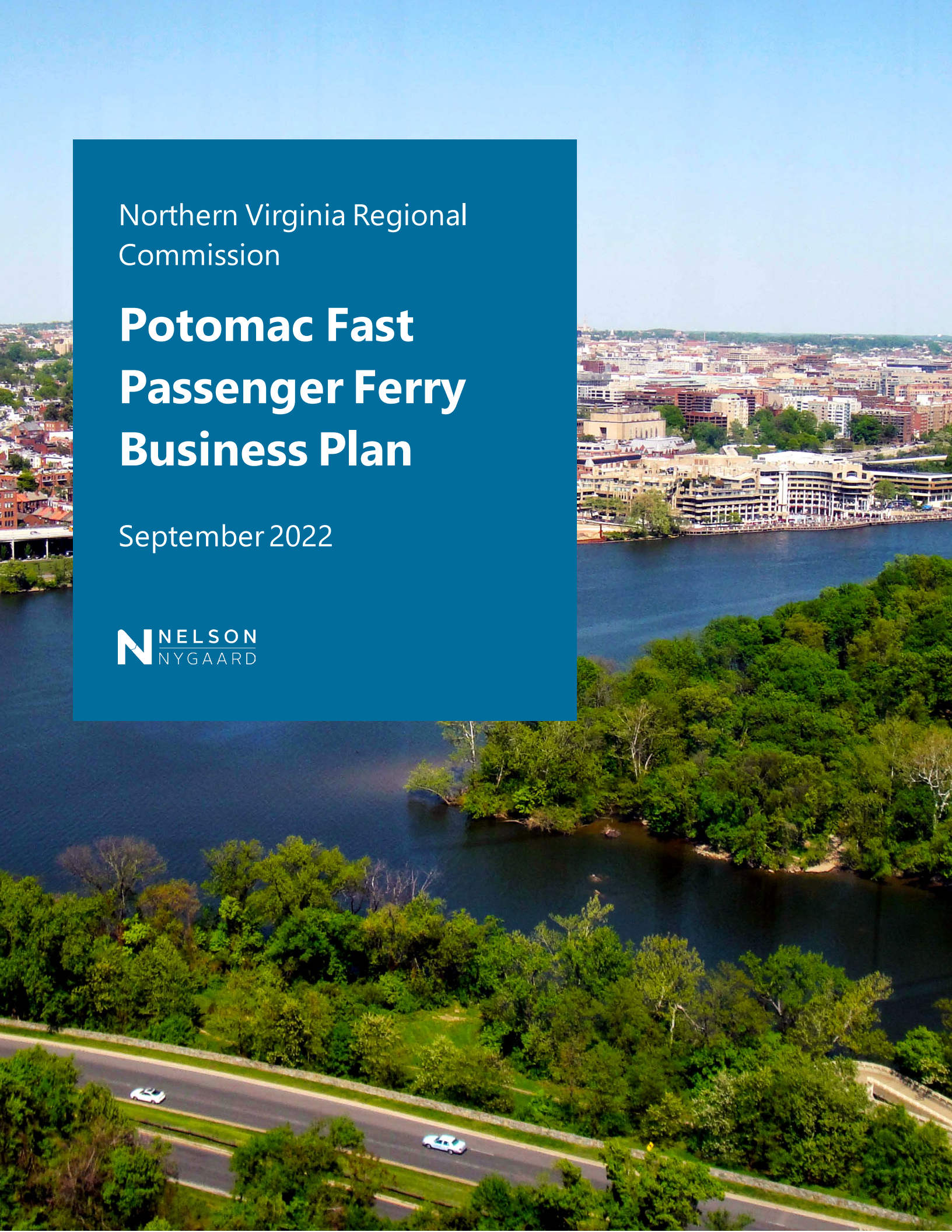

Northern Virginia Regional Commission

Potomac Fast Passenger Ferry Business Plan

September 2022

NELSON NYGAARD

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1 EXECUTIVE SUMMARY

Commuter ferry service connecting communities in the National Capital Region is on the very cusp of implementation. A decade-long history of studies has offered evidence that service is feasible, and a substantial and competitive market exists for commuter ferry service. As with many great transportation projects, getting from concept to implementation requires navigating a myriad of details. This business plan is a navigational chart to assist the region in finding a way through the complex archipelago—from concept to an implemented service.

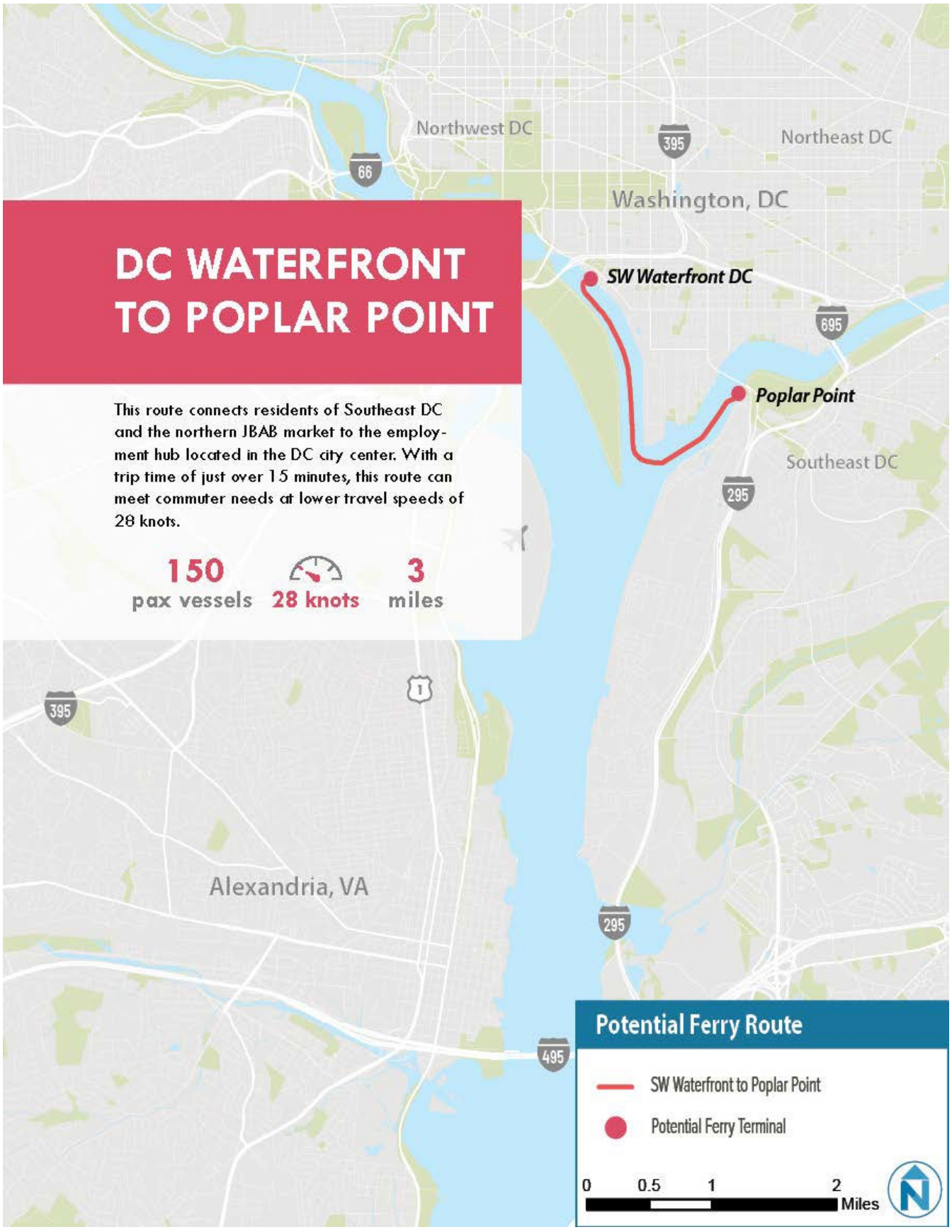
To date, project emphasis has focused on the organizational idea that the service will involve significant contributions from the private sector. What is very clear, however, is that the private sector is interested but continues to wait for more signs of support from the public sector in the region before moving ahead. Today's water taxi operations on the Potomac are fully private and mostly tourism oriented with the occasional work-related rider. Alexandria's commuter service demonstration in 2019 and 2022 provided some flashes of hope while Metro service closed for rebuilding south of Reagan Airport. Yet none of those events have spurred the private sector to self-launch a regional ferry service directed at commuters and non-tourists with year-long services focused on improving regional mobility and resilience. The first phase of this business plan addresses the details to form a business case. The plan organizes those into three essential buckets.

Operational Details: These include routes, level of service, fares, market response to service levels, travel times and fare levels, terminal development, maintenance functions.

Financial structure: To date, operator interest has depended on the ability to clearly demonstrate a financial model that reduces risk for the operators and improves the probability the service can successfully launch and be sustained.

Governance: If commuter passenger ferry service could be launched without governmental leadership, it would already be operating. Of all the details and barriers, the governance and funding structure are likely the most significant in terms of getting regional passenger commuter ferry service operating on the M-495 corridor. Regardless of the governance model ultimately selected, the agency/entity that will lead this project into implementation will have to supplement its current portfolio of infrastructure development with new and synergistic interstate, regional, and military partnerships to optimize service delivery and

coordinate multiple sources of funding. The business plan has advanced the operational details and financial structure to a significant degree. However, there remain a very large number of options, as reflected in the route profiles illustrated below. These are summaries that combine the operational and financial elements of the plan. Governance is discussed separately.


DC WATERFRONT TO POPLAR POINT
This route connects residents of Southeast DC and the northern JBAB market to the employment hub located in the DC city center. With a trip time of just over 15 minutes, this route can meet commuter needs at lower travel speeds of 28 knots.
150
pax vessels
28 knots
3
miles
Northwest DC
Northeast DC
Washington, DC
Southeast DC
Alexandria, VA
SW Waterfront DC
Poplar Point
66
395
695
295
1
495
Potential Ferry Route
SW Waterfront to Poplar Point
Potential Ferry Terminal
0
0.5
1
2
Miles

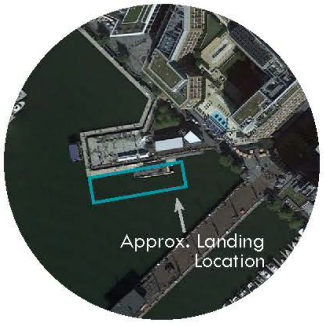
DC Waterfront

Two locations at the DC waterfront were analyzed as potential landing sites. The SW waterfront location was ultimately selected as it was more time competitive for potential riders. Other ferries currently operate from this location, requiring coordination with these operators.

The existing infrastructure means that a limited level of capital improvements would be needed to support ferry service. Needed improvements include:*

- Gangway
- Electrical lighting
- Guardrail along the float perimeter
- Signage/wayfinding

**Assumes existing freeboard and fendering are compatible with new vessels.*



Poplar Point

Located just south of the Frederick Douglas Memorial Bridge, the Poplar Point landing is located in D.C. near Anacostia Park. The site would likely serve the northern JBAB market and would require an uplands terminal facility that may include parking. Re-development of the site is currently being explored by numerous stakeholders, and an environmental investigation focused on the site is currently ongoing.

The following improvements would be needed to support ferry service from this location:

- New operating float approx. 85' by 20' (including piles, pile hoops, cleats, ballasting, installation, fire system etc.)
- Upgraded fendering
- Gangway
- Electrical lighting
- Guardrail along the float perimeter
- A float fire system
- Signage/wayfinding

Capital cost ranges include vessel, terminal and dredging costs per fleet option.

DC WATERFRONT TO POPLAR POINT

Transit Time
8 min

Trip Time (includes dwell time)
15 min

SERVICE OPTIONS
By # of vessels in the fleet

1 VESSEL

Time b/w Sailings
30 MINS

Capital Cost
$14.75M - $19.75M

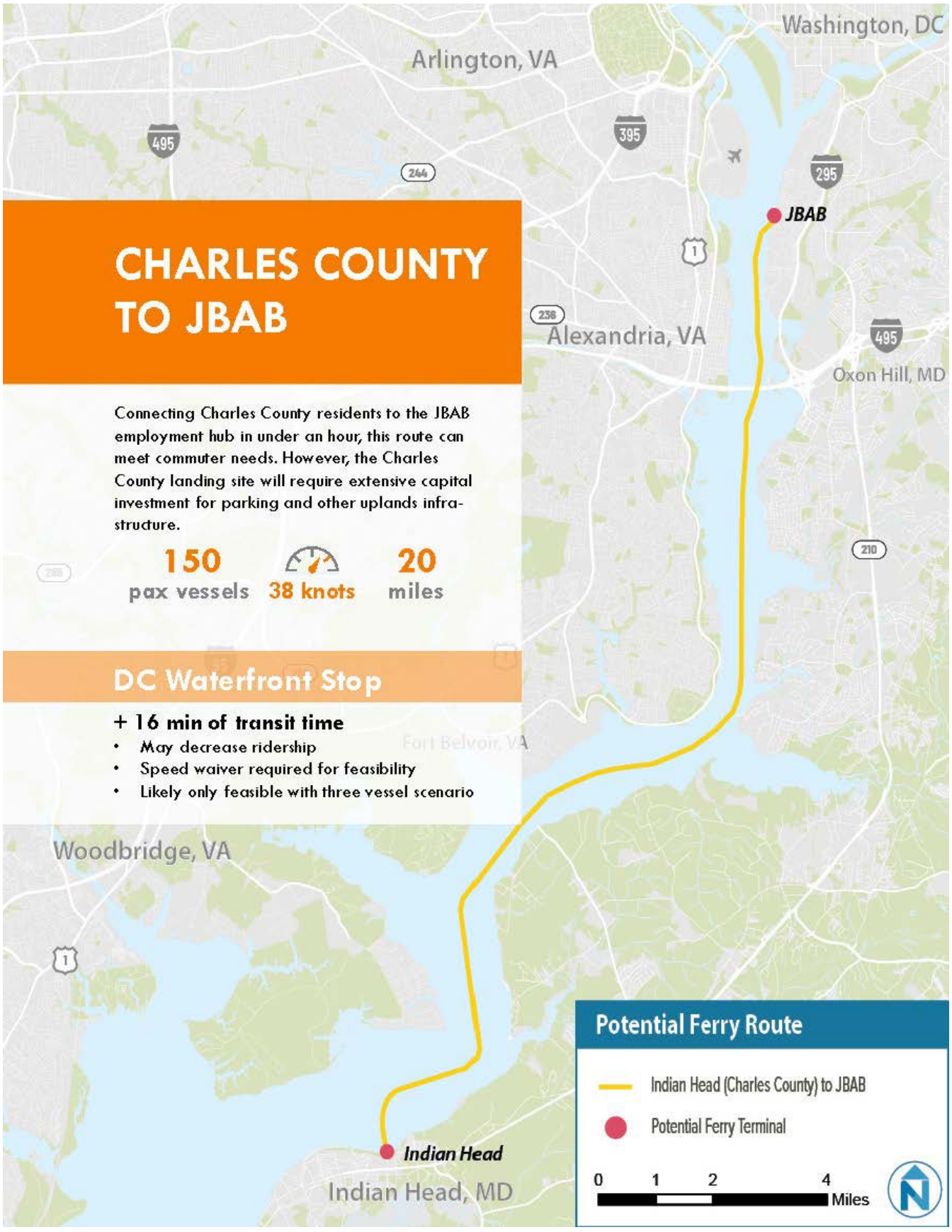
Ops Cost **$5.0M**

2 VESSELS

Time b/w Sailings
15 MINS

Capital Cost
$23M - $28M

Ops Cost **$8.3M**

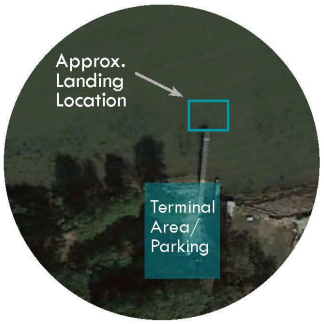

Washington, DC
Arlington, VA
495
395
244
295
JBAB
CHARLES COUNTY TO JBAB
1
238
Alexandria, VA
495
Oxon Hill, MD
Connecting Charles County residents to the JBAB employment hub in under an hour, this route can meet commuter needs. However, the Charles County landing site will require extensive capital investment for parking and other uplands infra-structure.
210
150 pax vessels
38 knots
20 miles
DC Waterfront Stop
+ 16 min of transit time
• May decrease ridership
• Speed waiver required for feasibility
• Likely only feasible with three vessel scenario
Fort Belvoir, VA
Woodbridge, VA
1
Indian Head
Indian Head, MD
Potential Ferry Route
Indian Head (Charles County) to JBAB
Potential Ferry Terminal
0 1 2 4
Miles
N

Charles County

A location between Potomac Heights and Indian Head was identified as a potential ferry landing location. Though accessible via Stoney Point Place, there is no parking and limited uplands infrastructure available at this location.

The following improvements would be needed to support ferry service from this location:

- Replacement for existing pier
- New operating float approx. 85' by 20' (including piles, pile hoops, cleats, ballasting, installation, fire system etc.)
- New parking facility
- Upgraded fendering
- Gangway
- Electrical lighting
- Guardrail along the float perimeter
- Signage/wayfinding



Shallow water depths pose a challenge for the Charles County site, necessitating additional capital costs for either significant dredging or an extended length of pier.

JBAB

The Capital Cove Marina at Joint Base Anacostia–Bolling was identified as a viable ferry landing site. Due to space constraints, landing at this location will be bow-loading only, and it is recommended that passengers wait on shore rather than on the landing float.

The following improvements would be needed to support ferry service from this location:

- New wing-walls/dolphins to support bow-loading
- Upgraded fendering
- Gangway
- Electrical lighting
- Guardrail along the float perimeter
- A float fire system
- Signage/wayfinding

**Does not include dwell time.*
Capital cost ranges include vessel, terminal and dredging costs per fleet option.

CHARLES COUNTY TO JBAB

Transit Time*
31 min

Transit Time w/ DC Stop*
47 min

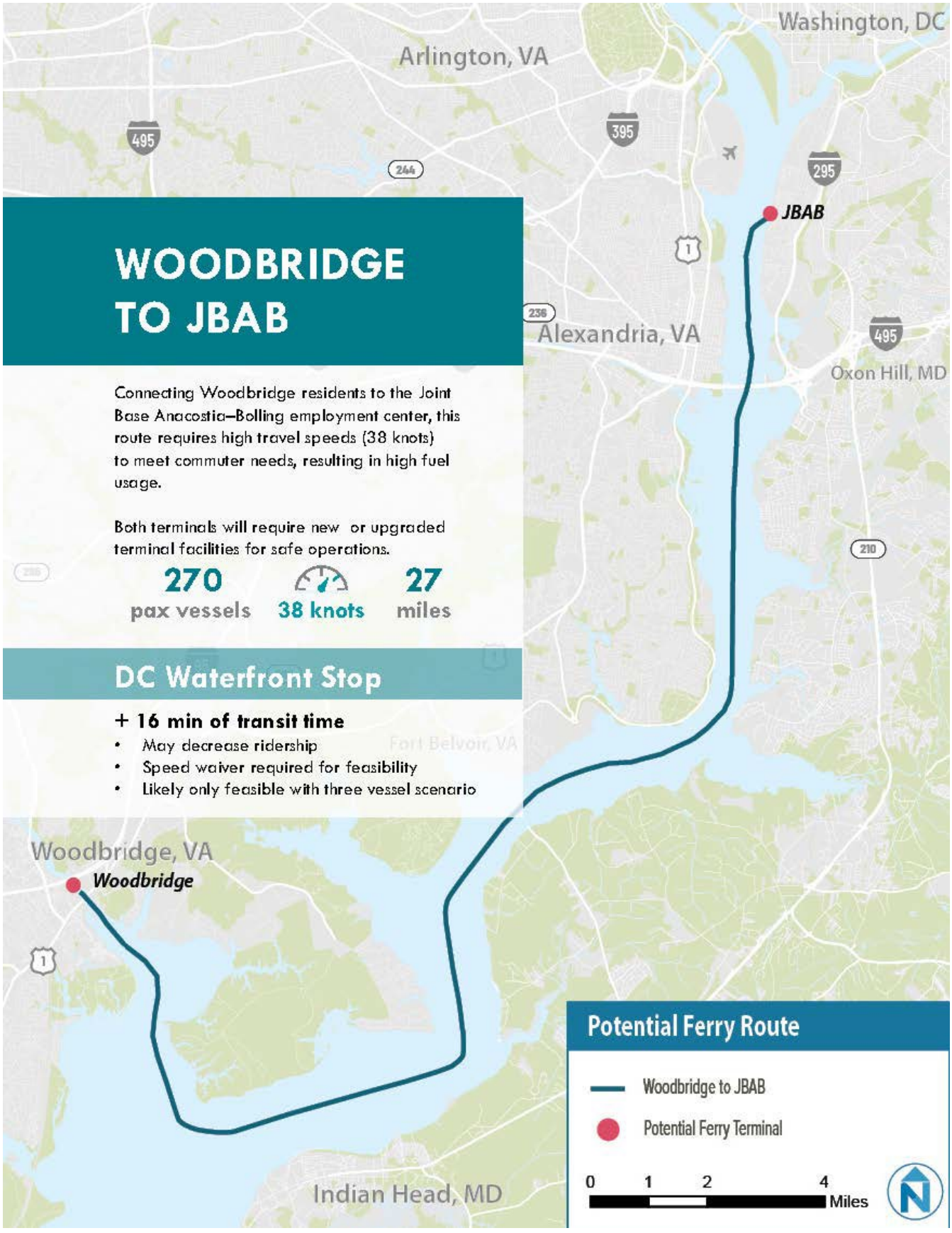
SERVICE OPTIONS

By # of vessels in the fleet

1 VESSEL
Time b/w Sailings: 1HR 20 MINS
Capital Cost: $25.65M - $31.35M
Ops Cost: $7.6M

2 VESSELS
Time b/w Sailings: 40 MINS
Capital Cost: $33.9M - $39.6M
Ops Cost: $14.6M

3 VESSELS
Time b/w Sailings: 30 MINS
Capital Cost: $42.15M - $47.85M
Ops Cost: $21.7M


WOODBRIDGE TO JBAB
Connecting Woodbridge residents to the Joint Base Anacostia–Bolling employment center, this route requires high travel speeds (38 knots) to meet commuter needs, resulting in high fuel usage.
Both terminals will require new or upgraded terminal facilities for safe operations.
270 pax vessels
38 knots
27 miles
DC Waterfront Stop
+ 16 min of transit time
• May decrease ridership
• Speed waiver required for feasibility
• Likely only feasible with three vessel scenario
Washington, DC
Arlington, VA
Alexandria, VA
Oxon Hill, MD
Fort Belvoir, VA
Woodbridge, VA
Woodbridge
JBAB
Indian Head, MD
Potential Ferry Route
Woodbridge to JBAB
Potential Ferry Terminal
0 1 2 4 Miles

Woodbridge

Located about 20 miles south of D.C., Woodbridge is a community with over 40,000 residents. The Occoquan Harbour Marina is sited between two highway bridges that span the river: I-95 and Route 1. This marina was identified as the optimal location for a ferry service in the Woodbridge region. Though close to a navigational channel, the landing is not within a half-mile walk of public transit.

The following improvements would be needed to support ferry service from this location:

- New operating float approx. 85' by 20' (including piles, pile hoops, cleats, ballasting, installation, fire system etc.)
- Fendering
- Gangway
- Electrical lighting
- Guardrail along the float perimeter
- Signage/wayfinding

JBAB

The Capital Cove Marina at Joint Base Anacostia–Bolling was identified as a viable ferry landing site. Due to space constraints, landing at this location will be bow-loading only, and it is recommended that passengers wait on shore rather than on the landing float.

The following improvements would be needed to support ferry service from this location:

- New wing-walls/dolphins to support bow-loading
- Upgraded fendering
- Gangway
- Electrical lighting
- Guardrail along the float perimeter
- A float fire system
- Signage/wayfinding

**Does not include dwell time.*
Capital cost ranges include vessel, terminal and dredging costs per fleet option.

WOODBRIDGE TO JBAB

Transit Time*
57 min

Transit Time w/ DC Stop*
73 min

SERVICE OPTIONS

By # of vessels in the fleet

1 VESSEL
Time b/w Sailings: 2 HRS & 10 MINS
Capital Cost: $24.5M - $28.5M
Ops Cost: $10.7M

2 VESSELS
Time b/w Sailings: 1 HR & 5 MINS
Capital Cost: $36M - $41M
Ops Cost: $20.5M

3 VESSELS
Time b/w Sailings: 45 MINS
Capital Cost: $48.5M - $54.5M
Ops Cost: $30.4M

GOVERNANCE

At the current time, there is no existing governing body that has expressed an interest in or is currently situated to take on regional operations of a new commuter ferry service in the Washington, DC region . That said, there is the high potential that a new agency would need to be created to lead this project into implementation. This presents an opportunity to form a governing body and operating structure that could work best to achieve the goals of a regional passenger commuter fast ferry. The key needs of a new governing model would be to have an agile governing structure that would allow for future growth without unwieldy limitations such as Congressional approval or over-complex approval boards. This new governing model should also allow cooperation between public-private partnerships, as the realization of a new ferry system may likely require an influx of monies both from local, state, or Federal governments and from private investors or developers.

Of the three governance structures studied, a new ferry service for the Washington, DC area should model its governance body's structure and operations after DC Water. The major advantage for this type of structure is that it can grow organically and adapt as the future comes into focus. Utilizing a similar structure would afford the entity autonomy to operate as it chooses without approval by governors of a state or congressional approval. This model is also flexible in supporting growth: it would allow for the addition and/or replacement of jurisdictions when necessary, so that the operating body could grow across the region incrementally; adding new service agreements would require approval by the governing body, but a governing body structure similar to DC Water would not be too limiting to stagnate or prevent growth.

NEXT STEPS

The early part of the business plan limited the potential development of ferry markets to the three most promising/feasible for initial implementation based on available funding to complete the work. However, the earliest work accomplished by the Northern Virginia Regional Commission (NVRC) and subsequent passage of time has indicated there are potential community interests that could intervene in the process as well as other potentially feasible markets that need to be understood and potentially queued-up for possible implementation. A follow-on work order will allow the Nelson Nygaard team to continue to advance progress on determining passenger ferry route(s) that are operationally and financially feasible and work to identify a potential governing body or ideal structure for managing a ferry operation.

It is also possible a jurisdiction(s) may choose to launch a parallel and collaborative effort to further explore ferry feasibility and/or start their own service. Should that occur, it will be

crucial for the entities to collaborate to the degree possible to leverage private sector interest, private finance, possible prototype development of a zero-emission or low-emission vessel, regional resilience planning, and facility sharing, such as a centralized fueling and maintenance facility.

The continuing work will include the analysis of one additional ferry route and convening groups to continue growing interest and support in establishing a partnership to support future ferry operations.

The next phases of work are outlined as follows:

- Study one additional ferry route in the region
- Hold working sessions to present concept of a ferry system to various financial markets, operators, and jurisdictions.
- Create an interest in an on-going coalition or governing body for ferry development and operations support.

2 STUDY ORGANIZATION

This study was organized with a Technical Team that provided expertise in transportation, finance and economics, and marine operations. The team was led by Nelson\Nygaard Consulting in partnership with Phoenix Infrastructure and KPFF Engineering, Marine Group.

The flow of work was divided into three topics areas, Routes and Operations, Financial Modeling, and Governance. This report is organized around those three topic areas.

The consulting team conducted the technical work and presented that work to two committees convened by NVRC. The topic areas for each meeting were also organized around the same three topic areas described above. The two committees were a Steering Committee comprised of local leaders and experts on issues surrounding transportation in the National Capital Region. The membership of this committee was:

Fatemeh Allahdoust, Transportation Planning Manager, VDOT NOVA multimodal planning
Mark Berger, Planning Section Chief 11 CES, JBAB
Michelina Coates, Commissioner Specialist to Comm. T. Coates (D2), Charles County, MD
Thomasina Coates, Commissioner, Charles County, MD
Clinton Edwards, NOVA Transit Programs Manager, DRPT
Thomas Hamed, Urban Planner, City of Alexandria
Seth Hendler Voss, Director of Parks, Recreation, and Tourism, Prince William County, VA
George Kandathil, Infrastructure and Planning Coordinator, Tri County Council for S. MD
Jeffrey King, Director of Climate, Energy, and Air Program, MWCOG
Chris Landgraf, Military Installation Resiliency Project Manager, NVRC
Meagan Landis, Regional Coordinator, Prince William County Dept of Transportation
Robert Lazaro, Executive Director, NVRC
Carla Longshore, Deputy Associate Director of Transit Operations, DDOT
Darlene Mungin, Contracts & Procurement Liaison, DDOT
Willem Polak, Marine Consultant, Former owner/operator, Potomac Riverboat Company
Mark Rinaldi, Vice President, Bush Companies
Jon Schermann, Transportation Planner, MWCOG
Bob Schneider, Executive Director, PRTC/Omni Ride
Jennifer Slesinger, Principal Planner, Transportation, City of Alexandria
Peggy Tadej, Director of Military Affairs, NVRC
Alyssa Tullar, Planner, JBAB

The second committee was a wide-ranging, open to all, committee of interested parties with about 200 invitees. The meetings were mostly convened virtually although there was one attempt early in the study to conduct the meeting as a hybrid in-person and virtual meeting. In-person participation was effective, but limited, so a decision was reached to save study

budget and resources and conduct all meetings virtually from that point forward. Table 1, below, offers a view of the dates of each meeting and the topics covered at each meeting.

Table 1 Steering and Stakeholder Committee Meetings

Meeting	Operating Plan	Financial Model	Governance
February 28/March 3 **Virtual**	Previously completed Studies Most likely three routes Draft route selection criteria	Financial Analysis Concepts	Draft ten governance models – high level overview - add/delete Draft selection criteria
April 18 / 21 **In-person/hybrid**	Route Profiles – Draft three routes Routes considered Final Selection Criteria	Initial Risk Assessment Initial Value for Money Assessment	Present Overview Survey Select three models for detailed case studies Refine selection Criteria
June 13 / 16 **Virtual**	Re-direction to evaluate two new routes	Initial results of Financial Plan	Present 3 case studies & final selection criteria
September 19/22 **Virtual**	Any revised findings on operating plan/routes	Preliminary financial model, risk factors, recommended course of action	Governance recommendations Implementation plan/roadmap

3 REVIEW OF PREVIOUS STUDIES

Feasibility studies for a ferry service in this region began in 1999 and have continued to this day with updates in findings for each iteration. Listed below include some report highlights and key findings for each preceding study.

SUMMARY OF PRECEDING STUDIES

2019 M-495 Commuter Fast Ferry | Project Development Phase

This project evaluated corridors and terminals for fast commuter ferry service between Virginia and Washington, DC and/or Maryland. Terminals were evaluated based on general access and access to transit, facility quality and available infrastructure, economic development opportunity, and cost. Potential terminals studied were:

Sites Studied

Origin sites

- Occoquan Harbour Marina in Woodbridge
- 3 distinct sites at the Belmont Bay development in Woodbridge: George Mason University's Potomac Science Center, the current harbor marina, and a former restaurant site.

Destination sites

- National Harbor in Maryland
- 2 sites at Joint Base Anacostia-Bolling (JBAB): a decommissioned dock and their recreational marina
- 4 commercial docks located at DC: Washington Harbour (Georgetown), The Wharf, Diamond Teague Park, and The Yards

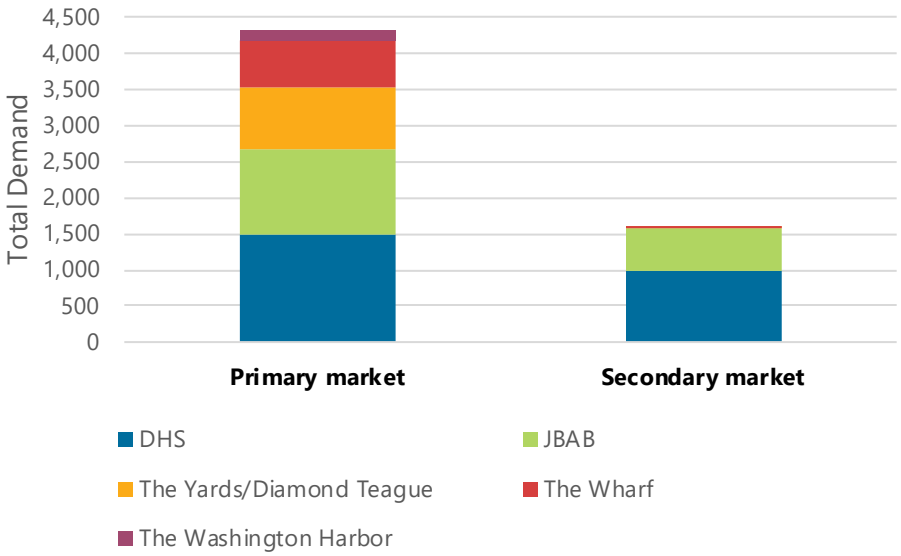
The ferry market between Woodbridge and the Joint Base/Department of Homeland Security is attractive from a time savings standpoint. While the market appears to have commercial viability, actual demand is very time and cost sensitive, meaning that ferry travel time reliability will be a very important decision factor for riders.

Most potential riders currently commute by driving alone. Thus, the primary market area appears to realize the greatest benefit, reinforcing the decision of the Occoquan River as an origin terminal location. The market for other DC waterfront destinations is not substantial enough at present to survive as a singular market, though adding those stops could add strength to the primary ferry route.

Woodbridge to JBAB & DC Commuter Travel Market

- Primary market: 4,325 Home-based Work AM trips (one-way)
- Secondary market: 1,599 Home-based Work AM trips (one-way)

Figure 1 5AM - 10AM HBW Trips to Ferry Terminals



Terminal Evaluation

This study seeks to identify ferry terminal sites that are eligible to receive grant funds for physical improvements as well as sites that meet the needs of the identified commuting population. Terminal sites were rated on a series of criteria, with certain sub-criteria to develop a final determination of a site's suitability to receive FTA funds for commuter ferry operational infrastructure improvements. The criteria cover topics related to site access, facility quality, economic development opportunity, and ongoing cost. The Occoquan Harbour Marina site may be the most suitable from an adjacent land use and future development perspectives, but it is less attractive due to a ten-minute longer run time to the main river channel.

As a result of this study, two feasible terminal locations were found to possess a viable market for fast commuter ferry was confirmed:

- Occoquan Harbour Marina
- JBAB

2015 NVRC Market Analysis Report

This study identified six corridors that proved to be most feasible for commuter ferry service due to market size and potential for travel time savings. The study utilized results from a household telephone survey as well as the Metropolitan Washington Council of Governments (MWCOG) regional travel demand model projected to 2020. The study found that even shorter distances, such as ones between Alexandria, VA/National Airport to Washington, DC had market feasibility. It also recognized that a stop at JBAB would be limited to personnel with a Department of Defense Common Assess Card (CAC) and therefore not open to the public. The six corridors identified were as follows:

- Old Town Alexandria to Southwest Waterfront
- Old Town Alexandria to Southeast Waterfront
- National Airport to Southwest Waterfront
- National Airport to Southeast Waterfront
- Alexandria – Wilson Bridge to JBAB
- Woodbridge, VA to Southeast Waterfront

2009 Prince William County Service Study and Route Proving Exercise

This analysis was conducted on the Potomac River. It concluded that a Potomac River ferry operation has the potential to be competitive with commuter services offered by Potomac and Rappahannock Transportation Commission and Virginia Rail Express in terms of travel time and service between the area of Occoquan, Virginia, and SE Washington DC. The study results conveyed that the commuter ferry service will require public financial support. Additional analysis of travel demands through market studies and a new trip generation model is warranted.

The study conducted a proving exercise testing on the following thirteen potential terminal sites:

- Quantico Marine Base
- Southwest Waterfront – Washington

- Anacostia Waterfront – Washington
- Harbor Station, VA
- Prince William Marina
- Occoquan Harbor Marina
- Belmont Bay Marina
- Marshall Hall, MD
- Fort Belvoir
- NSF Indian Head

2000 VDOT Ferry Feasibility Study

The study focused on existing travel conditions in Northern Virginia and documented projections of increased travel in the corridor. An alternatives analysis was conducted and concluded that the Woodbridge to Navy Yard route was selected as the recommended service for the ferry. The analysis was informative by demonstrating then need for the ferry service to operate at a speed that is competitive with other modes of travel.

4 ROUTES & OPERATIONS

ROUTE SELECTION

To commence the work of the Business Plan, the team first had to sort through potential routes to identify three routes that would provide the highest probability of success for service delivery. It is vital to note this need to limit the scope of the study was based on funding limits and not the actual viability of routes. Ultimately, there is a much larger and more diverse market for ferry service on the Potomac. Many routes were set aside that may also be viable ferry routes. This occurred for a number of reasons, such as unresolved community concerns and the high cost of developing terminal sites. The important message is to ensure that the routes selected for further development in the business plan are not the only three viable routes and that there are several more potential routes in the region. Given community interest and resolve and funding several of these other considered routes could also flourish as potential corridors. The selection process to bring the focus of this study down to the three routes that could be explored within the budget limitations of the study involved the steering committee and stakeholders as well as an internal evaluation process that allowed the most promising and lowest risk routes to be identified.

ROUTE SELECTION CRITERIA

At the first steering committee and stakeholder meeting (Meeting #1) in March 2022, a preliminary list of terminal site and route criteria was presented to the client and stakeholders. At Meeting #2, this list was refined and a seventh criteria was added. The team explained that in order to consider a route for further study, the route should:

1. **Have high projected ridership**. Although the team could not perform market analysis for a full list of potential routes, again based on the budget limitations of the study, various characteristics can help indicate that the route would have high ridership, including:
    - Routes should connect areas that are linked together and show a continued transportation need.
    - Typically, routes that save travelers the most time and can support a frequency balanced with demand will be an attractive service. (Ridership projections should be consistent with attractive levels of service).
    - Opportunity to contribute to military installation readiness and sustainability
2. **Be cost effective**. Although the team could not perform a financial analysis for the full list of potential routes, specific indicators could help lead the team to assume that:

- Potential operating and capital costs compared to the potential revenue are reasonable.
- The route holds the potential to share resources across multiple routes (either at the start of a service or as it grows into the future).

3. **Be feasible to operate**. Again, although the team would only perform operations analysis to the three selected routes, certain characteristics of the route should be qualified prior to selection. Requirements include that the route must allow:
    - The vessel to achieve speeds that create competitive travel time with present modes
    - Limited seasonal interruptions
    - Ability to limit wake-wash/erosion affects while still achieving speeds to maintain competitiveness
4. **Have an available or ready-to-build terminal.** Ideally, the routes studied should include at least one or two already built and ready-for-use terminal sites in order to minimize up-front capital costs (and to maintain cost effectiveness). The route's terminal sites should have limited and/or manageable environmental factors that would allow for site development or improvements; the sites' property ownership should allow for full site control with limited restrictions for use; and the terminal site(s) should have the following docking structure characteristics:
    - Wave, ice, and debris protection
    - docking impact strength
    - safe passenger transfer geometry (access to dock should allow for a safe egress path)
    - Sufficient floatation and space to accommodate entire vessel load
    - Ability to be illuminated
    - Relatively easy to clear of snow and ice
    - Few and small gaps to open pier edges
5. **Be multi-modally connected.** The terminal site(s) for the routes should present opportunities for easy access by vehicle, transit, bicycling, or walking. The site should have or support mobility connections including commuter parking lots, mass transportation services (such as regional rail like VRE and MARC, Metro, or bus routes), shuttle services, or biking and walking trail access.
6. **Present an opportunity for growth**. Terminals should be sited in areas that have projected growth as identified through regional planning councils, either by population (residential), commerce (commercial/retail/tourism), or military/government installations. Adjacencies of terminal sites to existing or future

businesses could present partner opportunities for capital or operational funding and support.

7. **Present manageable risk**. Although all routes present some level of risk to a service and financial model, each route studied should present an acceptable but not superfluous level of risk in order to maintain attraction to private sector interest and investment in the service.

POTENTIAL ROUTES

The initial preliminary list of route candidates included mostly sites originally explored in the 2015 NVRC Market Analysis Report, those are listed in Table 2.

The team received feedback from the steering committee and stakeholders on this preliminary list of routes and then studied additional terminal sites against the selection criteria. The team developed an evaluation matrix to rank the terminal sites and sorted a list of routes, both of which were presented at Meeting #2 in April 2022. The evaluation matrix of ranked terminal sites are shown in Table 2. The team organized the routes into two tiers: Tier 1 and Tier 2. Tier 1 mostly represented routes with existing terminals available or ready to be built, and, apart from Woodbridge and JBAB terminals, all Tier 1 route terminals are multi-modally connected with pedestrian, bicycle, and transit access.

Table 2 Candidate Route Scoring

ID	Origin	Destination	Tier	Available or Ready-to-build Terminal		Multi-modally Connected		Opportunity for Growth
				O	D	O	D	
1	Alexandria, VA	SE/SW Waterfront, DC	1	✓	✓	✓	✓	✓
2	Alexandria, VA	National Harbor, MD	1	✓	✓	✓	✓	✓
3	Woodbridge, VA	SE/SW Waterfront, DC	1	✓	✓	✗	✓	✓
4	Georgetown, DC (DC Water Taxi)	Poplar Point, DC	1	✓	✗	✓	✗	✓
5	Alexandria, VA	JBAB, DC	1	✓	✓	✓	✗	✓
6	Woodbridge, VA	JBAB, DC	1	✓	✓	✗	✗	✓
7	Charles County, MD	Quantico, VA	2	✗	✓	✗	✓	✓
8	Charles County, MD	JBAB, DHS, SE/SW Waterfront, DC	2	✗	✓	✗	✓	✓

9	Charles County, MD	Fort Belvoir, VA	2	✗	✗	✗	✗	✓
10	SE/SW Waterfront, DC	Crystal City, VA	2	✓	✗	✓	✓	✓
11	SE/SW Waterfront, DC	Pentagon, VA	2	✓	✗	✓	✓	✓
12	SE/SW Waterfront, DC	National Airport, VA	2	✓	✗	✓	✓	✓
13	Spotsylvania, VA	Quantico, VA	2	✗	✓	✗	✓	✓
14	Stafford County, VA	SE/SW Waterfront, DC	2	✗	✓	✗	✓	✓
15	Woodbridge, VA	National Harbor, MD	2	✓	✓	✗	✓	✓
16	Woodbridge, VA	Alexandria, VA	2	✓	✓	✗	✓	✓
17	Woodbridge, VA	National Airport, VA	2	✓	✗	✗	✓	✓

Routes originally selected by the client and stakeholders for further study were Woodbridge, VA to JBAB, DC; Alexandria, VA to SE/SW Waterfront, DC; and Alexandria, VA to JBAB, DC. However, after additional consideration and discussion, the routes that involved terminal sites in Alexandria, VA were excluded from further study. These routes show very high potential for development of passenger ferry operations, however, in consultation with the City of Alexandria it was determined that commuter ferry routes connecting the City of Alexandria with areas along the Potomac River required a more extensive effort than could be engaged by the scope of this study. What is apparent is that an effort needs to be led by the City with expansion to a very detailed market analysis and a broader public engagement process to be more effective in receiving and considering input from Alexandria residents and businesses.

Further study by the City of Alexandria could commence and be managed independent of efforts of future studies by NVRC. However, it would be beneficial to any route feasibility study – or eventual operations – to collaborate on leveraging private sector interest and financing on a regional scale. The City of Alexandria does possess the latitude to operate ferry service on their own if the study were to conclude market demand, financial feasibility, and public and political support for such an operation. In fact, in a limited sense, the City has already accomplished this degree of independence on two occasions with ferry service additions during the closure of the Blue and Yellow lines south of Reagan Airport in 2019 and

to a more limited degree during the closure of the Yellow line south of Reagan Airport in 2022.[1]

The two routes associated with terminal sites in Alexandria, VA were replaced with new routes: Charles County, MD to JBAB and Poplar Point, DC to SE/SW Waterfront, DC. The Poplar Point, DC to SE/SW Waterfront, DC route was a Tier 1 route, evaluated under a multi-destination route, Georgetown, DC (DC Water Taxi) to Poplar Point, and the Charles County to JBAB route involved two terminal sites that were previously evaluated.

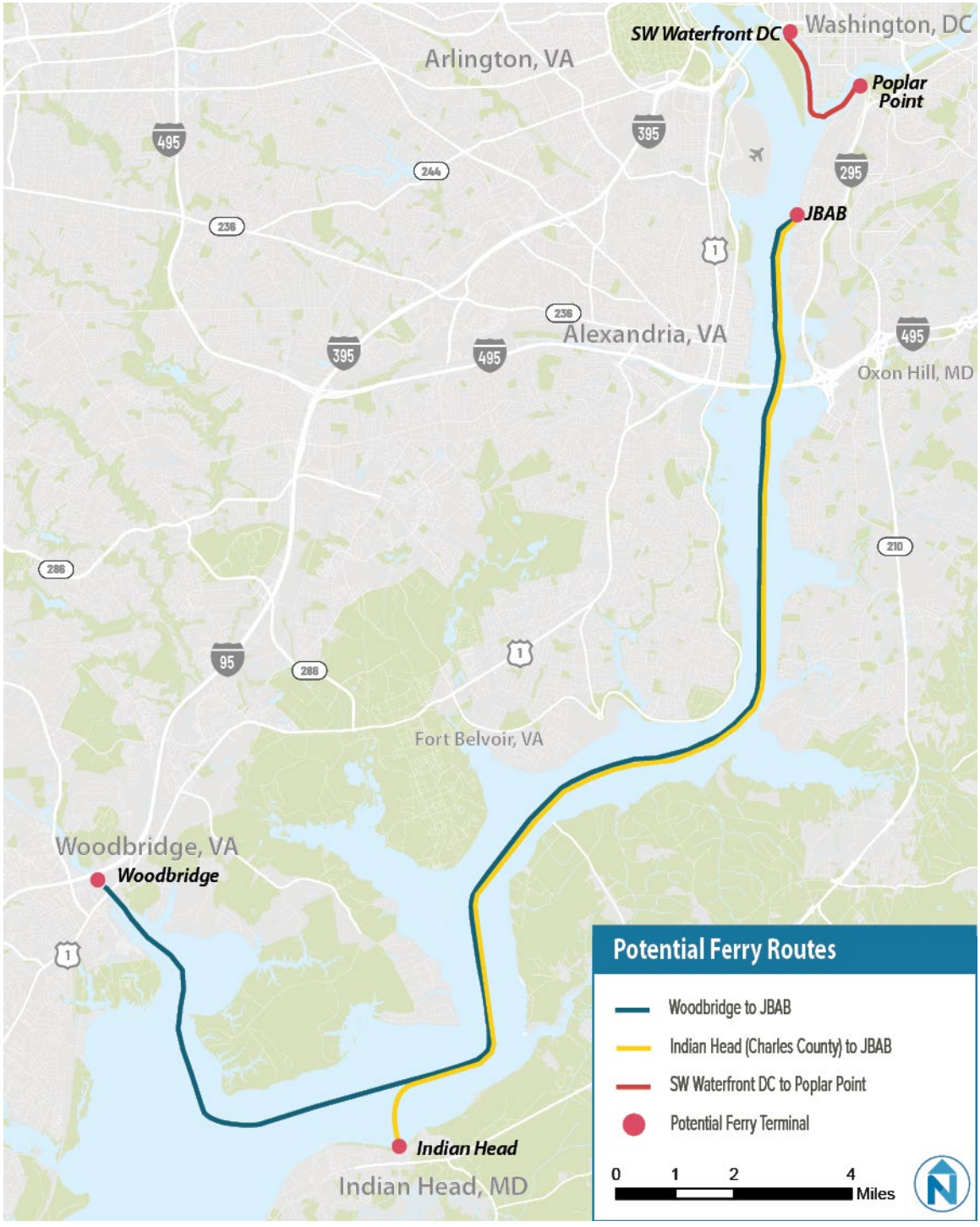
Selected routes for full market demand, operations, and financial study are listed below and depicted in a map in Figure 2:

- Poplar Point, DC to SE/SW Waterfront, DC
- Charles County, MD to JBAB, DC
- Woodbridge, VA to JBAB, DC

Note that the Charles County route is alternately referred to as Indian Head to JBAB throughout the study. This is due to an assumed location of the terminal in Charles County near the Town of Indian Head. This is not necessarily the final location, but is more descriptive of what option was evaluated given the size of Charles County.

[1] https://www.washingtonpost.com/transportation/2022/10/15/water-taxi-metro-shutdown-commute/

Figure 2 Map of Selected Routes



MARKET SIZE/DEMAND

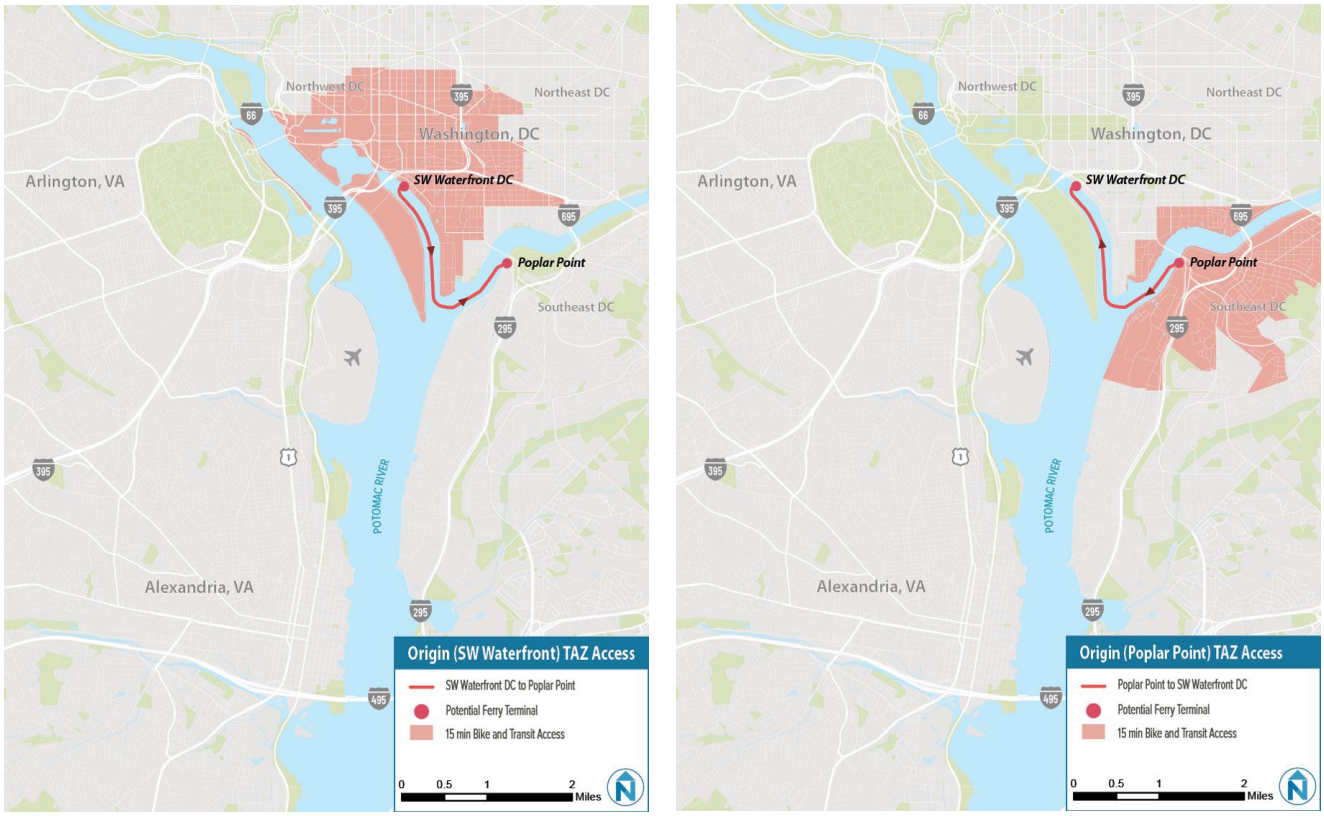
Transportation options between some locations in the Washington, DC metropolitan area are limited and can become constrained in periods of rush hour or unexpected incidents that cause congestion. This makes vehicular travel unreliable at times, which is why a passenger ferry provides an opportunity for an attractive alternative travel mode for daily or less frequent travelers. This study explored travel trends and origin-destination data to determine the number of likely riders that would be tempted to switch modes (from either driving or taking transit) to riding the ferry. In the study, our team identified primary travel markets for both the origin and destination terminal sites of the three proposed ferry routes using the MWCOG regional travel model. The study incorporated findings from the Woodbridge, VA to JBAB, DC route that was previously studied under the same methodology and source data (the MWCOG model) in the 2019 M495 Commuter Fast Ferry report (the Gap Analysis report).

The primary market is defined as the set of Traffic Analysis Zones (TAZ) located within a 15-minute AM peak hour walking, biking, or driving trip of the potential terminal location. Primary markets were identified for all terminal sites.

Figure 3 shows an example of such a market for the SW Waterfront DC- Poplar Point route. A 15-minute driving trip was excluded from the DC Waterfront, Poplar Point, and JBAB sites given their location, proximity to downtown DC, and low likelihood of parking availability at any potential terminal site.

Unlike the Indian Head – JBAB, Woodbridge -JBAB route, the SW Waterfront DC – Poplar Point has bi-directional demand. The evaluation of demand was conducted looking at each direction separately, then combined into a single route.

Figure 3 Primary Markets for SW Waterfront DC (Left) and Poplar Point (Right)



Existing Transportation Options and Travel Patterns

There are several transportation modes available for travel from the primary market areas to the ferry terminal catchment areas under study, including private automobile, bus, and commuter rail. The following sections describe in-vehicle times and out-of-pocket travel costs by mode under existing conditions. In-vehicle times are used in place of travel times because they correspond to scheduled transit departures and arrivals or, in the case of private vehicle travel, travel times to reach the driver's destination before any search for parking begins. This approach assumes that actual, door-to-door travel times of commuter trips may be longer than in-vehicle times due to additional walking and/or parking search time that each mode requires to reach the traveler's destination. Only AM peak period commute trips were reviewed in this analysis.

Travel Times and Costs

The costs used in estimating demand in this work are those that accrue to an individual rider and do not represent the actual cost of producing the ride. There are many variables in

estimating the cost to deliver ferry service on a per rider basis. Those operating costs are yet to be fully determined. The definition of the present project is based on the concept that a passenger market can be developed to support a fully private ferry operator. The fare levels modeled in this work are within a range that supports that operational arrangement. The determination of the actual costs and potential profitability of operating a ferry route to serve this market will continue to evolve and be refined.

Private Vehicle

The high-capacity road vehicle network in Northern Virginia, Maryland, and Washington, DC operates at, or above, capacity during peak periods. Despite the extensive network of HOV lanes, travel times are unpredictable and delays for those cars are common. These delays lead to increased time and financial costs. Access to Washington, DC from Indian Head, MD (located in Charles County) is provided only via State Hwy 210 which connects to I-495, with further connections to Washington, DC. Similarly for Woodbridge, from I-95 access to Washington, DC is provided via I-495, I-295, and I-395; all facilities operate at chronically congested levels during AM peak and are among the most congested corridors in the area.

Table 3 depicts the average in-vehicle times for private vehicles. Travel times during the AM peak period from the primary markets to the destination ferry terminal catchment areas can be as much as twice the travel time in free-flow conditions, equaling the time required to use transit modes due to roadway congestion.

Table 3 Average Private Vehicle In-vehicle Travel Time, AM Peak

Route	Average In-Vehicle Time (min)	Average Distance (miles)
SW Waterfront DC – Poplar Point	10-20	2.4
Indian Head - JBAB	35-60	24.4
Woodbridge - JBAB	35-50	24.8

Source: Google Travel API, 2022

Transit

Apart from walking and biking, the Metrorail is a convenient way to transit between Southwest Waterfront and Poplar Point. L'Enfant Plaza station on the Green Line is close to the SW Waterfront while Anacostia station (three stops away) is a 15 min walk away from Poplar Point station. In total, the trip takes around 27 min and costs around $2.25. Metro buses are another alternative which cost $3.00

Indian Head, MD currently has no direct transit connection to Washington, DC. The town is served by the VanGo network with the Indian Head route running to Waldorf, MD every hour.

The route is currently fare free till June 2023. From Waldorf, Route 620 operated by Maryland Transit Authority runs every hour during AM peak only to Washington, DC.

Several transit alternatives serve the counties in Northern Virginia. Several commute buses connect these counties with key destinations in Washington DC and Metrorail stops. The Virginia Rail Express (VRE) and Amtrak offer commute and regional services between Virginia and the District of Columbia. A trip from Woodbridge to L'Enfant Plaza in Washington, DC, with the option to transfer to Metrorail, takes from 35 minutes to 44 minutes, with a $6.22 per-ride monthly pass fare or a $9.10 single ride fare. VRE offers a combined ticket with Metro for $355.70 a month (approximately $8.89 per ride). However, there are no direct transit options from Woodbridge to the ferry catchment areas and all transit alternatives require transfers to the Metrorail/Metrobus system.

Table 4 One-Way Travel time and Expenses by Route

Route	Average In-Vehicle Time (min)	Average One-way Costs ($)
SW Waterfront DC – Poplar	10 (Metro) 31 (Bus)	$2.25 (Metro) $2.00 (Bus)
Indian Head – JBAB	175 (Bus)	$8.25 (Bus)
Woodbridge – JBAB	85 (Bus/Metro) 107 (VRE/Metro) 107 (Amtrak/Metro)	$15.25 (Bus/Metro) $10.00 (VRE/Metro) $24.00 (Amtrak/Metro)

Travel Time Reliability

Private Vehicle

Recurring congestion on area Interstate Highways during AM peak hours on a weekday negatively impacts travel time reliability compared to alternatives like rail, which travel in a dedicated right of way, or ferry, which does not encounter congestion.

MWCOG's Congestion Report (2017) evaluates travel time reliability through the Planning Time Index (PTI), defined as the ratio of 95th percentile travel time to free flow travel time. According to this report, the PTI for all roads of the MWCOG area was 1.41 in the 4th quarter of 2017 during AM peak and PM peak periods and 1.40 for the preceding four quarters. If looking only at the Interstate System, these numbers increase to 1.94 and 1.85 respectively.[2] This means that a traveler must budget 41% (94% in the Interstate System) longer than the

[2] MWCOG Congestion Dashboard

uncongested travel time to arrive at their destination on time. Peak periods are defined as 6 AM to 10 AM and 3 PM to 7 PM.

In the case of Woodbridge, the I-95 corridor from Newington to Fredericksburg is among the 10 most congested road segments in the MWCOG area during these same periods.

The Federal Highway Administration defines the level of travel time reliability (LOTTR) travel as the ratio of a "normal" travel time (50th percentile) to an 80th percentile travel time, expressed as a percentage. VDOT, using 2017 INRIX data, reported that the LOTTR ratio was 53.1 for Interstate roads within Fredericksburg Area MPO boundaries, 85.5 for non-interstate roads, and 56.1 and 72.1, respectively within the MWCOG MPO boundaries.[3]

While the values and times may vary slightly, the reliability issues are also common for commuters headed towards JBAB or Washington D.C from Charles County. For the shorter SW Waterfront DC- Poplar Point route, reliability is less of an issue. Here the major deciding factor, is convenient pedestrian, bike, and transit access to the ferry terminal on either the origin or destination side of the trip.

Rail

VRE on-time performance for May 2018 was 80% for the Fredericksburg Line.[4] Performance ranged from 80% to 95% per month for the first half of 2018. Delays are determined by the train's actual arrival time at the destination versus scheduled times. The 80% figure implies that these delays affect passengers in about one out of every five trips.

Comparable Ferry Service (New York Waterway Belford Ferry)

No commuter ferry currently exists in the study area, so no current data exists to estimate the travel time reliability of this mode. New York Waterway reports on-time performance of 98% on their Belford line, which is a comparable line to the longer distance proposed services.[5] In New York's Hudson River the most common causes of ferry delay are tidal currents and interference from other boats. The 98% figure implies that these delays affect passengers in about one out of 50 trips (about once a month). Delays for ferry operations in the DC area are more likely to be related to poor visibility, debris in the river (including ice) and friction with recreational vessels.

[3] Transportation Performance Management Measures and Target Setting

[4] VRE On-Time Performance

[5] Belford Ferry

Estimating Ferry Ridership

Methodology

Estimated Ridership Based on Generalized Cost Reduction (Pivot-Point Model)

A frequent approach to modelling is to formulate the model as predicting changes relative to a base-year situation. Such approaches are called "pivot-point" method or incremental models. This methodology estimates ridership that could be captured by the ferry from private automobiles and other transit modes by normalizing all generalized costs of each mode into a single utility function. The generalized cost of travelling is the sum of monetary and non-monetary costs of a journey. Monetary or "out-of-pocket" costs might include the transit fare versus the costs of fuel, parking, and tolls. Conversely, non-monetary costs refer to the time spent in travel, including in-vehicle time, wait time, access time, and transfer time. Time is monetized using a valuation of time, which usually varies according to the traveler's income and the purpose of the trip.

Based on modelling done in the previous study, ridership based on the pivot-point model was found to be more efficient compared to ridership estimates based on travel time reduction, which is an alternate method to model demand for a non-existent mode. A sensitivity analysis of potential ferry ridership to fare pricing has been performed using the fare range required to support a private ferry operator and based on the size of the rider market.

Demand Captured from Private Vehicle Trips

The general steps of the pivot-point procedure to estimate the demand that the ferry could capture from the private automobile mode are described below.

1. Quantify existing demand between the identified market areas and the ferry terminal catchment areas;
2. Determine the generalized travel cost of the private vehicle and existing transit in the existing scenario, including in-vehicle time, wait time, walk time, drive access time, and fare cost;
3. Determine the generalized travel cost of private vehicle and the proposed transit mode (ferry) in a scenario with ferry service, including in-vehicle time, wait time, walk time, drive access time, and fare cost;
4. Calculate the utility (general cost) of each mode (private vehicle and transit) in the existing scenario;
5. Calculate the utility (general cost) of each mode (private vehicle and transit) in the scenario with ferry;

6. Calculate the share of trips that will choose a specific mode, transit or private automobile, based on exponentiated utility;
7. Calculate the elasticity between the difference in the generalized cost of private and transit modes with the probability of choosing one of these modes;
8. Using that elasticity, calculate the increment of the share of one of these modes based on the variation of the cost of this mode; any increment of transit trips will be ferry trips, as the assumption is that private vehicle and other mode costs will remain the same.

A more detailed explanation of the methodology can be found in the Appendix.

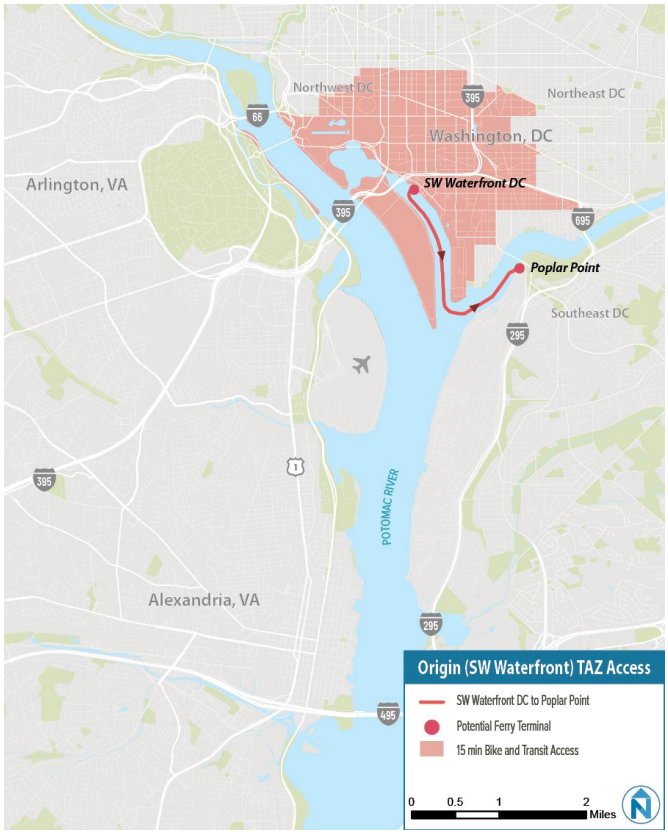
Demand Captured from Transit Modes

The general steps of the pivot-point procedure to estimate the demand that the ferry could capture from other transit modes is described below.

1. Quantify existing demand between the identified market areas and the ferry terminals catchment areas;
2. Determine the travel generalized cost of all transit modes in the existing scenario, including in-vehicle time, wait time, walk time, drive access time, and fare cost;
3. Determine the travel generalized cost of transit modes in the scenario with ferry service, including in-vehicle time, wait time, walk time, drive access time, and fare cost;
4. Calculate the utility (generalized cost) of the transit mode in the existing scenario;
5. Calculate the utility (generalized cost) of the transit mode in the scenario with ferry;
6. Using that elasticity estimated previously, calculate the increment of the transit share in the build scenario versus the no-build scenario (existing conditions); any increment of additional transit trips will be ferry trips, as the assumption is that the other transit modes will remain the same.

SW Waterfront DC to Poplar Point

Figure 4 SW Waterfront DC to Poplar Point Primary Market



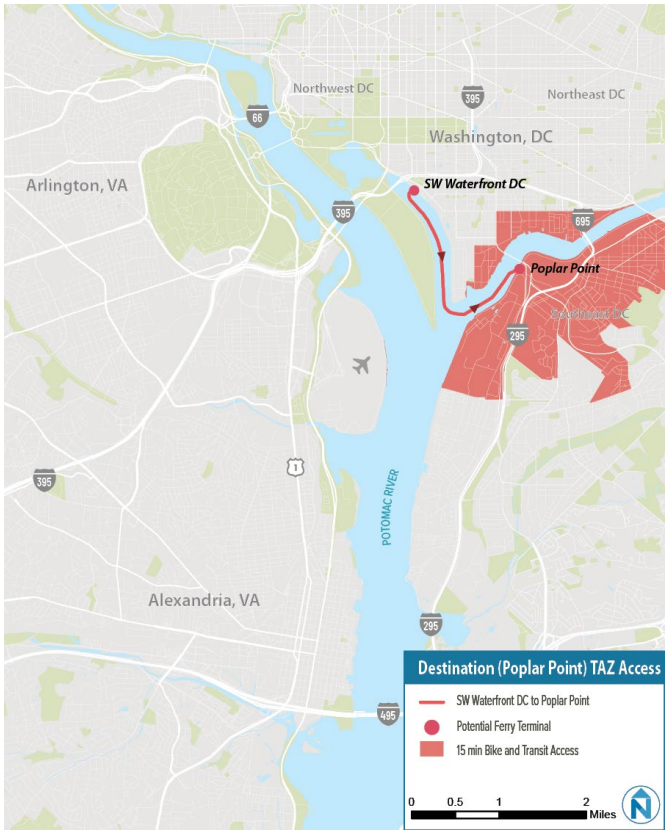
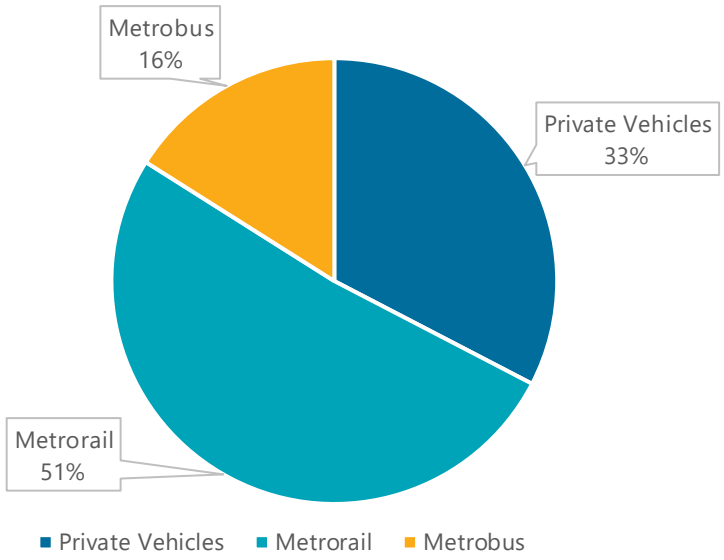


Figure 4 illustrates the 15 minutes bike and transit access for both the terminals. There are around 575 Home-based Work trips from the primary market to the ferry catchment area. It should be noted that the Department of Homeland Security Campus (DHS) is not included as it falls outside the primary market for Poplar Point. This will be addressed in future studies by including the DHS campus and the assumed costs of a shuttle service between the terminal and DHS, this action could substantially increase the market size for this route.

Figure 5 Mode Share for AM HBW Trips between SW Waterfront DC to Poplar Point



Source: MWCOG Travel Demand Model 2020

Figure 5 above shows the mode share for all trips between SW Waterfront DC to Poplar Point. With multiple transit options available, 67% of the trips are taken by transit. Out of these trips, 51% is on Metrorail while the others are on Metrobus. Trips taken on private vehicles constitute only 33% of total trips taken by commuters between the two terminal TAZs.

Figure 6 Projected Demand by Service for SW Waterfront DC - Poplar Point

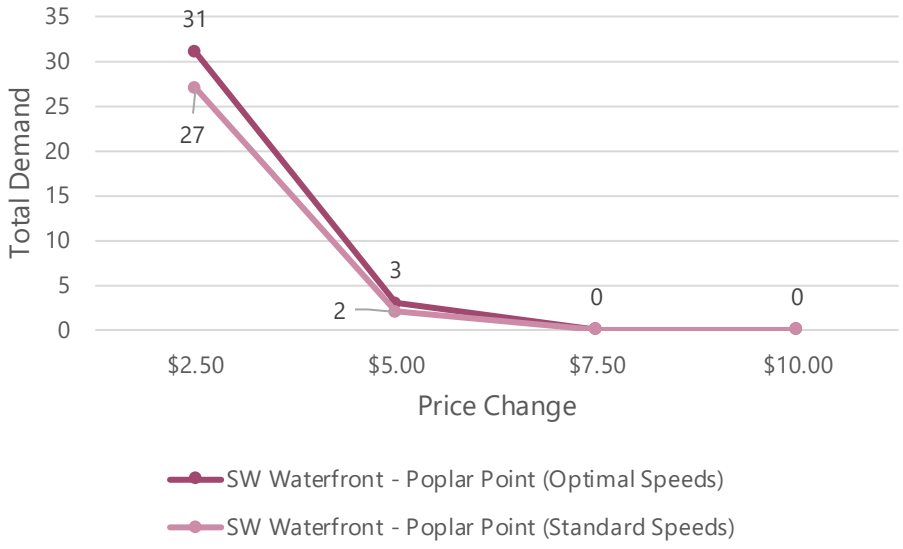


Figure 6 shows the projected demand for this route for services operating at different speeds. Given the short distance on this route, fares on this route are low to be competitive with Metrorail and Metrobus. Accounting for the generalized costs of trips, a fast ferry (with optimal speeds), could capture 31 AM trips from the other with a fare of $2.50/trip, 3 trips with a fare of $5/trip. There is a minimal decrease in demand with longer ferry in-vehicle travel times with 27 trips with a fare of $2.50/trip. In both services, there is a sharp decrease in the number of trips with an increase in fare beyond $2.50/trip. There are virtually no trips for fares at $7.50/trip and $10.00/trip.

Poplar Point to SW Waterfront DC

Figure 7 Poplar Point to SW Waterfront DC Primary Market

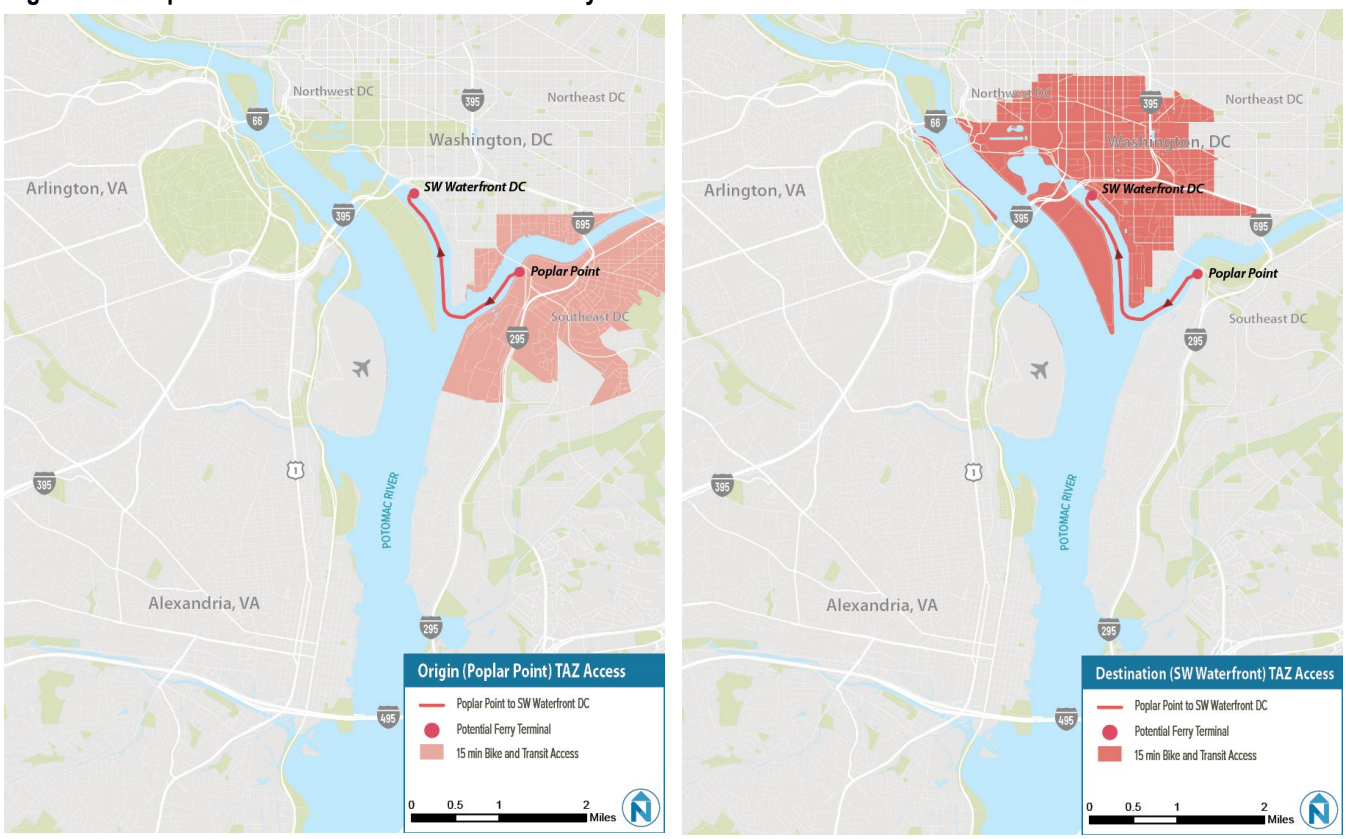
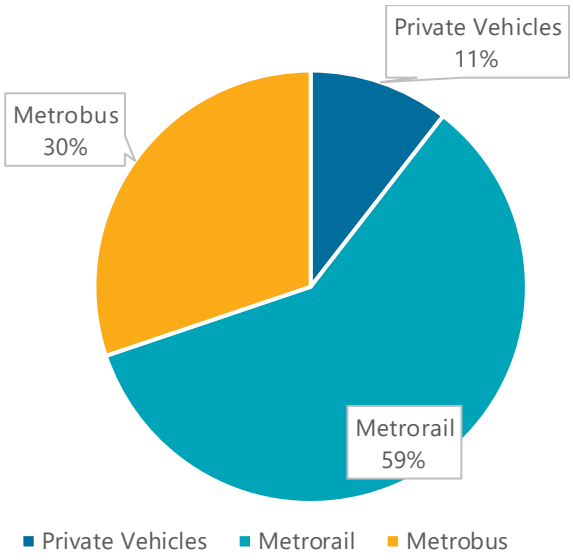


Figure 7 demonstrates the 15 minutes bike and transit access for both the terminals. There is no change in the TAZs that constitute the primary market in this route from the SW Waterfront DC – Poplar Point route. AM demand is much higher between Poplar Point to SW Waterfront DC with 3,915 Home-based Work trips from the primary market to the ferry catchment area. This can be attributed to the high concentration of jobs near SW Waterfront.

Figure 8 Mode Share for AM HBW Trips between SW Waterfront DC to Poplar Point



With a robust choice of public transit options, only 11% of commuters drive between Poplar Point and SW Waterfront DC. Metrorail is the most popular mode of commute (59%) followed by Metrobus (30%).

Figure 9 Projected Demand by Service for Poplar Point - SW Waterfront DC

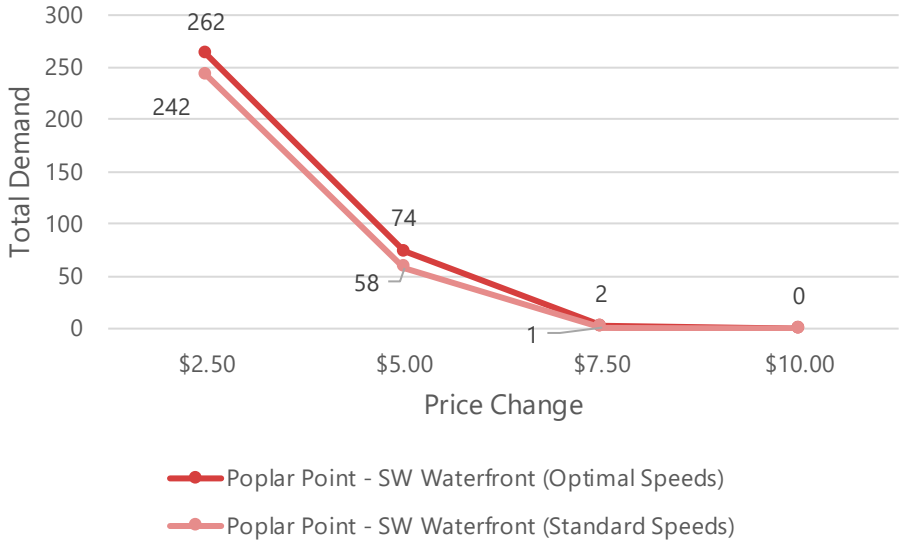
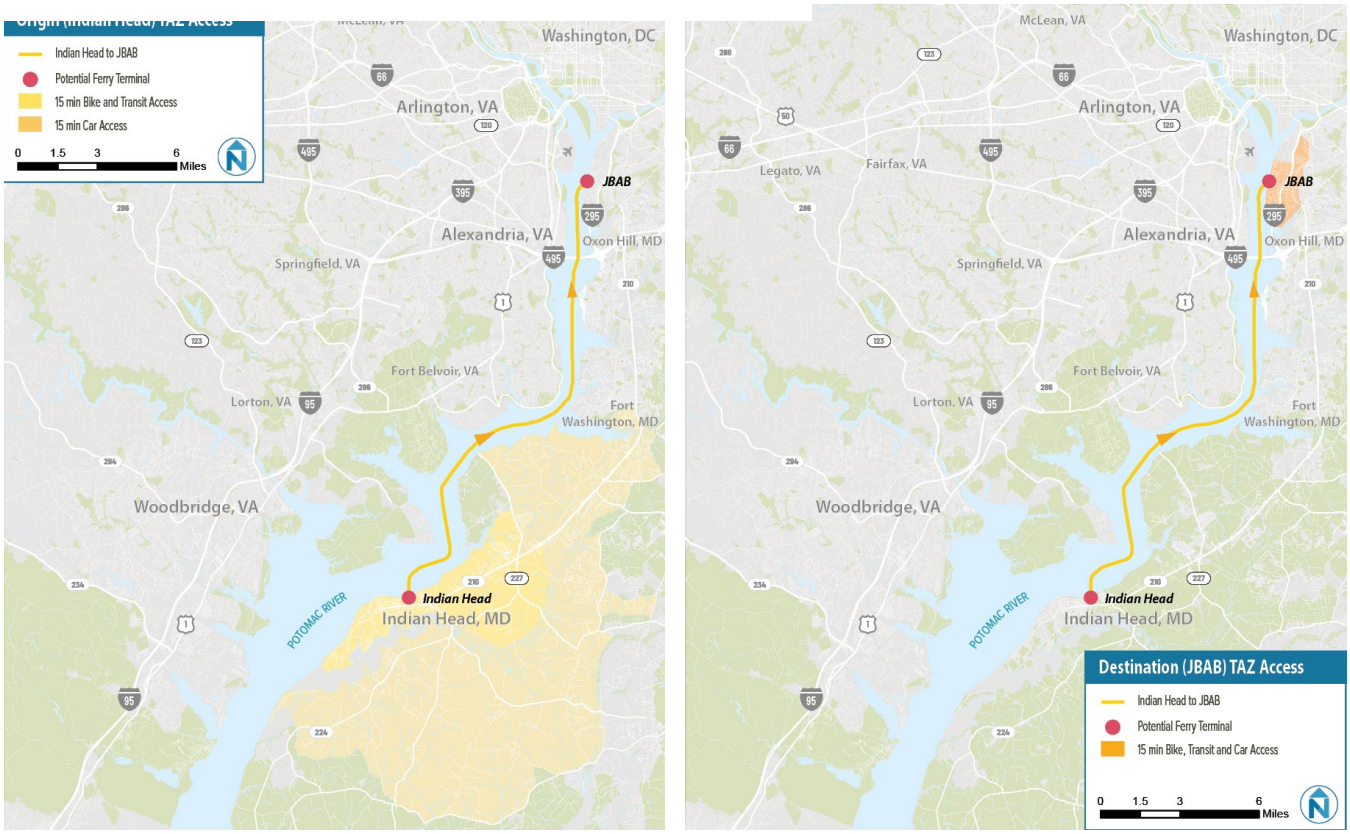


Figure 9 depicts the projected demand for this route. The projected demand is much higher for a fast ferry (with optimal speeds), which could capture 262 AM trips from other modes

with a fare of $2.50/trip and 74 trips with a fare of $5/trip. Like its counterpart, there is a sharp decrease in the number of trips with fare increase. The total demand is minimal for trips that cost $7.50 and $10. Thus, fares which cost more than $2.50 for both directions would not be competitive in attracting demand.

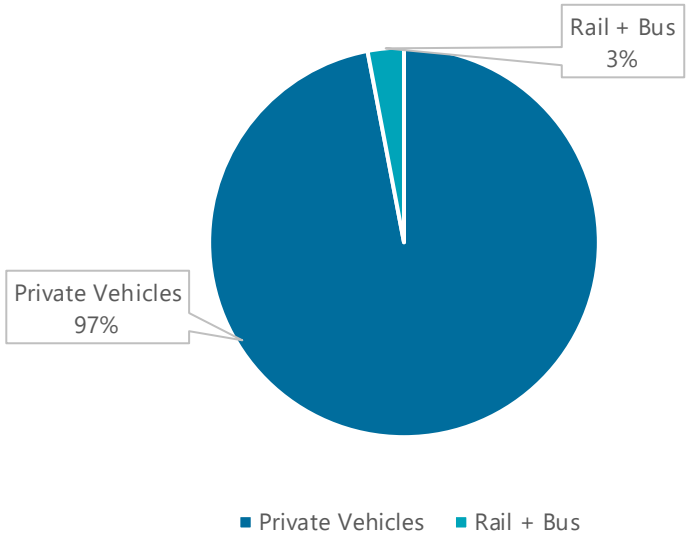
Indian Head to JBAB

Figure 10 Indian Head to JBAB Primary Market



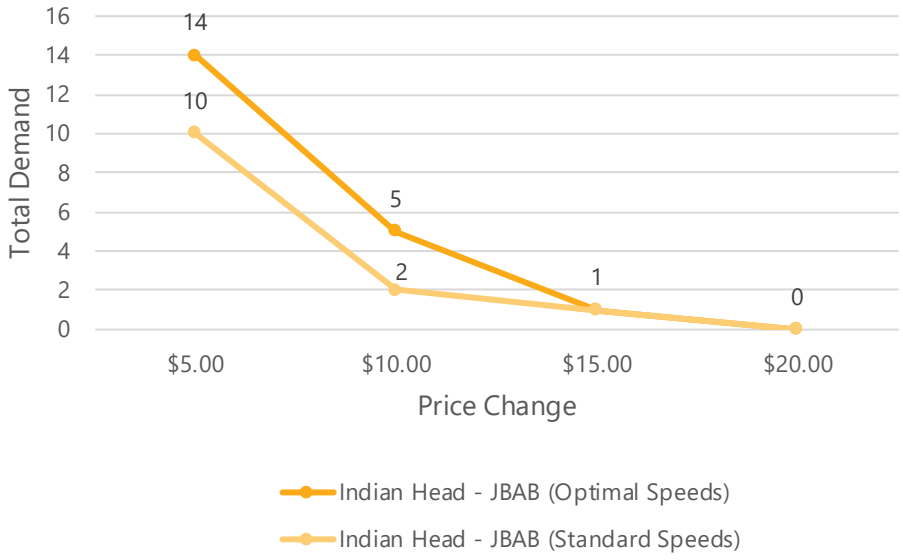
The primary markets for Indian Head and JBAB are shown in Figure 10. There are a total of 288 Home-based Work trips from the primary market in Indian Head to the ferry catchment area in JBAB. Nearly 14,000 employees serving approximately 50 different Federal agencies currently work at JBAB. The primary market for JBAB also includes the DHS campus which currently has about 14,000 employees. Of note, it is unclear how many employees are currently and, in the future, working fully remotely and what the influence of that will be on commute demand to this worksite long term.

Figure 11 Mode Share for AM HBW Trips between Indian Head to JBAB



With extremely limited public transit connections, 97% of commuters (see Figure 11) drive alone from Indian Head to JBAB. Despite the length of car commutes, less than 3% of current trips from the primary market to the JBAB catchment area are made via transit modes. Travel options described in the section regarding JBAB also apply to DHS.

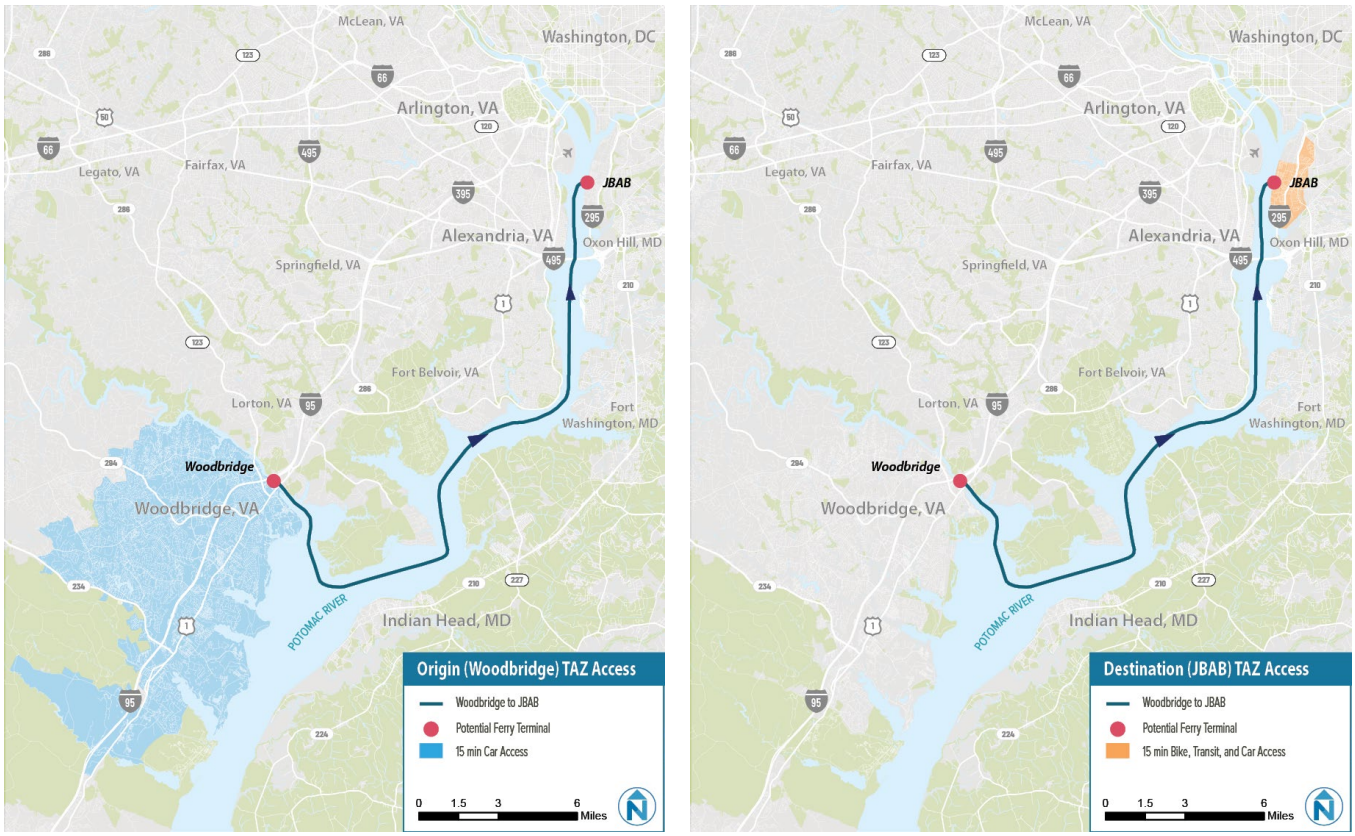
Figure 12 Projected Demand by Service for Indian Head - JBAB



A ferry service with optimal speeds between Indian head to JBAB would benefit 14 AM Home-based Work commute trips, from the primary market with a fare of $5/trip. If the ferry in-vehicle travel time were to increase with standard speeds, the number of commuters drops down slightly to the same fare. With an increase in fares to $10/trip and beyond, the demand drops significantly with virtually no commute trips expected with a fare of $20/trip for both services.

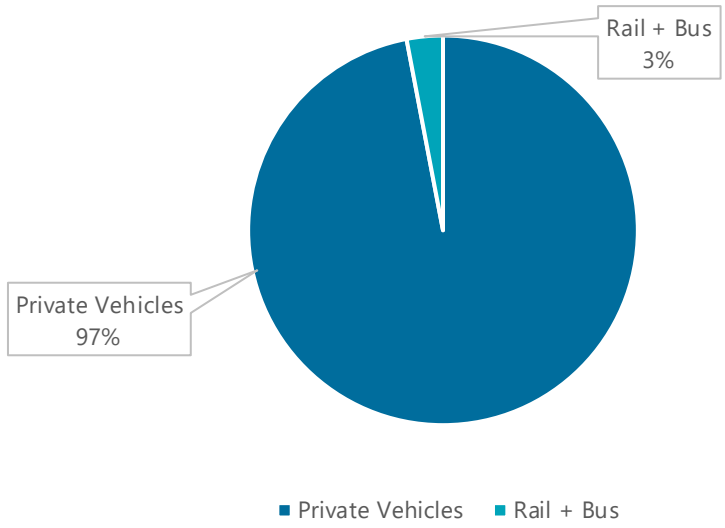
Woodbridge to JBAB

Figure 13 Indian Head to JBAB Primary Market



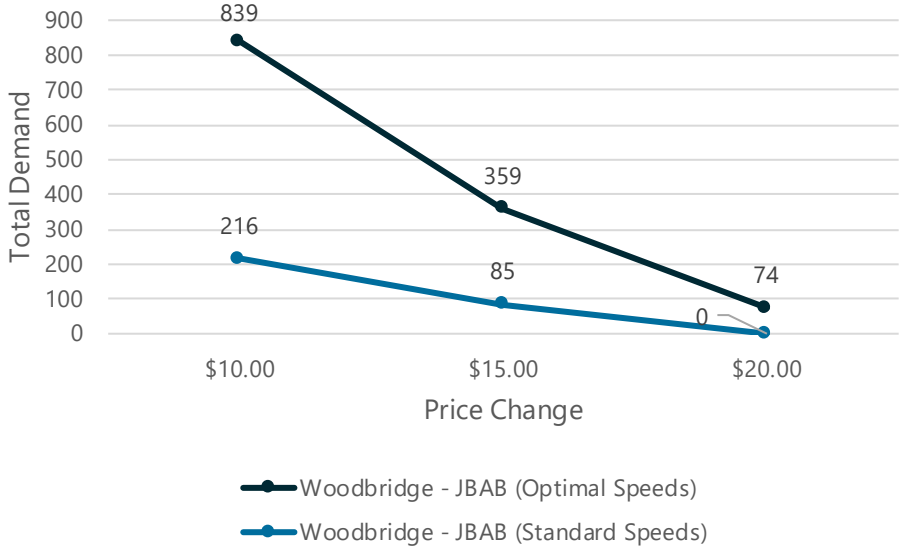
The primary market of Woodbridge consists of areas which are within a 15-minute car drive (seen in Figure 13). Around 2,677 Home-based Work trips occur during AM peak from the primary market to the ferry catchment in JBAB. Like the Indian Head – JBAB route, the catchment area for JBAB also includes the DHS campus.

Figure 14 Mode Share for AM HBW Trips between Woodbridge to JBAB



With JBAB home to over 8,000 parking spaces, around 97% of the commutes (Figure 14) use their cars to drive to JBAB. With limited transit options from Woodbridge, the share of trips taken on public transit is around 3%.

Figure 15 Projected Demand by Service for Indian Head - JBAB



When considering the generalized cost of the trip, it is estimated that ferries running at optimal speeds would capture over 840 AM Home-based Work trips with a fare of $10/trip. The trips are significantly lower when they operate in standard speeds with only 216 AM

Home-based Work at the same fare. The demand would reduce significantly if the fare were raised to $15 and above and/or the ferry in-vehicle travel time increases.

Total Estimated Ridership

Ridership Estimate Based on Improved Transit Options

Table 4 shows a subset of the potential ridership captured from current private vehicle and transit trips based on the elasticity of private automobile mode share versus the difference of generalized cost between transit and driving alone. The results have been filtered for those origin-destination pairs whose generalized transit cost with ferry is lower than 1.25 the generalized cost of the private vehicle. The demand captured from transit has been estimated using the same elasticity.

Results prove to be sensitive to ferry in-vehicle travel time and fares ranging from $2.50 to $10 and $10 to $20 per trip, depending on the length of the trip. The estimated demand drops by half when ferry running times increase by 25%, and the demand reduces by 65% on average when the fare increases by 50%. Demand drops by 90% when fares double.

Many commuters in these markets have access to federal government commute subsidy programs that subsidize transit fares to a maximum of $280 per month. That subsidy is NOT included in this analysis except to the extent that a rider considering one transit mode versus another is considered to have access to the same subsidies. For example, if a rider on VRE sees a one-way fare of $8.22, their actual out of pocket cost may be considerably less if that person is eligible for the federal commute subsidy program. The same would be true of an individual choosing to ride a ferry trip. Thus, ferry service may be even more attractive to this group, which makes up a significant portion of the potential market demand along this corridor, than the evaluating model suggests.

Note that those who drive a single occupancy vehicle (SOV) to work frequently do not benefit from the commuting subsidy. This group represents a high percentage of commuters in the markets of interest.

Table 5 Total Estimated Demand by Route

Route	Fare each way ($)	Total Estimated Demand for Standard Service (28 Kn)			Total Estimated Demand or Optimal Service (38 Kn)			TOTAL Home-based Work Trips (MWCOG model)			Estimated Demand as Percent of Total Trips, Standard Service	Estimated Demand as Percent of Total Trips, Optimal Service
		Auto	Transit	Total	Auto	Transit	Total	Auto	Transit	Total		
SW Waterfront to Poplar Point	$ 2.50	14	13	**27**	16	15	**31**	188	387	575	5%	5%
	$ 5.00	1	1	**2**	2	2	**3**				0%	1%
	$ 7.50	0	0	**0**	0	0	**0**				0%	0%
	$ 10.00	0	0	**0**	0	0	**0**				0%	0%
Poplar Point to SW Waterfront	$ 2.50	105	137	**242**	112	150	**262**	411	3,504	3,915	6%	7%
	$ 5.00	27	31	**58**	34	39	**74**				1%	2%
	$ 7.50	0	0	**1**	1	1	**2**				0%	0%
	$ 10.00	0	0	**0**	0	0	**0**				0%	0%
Indian Head to JBAB	$ 5.00	6	3	**10**	10	4	**14**	280	8	288	3%	5%
	$ 10.00	2	1	**2**	3	2	**5**				1%	2%
	$ 15.00	0	0	**1**	1	0	**1**				0%	0%
	$ 20.00	0	0	**0**	0	0	**0**				0%	0%
Woodbridge to JBAB*	$ 10.00	39	177	**216**	593	246	**839**	3,387	392	3,779	6%	22%
	$ 15.00	0	85	**85**	204	155	**359**				2%	9%
	$ 20.00	0	0	**0**	4	70	**74**				0%	2%

Source: MWCOG 2019 for Poplar Point and Indian Head, MWCOG 2012 for Woodbridge

Note: Trips values are one way, origin to destination, all-day for Home-based work trips. Actual ferry ridership will be approximately twice this value assuming most riders will use the same pathway to and from work.

ROUTE OPERATIONS

Based upon the identified landing locations, a typical path for each route option was developed, and the distance traveled along that path was measured. To calculate route travel times, the route path was broken down into segments identifying where vessels would be maneuvering to and from docks, where they would be travelling at cruising speed, and where they would be travelling in slowdown zones. An overall route transit time was developed by calculating how long it would take the vessel to traverse each route segment at the designated speed. For more detail on route paths and transit times, please see Appendix B.

To better understand potential route operations, example schedules were developed for each route. These schedules included the identified transit time, along with time to unload and load passengers, known as dwell time, and scheduled time for vessel start-up, fueling, and shutdown. For more detail on scheduling assumptions, please see Appendix A. An example of the developed schedules please see Appendix C.

Multiple operational considerations were examined for each route during the scheduling process. These include:

Cruising Speed

Multiple cruising travel speeds were evaluated, ranging between 28 knots and 38 knots. Slower speeds increase travel time for the customers, but less fuel is expended. Conversely, faster speeds can reduce travel times and increase level of service but require more fuel. A preferred cruising speed was selected for each route based upon market factors and a desire to achieve competitive travel times in comparison to other modes.

Vessel Size

Three vessel sizes options were identified as viable for potential passenger-only ferry (POF) service in this area: a 99 passenger (pax), 150 pax, and 250 pax. Following the market analysis, a preferred vessel size was selected for each route based upon the level of potential ridership. All of the vessel options were assumed to aluminum-hulled, catamaran vessels. Ultimately, no 99 pax vessels were recommended, even for routes with lower ridership. The minimal operational costs differential, restricted resale market, and limited potential to accommodate ridership growth or surges override the benefit of a less expensive acquisition cost of the 99 pax vessel.

Figure 16 M/V Spirit of Kingston, a 150 pax catamaran operated by King County Water Taxi

Source: Sol Duc, 2013

Larger vessels are often more expensive to purchase and maintain, however, running fewer larger vessels may be more cost effective than running more smaller vessels.

Figure 17 M/V Enetai, a 250 pax catamaran used by Kitsap Fast Ferries

Source: Baird Maritime, 2021

Fleet Size

Schedule options for multiple fleet sizes (1, 2 and/or 3 vessels) were developed per route. At this stage, no fleet size was eliminated, and operating costs for all analyzed fleet sizes are included in this report.

There are multiple trade-offs associated with fleet sizing decisions, and each potential operator must evaluate the fleet size that would best meet their operational needs. Generally, more vessels in the fleet allows for a higher number of departures and provides more options to customers, often leading to higher ridership. However, a large fleet requires more maintenance and more crew, which leads to increased operating costs. Additionally, as vessels are expensive, a large fleet would represent a high upfront capital investment.

The following sections summarize the top three routes, their key operational considerations, and their capital and operating costs based upon various evaluated fleet sizes.

Poplar Point, DC to SE/SW Waterfront, DC

This route connects residents of Southeast DC and the northern JBAB market to the employment hub located in the DC city center. With a trip time of just over 15 minutes, this route can be time competitive and meet commuter needs at travel speeds of 28 knots. Though the primary travel direction is from Poplar Point, a market for commute travel from the DC side was also identified.

Poplar Point Terminal

Located just south of the Frederick Douglas Memorial Bridge, the Poplar Point landing is located in D.C. near Anacostia Park. The site would likely serve the northern JBAB market and would require an uplands terminal facility that may include parking. Re-development of the site is currently being explored by numerous stakeholders, and an environmental investigation focused on the site is currently ongoing.

The following improvements would be needed to support ferry service from this location:

- New operating float approx. 85’ by 20’ (including piles, pile hoops, cleats, ballasting, installation, fire system etc.)
- Upgraded fendering
- Gangway
- Electrical lighting
- Guardrail along the float perimeter
- A float fire system
- Signage/wayfinding

SW Waterfront Terminal

Two locations at the DC waterfront were analyzed as potential landing sites. The SW waterfront location was ultimately selected as it was more time competitive for potential riders. Other ferries currently operate from this location, requiring coordination with these operators.

The existing infrastructure means that a limited level of capital improvements would be needed to support ferry service. Needed improvements include:

- Gangway
- Electrical lighting
- Guardrail along the float perimeter
- Signage/wayfinding

These improvements assume that existing freeboard and fendering are compatible with new vessels.

Table 6 Service Options and Operating Costs Breakdown (Poplar Point to SW Waterfront DC)

Route	Operating Cost
Poplar Point, DC to SE/SW Waterfront, DC	-
1 vessel (30 minutes between sailings)	$5.0 M
2 vessels (15 minutes between sailings)	$8.3 M

Table 7 Capital Cost Breakdown (Poplar Point to Waterfront)

Expense Type	Cost
Terminals	$6.5M - $10.5M
Fleet	$8.25M - $16.5M
Dredging	<$1M
Total	**$14.75M - $28.0M**

Indian Head, MD to JBAB, DC

Connecting Indian Head (Charles County) residents to the JBAB employment hub in under an hour, this route can meet commuter needs. However, the Indian Head landing site will require extensive capital investment for parking and other uplands infrastructure.

Projected demand for this route is currently low, due to most of the residential development, and consequently most of the potential commuter base, being concentrated in more inland locations. Additional waterfront development in Charles County could increase potential commuter demand.

Indian Head Terminal

A location between Potomac Heights and Indian Head was identified as a potential ferry landing location. Though accessible via Stoney Point Place, there is no parking and limited uplands infrastructure available at this location.

- The following improvements would be needed to support ferry service from this location:
- Replacement of existing pier
- New operating float approx. 85' by 20' (including piles, pile hoops, cleats, ballasting, installation, fire system etc.)
- New parking facility
- Upgraded fendering
- Gangway
- Electrical lighting
- Guardrail along the float perimeter
- Signage/wayfinding

Shallow water depths pose a challenge for the Indian Head site, necessitating additional capital costs. Two potential design options were evaluated to address these water depth challenges. The first included significant dredging while the second minimized dredging and assumed a longer pier and gangway structure.

JBAB Terminal

The Capital Cove Marina at Joint Base Anacostia–Bolling was identified as a viable ferry landing site. Due to space constraints, landing at this location will be bow-loading only, and it is recommended that passengers wait on shore rather than on the landing float.

The following improvements would be needed to support ferry service from this location:

- New wing-walls/dolphins to support bow-loading
- Upgraded fendering
- Gangway
- Electrical lighting
- Guardrail along the float perimeter

- A float fire system
- Signage/wayfinding

Table 8 Service Options and Operating Costs Breakdown (Indian Head to JBAB)

Route	Operating Cost
Charles County, MD to JBAB, DC	-
1 vessel (1 hour, 20 min between sailings)	$7.6 M
2 vessels (40 minutes between sailings)	$14.6 M
3 vessels (30 minutes between sailings)	$21.7 M

Potential terminal locations in Charles County would require significant in-water and uplands investment to provide service and to facilitate parking at/connection to the terminal.

Table 9 Capital Cost Breakdown (Charles County to JBAB)

Expense Type	Cost Option 1 (Additional Dredging)	Cost Option 2 (Longer Pier)
Terminals	$12.1M to $17.1M	$15.2M to $20.2M
Fleet	$8.25M to $24.75M	$8.25M to $24.75M
Dredging	~$6M	~$2.2M
Total	**$26.35M - $47.85M**	**$25.65M - $47.15M**

Woodbridge, VA to JBAB, DC

Connecting Woodbridge residents to the JBAB employment center, this route requires travel speeds of up to 38 knots, resulting in high fuel usage. Both terminals will require new or upgraded facilities for safe operations. An additional stop north of JBAB at the DC Waterfront would require an additional 20 minutes of transit time. This added stop is likely only feasible under a three-vessel operating scenario, may lead to decreased ridership resulting from less frequency of service, and would likely require a speed waiver to feasibly serve the route.

Woodbridge Terminal

Located about 20 miles south of Washington, DC, Woodbridge, VA located within Prince William County (population 482,204). The Occoquan Harbour Marina is sited between two highway bridges that span the river: I-95 and Route 1. This marina was identified as the optimal location for a ferry service in the Woodbridge region. Though close to a navigational channel, the landing is not within a half-mile walk of public transit, although a large and under-utilized park and ride is within a three-quarter mile walk, however, it is not presently connected with a pathway directly to the terminal site.

The following improvements would be needed to support ferry service from this location:

- New operating float approx. 85' by 20' (including piles, pile hoops, cleats, ballasting, installation, fire system etc.)
- Fendering
- Gangway
- Electrical lighting
- Guardrail along the float perimeter
- Signage/wayfinding

JBAB Terminal

The Capital Cove Marina at JBAB was identified as a viable ferry landing site. Due to space constraints, landing at this location will be bow-loading only, and it is recommended that passengers wait on shore rather than on the landing float. The following improvements would be needed to support ferry service from this location:

- New wing-walls/dolphins to support bow-loading
- Upgraded fendering
- Gangway
- Electrical lighting
- Guardrail along the float perimeter
- A float fire system
- Signage/wayfinding

Service for this route could be provided with either one, two, or three vessels. Providing commuters with at least three departure time choices during each commute window is vital for a viable commute service.

Table 10 Service Options and Operating Costs Breakdown (Woodbridge to JBAB)

Route	Operating Cost
Woodbridge, VA to JBAB, DC	-
1 vessel (2 hours 10 mins between sailings)	$10.7 M
2 vessels (1 hour 5 mins between sailings)	$20.5 M
3 vessels (45 minutes between sailings)	$30.4 M

Upfront capital costs include improvements to both terminal sites, dredging around the terminal, and the purchase of vessel fleet. Capital costs are listed in Table 11. Due to the higher demand expected for this route, a larger vessel size (250 pax) was recommended to accommodate passengers and prevent potential overloaded sailings. Larger vessels are more expensive, contributing to the high capital costs of this route.

Table 11 Capital Cost Breakdown (Woodbridge to JBAB)

Expense Type	Cost
Terminals	$10M - $15M
Fleet	$12.5M - $37.5M
Dredging	~$1M
Total	**$23.5M - $53.5M**

Summary of Routes' Operational Implications

All routes that were studied serve varying commuter bases and needs. Market demand, travel distances, assumed speeds, and existing terminal site conditions all vary and produce three distinct potential operating models and financial implications. Operating costs for Woodbridge to JBAB and Charles County to JBAB routes are much more expensive than the Poplar Point to DC Waterfront costs, mostly due to the travel distance, vessel speed, and fuel usage to deliver passengers to their destinations in a time competitive with other travel modes.

Table 12 Summary of Routes' Operational Implications

Route	Distance (miles)	Top Speed (knots)	Transit Time (mins)	Capital Cost	Operating Cost
Poplar Point, DC to SE/SW Waterfront, DC	**3**	**28**	**8**	**$14.75M -$28M**	
Terminal Infrastructure and Dredging				*$7.5M - $11.5M*	
Fleet (Medium Catamaran)				*($7M - $9.5M per vessel)*	
1 vessel (30 minutes between sailings)	-	-	-	*$8.25M*	$5.0 M
2 vessels (15 minutes between sailings)	-	-	-	*$16.5M*	$8.3 M
Charles County, MD to JBAB, DC	**20**	**38**	**31**	**$25.65 M - $47.85M**	
Terminal Infrastructure and Dredging				*$17.4M - $23.1M*	
Fleet (Medium Catamaran)				*($7M - $9.5M per vessel)*	
1 vessel (1 hour, 20 minutes between sailings)	-	-	-	*$8.25M*	$7.6 M
2 vessels (40 minutes between sailings)	-	-	-	*$16.5M*	$14.6 M
3 vessels (30 minutes between sailings)	-	-	-	*$24.75M*	$21.7 M
Woodbridge, VA to JBAB, DC	**27**	**38**	**57**	**$23.5M - $53.5M**	**-**
Terminal Infrastructure and Dredging				*$12M - $17M*	
Fleet (Large Catamaran)				*($11M - $14M per vessel)*	
1 vessel (2 hours 10 minutes between sailings)	-	-	-	*$12.5M*	$10.7 M
2 vessels (1 hour 5 minutes between sailings)	-	-	-	*$25M*	$20.5 M
3 vessels (40 minutes between sailings)	-	-	-	*$37.5M*	$30.4 M

5 FINANCIAL MODEL

To evaluate potential routes and plan for the ongoing costs, it is essential to understand the total cost of ferry service. The financial model is designed to allow its users to estimate these types of costs, effectively serving as a planning tool. The model estimates total costs for three pre-selected vessels prototype vessels that could be used to provide ferry service on a particular route given known service parameters.

Additionally, the model helps the user:

- Estimate the approximate cost of operating a ferry service.
- Determine the most cost-efficient vessel type.
- Understand the effect of route time and other factors on cost.

The cost of providing ferry service can be subdivided into capital, operating, and maintenance costs and calculated automatedly based on the selected inputs.

The inputs of the model include vessels costs, vessels useful life, crew wages, fuel costs, as well as revenue assumptions *(*see Table 1 in Appendix E*)*. Passenger service crew costs and passenger facility charges are additional indirect operating costs that could be added during further analysis.

Additionally, it is important to note that the blue font cells could be manually edited whereas the black font cells contain formula functions and therefore, they are automatically calculated.

For each of the previously mentioned three routes, the route worksheet automatically estimates operating, maintenance, and capital costs based on the vessel type, speed, type of service, and other parameters selected in the dropdown menu (see Tables 2-4 in Appendix E*)*. The costs are then amortized over a 25 year period for capital costs and annual operating costs are accumulated over the same period to arrive at total 25 year costs. These worksheets allow us to evaluate how much it would cost to service a particular route.

To use the model, complete all fields on 'Assumptions' tab in order to run the automatic portion of the model. For each of the three routes options, the route worksheet contains

weekly hours given the number of vessels required and service type. Fuel and terminal worksheets contain fuel consumption data based on the vessels and route selections.

Operating hours worksheet summarizes the number of daily/annual hours and number of trips based on the selections made in the dropdown menu.

For each of the selected three vessels, each worksheet estimates operating costs including labor, fuel, lubricant, insurance overhead costs, etc. and capital costs required to operate each fleet. The net present value of the total costs is calculated thereafter. The Debt and Equity worksheet calculates debt repayment schedule while the Depreciation and Amortization worksheet estimates the depreciation schedule based on the inputs entered on the 'Assumptions' tab.

Summary

Table 13 Annual Ridership Required at % Recovery of Operating Expenses

Annual Ridership Required at Recovery of OPEX	Poplar Point to SW Waterfront (Fare Price: $2.50)	Charles County to JBAB (Fare Price: $5.00)	Woodbridge to JBAB (Fare Price: $10.00)
50%	963,852	606,575	1,520,120
75%	1,445,778	909,863	2,280,180
100%	1,927,704	1,213,151	3,040,241
Annual Operating Subsidy Required	$4,306,435.77	$5,978,154.65	$22,700,906.31
Farebox Recovery Based on Estimated Ridership	10.6%	1.4%	25%

The initial results reveal that there is substantial potential for ferry operations in Woodbridge - JBAB and Poplar Point - SW Waterfront, given the higher demand. However, higher passenger fares have the characteristic of depressing demand and therefore, come at a cost of either the market demand or the overall financial feasibility of the service. This indicates a need to secure adequate funding to sustain the service, whether in start-up, or even longer term. Local funding in the form of tax levies in the range of $20-23 million for Woodbridge to JBAB route, $5-6 million for Charles Country to JBAB route, and $4-5 million for Poplar Point to SW Waterfront route will be necessary to support ferry operations until demand and the market develops. It is possible that further market evaluation and pilot testing could change this picture, even change it radically. But for start-up some level of funding will need to be secured to sustain operations under almost any operating model or business plan.

While operating costs or a portion of them could be covered by farebox revenue and subsidies, a significant portion of capital outlays need to be funded through other funding sources, e.g., state and federal grant programs. These state and federal grant programs are viable funding sources and might provide the majority of the required initial capital funding. To meet cash flows needs, a relatively small bond issuance might be required until local grant funds become available.

In addition to applicable federal and state grant programs, a fare collection strategy needs to be developed to address the fare collection method, fare levels, additional products for frequent riders, integration with local transit fare collection, such as the region's SmarTrip system, etc. A properly priced service will enable to achieve ridership targets and support the sustainability of the service.

6 GOVERNMENT MODELS ANALYZED

SELECTION FOR CASE STUDIES

The study identified fifteen governance bodies that were compared/contrasted across different factors/criteria/characteristics. The evaluation process began with the following potential case study governance models listed below. The end goal was to identify three governing models for more extensive, detailed analysis (case study review).

- Potomac and Rappahannock Transportation Commission (PRTC)
- Northern Virginia Transportation Commission (NVTC)
- Virginia Railway Express (VRE)
- Washington Metropolitan Area Transit Authority (WMATA)
- Metropolitan Washington Airports Authority (MWAA)
- Port Authority of New York and New Jersey (Port Authority)
- New York City Economic Development Corporation (NYC EDC)
- Massachusetts Bay Transportation Authority (MBTA)
- Kansas City Area Transportation Authority (KCATA)
- Alaska Marine Highway System (Alaska Marine HS)
- King County Metro Marine Division (King County Metro)
- Water Emergency Transportation Authority (WETA)
- Golden Gate Bridge, Highway and Transportation District (Golden Gate Bridge HTD)
- Regional Transit District Denver (RTD)
- Bi-State Development
- Maryland Stadium Authority (Maryland Stadium)
- DC Water

The team evaluated each governance model based upon the prioritized characteristics found within each agency's governance structure, jurisdictional reach, board of directors' configuration, and financial/funding structure. For governance structure, the focus was on understanding the collaborations between individual municipalities determining agency characteristics such as who can opt into public transit service but are not required to participate, complete separate special districts, or combinations of either. For jurisdictional reach, the study sought answers to questions like, "Does the agency govern and operate within the same county and/or city? Does it operate outside a distinct government

boundary?" Under board of directors, the team examined the makeup of plural-headed public bodies, the rules that govern board activities, and board composition and capacity. For financial/funding structure, the team sought information about the agency's funding identifying any dedicated local funding, federal funding, or local taxing authority.

The governance structures were evaluated, and a summary of key findings are shown in Table 14.

Table 14 Initial Evaluation of Governance Models

Governance Model	Governance Structure			Jurisdictional Reach	Board of Directors	Independent taxing authority
	Special Purpose	*General Purpose*	*Multi-state*			
PRTC	✓			✓	✓	✓
NVTC	✓				✓	
VRE	✓			✓	✓	✓
WMATA	✓		✓		✓	✓
MWAA	✓		✓		✓	
Port Authority	✓		✓		✓	
NYC EDC	✓				✓	
NFTA	✓				✓	
MBTA	✓				✓	✓
KCATA	✓		✓		✓	✓
Alaska Marine HS	✓			✓	✓	
King County Metro		✓			✓	
WETA	✓				✓	✓
Golden Gate Bridge HTD	✓			✓	✓	
RTD Denver	✓				✓	✓
Bi-State Development	✓		✓		✓	
Maryland Stadium	✓				✓	
DC Water		✓	✓	✓	✓	

Key findings were as follows:

- Agencies range from Inter-state agencies to independent agencies
- Most agencies serve areas lying within their jurisdictional boundaries
- Board of directors are usually composed of a mix of elected officials and people living within the agency's jurisdictions
- Most agencies receive a mix of local, state, and federal funding
- Majority of funding is derived from local taxes which account for nearly 40% of revenue across most agencies

Based these findings, the pool of possible models was narrowed to select a case study group of three governance models to review in further depth. DC Water, the Port Authority of New York and New Jersey (Port Authority), and the Washington Metropolitan Area Transit Authority (WMATA) were chosen due to their unique board makeup, jurisdictional reach, governing process, and funding structures. Although no governance agency was considered a candidate likely to take on the actual governing functions of a passenger ferry on the Potomac River, these three agencies represented models of governance that may be best suited to managing funding and operations of a ferry service, should a new agency be created.

GOVERNMENT MODEL CASE STUDIES

This section documents the research on the three governance bodies selected for case study and compares/contrasts across different factors/criteria/characteristics. Based on findings, recommendations are provided on a governance structure that would be most useful for regional ferry operations

General Powers and Essential Functions

DC Water

The District of Columbia Water and Sewer Authority (DC Water) provides retail drinking water and wastewater services to the District of Columbia (District) and wholesale wastewater treatment services to several adjoining municipalities in Maryland and Virginia. DC Water was created in 1996 under District law, with the approval of the United States Congress, as an independent authority of the District government with legal, financial and operational autonomy. DC Water is governed by an 11-member Board of Directors, with representatives from the District, Montgomery and Prince George's counties in Maryland, and Fairfax County in Virginia. The Board is responsible for adopting DC Water's policies and procedures, and its District representatives are vested with the sole authority to set DC Water's rates, fees, and

charges.[6] DC Water has 33 different powers of authority including, but not limited to the power:

- To sue and be sued
- To make, adopt, and alter by-laws, rules, and regulations for the administration and regulation of its business and affairs
- To elect, appoint, or hire offices, employees, or other staff (not including board members) of DC Water, outline their roles and regulate their compensation

Port Authority of New York and New Jersey (Port Authority)

In 1921, Congress gave its consent to the states of New York and New Jersey to form an interstate agency to develop and modernize the entire port district with the goal of improving commerce and trade. In the case of a state wishing to dissolve the agreement, either state may withdraw from this agreement if a plan for the comprehensive development of the port does not align with the original, agreed upon document. When a state withdraws it must communicate its intentions to the governor of the other state.[7] The port district centers around New York Harbor and includes 1,500 square miles of both states. The Port Authority and its subsidiaries are governed by By-Laws adopted by the Board for each entity.

The Washington Metropolitan Area Transit Authority (WMATA)

The Washington Metropolitan Area Transit Authority was created by an interstate compact in 1967 to accomplish the following:

- to plan, develop, finance improved transit facilities, in coordination with transportation and general development planning, utilizing various modes of transportation,
- to coordinate the operation of the public and privately owned or controlled transit facilities, and
- serve other regional purposes and to perform other regional functions as the signatories may authorize by appropriate legislation.

The WMATA Compact governs the terms of the agreement. Specifically, the Compact requires that WMATA develop and adopt a mass transit plan, which should "include one or more plans designating:

- The transit facilities to be provided by the Authority, including the locations of terminals, stations, platforms, parking facilities and the character and nature thereof;

[6] Green Bond Framework

[7] The New York State Senate

- The design and location of such facilities;
- Whether such facilities are to be constructed or acquired by lease, purchase, or condemnation;
- A timetable for the provision of such facilities;
- The anticipated capital costs;
- Estimated operating expenses and revenues relating thereto; and
- The various other factors and considerations, which justify and require the projects therein proposed."[8]

Metro began building its rail system in 1969, acquired four regional bus systems in 1973, and began operating the first phase of Metrorail in 1976. Today, Metrorail serves 91 stations and has 117 miles of track. Metrobus serves the nation's capital 24 hours a day, seven days a week with 1,500 buses. Metrorail and Metrobus serve a population of approximately 4 million within a 1,500-square mile jurisdiction. Metro began its paratransit service, MetroAccess, in 1994; it provides about 2.3 million trips per year.

Board

DC Water

DC Water is governed by an 11-member Board of Directors, with 11 alternate members. The board is comprised of six District of Columbia representatives, two Montgomery and Prince George's county representatives, respectively, and one Fairfax County representative.

All six District Board members and alternates, including the Chairman, are appointed by the Mayor of the District of Columbia and confirmed by the DC Council. In addition, depending on executive submissions from those jurisdictions, the Mayor picks the five principle and alternate members who represent the neighboring jurisdictions.

On policy considerations, DC Water may act only after receiving a favorable vote from at least six members of the Board of Directors. All members of the Board are involved in decisions that influence the management of joint-use facilities. Members of the District of Columbia participate in concerns affecting District ratepayers and in the establishment of rates for various services.

[8] WMATA Compact of 1966

Port Authority

The governor of each state appoints six members of the agency's Board of Commissioners, subject to state senate approval. Commissioners serve as public officials without pay for overlapping six-year terms. The governors retain the right to veto the actions of the commissioners from his or her own state. Board meetings are public. An Executive Director, appointed by the Board of Commissioners, is responsible for managing the operation of the Port Authority in a manner consistent with the agency's policies, as established by the Board. Officers of the Port Authority hold office until the next annual meeting of the Port Authority, or until their successors are elected or appointed, whichever may be the later.[9]

WMATA

The Metro Board of Directors is responsible for setting agency policy and overseeing the funding, operation, and growth of transit systems in the Transit Zone. Eight voting and eight alternate directors make up the Metro Board of Directors. Two voting and two alternate directors are appointed by Maryland, the District of Columbia, Virginia, and the federal government each.

The Northern Virginia Transportation Commission will appoint the Directors for Virginia; the Council of the District of Columbia will appoint the Directors for the District of Columbia; the Washington Suburban Transit Commission will appoint the Directors for Maryland; and the Secretary of the United States Department of Transportation will appoint the Directors for the federal government.

Directors for Virginia and Maryland are appointed from among the members of the appointing body and shall serve a term that runs concurrently with their term on the appointing body. According to the law of the appointing body, a director can be removed or suspended from their post. Members of the board are not paid for their efforts.

The board self-governs and meets annually to elect a Chairman and Vice-Chairman from among the board's members. Frequency of meetings is determined by the board itself.

Staff

DC Water

There are several levels of authority within DC Water based upon the Inter-Municipal Agreement (IMA.) The following levels help govern the entity and have specific responsibilities for each committee. The following levels are:

[9] The New York State Senate

- Policy Level: The IMA Signatories
- Administrative Level: The IMA Leadership Committee
- Technical Level: The IMA Regional Committee

As the operator of Blue Plains and Other Associated Facilities, DC Water is responsible for keeping track of pending federal, state, and local legislation and regulations, as well as anticipating potential impacts on the Blue Plains National Pollution Discharge Elimination System (NPDES) permit or other permit requirements. Other concerns that could reasonably be expected to effect Blue Plains permit conditions, programs, and process requirements are also monitored and analyzed by DC Water. The assessment of these consequences by DC Water must include, but not be limited to:

- an assessment of the possible implications on Blue Plains and Other Associated Facilities,
- the requirements of the Pretreatment Program.[10]

Port Authority

The Port Authority employs approximately 2,500 staff members. Staff include the Port Authority's own police force, executive leadership, daily operational staff among other roles. Executive leadership includes roles such as the Executive Director, Board Secretary, Chief Financial Officer, General Counsel, Inspector General, Chief Communications Officer, Chief Development Officer, Chief Diversity, Equity, and Inclusion Officer, Chief Engineer, Chief Ethics and Compliance Officer, Chief of Human Capital, Chief of Intergovernmental Affairs, Chief of Major Capital Projects, Chief Operating Office, Chief Procurement and Contracting Officer, Chief Safety Management Officer, Chief Security Officer, Chief Technology Officer, and all of their supporting staff.[11]

WMATA

The WMATA Board has the ability to appoint officers. None of the officers are permitted to be chosen from the Board. The officers permitted to be appointed are a general manager, secretary, treasurer, comptroller, general counsel, and any other roles deemed necessary by the Board. The Board also has the power to remove these officers from their posts. Their role's duties are specified by the Board. Compensation is fixed by the Board to all officers

[10] DC Water Enabling Legislation

[11] The New York State Senate

except the general manager who will be mandated to be a full-time employee while the other officer roles may either be part-time or full-time.[12]

Business and Funding

DC Water

DC Water funds itself through its bonds program. The Authority sells bonds to finance the capital infrastructure projects it implements. Some of these bonds are sold to private entities as investors.

The Board maintains insurance sufficient to protect the Authority, the Board, its members, officers, and employees, its lessees or occupants, the District's government, and other participating jurisdictions against risks associated with the Authority's or the Board's exercise of any authority included in the enabling legislation. Furthermore, no Board member is personally liable for any act or omission of the Authority, except in the case of the Authority's lessees or occupants, the District's government, and other participating jurisdictions committing a criminal act that is prosecutable.[13]

Port Authority

The Port Authority is a self-sustaining organization. It receives no tax money from either the state or any local jurisdiction, and it has no capacity to tax or pledge the credit of either the state or any municipality. The Port Authority receives funding from:

- Tolls from its bridges and tunnels between New York and New Jersey,
- user fees from airports and bus terminals, fares on its rail transport system,
- rent from facilities,
- consumer services,
- and retail stores

Earnings that are not from tolls or fares account for approximately two-thirds of the Port Authority's revenue, and the organization relies on private sector investment in its infrastructure. The agency's debt products consistently obtain strong ratings.

Because of the Port Authority's creditworthiness, it can tap into financing markets to fund long-term capital investments in its infrastructure. As of December 31, 2021, the Port Authority is expected to have approximately $24.1 billion in Consolidated Bonds and Notes

[12] WMATA Compact of 1966

[13] DC Water Enabling Legislation

outstanding, as well as $27.0 billion in total Obligations (including both Consolidated Bonds and Special Obligations). The principal and interest payments for these Obligations, as well as the cost of issuing additional debt, are reflected in the Port Authority's Debt Service Budget. The 2022 Debt Service Budget comprises $1.6 billion in total debt service, up $22 million or 1% from the 2021 Debt Service Budget due to the borrowing schedule that helps support the Capital Plan.[14]

WMATA

WMATA has the capability to exercise eminent domain. When the District of Columbia government or the Washington Metropolitan Area Transit Authority acquires real property for a program or project that is not subject to sections 210 and 211 of the 1966 Compact and the acquisition displaces any person on or after January 2, 1971, the Mayor of the District of Columbia or the Washington Metropolitan Area Transit Authority will subsidize all relocation costs and provide all supplementary relocation assistance.[15]

Summary

The three agencies studied have similarities as well as key differences that make each one unique. Each governance structure differs based on the need of the jurisdiction(s) it is serving, how the governance body was formed, and the powers afforded to it.

GOVERNANCE RECOMMENDATIONS

At the current time, there is no existing governing body that has expressed an interest in or is currently situated to take on regional operations of a new commuter ferry service in the Washington, DC region. That said, there is the high potential that a new agency would need to be created to lead this project into implementation. This presents an opportunity to form a governing body and operating structure that could work best to achieve the goals of a regional passenger commuter fast ferry. The key needs of a new governing model would be to have an agile governing structure that would allow for future growth without unwieldy limitations such as Congressional approval or over-complex approval boards. This new governing model should also allow cooperation between public-private-military partnerships,

[14] Port Authority 2022 Budget

[15] WMATA Compact of 1966

as the realization of a new ferry system may likely require an influx of monies both from local or state governments and from private investors or developers.

Of the three governance structures studied, a new ferry service for the Washington, DC area should model its governance body's structure and operations after DC Water. Utilizing a similar structure would afford the entity autonomy to operate as it chooses without approval by governors of a state or congressional approval. This model is also flexible in supporting growth: it would allow for the addition and/or replacement of jurisdictions when necessary, so that the operating body could grow across the region incrementally; adding new service agreements would require approval by the governing body, but a governing body structure similar to DC Water would not be too limiting to stagnate or prevent growth.

To start a new governing structure, a governing agreement must be formed and approved by all jurisdictions involved in the venture of managing and operating the ferry service. The agreement will discuss the establishment and general purpose of the newly developed entity or authority. Since this agreement will be formed by jurisdictional leadership independent of federal approval requirements, it will assume its autonomy and evade the necessity to involve governing councils from each jurisdiction in its decision making. This agreement will include the identities of each involved jurisdiction and articulate their role and stature within the governing body. Legal, financial, operational, and administrative policy agreed upon by the jurisdictions will be listed and discussed in detail. Once the agreement is established it will not go in effect until the governing body's first meeting.

Despite these numerous opportunities for beneficial results, there is the potential for challenges that may come with modeling the new governing body after DC Water. In the case of funding, DC Water is barred from receiving undue financial assistance from the District and must utilize other resources instead.[16] If the fast ferry governing body were to model this, it could pose potential financial risks for the agency if it struggles to remain self-funded. Additionally, regarding its decision-making structure, although DC Water's structure allows autonomy from Congress and governing councils of multiple jurisdictions, many decisions rest on the agency's board of directors. Since the mayor of DC appoints all board members, even those representing other jurisdictions, this could be conceived of as a disadvantage to jurisdictions outside of DC. In the future, if a ferry operating agency were to be developed, they could consider appointing board of directors through each jurisdictions' executive leader, rather than just DC's leadership.

[16] DC Water Enabling Legislation

7 NEXT STEPS

The early part of the business plan limited the potential development of ferry markets to the three most promising/feasible for initial implementation based on available funding to complete the work. However, the earliest work accomplished by NVRC and subsequent passage of time has indicated there are potential community interests that could intervene in the process as well as other potentially feasible markets that need to be understood and potentially queued-up for possible implementation. A follow-on work order will allow the team to continue to advance progress on determining a passenger ferry route(s) that is operationally and financially feasible while identifying a potential governing body or ideal structure for managing a ferry operation.

It is also possible a jurisdiction(s) may choose to launch a parallel and collaborative effort to further explore ferry feasibility or that a jurisdiction(s) could start their own ferry service. Should that occur, it will be crucial for the entities to collaborate to the degree possible to leverage private sector interest, private finance, possible prototype development of a zero-emission vessel, regional resilience planning, and facility sharing, such as a centralized fueling and maintenance facility.

The continuing work for NVRC will include the analysis of an additional ferry route(s) and convening groups to continue growing interest and support in establishing a partnership to support future ferry operations.

The work is described in more detail below:

- **Study an additional ferry route in the region**: Working with NVRC and the advisory group, the team will identify an additional ferry route for market assessment and operational variables that most affect ridership (travel times, fares, terminal access, frequency of service, span of service, etc.). The team will also assess necessary terminal infrastructure and costs to allow the route to be established. Coupled with operating costs and infrastructure feasibility and cost, a full financial feasibility assessment will be provided for the route. In total, the team will have studied market, operational, and financial feasibility for up to six routes; the team will then provide a potential phasing order in which the new ferry routes (or markets) would be implemented.
- **Hold working sessions to present concept of a ferry system to various financial markets, operators, and jurisdictions.** Working with NVRC and the advisory group, the team will conduct a market sounding study and provide an opportunity for a structured dialogue between parties to determine whether a public-private partnership is an effective approach to sustain the preferred service model.

- **Create an interest in an on-going coalition or governing body for ferry development and operations support.** This task will continue efforts to identify and establish a new leading agency to carry forward the governance of ferry operations on the Potomac. If no organization is identified, this may also include a roadmap to creation of a completely new governance structure that could be implemented if enough local or regional interest can be generated to keep the effort moving forward. Either the roadmap or an organizational transition plan will be developed between NVRC and an antecessor authority.