to the sample size of the data. However, it can be concluded that pedestrian and bicycle demand on Whites Ferry Road is assumed to be intermittent at best, and the majority of trips to the terminal are by automobile.

## 3.3.6 Temporal Distribution

Over the course of a typical Saturday, demand was observed between 6 a.m. and 11 p.m. The peak demand of approximately 120 vehicles per hour occurred in the late afternoon between 4 p.m. and 6 p.m. (Figure 3-8). For most other hours, the demand averaged between 60 and 80 vehicles per hour. The demand profile on weekdays (Figure 3-9) generally featured lower demand than Saturdays, and the highest hours typically occurred in the early morning (7 a.m.-8 a.m.), mid-afternoon (2 p.m.-3 p.m.), and late afternoon (5 p.m.-6 p.m.).

Figure 3-8: Saturday Temporal Demand distribution

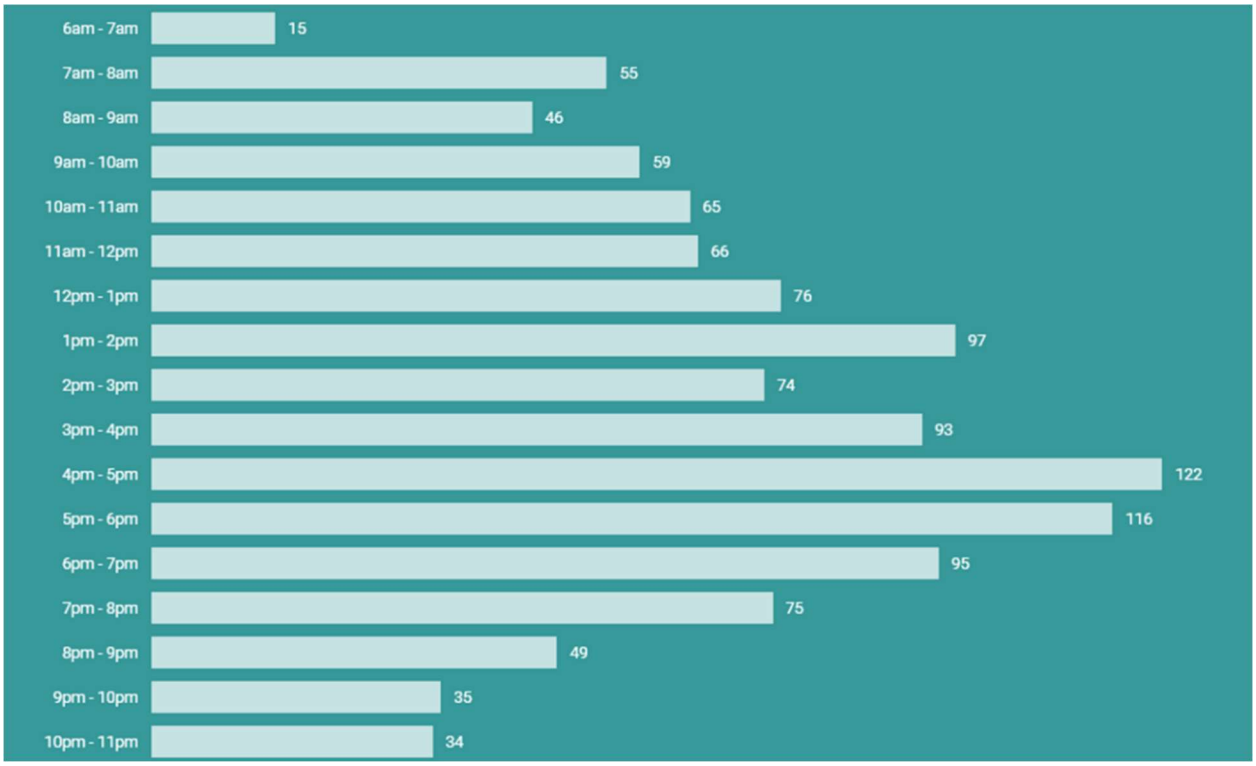
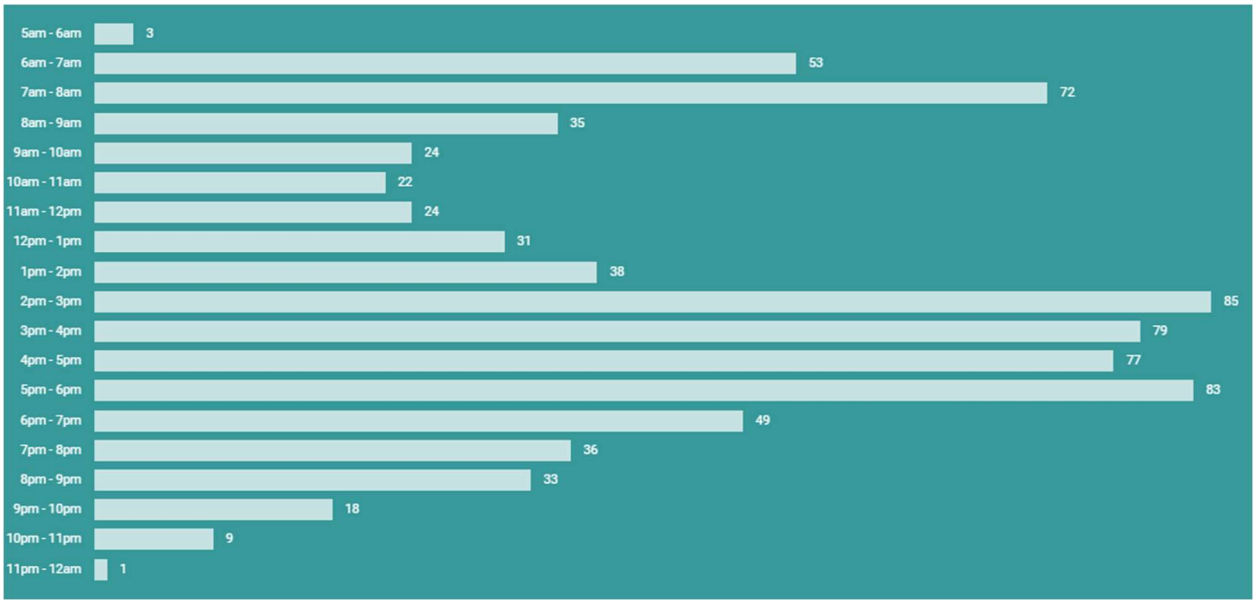



Figure 3-9: Weekday Temporal Demand Distribution




## 3.3.7 Seasonal Variation

As shown in Figure 3-10, demand for the Ferry terminal is highest in the summer months (June, July, and August, with nearly 6,000 vehicles per week), and it is nearly 30 percent lower during the winter months (January and February, with around 4,000 vehicles per week). Weekday demand is highest during the spring months (March, April, and May), and it is lowest during the fall and winter months (November and January), as shown in Figure 3-10. Weekend demand, however, is highest during the summer months (June and August), as shown in Figure 3-11. October was also

observed to be a month with high average weekend demand. As discussed below, an exploration of individual days may help identify individual peak activity days.

Figure 3-10: Seasonal Demand (2019, All Days of the Week)

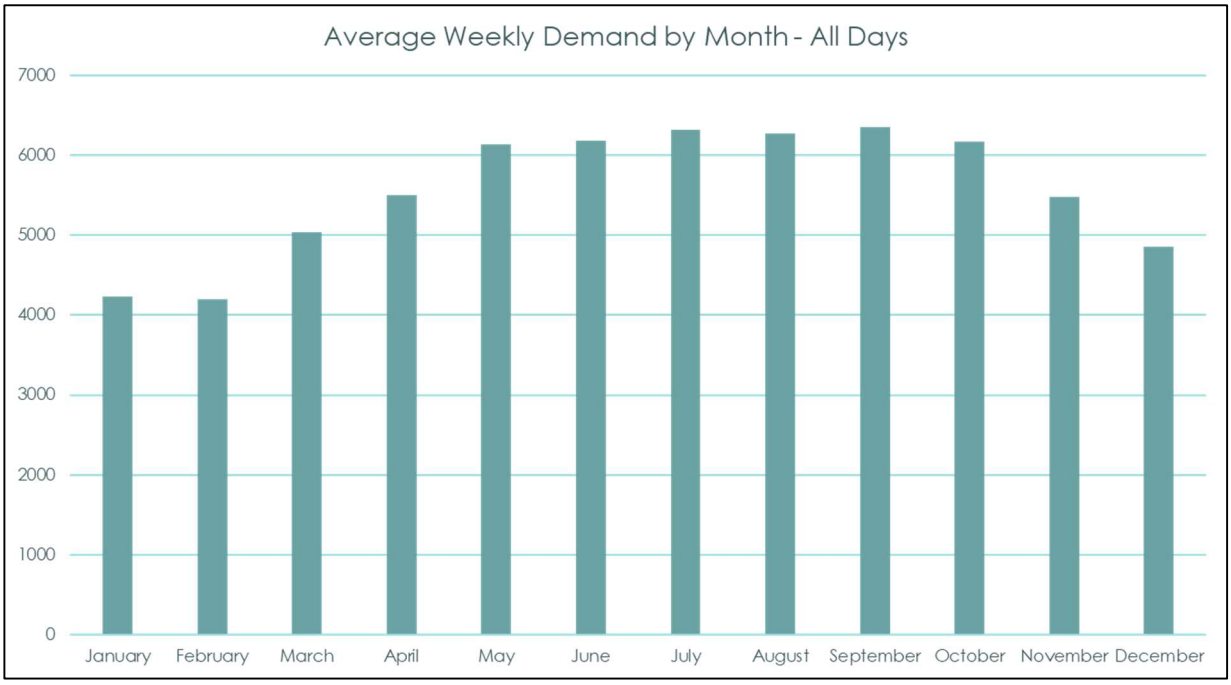



Figure 3-11: Seasonal Demand (2019, Weekdays)

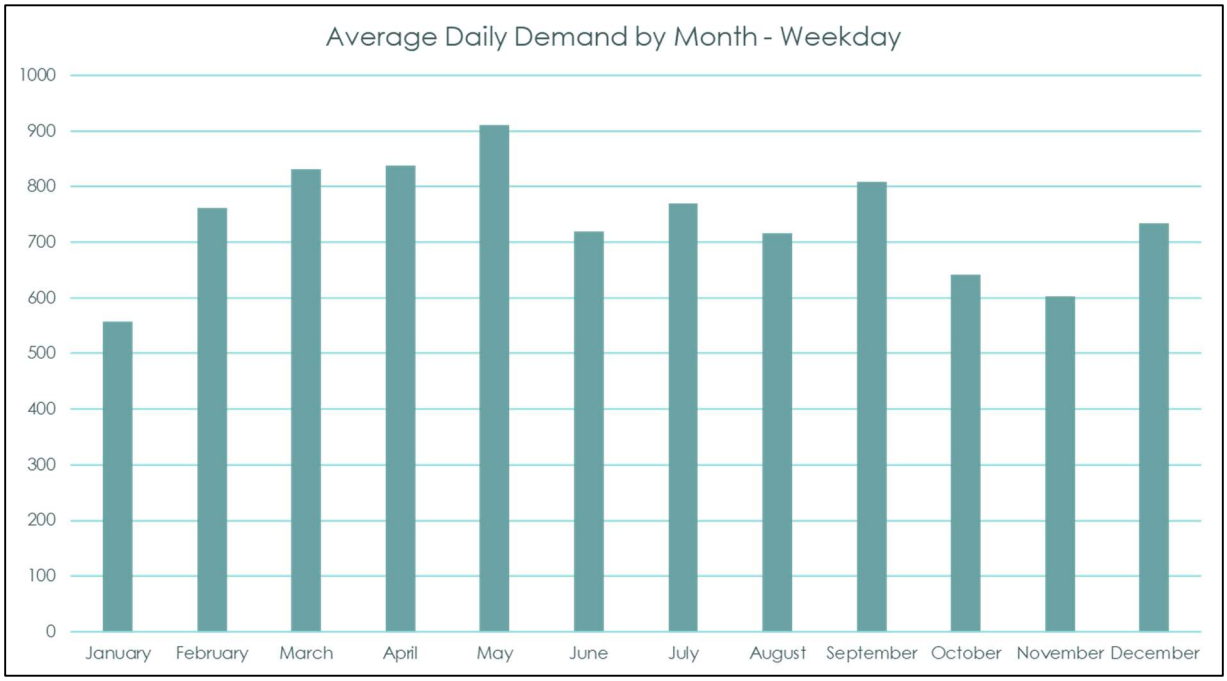
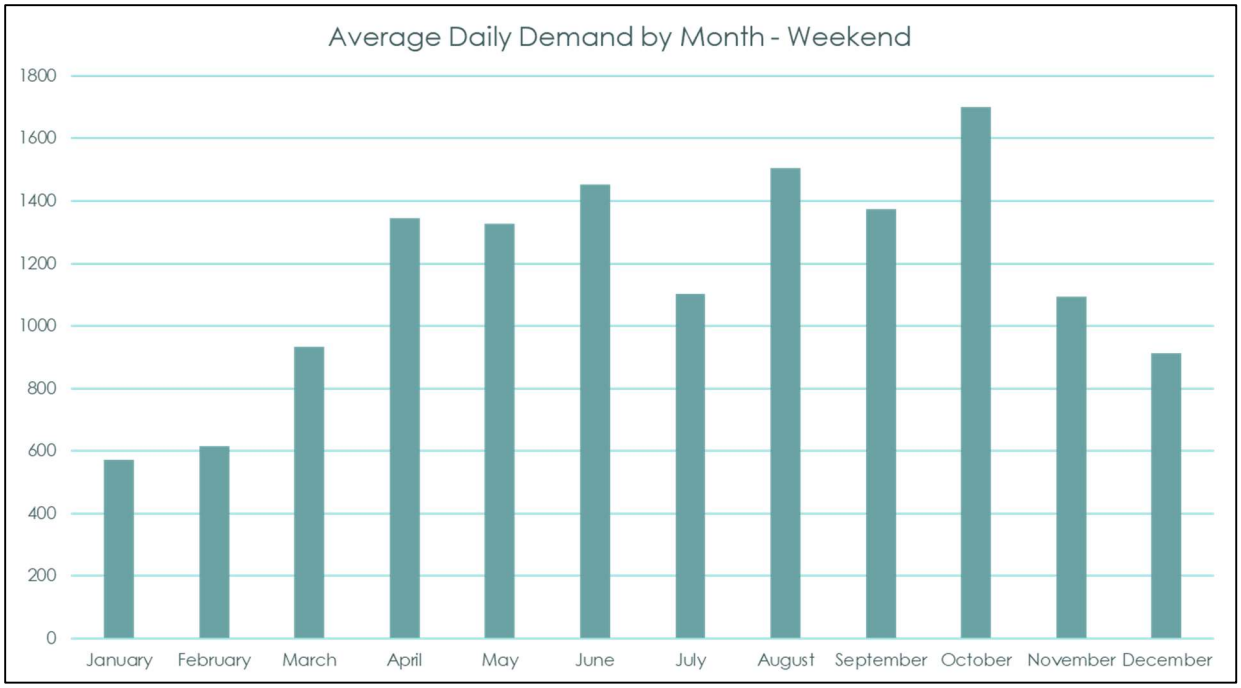


Figure 3-12: Seasonal Variation (2019, Weekend Days)




## 3.3.8 Trip Origins and Destinations

Trip origins and destinations were estimated based on the start or end point of trips observed at the terminal. Trip origins were analyzed for several geographies, including Census Block Groups and Traffic Analysis Zones (TAZ). An example of the trip origins and destinations for eastbound (EB) Ferry travel is shown in Figure 3-13 and Figure 3-14 below. On the Virginia side, most trips originated in Leesburg. Figure 3-13 shows the destination of users on the Maryland side. Most trips were destined for locations in Poolesville or surrounding areas such as Germantown. Note that the Streetlight platform also offers home and work locations for travelers. However, the trip origins and destinations (rather than home and work locations) are presented here because they are believed to be more accurate for modeling trips, without having to identify trip purpose.

Figure 3-13: Traffic Analysis Zones Trip Origins for Eastbound Ferry Travelers

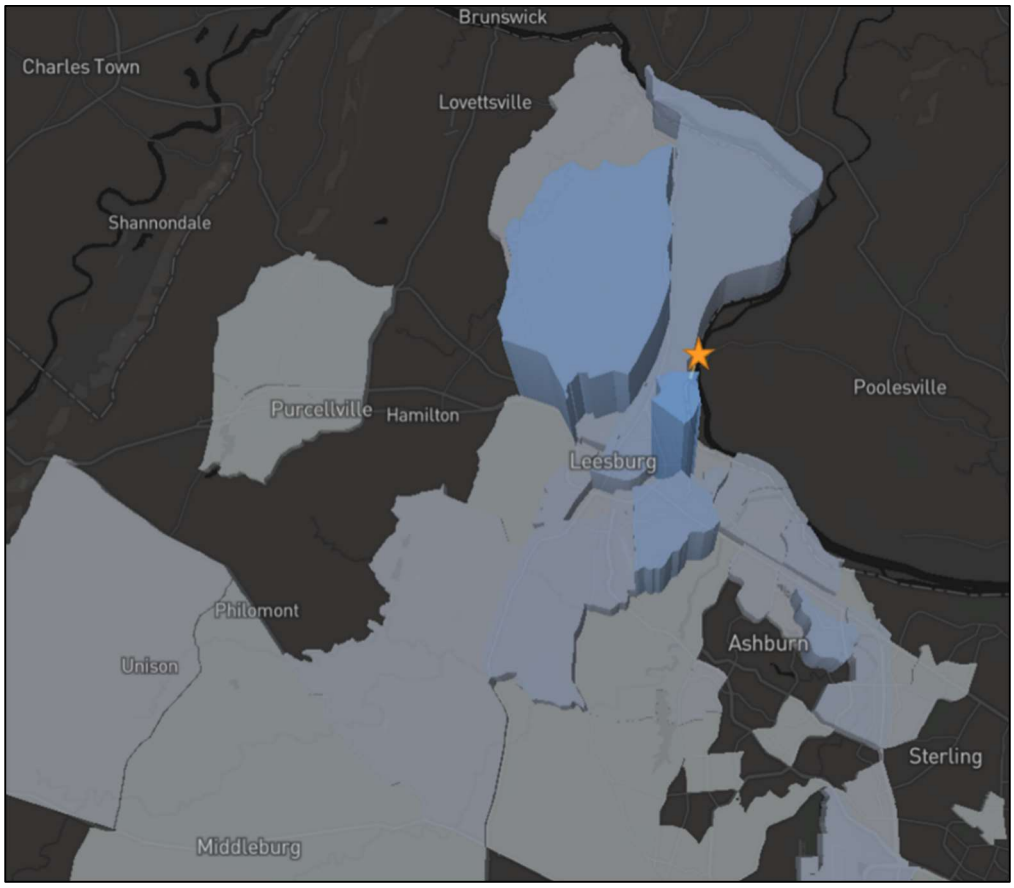
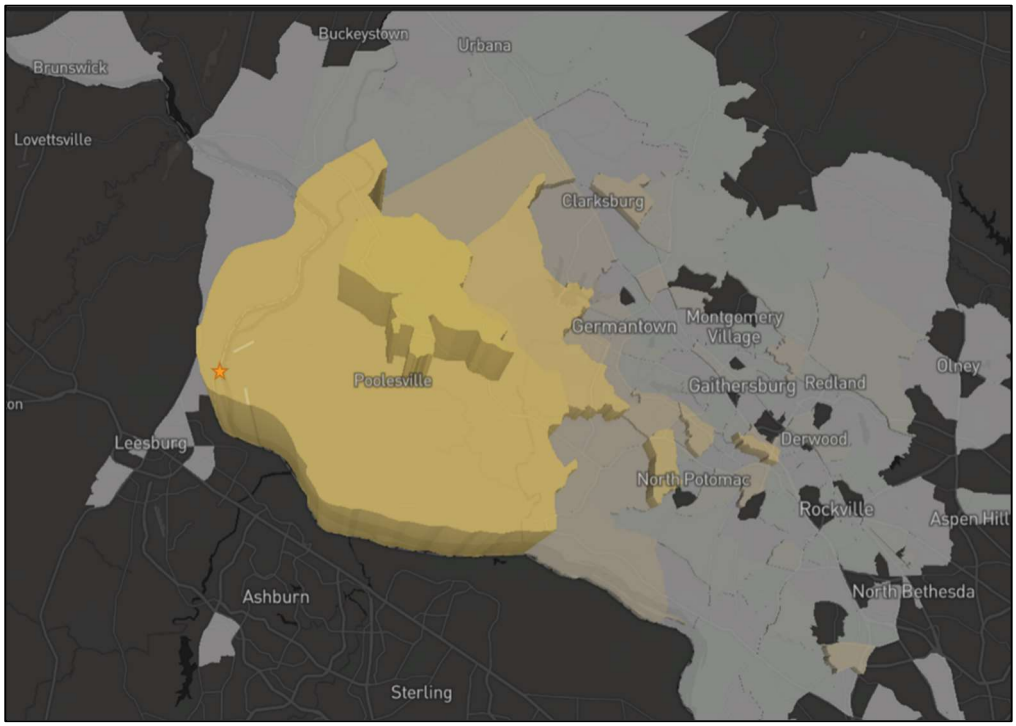



Figure 3-14: Traffic Analysis Zones Trip Destinations for Eastbound Ferry Travelers



## 3.4 Operational Characteristics

Discussions with the previous operator revealed the following operational characteristics:

- Based on an 18-hour service day (5 a.m. to 11 p.m.) and an average of 18 days per year when the Ferry was out of service due to mechanical and/or weather-related reasons, the Ferry delivered approximately 6,250 annual service hours.
- The Ferry's service was delivered by two persons – a captain, who primarily operated the Ferry, and a deckhand, who guided vehicles onto the deck and collected tickets and cash fares on the Ferry once vehicles and passengers had boarded.
- Fares were as follows:
  - Vehicles - one way $5.00, round trip $8.00
  - Motorcycles - $3.00 (one way)
  - Bicycles - $2.00 (one way)
  - Pedestrians - $1.00 (one way)
- Unfortunately, ridership statistics in terms of passengers and/or vehicles were not recorded while the Ferry service was in operation. Without this detailed information, assumptions have been made on total volumes of vehicles based on other data sources.
- The Ferry vessel accommodates up to 24 passenger cars in an 8-car by three-lane array. As noted in Table 2.2, the combined vehicle capacity of the White's Ferry is three rows of eight passenger for a total of 24 vehicles. Individual vessel capacities are less, as it was observed that vehicles straddle the "hinges" on the combined ferry

## 3.5 Parking Supply and Access Impacts

### 3.5.1 Maryland

There are a few parking spaces in front of the maintenance building, which has a 10-minute parking limit. These spaces are typically for people who are making a purchase in the store. Also, there is a gravel-surface parking lot on NPS property that patrons of White's Ferry use. Based on available geographic information system (GIS) data, this unmarked gravel parking area is approximately 44,900 square feet. The parking area is an abnormally shaped lot measuring approximately 250 feet on the back and 225 feet on the front, with sides of approximately 200 feet and 150 feet. There are no parking restrictions posted in the parking lot (i.e., no signs for "NPS users only"). However, the NPS has advised that the parking lot is heavily used and is at capacity during summer weekends.

The former operator of the Ferry service indicated that at certain times of the year (such as the Fourth of July) there typically was a surge of people who launched their vessels from the boat launch. These boaters would park their cars and trailers in the NPS lot, as no parking exists on White's Ferry property. Boaters compete for parking spaces with users of the National Park. In the past, White's Ferry would mow the grass adjacent to Whites Ferry Road (beyond the White's Ferry property) so that the grassy area could serve as overflow parking, but NPS indicated that this practice may not continue. Thus, parking is an issue for recreational boaters at certain times of the year.

At certain times of the year when travel demands are high, ferry traffic backs up onto Whites Ferry Road (according to Google Earth history, this occurred in May 2009, as shown in Figure 3-15). When this occurs, ferry traffic can block traffic headed for the NPS parking lot to use the C&O Canal Towpath and to access River Road south of its intersection with Whites Ferry Road, causing a delay and adding to the lineup along Whites Ferry Road.

Figure 3-15: Aerial Showing Queue Extending Beyond Intersection at River Road


*Source: Google Earth, May 2009 imagery*

## 3.5.2 Virginia

On the Virginia side of the river, there is a small, cleared area that could accommodate approximately three cars. This area is located near the hairpin turn on the access road to the Virginia landing. The operations manager of the Ferry indicated that the parking area on this side of the river is not sufficient to accommodate vehicles with boat trailers for people who want to use this as a boat launch and park their vehicle and trailer. Visual observations during the field visit confirmed this to be the case, as two parked vehicles clearly showed that there was indeed insufficient formal space to accommodate a vehicle with a trailer or to turn a vehicle around and back down to the ramp. Because of the location at the critical curve on the approach and the potential to interfere with vehicles using the Ferry, parking in this area should be restricted.

# 3.6 Resiliency Planning

The White's Ferry property is located entirely within the 100-year floodplain as shown on Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel 24031C0120D (Figure 3-16). The FEMA panel indicates that flood elevation data are unavailable, but flood markings on the White's Ferry store do indicate that flood waters have reached as high as the second floor of this building. The last flood that closed the ferry occurred in 2018 (see Figure 3-17 and Figure 3-18).

## Figure 3-16: FEMA FIRM Panel 24031C0120D

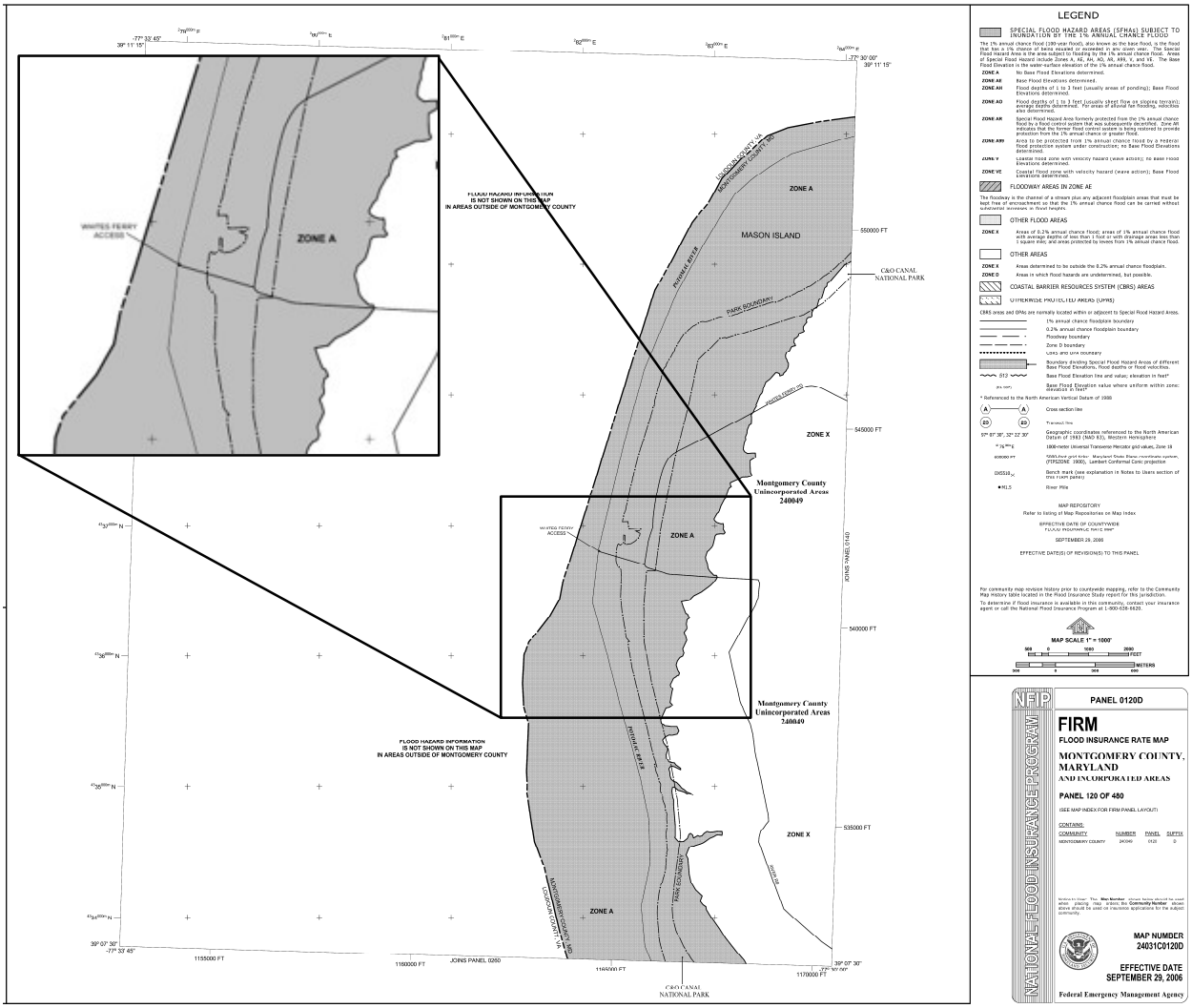


Figure 3-17: White's Ferry Store during River Flooding in 2018

Figure 3-18: 2018 Flooding Forces White's Ferry to Shut Down in Record Season of Closures


*Source: WJLA-TV*

The property's current conditions do not indicate substantial shoreline erosion, and several of the trees along the shoreline are greater than 30 inches in diameter, suggesting that they are several decades old. As observed from the Maryland shoreline, the Virginia shoreline just upstream from the Ferry landing is protected by riprap, indicating that there are some concerns with shoreline erosion on the Virginia side.

During severe flooding events, the previous operator would secure the Ferry by pulling it onto land and move the yaw boat (or tugboat) onto higher ground above the maintenance shed. This last flood occurred in 2018, when a dam broke in West Virginia and water levels reached 28 feet above normal levels.

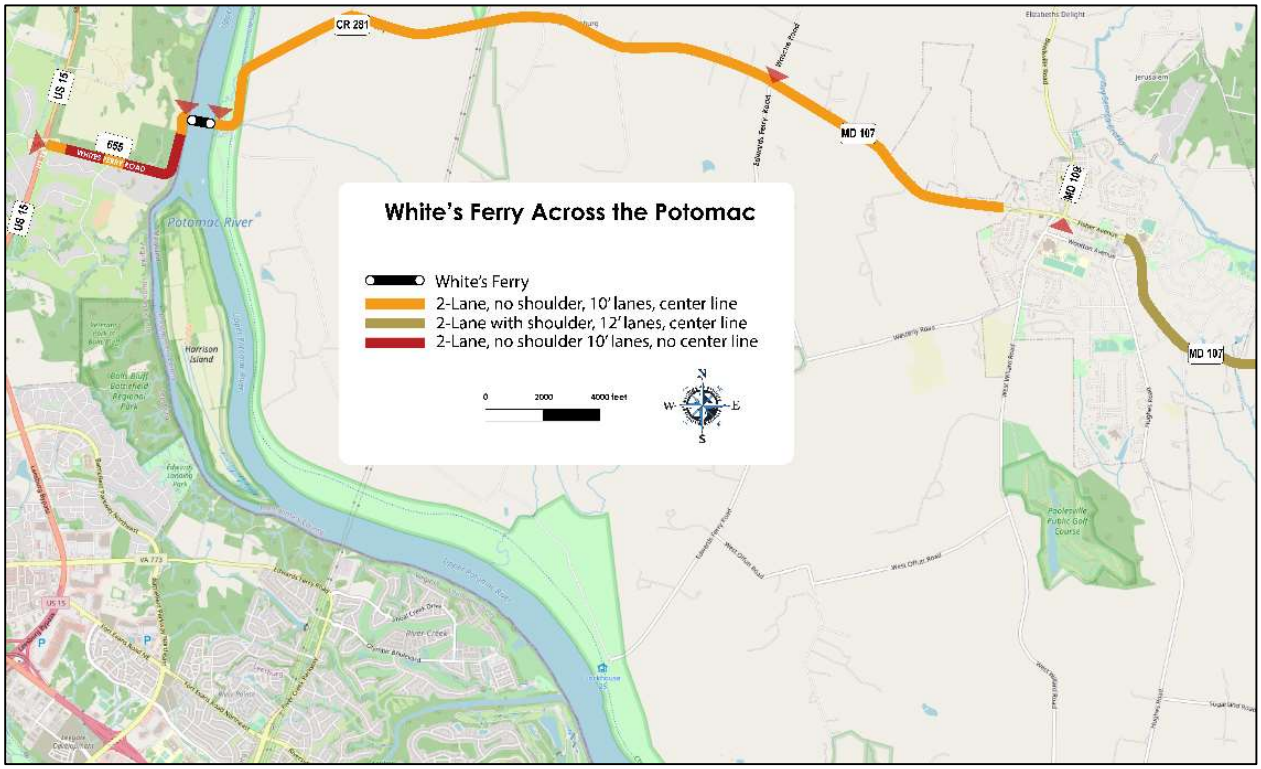
As noted earlier, an old ferry barge is used for the storage of fuel and other materials. It is located on the property near the maintenance shed but encroaches on NPS land. This ferry is secured to two telephone poles and is rigged such that the ferry slides up the telephone poles to float on the floodwaters in extreme flood events (see Figure 3-19). It should be noted that the 2018 flood did not affect the old ferry barge, but the first level of the store building was halfway under water. NPS has expressed concern with fuel storage on the old Ferry and its encroachment on NPS land. Fuel spills during refueling and during flood events are a primary concern to NPS. Fuel storage solutions should therefore be explored as part of any site design and planning.

Figure 3-19: Old Ferry Barge Used for Fuel Storage Secured with Float Rails to Accommodate River Flooding

# 3.7 Road Restrictions Constraining Vehicle Size

The road characteristics identified on roadways in the vicinity of the Ferry are shown in Figure 3-20.

Figure 3-20: Routes and Roadway Types




## 3.7.1 Maryland

The primary travel route from the Maryland landing is Whites Ferry Road (County Road [CR] 281), which connects to Maryland Route 107 (MD 107) at Wasche Road. Whites Ferry Road continues along MD 107 through Poolesville (connecting with MD 109 at Beallsville Road, which connects Poolesville to Beallsville and Maryland Route 28, MD 28, to the north). Beyond Poolesville, Whites Ferry Road continues eastward as MD 107 and terminates at MD 28.

West of Poolesville, Whites Ferry Road (CR 281) is a narrow, two-lane, two-way roadway with no paved shoulders, and its travel lanes are approximately 10 feet wide. This may create issues when large vehicles (such as fire trucks and/or charter buses) try to pass in opposing directions.

East of Poolesville, Whites Ferry Road (MD 107) travel lanes are approximately 12 feet. Paved shoulders are limited along this roadway, although there are grass shoulder areas. There are no signalized intersections along this road. West of MD 109, MD 28 is a two-lane roadway terminating at Point of Rocks. MD 28 varies in the number of lanes east and south of its intersection with MD 107. Travel lanes on MD 28 are approximately 12 feet wide with paved shoulders or curbs and gutters.

Local roadways in this area are narrow, and many have various weight restrictions due to bridges, some of which are narrow one-lane bridges. Some of these roadways do not have marked centerlines. Large farm equipment also travels along these roadways, and the farming community has expressed concerns about the safety of moving equipment on roads with ferry passenger traffic.

## 3.7.2 Virginia

Whites Ferry Road is the only roadway from Route 15 to the Virginia landing. The Route 15/Whites Ferry Road intersection is signalized with left-turn lanes for Route 15 traffic with protected/permitted phasing. Whites Ferry Road and Raspberry Drive approaches have concurrent phasing and right-turn bays. Whites Ferry Road is approximately 20

feet wide, with no centerline marking for most of its length. The lack of marking may create conflicts for large vehicles traveling simultaneously in opposing directions.

A plan view of the 90-degree turn at the bottom of the hill from Route 15 at the end of the road right-of-way is shown in Figure 3-21..

Figure 3-21: Tight Curve along Whites Ferry Road in Virginia :

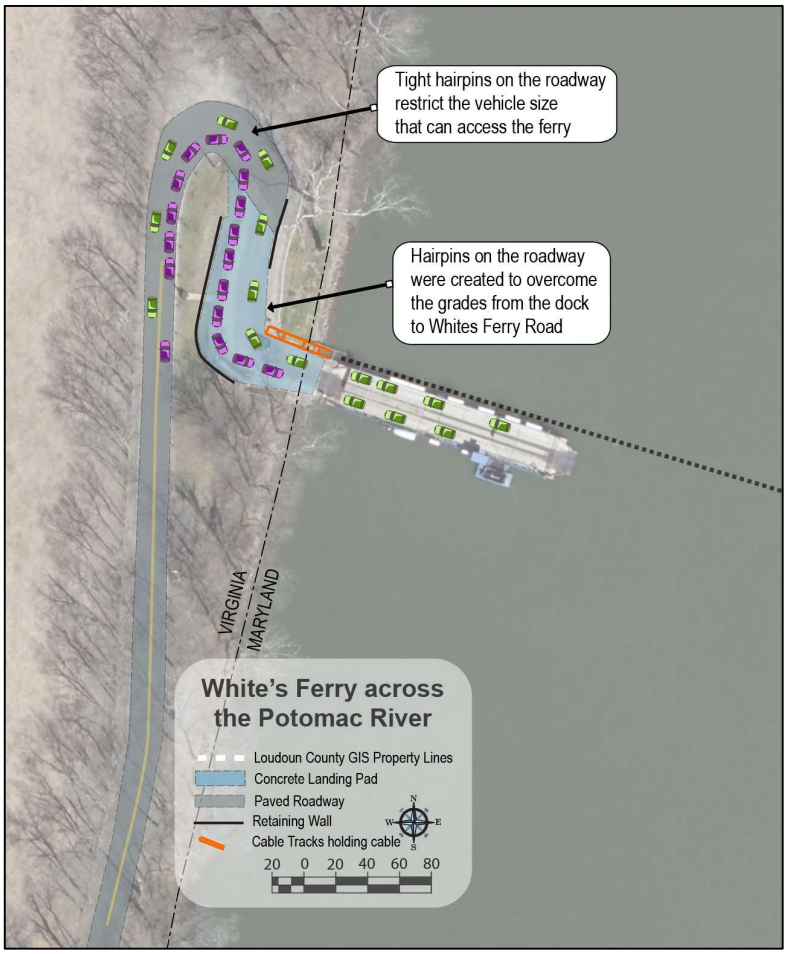

From Route 15, Whites Ferry Road runs gradually downhill until it meets the river where it makes a tight 90-degree turn northbound with a guardrail along the river side of the road. There are indications that vehicles have struck the guardrail (see Figure 3-22). From this tight turn, the roadway continues northbound to the Virginia landing site. For the most part, the roadway is 18 feet to 20 feet wide with no centerline, but for the last approximately 300 feet, the roadway has a double-yellow centerline. After the hairpin turn, the roadway switches from asphalt to concrete, as concrete is part of the landing itself.

Figure 3-22: Whites Ferry Road Guard Rail

There is a hairpin bend in the vicinity of the existing Ferry landing (Figure 3-23). This curve limits the size of vehicle that can access the Ferry.

Due to the significant grade differential between the river's edge and Whites Ferry Road, this improvement would require significant tree removal, a retaining wall and pavement removal, earthwork, and new pavement construction to provide a reasonable average grade not exceeding 5 percent. Construction would be subject to a permit from USACE due to its location within the floodway. At this time, there is no funding or intent by any party to initiate design or right-of-way acquisition for the shown conceptual improvements, nor are they required to restart Ferry operations. The cable is positioned on the north side of the ramp with the assoicated cable tracks that hold the tension therefore any future changes to the roadway must occur to the south of the cable.

Figure 3-21: Hairpin Bend near the Existing Ferry Landing:




# 3.8 River Conditions Assessment

As reported by the former operator of the service, the Ferry cannot operate when the river rises above 11 feet due to the limitations of the cable. There is also an issue with the increased angle between the Ferry and the landing because the landing is a fixed concrete structure.

To complement the depth of the Potomac River, a channel was reportedly dredged to a depth of approximately 4 feet during the 1940s, and while the removal of boulders and other debris has occurred intermittently, no additional dredging has occurred in the past 10 years.

While not included in this study. any change in the Ferry alignment across the river to accommodate a different landing site in Virginia would likely require dredging a clear path. During the June 2021 field visit, large branches and similar debris were visible in the river. These obstructions will need to be cleared if they occur within any revised Ferry path alignment. Based on information provided by the former Ferry operator, it appears that siltation of the river is not a

major concern, as dredging is needed very infrequently to maintain the Ferry channel. Multiple permits and authorizations would be needed from various regulatory agencies before dredging or any other construction activity could occur in the river.

# 3.9 Bike and Pedestrian Accommodation

## 3.9.1 Maryland

A second visit to the Maryland landing was made on a weekend in July 2021. The weather was sunny and warm. The travel path to the site from Interstate 270 was along MD 28 and Whites Ferry Road (MD 107 and CR 281). It was observed that there was significant bicycle activity in both directions along this route and these cyclists were riding road-racing bicycles. It is uncertain whether all observed cyclists along MD 28 and MD 107 were travelling to White's Ferry or not. Cyclists were also noted along River Road. Cyclists were frequently observed riding in the center of the travel lane along CR 281 as opposed to the edge of the travel lane due to the lack of a shoulder, which resulted in sand and gravel as well as vegetation creeping onto the roadway. As cyclists shied away from the shoulders where debris was present, they slowed vehicular traffic, which had to wait for traffic gaps in the opposing direction before being able to move over into the oncoming lane to pass the cyclists. The farming community has also expressed concerns over the safety of existing roadway interactions between cyclists and large farm equipment.

The C&O Canal Towpath (trail) is mainly used by cyclists with cruising or mountain bikes. It was observed that some cyclists (cyclists with both styles of bikes) stop at the White's Ferry Store and Grill.

## 3.9.2 Virginia

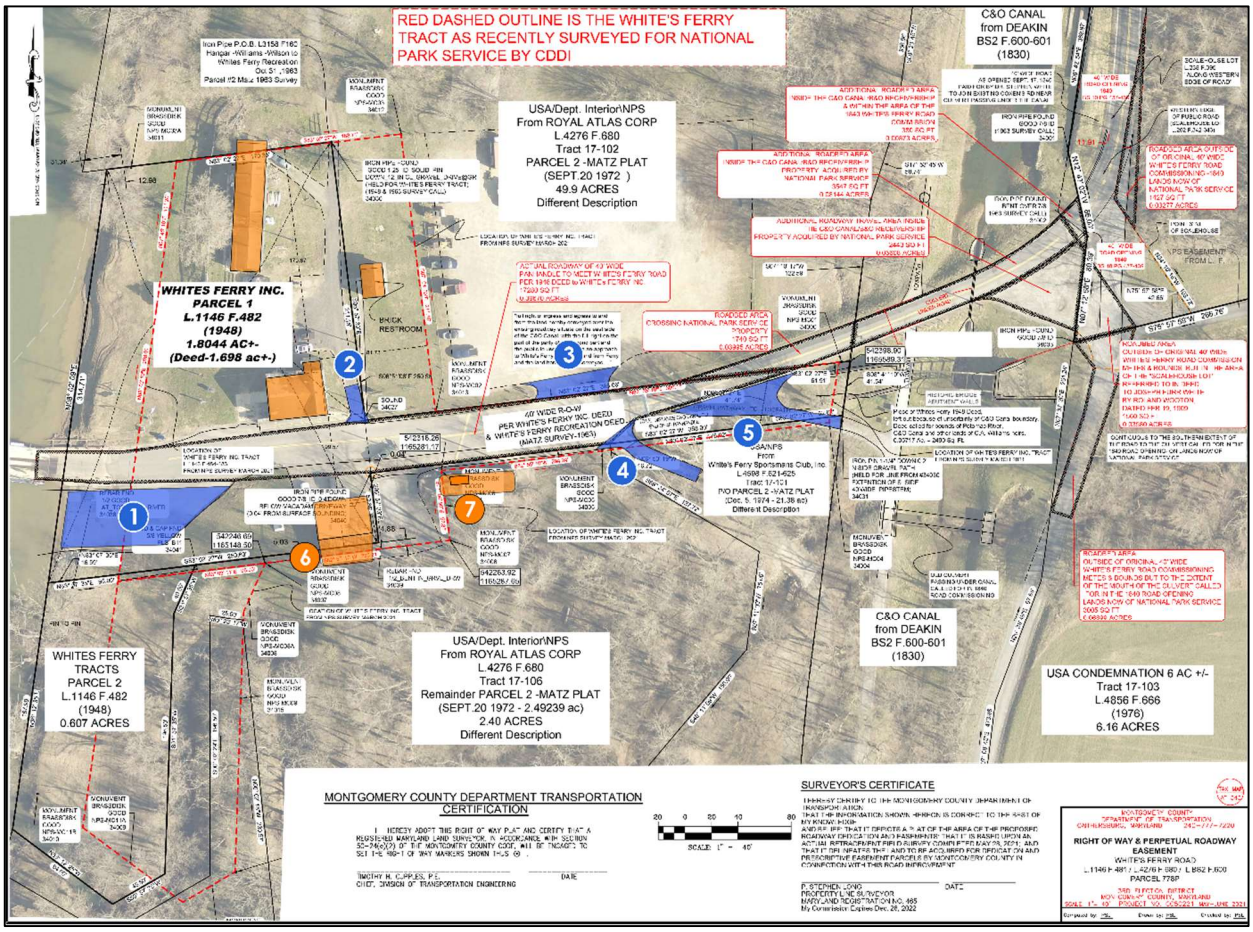
Currently there are no dedicated bicycle facilities serving White's Ferry between Leesburg and the Potomac River. However, detailed design of the Route 15 North Widening project between the Route 15 Bypass and Whites Ferry Road is currently underway and is expected to include a parallel shared-use path and a connecting path parallel to White's Ferry Road to accommodate bicycle and pedestrian traffic. Both paths are shown in Loudoun County's Countywide Transportation Plan. These paths along Route 15 and Whites Ferry Road would be a significant improvement to the safety and comfort of cyclists over riding along the narrow shoulder or in travel lanes along Route 15. While the final location and details of the shared-use paths have not been determined this facility, the paths would improve the potential for people walking and cycling to use the Ferry to cross the Potomac and access the C&O Canal Towpath or venues in northeast Loudoun County, including Downtown Leesburg.

# 3.10 Potential Issues Related to NPS Lands and Site Conditions

## 3.10.1 Maryland

Based on the discussions with NPS staff, there are several items of note, indicated by the blue circles in Figure 3-22, that relate to the lands south of the Ferry landing and connectivity to Whites Ferry Road within the studied site.

Figure 3-22: Official Survey of Maryland Side Lands




The items of note indicated by the blue circles in Figure 3-22 are discussed further below:

1. There is a portion of land adjacent to the landing ramp that is used by recreational boaters for parking after they have used the Ferry's ramp for launching their vessels. There is a charge to launch boats at the ramp. Recreational boaters also use the NPS parking lot to park their vehicles and trailers, which reduces the capacity of the lot for users of the C&O Canal Towpath.
2. Anticipated changes to the use of the NPS lands (the former cottage area) to more active uses, such as camping, will potentially increase traffic to the grocery store. This could result in increased driving and use of the parking area adjacent to the store and increased walking or cycling to the store. This has the potential to increase conflict with Ferry-bound traffic, given that the store has been the only location where Ferry tickets could be purchased using electronic fare media (due to reportedly poor Wi-Fi connectivity in the area).
3. The potential increase in traffic for both the Ferry and the C&O Canal Towpath parking lot means that the eastern end of the site will potentially generate increased congestion. Consequently, proper design will be required to ensure orderly and safe movement for all road users. There is also the potential that an increase in Ferry traffic queuing could back up traffic into this activity zone, and this would need to be addressed in future operations planning.
4. The access to the existing cottages on NPS lands may see increased traffic with a potential transformation to active uses. This may require a review of the intersection configuration.
5. There is an existing gravel path leading to the C&O Canal Towpath that may need to be realigned and integrated into the single intersection with the NPS parking lot entrance and White's Ferry Road.

Additional issues that need to be addressed are the result of three separate and differing land surveys produced in the past. These issues, which are highlighted in the two orange circles on the official survey map in Figure 3-22, are as follows:

6. The maintenance and storage shed with a small lean-to annex encroaches upon NPS land and will need to be relocated.
7. The old ferry barge that has been used as a storage facility for fuel and other supplies is also partially located on NPS land. The barge will have to be shifted and removed, requiring the relocation of the fuel storage tank, which would need to take into account sporadic flooding of the Potomac River.

The concrete ramps on either side of the river (see Figure 3-23) may reduce the ability of the Ferry to accommodate different river levels, given the angle created by the Ferry and the ramp at different water levels.

Figure 3-23: Maryland (left) and Virginia (right) Ramps


# 3.11 Condition Assessment of Ferry Landing Ramps

## 3.11.1 Maryland

The landing on the Maryland side of the river is approximately 20 to 22 feet wide and can accommodate all vehicles currently permitted on the Ferry. Although the ramp shows signs of cracking, it is in good condition. Cracks may need to be cleaned out and a joint compound applied to prevent further cracking or moisture damage. A separate but adjoining recreational boat launch ramp is also present. It was observed to be in good condition; however, there is some pitting of the top layer of asphalt. Some patch work should be completed to preserve the good state of the landing and boat launch ramps.

At the time of the visit, no boaters were observed using the boat launch ramp. The former operations manager indicated that after people launch their boats, they park their vehicles and trailers in the NPS gravel parking lot. In times of heavy usage (such as the Fourth of July) in years past, people would park on the grassy shoulders of Whites Ferry Road that are NPS property. There is a charge for launching boats on the Maryland side, but the operations manager indicated that Virginia users are not charged for using the ramp if they have paid to use the Ferry.

## 3.11.2 Virginia

On the Virginia side, the main concern is the hairpin bend in the access road turn limits the size of vehicles that can use the Ferry. There is sufficient roadway extending to the south of the Ferry landing to accommodate a large number of queued vehicles without conflicts by other uses.

The landing on the Virginia side of the river is approximately 20 feet to 22 feet wide and appears to be in a fair to good state of repair overall. The retaining wall along the approach ramps is in good condition, with no significant defects observed. There are cracks in the concrete ramp from which vegetation (grass or weeds) is growing. There were several small areas where the concrete has spalled, including one area that has exposed rebar. In addition to repairing exposed rebar and areas of spalling, any cracking should be cleaned out and joint sealant applied to prevent further cracking or moisture damage. Some mud residue (dried mud) was observed against the retaining wall. It is uncertain if this was from a high-water event, or if this was mud washed down from the small parking area.

The owners of Rockland Farms do not permit boat launches on the Virginia side and have recently installed a boat launch. The operations manager did however indicate that when the Ferry was in service, boat launching on the Virginia side was not permitted for two reasons. First, the gate to prevent this from occurring (see Figure 3-24). The ramp is not wide enough to accommodate both the Ferry and boat launching simultaneously. No parking is available as the roadway does not have shoulders for boaters to park their vehicles and trailers when they are using their boats. Parking in this area would block the travel way and impact operations.

Figure 3-24: Gate Restricting Access to Virginia Ramp


## 3.12 Commute Usage Analysis

Given that river crossings in the region are limited, resuming operations of White's Ferry would provide an opportunity to more directly connect areas of Montgomery County, MD, and Loudoun County, VA. This section analyzes commute patterns between the two counties based on Longitudinal Employer-Household Dynamics (LEHD) Census data; no other trip purposes are included in this dataset.

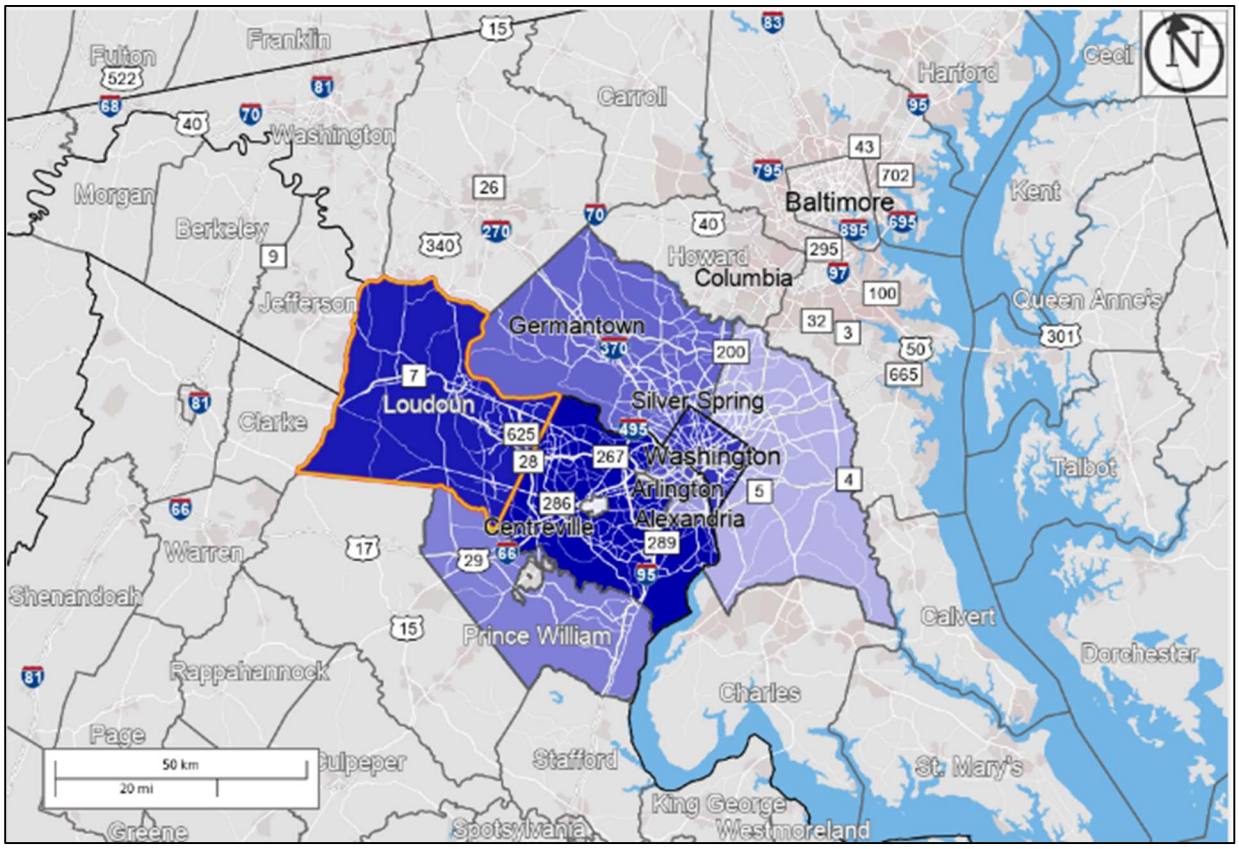
With the LEHD Census OnTheMap data analysis and mapping tool, an assessment of the home locations and the work locations for workers in both counties was performed.[1] Census OnTheMap data displays job counts by workplaces for selected categories of employees. This analysis used the following assumptions:

- Trips from home area
- Selection area: Loudoun County, VA
- Work destination analysis for counties
- 2018 data for all jobs

[1] United States Census Bureau, Longitudinal Employer-Household Dynamics Data, OnTheMap, https://onthemap.ces.census.gov/

The results of the analysis showed that the greatest number of jobs for Loudoun County, VA, residents are located in Fairfax County, VA (74,100 jobs), Loudoun County, VA (64,700 jobs), Washington, D.C. (11,600 jobs), and Arlington County, VA (10,000 jobs). Of the 211,400 jobs identified for Loudoun County residents, these four locations account for 75 percent of workplaces. The 2018 Census data show that 6,700 commuters from Loudoun County hold jobs in Montgomery County, MD. These workers may use the Ferry to get to work. Census data show that less than 0.9 percent of commuters travel to Frederick, MD, from Loudoun County. Figure 3-25 shows the concentration of job locations for Loudoun County residents.

Figure 3-25: Where People Who Live in Loudoun County Work (2018)



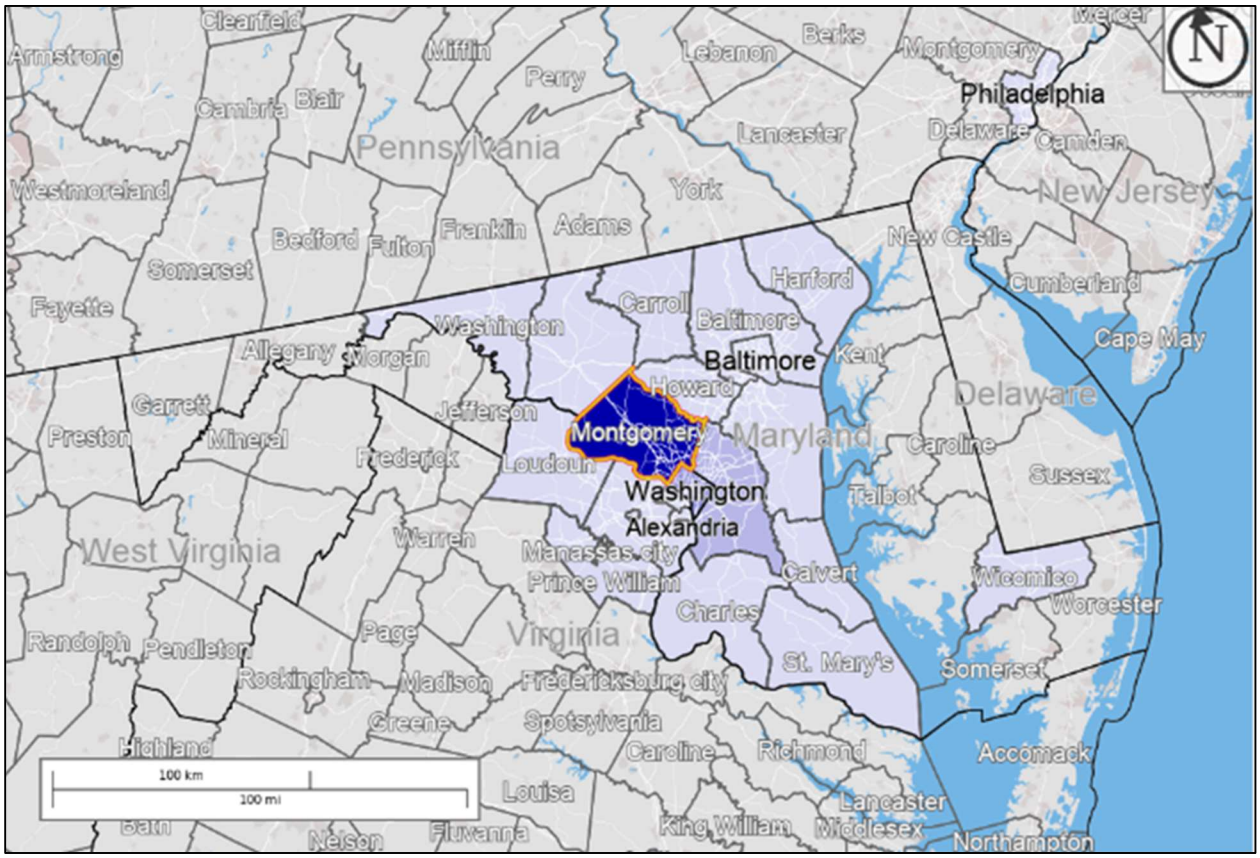

*Source: Census OnTheMap*

To assess commuters crossing the river in the opposite direction, Montgomery County, MD, was used as the home origin.

- Trips from home area
- Selection area: Montgomery County, MD
- Work destination analysis for counties
- 2018 data for all jobs

The results of Montgomery County's analysis likewise showed that a limited number of commuters would potentially use the Ferry. Of the 492,000 jobs for Montgomery County, MD, residents, 0.9 percent (4,400 jobs) of that total are destined for Loudoun County, VA. A greater number of jobs are located in Montgomery County, MD (241,100 jobs), Washington, D.C. (91,600 jobs), Prince George's County, MD (39,300 jobs), and Fairfax County, VA (22,000 jobs). Figure 3-26 shows the concentration of job locations for Montgomery County, MD residents, including the 4,400 jobs in Loudoun County.

Figure 3-26: Where People Who Live in Montgomery County Work (2018)




*Source: Census OnTheMap*

The analysis shows that commuters may use the Ferry between the two counties. for up to 11,100 jobs. The Streetlight data and the forecast analysis showed few home-based work (HBW) (commute) trips in both 2019 and 2040 (i.e., 130 trips and 290 trips per day, respectively, taking into account vehicles traveling in both directions). Therefore, less than 4 percent of the 11,100 potential daily commute trips would likely use the Ferry route in the opening year. If, however, the analysis focuses on the primary origin and destination locations of White's Ferry users, the data shows that White's Ferry captures 80 percent of the trips between western Montgomery County and northeast Loudoun County. Without White's Ferry these trips will add traffic to MD 28, Point of Rocks Bridge and Route 15.

# 3.13 Future Forecasts for Ridership

This section provides a discussion of the ridership forecast methodology and results for the White's Ferry forecasting task. The team used the Streetlight data as a basis for carrying out the forecasting task. The Streetlight data analysis included trip end data in the form of separate origins and destinations for the EB and westbound (WB) travelers. For forecasting, a full origin-destination (OD) matrix was desirable. However, the team's initial attempt at extracting a full origin-destination pair table generated less than 50 percent of the total demand. It was subsequently found that this was due to the limitation on the number of origin-destination zones allowed for a middle filter analysis on the Streetlight platform. Therefore, trip end data, which included a complete set of White's Ferry demand at the Census block groups, were used to forecast future demand.

## 3.13.1 Forecast Methodology and Results

Three different forecasting methods were applied to estimate the demand for 2040 using the Streetlight average daily vehicle trips from 2019 and a calibration adjustment factor of 0.9.

These forecasting methods include as the following:

*Land-Use Growth from Loudoun County Model:* The Streetlight trip end data by Census block group was converted to the Loudoun County Model (LCM) TAZs. The LCM land use growth (ratio method) by TAZ was applied to both trip origins and trip destinations of both EB and WB White's Ferry travelers. The total trip origins and total destinations were averaged to forecast trips. Extreme growth factors (>10x) were adjusted based on the average growth of the surrounding zones.

*Person-Trips Growth from Loudoun County Model:* The Streetlight trip end data by Census block group were converted to the LCM TAZs. The LCM person trip production growth (ratio method) by TAZ was applied to both trip origins and trip destinations of both EB and WB White's Ferry travelers. The growth was applied using the LCM trip productions by trip purpose (HBW=home-based work, HBO=home-based other, and NHB=non-home-based). The total trip origins and total destinations were averaged to forecast trips. Extreme growth factors (>10x) were adjusted based on the average growth of the surrounding zones.

*Person-Trips Growth from MWCOG Regional Model:* The Streetlight trip end data by Census block group were converted to the Metropolitan Washington Council of Governments (MWCOG) regional model TAZs. The MWCOG model person trip productions growth (ratio method) by TAZ was applied to both trip origins and trip destinations of both EB and WB White's Ferry travelers. The growth was applied using the MWCOG model trip productions by trip purpose (HBW, HBO and NHB). The total trip origins and total destinations were averaged to forecast trips. Extreme growth factors (>10x) were adjusted based on the average growth of the surrounding zones.

These three methods were applied using the Streetlight trip end data by Census block group for January 2019 and July 2019.

Table 3-2 and Table 3-3 show average daily vehicle trips by trip purpose from Streetlight 2019 and the three 2040 forecasting methods for January 2019 and July 2019 respectively. Overall, the forecast results show a growth range between 35 and 41 percent for January 2019 and between 33 and 48 percent for July 2019. The MWCOG person-trips method generated the lowest forecast and the LCM land-use method generated the highest forecast.

The LCM person-trips growth showed a mid-range growth and was a preferred forecast due to a more detailed TAZ structure and network in the study area.

Table 3-2: Daily Vehicle Trips from Streetlight (January 2019) and 2040 Forecasts

| Trip Purpose | Streetlight Data | LCM Land-Use Growth Method | | LCM Person-Trip Growth Method | | MWCOG Person-Trip Growth Method | |
|---|---|---|---|---|---|---|---|
| | 2019 | 2040 | Growth | 2040 | Growth | 2040 | Growth |
| HBW[1] | 190 | 247 | 30% | 233 | 23% | 250 | 32% |
| HBO[2] | 433 | 658 | 52% | 626 | 45% | 614 | 42% |
| NHB[3] | 469 | 639 | 36% | 658 | 40% | 607 | 29% |
| **Total** | **1,092** | **1,544** | **41%** | **1,516** | **39%** | **1,471** | **35%** |

Table 3-3: Daily Vehicle Trips from Streetlight (July 2019) and 2040 Forecast

| Trip Purpose | Streetlight Data | LCM Land-Use Growth Method | | LCM Person-Trip Growth Method | | MWCOG Person-Trip Growth Method | |
|---|---|---|---|---|---|---|---|
| | 2019 | 2040 | Growth | 2040 | Growth | 2040 | Growth |
| HBW[1] | 282 | 384 | 36% | 354 | 25% | 367 | 30% |
| HBO[2] | 644 | 1,026 | 59% | 952 | 48% | 900 | 40% |
| NHB[3] | 699 | 996 | 43% | 1,001 | 43% | 890 | 27% |
| **Total** | **1,625** | **2,406** | **48%** | **2,307** | **42%** | **2,158** | **33%** |

*Notes:*

*1 HBW = home-based work trips - trips between home and work*

*2 HBO = home-based other trips - trips for non-work purposes*

*3 NHB = non-home-based trips - trips between activity locations*

*LCM = Loudoun County Model*
*MWCOG = Metropolitan Washington Council of Governments*

Figure 3-27 and Figure 3-28 show the trip origins for White's Ferry (EB and WB travelers) from Streetlight July 2019 data and the LCM person-trip forecast for 2040, respectively. Figure 3-29 and Figure 3-30 show the trip destinations from White's Ferry (EB and WB travelers) from Streetlight July 2019 data and the LCM person-trip forecast for 2040, respectively.

Figure 3-27: White's Ferry (EB and WB Travelers) Trip Origins, Streetlight July 2019 Data

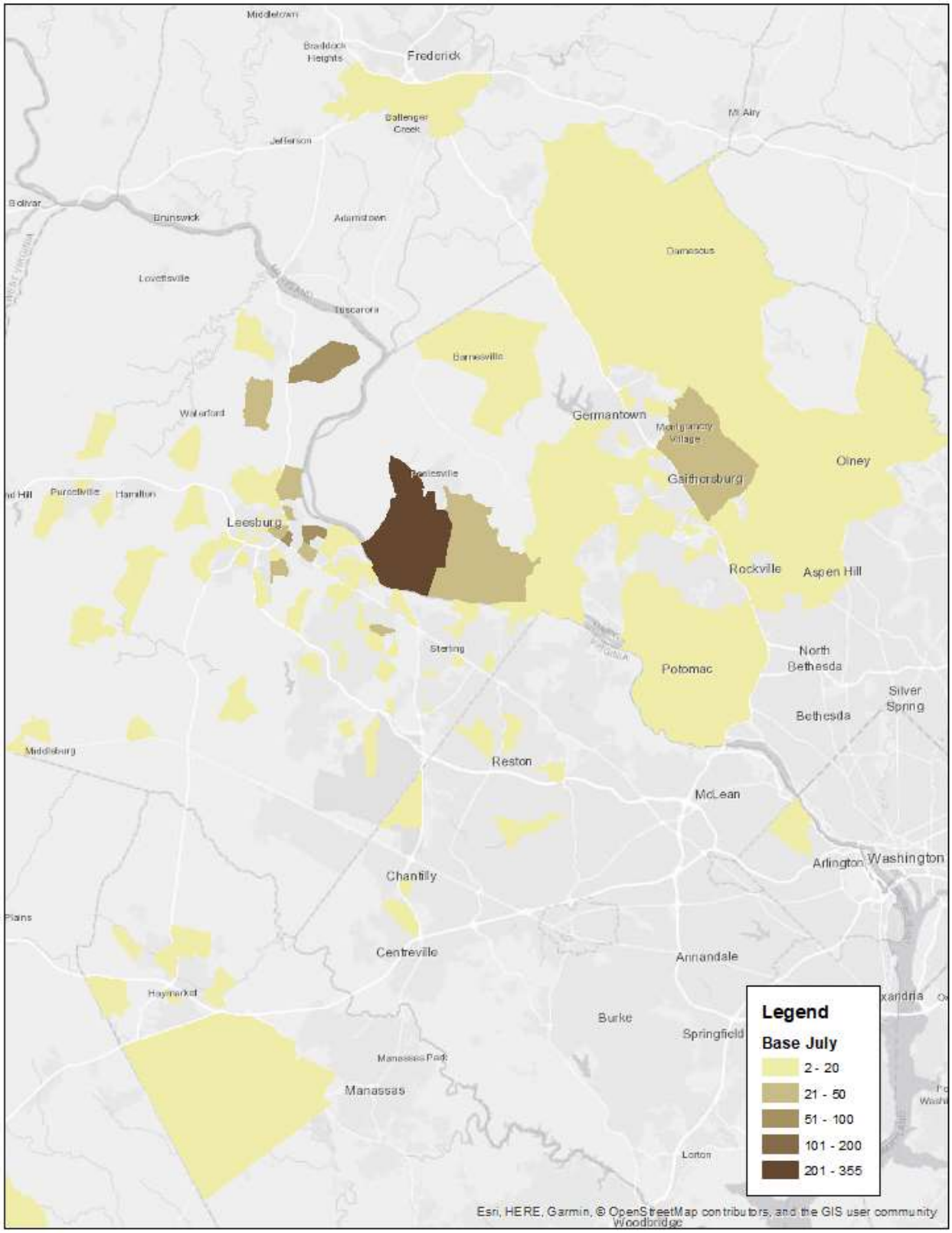


Figure 3-28: White's Ferry (EB and WB Travelers) Trip Origins, LCM Person-Trip Forecast for 2040

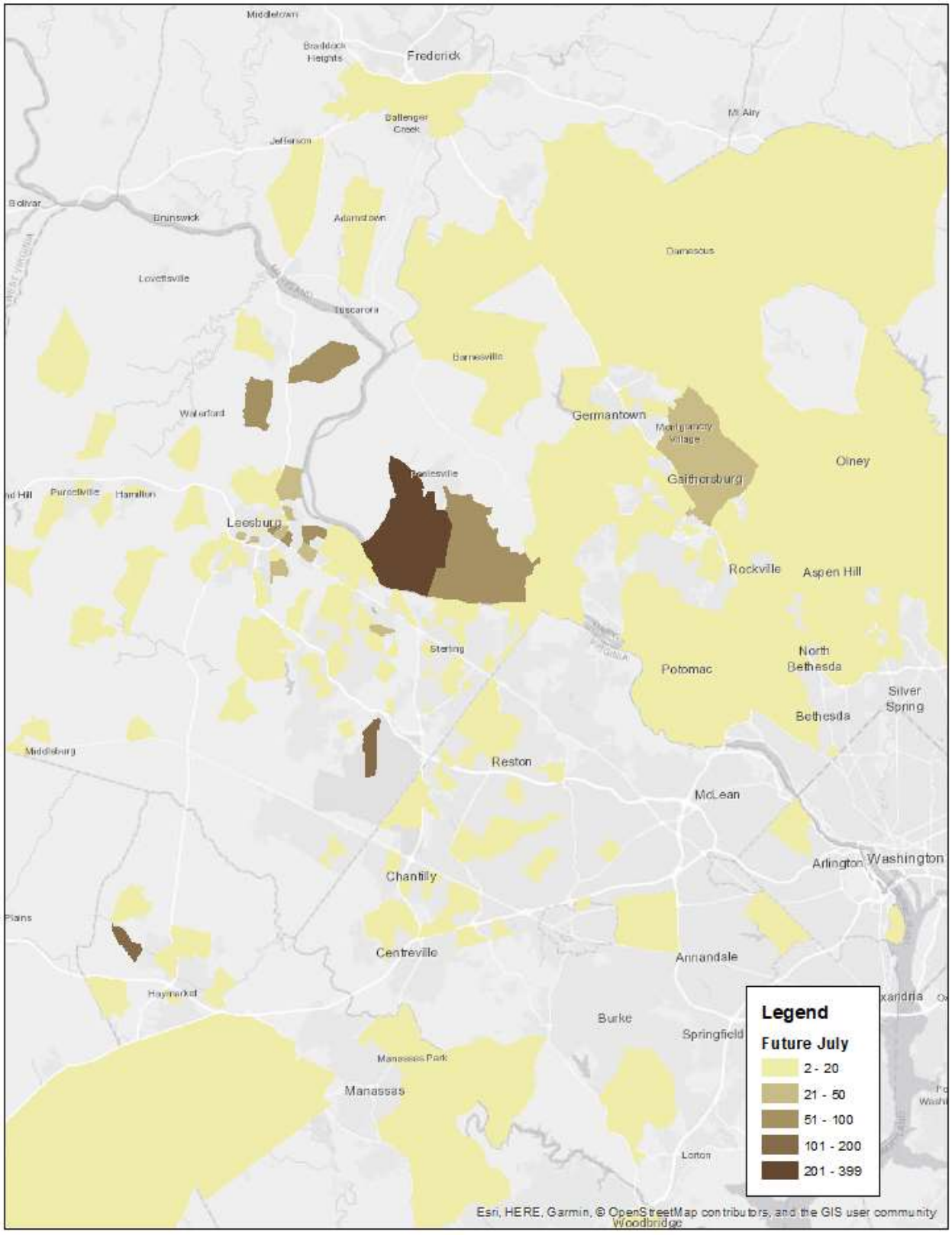


Figure 3-29: White's Ferry (EB and WB Travelers) Trip Destinations, Streetlight July 2019 Data

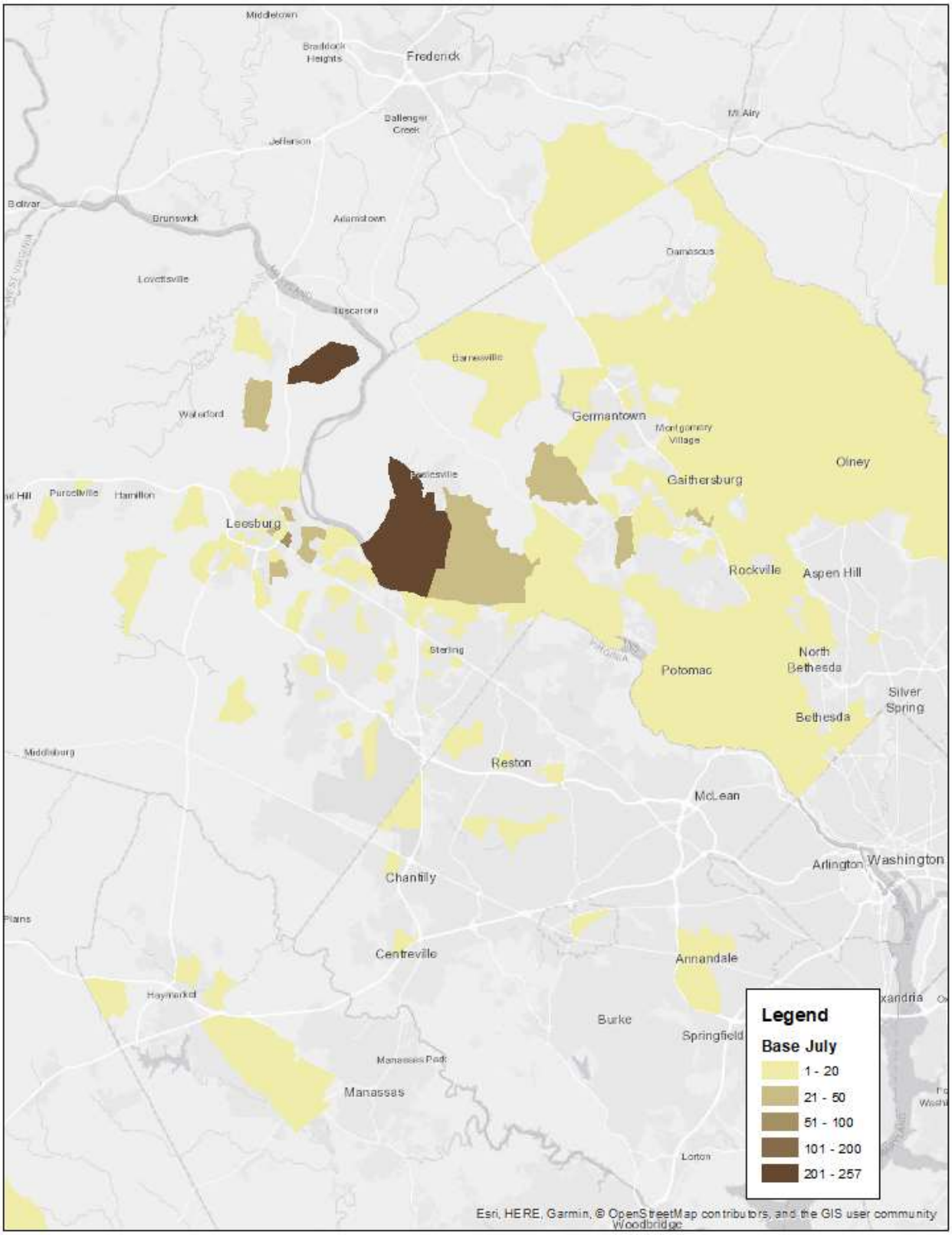
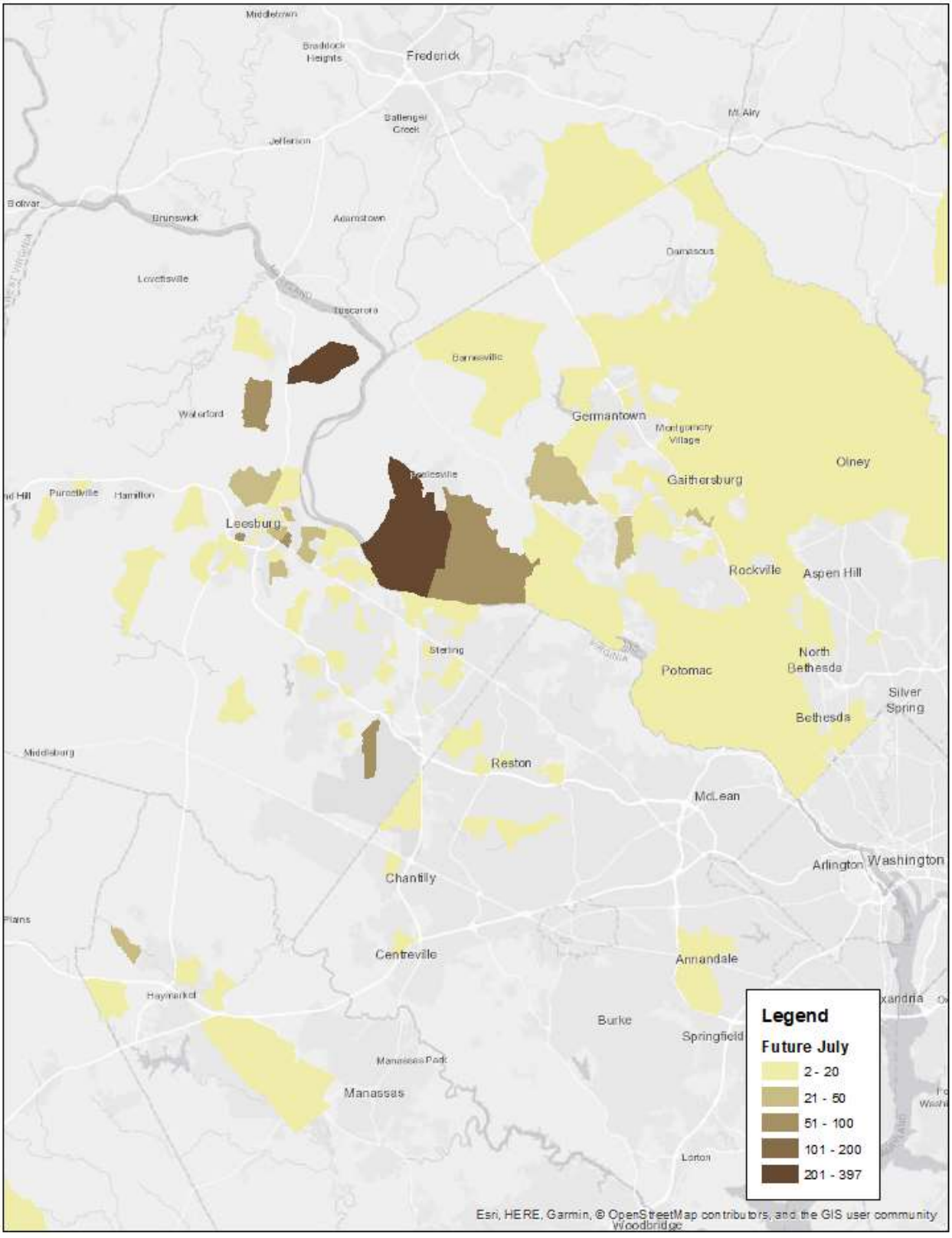


Figure 3-30: White's Ferry (EB and WB Travelers) Trip Destinations, LCM Person-Trip Forecast for 2040



## 3.13.2 Existing and Forecasted Trips by Month, Day, and Time

Streetlight 2019 data included White's Ferry total demand profile by month, day of week and time of day. A uniform growth of 40 percent (based on the average of January 2019 and July 2019 using the LCM person-trip forecasting method) was applied to the Streetlight data to generate the forecast by month, day of week and time of day.

Figure 3-31, Figure 3-32, and Figure 3-33 show the average daily vehicle trips from Streetlight 2019 and the 2040 forecast by month, day of week and time of day, respectively.

Figure 3-31: Average Daily Vehicle Trips by Month from Streetlight 2019 and the 2040 Forecast

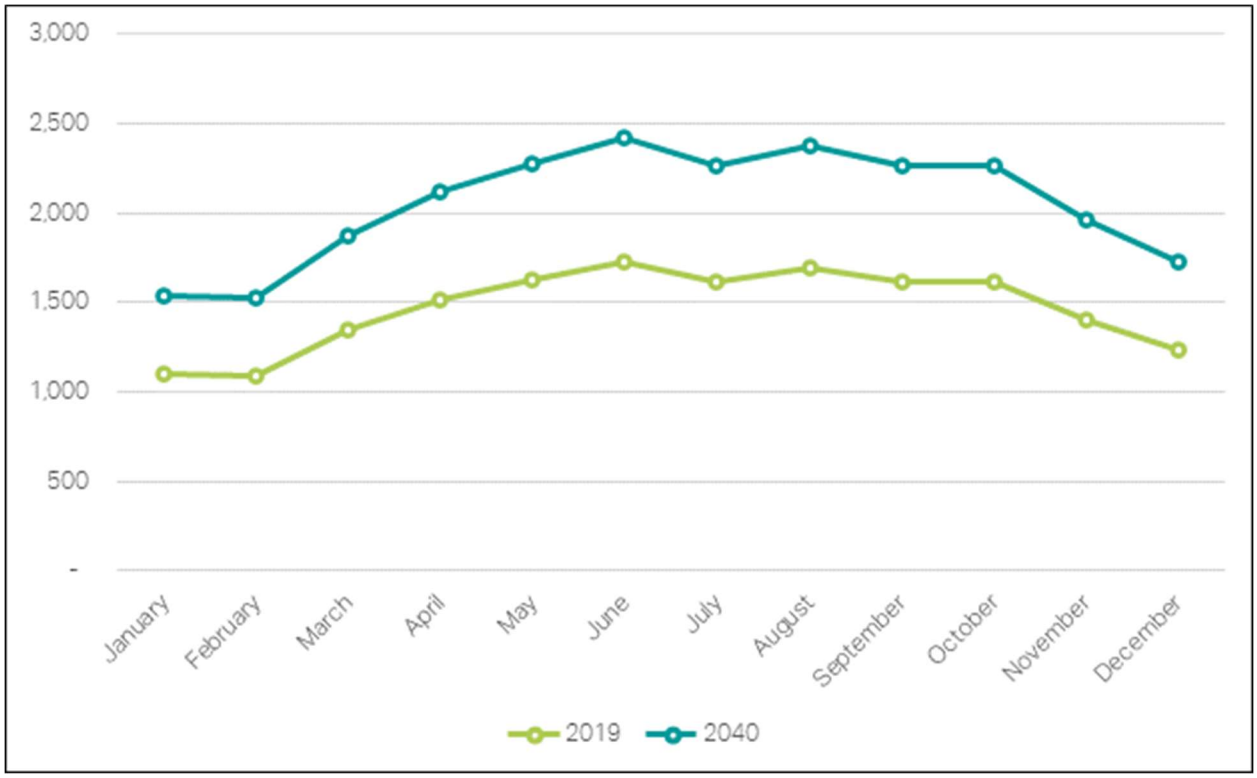


Figure 3-32: Average Daily Vehicle Trips by Day of Week from Streetlight 2019 and the 2040 Forecast

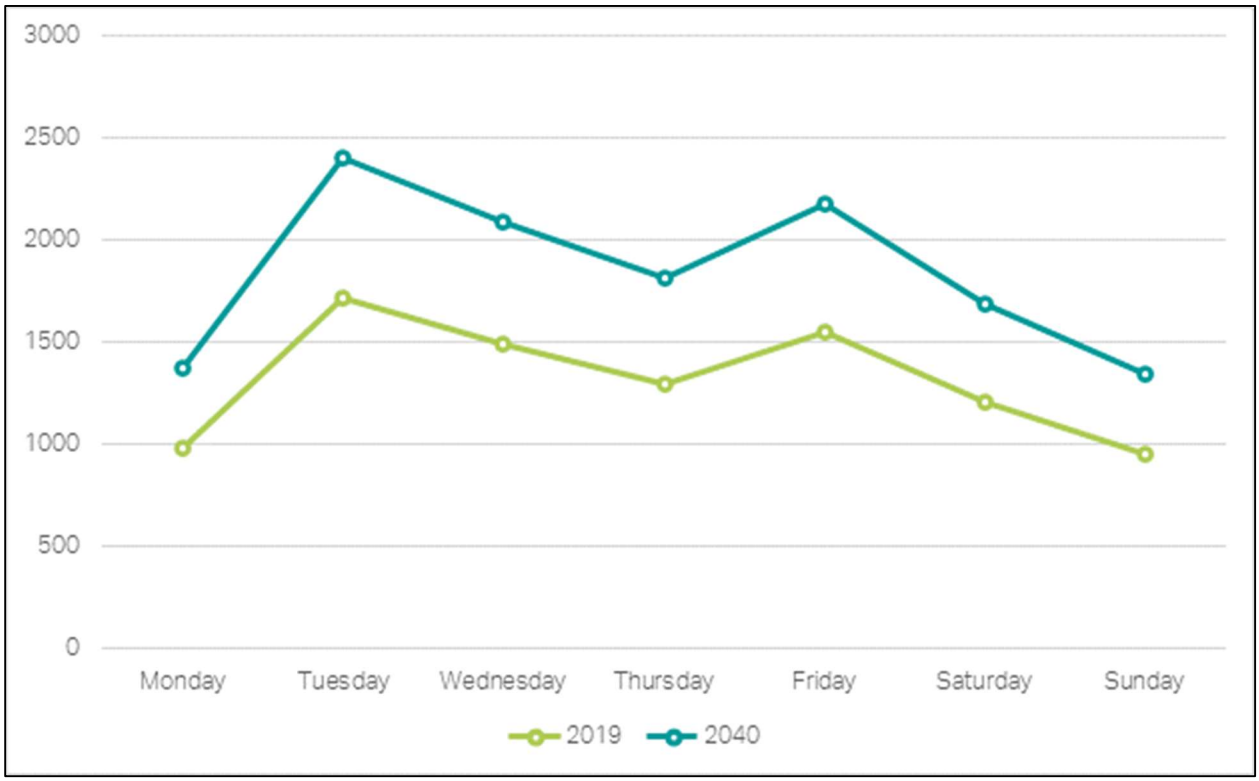
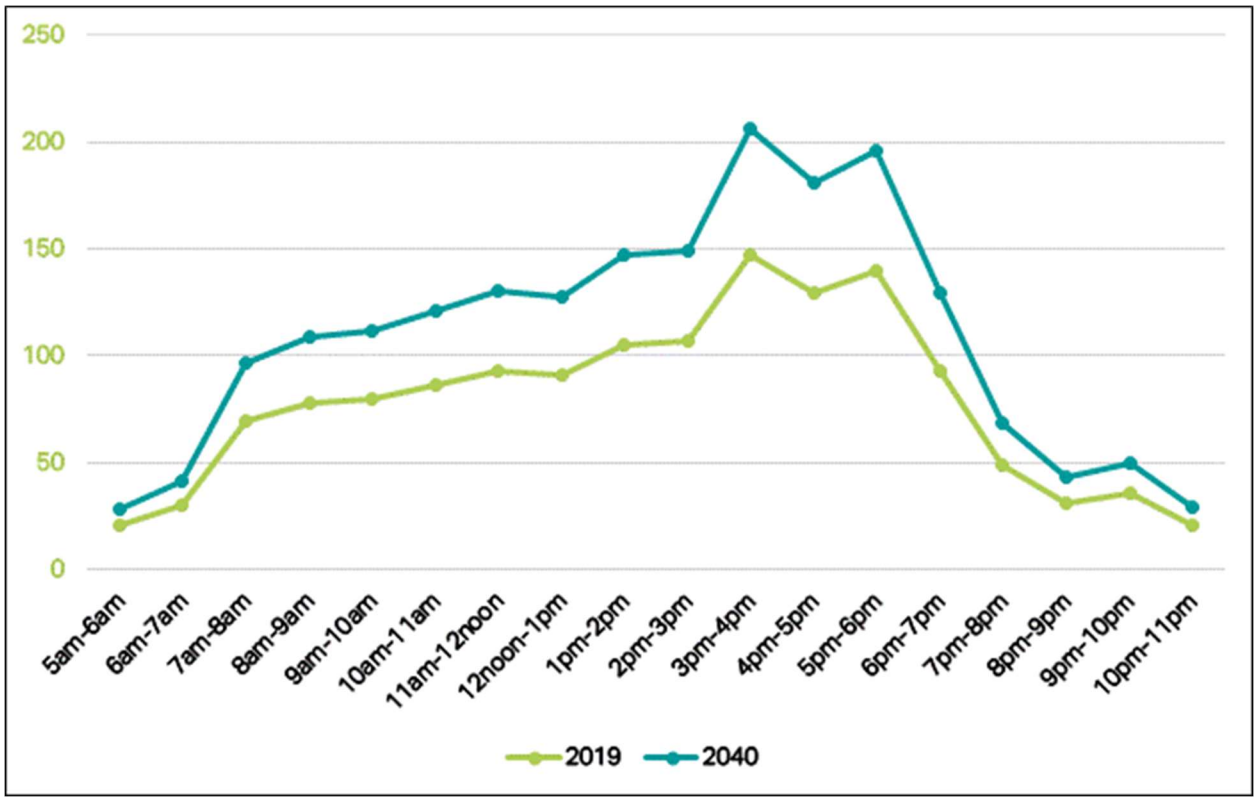



Figure 3-33: Average Daily Vehicle Trips by Time of Day from Streetlight 2019 and the 2040 Forecast



### 3.13.3 Average Trip Lengths and 2019 Vehicle Miles Traveled

Streetlight 2019 data partial origin-destination pair tables and trip durations were used to estimate the average trip lengths for EB and westbound travelers. These were estimated using weighted average of daily vehicle trips.

Daily vehicle miles and vehicle hours were also estimated based on annual average vehicle trips and average trip lengths for the EB and westbound travelers.

Table 3-4 shows the estimated trip lengths and vehicle miles and vehicle hours of travel for the EB and WB travelers from Streetlight 2019 data (with White's Ferry as a modeled link) and 2019 average daily travel times and trip lengths from the LCM model (without White's Ferry). The LCM model estimates were based on the trip length and average daily travel time between the origins and destinations of the travelers who used White's Ferry in 2019. These are primarily trips between Poolesville and Leesburg using the Point of Rocks Bridge.

Table 3-4: Average Daily Trip Lengths and Miles and Hours of Travel for 2019 White's Ferry Users

| Measures | Streetlight 2019 With White's Ferry | | LCM Model 2019 Without White's Ferry | |
|---|---|---|---|---|
| | Eastbound | Westbound | Eastbound | Westbound |
| Time (minutes) | 58.5 | 57.2 | 67.3 | 63.5 |
| Distance (miles) | 24.7 | 25.0 | 41.7 | 42.0 |
| Speed (mph) | 25.3 | 26.6 | 37.2 | 39.7 |
| Vehicle Trips | 768 | 696 | 768 | 696 |
| Vehicle-Miles | 18,962 | 17,393 | 32,013 | 29,219 |
| Vehicle-Hours | 749 | 663 | 861 | 763 |

### 3.13.4 Alternative Routes Analysis and 2040 Vehicle Miles Traveled

If White's Ferry is not available, the travelers who use White's Ferry will need to select an alternate route. The alternative route analysis focused on the primary origin and destination locations of White's Ferry users extracted from the Streetlight data. The analysis includes travelers who used White's Ferry and those who used alternate routes between the same origins and destinations. The analysis showed that:

a. 83 percent of the travelers between primary Virginia origins and Maryland destinations use White's Ferry and about 17 percent use the Point of Rocks Bridge on Route 15 and less than one percent use the American Legion Bridge on the Capital Beltway.

b. 78 percent of the major Maryland origins and Virginia destinations use White's Ferry and about 21 percent use the Point of Rocks Bridge on Route 15 and less than one percent use the American Legion Bridge on the Capital Beltway.

Figure 3-34 and Figure 3-35 show the traffic volume heatmaps for the alternate routes for the primary origin-destination trips of White's Ferry users.

This analysis confirms that the only viable travel alternative for White's Ferry users is the Point of Rocks Bridge on Route 15, further exacerbating the traffic concerns on Route 15 and the bridge. According to Google Maps, the trip via Route 15 should take 39 minutes to drive the 25 miles from Poolesville to Leesburg. Using White's Ferry service reduces that trip length to 11 miles, essentially cutting the trip distance in half.

Figure 3-34: Alternate Routes for Eastbound White's Ferry Origins and Destinations, Streetlight 2019

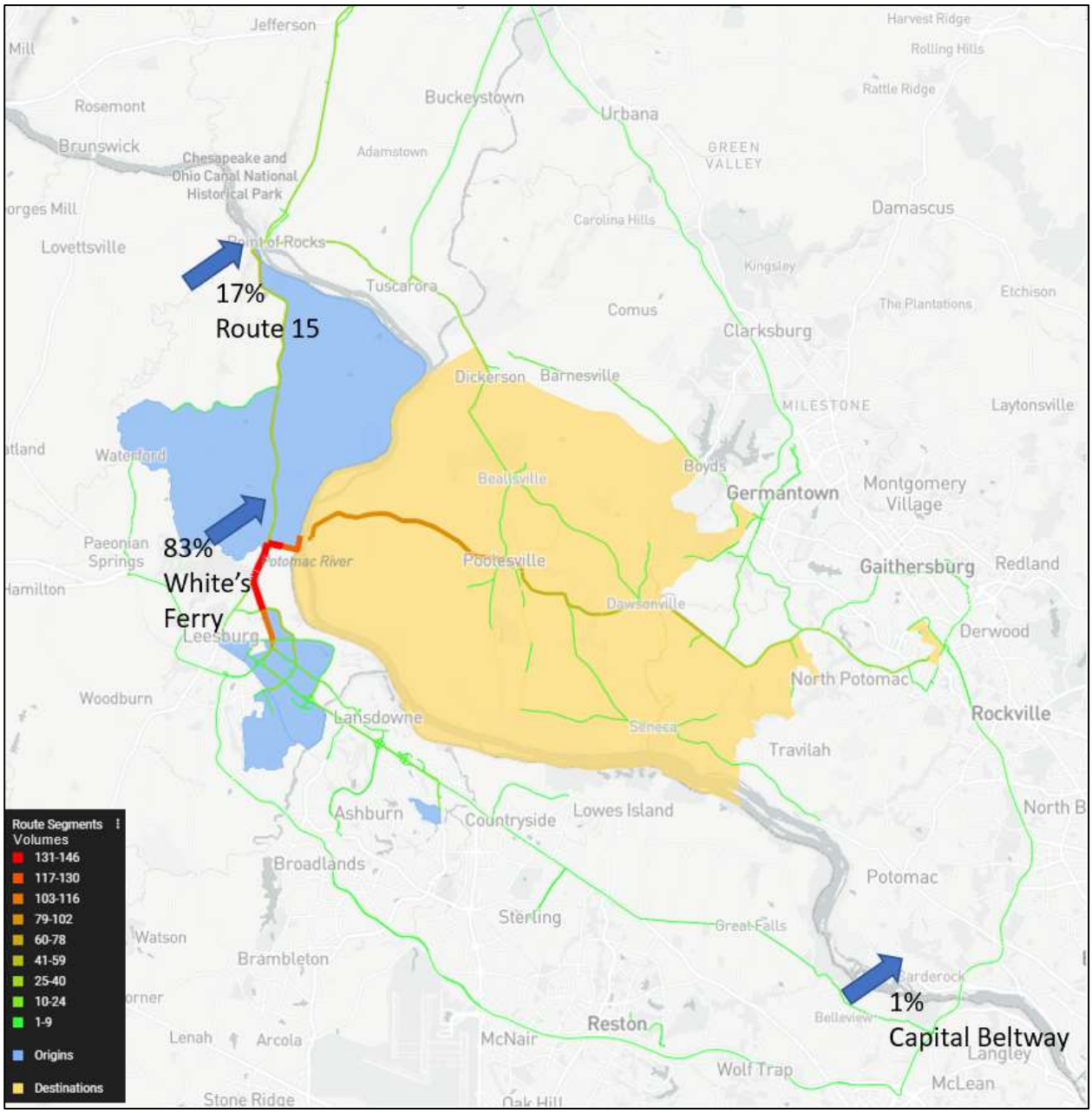
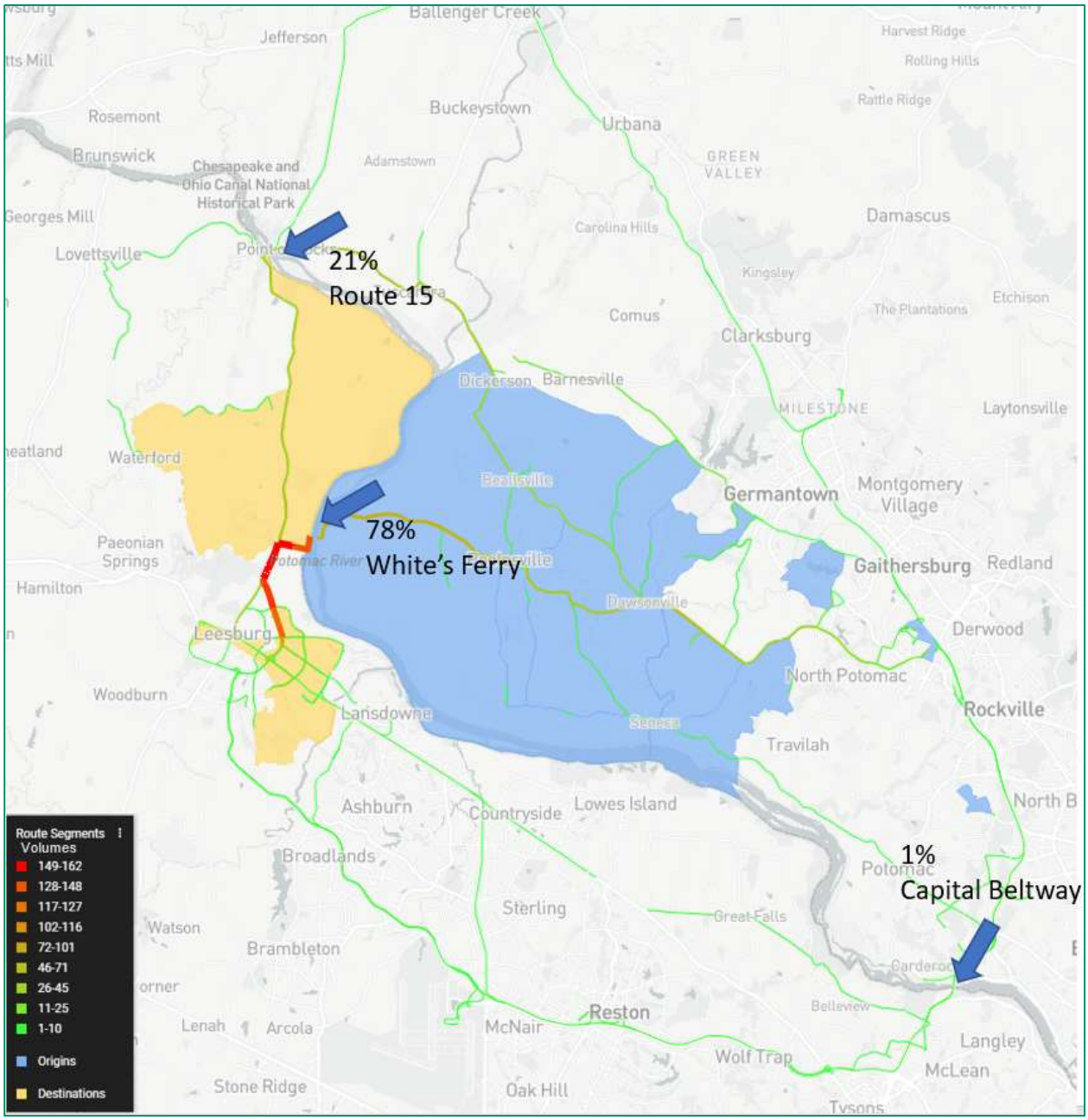


Figure 3-35: Alternate Routes for Westbound White's Ferry Origins and Destinations, Streetlight 2019




To estimate the travel times for 2040, LCM congested travel times on facilities in the study area (e.g., Route 15, White's Ferry Road, MD 28, etc.) were compared between 2040 and 2019 model applications. The future traffic congestion was applied to the Streetlight 2019 travel time estimates to calculate the average 2040 travel times. Estimates without White's Ferry were derived from the model for the primary White's Ferry origin-destination pairs (e.g., Poolesville to Leesburg).

As shown in the Figure 3-36 and Figure 3-37, travel times generated by the Loudoun Count Model on Route 15 and MD 28 between 2019 and 2040 increase by 22 percent for PM peak period EB travel and by 12 percent for AM peak period WB travel. Table 3-5 shows the travel impacts with and without the Ferry in 2040. It shows a 68 percent increase in vehicle miles of travel and a 17 percent increase in vehicle hours of travel without the Ferry.

Figure 3-36: Eastbound PM Peak Period Travel Time Changes between 2019 and 2040 (minutes)

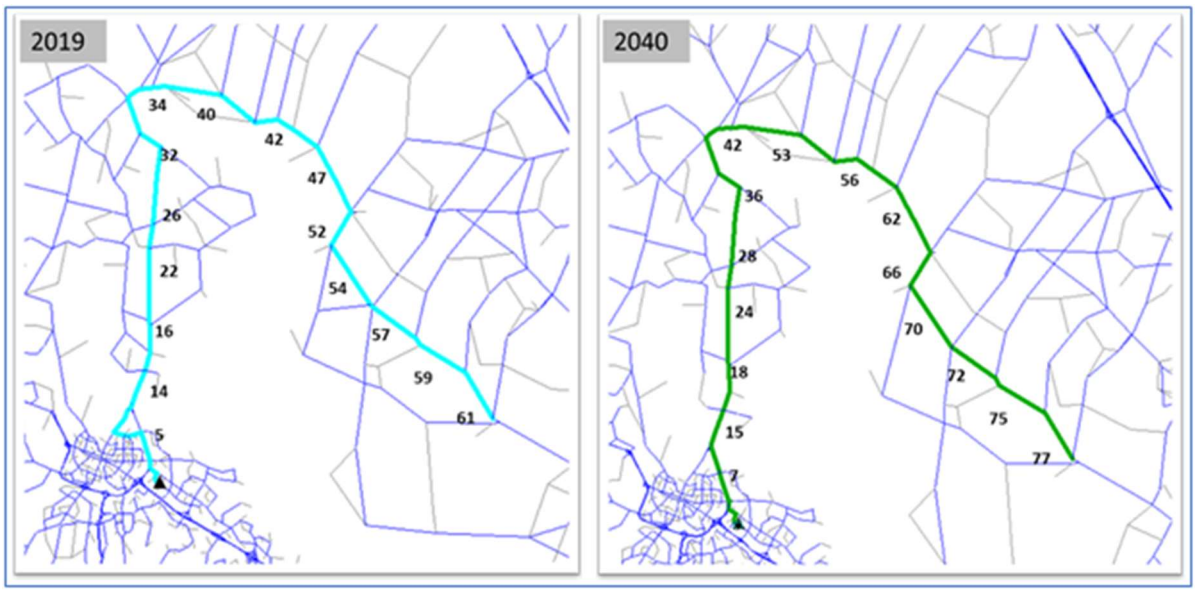



Figure 3-37: Westbound AM Peak Period Travel Time Changes between 2019 and 2040 (minutes)

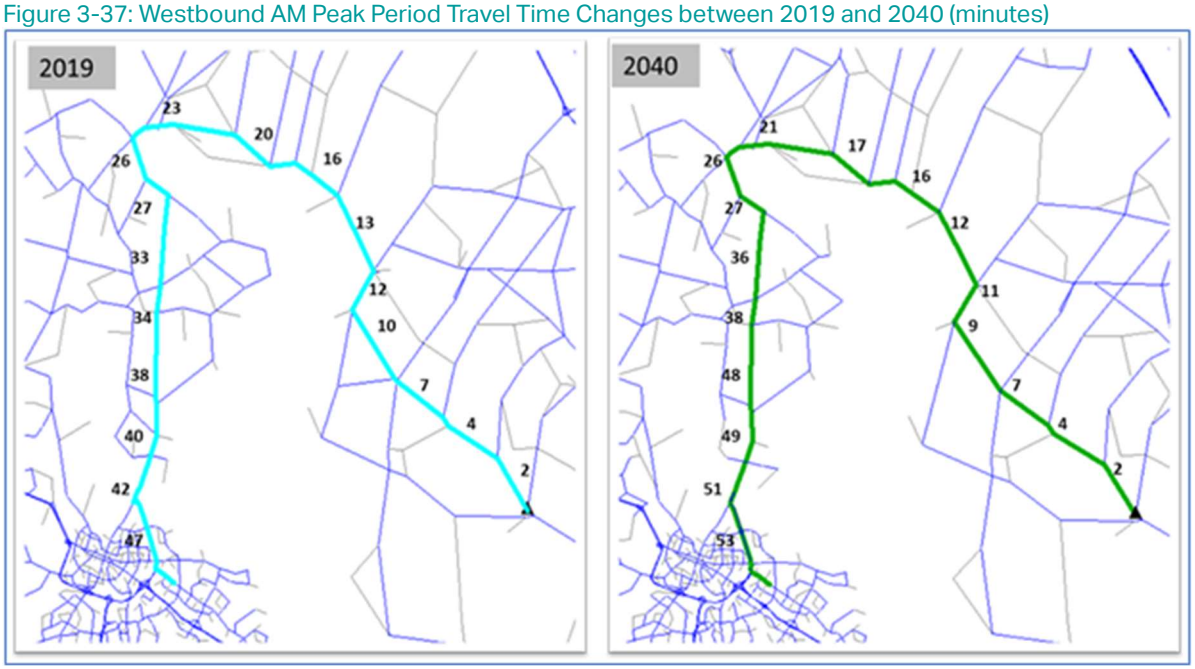


Table 3-5: Peak Period Travel Time and Daily Miles and Hours of Travel in 2040

| Measure | 2040 Forecast with White Ferry | | 2040 Forecast without White Ferry | |
|---|---|---|---|---|
| | Eastbound | Westbound | Eastbound | Westbound |
| Time (minutes) | 65.0 | 63.5 | 76.1 | 74.3 |
| Distance (miles) | 24.7 | 25.0 | 41.7 | 42.0 |
| Speed (mph) | 22.8 | 23.6 | 32.9 | 33.9 |
| Vehicle Trips (Daily) | 1,075 | 974 | 1,075 | 974 |
| Vehicle-Miles (Daily) | 26,547 | 24,350 | 44,818 | 40,907 |
| Vehicle-Hours (Daily) | 1,165 | 1,031 | 1,363 | 1,207 |


# 4

# Potential Alternatives

# 4 Potential Alternatives

This chapter will identify the minimum requirements to restore service in the immediate term today and show how the service might need to evolve and be improved to respond to and accommodate future ridership demands and maximize service benefits to the public on both sides of the river. Longer term investments include potential vessel improvements as the existing vessel ages beyond its expected lifespan.

This chapter will review:

- Existing daily demand characteristics
- The impact of future demand on operational capacity constraints
- Requirement to restart service with minimal changes
- Long-term infrastructure changes to be considered to improve the capacity of the system, which include staffing, roadway, fare collection, lighting, and vessel improvements
- Identification of service delivery options (ownership and operations) to be considered to restart the service
- Estimated timelines to restart the service

## 4.1 Sample Operations Plan

### 4.1.1 Existing Travel Demand

The existing travel demand is described in Chapter 3 and was an input into future travel demand estimates. The demand estimates from the Streetlight platform were compared to traffic counts on the Maryland and Virginia approaches to the Ferry and were determined to be a good representation of actual conditions. An analysis of peak day conditions was conducted to understand the difference between the peak and typical day. This comparison was performed by examining the demand for each day of 2019 (Table 4-1), as estimated by Streetlight. The analysis results show that higher than typical travel patterns occur several times per year, and the peak travel demand can be almost three times higher than travel demand on a typical day.

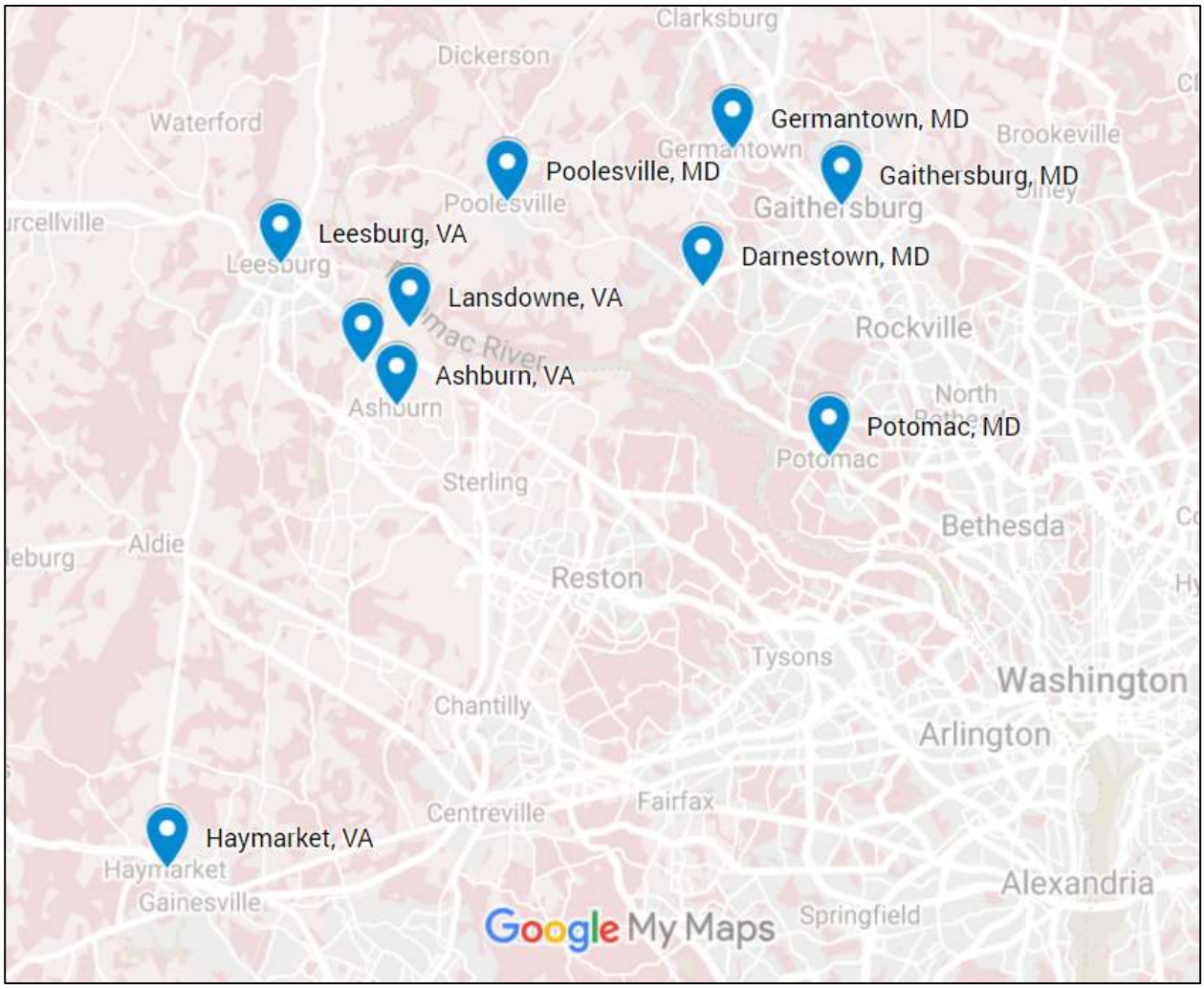
Table 4-1: 2019 Estimated Daily Demand

| Date | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 790 | 423 | 614 | 598 | 784 | 1328 | 548 | 902 | 1480 | 829 | 812 | 278 |
| 2 | 790 | 127 | 1048 | 930 | 934 | 1253 | 861 | 825 | 1254 | 658 | 1173 | 525 |
| 3 | 957 | 593 | 361 | 731 | 693 | 476 | 1201 | 1134 | 828 | 744 | 903 | 896 |
| 4 | 999 | 719 | 542 | 697 | 904 | 927 | 731 | 696 | 727 | 1001 | 662 | 525 |
| 5 | 957 | 804 | 578 | 797 | 482 | 727 | 1070 | 877 | 702 | 1315 | 451 | 927 |
| 6 | 832 | 677 | 614 | 1063 | 90 | 1052 | 913 | 722 | 602 | 658 | 722 | 773 |
| 7 | 499 | 635 | 470 | 897 | 181 | 526 | 1174 | 1057 | 1229 | 801 | 662 | 896 |
| 8 | 416 | 973 | 723 | 465 | 633 | 1278 | 261 | 902 | 652 | 629 | 963 | 804 |
| 9 | 666 | 1397 | 1192 | 531 | 874 | 852 | 652 | 722 | 627 | 686 | 842 | 309 |
| 10 | 874 | 550 | 1012 | 631 | 934 | 551 | 757 | 877 | 552 | 601 | 752 | 835 |
| 11 | 790 | 339 | 397 | 797 | 1145 | 752 | 809 | 1057 | 853 | 1115 | 391 | 556 |
| 12 | 624 | 719 | 506 | 897 | 573 | 652 | 1018 | 645 | 828 | 2145 | 722 | 556 |
| 13 | 83 | 593 | 795 | 1195 | 482 | 652 | 1174 | 696 | 502 | 1173 | 572 | 649 |
| 14 | 416 | 635 | 903 | 631 | 934 | 802 | 913 | 748 | 903 | 887 | 481 | 618 |
| 15 | 790 | 466 | 1084 | 664 | 693 | 1278 | 548 | 490 | 1154 | 658 | 782 | 525 |
| 16 | 790 | 931 | 867 | 631 | 784 | 977 | 809 | 722 | 577 | 629 | 1113 | 402 |
| 17 | 374 | 677 | 1337 | 631 | 1055 | 652 | 835 | 877 | 853 | 658 | 752 | 618 |
| 18 | 582 | 719 | 542 | 565 | 1055 | 802 | 861 | 1109 | 778 | 1601 | 632 | 680 |
| 19 | 666 | 889 | 723 | 465 | 1175 | 1153 | 757 | 722 | 928 | 1601 | 842 | 835 |
| 20 | 582 | 212 | 903 | 1162 | 904 | 852 | 861 | 593 | 1054 | 686 | 722 | 618 |
| 21 | 374 | 762 | 542 | 199 | 964 | 877 | 600 | 438 | 1104 | 543 | 782 | 1051 |
| 22 | 458 | 719 | 0 | 731 | 1145 | 1529 | 966 | 825 | 903 | 629 | 391 | 1051 |
| 23 | 749 | 254 | 36 | 697 | 904 | 1078 | 887 | 773 | 853 | 715 | 993 | 804 |
| 24 | 707 | 381 | 686 | 631 | 844 | 626 | 1044 | 1547 | 577 | 944 | 542 | 464 |
| 25 | 166 | 212 | 506 | 830 | 1688 | 727 | 913 | 1366 | 928 | 1030 | 752 | 556 |
| 26 | 42 | 127 | 939 | 797 | 2441 | 777 | 731 | 748 | 803 | 1373 | 873 | 835 |
| 27 | 125 | 593 | 542 | 2258 | 1055 | 877 | 1409 | 748 | 853 | 772 | 542 | 649 |
| 28 | 874 | 593 | 1156 | 2059 | 603 | 902 | 1122 | 619 | 1003 | 629 | 481 | 835 |
| 29 | 707 | 0 | 795 | 764 | 844 | 1253 | 626 | 954 | 903 | 744 | 1143 | 711 |
| 30 | 624 | 0 | 1012 | 830 | 1236 | 1704 | 913 | 1083 | 502 | 572 | 933 | 495 |
| 31 | 291 | 0 | 831 | 0 | 753 | 0 | 913 | 2011 | 0 | 543 | 0 | 835 |

As discussed in section 3.3.4, weekend demand for the ferry is 30 to 50 percent higher than weekday demand. Peak demands occur on a weekend in April, late May (Memorial Day weekend), and several weekends in October. The highest directional demand ranged, for example, from a low of 482 on May 13, 2019, to a high of 2,441 on May 26, 2019. The peak demand day is nearly 2.5 times higher than the average day in July 2019. There may be many factors that contribute to peak demand, including C&O Canal towpath usage days, special events in one of the towns on either side of the Potomac River, or public holidays. The number of peak days supports the need for a more organized queuing operation, possibly with multiple queueing or processing lanes, to minimize queues on peak days.

To understand the reasons for these peaks, Streetlight's Pre-Set Geography analysis was conducted with census block group origins for a typical and peak day in the spring and fall seasons. The results were then aggregated to Census places. The analysis shows that several places in Virginia, such as Leesburg, Lansdowne Belmont, Ashburn, and Haymarket generated significantly higher demand on the approaches to White's Ferry on peak days than on off-peak days. Similarly, higher demand in Maryland was observed in Germantown, Poolesville, Potomac, Darnestown, and Gaithersburg. These locations are shown in Figure 4-1 below.

Figure 4-1: Census Places with Higher Trips to White's Ferry Approaches on Peak Days




## 4.1.2 Existing Ferry Operations and Growth

Based on the former operator interview, it takes approximately 6 minutes to load the Ferry, 3 minutes to make the river crossing, and 6 minutes to unload for a 15-minute one-way trip or two full round trips per hour. The results of location-based data and resultant traffic volumes do tend to suggest that the operator was running up to six or seven trips per hour in peak times, although this cannot be verified because of the lack of available trip records. The service also operated on an on-demand basis to reduce waits on either side in non-peak periods. Table 4-2 shows a schedule based on a 15-minute one-way trip.

Table 4-2: Presumed Operations Timetable

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lv. Maryland | 0:12 | **5:00** | 5:30 | **6:00** | 6:30 | **7:00** | 7:30 | **8:00** | 8:30 | **9:00** | 9:30 | **10:00** | 10:30 | **11:00** | 11:30 | **12:00** | 12:30 |
| Ar. Virginia | 0:03 | 5:03 | 5:33 | 6:03 | 6:33 | 7:03 | 7:33 | 8:03 | 8:33 | 9:03 | 9:33 | 10:03 | 10:33 | 11:03 | 11:33 | 12:03 | 12:33 |
| Lv. Maryland | 0:12 | 5:15 | 5:45 | 6:15 | 6:45 | 7:15 | 7:45 | 8:15 | 8:45 | 9:15 | 9:45 | 10:15 | 10:45 | 11:15 | 11:45 | 12:15 | 12:45 |
| Ar. Virginia | 0:03 | 5:18 | 5:48 | 6:18 | 6:48 | 7:18 | 7:48 | 8:18 | 8:48 | 9:18 | 9:48 | 10:18 | 10:48 | 11:18 | 11:48 | 12:18 | 12:48 |

The existing demand to service capacity (Figure 4-2) suggests that there are either crossing waits later in the day or the operator manages to deliver a faster service to reduce the number of cars left at either side. This capacity constraint would be exacerbated in the future when compared to future growth in traffic if no improvements to the operations or the vessel are made by 2040. As shown in Table 4-3 by 2040 between 8 a.m. and 6 p.m., the Ferry is projected to be operating at capacity with. There will be an excess demand (expressed as crossing waits or the number of Ferry crossings occurring before vehicles in the lineup can actually board the Ferry) resulting in crossing

waits (highlighted in red), with a projected five crossing waits at 3 p.m. It should be noted that these statistics denote total demand as opposed to by-direction demand. Differences in demand direction could result in lower or higher wait times depending on the side of the river a passenger is waiting.

Figure 4-2: Total Existing Demand versus Service Capacity

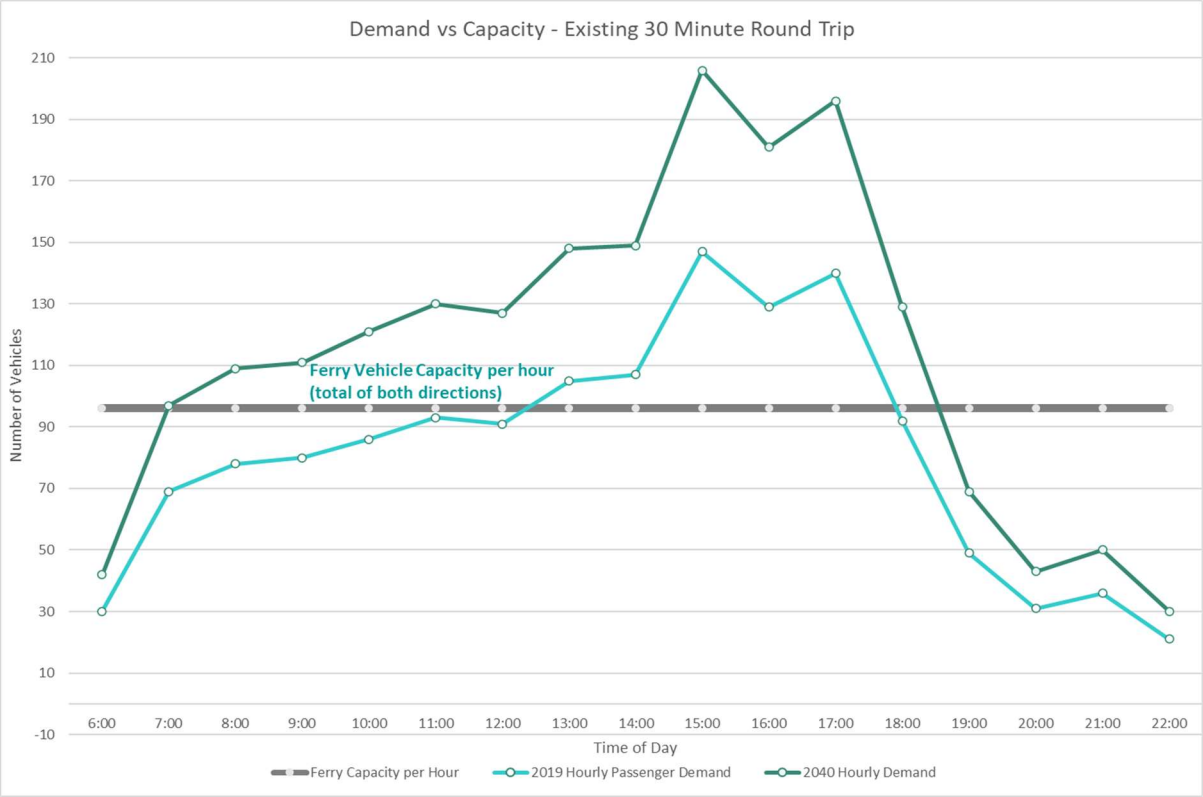



Table 4-3: Total Hourly Capacity versus Demand and Estimated Crossing Waits by 2040

| | Ferry Capacity Per Hour (Vehicles) | 2019 Hourly Demand (Vehicles) | Difference (Vehicles) | 2040 Estimated Crossing Waits | 2040 Estimated Crossing Wait Time (Minutes) | 2040 Hourly Demand (Vehicles) | Difference (Vehicles) | 2040 Estimated Crossing Waits | 2041 Estimated Crossing Wait Time (Minutes) |
|---|---|---|---|---|---|---|---|---|---|
| 6:00 | 96 | 30 | 66 | | | 42 | 54 | | |
| 7:00 | 96 | 69 | 27 | | | 97 | -1 | 1 | 30 |
| 8:00 | 96 | 78 | 18 | | | 109 | -13 | 1 | 30 |
| 9:00 | 96 | 80 | 16 | | | 111 | -15 | 1 | 30 |
| 10:00 | 96 | 86 | 10 | | | 121 | -25 | 2 | 60 |
| 11:00 | 96 | 93 | 3 | | | 130 | -34 | 2 | 60 |
| 12:00 | 96 | 91 | 5 | | | 127 | -31 | 2 | 60 |
| 13:00 | 96 | 105 | -9 | 1 | 30 | 148 | -52 | 3 | 90 |
| 14:00 | 96 | 107 | -11 | 1 | 30 | 149 | -53 | 3 | 90 |
| 15:00 | 96 | 147 | -51 | 3 | 90 | 206 | -110 | 5 | 150 |
| 16:00 | 96 | 129 | -33 | 2 | 60 | 181 | -85 | 4 | 120 |
| 17:00 | 96 | 140 | -44 | 2 | 60 | 196 | -100 | 5 | 150 |
| 18:00 | 96 | 92 | 4 | | | 129 | -33 | 2 | 60 |
| 19:00 | 96 | 49 | 47 | | | 69 | 27 | | |
| 20:00 | 96 | 31 | 65 | | | 43 | 53 | | |
| 21:00 | 96 | 36 | 60 | | | 50 | 46 | | |
| 22:00 | 96 | 21 | 75 | | | 30 | 66 | | |

Ridership would likely not continue to increase because of crossing waits or delays in crossing. Without improvements to operations, the growth in ridership would likely be much less than forecast because there will be a relationship between the length of a crossing wait versus the time added to a journey that avoids the Ferry.

### 4.1.3 Future Operations Plan Based on Improvements

If the proposed future landside improvements can reduce the loading/unloading times sufficiently to allow an overall 10-minute trip time, this would add an additional round trip per hour or three trips in either direction. The resulting schedule is shown in Table 4-4.

Table 4-4: Future Timetable at 10 Minutes per Crossing

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lv. Maryland | 0:07 | 5:00 | 5:20 | 5:40 | **6:00** | 6:20 | 6:40 | **7:00** | 7:20 | 7:40 | **8:00** | 8:20 | 8:40 | **9:00** | 9:20 | 9:40 | **10:00** | 10:20 | 10:40 | **11:00** | 11:20 | 11:40 | **12:00** |
| Ar. Virginia | 0:03 | 5:03 | 5:23 | 5:43 | 6:03 | 6:23 | 6:43 | 7:03 | 7:23 | 7:43 | 8:03 | 8:23 | 8:43 | 9:03 | 9:23 | 9:43 | 10:03 | 10:23 | 10:43 | 11:03 | 11:23 | 11:43 | 12:03 |
| Lv. Maryland | 0:07 | 5:10 | 5:30 | 5:50 | 6:10 | 6:30 | 6:50 | 7:10 | 7:30 | 7:50 | 8:10 | 8:30 | 8:50 | 9:10 | 9:30 | 9:50 | 10:10 | 10:30 | 10:50 | 11:10 | 11:30 | 11:50 | 12:10 |
| Ar. Virginia | 0:03 | 5:13 | 5:33 | 5:53 | 6:13 | 6:33 | 6:53 | 7:13 | 7:33 | 7:53 | 8:13 | 8:33 | 8:53 | 9:13 | 9:33 | 9:53 | 10:13 | 10:33 | 10:53 | 11:13 | 11:33 | 11:53 | 12:13 |

The forecasts for future ridership show that this increase in service levels is sufficient to accommodate the majority of demand today, with the exception of several trips between 3 p.m. and 5 p.m. that may be close to capacity (see Figure 4-3). By 2040, however, even with potential reduced trip times there is an overall shortfall in capacity between 1 p.m. and 5 p.m., with one to three crossing waits (both directions) (see Table 4-5). This scale of capacity deficit can likely only be overcome through an increase in vessel size or incentives to encourage travelers to shift their travel away from the peak.

Figure 4-3: Total Potential Demand versus Service Capacity

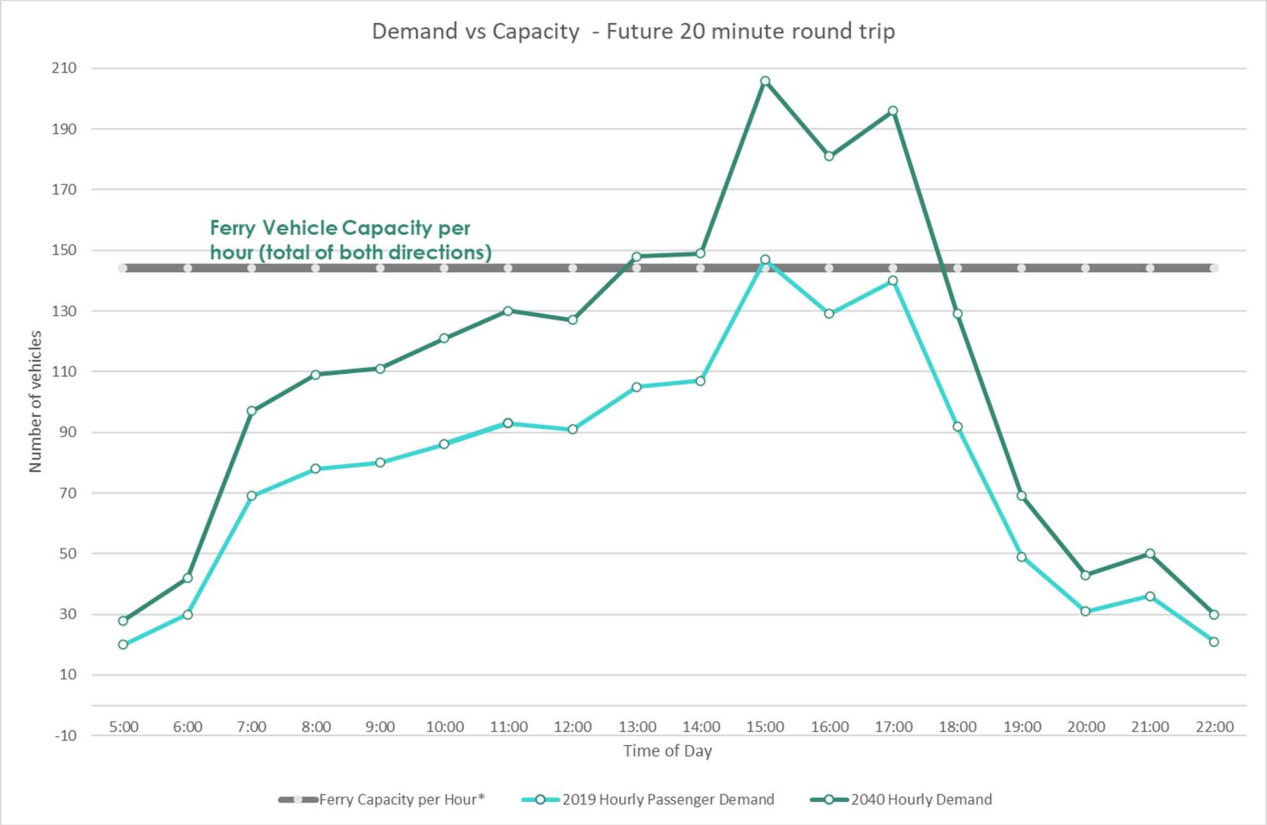


Table 4-5: Total Hourly Capacity to Demand and Estimated Crossing Waits with Improvements

| | Ferry Capacity per Hour (Vehicles) | 2019 Hourly Passenger Demand (Vehicles) | Difference (Vehicles) | 2040 Hourly Demand (Vehicles) | Difference (Vehicles) | 2040 Estimated Crossing Wait | 2040 Estimated Crossing Wat (Minutes) |
|---|---|---|---|---|---|---|---|
| 5:00 | 144 | 20 | 28 | 28 | 114 | | |
| 6:00 | 144 | 30 | 114 | 42 | 114 | | |
| 7:00 | 144 | 69 | 75 | 97 | 109 | | |
| 8:00 | 144 | 78 | 66 | 109 | 46 | | |
| 9:00 | 144 | 80 | 64 | 111 | 41 | | |
| 10:00 | 144 | 86 | 58 | 121 | 24 | | |
| 11:00 | 144 | 93 | 51 | 130 | 19 | | |
| 12:00 | 144 | 91 | 53 | 127 | 24 | | |
| 13:00 | 144 | 105 | 39 | 148 | -5 | 1 | 20 |
| 14:00 | 144 | 107 | 37 | 149 | -6 | 1 | 20 |
| 15:00 | 144 | 147 | -3 | 206 | -61 | 3 | 60 |
| 16:00 | 144 | 129 | 15 | 181 | -36 | 2 | 40 |
| 17:00 | 144 | 140 | 4 | 196 | -51 | 3 | 60 |
| 18:00 | 144 | 92 | 52 | 129 | 49 | | |
| 19:00 | 144 | 49 | 95 | 69 | 94 | | |
| 20:00 | 144 | 31 | 113 | 43 | 109 | | |
| 21:00 | 144 | 36 | 108 | 50 | 104 | | |
| 22:00 | 144 | 21 | 123 | 30 | 28 | | |

## 4.2 Minimal Requirements to Restore Ferry Service

### 4.2.1 Maryland Terminal

On the Maryland side, the existing condition of the Ferry passenger lineup was a single-file holding pattern for vehicles along Whites Ferry Road that was known to back up beyond the entrance to the NPS gravel parking lot (see Figure 4-5). When backups occurred, traffic trying to exit the parking lot, access the NPS lands to the south, or access the general store had to wait until the Ferry traffic had cleared. Pre-purchased fares were collected on board the vessel boat. Tickets were pre-purchased at the store, either in single denominations or as books of tickets, and the only forms of payment were cash or check. In addition to the captain of the vessel, there was one deckhand who managed the loading and unloading of vehicles and collected fares. There were no landside personnel on either side of the river.

There is a gravel path through the property that provides a connection to the C&O Canal towpath and a road to the south providing access to NPS lands. This access road is not aligned with the entrance to the gravel parking lot.

The following potential minor improvements could be considered prior to restart (Figure 4-5):

- Restripe a section of the road between the NPS parking lot entrance and the store parking entrance to create a queue lane that would still allow traffic to bypass vehicles that are lined up to get to the store. This may require some minor repaving to add the second lane.
- Improve payment options to include electronic debit and credit cards to increase wireless prepayment and track utilization without having to make a trip to the store. This will require improvements to the Wi-Fi connectivity in the area.

The basic elements required for restart are:

- Reconnection of the ferry cable
- Vessel inspection of the ferries and yaw boat

- Establish the employee base needed to operate the service
- Improve on-site operational data collection. Typical statistics should include (per crossing):
  - Vehicles less than 20 feet in length
  - Vehicles exceeding 20 feet in length
  - Cyclists
  - Pedestrians
  - Other uses on-site
- Consider constructing a purpose-built facility to replace the storage shed and the old barge that is partially located on NPS lands and currently is used for fuel storage. A two-story or elevated facility should be considered to ensure that fluids can be stored above historic flood levels.

### 4.2.2 Virginia Terminal

The basic elements required for restart are:

- Reconnection of the ferry cable
- Determine if the gate that was put in place to restrict access to the terminal for pleasure boaters restricts vehicle movements to and from the ferry landing.

## 4.3 Potential Enhanced Ferry Improvements

This section considers possible improvements to the landside infrastructure and the operational components of the Ferry service in the short and long term, including adopting a different approach to landside operations similar to that on the west coast of North America. As noted in the previous sections, the future traffic demand warrants investigation into possible ways to improve operations that could reduce overall trip times. Communications will play an important role in ensuring access to information for people as they plan their journey through the use of websites, social media, emails etc.

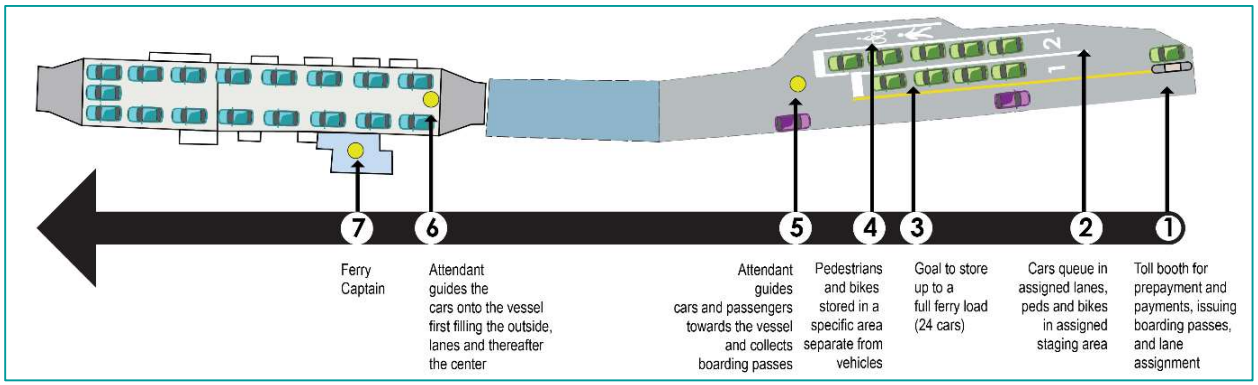
### 4.3.1 General Concepts

In many ferry operations of this size, the landside operations consist of the following elements (Figure 4-4):

- Prepayment of fares (except at DOT-run services where no fares are charged)
- Toll booths to verify prepayments, accept payments (cash and card-based electronic payments, typically requiring Wi-Fi or landline connections), and issue boarding passes
- Numbered queuing lanes for vehicles to ensure first-come, first-served boarding
- Dedicated waiting space for pedestrians and cyclists
- Appropriate landside and vessel staffing to streamline the loading and unloading activities:
  - A landside staff member who controls queuing lanes and directs vehicles, cyclists, and passengers onto the ferry
  - A deckhand who directs vehicles into parking lanes and manages gaps between cars
  - A vessel captain

If the above elements are adopted, new and improved operational areas on both sides of the Potomac River are required to increase the speed of loading and unloading. The goal is to reduce the current loading and unloading time by half to move from a 15-minute service to at least a 10-minute service. These improved operating arrangements will allow for an increase in service capacity prior to any consideration of future vessel improvements.

Figure 4-4: Ferry Landside Operations




An issue that may require further discussion is whether the improvements that would allow for larger vehicles to use the Ferry, should also extend to disallowing large freight vehicles from using the service in peak times. Although Whites Ferry Road on either side of the Potomac does not have weight restrictions, the vessel has a GVW that it cannot exceed. Therefore, a truck and trailer may displace enough vehicles to create crossing waits where none are currently forecast. Therefore, weight restrictions on larger trucks may be a consideration in future operations.

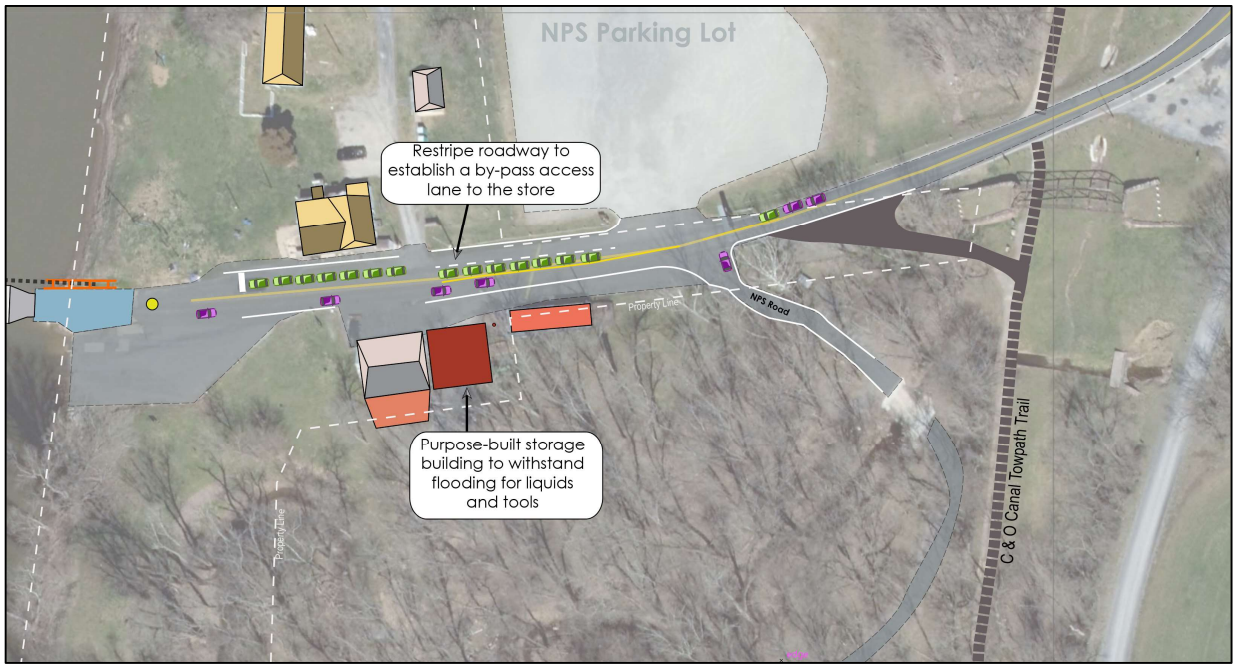
## 4.3.2 Maryland Side

### 4.3.2.1 Short Term Improvement

The following potential minor improvements could be considered after restart (Figure 4-5):

- Restripe a section of the road between the NPS parking lot entrance and the store parking entrance to create a queue lane that would still allow traffic to bypass vehicles that are lined up to get to the store. This may require some minor repaving to add the second lane.
- Improve payment options to include electronic debit and credit cards to increase wireless prepayment and track utilization without having to make a trip to the store. This will require improvements to the Wi-Fi connectivity in the area.
- Consider constructing a purpose-built facility to replace the storage shed and the old barge that is partially located on NPS lands, which is used for fuel storage. A two-story facility should be considered to ensure that fluids can be stored above historic flood levels.

Figure 4-5: Proposed Terminal Improvements in Maryland

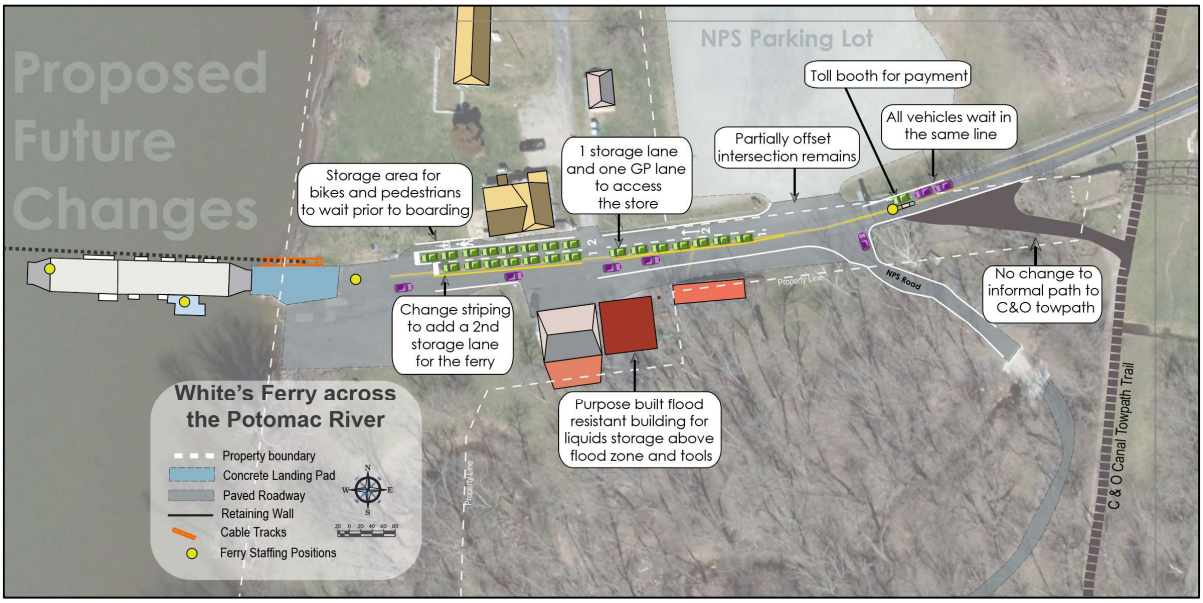



Two improvement scenarios that impact NPS lands are discussed below.

### 4.3.2.2 Long Term Improvements Without NPS Land Integration

If NPS does not plan to improve overall access to the NPS lands to the south as well as access to the NPS parking lot through an agreed-upon use of additional land, intersection improvements to better accommodate access (see Figure 4-6). Improvements to the Ferry terminal will be limited to the property east of this intersection and the NPS parking lot and access road to the NPS lands to the south, and the connector trail to the C&O Canal towpath will remain unchanged. If a toll booth is introduced, traffic queuing related to the Ferry that extends to the toll booth and beyond (a potentially regular occurrence by 2040) would restrict traffic destined for the parking lot, NPS lands, or the store.

Figure 4-6: No NPS Land Encroachments



#### 4.3.2.3 Suggested Improvements Integrated with Some NPS Land Improvements

In the review of possible improvements, the study considered public benefits for all stakeholders, including NPS and Ferry users, to improve the roadway geometrics and access to the Ferry, to the store (which could be a valuable resource for active transportation uses on NPS lands), and to the gravel parking lot and the NPS lands to the south that may be considered for additional facility improvements in the future. Improving the access for all users would require input and approval from NPS on proposed changes that include both private and NPS lands and should only be pursued as a partnership. It should be noted that improvements on federal lands will be require a more complex effort than modification on the private property around the ferry landing.

NPS has requested removal of the annex from the storage shed (see section 3.10.1) and the old barge that is used as a storage facility for tools and fuel, which both encroach on NPS land. Evaluation of alternative options for the ferry operation found that a new multi-level facility should be considered to the east of the existing storage shed to allow for storage of fuel and other materials on an upper level and beyond river flood levels. The ground level could be enclosed and used for additional storage or could be open and used for parking for staff. This improvement will require new paving, resurfacing, and striping to create a more cohesive space for all users.

As shown in Figure 4-7 and Figure 4-8, the road providing access to NPS lands in the south and the pathway to the towpath would require realignment to create an appropriate intersection with the NPS parking lot. This would allow more traffic to use the intersection to access the various destinations while the dedicated queuing lanes for the Ferry are occupied. The road would be paved and striped west of this intersection to accommodate egress from the Ferry, two lanes for vehicle storage, and a holding area for cyclists and pedestrians. The roadway east of the intersection would include a third lane on the outside of the existing right-of-way to create a lane for Ferry traffic and a bypass lane for those accessing the NPS parking lot, the NPS lands to the south, or the general store.

The Ferry lane would include a toll booth for ticketing and fare payments, which should be connected to enhanced Wi-Fi to allow for the use of electronic debit and credit cards.

Figure 4-7: Suggested changes to the Maryland Side with NPS Land Agreement

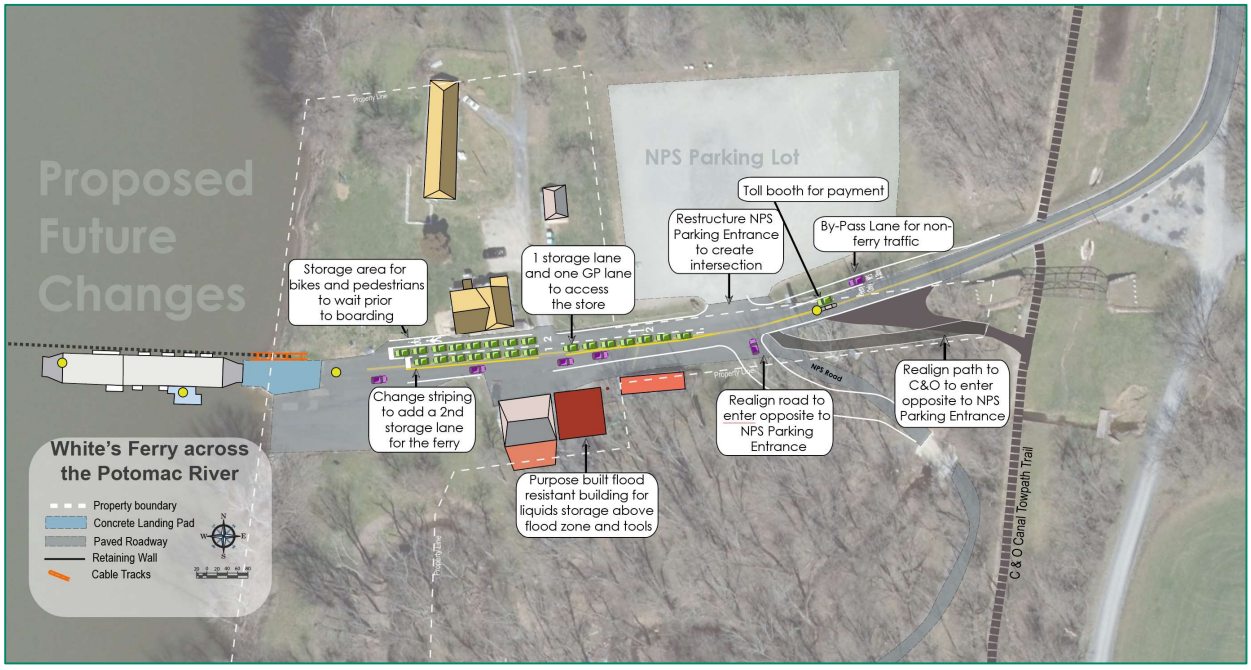
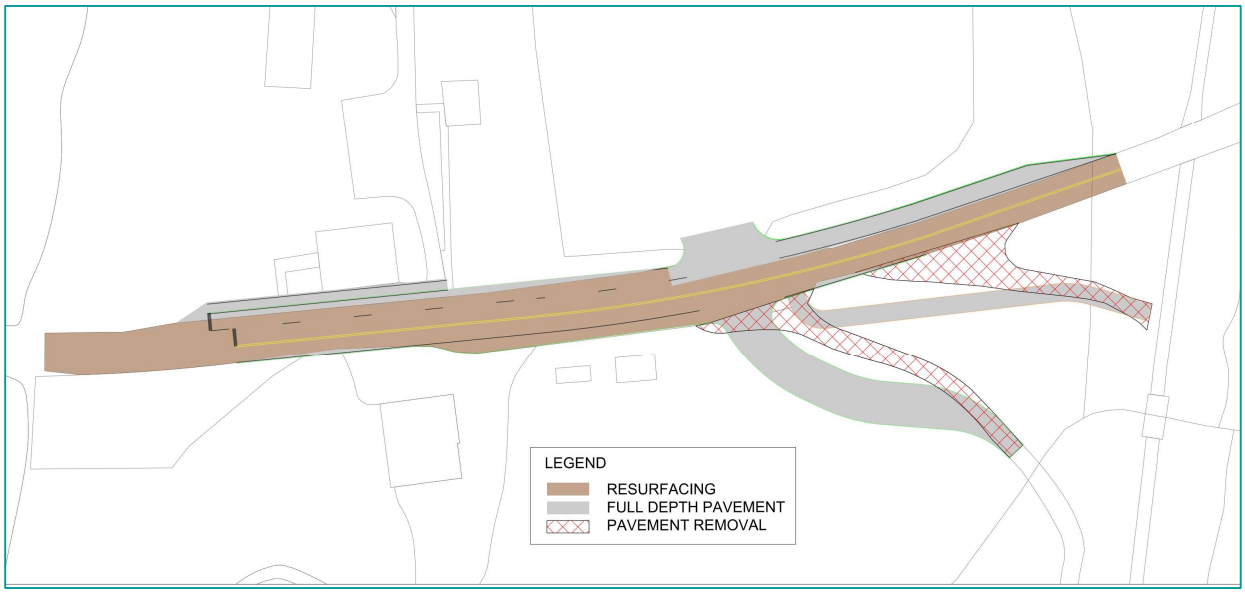


Figure 4-8: Technical Drawing Depicting Proposed Maryland Land Use Alterations




## 4.3.3 Virginia Side

### 4.3.3.1 Short Term

Upon resolution of the terminal and right-of-way arrangements in Virginia, the following improvements are recommended from an asset preservation and operational perspective:

- Removal of the deteriorated concrete surface and repair of several isolated patches on the landing ramp
- Cleaning of joints and cracks and application of joint sealant on the concrete landing ramp
- Restoration of the lighting system (generator powered) to good working condition. The previous owner operated a similar system to improve lighting. A short term option would be to use a generator based temporary light to provide sufficient illumination the landing area to improve visibility for staff and users. This could be upgraded to electric lighting to add roadway lighting and provide land side power for a toll booth and quick recharging of an electric vessel in the future. The rough cost of these improvements is estimated at $10,000.

### 4.3.3.2 Long Term

While not required to restart Ferry operations, future improvements to the Virginia side could include the removal of the hairpin bend leading to the landing, which would allow Ferry use by recreational vehicles or coaches (see Figure 4-9 and Figure 4-10). This would, however, not extend to use of the service by large freight trucks. To accommodate larger vehicles, a new roadway that establishes a wider turn, using a 60-foot radius, to a new landing site and realignment of the Ferry cable will be required (see section 3.2.5 for further discussion). The new roadway could be located adjacent to the existing Ferry terminal (see Figure 4-9) and could ultimately feature a shared-use path connection to Route 15 and Leesburg where a new shared-use path is planned for construction as part of the Route 15 improvement project. The road would have a waiting area for pedestrians and cyclists along with two lanes of queuing traffic and an exit lane. The change in boat landing position could potentially allow the property owner to create a roadway to the old dock for recreational boating purposes. There should also be a toll booth for payment and boarding passes that would require Wi-Fi access.

Figure 4-9: Virginia Side Long-Term Suggested Improvements

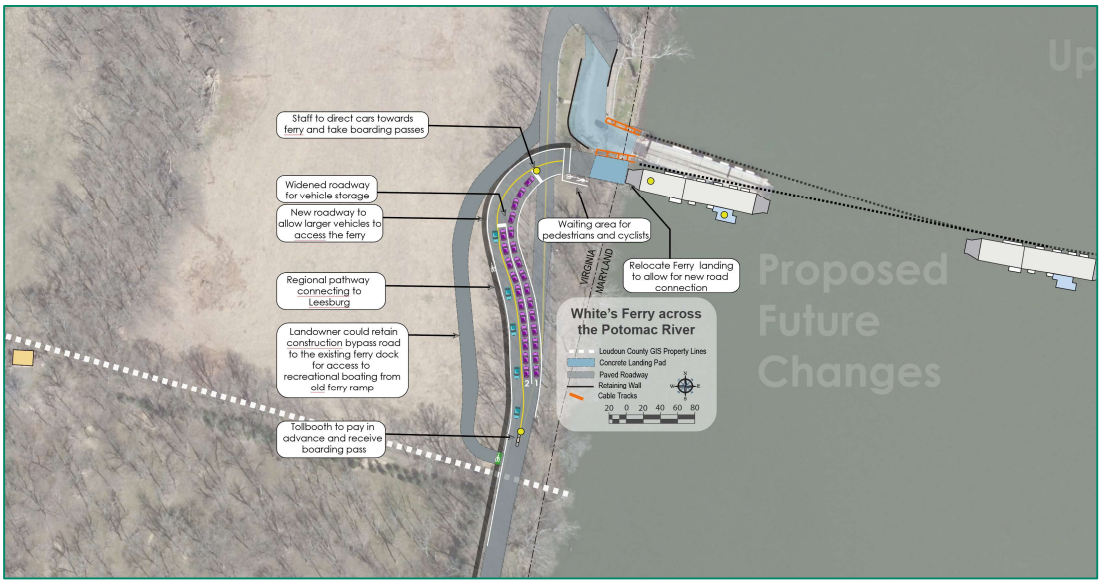
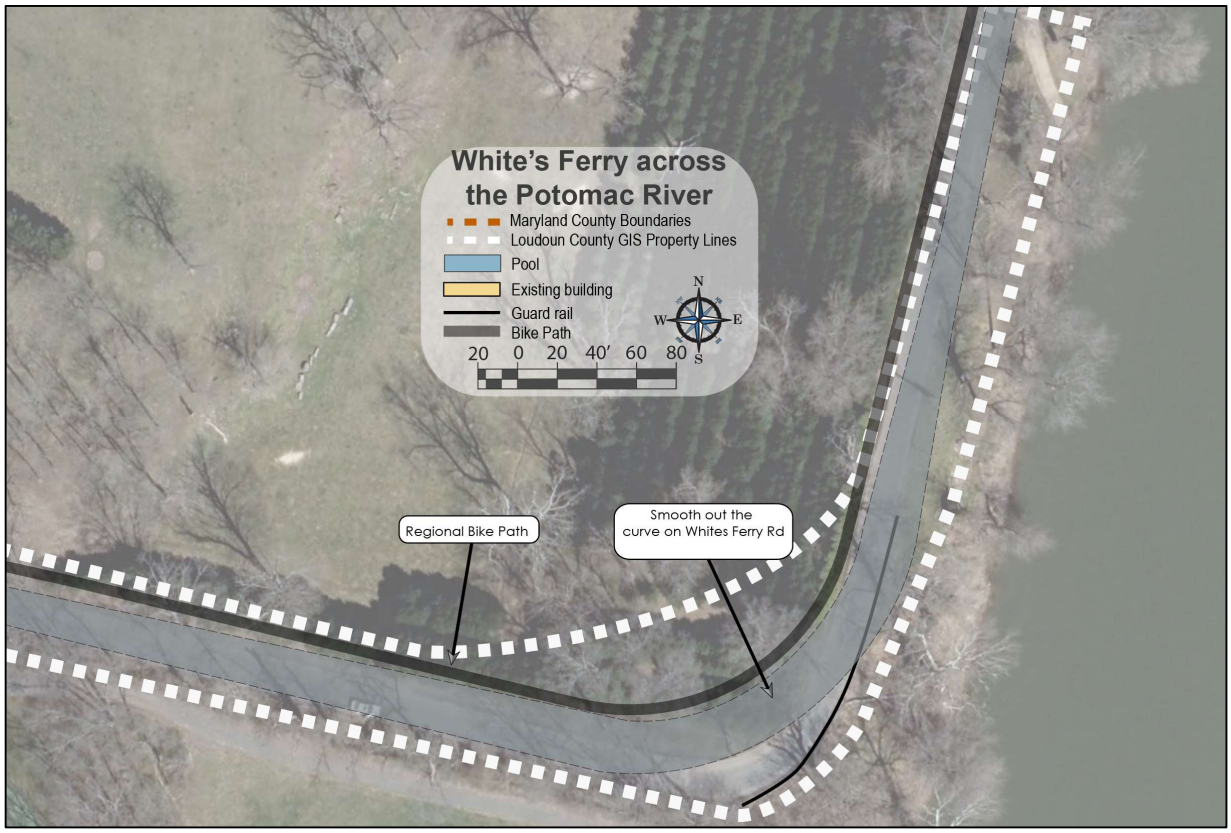



Figure 4-10: CAD drawing of Proposed Roadway Adjustments on Virginia Side


A second component of infrastructure improvements should include geometric improvements to the 90 degree turn on Whites Ferry Road south of the Ferry terminal to increase the turn radius as much as possible while remaining within the existing right- of-way (see Figure 4-11).

Figure 4-11: Roadway Improvements on Whites Ferry Road




## 4.3.4 Adjustable Slips and Loading Ramps

Further research into the potential provision of adjustable ramps for Ferry docking to reduce Ferry disruptions and better accommodate Ferry operations during river level fluctuations and minor flooding is recommended. The existing fixed concrete ramp is typical of what is provided at low-use ferry operation sites (see Figure 4-12 and Figure 4-14). The projected growth in traffic volumes does, however, suggest a higher use of the Ferry in the future. A floating ramp or slip could be as simple as a system of "dolphin" posts and rings (as used for the old Ferry barge and shown in Figure 4-13) that allow the landing to float and adjust its height during floods or a ramp could be adjustable through other means (see Figure 4-15 through Figure 4-18).

Higher-use ferry services, such as the Toronto Island ferry system (see Figure 4-16 and Figure 4-17), often have ramps and slips that adjust to tidal movements of lakes or oceans, which could help reduce closures of the existing service when the river is too high or too low. The goal of an adjustable ramp is to improve the angle between the boat and the ramp so that vehicles are still able to access and exit the Ferry. The feasibility of adding loading ramps to the vessel that are lowered onto the terminal concrete pads should also be considered to facilitate improved roll-on-roll-off vehicle movements. Some vessels have extended ramps that are adjustable versus having the adjustable ramp on the landside. The existing vessels have small ramps that are not adjustable.

Figure 4-12: Existing Concrete Ramp


Figure 4-13: Floats Rail to Accommodate River Water Fluctuation

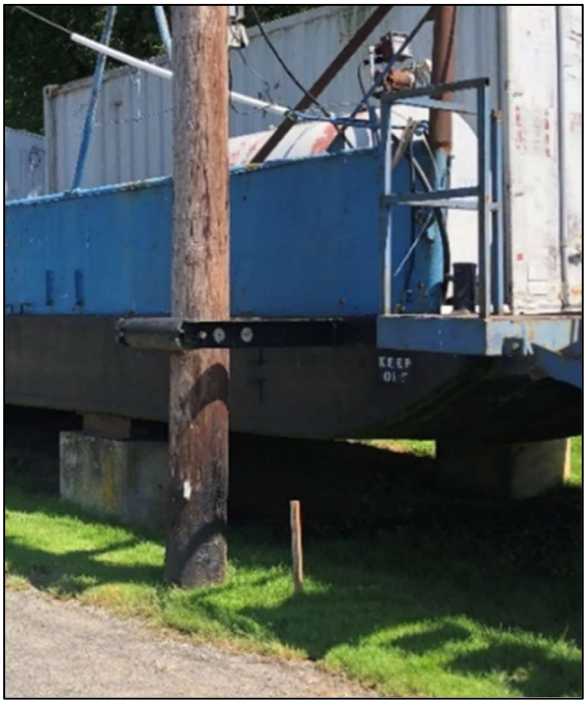


Figure 4-14: Fixed Ferry Ramp (facilitates horizontal movement only)

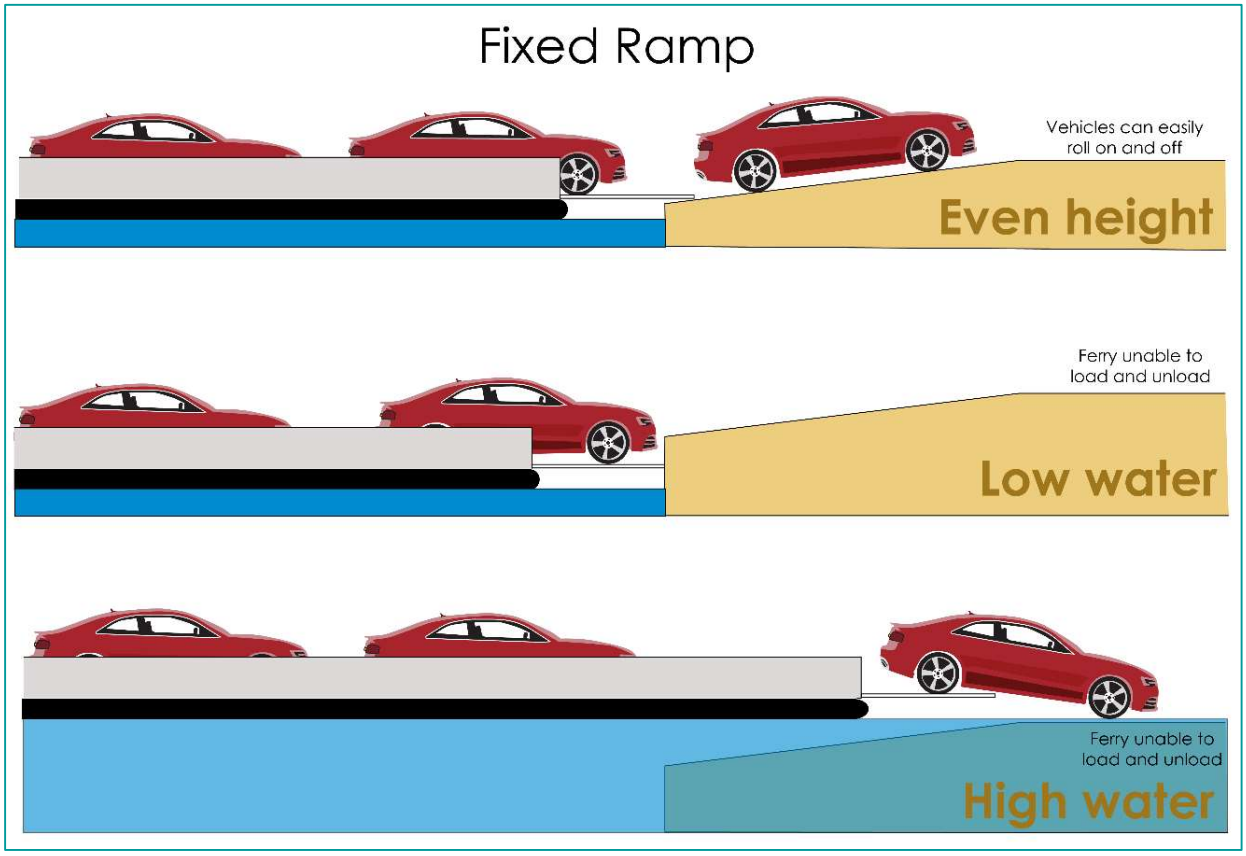
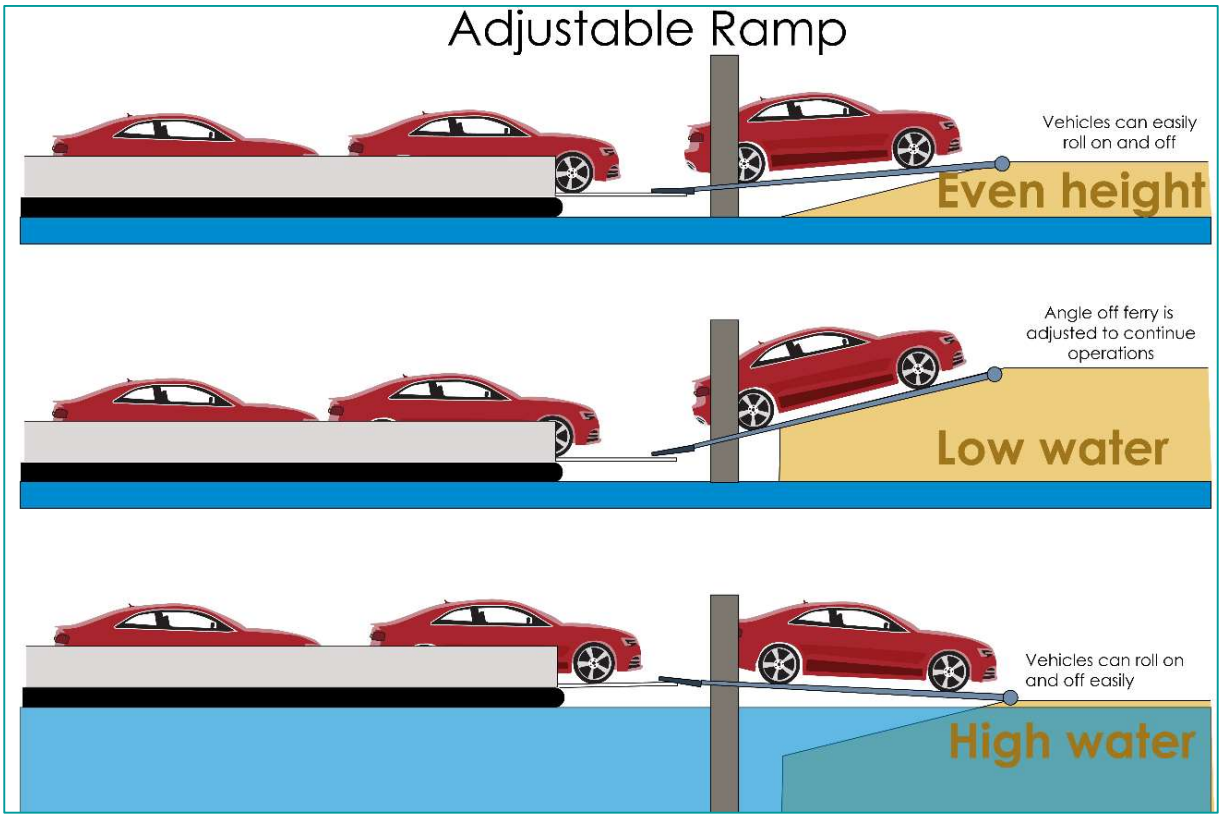


Figure 4-15: Adjustable Ferry Ramp to Facilitate Horizontal and Vertical Movement




Some ferry slips use a hinged steel plate ramp like those of the Toronto Island ferry system, which connects an island chain with downtown Toronto, Ontario (see Figure 4-16 and Figure 4-17). This type of ramp can be raised or lowered to match tidal movements.

Figure 4-16: Hanlan's Point Ferry Dock, Toronto Island (Google Street View)

Figure 4-17: Ward's Island Ferry Dock, Toronto Island, Canada (Google Street View)

## 4.3.5 Vessel Replacement

While not immediately necessary, three vessel replacement options should be considered for the long term:

- Replacing the smaller (and older) barge portion with a similarly sized vessel
- Replacing the smaller barge with a larger barge to increase overall capacity
- Replacing the complete Ferry with a single new vessel with increased capacity. This option should also consider alternate fuel options (e.g., low-sulfur diesel, hybrid, battery electric). Figure 4-18 and Figure 4-19 below provide two examples of cable-propelled ferries with similar capacity in Canada. Note the vessel's loading ramps.

Figure 4-18: Example of Cable Ferry with a 24-Vehicle Capacity in British Columbia, Canada

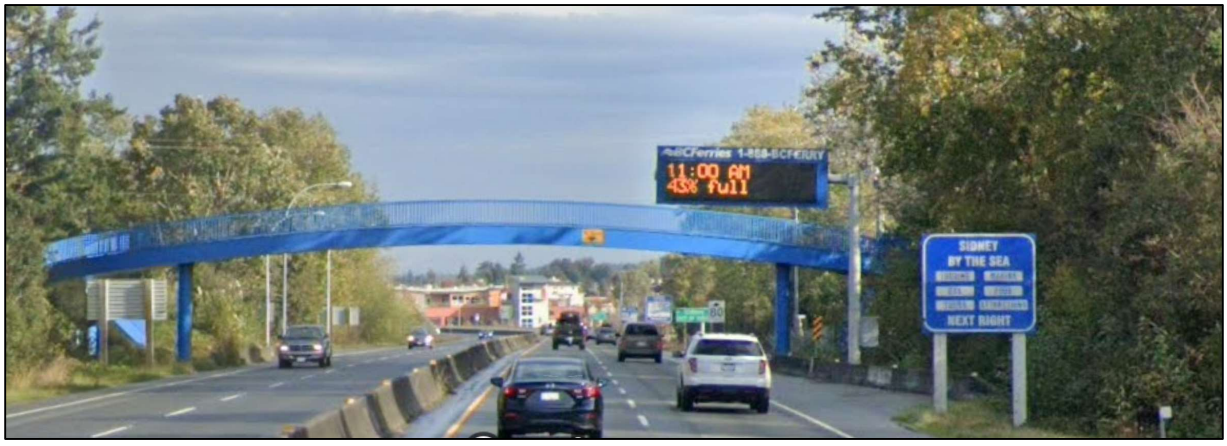
Figure 4-19: Another Example of Ferry with a Boat Based Loading Ramp

## 4.3.6 Signage and Wayfinding

Signage and wayfinding are general terms given to the provision of information to provide critical decision-making data and directions to travelers so that they can reach their destinations.

Signage refers to real-time information on variable message signs (VMS) that provide sufficient information for travelers to make informed decisions on their trip. As shown the example in Figure 4-20, VMS provide key information related to crossing conditions, such as the next scheduled ferry crossings and the available capacity remaining on these crossings. Signs would be located at key decision points where travelers can choose to continue on to White's Ferry or select an alternate route, or take their time reaching the Ferry based on knowledge of the next available crossings.

Figure 4-20: Variable Message Sign on Highway Approach to Sidney-Tsawwassen Ferry in Victoria, Canada

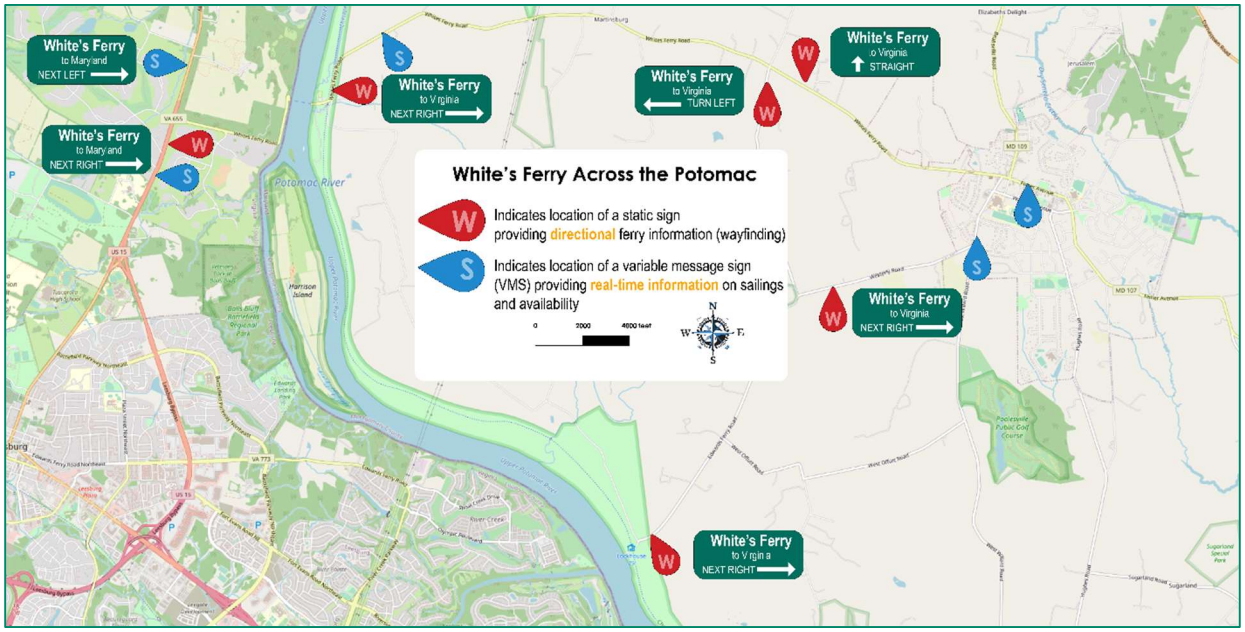



Wayfinding signs are directional signs that provide the traveler with guidance along a route to the Ferry. These are typically "take exit X" or "next right" signs that allow the traveler to confirm that they are on the correct route to the destination. They are placed at major intersections and at regular intervals where turns must be made.

Based on these two premises, we have a sample signage and wayfinding plan that has VMS at critical points is provided where someone could divert to an alternative route (e.g., divert north to use Route 15, if required based on a long lineup for the Ferry or crossing cancellations). The plan also has key locations along the route that provide directional information. The Maryland side is somewhat more complex than the Virginia side because it has three

potential VMS sites and five directional signage locations, while the Virginia side has just one of each. Figure 4-21 shows the potential sites for the two types of signage as well as the required directional information.

Figure 4-21: Recommended Signage and Wayfinding Plan




## 4.3.7 Estimated Preliminary Estimated Costs

Some high-order estimates of costs have been developed using the information available from online resources and stakeholder interviews (see Table 4-6).

Table 4-6: Preliminary Estimated Cost

| | Cost Estimate ($'000,000) | | |
|---|---|---|---|
| | Low | High | Notes |
| **Ferry-Related Infrastructure** | | | |
| New Barge Equipment | 1.0 | 2.0 | To attach to existing Yaw boat |
| New Ferry Vessel | 10 | 15 | 40 - 42 years useful life |
| Ferry Cable Replacement | 0.016 | 0.02 | Cost for 2 annual replacements |
| **Maryland Terminal** | **Cost Estimate ($'000)** | | |
| | Low | High | Notes |
| **Infrastructure Improvements** | | | |
| Grading | 40 | 45 | |
| Paving | 90 | 100 | |
| Toll Booth | 50 | 100 | Portable booths approximately $50,000, and permanent booths with electrical and Wi-Fi connectivity approximately $100,000. Source: Sandy Hook, New Jersey |
| Replacement Building | 400 | 500 | Two-story maintenance and storage facility with storage on second level |
| Signage | 600 | 700 | 3 VMS ($220 each) located at key decision points |

| Maryland Terminal | Cost Estimate ($'000) | | |
|---|---|---|---|
| | Low | High | Notes |
| Wayfinding | 100 | 120 | 5 directional signs with foundation and steel support ($20K each), leading to the ferry site. Based on Maryland Department of Transportation State Highway Administration's cost estimating manual |
| Wi-Fi Connectivity | | | TBD |
| Lighting | 15 | 20 | Assume two light poles ($6K each) for materials and installation. Soil conditions may require additional site preparation work. Given the surrounding National Parks Service lands, light pollution will need to be a consideration. |
| Total | 1,295 | 1,585 | |
| Contingency (40%) | 515 | 635 | |
| Total | **1,810** | **2,220** | |
| Staffing Requirements | Number | Annual Costs | Based on 3 (6-hour) shifts per day |
| Captains | 3 | 300 | Assume $45 per hour |
| Deckhands | 3 | 165 | Assume $25 per hour |
| Landside Staffing | 6 | 330 | Assume $25 per hour |
| Total | | **795** | |
| **Virginia Terminal** | **Cost Estimate ($'000)** | | |
| | Low | High | Notes |
| Infrastructure Improvements | | | |
| Landing Ramp Area and Roadway | 288 | 346 | 50-year useful life. Includes earthwork, pavement, drainage, and incidentals |
| Roadway Curve Improvement | 263 | 316 | 50-year useful life. Includes earthwork, pavement, drainage, and incidentals |
| Shared-use Path | 667 | 800 | 50-year useful life. Includes earthwork, pavement, drainage, and incidentals |
| Lighting | 24 | 29 | |
| Relocate Cable Winch | 5 | 7 | |
| Toll Booth | 50 | 100 | |
| Signage | 220 | 230 | 1 VMS on Route 15 |
| Wayfinding | 20 | 25 | 1 directional sign on Route 15 |
| Subtotal | 1537 | 1853 | Cost total |
| Design and CEI (20%) | 244 | 293 | 20% of construction costs |
| Contingency (20%) | 244 | 293 | 20% of construction costs |
| Total | **2025** | **2439** | |
| Staffing Requirements | Number | Annual Costs | Based on 3 (6-hour) shifts per day |
| Landside Staffing | 6 | 330 | Assume $25 per hour |
| Total | | **330** | |

| Operating Costs | Low | High | Notes |
|---|---|---|---|
| Cost per Ferry Operating Revenue Hour | $100 | $600 | Based on information provided by stakeholders and peer review. |

*% = percent*
*CEI = construction engineering and inspection*
*TBD = to be determined*
*VMS = variable message sign(s)*

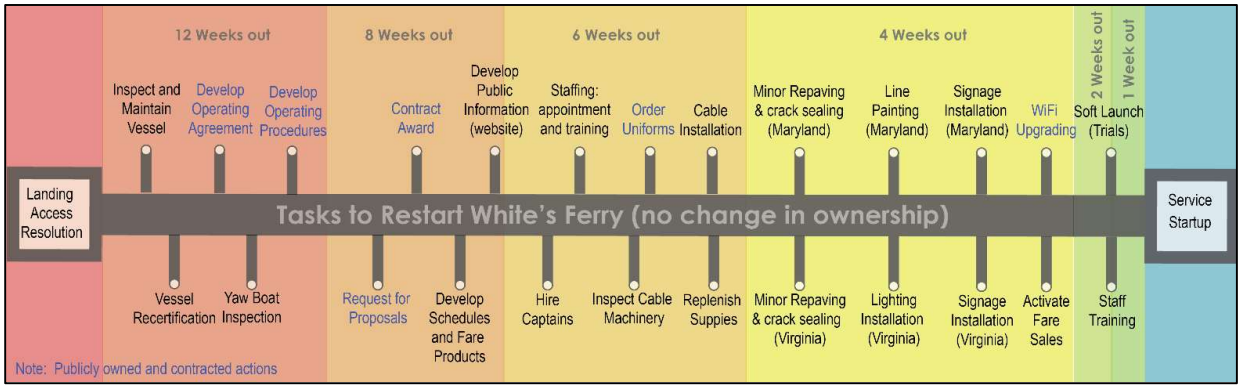
### 4.3.8 Schedule to Restart Operations

According to previous operator, it should take a few weeks to restart operation, including string cable, ensure staff is available and certified, inspect equipment and ensure it is operational.

### 4.3.9 Schedule to Restore Operations

A summary of tasks to be completed to restore White's Ferry operations with minimal repair improvements and without a change in operational ownership is summarized in Figure 4-22.

Figure 4-22: Task Summary




Resolution of the current land dispute and a decision on the potential operational model to pursue are priorities that are in the interest of all parties. Thereafter, in order to reinstate Ferry services in the shortest possible time frame, the tasks summarized in Figure 4-22 above should be reviewed in further detail to ensure appropriate timelines are identified and met to ensure a smooth service restoration.

The number of weeks required to reestablish service is an estimate based on the information available to date and could be compressed, depending on the operational model that is chosen and the ease of restaffing the service and ensuring that the vessels have no issues (other than simply restringing the cable) that would prevent an easy return to service.

## 4.4 Ownership and Operations Service Delivery Models

### 4.4.1 Matrix of Responsibilities

Table 4-7 provides a generalized list of the tasks and associated responsibilities in establishing transportation services, noting private versus public owner operators as well as a hybrid model in which a private operator delivers service on behalf of a public agency.

In the case of White's Ferry, three feasible operational service delivery models have been identified. This section is intended to inform rather than make any recommendations as to a preferred ownership and operational model.

#### 4.4.1.1 Service Delivery Model 1: Privately Owned and Operated

Over the past decades, the Ferry's services across the Potomac River were operated under this model. With this model, the Ferry is privately owned and, other than mandatory Ferry inspections, all operational aspects of the Ferry service are determined by the owner/operator. These owner-controlled factors include service schedules, fares and fare payment options, loading and unloading procedures, and vessel maintenance. Operational service changes can therefore be made without obtaining approval.

In this scenario, vessel replacement at the end of the service life of the existing Ferry in view of potentially increasing service capacity is an important consideration. Vessel replacement is a costly undertaking, and this may not be considered a priority or economically feasible for a private operator, potentially posing a risk of service disruptions or inability to meet demand in the near future as the two vessels reach their end-of-service age.

#### 4.4.1.2 Service Delivery Model 2: Publicly Owned and Operated

This model can be realized if the Ferry and its infrastructure are purchased by or bequeathed by the current owners to a public agency such as VDOT or MDOT. Public ownership would allow integration of this route into the state road networks and facilitate long-term infrastructure improvements. A public agency may be in a better position to access, plan, and execute capital improvements, such as landside and ferry dock infrastructure upgrades as well as appropriate vessel replacement plans. However, available data from peer review have shown that the cost of operations by public entities can be up to six times greater than the cost for private operators.

#### 4.4.1.3 Service Delivery Model 3: Hybrid (Publicly Owned and Privately Contracted Operations)

Under this third service delivery model, which is a subset of Service Delivery Model 2, publicly owned transportation infrastructure is operated by a private operation for specified terms. The major advantage of this arrangement is that the public agency specifies and controls operations while service is delivered under contract by a private party. As these operating contracts are the result of private, competitive bids, they typically provide operating cost efficiencies.

## Table 4-7: Matrix of Responsibilities to Operate the Ferry Service

| White's Ferry Tasks and Responsibilities | Model 1: PRIVATE | Model 2: PUBLIC | Model 3: HYBRID | | Notes |
|---|---|---|---|---|---|
| | Owned & Operated | Owned & Operated | Publicly Owned | Privately Operated | |
| **SERVICE START-UP, CONTRACT DEVELOPMENT** | | | | | |
| Establish operating procedures | ● | ● | ● | | Payment, parking, loading, etc |
| Develop Operating Agreement | | | ● | | Service specification and annual operating budget |
| Request for Proposals and evaluation | | | ● | | |
| Contract Negotiations and Award | | | ● | | Negotiate renumeration with operating company |
| Service Scheduling | ● | ● | ● | | |
| Fares, fare policy and payment methods | ● | ● | ● | | Amend and approve fares |
| Transfer of Assets | | ● | ● | | From private owner to Public Agency |
| Staffing: recruitment and training | ● | ● | | ● | |
| Vessel readiness (inspection and maintenance) | ● | ● | | ● | |
| Vessel certification | ● | ● | | ● | US Coast Guard |
| Supplies and Equipment - procurement, inspection and installation | ● | ● | | ● | |
| Short term terminal improvements | | ● | ● | | |
| Soft Launch/sea trials | | ● | | ● | |
| Vessel replacement (design and procurement) | ● | ● | ● | | Ferry design and commisioning |
| **CONTRACT MANAGEMENT & ADMINISTRATION** | | | | | |
| Contract management and administration | | ● | ● | | Daily administration and oversight of service |
| Annual operations review | | ● | ● | | Review of KPI's to report to Board, including complaints and issue management, service reliability and ridership trends |
| Annual maintenance review | | ● | ● | | |
| Accountability and Reporting | | ● | ● | | Board reporting |
| Data collection and analysis | | ● | | ● | Service performance, ridership and revenue |
| Service performance and issue reporting | | ● | | ● | Performance reporting and customer comments |
| Issues Management | | ● | | ● | General resolution of issues |
| **COMMUNICATION AND MARKETING** | | | | | |
| Public communications | ● | ● | ● | ● | Press releases, web information |
| Fare product design, printing and distribution | | ● | ● | | |
| Website design and updates | | ● | ● | | Public information |
| Signage and wayfinding | | ● | ● | | Directional and VMS signage on road netowk as well as on-site signage (e.g fares, schedule and service alerts) |
| Public communications, customer information/service schedule | ● | ● | | ● | |
| Public relations and customer service (complaints/commendations) | | ● | | ● | |
| On-board Advertising | | ● | ● | | Installation by operator |
| **FINANCE** | | | | | |
| Advertising sales | | ● | ● | | |
| Financial Tracking | | ● | ● | | Monthly financial review (budget vs actuals) |
| Annual budgeting and reporting | | ● | ● | | Creation of an annual budget |
| Farebox security and revenue depositing, reconciliation and reporting | ● | ● | | ● | Revenue collection and reporting policies |
| Ticket/pass sales | ● | ● | | ● | |
| Operator renumeration processing | | ● | ● | | |
| Insurance | ● | ● | | ● | Watercraft, buildings and public liability |
| **OPERATIONS** | | | | | |
| Daily operation oversight and management | ● | ● | | ● | |
| Service scheduling | | ● | | ● | |
| Daily service monitoring | | ● | | ● | Meeting service schedule |
| Daily vessel cleaning, maintenance and safety compliance | ● | ● | | ● | |
| Scheduled vessel and equipment maintenance | ● | ● | | ● | |
| Vessel inspections/service audits | ● | ● | ● | | |
| Operations facility maintenance and cleaning | ● | ● | | ● | General cleaning and routine maintenance |
| Lost and Found | | ● | | ● | Communication, storage and retrieval of lost goods |
| Customer complaint log and issue resolution | | ● | | ● | Operator primary contact |
| Snow Removal | | ● | | ● | Contracted service |


# 5

# Economic Impacts and Opportunities

# 5 Economic Impacts and Opportunities

This chapter discusses the potential economic impacts of the White's Ferry service for the District of Columbia-Maryland-Virginia (DMV) region, including Loudoun County and Montgomery County. The impacts include estimates related to travel time avoided, travel cost avoided, safety savings, environmental impacts prevented, tourism and recreation values, and the cost of not having the Ferry service.

The following sections analyze regional attractions that would influence ridership of the Ferry. They also discuss the positive economic impacts and costs of operating the service and any construction-related improvements.

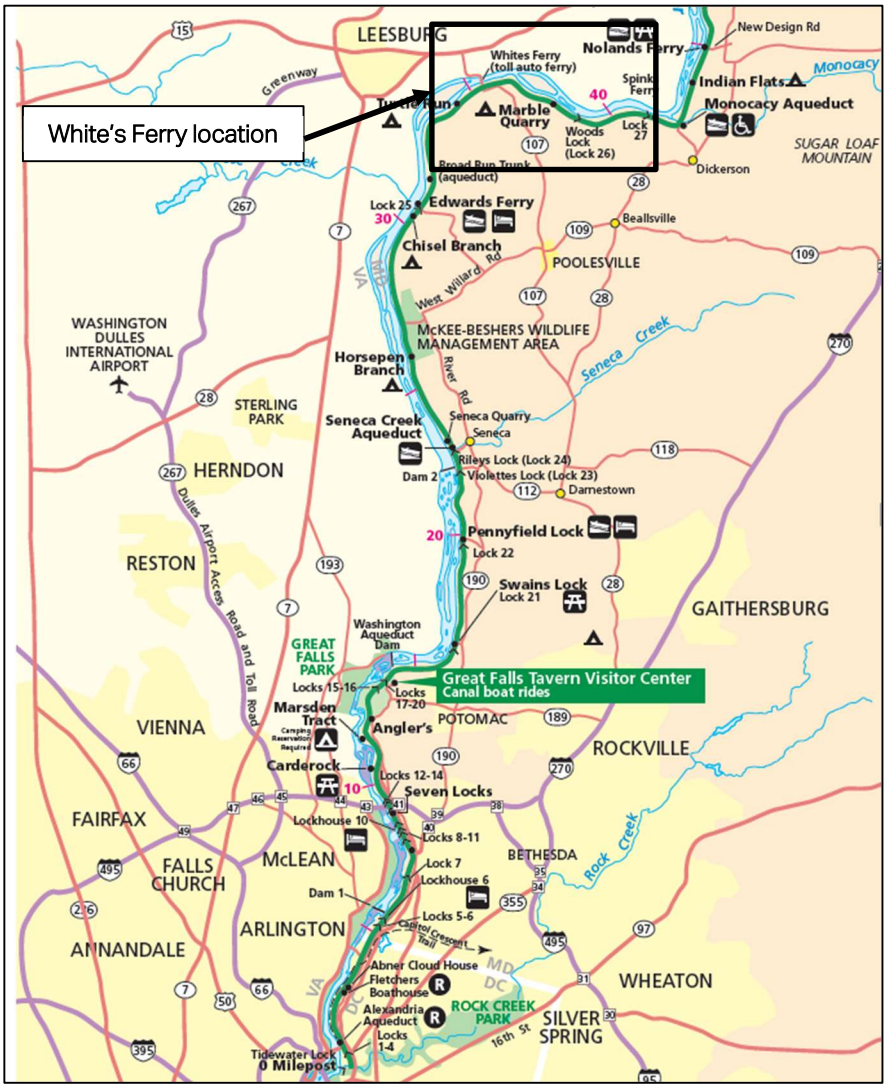
## 5.1 Regional Attractions and Opportunities

There are several attractions on both sides of the Potomac River, including parks, wineries, restaurants, bed and breakfasts, and historic sites (including battlefields, villages, and trails) that could generate opportunities for recreation and tourism in the region. In the past these attractions generated Ferry trips, and it is expected that when service resumes, recreational and tourism trips will account for a significant percentage of total Ferry trips.

The Chesapeake and Ohio Canal National Historical Park is owned and managed by NPS, and the 184.5-mile C&O Towpath trail is a popular and scenic multiuse path along the Maryland side of the Potomac River. Attractions along the trail include NPS visitor centers, heritage sites and passages, forests, and museums. Many dining and accommodation options can also be found along the trail.

Table 5-1 provides a list of selected attractions, accommodations, and restaurants along the C&O Canal Towpath trail along the Potomac River in Maryland. Figure 5-1 shows recreational opportunities along the C&O Canal between Washington, D.C. and Leesburg, VA.

Figure 5-1: Map of Chesapeake and Ohio Canal




*Source: National Park Service*[2]

Table 5-1: Attractions and Accommodations along the C&O Canal Towpath Trail

| Type of Site | Name |
|---|---|
| Attractions | Allegany Museum |
| | Antietam National Battlefield |
| | Barron's C&O Canal Museum and Store |
| | Brunswick Heritage Museum |
| | C&O Canal National Historical Cumberland Park Visitor Center |
| | C&O Canal National Historical Park Hancock Visitor Center |
| | C&O Canal National Historical Park-Great Falls Tavern Visitor Center |
| | C&O Canal Paw Tunnel (from the 1850s) |
| | Carderock Recreation Area |
| | Get Out & Play! Outfitters |
| | Great Allegheny Passage Trail |
| | Green Ridge State Forest |
| | Passages of the Western Potomac Heritage Area |

[2] National Park Service. https://www.nps.gov/choh/planyourvisit/maps.htm

| Type of Site | Name |
|---|---|
| | Seneca Creek State Park<br>Spring Gap Recreation Area<br>Western Maryland Rail Trail<br>Wilson Country School/Wilson Store |
| Accommodations | Canal Quarters - C&O Canal Trust (lockhouses 6, 10, 21, 22, 25, 28, and 49) |

*Source: Maryland Office of Tourism*[3]
*C&O = Chesapeake and Ohio*

Similarly, numerous recreational opportunities are identified along the Potomac River in Northern Virginia. In addition to attractions in the Town of Leesburg, VA, there are several trails, parks, and wineries for visitors to enjoy while learning about the Potomac's history. According to the Virginia Tourism Corporation, there are approximately 100 wineries and breweries in Northern Virginia.[4] Table 5-2 lists some of the recreational sites and wineries along the Virginia side of the Potomac River, and there are many more restaurants along the river that tourists can visit. In addition, Figure 5-2 shows recreational opportunities along the Potomac Heritage Trail.

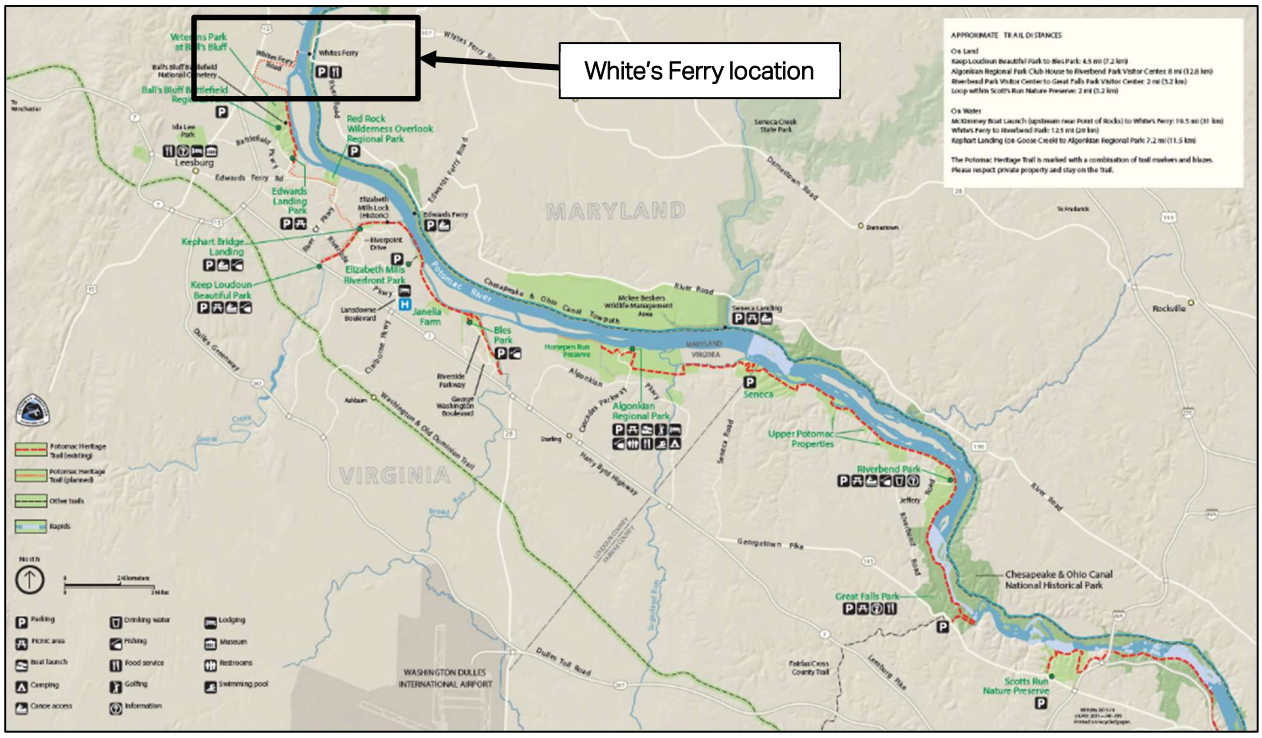
Table 5-2: Recreational Sites and Wineries along the Virginia Side of the Potomac River

| Type of Site | Name |
|---|---|
| Recreational Sites | Dahlgren Railroad Heritage Trail<br>Locust Shade Park<br>Mount Vernon Estate<br>Mount Vernon Trail<br>Potomac Heritage National Scenic Trail<br>Prince William Forest Park<br>Theodore Roosevelt Island<br>Virginia Neck Heritage Trail<br>Woodlawn Historic District |
| Wineries | Hiddencroft Vineyards<br>Potomac Point Winery<br>The Estate at White Hall Vineyard |

*Source: National Park Service*[5]*; Virginia Tourism Corporation*[6]

[3] Maryland Office of Tourism, Scenic Byways Chesapeake & Ohio Canal. https://www.visitmaryland.org/scenic-byways/chesapeake-ohio-canal
[4] Virginia Tourism Corporation. https://www.virginia.org/things-to-do/food-and-drink/wineries/?categories=83&regionid=5
[5] National Park Service. https://www.nps.gov/pohe/planyourvisit/maps.htm
[6] Virginia Tourism Corporation. https://blog.virginia.org/2017/06/traveling-potomac-guide-restaurants-breweries-waterfront-fun/

Figure 5-2: Potomac Heritage Trail




*Source: National Park Service*[7]

In 2019, arts, entertainment, recreation, and accommodation and food services were 3 percent and 5 percent of the gross domestic product (GDP) of Montgomery County, MD, and Loudoun County, VA, respectively.[8] Although multiple attractions have been completely or partially closed due to the COVID-19 pandemic, tourism is expected to resume after COVID-19 impacts are mitigated.

## 5.2 Economic Impacts and Costs Under the Ferry Alternative versus the No Ferry Alternative

Resuming operation of the White's Ferry service between Maryland and Virginia (i.e., the Ferry Alternative) will result in a number of potential impacts. Under the No Ferry Alternative, White's Ferry does not resume operations. This section quantifies the net impacts that result from the investment in capital and operating costs to the region in terms of temporary or permanent jobs and earnings between the Ferry Alternative and the No Ferry Alternative. It also quantifies the net impacts of the Ferry Alternative versus the No Ferry Alternative on changes to travel patterns that result in travel time savings, travel cost savings, safety savings, emissions reduction, and the value of trips not taken.

### 5.2.1 Methodology and Assumptions

The economic analysis was conducted using the U.S. Department of Transportation (USDOT) 2021 Benefit-Cost Analysis (BCA) Guidance for Discretionary Grant Programs[9] for preferred methods and monetized values. The 2019 values from the BCA Guidance were escalated to 2021 dollars using the White House GDP Deflator.[10] The parameters of the benefits analysis follow the protocols set by the Office of Management and Budget Circular A-94. Generally,

[7] National Park Service. https://www.nps.gov/pohe/planyourvisit/upload/POHE_Piedmont_map_low-res_11JAN2016_Access.pdf
[8] Bureau of Economic Analysis. https://www.bea.gov/data/gdp/gdp-industry
[9] U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, February 2021, https://www.transportation.gov/sites/dot.gov/files/2021-02/Benefit%20Cost%20Analysis%20Guidance%202021.pdf
[10] White House Table 10.1 – Gross Domestic Product and Deflators Used in the Historical Tables: 1940-2026, https://www.whitehouse.gov/wp-content/uploads/2021/05/hist10z1_fy22.xlsx

standard factors and values accepted by state and federal agencies were used for the benefits calculations except in cases where more project-specific values or prices were available.

The analysis assumes that under the Ferry Alternative, the first full year of operations would begin in 2023; economic operations and market response outcomes focus on full build-out conditions in the horizon year 2040. Ferry ridership estimates for 2019, as found in Chapter 4, are applied in opening year 2023.

The Ferry Alternative's economic impacts are estimated under two scenarios (see Table 5-3). Under Scenario 1, the Ferry resumes operations with no landside upgrades or improvements. Under Scenario 2, Ferry service resumes after improvements are constructed on the Virginia and Maryland landside terminals, as shown in Table 5-4.

Table 5-3: Ferry Alternative Scenarios 1 and 2 versus No Ferry Alternative

| Scenario 1: Restore Ferry | Scenario 2: Enhance Ferry |
|---|---|
| Negligible construction costs | New/upgraded infrastructure |
| No new operational improvements | Improved operations |
| New ridership with no capacity constraints | 3% ridership increase compared to Scenario 1 due to improved operations |

Source: Chapter 4.

The improvements under Scenario 2 allow for operational efficiencies and reduced loading and unloading times, which increase the capacity of the service and attract 3 percent more riders than Scenario 1 (Table 5-4). As a result, the potential impacts are greater under Scenario 2.

Table 5-4: Scenario 2 Operational and Physical Improvements Assumptions

| General Operational Improvements | |
|---|---|
| Provide users with the option to prepay fares | Design dedicated waiting space for pedestrians and cyclists |
| Build toll booths to verify and collect payment and issue boarding passes | Hire staff to control queuing lanes, a deckhand, and a vessel captain |
| Number of queuing lanes | |
| **Maryland Landside Improvements** | **Virginia Landside Improvements** |
| Add a second lane to increase capacity | Relocate Ferry landing to allow for new road connection |
| Build flood-resistant building for liquids storage above flood zone | Build new roadway to allow larger vehicles to access the Ferry |
| Restructure NPS parking entrance to create intersection | Build bypass lane for landowner to the existing dock |
| Construct bypass lane for non-ferry traffic | Smooth out the curve on Whites Ferry Road |
| Realign private road and bike path opposite NPS reconfigured parking entrance | |

*Source: Chapter 4.*

Table 5-5 lists the inputs assumed for estimating the economic impacts.

Table 5-5: General Assumptions and Inputs

| Input | Value | Source |
|---|---|---|
| **General** | | |
| Construction Year | 2022 | |
| Opening Year | 2022 | Set equal to 2019 |
| First Full Year of Operations | 2023 | Set equal to 2019 |
| Future Year | 2040 | |

| Input | Value | Source |
|---|---|---|
| Annual Ferry Operating Hours | 6250 | Chapters 3 and 4: 18 Hours per day operation equates to two 9 hour shifts or three shorter shifts. Assumes the more conservative version. |
| Annual Ferry Operating Days | 347 | Chapter 3 |
| Value of Time Personal, 2019$ per person-hour | $16.50 | 2021 Benefit-Cost Analysis Guidance for Discretionary Grant Programs |
| Value of Time Personal, 2021$ per person-hour | $16.99 | Deflated using GDP deflator |
| Value of Time, recreation 2021$ | $11.33 | 2/3 of personal time |
| Value of Time, work 2019$ | $27.90 | 2021 Benefit-Cost Analysis Guidance for Discretionary Grant Programs |
| Value of Time, work 2021$ | $28.73 | Deflated using GDP deflator |
| Useful Life of Ferry, years | 40-42 | National Transit Database (NTD) average |
| Ferry Facing Virginia Landing (length and build year) | 52 feet, 1995 | Chapter 2 |
| Ferry Facing Maryland Landing (length and build year) | 84 feet, 1988 | Chapter 2 |
| Dollar Year | 2021 | |
| Average Fare per Car (2021$) | $5.00 | A ticket is $5 one way or $8 round trip for cars. Cyclists ($2) and pedestrians ($1) may use the ferry. Commuter books are available. https://visitmontgomery.com/resources/transportation/historic-whites-ferry/ |
| Average Fare per Bicycle/Pedestrian (2021$) | $1.50 | Average of bike and pedestrian fare |
| Auto Occupancy, all travel | 1.67 | 2021 Benefit-Cost Analysis Guidance for Discretionary Grant Programs |
| New Equipment (tug) | $1,500,000 | Stantec average of range from $1M-$2M |
| Maryland Landing Site | $2,015,000 | Chapter 4 |
| Virginia Landing Site | $2,232,000 | Chapter 4; includes trail |
| Vessel | $12,500,000 | Stantec, average of $10M-$15M estimate |
| Cable (annual total) | $18,000 | Replaced twice a year for $8,000-$10,000. Included in annual O&M costs. |
| Tug/Yaw Annual Maintenance | $15,000 | Chapter 6 |
| Trail (from Route15 to VA landing), 2025, 2021$ | $733,500 | Chapter 4. Included in Scenarios 1 and 2; otherwise there are no recreational benefits |
| VA Landing Site Scenario 1 Miscellaneous Updates | $10,000 | Chapter 4 |
| Assumed Share of Capital Costs for Construction | 90% | |
| Assumed Share of Capital Costs for Professional Services | 10% | |

| Input | | Value | Source |
|---|---|---|---|
| Hours of Operations | | 6 a.m.-10 p.m. | Summer |
| Hours of Operations | | 6 a.m.-5 p.m. | Winter |
| Staffing Assumptions on Ferry (per shift) | | 2 | One captain on ferry and one collecting fares on vessel; 3 shifts per day |
| O&M Range of Costs per Operating Revenue Hour (2021$) | Low | $100.00 | Applies to first full year of operations, 2023 |
| | High | $600.00 | |
| Share of NHB that is Work Trips | | 32% | National Household Travel Survey |
| Annual Traffic Growth Rate | | 1% | |
| Increase in Travel Time Savings from Improved Loading/Unloading | | 10% | AECOM |
| Increase in Ridership due to Travel Time Savings | | 3% | AECOM |
| Trips Not Made, of non-work trips | | 10% | AECOM |
| Trip Not Taken, hours per trip | | 12 | Federal Emergency Management Agency (FEMA) |
| Cost per Mile, Auto 2019$ | | $0.43 | 2021 Benefit-Cost Analysis Guidance for Discretionary Grant Programs (GDP) |
| Cost per Mile, Auto 2021$ | | $0.44 | Deflated using GDP deflator |
| Time No Ferry/Current Operations (minutes per trip) | | 15 | 6 minutes to load, 3 to cross, and 6 to unload |
| Time Ferry (minutes per trip) | | 9 | 3 minutes to load, 3 to cross, and 3 to unload |
| Safety (resulting from reduced vehicle miles traveled [VMT]) | | | |
| K - Fatal Crash (2019$) | | $10,900,000 | 2021 Benefit-Cost Analysis Guidance for Discretionary Grant Programs |
| K - Fatal Crash (2021$) | | $11,223,782 | Inflated using GDP deflator |
| U - Injured (severity unknown) (2019$) | | $197,600 | 2021 Benefit-Cost Analysis Guidance for Discretionary Grant Programs |
| U - Injured (severity unknown) (2021$) | | $203,470 | Inflated using GDP deflator |
| PDO per vehicle (2019$) | | $4,500 | 2021 Benefit-Cost Analysis Guidance for Discretionary Grant Programs |
| PDO per vehicle (2021$) | | $4,634 | Inflated using GDP deflator |
| Damage Costs for Emissions per metric ton (2021$) (resulting from reduced VMT) | | | |
| Grams per Metric Ton | | 1,000,000 | |
| Year | | CO2 | |
| 2023 | | $56 | 2021 Benefit-Cost Analysis Guidance for Discretionary Grant Programs, inflated using GDP deflator |
| 2040 | | $74 | |
| Year | | NOx | |
| 2023 | | $16,887 | |

| Input | Value | Source |
|---|---|---|
| 2040 | $18,535 | 2021 Benefit-Cost Analysis Guidance for Discretionary Grant Programs, inflated using GDP deflator |
| Year | PM2.5 | |
| 2023 | $791,843 | 2021 Benefit-Cost Analysis Guidance for Discretionary Grant Programs, inflated using GDP deflator |
| 2040 | $878,029 | |
| Year | SO2 | |
| 2023 | $44,277 | 2021 Benefit-Cost Analysis Guidance for Discretionary Grant Programs, inflated using GDP deflator |
| 2040 | $49,632 | |

*% = percent*
*CO2 = carbon dioxide*
*GDP = gross domestic product*
*NHB = non-home base*
*NOx = nitrogen oxides*
*O&M = operations and maintenance*
*PDO = Property Damage Only*
*PM2.5 = particulate matter 2.5*
*SO2 = sulfur dioxide*
*VMT = vehicle miles traveled*

### 5.2.2 Capital Costs and Construction Impacts

Under the Ferry Alternative, restoring or enhancing the Ferry will support the local economy and impact the local labor and manufacturing markets through the hiring of construction personnel, the renting or purchasing of construction equipment, and the procurement of construction materials for the duration of the construction period. Construction is scheduled to take place between 2022 and 2025; impacts are estimated for 2022. The construction costs are described in Chapter 4, Section 4.3.7.

During construction, specialized labor from throughout the region will be engaged, leading to an increase in employment. In addition, construction-related goods will be purchased, much of which will come from the region. These activities will have direct, indirect, and induced effects on the local economy:

- Direct effect – Includes the effects on industries that are directly purchased to build the project, including control equipment and construction.
- Indirect effect – Includes the effects on supporting industries that supply goods and services to the direct effect industries. This includes workers in industries that supply equipment, parts, steel, concrete, wood, pavement, and other raw materials needed for construction.
- Induced effect – Includes the effect of direct and indirect workers spending their income on consumer goods and services such as food, shelter, clothing, recreation, and personal services.

The final demand employment multiplier represents the total change in number of jobs that occurs in all industries for each $1 million of output (in 2018$) delivered to final demand by a certain industry. The final demand earnings multiplier represents the total dollar change in earnings of households employed by all industries for each additional dollar of output delivered to final demand by a certain industry. Jobs are reported in job-years (i.e., one job year is one job for one person over 1 year) and earnings are reported in 2018 dollars.

Using the Bureau of Economic Analysis (BEA) Regional Input-Output Modeling System (RIMS II) Series 2018 multipliers, this section estimates jobs and earnings effects resulting from construction. The multipliers are constructed to reflect the economic structure of the Washington-Baltimore-Arlington Combined Statistical Area, also known as the DC MD VA-WV-PA CSA (consists of the Washington, D.C., and Baltimore metropolitan statistical areas (MSAs). The Washington-Arlington-Alexandria MSA (referred to as the Washington, D.C. MSA) is centered on Washington, D.C., and includes five counties in Maryland, 11 counties and six independent cities in Virginia, and one county in West Virginia. The counties that could be considered as Washington, D.C., inner suburbs are Montgomery

County and Prince George's County in Maryland and Arlington County, the City of Alexandria, Fairfax County, and the cities of Fairfax and Falls Church in Virginia. The Baltimore-Columbia-Towson MSA (referred to as Baltimore MSA) is centered on Baltimore City and six counties nearby, including Anne Arundel County, Baltimore County, Carroll County, Harford County, Howard County, and Queen Anne's County. Defined by proximity to Baltimore City, the MSA's inner suburbs are Baltimore County, Anne Arundel County and Howard County.[11] The multipliers used in the analysis are shown in Table 5-6.

Table 5-6: Washington-Baltimore-Arlington CSA Employment and Earnings Multipliers for Construction, Professional Services and Water Transportation

| Industry | Final Demand Earnings (2018 dollars) | Final Demand Employment | Direct-Effect Earnings (2018 dollars) | Direct-Effect Employment |
|---|---|---|---|---|
| Construction | 0.605 | 11.5781 | 1.5673 | 1.7688 |
| Professional Services | 0.7435 | 11.9746 | 1.6068 | 2.1017 |
| Water Transportation | 0.3846 | 6.8889 | 2.7702 | 4.3539 |

*Source: U.S. Bureau of Economic Analysis*

The multipliers are applied to the estimated construction cost, which is deflated to 2018 dollars for consistency with the multiplier dollars. For Scenario 1, construction costs include the trail,[12] miscellaneous repairs on the Virginia side, a new tug, and a new vessel. For Scenario 2, construction costs include a new tug, improvements at the Maryland and Virginia landing sites, a new vessel, roadway improvements, the trail, and new toll booths. It was assumed that 90 percent of the capital costs are for construction and the remaining 10 percent are for professional services; contingency is included. The capital costs assume vehicle and equipment purchases (the vessel and tug) will be made outside of the region; no land purchases are assumed for the analysis.

Table 5-7: Summary of Impacts from Construction in 2022

| Construction | Scenario 1: Restored Ferry | Scenario 2: Ferry with Enhancements |
|---|---|---|
| Total Job-Years | 8 | 47 |
| Total Earnings (2021$) | $460,000 | $2,628,000 |

*Source: AECOM 2021. Results are rounded to the nearest thousand.*
*Note: A job-year is one job for one person for one year.*

Eight to 47 annual total jobs would be created by construction over the construction period, representing a negligible percent13 of the DMV region's construction employment. This is not enough to cause inflationary pressures in the market by itself. If there are other large infrastructure projects planned for the same time horizon, the region could see pressure on construction costs or difficulty finding workers.

Since White's Ferry is rehabilitated in 2022, there are no construction impacts in 2040.

[11] A CSA is a grouping of areas that have a significant amount of employment interchange. The Washington-Baltimore-Arlington, DC-MD-VA-WV-PA CSA is composed of six metropolitan areas and two micropolitan areas across four states and the District of Columbia. Metropolitan and micropolitan areas are comprised of counties.
Metropolitan statistical areas, by definition, are areas that have "at least one urbanized area of 50,000 or more in population, plus adjacent territory that has a high degree of social and economic integration with the core."
Micropolitan statistical areas are defined as area that have at least one urban cluster with a population of between 10,000 and 50,000 and "adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties."
[12] The trail, also referred to as the shared use path, is included in Scenarios 1 and 2. Without it, there are no recreational benefits under Scenario 1.
[13] Based on 2019 American Community Survey 5-Year estimates. Employment of the Construction industry were 33,637 and 11,014 in Montgomery County and Loudoun County, respectively.

### 5.2.3 Operations and Maintenance Costs and Employment and Earnings Impacts

Under the Ferry Alternative, restoring or enhancing the Ferry will support annual jobs and earnings as a result of ongoing O&M expenditures. These impacts are recurring annual impacts that will continue through the life of the service. Operating and maintaining the service will expand payrolls in each year service is operated. The O&M costs are described in Chapter 4.

The O&M hiring associated with White's Ferry represents the direct effects within the DMV region. The earnings of these newly hired employees will translate into a proportional increase in consumer demand as these workers purchase goods and services in the region. A further increase of new employment across a variety of industrial sectors and occupational categories is expected as employers hire to meet this increase in local consumer demand. This effect represents the service's potential induced impacts. Finally, the hiring created due to the provision of supplies to the Ferry service represents the service's indirect impacts.

As with construction impacts, the direct, indirect, and induced effects of the O&M impacts for the DMV region were estimated using RIMS II Series 2018 multipliers. The multipliers were applied to the estimated O&M costs under two scenarios: low and high scenarios. The O&M costs were converted to 2018 dollars for consistency with the multiplier dollars. These recurring effects continue over time for as long as the service is in operations.

Table 5-8 presents the multipliers used in the analysis for the O&M expenditures in DMV region. Multipliers for "Water Transportation" were applied to the O&M cost for the Ferry service.

On the low end, O&M is expected to cost $100 per ferry operating hour; on the high end, the cost is $600 per ferry operating hour (see Table 4-6) . Based on Ferry operations over its past three years, it averages 6,250 annual operating hours. The O&M costs also include $16,000 to replace the cable twice a year (each replacement is $8,000) and annual tug maintenance of $15,000; as a result, annual O&M costs in 2023, the first full year of operations, range from $658,000 to $3.8 million. The analysis assumes constant operations and therefore the annual O&M costs in 2040 are equal to 2023.

The total annual job-years and earnings resulting from O&M cost spending in 2023 and 2040 are shown in Table 5-8. O&M spending is equal under Scenarios 1 and 2.

Table 5-8: Summary of Operations and Maintenance Cost Impacts

| O&M: Low ($100 per hour) | 2023 and 2040 |
|---|---|
| Total Job-Years | 4 |
| **Total Earnings (2021$)** | **$265,000** |
| **O&M: High ($600 per hour)** | **2023 and 2040** |
| Total Job-Years | 25 |
| **Total Earnings (2021$)** | **$1,526,000** |

*Source: AECOM 2021. Results are rounded to the nearest thousand.*
*Note: A job-year is one job for one person for one year.*

### 5.2.4 Economic Impacts

Economic impacts can result from various sources. Under the Ferry Alternative, restoring or enhancing the Ferry will result in travel time savings, travel cost savings, road safety savings, emissions savings, and the benefits for trips that would not be made in the absence of the Ferry. Impacts are derived from trips that may save time and mileage when White's Ferry is fully operational (2023); these trips were estimated and described in Chapter 4.

The Ferry Alternative economic impacts are estimated under two scenarios (see Table 5-3). Under Scenario 1, the White's Ferry service resumes operations with no landside upgrades or improvements. Under Scenario 2, White's Ferry service resumes after constructing improvements on the Virginia and Maryland landside terminals as shown in Table 5-4. The improvements under Scenario 2 allow for operational efficiencies and reduced loading and unloading

times, which increases the capacity of the service and attracts 3 percent more riders than Scenario 1. As a result, the potential impacts are greater under Scenario 2.

The market impacts for users are described in the following sections for first full year of operations, 2023, and the horizon year, 2040. Values are stated in 2021 dollars.

### 5.2.4.1 Travel Time Savings

White's Ferry will create travel time savings for trips that take longer routes under the No Ferry. The time savings and trip data for the Ferry come from Streetlight data for 2019 and projections for 2040. Trips are broken down by trip purpose and auto or bike/pedestrian mode, as shown in Chapter 4.

The travel time analysis applies three values of time: personal, work, and recreational. Personal and work values of time are provided by USDOT Guidance; the recreational value of time is valued at two-thirds the hourly value of personal time (i.e., recreational value of time assumes a person works 8 hours per day, therefore, 16 hours per day are non-working hours, or recreational time). Value of time assumptions are included in Table 5-5 in 2021 dollars.

The analysis assumes all bicycle and pedestrian trips are for recreational purposes. Since there are no bicycle and pedestrian trips under the No Ferry, therefore there are no travel time impacts for those users. The analysis assumes 32 percent of non-home base (NHB) trips are work trips, based on National Household Travel Survey data. All other trips are valued using the value of personal time.

Travel times for major origin-demand pairs were found from Streetlight for 2019 and from projections for 2040. The 2019 values are assumed to be applicable in the first opening year of White's Ferry, 2023. The total travel time savings under Ferry Alternative Scenarios 1 and 2 are displayed by mode in Table 5-9.

Table 5-9: Annual Travel Time Savings by Trip Purpose, 2021$

| Impacts | Scenario 1: Restored Ferry | | Scenario 2: Ferry with Enhancements | |
|---|---|---|---|---|
| | 2023 | 2040 | 2023 | 2040 |
| Recreation | $203,000 | $431,000 | $230,000 | $881,000 |
| Work | $243,000 | $259,000 | $275,000 | $530,000 |
| Personal | $595,000 | $1,043,000 | $674,000 | $2,134,000 |
| **Total Travel Time Savings** | **$1,041,000** | **$1,732,000** | **$1,180,000** | **$3,545,000** |

*Source: AECOM 2021. Sums may not total due to rounding.*

### 5.2.4.2 Travel Cost Savings

Based on USDOT 2021 BCA guidance, $0.44 (2021$) is saved per mile avoided for automobiles. These out of pocket vehicle operating costs are netted with the additional fares for each vehicle using the Ferry. White's Ferry riders would pay $5 each per trip per car, and bikes and pedestrians pay an average of $1.50 per trip.[14] Together, they result in the net travel cost to be incurred or saved under the Ferry Alternative Scenarios 1 and 2. The total travel cost savings are shown in Table 5-10.

Table 5-10: Annual Travel Cost Savings, 2021$

| Impacts | Scenario 1: Restored Ferry | | Scenario 2: Ferry with Enhancements | |
|---|---|---|---|---|
| | 2023 | 2040 | 2023 | 2040 |
| Cost of VMT Avoided | $1,911,000 | $2,676,000 | $1,968,000 | $4,977,000 |
| Auto Fares | $1,270,000 | $1,778,000 | $1,308,000 | $3,307,000 |
| Bike/Ped Fares | $10,000 | $14,000 | $10,000 | $14,000 |
| **Net Travel Costs** | **$631,000** | **$884,000** | **$650,000** | **$1,657,000** |

[14] A one-way ticket is $5 or $8 round trip for cars. Cyclists ($2) and pedestrians ($1) may use the ferry. Commuter books are available. Autos and an average of cyclist and pedestrian fares are assumed for this analysis. https://visitmontgomery.com/resources/transportation/historic-whites-ferry/

*Source: AECOM 2021. Sums may not total due to rounding.*

### 5.2.4.3 Safety Savings

Under the Ferry Alternative, White's Ferry allows for drivers to take a more direct route between origin and destination. Those trips save vehicle miles traveled (VMT); VMT savings were estimated in Chapter 4. The rates of crashes that result in fatalities, injuries, and property damage are applied to the net annual VMT to derive the estimated crashes from the change in VMT. The crash rates and value for fatalities, injuries, and property damage are based on national data and on USDOT 2021 BCA guidance as found in Table 5-11.

Table 5-11: Crash Rates and Values by Severity

| Crash Severity | Rate of Accident per 100,000,000 VMT | Value of Crash (2021$) |
|---|---|---|
| Fatalities | 1.11 | $11,223,782 |
| Injuries | 84 | $203,470 |
| Property Damage Only | 70.9% of total number of accidents | $4,634 |

*Source: National Highway Traffic Statistics Administration; USDOT, BCA guidance (2021); AECOM 2021*
*VMT = vehicle miles traveled*

The probability of a Property Damage Only (PDO) event was calculated based on the number PDO events as a share of total number of crashes from 2017 to 2019. Applying values of a fatality, non-fatal injury, and PDO event as found in Table 5-5 to the number of fatal, injury and PDO events avoided, respectively, White's Ferry safety savings under the Ferry Alternative Scenarios 1 and 2 are shown in Table 5-12.

These crash rates multiplied by the VMT avoided were then converted to KABCO ratings, which refers to the letters used to designate five levels of crash severity used by police at a crash scene. Estimating the distribution of expected injury types is important because the economic cost of the injury increases as injury severity increases. Values for K - fatality, U - injured (severity unknown), and PDO were used, based on USDOT 2021 BCA guidance.

Table 5-12: Annual Safety Savings by Crash Severity, 2021$

| Year | Reduced Auto VMT | Cost Savings from Accidents Avoided (2021$) | | | |
|---|---|---|---|---|---|
| | | Fatalities | Injuries | Property Damage Only | Total |
| **Scenario 1: Restored Ferry** | | | | | |
| 2023 | 4,316,000 | $538,000 | $738,000 | $42,000 | **$1,317,000** |
| 2040 | 6,043,000 | $753,000 | $1,033,000 | $58,000 | **$1,844,000** |
| **Scenario 2: Ferry with Enhancements** | | | | | |
| 2023 | 4,446,000 | $554,000 | $760,000 | $43,000 | **$1,356,000** |
| 2040 | 11,241,000 | $1,400,000 | $1,921,000 | $108,000 | **$3,430,000** |

Source: AECOM 2021. Sums may not total due to rounding.
*VMT = vehicle miles traveled*

### 5.2.4.4 Emissions Savings

The change in VMT between the Ferry Alternative and the No Ferry Alternative results in auto emissions savings to the region. The emissions rates in grams per mile were found from the California Air Resource Board (CARB) EMFAC2021 model (v1.01.1)[15] for years 2023 and 2040. The rates are shown in Table 5-13.

[15] The EMFAC2021 model can be accessed at https://arb.ca.gov/emfac/emissions-inventory

Table 5-13: Auto Emissions Rates (grams/mile)

| Year | NOx | PM2.5 | SO2 | CO2 |
|---|---|---|---|---|
| 2023 | 0.048 | 0.006 | 0.01 | 291.942 |
| 2040 | 0.021 | 0.005 | 0.03 | 242.462 |

*Source: California Air Resource Board*

This analysis applied automobile emissions rates for NOx, PM2.5, SO2, and CO2 emissions to the annual reduced VMT to estimate the total tonnage of auto emissions avoided. The value per metric ton of each pollutant, as found in Table 5-13, was applied to the tonnage of emissions avoided, resulting in the emissions savings in 2023 and 2040. The total emissions savings are shown in Table 5-14. This analysis does not consider any changes to emissions from the Ferry operations, including operating the tug under the Ferry Alternative.

Table 5-14: Annual Emissions Savings from Reduced Auto VMT, 2021$

| Year | Reduced Auto VMT | NOx | PM2.5 | SO2 | CO2 | Total |
|---|---|---|---|---|---|---|
| Scenario 1: Restored Ferry | | | | | | |
| 2023 | 4,316,000 | $4,000 | $21,000 | $1,000 | $72,000 | **$98,000** |
| 2040 | 6,043,000 | $2,000 | $28,000 | $1,000 | $112,000 | **$144,000** |
| Scenario 2: Ferry with Enhancements | | | | | | |
| 2023 | 4,446,000 | $4,000 | $22,000 | $1,000 | $74,000 | **$100,000** |
| 2040 | 11,241,000 | $4,000 | $53,000 | $1,000 | $208,000 | **$267,000** |

*Source: AECOM 2021. Sums may not total due to rounding.*
*VMT = vehicle miles traveled*

### 5.2.4.5 Trip Not Taken Savings

There is value in trip-making; otherwise, trips would not be made. Likewise, there is a value for trips that are not taken, and the cost is primarily in productivity and economic activity. The value of a trip not taken is estimated using FEMA guidance, which assumes a 12-hour penalty for each one-way trip lost.[16] The analysis estimates the value of the loss in productivity and spending for each trip that is not made. The avoidance of this loss is a benefit for the region.

When a trip is not made, the productivity and spending impacts associated with that trip are lost to the region. It is assumed that 10 percent of non-work trips are not made in the No Ferry Alternative, totaling about 35,000 in 2023 and 50,000 in 2040 under Scenario 1. Under Scenario 2, 36,000 non-work trips are not made in 2023 and 94,000 in 2040. The value of trips not taken in 2023 and 2040 are shown in Table 5-15.

Table 5-15: Annual Value of Trips Not Taken in No Ferry Alternative, 2021$

| Impacts | Scenario 1: Restore Ferry | | Scenario 2: Enhance Ferry | |
|---|---|---|---|---|
| | 2023 | 2040 | 2023 | 2040 |
| Value of Trips Not Taken | $5,956,000 | $8,568,000 | $6,135,000 | $15,940,000 |

*Source: AECOM 2021. Results are rounded to the nearest thousand.*

Emissions, safety concerns and travel costs generated under the Ferry Alternative due to trips not previously taken have not been estimated in this analysis. The negative externalities of trips not taken could range between 10 percent to 15 percent of each impact type depending on trip length.

[16] Federal Transit Administration, How to Use the FTA HMCE Tool, 2014, http://www.fta.dot.gov/documents/FTA-User_Guide-final.pdf

# 5.3 Qualitative Considerations

In addition to the quantitative impacts of resuming the White's Ferry service, there are qualitative impacts including a reduced risk of hazardous spill and reduced congestion at Point of Rocks Bridge.

## 5.3.1 Risk of Hazardous Materials Spill Reduction

On the NPS land is an out-of-service barge that stores fuel. When the Potomac River floods, there is greater potential for a hazardous materials spill. Spill risk will be reduced by relocating fuel storage into a new storage facility as recommended in Section 4.1. If the Ferry vessel operation instead used an electric ferry, then there would be less of a need to store fuel on site and a reduction in the risk of a spill.

## 5.3.2 Congestion Reduction at Point of Rocks Bridge

Aside from White's Ferry, the next crossing of the Potomac River outside of the Washington, DC, area is the Point of Rocks Bridge. It is about 40 minutes (17 miles) north of White's Ferry on the Virginia side and about 30 minutes (11 miles) north on the Maryland side. The two-lane bridge is expected to near capacity within the next few years without the Ferry service, causing increased congestion in the region.

# 5.4 Summary

Under the Ferry Alternative, White's Ferry will result in a number of potential economic impacts. This section summarizes the quantifiable impacts of the Ferry on changes to travel patterns resulting in travel time savings, travel cost savings, safety savings, emissions reductions, and the value of trips not taken, in addition to construction and annual O&M cost impacts (including earnings and number of job-years).

Table 5-16: White's Ferry Impacts Summary

| | Scenario 1: Restore Ferry | | | Scenario 2: Enhance Ferry | |
|---|---|---|---|---|---|
| Year | 2022 | 2040 | | 2022 | 2040 |
| Construction Cost Impacts | | | | | |
| Total Job-Years | 8 | NA | | 47 | NA |
| Total Earnings (2021$) | $460,000 | NA | | $2,628,000 | NA |
| | | | | | |
| Year | 2023 | 2040 | | 2023 | 2040 |
| Annual O&M Cost Impacts: Low | | | | | |
| Total Job-Years | 4 | 4 | | 4 | 4 |
| Total Earnings (2021$) | $265,000 | $265,000 | | $265,000 | $265,000 |
| Annual O&M Cost Impacts: High | | | | | |
| Total Job-Years | 25 | 25 | | 25 | 25 |
| Total Earnings (2021$) | $1,526,000 | $1,526,000 | | $1,526,000 | $1,526,000 |
| | | | | | |
| Year | 2023 | 2040 | | 2023 | 2040 |
| Economic Impacts | | | | | |
| Travel Time Savings | $1,041,000 | $1,732,000 | | $1,180,000 | $3,545,000 |
| Recreation | $203,000 | $431,000 | | $230,000 | $881,000 |
| Work | $243,000 | $259,000 | | $275,000 | $530,000 |
| Personal | $595,000 | $1,043,000 | | $674,000 | $2,134,000 |
| Travel Cost Savings | $631,000 | $884,000 | | $650,000 | $1,657,000 |
| Safety Savings | $1,317,000 | $1,844,000 | | $1,356,000 | $3,430,000 |

| | Scenario 1: Restore Ferry | | | Scenario 2: Enhance Ferry | |
|---|---|---|---|---|---|
| Emissions Avoided | $98,000 | $144,000 | | $100,000 | $267,000 |
| Trips Not Taken | $5,956,000 | $8,568,000 | | $6,135,000 | $15,940,000 |
| Risk of Hazardous Materials Spill Reduction | Qualitative | | | Qualitative | |
| Congestion Reduction at Point of Rocks Bridge | Qualitative | | | Qualitative | |
| **Total Impacts** | **$9,043,000** | **$13,172,000** | | **$9,421,000** | **$24,839,000** |

*Note: 2022 is the construction year. 2023 is the first full year of operations. NA means not available. A job-year is one job for one person for one year.*
*Source: AECOM 2021. Sums may not total due to rounding.*


# 6

# Fiscal Analysis

# 6 Fiscal Analysis

## 6.1 Introduction

The goal of the financial analysis is to provide an overview of the financial resources necessary to restart service for White's Ferry. The financial analysis explored several Service Delivery Models which provided alternative investment and expenditure assumptions. Using these estimates and informed assumptions, sufficient information on resources needed for operating and maintenance (O&M) costs as well as capital investments were provided. Although operations on the Ferry may start as soon as 2022, the first full year of operations assumed for the financial analysis was calendar year 2023. Thus, the analysis period was 2023 to 2040. The cashflow analysis included the first five years of operations, 2023 to 2027.

Three Service Delivery Models that considered various ownership options for White's Ferry were explored (Table 6-1). Under the No Ferry Alternative (the no service scenario) no financial projections are provided. Similarly, no projections were provided for Service Delivery Model 1 except a discussion of a Virginia side land agreement. The analysis provides financial projections for Service Delivery Models 2 and 3 as those involve potential cost to Loudoun and Fairfax counties. Service Delivery Models 2 and 3 are presented for the three Ferry scenarios:

Restart Ferry Scenario, Business as Usual (BAU)– no enhancements to previously provided services except for the cost for constructing a shared-used path and a discussion of an agreement using the Virginia landing side.
Restore Ferry Scenario– no enhancements to previously provided services, except cost for constructing a shared-use path and a flat capital cost for miscellaneous start-up improvements such as weeding, and pavement repairs have been included.

Enhance Ferry Scenario– includes enhanced operations, fare collection and infrastructure as described in Chapters 4 and 5.

Table 6-1: Financial Analysis Structure

| Service Delivery Model | Description | Scenario |
|---|---|---|
| No Ferry | No ferry service | |
| Model 1 | Privately owned and operated with agreement between the Virginia and Maryland property owners | Business as usual and property agreement |
| Model 2 | Publicly owned and operated | Restored Ferry and Ferry with Enhancements Scenarios |
| Model 3 | Publicly owned and contracted service | Restored Ferry and Ferry with Enhancements Scenarios |

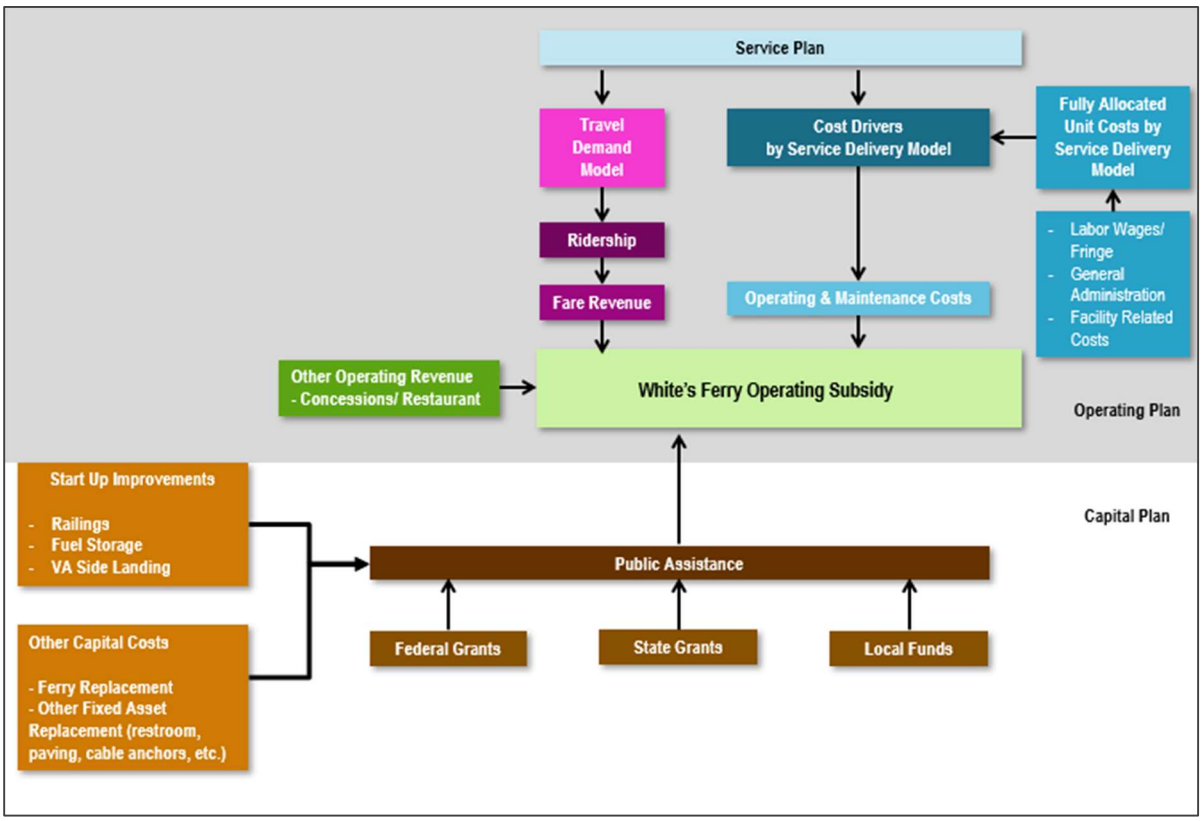
## 6.2 Financial Analysis Process

Figure 6-1 provides an overview of the financial analysis process for this study. The financial analysis focused on estimating the revenues necessary to put the ferry back into operation under various ownership models. Consequently, the analysis sought to answer the following questions:

- How much would it cost to operate and maintain the ferry under the various model scenarios?
- How much revenue will the ferry generate under reasonable ridership projections? Does the revenue from fares adequately cover O&M costs?
- How much capital investment is required to restart ferry operations and maintain it at a safe and reliable service level 5 years after operations begin?
- What are potential sources of federal and state funding for the ferry and what eligibilities apply?

The operating and capital plans are described below.

Figure 6-1: Financial Analysis Process




# 6.3 Operating Plan

This section of the report describes the assumptions and composition of the operating sources and uses of funds. The financial analysis for the ferry services utilized two main inputs for the service plan: (1) the O&M costs and (2) the travel demand model forecast from Chapter 3.

The first full year of ferry operations is assumed to be in 2023 and projected out to 2040.

## 6.3.1 Operating and Maintenance Costs

In general, O&M costs may be categorized under ferry operations, ferry and facility maintenance costs, and general administration costs. Examples of costs under the three categories include employee salaries/wages, fringe benefits, paid absences, operations services, fuel, materials/supplies, utilities, casualty/liability, and taxes. These costs can be estimated on a unit cost basis using cost drivers for each type of cost.

For this analysis, conceptual O&M unit costs for ferries were calculated using data from the National Transit Database (NTD), a data repository developed from annual reports submitted by transit agencies that receive federal funding.

- Aggregated unit costs were calculated using 2019 NTD data adjusted to 2021 using the Washington DC area CPI[17]
- Cost drivers were assigned by function and object class
- Driving variable for ferry operations and maintenance costs was revenue hours

[17] Bureau of Labor Statistics, Washington-Arlington-Alexandria, DC-VA-MD-WV, all urban consumers, not seasonally adjusted. CUURS35ASA0, CUUSS35ASA0

- Driving variable for facility maintenance costs was number of stations
- Driving variable for general administration costs was revenue hours
- Agency operated (Directly Operated [DO]) systems were generally larger than contractor operated systems (Purchased Transportation-PT)

Table 6-2: NTD Reported Ferry Expenses and Assigned Cost Drivers for Financial Analysis

| Ferry System Cost Item Reported to NTD | Assigned Cost Driver |
|---|---|
| Ferry Operations and Maintenance Expenses | |
| Operators Salaries/Wages | VehRevHrs |
| Operators Paid Absences | VehRevHrs |
| Other Salaries/Wages | VehRevHrs |
| Other Paid Absences | VehRevHrs |
| Fringe Benefits | VehRevHrs |
| Services | VehRevHrs |
| Fuel/Lube | VehRevHrs |
| Tires/Tubes | VehRevHrs |
| Other Materials/Supplies | VehRevHrs |
| Utilities | VehRevHrs |
| Casualty/Liability Costs | VehRevHrs |
| Taxes | VehRevHrs |
| In Report | VehRevHrs |
| Filing Separate Report | VehRevHrs |
| Miscellaneous Expenses | VehRevHrs |
| Expense Transfers | VehRevHrs |
| Facility Maintenance Expenses | |
| Operators Salaries/Wages | Stations |
| Operators Paid Absences | Stations |
| Other Salaries/Wages | Stations |
| Other Paid Absences | Stations |
| Fringe Benefits | Stations |
| Services | Stations |
| Fuel/Lube | Stations |
| Tires/Tubes | Stations |
| Other Materials/Supplies | Stations |
| Utilities | Stations |
| Casualty/Liability Costs | Stations |
| Taxes | Stations |
| In Report | VehRevHrs |
| Filing Separate Report | VehRevHrs |
| Miscellaneous Expenses | Stations |
| Expense Transfers | Stations |
| General Administration Expenses | |

| Ferry System Cost Item Reported to NTD | Assigned Cost Driver |
|---|---|
| Operators Salaries/Wages | VehRevHrs |
| Operators Paid Absences | VehRevHrs |
| Other Salaries/Wages | VehRevHrs |
| Other Paid Absences | VehRevHrs |
| Fringe Benefits | VehRevHrs |
| Services | VehRevHrs |
| Fuel/Lube | VehRevHrs |
| Tires/Tubes | VehRevHrs |
| Other Materials/Supplies | VehRevHrs |
| Utilities | VehRevHrs |
| Casualty/Liability Costs | VehRevHrs |
| Taxes | VehRevHrs |
| In Report | VehRevHrs |
| Filing Separate Report | VehRevHrs |
| Miscellaneous Expenses | VehRevHrs |
| Expense Transfers | VehRevHrs |

*Note: VehRevHrs – vehicle revenue hours - the hours vehicles travel while in revenue service considering running time and layover/recovery time. It does not include deadhead time, operator training, or maintenance testing time.*

*Stations - Passenger stations are significant structures with a separate right-of-way. For ferries, all stops are included.*

Figure 6-2 and Figure 6-3 show the aggregated O&M unit costs for U.S. ferry systems reported in the NTD. On average, agency-operated systems had a higher O&M cost per revenue hour of approximately $1,591 per revenue hour as compared contracted service which had an average cost of $762 per revenue hour.

Figure 6-2: Aggregated Direct Unit Cost Per Revenue Hour for Agency Operated Ferry Service (2021$)

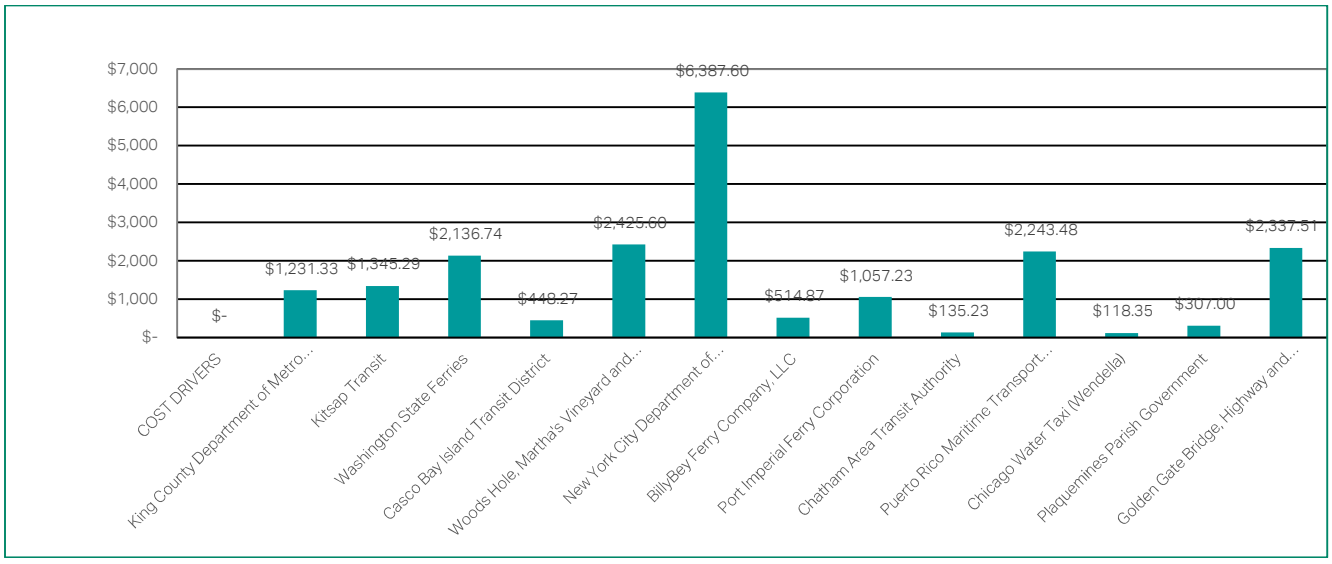
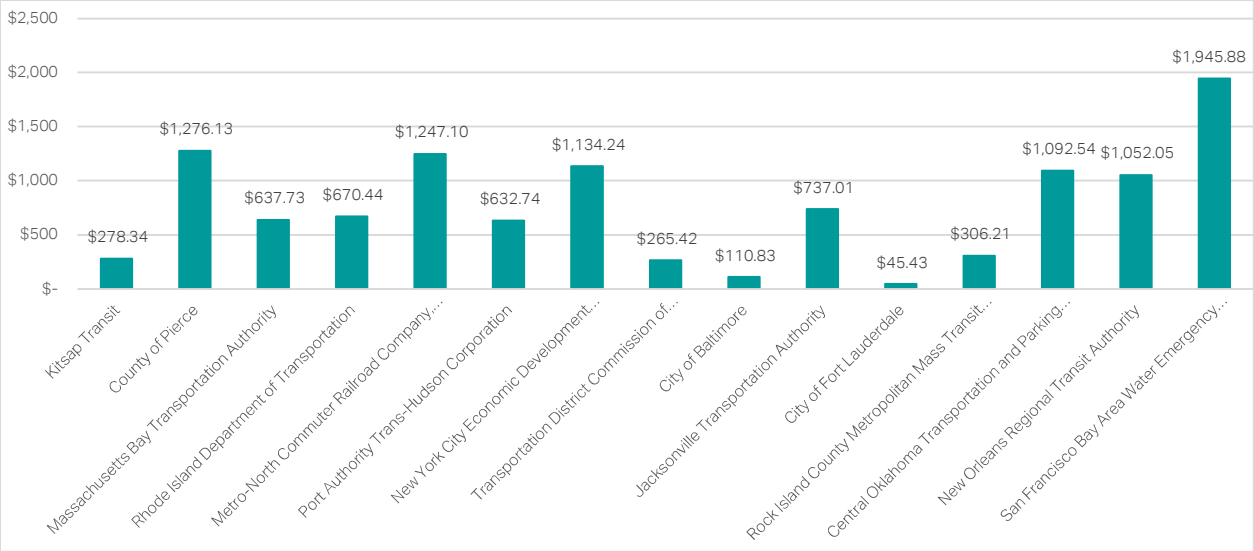


Figure 6-3: Aggregated Direct Unit Cost Per Revenue Hour for Contractor Operated Ferry Service (2021$)




The national averages were not used in this analysis due to the skew caused by difference in operation size. In 2019, while White's Ferry operated a single ferry at about 6,250 revenue hours, large ferry agencies across the country provided as much as 126,00 revenue hours using 19 ferries and 19 total stations (see Table 6-3).

Table 6-3: Operational Statistics from Ferries Across the U.S. (2019 NTD Data-Adjusted to 2021$)

| Agency | Annual Total Actual Revenue Hours[18] | Annual Total Actual Revenue Miles | Total Stations[19] | Ferries Operated in Maximum Service | Cost/VehRevHrs | Cost /Station |
|---|---|---|---|---|---|---|
| Agency Operated | | | | | | |
| King County Department of Metro Transit | 6,017 | 52,362 | 3 | 3 | $1,231 | $43,747 |
| Kitsap Transit | 5,418 | 124,682 | 3 | 3 | $1,345 | $26,478 |
| Washington State Ferries | 126,622 | 906,867 | 19 | 19 | $2,137 | $691,628 |
| Casco Bay Island Transit District | 16,327 | 85,249 | 1 | 4 | $448 | $45,162 |
| Woods Hole, Martha's Vineyard and Nantucket Steamship Authority | 37,587 | 348,658 | 5 | 9 | $2,426 | $424,906 |
| New York City Department of Transportation | 20,088 | 208,883 | 2 | 4 | $6,388 | $3,958,651 |
| Billybey Ferry Company, LLC | 21,725 | 262,518 | 6 | 7 | $515 | $12,558 |
| Port Imperial Ferry Corporation | 28,476 | 474,418 | 6 | 12 | $1,057 | $6,361 |
| Chatham Area Transit Authority | 6,790 | 15,352 | 3 | 2 | $135 | $41,079 |
| Puerto Rico Maritime Transport Authority | 15,689 | 196,483 | 5 | 7 | $2,243 | $244,208 |
| Chicago Water Taxi (Wendella) | 11,182 | 44,378 | 7 | 4 | $118 | $0 |
| Plaquemines Parish Government | 12,119 | 21,334 | 4 | 2 | $307 | $7,974 |

[18] *Actual Vehicle Revenue Hours and miles - the hours and miles vehicles travel while in revenue service. It considers running time and layover/recovery time. It does not include deadhead time, operator training, or maintenance testing time.*
[19] *Passenger stations are significant structures with a separate right-of-way. For ferries, all stops or terminals are included in this report.*

| Agency | Annual Total Actual Revenue Hours[18] | Annual Total Actual Revenue Miles | Total Stations[19] | Ferries Operated in Maximum Service | Cost/VehRevHrs | Cost /Station |
|---|---|---|---|---|---|---|
| Golden Gate Bridge, Highway and Transportation District | 15,046 | 208,111 | 5 | 6 | $2,338 | $301,874 |
| Contractor Operated | | | | | | |
| Kitsap Transit | 6,158 | 43,822 | 3 | 2 | $278 | $9,739 |
| County of Pierce | 5,248 | 41,557 | 3 | 2 | $1,276 | $102,148 |
| Massachusetts Bay Transportation Authority | 24,860 | 262,174 | 9 | 9 | $638 | $233 |
| Rhode Island Department of Transportation | 1,593 | 24,904 | 2 | 1 | $670 | $0 |
| Metro-North Commuter Railroad Company | 3,701 | 43,057 | 2 | 2 | $1,247 | $1,123 |
| Port Authority Trans-Hudson Corporation | 13,075 | 150,823 | 4 | 6 | $633 | $1,197 |
| New York City Economic Development Corporation | 66,862 | 846,623 | 21 | 23 | $1,134 | $269,481 |
| Transportation District Commission of Hampton Roads | 6,516 | 18,734 | 4 | 2 | $265 | $31,730 |
| City of Baltimore | 7,895 | 24,561 | 5 | 3 | $111 | $304 |
| Jacksonville Transportation Authority | 4,298 | 7,736 | 2 | 1 | $737 | $64,562 |
| City of Fort Lauderdale | 4,643 | 13,369 | 8 | 1 | $45 | $22 |
| Rock Island County Metropolitan Mass Transit District | 1,480 | 11,166 | 4 | 3 | $306 | $5,600 |
| Central Oklahoma Transportation and Parking Authority | 591 | 2,405 | 4 | 2 | $1,093 | $318 |
| New Orleans Regional Transit Authority | 8,239 | 16,187 | 4 | 2 | $1,052 | $0 |
| San Francisco Bay Area Water Emergency Transportation Authority | 20,596 | 405,374 | 13 | 11 | $1,946 | $86,213 |

Instead of national averages, the analysis team used comparable unit cost estimates from ferries of similar size (revenue hours and miles of operation). Although the services were not cable guided, estimates chosen were within 10 percent of the White's Ferry's actual service hours of revenue. Table 6-4 shows the cost estimates used in this analysis.

Table 6-4: O&M Unit Cost Estimates Used in Analysis

| Description | Cost (2021$) | Notes |
|---|---|---|
| Agency Operated | | |
| Unit O&M Cost/Revenue Hour | 683 | Average King County and Chatham Area County |
| Facility/Facility Maintenance Cost per Station | 42,000 | Average King County and Chatham Area County |
| National Average O&M Cost/ Revenue Hour | 1,591 | Calculated from NTD 2019 Reports |
| Contractor Operated | | |
| Unit O&M Cost/Revenue Hour | 271 | Average Kitsap and Hampton Roads |
| Facility/Facility Maintenance Cost per Station | 21,000 | Average Kitsap and Hampton Roads |
| National Average O&M Cost | 702 | Calculated from NTD 2019 Reports |

*Note: For ferries, the NTD considers all stops as stations. White's Ferry has two stops. Actual cost per station for White's Ferry might be less than NTD reported systems. O&M = Operating and Maintenance*

Table 6-5 summarizes the annual O&M cost for White's Ferry operations. The White's Ferry service, on a fully allocated cost basis, is estimated to approximately cost between $1.7 million and $4.3 million in 2021 dollars per year depending on the ownership model. The estimates were based on estimated unit O&M costs and the average annual revenue service hours. The main differences observed were the lower annual expenses associated with contracted service.

Table 6-5: Estimated Annual O&M Costs for White's Ferry Service

| Service Delivery Model | Descriptions | Annual Operating Expense | Annual Cost/Station (Facility) | Total Annual Operating Expense |
|---|---|---|---|---|
| Model 2 | Publicly Owned and Operated (Restored Ferry) | $4,271,000 | $85,000 | $4,356,000 |
| Model 2 | Publicly Owned and Operated (Enhanced Ferry) | $4,271,000 | $85,000 | $4,356,000 |
| Model 3 | County Owned and Contractor Operated (Restored Ferry) | $1,699,000 | $41,000 | $1,740,000 |
| Model 3 | County Owned and Contractor Operated (Enhanced Ferry) | $1,699,000 | $41,000 | $1,740,000 |

*Constant 2021 Dollars – Not including inflation or land cost.*
*Note: For ferries, NTD considers all stops included in the station count. White's Ferry has two stops. Actual cost per station could be less than NTD reported systems.*

## 6.3.2 Sources of Operating Funds

The revenue generated from ticket sales serves as the primary source of operating funds for the ferry. Other potential sources of revenue include revenue from the onsite restaurant and concessions. At the time of the study, the analysis team did not have enough historical information on the past sales from the restaurant or other potential sources to include accurate estimates in the analysis. Thus, the only source of operating revenue estimated in this analysis is from revenue based on projected ferry ridership and ticket sales. Revenue was calculated as the product of ridership and average fares.

Due to the lack of detailed historical information on ridership and ticket sales, the analysis team sought to develop conservative estimates. Thus, the lowest ridership estimates determined from the January 2019 MWCOG Person-Trip Model in Chapter 3 were used. Due to the uncertainty from the lack of actual historical data on ticket sales and associated discounts, all vehicle trips were assumed to one-way trips receiving an average discount of 20 percent. An average fare of $1.50 was assumed for bicycle/pedestrian trips. Table 6-6 shows the published and assumed fare categories used in the financial analysis.

Table 6-6: Summary Table Showing Ferry Fares

| Fare Description | Amount |
|---|---|
| Published Ferry Fares | |
| Vehicle Round Trip | $ 8.00 |
| One-Way Vehicle | $ 5.00 |
| Motorcycles | $ 3.00 |
| Bicycles | $ 2.00 |
| Pedestrians | $ 1.00 |
| Fares Used for Financial Analysis | |
| Assumed One-Way Vehicle | $ 4.00 |

| Fare Description | Amount |
|---|---|
| Average Bicycle/Pedestrian | $ 1.50 |

*Assumed one-way vehicle fare was used due to general practice of discounting tickets. A 20 percent discount from the one-way full fare was assumed for the average vehicle fare.*

Consequently, the following annual revenue estimates were developed using the assumed analysis fares and ridership estimates from the January 2019 MWCOG Person Trip model developed in Chapter 3. Table 6-7 provides a summary of the generated funds. It should be noted that, estimates remained consistent across scenarios and only differed when ferry enhancements were considered. In the Enhance Ferry scenario for model 2 and 3, ridership estimates were assumed to increase by 3 percent due to the increased operational efficiencies. The revenue generated for that scenario therefore also increased.

Table 6-7: Estimated Operating Revenue from Passenger Fares (in thousands)

| Operating | 2023 | 2024 | 2025 | 2026 | 2027 | 2023-2027 Total | 2040 |
|---|---|---|---|---|---|---|---|
| Restore Ferry | $1,615 | $1,638 | $1,661 | $1,685 | $1,709 | $8,308 | $2,056 |
| Enhance Ferry | $1,663 | $1,687 | $1,711 | $1,736 | $1,760 | $8,557 | $2,117 |

# 6.4 Capital Plan

This section describes the assumptions and composition of the capital sources and uses of funds. Capital costs for White's Ferry can be divided into two costs: (1) capital investments required to maintain a state of good repair, and (2) capital investments to enhance ferry service operations and customer experience. Concerning the former, a capital asset is in a state of good repair if it is in a condition sufficient for the asset to operate at a full level of performance. Therefore, such capital costs for the ferry include vessel replacement after the service life is reached, annual capital maintenance for ferry and facilities, and other costs related to engine rehabilitation. The latter set of capital costs related to ferry enhancements have been thoroughly described in Chapters 4 and 5. These include improvements on the Maryland and Virginia landing sites.

## 6.4.1 Capital Expenses

Table 6-8 summarizes the capital expenses accounted for in the financial analysis. A 40-year useful life for the vessel was assumed. Thus, at the end of the useful life, the vessel would be replaced at an estimated $12.5 million. Of that amount, approximately 0.2 percent was set as the annual capital renewal. This annual capital expense is set as a percent of the asset's replacement cost and intended to cover low cost and frequent capital reinvestment needs. Finally, the yaw (tug) boat, a smaller boat with an engine used to guide the ferry was estimated to cost approximately $1.5 million. In the absence of good estimates for yaw boat useful lives, it was assumed that a new yaw boat would also be purchased at the time of vessel replacement in 2028. Additionally, the rehabilitation and inspection process that occurs every 5 years was assumed at 5 percent of the total yaw boat cost.

Landing site improvements have already been described in detail in Chapters 4 and 5. These include costs related to improvements needed to restart ferry operations. It includes costs for railings on ferry boat to improve safety, improved fuel storage, and construction costs. The construction costs cover concrete pavement work for the landing. Estimates for construction include contingency and markup costs.

Table 6-8: Summary of Capital Expenses (2021$) (Not required for startup unless noted)

| Capital Expense | Cost | Notes |
|---|---|---|
| **Ferry Assumptions** | | |
| Ferry Replacement | $12,500,000 | Ferry useful life of 40 years. Replacement in 2028 |
| Annual Capital Renewal (0.2%) | $25,000 | Annual cost assumed at 0.2% of ferry replacement cost |
| **Yaw Boat** | | |
| Yaw Boat Replacement | $1,500,000 | Purchased in 2028 with new vessel |
| Yaw Boat Engine Rehab and Inspection | $75,000 | Rehabilitation and inspection every 5 years. Assumed cost of 5% of yaw boat replacement |
| **Landing Site Improvements** | | |
| Maryland Landing | $2,015,000 | Amount was annualized into smaller payments from 2023 to 2040 |
| Virginia Landing | $2,232,000 | Amount was annualized into smaller payments from 2023 to 2040. Incudes shared-use trail and other operational enhancements |
| Cost of Shared-Use Trail | $733,500 | Assumed for Restore Ferry scenario with construction in 2028. This cost was annualized from 2028 to 2040 |
| Miscellaneous Repairs for Start-Up | $10,000 | Weeds and minimum pavement repairs for Restore Ferry scenario |

Capital expenses for White's Ferry were determined for the first full 5 years of operations and year 2040 (the end year of the travel demand forecast model). The expenses were shown under the two scenarios of (1) Restore Ferry (reinstating operations under previous conditions) and (2) Enhance Ferry. The capital expenses described were constant irrespective of owner type. It was assumed that all of the financial alternatives that provide for ferry service involve the public acquisition of access to the Virginia landing. However, estimates for any future need for land acquisition were excluded from this analysis, therefore, the actual capital costs required to provide service under all build scenarios could be higher than the estimates provided.

Table 6-9 and Table 6-10 summarize the capital expenses for White's Ferry service under service delivery models 2 and 3. For both models capital expenses remain the same and only differ in the "Restore Ferry" or "Enhance Ferry" scenarios. Under the Restore Ferry scenario, no operational enhancements are considered in the capital costs. However, capital costs were included for annual capital renewal, yaw boat engine rehabilitation, and minimum improvements on the Virginia landing sides.

Table 6-9: Summary Capital Expenses for Restore Ferry (Publicly-Owned/Operated or Contracted Service) (thousand)

| Capital Expenses | 2023 | 2024 | 2025 | 2026 | 2027 | Total | 2040 |
|---|---|---|---|---|---|---|---|
| **Ferry Replacement (40 years)** | | | | | | | |
| Annual Capital Renewal[20] (0.2%) | $25 | $25 | $25 | $25 | $25 | $125 | $25 |
| Yaw Boat Replacement (one-time) | | | | | | | |
| Yaw Boat Engine Rehab and Inspection[21] (5 yrs.) | $75 | | | | | $75 | |
| **Maryland Landing Site Improvements** | | | | | | | |
| Virginia Landing Site Improvements and | $10 | | | | | $10 | $56* |

[20] Estimated cost to cover low cost and frequent capital reinvestment needs
[21] Estimated cost for yaw boat engine rehabilitation and required inspection every five years

| Capital Expenses | 2023 | 2024 | 2025 | 2026 | 2027 | Total | 2040 |
|---|---|---|---|---|---|---|---|
| Shared-use Path[22] (min. annualized) | | | | | | | |
| Total Capital Expenses | $110 | $25 | $25 | $25 | $25 | $210 | $81 |

**Represents annualized cost for shared-use trail accounted for in 2028 to 2040*

Table 6-10: Summary Capital Expenses for – Enhance Ferry (Publicly-Owned/Operated or Contracted Service) (thousand)

| Capital Expenses | 2023 | 2024 | 2025 | 2026 | 2027 | Subtotal | 2040 |
|---|---|---|---|---|---|---|---|
| Ferry Replacement (40 years) | | | | | | | |
| Annual Capital Renewal (0.2%) | $25 | $25 | $25 | $25 | $25 | $125 | $25 |
| Yaw Boat Replacement (one-time) | | | | | | | |
| Yaw Boat Engine Rehab and Inspection (5 yrs.) | $75 | | | | | $75 | |
| Maryland Landing Site Improvements | $112 | $112 | $112 | $112 | $112 | $56 | $112 |
| Virginia Landing Site Improvements (min. annualized) | $124 | $124 | $124 | $124 | $124 | $620 | $124 |
| Total Capital Expenses | **$336** | **$261** | **$261** | **$261** | **$261** | **$1,380** | **$261** |

*Enhancements on Virginia landing site includes cost for shared-use trail.*

#### 6.4.1.1 Cost of Land and Acquisition

White's Ferry owns real estate and access on the Maryland shore of the river. However, the current interruption in service involves at least in part the lack of access to the Virginia landing or Virginia shore. Additional improvements, while not required for reopening, may be desired at the Virginia landing as described in scenarios that include Virginia improvements. All the financial scenarios that provide for ferry operation assume public access to the Virginia landing. In Model 1, which assumes complete private ownership and operation of the ferry service, the private owner would negotiate a lease or other means of conveying the publicly acquired Virginia access to the ferry operator. In all the other scenarios in which public agencies retain the underlying business rights, ownership, and risk, the lease or similar operating instrument may be unnecessary or for nominal value.

While the final scenarios for public access to the Virginia landing has not been established, if future improvements to the approach roadway and landing are desired, approximately 40,000 square feet of land on the Virginia side of the state boundary and river's edge would be needed. Any decision to proceed with or abandon any of the financial scenarios for ferry operation should consider costs of land acquisition.

In Service Delivery Models 2 and 3, the cost of initially acquiring any ferry assets from the existing owner necessary for the publicly owned ferry service are excluded from this analysis.

### 6.4.2 Potential Sources of Capital Funds

At the time of the analysis, no sources of capital funding outside revenues generated from ticket sales had been identified as an existing capital funding source. However, other potential sources exist to fund capital expenses that can be explored by the ferry owners. These include self-generated, local, state, and federal sources. Public sources of funding, however, are often associated with meeting requirements for reporting and oversight by the funding body. Some sources are described below.

[22] Estimated cost to cover minimum pavement repairs and weed removal on Virginia landing side. It also includes the estimated cost per year for construction of the shared-use path.

### 6.4.2.1 Federal/State Funding Sources

#### Construction of Ferry Boats and Ferry Terminal Facilities Formula Program (FBP)

Authorized under the Fixing America's Surface Transportation Act (FAST Act), this formula program is available through state transportation agencies for designing and constructing ferry boats. Data from the Bureau of Transportation Statistics (BTS) National Census of Ferry Operators (NCFO) database is used to determine eligibility. Funds are allocated on the basis on the number of ferry passengers (35 percent), vehicles carried (35 percent), and the total route nautical miles (30 percent). States that have at least one eligible ferry operator received at least $100,000 for the FY2020 full year distribution per 23 United States Code (U.S.C.) 147.23 Per the regulation, the federal share will be 80 percent.

Funds may also be requested for designing, acquiring right-of-way, and constructing terminal facilities such as stations. This source is available to both ferries that serve vehicular travel as well as passenger travel. Eligibility must be verified by the Federal Highway Administration (FHWA). shows the 2021 FBP Funding Available for Virginia and Maryland as reported by the FHWA.

Table 6-11: 2021 Federal Ferry Boat Program Funding Available for Allocation

| Operator/Ferry Service | Fiscal Year (FY) 2021 Funds | | | | | |
|---|---|---|---|---|---|---|
| | FY 2021 Funds Authorized | Funds Pulled and Redistributed* | Total Funds for FY 2021 | FY 2021 Funds Allocated | FY 2021 Funds Transferred | FY 2021 Funds Remaining |
| Transportation District Commission of Hampton Roads | $53,797 | $5,456 | $59,253 | $0 | $0 | $59,253 |
| Virginia Department of Transportation | $1,446,325 | $149,062 | $1,595,387 | $0 | $0 | $1,595,387 |
| **Virginia Total** | **$1,500,122** | **$154,518** | **$1,654,640** | **$0** | **$0** | **$1,654,640** |
| Wicomico County - Road Division | $100,000 | $0 | $100,000 | $0 | $0 | $100,000 |
| **Maryland Total** | $100,000 | $0 | $100,000 | $0 | $0 | $100,000 |

Source: Federal Highway Administration, Special Federal-aid Funding (based on FY2021 distribution and redistribution of FY 2013-2016 available funds). Operators shown in this table are all publicly owned terminals and vessels.
*(from unobligated prior distribution) [24]

#### Passenger Ferry Grant Program

In August 2021, the FTA announced the availability of $38 million[25] of the of the FY2021 Section 5307 Urbanized Area Formula Program Funds capital funding assistance for ferry service. This included existing passenger ferry service, establishing new service, or for repairing and upgrading ferries and associated facilities and equipment. Of the $38 million, $4 million was made available for low or zero-emission ferries including ferries using electric battery or fuel cell component and related infrastructure.

This funding source is available to eligible recipients of Section 5307 funds who are public entities providing public passenger ferry service in urbanized areas.

#### Other Federal/State Sources

Based on the financial team's research of funding sources from the 2019 NTD database of ferry operators, the following sources were identified as funding ferry services for either operating or capital. It should be noted that, many

[23] 23 U.S. Code § 147 - Construction of ferry boats and ferry terminal facilities
[24] 2021 - FBP Funding Available for Allocation - FBP - Federal-aid Programs - Federal-aid Programs and Special Funding - Federal Highway Administration (dot.gov)
[25] Federal Transit Administration (2021). FY2021 Notice of Funding Opportunity -Passenger Ferry Grant Program 5307 (h). Opportunity ID: FTA-2021-006-TPM-Ferry

of these programs are not specific to ferry boat operations but certain ferry activities were considered eligible under those programs. Some funds like 5307 funds are not available directly to Counties that are federal "direct recipients" and may be only accessible to the Commonwealth.

- RAISE Discretionary Grants
- 5309 FTA Capital Program
- 5339 Bus and Bus Facilities
- 5337 State of Good Repair
- 5307 Urbanized Area Formula
- 5303 FTA Metro Planning
- 5308 FTA Clean Fuels Program
- 5310 Enhanced Mobility of Seniors and Individuals with Disabilities
- 5311 Other than Urbanized Area
- 5316 Job Access and Commute
- 5317 FTA New Freedom Program

#### 6.4.2.2 Local Funding Sources

Local funding sources include funds available through local government sources. This serves as a potential option should ferry ownership be transferred to a public entity such as Loudoun or Montgomery Counties. At the counties' discretion and availability, potential funding sources could include general revenues, local sales, property or gas tax, or other form of innovative public funding.

#### 6.4.2.3 Directly Generated Ferry Sources

Directly generated sources are funding sources generated directly from the ferry service. Revenue sources include those generated from ticket sales, parking, concession/restaurant, or advertising.

## 6.5 Summary of Financial Analysis Assumptions

Table 6-12 provides a summary of the assumptions and inputs used in the analysis.

Table 6-12: Assumptions for Financial Analysis

| 1. Revenue Drivers | Estimate | Notes |
|---|---|---|
| i. Average Daily Vehicle Trips | | |
| 2019 Streetlight | 1,092 | |
| 2040 MWCOG Person Trip | 1,471 | Preferred model for conservative financial estimate |
| Increase in ridership due to enhancements | 3% | |
| ii. Ticket Price | | |
| Assumed one-way vehicle trip | $ 4.00 | Assuming 20% discount. Discounting is the general practice. Conservative estimate. |
| Average bike/ped | $1.50 | Assume 10% of trips are bike/ped and 90% vehicular |
| iii. Average Operating Days per Year | 347 | Per Year (Chapter 3) |
| 2. Cost Drivers | | |
| i. Revenue hours of operation | | |
| Model Figure | 6250 | Chapter 3 |

| 1. Revenue Drivers | Estimate | Notes |
|---|---|---|
| +/- 10% of Revenue hours | 5625/6875 | Used for selecting range for similar unit costs across systems |
| ii. Operating & Maintenance Costs | | |
| DO-Unit O&M Cost/HR | $683.28 | Average King County and Chatham Area County |
| PT (Contract)-Unit O&M Cost/HR | $271.88 | Average Kitsap and Hampton Roads |
| Agency- Facility/Facility Maintenance Cost/Station | $42,412.98 | Average King County and Chatham Area County |
| Contractor- Facility/Facility Maintenance Cost/Station | $20,734.64 | Average. Kitsap and Hampton Roads |
| Agency-National Average O&M Cost | $1,591.43 | Calculated from NTD 2019 Reports |
| Contractor-National Average O&M Cost | $702.43 | Calculated from NTD 2019 Reports |
| iii. Capital Costs | | |
| Ferry replacement | $ 12,500,000 | Assumed in 2028 |
| Yaw boat replacement | $1,500,000 | Chapter 4 |
| Yaw boat engines rehab | $75,000.00 | Every 5 years or 300K hours. Assumed 5% of replacement cost |
| Maryland Landing Site (Min) | $2,015,000.00 | Economic assumption |
| Virginia Landing Site (Min) | $2,232,000.00 | |
| Trail (from Rt. 15 to VA landing), 2025, 2021$ | $733,500.00 | 10 feet wide shared-use path from Route 15 to the ramp, for a length of about 6,500 feet |
| Miscellaneous Repairs for VA landing | $10,000.00 | |
| 3. Vehicle Characteristics | | |
| VA side 52 feet replacement year | 2035 | Purchased in 1995 |
| MD side 84 feet replacement year | 2028 | Purchased in 1988 |
| Ferry Useful life | 40 years | |
| Vessel replacement | $12,500,000 | Chapter 4 |
| Cable cost and installation | $16,000.00 | Replaced every 6 months. Assumed to be contained in O&M unit cost |
| Dollar year | 2021 | Constant dollars |
| 4. Construction schedule | | |
| Construction year | 2022 | Earliest start year for operations |
| Analysis start year | 2023 | First full year of operations |
| Analysis End Year | 2040 | |

## 6.6 Summary of Operating and Capital Plan by Service Delivery Model

Service Delivery Model 1 – Privately owned and operated represents the "business as usual" arrangement in effect prior to service shut down. If agreement on the land access issue in Virginia is reached, it is a very viable model. Since no public investment would be required, no detailed financial analysis was conducted for this model.

The tables below summarize the funding shortfalls for four analysis scenarios. These are:

- Service Delivery Model 2 - Publicly owned and operated
- Restore Ferry
- Enhance Ferry
- Service Delivery Model 3 - Publicly owned and contracted
- Restore Ferry
- Enhance Ferry

Service Delivery Model 1 assumes a privately owned and operated model, thus, no costs were assumed to be incurred by the public in terms of operating and maintenance costs. However, capital costs for the construction of the shared-use trail must still be considered after 2028. Because this analysis presented data for the first five years of ferry operations, it was assumed that the public would not incur any costs for that duration.

Table 6-13: Service Delivery Model 2 – Publicly Owned and Operated (Restore Ferry) (in thousands)

| Operating/Capital | 2023 | 2024 | 2025 | 2026 | 2027 | Total | 2040 |
|---|---|---|---|---|---|---|---|
| Total Operating Revenue | $1,615 | $1,638 | $1,661 | $1,685 | $1,709 | $8,308 | $2,056 |
| Total Operating Expenses | $4,356 | $4,356 | $4,356 | $4,356 | $4,356 | $21,780 | $4,356 |
| Operating Funding Gap | -$2,741 | -$2,718 | -$2,695 | -$2,671 | -$2,647 | -$13,472 | -$2,300 |
| Total Capital Revenue | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Total Capital Expenses | $110 | $25 | $25 | $25 | $25 | $210 | $81 |
| Capital Funding Gap | -$110 | -$25 | -$25 | -$25 | -$25 | -$210 | -$81 |

*(Constant 2021 dollars – Not including inflation or land cost)*

Table 6-14: Service Delivery Model 2 – Publicly Owned and Operated (Enhance Ferry) (in thousands)

| Operating/Capital | 2023 | 2024 | 2025 | 2026 | 2027 | Total | 2040 |
|---|---|---|---|---|---|---|---|
| Total Operating Revenue | $1,663 | $1,687 | $1,711 | $1,736 | $1,760 | $8,557 | $2,117 |
| Total Operating Expenses | $4,356 | $4,356 | $4,356 | $4,356 | $4,356 | $21,780 | $4,356 |
| Operating Funding Gap | -$2,693 | -$2,669 | -$2,645 | -$2,620 | -$2,596 | -$13,223 | -$2,239 |
| Total Capital Revenue | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Total Capital Expenses | $336 | $261 | $261 | $261 | $261 | $1,380 | $261 |
| Capital Funding Gap | -$336 | -$261 | -$261 | -$261 | -$261 | -$1,380 | -$261 |

*(Constant 2021 dollars – Not including inflation or land cost)*

Table 6-15: Service Delivery Model 3 - Publicly Owned and Contractor Operated (Restore Ferry) (in thousands)

| Operating/Capital | 2023 | 2024 | 2025 | 2026 | 2027 | Total | 2040 |
|---|---|---|---|---|---|---|---|
| Total Operating Revenue | $1,615 | $1,638 | $1,661 | $1,685 | $1,709 | $8,308 | $2,056 |
| Total Operating Expenses | $1,740 | $1,740 | $1,740 | $1,740 | $1,740 | $8,700 | $1,740 |
| Operating Funding Gap | -$125 | -$102 | -$79 | -$55 | -$31 | -$392 | $316 |
| Total Capital Revenue | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Total Capital Expenses | $110 | $25 | $25 | $25 | $25 | $210 | $81 |
| Capital Funding Gap | -$110 | -$25 | -$25 | -$25 | -$25 | -$210 | -$81 |

*(Constant 2021 dollars – Not including inflation or land cost)*

Table 6-16: Service Delivery Model 3 - Publicly Owned and Contractor Operated (Enhance Ferry) (in thousands)

| Operating/Capital | 2023 | 2024 | 2025 | 2026 | 2027 | Total | 2040 |
|---|---|---|---|---|---|---|---|
| Total Operating Revenue | $1,663 | $1,687 | $1,711 | $1,736 | $1,760 | $8,557 | $2,117 |
| Total Operating Expenses | $1,740 | $1,740 | $1,740 | $1,740 | $1,740.00 | $8,700.00 | $1,740.00 |
| Operating Funding Gap | -$77 | -$53 | -$29 | -$4 | $20 | -$143 | $377 |
| Total Capital Revenue | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Total Capital Expenses | $336 | $261 | $261 | $261 | $261 | $1,380 | $261 |
| Capital Funding Gap | -$336 | -$261 | -$261 | -$261 | -$261 | -$1,380 | -$261 |

*(Constant 2021 dollars – Not including inflation or land cost)*

# 6.7 Conclusion

The financial analysis for this study provided a high-level overview of potential operating and capital plans for White's Ferry service considering three service delivery models. The analysis reviewed projected revenues and costs for either publicly-owned and operated service or publicly-owned and contractor operated service. Under each service delivery model, revenues and expenses for both operating and capital cost items were estimated for the first five years (2023 to 2027).

Under the publicly-owned and operated service delivery model, both scenarios, the Restore Ferry and Enhanced Ferry, show funding gaps for the operating plans. The funding gap for the Enhance Ferry scenario is slightly lower than the Restore Ferry scenario due to the projected increase in ridership (and revenues) from the ferry enhancements. In terms of the capital plan, because no capital revenue source currently exists beyond the ferry ticket sales, expenses under both scenarios produce a deficit for the ferry owners. None of the scenarios under the publicly-owned and operated model produce a profit in the first five years.

For the publicly-owned and contractor operated service, the cumulative operating expenses for the first five years exceed revenues generated from the ferry under both Restore Ferry and Enhance Ferry scenarios. However, in the fifth year, the results of the ferry enhancements under this service model produce a slight profit. By year 2040, the model target year, both scenarios under the contractor operated Service Delivery Model produce a significant profit when compared to previous years. Overall, the contractor operated service model produced lower deficits over the analysis period due to the lower unit operating and maintenance cost.

Some sources of operating and capital funds that the ferry owner could potentially apply were also identified. Once all the eligibility and reporting requirements are met, the funding shortfalls could be offset and make operations more viable.


Chesapeake & Ohio Canal
National Historical Park
THE CANAL AND TOWPATH ARE DEDICATED TO
JUSTICE WILLIAM O. DOUGLAS
WHITES FERRY
UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

# 7

# SUMMARY

# 7 Summary

## 7.1 Introduction and Background

The White's Ferry has long history as the last remaining ferry crossing of the Potomac River between Loudoun County, Virginia and Montgomery County, Maryland. Riding the ferry is a novel experience for many tourists and visitors to the region, but a very practical and important everyday transportation link for many local residents that saves them time and reduces miles travelled. It also supports regional businesses and employment (directly and indirectly) and is a unique part of the local history and culture.

In December of 2020, a long running dispute over land ownership and ferry traffic crossing private property on the Virginia side of the river came to an impasse which led to an abrupt shut down of service that continues to the present. Since then, the ferry assets and associated property on the Maryland side of the Potomac river have been acquired by a local businessman who indicates his goal is to restore and improve service.

## 7.2 Legal and Environmental Compliance

Regulations regarding the current operation and future requirements related to new ownership or physical improvements have been reviewed. Business is a Maryland entity and subject to state labor laws and permits. Environmental regulations would be focused on prevention/remediation of any contamination on the property; protection of historic and cultural resources; and reviewing, permitting, and mitigating impacts of any land disturbing activities within the floodplain or floodway including dredging. Finally, the operation of a passenger ferry service across state lines makes the service clearly subject to U.S. Coast Guard oversight and regulation. Those regulations include limits on the type number and size of vehicles that can use the ferry, requirements for periodic inspection, and regulations on the training and certification required of the operators.

## 7.3 Transportation Operations

The study team reached out to stakeholders and knowledgeable parties regarding the operation of similar ferry systems in Virginia and Maryland, the operators of the ferry prior to sale, neighboring property owners including the owners of Rockland Farms and the National Park Service. Field visits to understand the context and surroundings and the condition of the facilities and equipment were also conducted on both sides of the river.

### 7.3.1 Existing Conditions

The ferry related facilities supporting operation include property, buildings, equipment, and vessels that are predominantly located on the Maryland side. Among these are the store/office, employee housing, a restroom building, a maintenance shed/equipment garage, and a retired ferry boat section that is used as a platform for storage of fuel and other materials that can remain above any anticipated floodwaters. The concrete landing ramp and numerous cable anchors and winches and the ferry vessel and the smaller yaw boat that attaches and provides the propulsion of the ferry are also docked and serviced from the Maryland side. The National Park Service owns land surrounding the Ferry property, including an area downstream that has potential for future camping use, a picnic pavilion upstream, the gravel parking lot and the popular C&O Canal Towpath.

On the Virginia side, the ferry related facilities consist of a concrete ramp and retaining wall that support an access drive with a tight "hairpin" curve configuration that ultimately ties to Whites Ferry Road and connects to U.S. Route 15. A substantial section of Whites Ferry Road is located on private owned property associated with Whites Ferry Manor and Rocklands Farm, but has long been maintained by the Virginia Department of Transportation.

### 7.3.2 Operations

The ferry operations prior to shut down involved a two-section vessel that can accommodate up to 24 passenger vehicles per trip. A captain and a second employee at a minimum are required for operation. The service model is "on-demand" and does not follow a set schedule. Once a sufficient number of vehicles to justify a crossing have been

loaded, the gates are raised and the ferry vessel crosses the river along a fixed steel cable guideway and proceeds to the ramp on the opposite shore. The fare for the trip is collected during the crossing, either in the form of pre-purchased tickets or cash. Once the vessel docks on the ramp, the gate/ramp is lowered, and the vehicles drive off as directed by the staff. Then waiting vehicles on that side are directed onto the vessel, and the process is repeated in the opposite direction. A full loading, crossing, and unloading cycle requires between 10 minutes and 15 minutes depending on the number of vehicles carried.

### 7.3.3 Ridership

The ferry operation prior to shut down kept records of daily revenue but did not collect data on the type or number of vehicles using the service. In order to develop an estimate of the typical ridership in both the normal season (represented by January) and the peak season (represented by July), the Study Team acquired commercially available travel data from StreetLight to approximate the vehicular traffic utilizing the ferry during those periods in 2019. That data indicated daily travel of 1092 trips per day in January and 1625 trips per day in July when demand is at its peak. These numbers served as the basis for forecasting future demand based on three different travel demand models for the year 2040. These models were the Loudoun County Land Use Growth Method, the Loudoun County Person Trip Growth Method, and the MWCOG Person Trip Growth Method. The results are summarized below for the 2019 and 2040 forecast for each of the methodologies for the January (normal) and July (peak) timeframes.

Table 7-1: Use Growth Method

| Trip Purpose | Streetlight Data | LCM Land-Use Growth Method | | LCM Person-Trip Growth Method | | MWCOG Person-Trip Growth Method | |
|---|---|---|---|---|---|---|---|
| | 2019 | 2040 | Growth | 2040 | Growth | 2040 | Growth |
| January | 1,092 | 1,544 | 41% | 1,516 | 39% | 1,471 | 35% |
| July | 1,625 | 2,406 | 48% | 2,307 | 42% | 2,158 | 33% |

The results indicate that demand for the ferry is strong, especially in the summer tourist season, and is expected to grow substantially (by about 40% based on the average of the models). Whites Ferry is an important transportation link for many residents and visitor to the adjacent areas, and its demand and value is expected to increase substantially in the coming decades.

## 7.4 Potential Alternatives

Based on the knowledge gained from the previously discussed field investigation, stakeholder interviews, and research on the previous ferry operations, the study team examined several options for immediate, short-term, and long-term operations

### 7.4.1 Restart Ferry Scenario (Immediate)

The most immediate actions and bare minimum efforts needed to get the ferry operating include: ensuring the needed staff for all shifts are available and have the required certifications; replacing the guide cable across the river; inspecting the vessels and related equipment to ensure all are in good working order; notifying the public and state and local government agencies that the ferry is again operational.

### 7.4.2 Restore Ferry Scenario (Short-Term)

The study team determined from the field observations of existing facilities and operations that several repairs and minor improvements were advisable in the near term to improve safety and efficiency and to maintain a state of good repair and avoid more costly repairs in future years. These recommendations do not require the acquisition of right of way or major utility upgrades.

#### 7.4.2.1 Maryland Side Improvements

Restripe a section of the road between the NPS parking lot entrance and the store parking entrance to create a queue lane that would still allow traffic to bypass vehicles that are lined up to get to the store (may require some minor

repaving to add the second lane); improve payment options to include electronic debit and credit cards to increase wireless prepayment and track utilization without having to make a trip to the store. This will require improvements to the Wi-Fi connectivity in the area.

#### 7.4.2.2 Virginia Side Improvements

Repair deteriorated concrete on ramp; clean and seal joints in ramp; ensure ramp lighting is operable.

### 7.4.3 Enhanced Ferry Scenario (Long-Term)

Based on the data and findings from Chapter 3, including the strong forecast growth in demand, the demand for ferry service will exceed the capacity. While this is already the case during peak periods and peak season, the unmet demand will increase dramatically in the 2040 study year unless improvements in the efficiency and capacity of the system are implemented. In order to better meet the future demand, the Study Team developed an improvement scenario called Enhanced Ferry.

#### 7.4.3.1 Maryland Side Improvements

Approach roadway widening: restriping to allow dual lane loading; add toll booth for offboard fare collection; construct new elevated storage building for fuel and material storage; realign intersection at NPS Parking lot and access road, create a staging area for bicyclists and pedestrians outside vehicular lanes, improve site lighting; improve Wi-Fi; add wayfinding signage and dynamic message signs on approach roadways.

#### 7.4.3.2 Virginia Side Improvements

Improve approach roadway curve: reconstruct landing ramp with better alignment to accommodate smoother flow and larger vehicles; add toll booth for offboard fare collection; create a staging area for bicycles and pedestrians outside vehicular lanes, improve site lighting, construct a parallel shared use path between Route 15 and the ferry landing to provide dedicated access for pedestrians and bicyclists; add wayfinding signage and dynamic message sign on Route 15.

#### 7.4.3.3 Ferry Related Improvements

Replacement of the ferry vessel; replacement of the tug/yaw boat. A larger boat would improve peak capacity but would also likely increase operating costs. The enhanced scenario envisions an additional employee on each side of the River to manage queuing and collect fares during preboarding.

These improvements would streamline the loading and unloading process and reduce the time required for a round trip from 30 minutes to 20 minutes, representing a significant increase in peak hour capacity.

## 7.5 Economic Impacts and Opportunities

In addition to the direct impact of the ferry on those who use it for travel (reduced miles and reduced travel time), there are numerous other indirect impacts related to the environment (reduced emissions), transportation facilities, and regional employment and businesses. The study team transportation economists performed analysis to quantify those benefits in dollar terms to provide perspective on the economic impacts of the ferry service (and of the service shutdown).

The qualitative impacts of reduced congestion on Route 28 in Maryland and Route 15 between Point of Rocks and Whites Ferry Road in Virginia are positive but not quantified. The reduced chance of hazardous material contamination associated with a new equipment and fuel storage facility is likewise positive but not quantified for this analysis. The following table summarizes the calculated economic impact of the ferry under both the Restore Ferry and Enhance Ferry Scenarios for the near term (by 2023) and the long term (2040).

Table 7-2: Calculated Economic Impacts Summary

| | Restore Ferry Scenario | | Enhance Ferry Scenario | |
|---|---|---|---|---|
| Year | 2023 | 2040 | 2023 | 2040 |
| **Economic Impacts** | | | | |
| Travel Time Savings | $1,041,000 | $1,732,000 | $1,180,000 | $3,545,000 |

| | Restore Ferry Scenario | | Enhance Ferry Scenario | |
|---|---|---|---|---|
| Travel Cost Savings | $631,000 | $884,000 | $650,000 | $1,657,000 |
| Safety Savings | $1,317,000 | $1,844,000 | $1,356,000 | $3,430,000 |
| Emissions Avoided | $98,000 | $144,000 | $100,000 | $267,000 |
| Trips Not Taken | $5,956,000 | $8,568,000 | $6,135,000 | $15,940,000 |
| **Total Impacts** | **$9,043,000** | **$13,172,000** | **$9,421,000** | **$24,839,000** |
| Year | 2022 | 2040 | 2022 | 2040 |
| Construction Cost Impacts | | | | |
| Total Job-Years | 8 | NA | 47 | NA |
| Total Earnings (2021$) | $460,000 | NA | $2,628,000 | NA |
| Year | 2023 | 2040 | 2023 | 2040 |
| Annual O&M Cost Impacts: Low | | | | |
| Total Job-Years | 4 | 4 | 4 | 4 |
| Total Earnings (2021$) | $265,000 | $265,000 | $265,000 | $265,000 |
| Annual O&M Cost Impacts: High | | | | |
| Total Job-Years | 25 | 25 | 25 | 25 |
| Total Earnings (2021$) | $1,526,000 | $1,526,000 | $1,526,000 | $1,526,000 |

## 7.6 Financial Analysis

In addition to the Restore Ferry and Enhance Ferry scenarios, the study team conducted financial modelling of the cost and revenue implications of three alternative service delivery models.

Service Delivery Model 1 assumes a privately owned and operated model, thus, no costs were assumed to be incurred by the public in terms of operating and maintenance costs. However, capital costs for the construction of the shared-use trail must still be considered after 2028. Because this analysis presented data for the first five years of ferry operations, it was assumed that the public would not incur any costs for that duration

The financial analysis for this study provided a high-level overview of potential operating and capital plans for White's Ferry Service considering alternative service delivery models. The analysis reviewed projected revenues and costs for either publicly-owned and operated service or publicly-owned and contractor operated service. Under each service delivery model, revenues and expenses for both operating and capital cost items were estimated for the first five years (2023 to 2027).

Table 7-3 summarize the funding shortfalls for four analysis scenarios:

- Service Delivery Model 2 - Publicly owned and operated
  - Restore Ferry Scenario
  - Enhance Ferry Scenario
- Service Delivery Model 3 - Publicly owned and contracted
  - Restore Ferry Scenario
  - Enhance Ferry Scenario

Table 7-3: Service Delivery Model Comparison Years 2023-2027 Total and Year 2040 Annual

| Delivery Model | Model 2: Publicly Owned and Operated | | | | Model 3: Publicly Owned and Contracted | | | |
|---|---|---|---|---|---|---|---|---|
| Scenario | Restore Ferry | | Enhance Ferry | | Restore Ferry | | Enhance Ferry | |
| Operating/Capital | 2023-2027 Total | 2040 | 2023-2027 Total | 2040 | 2023-2027 Total | 2040 | 2023-2027 Total | 2040 |
| Total Operating Revenue | $8,308 | $2,056 | $8,557 | $2,117 | $8,308 | $2,056 | $8,557 | $2,117 |
| Total Operating Expenses | $21,780 | $4,356 | $21,780 | $4,356 | $8,700 | $1,740 | $8,700 | $1,740 |
| Operating Funding Gap | -$13,472 | -$2,300 | -$13,223 | -$2,239 | -$392 | $316 | -$143 | $377 |
| Total Capital Revenue | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Total Capital Expenses | $210 | $81 | $1,380 | $261 | $210 | $81 | $1,380 | $261 |
| Capital Funding Gap | -$210 | -$81 | -$1,380 | -$261 | -$210 | -$81 | -$1,380 | -$261 |

*(Constant 2021 dollars – Not including inflation or land cost)*

Under the Service Delivery Model 2 (Publicly-Owned and Operated), both scenarios, Restore Ferry and Enhance Ferry, showed funding gaps for the operating plans. The funding gap for the Enhance Ferry alternative was slightly lower than the Restore Ferry alternative due to the projected increase in ridership (and revenues) form the ferry enhancements.

Under the Service Delivery Model 3 (Publicly-Owned and Contracted), both scenarios showed funding surplus for the operating plans in year 2040. The funding surplus for the Enhance Ferry alternative was slightly higher than the Restore Ferry alternative due to the projected increase in ridership (and revenues) from the ferry enhancements and increased capacity.

Consequently, estimates provided under Model 3 show a better financial outlook as compared to Model 2. However, the heavy capital funding gap under either scenario or financial delivery model indicates that significant public investment will be required to ever generate the positive operating returns.


# 8

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# 8 References

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# Attachments

United States Census Bureau **OnTheMap**

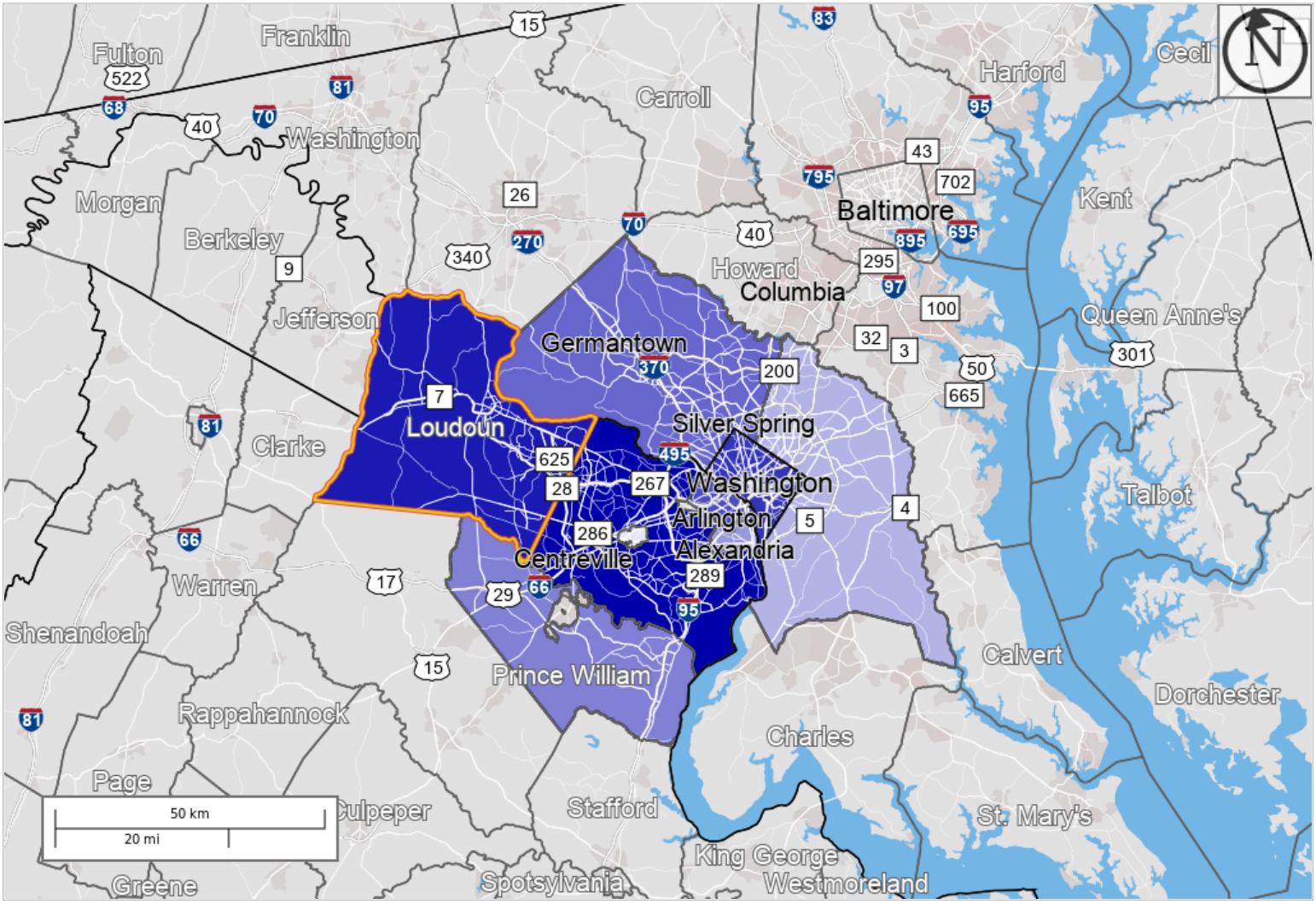
# Work Destination Report - Home Selection Area to Work Counties

All Jobs for All Workers in 2018

Created by the U.S. Census Bureau's OnTheMap `https://onthemap.ces.census.gov` on 08/27/2021

## Counts of All Jobs from Home Selection Area to Work Counties in 2018

**All Workers**




## Map Legend

**Job Count**

- 74,085
- 64,705
- 11,628
- 10,001
- 6,709
- 6,471
- 4,036
- 2,870
- 2,266
- 2,002

**Selection Areas**

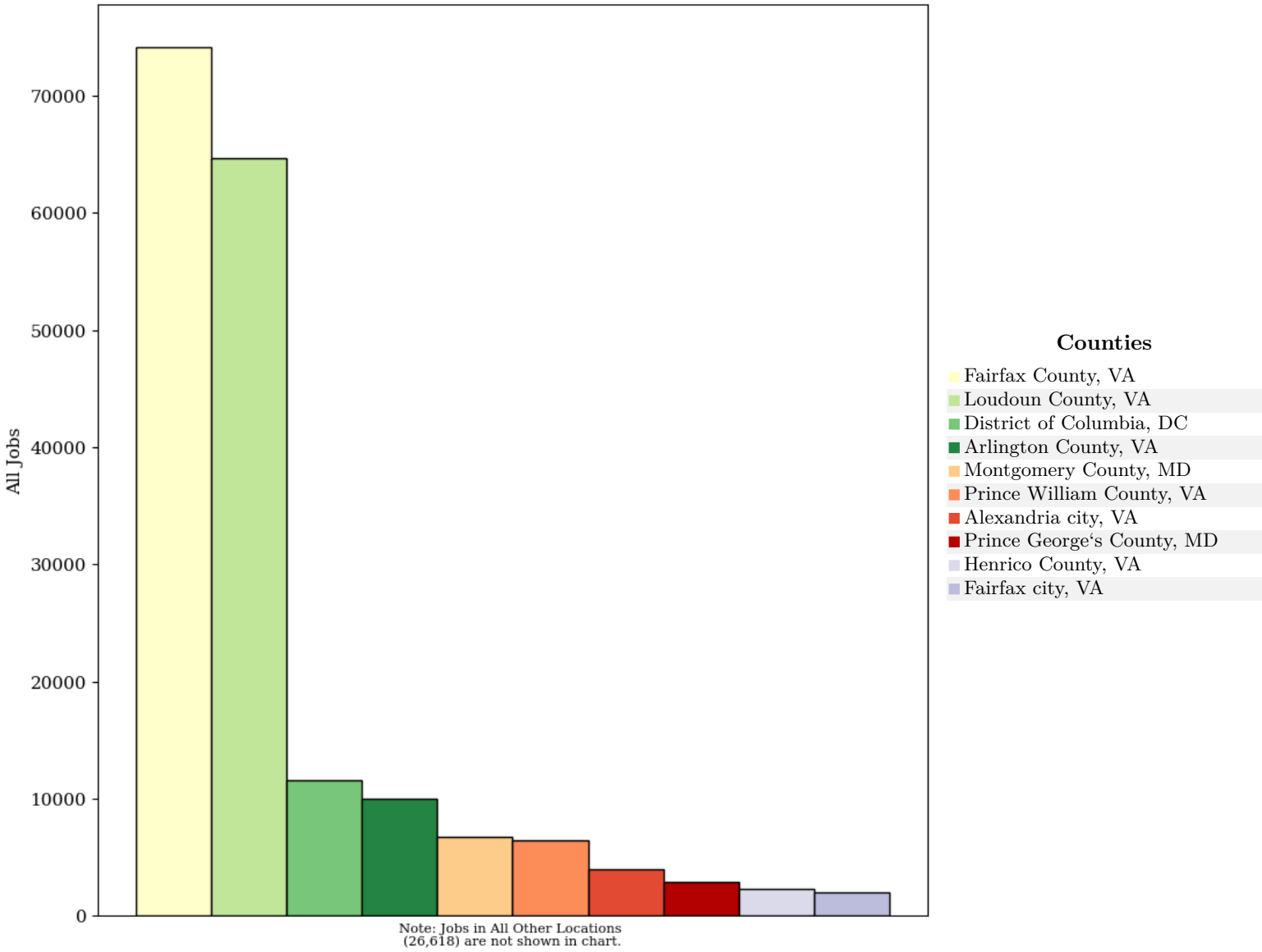
- Analysis Selection



United States Census Bureau

## All Jobs from Home Selection Area to Work Counties in 2018

**All Workers**




## All Jobs from Home Selection Area to Work Counties in 2018

**All Workers**

| Counties as Work Destination Area | 2018 Count | Share |
|---|---|---|
| **All Counties** | 211,391 | 100.0 |
| **Fairfax County, VA** | 74,085 | 35.0 |
| **Loudoun County, VA** | 64,705 | 30.6 |
| **District of Columbia, DC** | 11,628 | 5.5 |
| **Arlington County, VA** | 10,001 | 4.7 |
| **Montgomery County, MD** | 6,709 | 3.2 |
| **Prince William County, VA** | 6,471 | 3.1 |
| **Alexandria city, VA** | 4,036 | 1.9 |
| **Prince George's County, MD** | 2,870 | 1.4 |
| **Henrico County, VA** | 2,266 | 1.1 |
| **Fairfax city, VA** | 2,002 | 0.9 |
| **All Other Locations** | 26,618 | 12.6 |

# Additional Information

## Analysis Settings

| | |
|---|---|
| **Analysis Type** | Destination |
| **Destination Type** | Counties |
| **Selection area as** | Home |
| **Year(s)** | 2018 |
| **Job Type** | All Jobs |
| **Selection Area** | Loudoun County, VA from Counties |
| **Selected Census Blocks** | 5,994 |
| **Analysis Generation Date** | 08/26/2021 14:24 - OnTheMap 6.8 |
| **Code Revision** | 5dc8e60ec2609d78ebfa7d4b188db13aacbb1ba6 |
| **LODES Data Version** | 20201117_1559 |

## Data Sources

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2nd Quarter of 2002-2018).

## Notes

1. Race, Ethnicity, Educational Attainment, and Sex statistics are beta release results and are not available before 2009.
2. Educational Attainment is only produced for workers aged 30 and over.
3. Firm Age and Firm Size statistics are beta release results for All Private jobs and are not available before 2011 and in 2018.

# United States Census Bureau OnTheMap

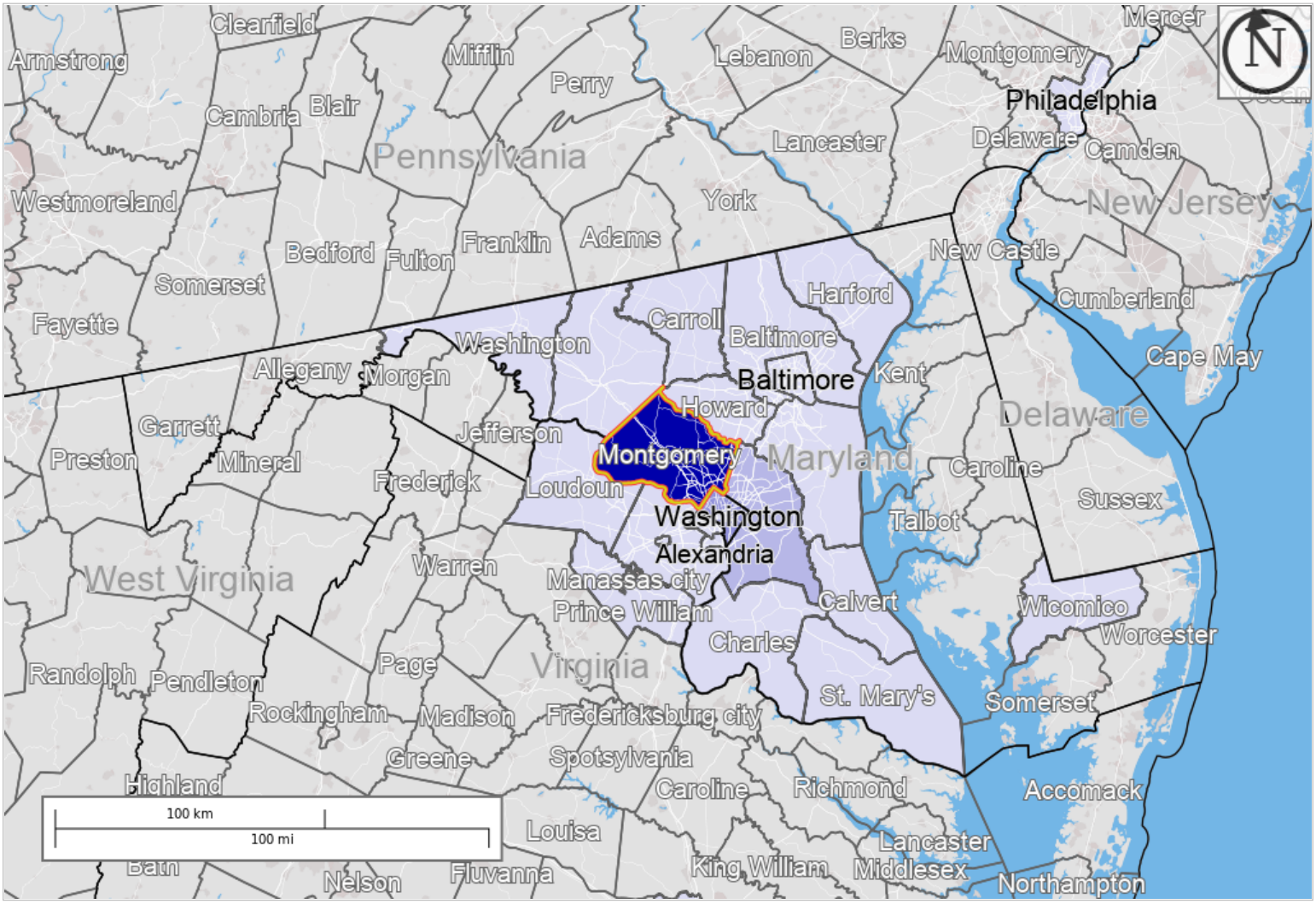
## Work Destination Report - Home Selection Area to Work Counties

All Jobs for All Workers in 2018

Created by the U.S. Census Bureau's OnTheMap `https://onthemap.ces.census.gov` on 08/27/2021

### Counts of All Jobs from Home Selection Area to Work Counties in 2018

**All Workers**




### Map Legend

**Job Count**

- 206,726 - 241,116
- 172,336 - 206,725
- 137,945 - 172,335
- 103,555 - 137,944
- 69,164 - 103,554
- 34,774 - 69,163
- 383 - 34,773

**Selection Areas**

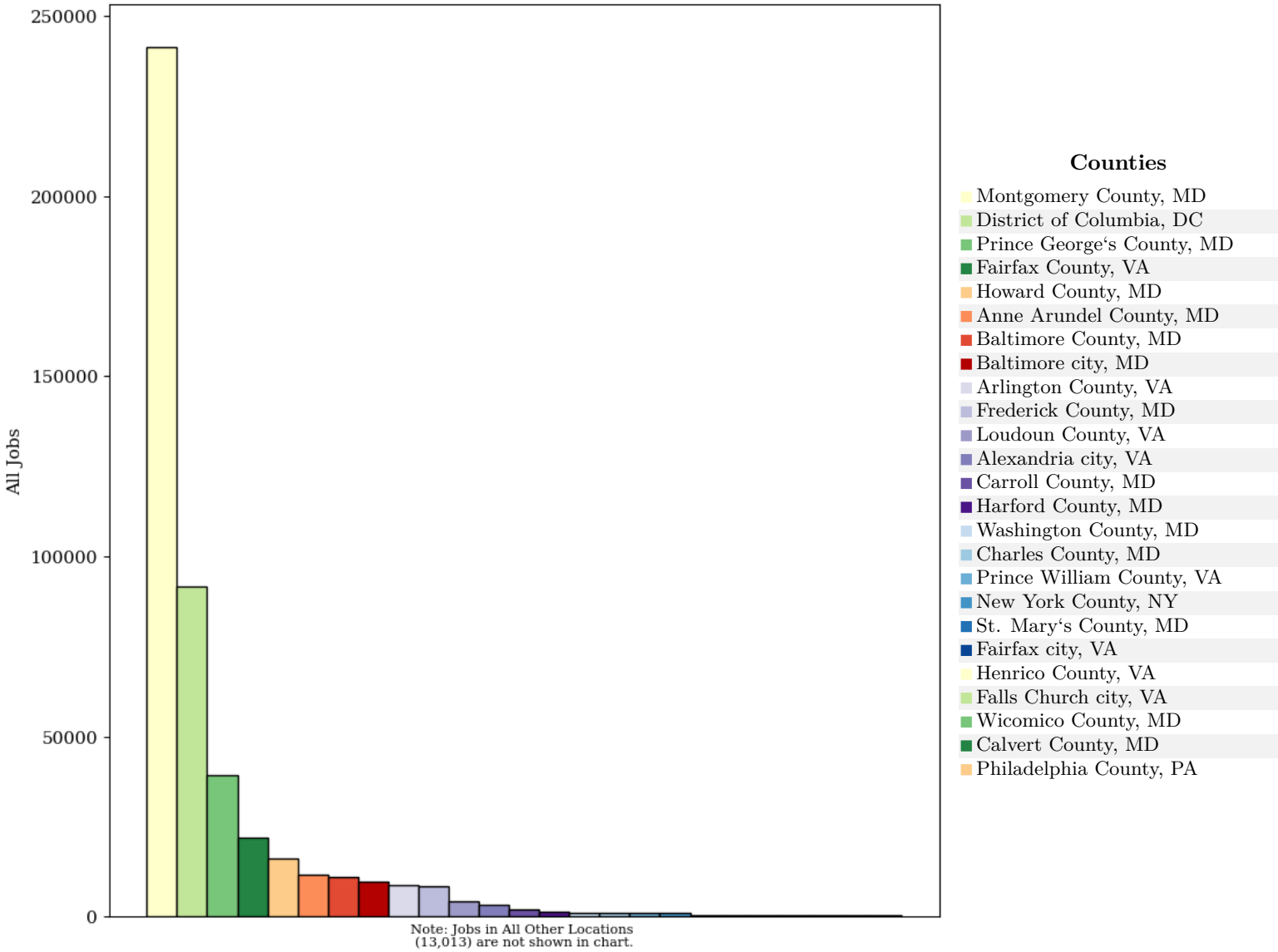
- Analysis Selection



United States Census Bureau

## All Jobs from Home Selection Area to Work Counties in 2018

**All Workers**




## All Jobs from Home Selection Area to Work Counties in 2018

**All Workers**

| Counties as Work Destination Area | 2018 Count | Share |
|---|---|---|
| **All Counties** | 492,066 | 100.0 |
| **Montgomery County, MD** | 241,116 | 49.0 |
| **District of Columbia, DC** | 91,609 | 18.6 |
| **Prince George's County, MD** | 39,344 | 8.0 |
| **Fairfax County, VA** | 22,047 | 4.5 |
| **Howard County, MD** | 16,103 | 3.3 |
| **Anne Arundel County, MD** | 11,745 | 2.4 |
| **Baltimore County, MD** | 11,134 | 2.3 |
| **Baltimore city, MD** | 9,842 | 2.0 |
| **Arlington County, VA** | 8,777 | 1.8 |
| **Frederick County, MD** | 8,463 | 1.7 |
| **Loudoun County, VA** | 4,352 | 0.9 |

| Counties as Work Destination Area | 2018 Count | Share |
|---|---|---|
| **Alexandria city, VA** | 3,410 | 0.7 |
| **Carroll County, MD** | 1,921 | 0.4 |
| **Harford County, MD** | 1,420 | 0.3 |
| **Washington County, MD** | 1,196 | 0.2 |
| **Charles County, MD** | 1,177 | 0.2 |
| **Prince William County, VA** | 1,136 | 0.2 |
| **New York County, NY** | 1,110 | 0.2 |
| **St. Mary‘s County, MD** | 553 | 0.1 |
| **Fairfax city, VA** | 503 | 0.1 |
| **Henrico County, VA** | 473 | 0.1 |
| **Falls Church city, VA** | 438 | 0.1 |
| **Wicomico County, MD** | 409 | 0.1 |
| **Calvert County, MD** | 392 | 0.1 |
| **Philadelphia County, PA** | 383 | 0.1 |
| **All Other Locations** | 13,013 | 2.6 |

# Additional Information

## Analysis Settings

| | |
|---|---|
| **Analysis Type** | Destination |
| **Destination Type** | Counties |
| **Selection area as** | Home |
| **Year(s)** | 2018 |
| **Job Type** | All Jobs |
| **Selection Area** | Montgomery County, MD from Counties |
| **Selected Census Blocks** | 10,591 |
| **Analysis Generation Date** | 08/27/2021 13:29 - OnTheMap 6.8 |
| **Code Revision** | 5dc8e60ec2609d78ebfa7d4b188db13aacbb1ba6 |
| **LODES Data Version** | 20201117_1559 |

## Data Sources

Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2nd Quarter of 2002-2018).

## Notes

1. Race, Ethnicity, Educational Attainment, and Sex statistics are beta release results and are not available before 2009.
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